1. Introduction: From Plato's Text to the Beginnings of Modern Science: Towards a New Understanding of the Disciplinary Inheritance of Plato's *Timaeus*

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Abstract

In the last two and half decades, Plato's *Timaeus* has reawakened the interest of scholars, resulting in extensive research into the influence of this work on a wide range of intellectual traditions and cultural production since antiquity. This introduction considers the unexplored reasons for this influence of the *Timaeus* in shaping and conditioning the multidisciplinary worlds of learning in ancient, medieval and Renaissance Europe. In a general assessment of the influence on Plato's successors of the text and its offshoots, we investigate why and how the mathematical principles of the Timaean creation myth came to function as a scientific language in multifarious scientific disciplines, how the dialogue was used to reconcile ancient Greek philosophy and science with Christian and Islamic beliefs, to what extent its view on the cosmos influenced various conceptions of human nature, and how far the text with its mathematical approaches which gave rise to the four mathematical sciences of the quadrivium - arithmetic, music, geometry, and astronomy - came to underpin emergent practices in natural philosophy, music, medicine, and architecture. We argue that the Timaeus' combination of a high degree of complexity, incompleteness, vagueness, and even obscurity did not discourage its ancient, medieval, and Renaissance readers, but, rather, was seen as a challenge to reveal its secrets and to formulate creative interpretations that professed to make sense of its contents.

1 The Harmonic Structure of the World Soul in Plato's *Timaeus* as "Key to the Universe"

Music and Architecture, however, make us think of something quite different from themselves; they are at the centre of this world, like monuments from another world; or like examples, scattered here and there, of a structure and duration that are not those of beings, but those of forms and laws. They seem to be dedicated to reminding us directly, one of the creation of the universe, the other of its order and stability.'¹

Plato's *Timaeus* is one of the most seminal works of ancient philosophy.² If its ostensible subject is the creation of the world, its reach goes far beyond these bounds. The ideas presented in this text, still the most comprehensive exploration of divine craftsmanship surviving from antiquity, have implications not only for cosmology and theology, but also for practical sciences and the creative arts. Above all, architecture and music are, as Paul Valéry so eloquently expresses in the epigraph to this chapter, closely related to, and conceptually

¹ Paul Valéry, *Eupalinos ou l'Architecte, précédé de l'âme et la danse*' (Paris: Gallimard, 1921); *Œuvres de Paul Valéry*, vol. 1, *L'Ame et la Danse Eupalinos ou l'Architecte Paradoxe sur l'Architecte* (Paris: Editions du Sagittaire, 1931), 115; Paul Valéry, *Eupalinos and L'Ame et la Danse*, ed. Vera J. Daniel (London: Oxford University Press, 1967). ("Mais la Musique et l'Architecture nous font penser à tout autre chose qu'ellesmêmes; elles sont au milieu de ce monde, comme les monuments d'un autre monde; ou bien comme les exemples, çà et là disséminés, d'une structure et d'une durée qui ne sont pas celles des êtres, mais celles des formes et des lois. Elles semblent vouées à nous rappeler directement, — l'une, la formation de l'univers, l'autre, son ordre et sa stabilité ...") Authors' translation.

² For an introduction to the *Timaeus*, see Donald Zeyl and Barbara Sattler, "Plato's *Timaeus*", in Edward N. Zalta (ed.), *The Stanford Encyclopedia of Philosophy*, online at

https://plato.stanford.edu/archives/sum2019/entries/plato-timaeus/ ad Frank Grabowski, Plato: The *Timaeus*, in *Internet Encyclopedia of Philosophy*, online at https://iep.utm.edu/timaeus/; and Peter Adamson, 'A Likely Story: Plato's *Timaeus*, in *History of Philosophy without any Gaps*, online at

https://www.historyofphilosophy.net/plato-timaeus. On the *Timaeus*, see the literature mentioned on these three websites. In addition, we would like to mention the work of Sarah Broadie, who took part in the conference that formed the basis for this book, but sadly died in 2021, before its publication: Sarah Broadie, *Nature and Divinity in Plato's Timaeus* (Cambridge: New York: Cambridge University Press, 2012). On the *Timaeus* and the reception of Plato in antiquity, see further: Chad Jorgenson, Filip Karfik, and Štěpán Špinka (eds.), *Plato's Timaeus. Proceedings of the Tenth Symposium Platonicum Pragense* (Leiden: Brill, 2020); Franco Ferrari & Federico M. Petrucci, *Platone. Timeo* (Milan: Mondadori, 2022); generally, Harold Tarrant, François Renaud, Dirk Baltzly, and Danielle A. Layne (eds.), *Brill's Companion to the Reception of Plato in Antiquity* (Boston: Brill, 2017).

dependent upon, respectively the imagined construction of the universe and its continued harmony. In addition, fields of intellectual creation as diffuse as geometry, astronomy, ethics, physiology, medicine, and politics can be conceptualised based on, or by analogy with, the organisation of the world and its components.

In short, the underlying structural congruence between all phenomena in the human and cosmic realms that is proposed within Plato's work has the potential to link such disparate fields as philosophy, theology, cosmology, natural philosophy, music, medicine, and architecture. Its systematic construction of ideas of cosmic order offers a natural starting point for thinking about the ways in which order in general has been envisaged in different domains across the humanities and sciences, and about how these domains have changed over time and manifest themselves differently in varying cultural contexts. Although assessments of its influence have changed over time, current scholarship is once again leaning towards the view that the *Timaeus* continued to be one of the most important Platonic dialogues in the emergence of many strands of ancient, medieval, and Renaissance learning.

Between antiquity and the seventeenth century, scholars from different disciplines believed that the *Timaeus* could be beneficial for answering questions about the workings of the universe and about happiness and the good life, which, in their view, were inter-related because the divinely created, harmonically ordered cosmos served as a guide for human existence. Not only was cosmology vital to make sense of medicine and ethics, but the experience of harmony in music and architecture itself facilitated the discovery of harmony within a person's soul. One such scholar was the legendary Count Aimery of Poitiers, described, in the version by Jean d'Arras (1393), as "a very worthy man, who loved all noble things and was also the most learned in astronomy of any man of his time, indeed since Aristotle".³ His prescience from watching the stars enabled him to foretell a noble's death without realising that this would be his own. In a fifteenth-century manuscript of the romance (cover image), we see him viewing the heavens with the aid of a diagram that resembles those used in the medieval tradition of commentaries on the *Timaeus*.⁴

The way in which Plato in his *Timaeus* turned harmonics into a tool for understanding the cosmic and human body and soul and the surrounding natural and cosmic environment was indeed already a subject of vehement debate in the earliest receptions of the dialogue in Plato's Academy.⁵ Even Xenocrates who resisted the notion of a created universe, still "declared the soul's essence to be number itself".⁶ As Aristotle recalled, the so- called Pythagoreans could assume "the elements of numbers to be the elements of everything, and the whole universe to be a proportion (*harmonia*) or number" because it seemed clear to them "that all other things have their whole nature modelled upon numbers, and that numbers are the ultimate things in the whole physical universe".⁷ Nonetheless, in his own work *On the Heavens*, he rejected this theory of the harmony of spheres, making it clear that he did not believe that the cosmos was a kind of celestial sounding monochord, and argued in favour of a silent cosmos with frictionless spheres.⁸

Three commentators on the *Timaeus* shaped and conditioned the ways in which its ideas about cosmology, music, medicine, and architecture were interpreted: Calcidius, Proclus, and Marsilio Ficino. In the late fifteenth century, Ficino formulated an innovative interpretation of the *Timaeus* built on the doctrine of the harmonic structure of the World

³ *Mélusine* 16, in Jean d'Arras, *Melusine; or, The Noble History of Lusignan*, trans. Donald Maddox and Sara Sturm-Maddox (University Park, PA: Pennsylvania State University Press, 2012), 27–28.

⁴ The miniature is taken from the Roman de Mélusine, Paris, BnF, MS Français 12575, fol.8.

⁵ John Dillon, "The Timaeus in the Old Academy", in Gretchen Reydams-Schils (ed.), *Plato's Timaeus as Cultural Icon* (Notre Dame: 2003), 80–94.

⁶ Plutarch, *De animae procreatione in Timaeo* 3, 1012d; trans. Harold Cherniss, in Plutarch, *Moralia, vol. 13 Part 1, Platonic Essays,* LCL 427 (Cambridge, MA: 1976), 163.

⁷ Aristotle, *Metaphysics* 1.5, 985b23–986a3. For the relation of Plato's account of the generation of the World Soul in the *Timaeus* to mathematical Pythagoreanism, see Philip Sidney Horky, *Plato and Pythagoreanism* (New York: Oxford University Press, 2013), 201–259, especially 255–256.

⁸ Aristotle, *De Caelo* 2.9, 290b12–291a25.

Soul, which shaped his views of cosmology and music as well as those of later generations.⁹ Although he presented himself as an ardent Platonist, his interest in the Timaeus was not that of a modern philologist, but from the perspective of an "ancient theologian". He saw himself as the final link in a long line of descent of interpreters chosen by God to reveal the mysteries of His creation. One of these interpreters was Macrobius, who in his Latin commentary on the Somnium Scipionis (Dream of Scipio) at the end of Cicero's Republic, sets out a vision of the cosmos derived from the *Timaeus*.¹⁰ What appealed most to Macrobius in the *Timaeus* was the harmony of the elements described at 31b, bound together by the Creator of the Universe with "an unbreakable chain". Following the numerical theories of the Pythagoreans, he interpreted the doctrine of the music of the spheres, that is, the way in which the planetary "spheres produce seven different tones" as evidence of the fact that the number seven, was "one might almost say, the key to the universe (*rerum omnium fere nodus*)."¹¹ Inspired by this view, the doctrine of cosmic harmony became a founding principle in Ficino's philosophy.¹² Yet, aware of discrepancies between Pythagorean ratios and musical sounds as well as planetary orbits, he never found that key but still continued to work for much of his career on a final, unfinished version of his commentary on the dialogue. Subsequent early modern approaches to the *Timaeus* were strongly influenced by Ficino's Latin translation and commentary, especially that of Johannes Kepler, who continued to search for a "key" to explain the harmonic structure of the cosmos, then understood as a heliocentric order.¹³

⁹ Marsilio Ficino. Commentaries on Plato, Timaeus, ed. and trans. Jacomien Prins, I Tatti Renaissance Library 98 (Cambridge, MA: Harvard University Press: forthcoming).

¹⁰ Ambrosii Theodosii Macrobii Commentarii in Somnium Scipionis, ed. James Willis, 2nd edn. (Stuttgart and Leipzig: Teubner, 1970); Macrobe. Commentaire au songe de Scipion, ed. Mireille Armisen-Marchetti, 2 vols. (Paris: Les Belles Lettres, 2001); Macrobius, Commentary on the Dream of Scipio, trans. with intro. and notes by William Harris Stahl (New York: Columbia University Press, 1952). See Douglas Kelly, *The Conspiracy of Allusion. Description, Rewriting, and Authorship from Macrobius to Medieval Romance* (Leiden: Brill, 1999), 13–35, "Macrobius in the High Middle Ages".

¹¹ Ambrosii Theodosii Macrobii Commentarii 1.6.34, ed. Willis, 24-25, tr. Stahl, 198–199.

¹² See, in more detail, Jacomien Prins, *Echoes of an Invisible World. Marsilio Ficino and Francesco Patrizi on Cosmic Order and Music Theory*, BSIH 234 (Leiden: 2015), 56–76.

¹³ On Ficino's influence on Kepler, see, for example, Rhonda Martens, 'A Commentary on Genesis, Plato's *Timaeus* and Kepler's Astronomy', in Reydams-Schils (ed.), *Plato's Timaeus as Cultural Icon*, 251–66.

Ficino had access to both Greek and Latin texts in the Neoplatonic tradition of writing after the *Timaeus*. The commentary by Porphyry (*c*. 234–305 C.E.), who followed the Platonism of his master Plotinus, helped to strengthen Ficino's belief in a music of the spheres after *Timaeus* 35b–36d.¹⁴ Just as many other scholars in the Latin West, he consulted Calcidius' Latin translation and accompanying commentary, composed around the year 321. Covering the first part of the dialogue up to 53c, it extended Cicero's earlier version that covered only *Timaeus* 27d to 47b and omitted the introductory conversation on the model of the universe, and so became one of the most important works in the reception history of the dialogue.¹⁵ For about eight centuries, it was the only extensively available text of Plato.¹⁶ From at least the ninth century, following the promotion of classical learning by the Carolingian educational reforms, it was well-known to scholars.¹⁷

Earlier medieval readers in the West supported their understanding of the dialogue's often obscure, elusive, or even sometimes incomprehensible content with Calcidius' translation and commentary and other Latin texts from late antiquity, including Cornelius Labeo, Marius Victorinus, and Saint Augustine of Hippo (d. 430). Calcidius' work differed from the Neoplatonism of Porphyry, his interpretations based not only on Middle Platonist

¹⁴ Porphyrii in Platonis Timaeum Commentariorum fragmenta, ed. A.R. Sodano (Naples:1964), with an additional testimony from Philoponus, *De aeternitate mundi* 172, 5–20 in *Porphyrii Philosophi Fragmenta*, ed. A. Smith (Stuttgart: 1993), 198, fr. 172F. Cf. Porphyry, *Life of Pythagoras* 30–1, ed. Des Places.

¹⁵ Calcidius, On Plato's Timaeus, ed. and trans. John Magee (Cambridge, MA: Harvard University Press, 2016), henceforth Magee; *M. Tulli Ciceronis scripta quae manserunt omnia, fasc. 46, De Divinatione De Fato / Timaeus*, eds. Otto Plasberg and Wilhelm Ax (Stuttgart: Teubner, 1938, reprinted 1965). For the early Latin reception of the *Timaeus*, see Christina Hoenig, *Plato's* Timaeus *and the Latin tradition* (Cambridge: Cambridge University Press, 2018); Gretchen Reydams-Schils, *Calcidius on Plato's* Timaeus: *Greek Philosophy, Latin Reception and Christian Contexts* (Cambridge: Cambridge University Press, 2020); Anna Somfai, "Calcidius' *Commentary* on Plato's *Timaeus* and its place in the commentary tradition: the concept of *analogia* in text and diagrams", in Peter Adamson, Han Baltussen and M. W. F. Stone (eds.), *Philosophy, Science and Exegesis in Greek, Arabic and Latin commentaries*, I, *BICS, Suppl. 83* (Oxford: Oxford University Press, 2004), 203–20.

¹⁶ Anna Somfai, 'The eleventh-century shift in the reception of Plato's *Timaeus* and Calcidius's *Commentary*', *Journal of the Warburg and Courtauld Institutes* 66 (2002), 1–21, at 1; Raymond Klibansky, *The Continuity of the Platonic Tradition during the Middle Ages*, revised edition (Munich: Kraus International, 1981), 22–29 (the next dialogues translated into Latin were the *Phaedo* and *Meno*, in the twelfth century).

¹⁷ For an early manuscript indicating knowledge of the dialogue, see Rosamond McKitterick, 'Knowledge of Plato's *Timaeus* in the Ninth Century: The Implications of Valenciennes, Bibliothèque Municipale MS 293', in Haijo Jan Westra (ed.), *From Athens to Chartres: Neoplatonism and Medieval Thought. Studies in Honour of Édouard Jeauneau* (Leiden: Brill, 1992), 85–95.

and Stoic views, but also on the second century Pythagorean Numenius and even Homeric poetry, with which he tried to explain and reconcile the cosmology of the *Timaeus*.¹⁸ Ficino also had access to the more extensive commentary of Proclus (411–485), which survives up to his fifth book as far as *Timaeus* 44d, and has an importance in the commentary tradition not only in its own right, but also because of the earlier, wide-ranging handbooks and debates on Plato's work that it incorporates.¹⁹

Besides Calcidius, Proclus, and Ficino, two other Latin authors influenced the way in which western readers drew implications from the harmonic structure of the World Soul in the *Timaeus*. First, the early fifth century, learned allegory by Martianus Capella, *De nuptiis Philologiae et Mercurii (On the Marriage of Philology and Mercury)*, tried to reconcile the cosmic order of the *Timaeus* with the mythography of the ancient Olympian gods, showing that myth was not only poetic fiction, but pointed to philosophical truth.²⁰ Above all, Martianus encouraged scholars from the Carolingian period to see number, on which the structure of the World Soul depended in the *Timaeus*, as "the unifying principle of the cosmos, the key to the universe and the means of probing its secrets".²¹ His text also drew out pedagogical lessons, providing a systematic explanation of the canon of the, crucially, seven Liberal Arts adopted in medieval schools, each of which served to understand the world better: Grammar; Dialectic; Rhetoric; Geometry; Arithmetic; Astronomy; and Harmony.

¹⁸ Robert Lamberton, *Homer the Theologian. Neoplatonist Allegorical Reading and the Growth of the Epic Tradition* (Berkeley: University of California Press, 1986), 250–256, explaining, e.g., the harmony of the spheres in *Timaeus* 36b–d through *Il.* 12.239.

¹⁹ Dirk Baltzly and Harold Tarrant, 'General introduction to the *Commentary*', in Tarrant (ed.), *Proclus*. *Commentary on Plato's Timaeus, Vol. 1: Book 1: Proclus on the Socratic State and Atlantis* (Cambridge: Cambridge University Press, 2010), 1–20. See also Vol. 2, eds. David T. Runia and Michael Share (2008); Vol. 3, ed. Baltzly (2007); especially Vol. 4, *Book 3, part II Proclus on the World Soul*, ed. Baltzly (2009); Vol. 5, ed. Baltzly (2013); Vol. 6, ed. Tarrant (2017). See also Marije Martijn, *Proclus on Nature. Philosophy of Nature and Its Methods in Proclus' Commentary on Plato's Timaeus*, Philosophia Antiqua 121 (Leiden: Brill, 2010). ²⁰ Winthrop Wetherbee, "Learned Mythography: Plato and Martianus Capella", in Ralph Hexter and David Townsend (eds.), *The Oxford Handbook of Medieval Latin Literature* (Oxford: Oxford University Press,) 335– 355.

²¹ Sinéad O'Sullivan, "Martianus Capella and the Carolingians: Some observations based on the glosses on books I–II from the oldest gloss tradition on 'De nuptiis'", in Elizabeth Mullins and Diarmuid Scully (eds.), *Listen, O Isles, unto Me. Studies in Medieval Word and Image in Honour of Jennifer O'Reilly* (Cork: Cork University Press, 2011), 28–38, at 36.

These arts found acceptance within visual iconography on the twelfth-century Royal Portal at Chartres.²² Separated, however, from these seven celestial arts were Architecture and Medicine, which represented more earthly spheres of human endeavour.

The second author was Anicius Manlius Severinus Boethius (*c*. 480–524), whose treatises on philosophy, theology, arithmetic, and especially music, developed out of the *Timaeus*, were even more important for mathematical understandings.²³ The centrepiece of Boethius' *De Consolatione Philosophiae* (*Consolation of Philosophy*), which invoked the Christian God, is a condensation of Plato's account of the creation of the universe, the motion of its elements, the division of the soul, and the creation of the "lesser souls" of humans.²⁴ Together, these later sources tried to understand the world through a *Timaeus* filtered through the reception of later Platonists, Aristotelian (Peripatetic), "Pythagorean", and especially Stoic thinkers.²⁵

Exponents of the disciplines of medicine and architecture also had access to technical texts that absorbed Timaean ideas about the harmonic structure of the human body and soul and their relations with the cosmic body and Soul. These ideas often reached readers of medical literature through the lens of Galen, who creatively appropriated key doctrines of the *Timaeus* to forge a closer link between philosophy and medicine. Galen's view of the harmonic relationships between the four elements – fire, air, earth, and water – and their different qualities – hot, cold, dry, and wet – and their correspondence with the four humours and their dispositions – sanguine, choleric, melancholic, and phlegmatic – and his understanding of the bodily locations of the different parts of the human soul ultimately

²² David Knipp, "Medieval Visual Images of Plato", in Stephen Gersh and Maarten J. F, M. Hoenen (eds.), *The Platonic Tradition in the Middle Ages: A Doxographic Approach* (Berlin: De Gruyter, 2002), 373–414, at 377–378.

 ²³ Boethius, Consolation of Philosophy, trans. Joel Relihan (Hackett: Indianapolis, 2001); Boethius, Fundamentals of Music, trans. C. M. Bower, ed. C. V. Palisca (New Haven: Yale University Press, 1989).
 ²⁴ Boethius, Consolation of Philosophy 3.9.

²⁵ See above all Gretchen Reydams-Schils, *Demiurge and Providence. Stoic and Platonist Readings of Plato's* Timaeus (Turnhout: Brepols, 1999).

derived from conceptions in the *Timaeus*.²⁶ In architecture, the harmonic structure of the World Soul could also be a guide for architectural design. From the Carolingian period, readers could draw on the varied ideas on cosmology, harmonics, and proportion transmitted in Vitruvius' treatise of the first century B.C.E., which encouraged them to make connections with ideas in Calcidius' *Timaeus*. In the multifaceted western tradition up to the sixteenth century and beyond, texts and buildings used these ideas to develop new approaches to the discipline and practice of architecture.²⁷ Before, however, discussing in more detail the role that the *Timaeus* played in the four disciplines of cosmology, music, medicine, and architecture, we must first provide an overview of the commentary tradition through which readers interpreted the *Timaeus*.

2 The Reception of the *Timaeus*: Tradition and Innovation

The complexity of Plato's dialogue was no obstacle to its influence on the formation of a wide range of scholarly disciplines from theology, philosophy, and cosmology to music, medicine, and architecture. On the contrary, it offered ancient, medieval, and Renaissance scholars considerable freedom to formulate ingenious interpretations and to develop their own scholarly ideas. In this historical web of creative interpretation, the *Timaeus* was used to anchor beliefs and practices and to give them meaning, even though it is not always easy to retrieve "the original Plato" or "the original *Timaeus*".

²⁶ For an introduction to Galen, see Peter N. Singer, "Galen", in Zalta (ed.), *Stanford Encyclopedia*, online at <u>https://plato.stanford.edu/archives/win2021/entries/galen/</u>.

²⁷ For an introduction to the role of philosophy in the tradition of architectural theory, see Saul Fisher, "Philosophy of Architecture", Zalta (ed.), *Stanford Encyclopedia*, online at https://plato.stanford.edu/archives/win2016/entries/architecture/.

As recent manuscript research has shown, the emerging interest in the *Timaeus* in western intellectual centres in the ninth century quickly preferred Calcidius' version to that of Cicero. Early manuscripts combined Calcidius' translation and commentary, bound together, and divided into two parts: 17a–39e, supported by diagrams embedded in the text and helping his readers to use the mathematical skills taught by the quadrivium to progress from empirical observation to complex philosophical understanding; and 39e–53c, on the structure of the created universe according to Timaeus.²⁸ Manuscripts started to become more abundant in the eleventh century, well before the so-called "twelfth-century Renaissance", with seventy-five surviving manuscripts of the translation and/or commentary, of which forty-seven originated in the twelfth century alone.²⁹ The organisation of these manuscripts seems to reflect a particular interest in the mathematical quadrivium and a mathematical approach to the *Timaeus*. The self-standing manuscripts of the translation alone were often bound with other works of the Latin Platonic tradition such as Boethius and Macrobius and annotated directly with marginal comments and diagrams, instead of adding glosses to the commentary as before (Fig. 1.1.).³⁰

[Insert Fig. 1.1 here]

Fig. 1.1. A copy of a diagram in Calcidius' *Commentary on Plato's Timaeus* on the left page combined with a Lambda Diagram representing the harmonic structure of the World Soul on the right page. From a copy of Macrobius' *Commentarii in Somnium Scipionis (Dream of Scipio)* (ca. 1175–1200) fols. 65v, and 66r in the collection of the Walters Art Museum (Creative Commons License).

²⁸ Somfai, 'Eleventh-century shift', 4–5.

²⁹ J. H. Waszink, *Timaeus a Calàdio translatus commentarioque instructus* (London/ Leiden, 1962), evii– exxviii. This does not include monastic libraries as at Durham where a copy of Calcidius' *Timaeus* is attested in this period but does not survive.

³⁰ For more details on this and discussion of the implications of the manuscript evidence and the glosses, see Somfai, 'Eleventh-century shift', esp. 8–20.

They were also now read alongside independent collections of comments, or "glosses", which reflected a growing wider fashion for separate commentaries on ancient texts. The most influential of these for the *Timaeus* belonged to the Chartres School, the *Glosae super Platonem (Glosses on Plato)*, written by Bernard of Chartres around 1100–1115 and the commentaries by William of Conches and Thierry of Chartres a little later in the century.³¹ Bernard's glosses encouraged interest in Boethius and the mathematical quadrivium, while Thierry's commentary extended the lessons of Platonic theory to Christian doctrine. Thierry also used the Timaean creation story to explicate the biblical cosmogony of *Genesis* and to bring it in line with the philosophy of nature and mathematical theory of his own time.³²

By this time the consequence of the growth in copies of Calcidius' translation of the dialogue was that it was no longer restricted to a few scholars in a few centres. Calcidius' translation, and frequently his commentary too, are attested in almost every important medieval library, so that it can be called virtually a *sine qua non* of medieval learning.³³ Others, like Durham Cathedral Priory, preserve manuscripts of Bernard's *Glosses*, bound with other *Platonic Notes* on the *Timaeus*, associated with the same school, which demonstrate the curiosity of members of the cathedral chapter to understand the ideas

³¹ Édouard Jeauneau, *Rethinking the School of Chartres*, trans. Claude Paul Desmarais (Toronto: University of Toronto Press, 2009), 72. See *The Glosae super Platonem of Bernard of Chartres*, ed. Paul E. Dutton (Toronto: Pontifical Institute of Mediaeval Studies, 1991), especially 49–50 for this way of presenting modern commentary on an ancient text, and also Lodi Nauta, 'The "glosa" as instrument for the development of natural philosophy. William of Conches' commentary on Boethius', in Maarten J. F. M. Hoenen and Lodi Nauta (eds.), *Boethius in the Middle Ages. Latin and vernacular traditions of the* Consolatio Philosophiae (Leiden: Brill, 1997), 3–39, esp. 10. For the availability of these commentaries, see Paul Dutton and James Hankins, 'An Early Manuscript of William of Conches' *Glosae super Platonem'*, *Mediaeval Studies* 47 (1985), 487-494.
 ³² On Plato's philosophy of nature and ideas about science, see Andrew Gregory, *Plato's Philosophy of Science* (London: Duckworth, 2000); Thomas K. Johansen, *Plato's Natural Philosophy* (Cambridge: Cambridge University Press, 2004). On its medieval reception, see David Albertson, *Mathematical Theologies. Nicholas of Cusa and the Legacy of Thierry of Chartres* (New York: Oxford University Press, 2014), 107.
 ³³ Anna Somfai, 'Eleventh-century shift', 1 calculates 156 extant medieval manuscripts of Cicero's and Calcidius' translations.

propounded by Plato's text.³⁴ The interest of these medieval audiences in what moderns have traditionally regarded as Plato's 'physics' was far wider than natural philosophy. Readers of Latin turned to this translated extract of Plato's iconic text for its mathematical content and its lessons for the quadrivium, and they looked to it for guidance on subjects as diverse as theology, philosophy, cosmology, music, medicine, and architecture. Further east, Islamicate scholars had become familiar somewhat earlier with an epitome of Plato's text known as 'the Spiritual Timaeus', translated into Arabic by Yahyā ibn al-Bitrīq around 815 C.E., and with Arabic versions of two commentaries on the *Timaeus* by Galen, known from their particular emphases as "the Physical Timaeus" and "the Medical Timaeus", and translated by Hunayn ibn Ishāq and 'Īsā ibn Yahyā and by Hunayn and Ishāq respectively.³⁵ Their reception of Plato's text was indirect and mainly through Galen, but they modified these interpretations by using this mediated understanding of the *Timaeus* to stress the eye as a point of access to cosmic knowledge and the role of theological knowledge as part of medicine.³⁶

The twelfth century was a critical period in the reception of Plato and especially the *Timaeus*. The first half of the century marked the climax of its reception in the Middle Ages, especially the activity of the School of Chartres. In the second half, however, study of Plato diminished. The result was either insignificance or suspicion. The movement to translate Plato's oeuvre beyond the *Timaeus* raised little interest, and, in the trial of Peter Abelard, the preoccupation with Plato was seen as a possible seduction away from Christ.³⁷ As Aristotle's

³⁴ Durham Cathedral Library, MS C.IV.7, fols. 42r–49v. For its possible influence on the architectural design of the cathedral, see John Hendrix, Chapter 9, below.

³⁵ On the Islamicate reception of the *Timaeus*, see Rüdiger Arnzen, 'Plato's *Timaeus* in the Arabic Tradition. Legend – Testimonies – Fragments', in F. Celia and A. Ulacco (eds.), *Il Timeo. Esegesi greche, arabe, latine* (Pisa: Pisa University Press, 2012), 181–267.

³⁶ Aileen R. Das, *Galen and the Arabic Reception of Plato's Timaeus* (Cambridge University Press, Cambridge, 2020), 22–29.

³⁷ Thomas Ricklin, 'Plato im zwölften Jahrhundert: Einige Hinweise zu seinem Verschwinden', in Stephen Gersh and Maarten J. F. M. Hoenen (eds.), *The Platonic Tradition in the Middle Ages. A doxographic approach* (Berlin: De Gruyter, 2002), 139–164; John Marenbon, 'Peter Abelard and Platonic Politics' in Marcel van Ackeren and Orrin Finn Summerell (eds.), *The Political Identity of the West: Platonism in the Dialogue of Cultures* (Frankfurt a. M.: Peter Lang, 2007), 133–150.

newly translated works on natural philosophy, metaphysics, and ethics grew in influence during the latter part of the century, on top of his already translated works on logic, Plato and his *Timaeus* became marginalised. A guide for students at Paris, composed *c*. 1230–40, instead lists nine Aristotelian works as authorities on 'natural science', the *scientia naturalis inferior* that was then ranked below metaphysics or mathematics.³⁸ Overcoming that marginalisation and rediscovering Plato and his *Timaeus* as an important philosophical document would be essential features of the Renaissance. Yet, even after the rediscovery of Aristotle's books on natural philosophy in the twelfth century, the *Timaeus* continued to attract new readers.³⁹

Medieval and Renaissance scholars almost always read these versions of the *Timaeus* through the lens of Middle Platonic and Neoplatonic commentaries on the dialogue. Calcidius' commentary became particularly influential for the reception of the harmonics and music theory in the dialogue and helped to define the study of music within the quadrivium as 'a physico-mathematical science, built upon fixed rules and stated proportions'.⁴⁰ Proclus' translation and commentary were translated into Latin in the thirteenth century by the Flemish Dominican, William of Moerbeke, but, with the exception of the *Speculum divinorum et quorundam naturalium* by Henry Bate of Mechelen (1246–after 1310), this translation had little impact.⁴¹ It was only with the rediscovery of the entire original Greek

³⁸ Barcelona, MS Ripoll. 109, fols. 134r–158v (Arist., *De An., Ph., De Caelo, Gen. Corr., Parv. nat., Meteora, De plantis, De animalia*, and *De motu cordis*); C. H. Lohr, 'The medieval interpretation of Aristotle', in Norman Kretzmann, Anthony Kenny, and Jan Pinborg (eds.), *The Cambridge History of Later Medieval Philosophy. From the Rediscovery of Aristotle to the Disintegration of Scholasticism, 1100–1600* (Cambridge: Cambridge University Press, 1982), 80–98, at 85.

³⁹ Carlos Steel, 'Plato', in Thomas F. Glick et al. (eds.), *Medieval Science, Technology, and Medicine. An Enciclopedia* (New York: Routledge, 2005), 412–414, at 413.

⁴⁰ William Wotton, *Reflections upon Ancient and Modern Learning*, 2nd edition (London, 1697), 329. On Calcidius' harmonics and music theory, see Christina Hoenig, 'Calcidius on Cosmic Harmony', in Francesco Pelosi and Federico Petrucci (eds.), *Music and Philosophy in the Roman Empire* (Cambridge: Cambridge University Press, 2020), 262–85.

⁴¹ H. Boese (ed.), *Proclus, Elementatio theologica translata a Guillelmo de Morbecca* (Leuven, 1987). On Moerbeke, see Stephen Gersh, 'One thousand years of Proclus', in Gersh (ed.), *Interpreting Proclus: from Antiquity to the Renaissance* (Cambridge: Cambridge University Press, 2014), 1–29, at 18 and 26–27. For further discussion of Proclus' influence in the later Middle Ages (but less on his *Timaeus* commentary), see P.

text in the fifteenth century, of which Marsilio Ficino (1433–1499) had access to two manuscripts and Giovanni Pico della Mirandola and Cardinal Bessarion also had copies, and with its translation with a commentary by Ficino and in the next century the translation by Francesco Patrizi da Cherso (1529–1597), that Proclus' work became an important guide to Plato's text for Renaissance readers.⁴² At that point too, the early second-century Greek work by Theon of Smyrna, *Expositio rerum mathematicarum ad legendum Platonem utilium* ('On Mathematics Useful for the Understanding of Plato'), the first part of which was also translated into Latin by Ficino, provided learned Renaissance readers with a technical exegesis of Timaean mathematics and harmonics.⁴³

3 Modern Scholarship on the Legacy of the *Timaeus*: The Contribution of this

Book

O. Kristeller, 'Proclus as a Reader of Plato and Plotinus, and His Influence in the Middle Ages and in the Renaissance', in J. Pepin and H.-D. Saffrey (eds.), *Proclus: lecteur et interprète des anciens, Actes du colloque international du CNRS, Paris, 2–4 Octobre 1985* (Paris, 1987), 191–211; Loris Sturlese, 'Il dibattito sul Proclo latino nel medioevo fra l'universita di Parigi e lo studium di Colonia', in Gilbert Boss and Gerhard Seel (eds.), *Proclus et son influence, Actes du colloque de Neuchâtel, juin 1985* (Zurich, 1987), 261–285; Carlos Steel, 'Das neue Interesse für den Platonismus am Ende des 13. Jahrhunderts', in T. Kobusch and B. Mojsisch (eds.), *Platon in der abendländischen Geistesgeschichte. Neue Forschungen zum Platonismus* (Darmstadt, 1997), 120–133, and idem, 'William of Moerbeke, translator of Proclus', in Gersh (ed.), *Interpreting Proclus*, 247–263, at 253–258.

⁴² Michael J. B. Allen, in Gersh (ed.), *Interpreting Proclus*, 353–79; and, for an overview, Guy Claessens, 'Proclus in the Renaissance', in Marco Sgarbi (ed.), *Encyclopedia of Renaissance Philosophy* (Cham: Springer, 2019); Thomas Leinkauf, 'Francesco Patrizi', in Gersh (ed.), *Interpreting Proclus*, 380–402, at 383.

⁴³ Teone di Smirne. Expositio rerum mathematicarum ad legendum Platonem utilium, ed. and trans. Federico Petrucci (Sankt Augustin: Academia, 2012). Theon of Smyrna: Mathematics useful for understanding Plato, trans. from the 1892 Greek/French edition of J. Dupuis by Robert and Deborah Lawlor, ed. and annotated by Christos Toulis and others (San Diego: Wizards Bookshelf, 1979). See Federico Petrucci, 'Theon of Smyrna: rethinking Platonic mathematics in Middle Platonism', in Tarrant et al. (eds.), Brill's Companion to the Reception of Plato in Antiquity (Leiden: Brill, 2018), 143–155. Ficino's partial translation of Theon's Expositio is preserved in manuscript at Vatican City, MS Vat. Lat. 4530, fols. 119r–151r and Hamburg, Staats- und Universitätsbibliothek, MS Cod. Philol. 305, fols. 139–191v (copied from the Vatican MS by Lucas Holstenius in the seventeenth century). See Paul Oskar Kristeller, Marsilio Ficino and his work after five hundred years (Florence: Olschki, 1987), 90 and 105; Michael J. B. Allen, Nuptial Arithmetic. Marsilio Ficino's Commentary on the Fatal Number in Book VIII of Plato's Republic (Berkeley: University of California Press, 1994).

Given the enduring importance of the *Timaeus* in the survival of the Platonic tradition in ancient, medieval, and Renaissance thought, it is no surprise that in the last two and half decades scholars have devoted increasing attention to its impact.⁴⁴ The recent revival of interest in this legacy started around October 1997, when the second International Colloquium on the Reception of Plato at Lausanne was devoted to the reception of this seminal text and its changing "horizons of expectation", in the language developed by Hans Georg Gadamer and Hans Robert Jauss.⁴⁵ This conference viewed Plato's work primarily as a contribution to natural philosophy and its late antique, medieval, and Renaissance offshoots as starting from that point. Yet its papers were barely in press when a second conference, at Notre Dame, Indiana, extended the debate, stressing the varied reception of the Timaeus: its contributors, now also from the U.S.A. and U.K., offered evidence for the dialogue's sustained impact from the Old Academy to nineteenth-century German idealism.⁴⁶ Two further conference volumes appeared in rapid succession. As the Notre Dame collection was published, a third conference, at Leuven, reconsidered the dialogue's role in shaping later ideas of natural philosophy, while a fourth meeting, in 2007 at Urbana, Illinois, reinforced the intellectual diversity of the text and the breadth of its impact by considering how Plato's ideas impinged on further areas such as modern physics.⁴⁷ Finally, a seminar at Pisa in 2010

⁴⁴ The fundamental work on the medieval reception is still Klibansky, *Continuity* (above, n. 11).

⁴⁵ Ada Neschke-Hentschke, (ed.) *Le Timée de Platon: contributions à l'histoire de sa réception = Platos Timaios: Beiträge zu seiner Rezeptionsgeschichte* (Louvain-la-Neuve: Editions de l'Institut supérieur de philosophie, 2000), henceforth Neschke-Henschke. Cf. Hans Georg Gadamer, *Truth and Method.* Translated from the German (London: Sheed and Ward, 1975) and Hans Robert Jauss, *Toward an Aesthetic of Reception* (Brighton: Harvester, 1982).

⁴⁶ Reydams-Schils (ed.), *Plato's Timaeus as Cultural Icon* (above, n. 3).

⁴⁷ Thomas Leinkauf and Carlos Steel, (eds.), *Platons Timaios als Grundtext der Kosmologie in Spätantike, Mittelalter und Renaissance = Plato's Timaeus and the foundations of cosmology in Late Antiquity, the Middle Ages, and the Renaissance* (Leuven: Leuven University Press, 2005), henceforth Leinkauf-Steel; Richard Mohr and Barbara Sattler (eds.) *One Book, the Whole Universe: Plato's Timaeus Today* (Las Vegas: Parmenides, 2010), henceforth Mohr and Sattler.

resulted in a fifth collection of essays on the textual and exegetical traditions of the *Timaeus* in Arabic and Latin.⁴⁸

The present book also springs from a conference, held at Durham, U.K, in 2018, and one might wonder why yet another volume on the legacy of the *Timaeus* is needed. In the first place, the last decade has seen the publication of many important translations or studies, not only on the Timaeus itself and the major commentaries by Calcidius and Proclus, but also of later interpretations of the work in the Middle Ages and Renaissance including the translation of Proclus by William of Moerbeke, the reception of Plato's dialogue in Islamicate culture, and the complete commentary by Ficino. This collection of essays builds on this recent work on the Timaeus and its reception history. Second, the scope of this book differs from that of previous conference volumes. In reviewing Plato's legacy for ancient, medieval and Renaissance thought, the chapters here help to challenge earlier assumptions by emphasizing how this dialogue, rather than the *Republic*, played the most formative role in establishing the prevailing intellectual structures of Late Antiquity, the Middle Ages, and the Renaissance.⁴⁹ It was the *Timaeus* that helped thinkers in fields as disparate as theology, philosophy, cosmology, music, ethics, medicine, and architecture to think about the relevance to their disciplines of fundamental structures of harmonics and to develop mathematical proportion as a common scholarly language. The present volume seeks to draw out the implications of the text's multidisciplinary content and influences. The multifarious uses of the *Timaeus* in different intellectual and practical contexts are explored here by combining the framework of classical reception studies with modern approaches from the history of

⁴⁸ Francesco Celia and Angela Ulacco (eds.) *Il Timeo: Esegesi Greche, Arabe, Latine* (Pisa: PLUS-Pisa University Press, 2012).

⁴⁹ For earlier work highlighting the *Republic*, particularly after the Islamic translation and commentary on that work by Averroes, and its influence on thinkers such as Duns Scotus and Thomas Aquinas, see, e.g., Abraham Melamed, *The Philosopher-King in Medieval and Renaissance Jewish Political Thought* (Albany, NY: SUNY Press, 2003). For new work on Averroes' legacy, see Alexander Orwin (ed.), *Plato's Republic in the Islamic Context. New Perspectives on Averroes's Commentary* (Rochester, NY: University of Rochester Press, 2022).

ideas, historical musicology, the history of health and medicine, and architectural history. Late antique, medieval, and Renaissance attempts to interpret the texts through images, diagrams, and material culture, particularly buildings, that were associated with the *Timaeus* and its harmonic language, were often inspired by the wish to underpin contemporary scholarly theories with ancient origins. Exploring how the *Timaeus* was used during this formative period in the history of Western thought will help to trace the affirmation and denial of scholarly values and identities through both traditional and emergent learned disciplines.

That does not mean that conscious Timaean motivation can be identified in every aspect of ancient, medieval, and Renaissance theory and practice discussed in this book. The scholars, doctors, composers, and architects who are central to our reception history did not always view their work as an interpretation or illustration of the *Timaeus*. But to exclude Timaean ideas in the absence of explicit reference to them from the discourse of those who thought about related disciplines such as cosmology, music theory, medicine, and architecture, would be to focus too narrowly on the literal content of sources within the *Timaeus* commentary tradition.⁵⁰ In particular, this volume aims to explore in more detail the dominant role that this text and its tradition played in shaping the integrated quadrivium of ancient and medieval learning into the mathematical disciplines of arithmetic, music, geometry, and astronomy. Moreover, it investigates the decline of the quadrivium altogether and the emergence in its place of independent scholarly disciplines such as natural philosophy, music, medicine, and architecture based on interpretations of the *Timaeus*.

The story that this book tells is how between the second and seventeenth centuries scholarly thinkers employed a Timaean concept of cosmos in the search for an external

⁵⁰ For the lively current debate on the possible influence of Porphyry's ideas about Pythagoreanism and the *Timaeus* on Calcidius' *Timaeus* commentary, see Reydams-Schils, *Calcidius on Plato's Timaeus*, where she argues that the evidence is too weak to posit Porphyry's commentary on the *Timaeus* as a major source for Calcidius' commentary.

reference point with which to anchor their own subject matters and confer meaning upon them. At the same time, however, it is also a story of how cosmology and philosophy of nature used disciplines such as mathematics and harmonics as internal reference points to assign them a place in the pre-modern learned world. The individual essays in this book form a series of variations on that theme or intellectual structure. Barbara Sattler's opening chapter explains how harmonics operates as a mathematical language within Plato's original text that could subsequently be adopted by later readers from different disciplinary perspectives. Her chapter, therefore, presents the central explanation as to why Plato's text had such utility for so many different scholarly interests. The following chapters, by scholars from different academic fields, show how the ancient, medieval, and Renaissance reception history of the dialogue, studied from the multidisciplinary perspective of a shared belief in a harmoniously ordered universe, demonstrates that similar Timaean ideas of order and beauty underpinned multiple scholarly disciplines.

The core of the volume explores the legacy of the ideas presented in Plato's text. It follows two organising principles: chronological and disciplinary. The three principal sections address the impact of the *Timaeus* across the three broad historical periods of late antiquity, the Middle Ages, and the Renaissance; but each section also folds internally into disciplinary subdivisions exploring concepts ranging from cosmology to music and from medicine to architecture. Together, these groupings reflect the increasing diversification of ideas prompted by Plato's dialogue. In sequence, they demonstrate how the inquiry into the macrocosm and the microcosm – the human being – which primarily took place within the quadrivial disciplines during late antiquity and the early Middle Ages, further developed during later periods in reaction to emerging translations of Greek and Arabic texts on nature and in response to changing wider views on the cosmos, humankind, and human creations such as music and architecture. This culminated in Renaissance conceptions of man as a

creator, who, in imitation of his own Creator, could not only construct his own worlds, as reflected in the emancipation of disciplines such as music, medicine, and architecture, but also could know the structure of the universe, explored along the parallel intellectual routes of astronomy, theology, and philosophy. In short, the theme of the book is the influence of the *Timaeus* on the formation, transformation, and emancipation of the scholarly disciplines that were privileged between antiquity and the end of the Renaissance and, therefore, more generally, the transformative potential of the humanities for scientific construction of the world in which we live.

4 The Disciplinary Inheritance of Plato's *Timaeus*

The final part of this Introduction sets the stage for the main question of our book: how the *Timaeus* was used in the pre-modern western worlds in the disciplines of music, cosmology, medicine, and architecture. First, we explain why the *Timaeus* played an important role in the development of the quadrivium. From the Old Academy to the late Middle Ages, the study of these four disciplines was considered as propaedeutic to the study of philosophy and theology. Within the quadrivium the focus was on the study of numbers: arithmetic (abstract number); geometry (number in space); music (number in time); and astronomy (number in space and time). While the quadrivium remained important in liberal arts education at European centres of learning until the end of the Middle Ages, it gradually became replaced in university curricula by other subjects and disciplines from the fourteenth century onwards. The four sub-sections below (4.1–4) introduce the reader in turn to the role of the *Timaeus* across this period in the processes of forming the disciplines of music, cosmology, medicine, and architecture and the contributions of the chapters in this book.

4.1 The *Timaeus* as Fundamental Source for the Discipline of Music

Plato's account of the creation of the cosmos in the *Timaeus* in terms of its harmonious order and beauty is notoriously difficult and mysterious. He argued that the cosmos was the work of a divine Creator, or Demiurge, who transformed a pre-existent chaos into harmonic order by imitating a perfect, harmonious structure. In the Timaean creation myth (35a–36d) harmony is a universal mathematical force that organizes contraries and generates unity. The Creator first mixed Difference, Sameness, and Being, which resulted in the invisible substance of the World Soul. To create the physical cosmos from this substance, he divided it as follows:

First, he took one portion from the whole, and next a portion double of this; the third half as much again as the second, and three times the first; the fourth double of the second; the fifth three times the third; the sixth eight times the first; and the seventh twenty-seven times the first.⁵¹

Following the commentary tradition after Theon of Smyrna, scholars arranged the numbers in the World Soul in the form of a lambda and used a common diagram to illustrate the arrangement in two geometrical series (1, 2, 9, 27 and 1,3, 4, 8) (Fig. 1.1: the figure on the right).⁵² Plato's mathematical division was the basis for the construction of a musical scale,

⁵¹ Pl. *Ti*. 35b–c. All translations of Plato's *Timaeus* in this volume are taken from *Plato's Cosmology*. *The* Timaeus *of Plato translated with a running commentary* by Francis Cornford (London: Kegan Paul, Trench, Trubner & Co: 1937), henceforth Cornford, unless stated.

⁵² On diagrams related to the *Timaeus*, see Simeon K. Heninger Jr. *The Cosmographical Glass: Renaissance Diagrams of the Universe* (San Marino, CA: Huntington Library, 1977) and Somfai, 'Eleventh-Century Shift',

which Plato subsequently explained: "These links gave rise to intervals of 3:2 and 4:3 and 9:8 within the original intervals"; and the Creator "went on to fill up all the intervals of 4:3 (i.e. fourths) with the interval 9:8 (the tone), leaving over in each a fraction ... in the numerical proportion of 256 to 243 (semitone)".⁵³

The Pythagorean scale of eight notes associated with the *Timaeus* was constructed from a group of ratios between the four smallest numbers: 1, 2, 3, 4. The Neoplatonist tradition preserved the legend that Pythagoras was the first to demonstrate the affinity between numbers and consonant musical intervals in an experiment with strings.⁵⁴ In line with Pythagoras' alleged discovery, a single string on a monochord was used to indicate consonant intervals.⁵⁵ The consonant intervals of the Pythagorean scale that were determined by mathematical calculation were assumed to be the ratios between the numbers which together constituted the perfect number ten, the decad: the *dupla* ratio (2:1) belongs to the musical interval of the octave, or *diapason*. Moreover, the *diapason* can be divided into a *diapente* ratio (3:2), belonging to the fifth, and the *diatessaron* (4:3), belonging to the fourth. Last, the *tonus* ratio (9:8) belongs to the musical interval between the fourth and the fifth, and the *leimma* ratio (256:243) to the semitone. In the commentary tradition, these intervals were together taken to form the Pythagorean scale:⁵⁶

C (9:8) D (9:8) E (256:243) F (9:8) G (9:8) A (9:8) B (256:243) C

⁵⁵ On the monochord and its role in ancient Greek harmonics, see especially David Creese, *The Monochord in Ancient Greek Harmonic Science* (Cambridge: Cambridge University Press, 2010).

and <u>eadem</u>, "Calcidius' *Commentary* on Plato's *Timaeus*". For the harmonics and music theory of Ficino's *Timaeus* commentary, see Prins, *Echoes of an invisible world*, 25–213, and, on the *Timaeus*, 30–37. ⁵³ Pl. *Ti*. 35b–c; 36b.

⁵⁴ Calc. Comm. 45; Magee, 192–193; Boethius, Fundamentals of Music, tr. Bower, 19.

⁵⁶ Cornford, 72.

The following passage of Plato's text describes how the creator created the physical cosmos by dividing the invisible substance of the World Soul into two long strips, which produced the spheres of the planets and other stars.⁵⁷ The harmonic structure of the World Soul thus permeated the entire cosmos.

The Timaean theory that the same numerical proportions both order the cosmos and produce consonant intervals in earthly music haunted scholars for centuries. Ancient, medieval, and Renaissance scholars alike tried to make sense of the theory of the harmony, or music, of the spheres, according to which the planetary revolutions could be defined in terms of the harmonic proportions of a musical scale, but even though they were convinced that heavenly music and earthly music were interchangeable, the concept was elusive. The harmonic structure of the World Soul was a purely theoretical system, and its relationship with earthly music remained obscure. The dialogue formulated a clear theory of neither the harmony nor the music of the spheres. That fascinating "Pythagorean" concept came into play when later commentators fused the harmonic system of the World Soul with Plato's Myth of Er in his *Republic*.⁵⁸

In the late third or early fourth century, the musical theorist Aristides Quintilianus explained the discovery of musical harmony through analogy with the construction of cosmic harmony by the Creator of the world "who has fitted together harmoniously the whole of this visible world with invisible devices, and devised every soul most perfectly with the ratios of *harmonia*" and who "has arrested the multiplicity and diversity of things, and holds them together in one with unbreakable bonds".⁵⁹

⁵⁷ Pl. *Ti*. 36b–d.

⁵⁸ On the concept of the harmony, or music, of the spheres, see James Haar, *Musica mundana: Variations on a Pythagorean Theme* (Ph.D. dissertation, Harvard University, 1961); idem, "Pythagorean Harmony of the Universe", in P. P. Wiener (ed.), *Dictionary of the History of Ideas* (New York: Charles Scribner's Sons, 1973), vol. 4, 38–39; and idem, "Music of the Spheres", in L. Macy et al. (eds.), *Grove Music Online* (Oxford: Oxford University Press, 2007–2009); Jacomien Prins, "Renaissance Conceptions of Harmony", in Marco Sgarbi (ed.), *Encyclopedia of Renaissance Philosophy* (Cham: Springer, 2022), 1470–1481.

⁵⁹ Aristid. Quint. On Music 3, trans. Bychkov and Sheppard; cf. Pl. Phdr. 245c; Ti. 34b-c.

Soon afterwards, in his commentary on the *Timaeus*, Calcidius made frequent use of music theory and its kinship with the related sciences. In his view, understanding the sensible world required "recourse to all of the technical remedies of the sciences – to arithmetic, astronomy, geometry, and music – … so that the various subjects might be explained by cognate and related methods of reasoning".⁶⁰ As Proclus would later explain, arithmetic and music were the pair in the quadrivium that dealt with numbers or quantity: arithmetic as the prime discipline, dealing with quantity in itself, without external relationships; music as the science that dealt with relative quantity, or the relationship between whole numbers, expressed as ratios or proportions.⁶¹ Numerical ratios or proportions could be expressed in the medium of sound by musical intervals that were considered to be consonant and harmonious or not. Within the reception history of the *Timaeus* in the discipline of music, there was a fierce debate as to whether, and, if so how, the purely abstract, "Pythagorean" harmonics and the music theory that it involves could be translated into the world of sense perception and audible music.

Even though the harmonic structure of the World Soul was described in the *Timaeus* in purely theoretical terms, Calcidius, commenting on 35c–36a, compared the Creator to a musician who composed the cosmos as a well-tempered symphony: "As when musicians in tuning instruments within the two extremes set by the outer strings, …so god is represented as attuning the world soul."⁶² In the *Timaeus*, Plato had not only described the World Soul as a structure of harmonic ratios; he also argued that the lesser souls were created in the same way.⁶³ Incarnation in a human body certainly distorted and disordered the original harmonic structure of a human soul. Since, however, the *Timaeus* stated that "harmony, whose motions

⁶⁰ Calc. *Timaeus* 1.2; Magee, 127.

 ⁶¹ Procl. In Eucl. 1.12; Proclus. Commentary on the First Book of Euclid's Elements, trans. Morrow, xxviii, 29–30. On later concepts of the quadrivium, see Simeon K. Heninger, Jr., Touches of Sweet Harmony: Pythagorean Cosmology and Renaissance Poetics (San Marino, CA: Huntington Library, 1974), 71–145.
 ⁶² Calc. Comm. 1.40; Magee, 185.

⁶³ Pl. *Ti*. 35a–36d and 41d; cf. 43d, where it is assumed that the same ratios are used for the human soul.

are akin to the revolutions of the soul within us, has been given by the Muses to him whose commerce with them is guided by intelligence, ... as an ally against the inward discord that has come into the revolution of the soul", it followed that earthly music might have a direct restorative influence on the human soul.⁶⁴

In the commentary tradition, therefore, the *Timaeus* helped to assign music both an ethical and an epistemological function. The human soul could be considered a musical instrument, which must be tuned and tempered to be able to participate in God's world symphony. Whereas arithmetic, geometry, and astronomy, the other three mathematical disciplines of the quadrivium, were focused on the structure of the metaphysical and physical cosmos, music dealt not only with the structure of the cosmos and with earthly music but was also related to ethics.

In his commentary, Proclus defended a theological interpretation of the *Timaeus* as a description of the physical cosmos. Although his surviving translation does not include this passage, it was an important theme in his commentary and its reception history. According to Proclus, prayer could be an instrument to reveal the first divine principles of all things: 'Prayer ... unifies those who pray with the gods who are being prayed to. Prayer is the creator of divine persuasion and established all which is ours in the gods.'⁶⁵ The precise character of these prayers is unknown to us, but it is highly likely that they were sung to musical accompaniment during religious rituals. Thus, for Proclus, by reflecting on their own nature and through participation in religious ceremonies, human beings might restore their inner harmony and from there also comprehend the structure of the cosmos.

After Calcidius and Proclus, Boethius formulated in his *De institutione musica* (*Fundamentals of Music*) a tripartite definition of music, which clearly reflects Pythagorean

⁶⁴ Pl. *Ti*. 47d.

⁶⁵ Procl. In Ti. 1.211.1-8. Baltzly, II, 47.

and Platonic ideas about music that are associated with the *Timaeus*. He distinguishes three varieties of music: cosmic music (*musica mundana*), that is, the harmony or music of the spheres "observed in heaven itself"; human music (*musica humana*), that is, the harmony which "unites the incorporeal nature of reason with the body"; and earthly music "which is said *to rest in various instruments*" (*musica instrumentalis*). All three express the harmonic structure of the World Soul.⁶⁶ Boethius also theorized about the power of music in this Platonic understanding to influence the human soul and listed many examples of its powerful effects from both classical and biblical sources.⁶⁷ He considered music capable of curing both body and soul, but also as having an ethical dimension.

In the twelfth century, Bernard of Chartres reordered Boethius' threefold division of music according to his own understanding of the *Timaeus*. He envisaged these three varieties of music as progressing from a material music grasped by the senses (*musica instrumentalis*) to the intelligible music of the universe (*musica mundana*).⁶⁸ In Renaissance texts on the discipline of music, the doctrines of the music of the spheres and of musical ethos became finally fully merged (Fig. 1.2).⁶⁹

[Insert Fig. 1.2 here]

Fig. 1.2. Renaissance engraving showing Apollo, the Muses, the planetary spheres and the musical modes. From Gafurius's *Practica musice* (1496). Courtesy of Wikimedia Commons.

The three chapters in this book that discuss the discipline of music investigate the use of the *Timaeus* to formulate ancient, medieval, and Renaissance music theory, and how

⁶⁶ Boethius, Inst. Mus. 1.2; Fundamentals of Music, 9–10, trans. Bower (adapted).

⁶⁷ Boethius, Fundamentals of Music 1.1, 4–8.

⁶⁸ Andrew Hicks, *Composing the World: Harmony in the Medieval Platonic Cosmos* (Oxford: Oxford University Press, 2017), 109.

⁶⁹ For a detailed discussion of this image, see James Haar, "The Frontispiece of Gafori's Practica Musicae (1496)", *Renaissance Quarterly* 27 (1974), 7–22.

Platonic conceptions of world harmony and the power of music were continuously reshaped and aligned with earthly musical practices. Federico Petrucci's argument for the role of the *Timaeus* in the formation of the quadrivium, seen through the work of Middle Platonists such as Theon of Smyrna and Nicomachus of Gerasa, highlights the development of music in late antiquity as a mathematical discipline. Barbara Haggh-Huglo's consideration of medieval debates about the harmony of the spheres, diagrams, and musical instruments illustrates the fundamental role of Timaean mathematics in medieval music theory. Jacomien Prins shows how the assumption that the human soul is attuned to the *musica mundana*, which was so prominent in Proclus' commentary on the *Timaeus*, formed an important foundation for Marsilio Ficino's musical thought.

4.2 Cosmology and Philosophy of Nature

Although listed only third among the four sciences of the quadrivium in Plato's *Republic* VII, astronomy has a prominent place in the afterlife of the *Timaeus* because of the text's primary preoccupation with the composition of the universe. Aristotle recognised the *Timaeus* as a primary point of reference for his works on natural philosophy, the *Physics* and *De Caelo*, and its notion of the receptacle as a model for the scientific study of space and matter.⁷⁰ Proclus regarded the main purpose of the *Timaeus* as 'the explanation of nature' (*physiologia*) and continued to reassert the superiority of the *Timaeus* to Aristotle's *Physics* as a work of natural philosophy and its importance as an authority on the origins of the world.⁷¹

⁷⁰ Aristotle, *Physica* 209b.

⁷¹ Proclus, *In Platonis Timaeum Commentarii* 1.1.17–20; Proclus, *Commentary*, vol. 3, xiii. Carlos Steel, "Why should we prefer Plato's 'Timaeus' to Aristotle's 'Physics'? Proclus' critique of Aristotle's causal explanation

The tool for answering these questions was the mathematical skill of astronomy, which differs in meaning from the later discipline of that name.⁷² Noted for its practical application for agriculture, sailing, and military operations in helping to recognise the seasons of the year, astronomy is defined in the *Republic* as a specific mathematical science relating to the study of solid bodies in motion and following from geometry, which studies solid bodies at rest.⁷³ In the *Gorgias*, Socrates defined the object of astronomy as 'the motion of the stars, sun, and moon, and their relative speeds'.⁷⁴ Yet, he reiterated in the *Republic*, it concerned not so much the actual stars, like later astronomy, 'the ornaments ($\pi \sigma \iota \kappa i \lambda \mu \alpha \tau \alpha$) visible in the sky'', as ''the real ones ... which move in relation to each other by real speed and real slowness in real number and all their real shapes and which move their contents, things which can be captured by reason and intellect, not sight''.⁷⁵ For that reason, Proclus argued that ''the divine Plato'' offered a higher perspective on the cosmos than astronomers concerned with the movements of the visible living creatures in the heavens rather than the nature of the divine intellectual souls on which these planetary creatures depend.⁷⁶

The discussion in the *Timaeus* of the composition of the World Soul and its division into harmonic intervals and of the construction of the planetary circles and their movements follows mathematical principles, explaining the changes between elements and sensible phenomena in terms of underlying mathematical configurations.⁷⁷ The sixth-century philosopher Simplicius recorded the report of Sosigenes four centuries earlier, on the authority of Aristotle's pupil Eudemus of Rhodes, "that Plato, after unequivocally assigning to the celestial movements that which is circular, uniform, and regular, put a problem to the

of the physical world", Bulletin of the Institute of Classical Studies 78 (2003), Ancient Approaches to Plato's "Timaeus", 175–187.

⁷² Crombie A.C., *Styles of scientific thinking in the European tradition: the history of argument and explanation especially in the mathematical and biomedical sciences and arts* (London: 1994) 131.

⁷³ Plato, *Respublica* 7, 529a–530d.

⁷⁴ Plato, *Gorgias* 451c.

⁷⁵ Plato, *Respublica* 7, 529d.

⁷⁶ Proclus, *Commentary*, ed. Baltzly, vol. 5, 15–16.

⁷⁷ Pl. Ti. 35a-36d.

mathematicians, what uniform, circular, and regular motions can be hypothesised, by means of which the phenomena regarding the planets can be saved, and that Eudoxus of Cnidus interjected with his hypotheses of the so-called concentric spheres".⁷⁸ Plato did not use the expression "saving the phenomena" himself, but the principle underlies the explanations of the *Timaeus*, such as his assigning of the square to the element earth to 'preserve the probability of our account'.⁷⁹ By the end of the third century B.C.E., astronomers had rejected Plato's order of the planets, with the Earth in the centre and above it the Moon, Sun, Venus, and Mercury, in favour of the so-called 'Chaldean order' with the Sun placed between two triads, the Moon, Mercury, and Venus, and Jupiter, Saturn, and the fixed stars.⁸⁰

In the mid-second century C.E., the astronomer Ptolemy denied Plato's claim of uniform heavenly motion in his *Almagest*, but continued to look for a reasonable account of observable experience that would "save the phenomena". He explains the apparently irrational motions of the planets by a combination of different circular motions, although he considers them to be uniform around centres other than the centres of the circles of their motion.⁸¹ Yet the continued recourse to the *Timaeus* in late antiquity as an authority on natural philosophy resulted from its potential compatibility with the account of the creation of the world at the start of the book of *Genesis*, the so-called "Hexaëmeron", the six-day creation account ascribed to Moses. Although the rational explanation for the natural world proposed by the *Timaeus* seems at odds with that religious account, there were not only many detailed resemblances between Plato's creation narrative and the biblical version, including the initial appearance of water and the primeval flood, but the *Timaeus* also problematised the identity of the person responsible for the process in a way that resonated with Jewish readers: "The

⁷⁸ Simplicii In Aristotelis De Caelo Commentaria 2.12, comm. 43 and 46, ed. I. L. Heiberg (Berlin: Georg Reimer, 1894), 488, 492–3.

⁷⁹ Pl. *Ti.* 56a (τὸν εἰκότα λόγον διασώζομεν).

⁸⁰ Pl. *Ti.* 38d1–3; cf. the whorls in the Myth of Er in *Resp.* 616e–617b; *Epin.* 986a–987b; contr. Macrob. *In Somn.* 1.19 on the prevailing Chaldean order. Baltzly, *Commentary*, vol. 5, 16. ⁸¹ Ptol. *Alm.* 1.8.

maker and father of this universe it is a hard task to find, and having found him it would be impossible to declare him to all mankind."⁸² That the "maker" is then described as "good" ($\dot{\alpha}\gamma\alpha\theta\delta\varsigma$) and called "the god" ($\dot{o}\ \theta\epsilon\delta\varsigma$) naturally appealed to those who believed in a morally perfect deity as the supreme creator of the world.⁸³ In fact, the first two chapters of the Greek Vulgate translation produced in Alexandria in the late 270s B.C.E. show familiarity with Plato's *Timaeus*.⁸⁴ In the second century B.C.E., the Jewish thinker Aristobulus of Paneas argued that Pythagoras, Socrates, and Plato "follow completely in [Moses'] footsteps when they claim to hear the voice of God, observing about the universe as a whole that, through God, it has carefully come about and is maintained incessantly".⁸⁵

In the first century C.E., Philo of Alexandria appears to have had a direct knowledge of the dialogue. He was influenced, however, not only by Platonist thought, but by the Jewish allegorical tradition, and, while he was not sympathetic to all Stoic ideas, his understanding of the Creator God is inspired by Stoic ideas of the active principle, and his reading of the *Timaeus* as a text 'on nature' ($\pi\epsilon\rho$ ì φύσεως) is shaped by its Stoic reception.⁸⁶ Philo too focused on the parallels between Platonic cosmogony and the account of creation in the Hexaëmeron.⁸⁷ In *De Opificio Mundi* ('On the Creation of the World'), his extended commentary on the *Genesis* account, he makes a clear analogy between Plato's Demiurge and

⁸⁴ Łukasz Niesiolowski-Spanò, "Primeval history in the Persian period?", *Scandinavian Journal of the Old Testament* 21.1 (2007), 106–126; Philippe P. Wajdenbaum, *Argonauts of the Desert. Structural Analysis of the Hebrew Bible* (Sheffield: 2011), 92–96; Russell E. Gmirkin, *Plato's* Timaeus and the biblical creation accounts: cosmic monotheism and terrestrial polytheism in the primordial history (Abingdon: 2022), Chapter 4.

⁸⁵ Aristobulus, fr. 4.3.1, ed. Holladay = Eusebius, *Praeparatio evangelica* 13.12.3–4; trans. from Reydams-Schils, *Demiurge and Providence*, 137–8, who argues that Aristobulus refers here to the Demiurge's promise at Pl. *Ti*. 41a7–b6 to *maintain* the universe. See also McDonough, *Christ as Creator*, 97–134. Aristobulus was also influenced by Stoic reception of the *Timaeus*: Reydams-Schils, *Demiurge and Providence*, 138.

⁸² Pl. *Ti.* 28c; cf. Sean M. McDonough, *Christ as Creator: Origins of a New Testament Doctrine* (Oxford: Oxford University Press, 2009), 107.

⁸³ Pl. Ti. 29a and 30a.

⁸⁶ Reydams-Schils, *Demiurge and Providence*, 135–65, *in extenso*.

⁸⁷ David T. Runia, *Philo of Alexandria and the 'Timaeus' of Plato*, Philosophia Antiqua 44, 2nd edition (Leiden: Brill, 1986).

Moses' God, repeating the description in the *Timaeus* of the "maker and father" (π οιητοῦ καὶ π ατρὸς) of the universe.⁸⁸

The lessons of this creationism appealed to early Christian writers from the second century onwards. In the fourth century, Ambrose made extensive use of Philo's writings, often Christianizing their message, and started his commentary on *Genesis* by distancing the biblical account of creation in which the creative force was a single entity, God, from what he regarded as the 'errors' of Plato's text in referring to three separate principles: God (the Demiurge); Idea (the Forms); and Matter (the Receptacle).⁸⁹ Despite their circulation in manuscript and profound impact on medieval commentators, Ambrose's writings on *Genesis* were not widely read in the Middle Ages.⁹⁰ His pupil Augustine, however, who, like Boethius later, insisted that the opening of *Genesis* was compatible with the *Timaeus*, rehabilitated Plato's text and laid the path for medieval interest in its arguments.⁹¹

In the sixth century the Neoplatonist philosopher John Philoponus (*c*. 490–570), also known as John the Grammarian, and a pupil of Ammonius Hermieu, who had studied in Athens with Proclus, returned to a fuller attempt to bring the *Timaeus* into the Christian biblical tradition, producing his own Christian scientific commentary on the Hexaëmeron.⁹² Taking issue with the then prevailing view of the Antioch School that pagan cosmology was fundamentally incompatible with the Christian narrative of creation, Philoponus contended that the biblical account was in step with Ptolemy's geocentric model derived from the *Timaeus*.⁹³ Rather than offering a compromise between pagan natural philosophy and

⁸⁸ Philo, De Opificio Mundi 1.7; cf. Pl. Ti. 28c.

 ⁸⁹ Exameron, Homily 1, 1–5: Saint Ambrose, *Hexameron, Paradise, and Cain and Abel*, trans. John J. Savage (New York: Fathers of the Church, 1961), 3–5. *Clavis patrum latinorum*, ed. Eloi Dekkers and Emil Gaar (Bruges: Beyaert, 1951), 123. Ambrose's use of Philo: David T. Runia, *Philo in Early Christian Literature. A Survey* (Assen: Van Gorcum, 1993), 291–311. See Gmirkin, *Plato's Timaeus and the biblical creation accounts.* ⁹⁰ Michael Gorman, "From Isidore to Claudius of Turn: The Works of Ambrose on Genesis in the early Middle Ages", *Revue des Etudes Augustiniennes* 45 (1999), 121–38.

⁹¹ Augustine, City of God, 8.11. Klibansky, The Continuity of the Platonic Tradition, 23-4.

⁹² Johannes Philoponos, *De Opificio Mundi, Über die Erschaffung der Welt*, ed. C. Scholten (Freiburg: 1997), vol. 1, 46.

⁹³ John Philoponus, *De Opificio Mundi* 1 pr., ed. Scholten, 1, 73.13–74.5; cf. Scholten, vol. 1, 59.

Christian teaching, Philoponus argued that the cosmology attributed to Moses was wholly consistent with scientific explanations of visible phenomena, and, vice versa, that Platonic natural philosophy should be seen from the perspective of Scripture.⁹⁴

Reading the *Timaeus* alongside the creation account in *Genesis* was the starting point for what has been called the 'discovery of nature in the twelfth century'.⁹⁵ In their commentaries on both the *Timaeus* and the biblical narrative, scholars of the Chartres School made nature into a central theme which transcended a metaphysical concept, "identical with the essence", as Anselm of Canterbury still maintained in the early 1100s, and which embraced the empirical entities of the world.⁹⁶ William of Conches listed the range of natural phenomena and stressed that in investigating them "reason must be sought in everything".⁹⁷ Once nature was recognised as an independent principle of a regular rational order, it became personified, as in Bernardus Silvestris' *Cosmographia*, and its creative role dramatized, as in *The Complaint of Nature (De Planctu Naturae*) by Alain of Lille.⁹⁸

The harmonic structure of the planetary orbits also features in Copernicus' De

revolutionibus orbium coelestium (On the Revolutions of the Heavenly Spheres, 1543), in

which he presented his revolutionary heliocentric theory of the universe.⁹⁹ Even though this conception opposed the geocentric model of Plato and Ptolemy, it was still possible to theorize it in terms of a different kind of world harmony. Copernicus thus retained Plato's

⁹⁴ Scholten, vol. 1, 45.

⁹⁵ Klaus Reisenhuber, "Arithmetic and the Metaphysics of Unity in Thierry of Chartres: On the Philosophy of Nature and Theology in the Twelfth Century", in Chumaru Koyama (ed.), *Nature in Medieval Thought: Some Approaches East and West*, Studien und Texte zur Geistesgeschichte des Mittelalters, 73 (Leiden: Brill, 2000), 43–73, at 44.

⁹⁶ Anselm of Canterbury, *Monologion* 4: *Idem namque naturam hic intelligo quod essentiam*. Translation from *Complete Philosophical and Theological Treatises of Anselm of Canterbury*, tr. Jasper Hopkins and Herbert Richardson (Minneapolis: Arthur J. Banning Press, 2000), 12. See Reisenhuber, "Arithmetic and the Metaphysics of Unity", 44–45.

⁹⁷ William of Conches, *Philosophia Mundi* 1.22: Nos autem dicimus in omnibus rationem esse quaerendam.
⁹⁸ Reisenhuber "Arithmetic", 44–6; Brian Stock, *Myth and Science in the Twelfth Century. A Study of Bernard Silvester* (Princeton: Princeton University Press, 1972), 63–87; Winthrop Wetherbee, *Platonism and Poetry in the Twelfth Century. The Literary Influence of the School of Chartres* (Princeton: Princeton University Press, 1972), 187–219; idem, "Alan of Lille, De planctu Naturae: The Fall of Nature and the Survival of Poetry", *Journal of Medieval Latin* 21 (2011), 223–252.

⁹⁹ Klibansky, *Continuity*, 26.

commitment to uniform circular motion as "the motion proper to its bodily form, namely that one of the seven which above all belongs to reason and intelligence".¹⁰⁰

Like Philo and Philoponus earlier, the Protestant Kepler sought to reconcile the dialogue with *Genesis*, on which he considered Plato's work to be "a kind of commentary".¹⁰¹ The mathematical basis of the *Timaeus* made it attractive for the newly reawakened sciences, as he tried to align biblical and Platonic cosmological accounts with the more accurate observations of his day. In his *Astronomia Nova (New Astronomy)* of 1609, he used the *Timaeus* to justify his own merging of mathematics and physics in his astronomy.¹⁰² The Platonic text was not just an authority for him, but a resource on which he drew creatively for his own cosmological questions. Despite the stark conflict between the heliocentric system of the early modern era and the geocentric view of antiquity, the *Timaeus* and its geometrical roots had come to define the new science of astronomy.

The three chapters of this book that discuss cosmology, the study of the nature and origin of the universe, demonstrate how the universe was studied through the lens of Timaean harmonics, and, conversely, how new observations of nature led at different periods to new interpretations of the *Timaeus*. Riccardo Saccenti shows how the wider understanding of "nature" in the Middle Ages came about through framing biblical exegesis in an awareness of Calcidius' *Timaeus* translation and commentary. In the Renaissance, as Guy Claessens explores in his chapter, scholars tried to understand the relation between two levels of reality: the geometrical infrastructure and a perceptible, physical superstructure. They either defended the interpretation of the theory of the *Timaeus* as a geometrical atomism or

¹⁰⁰ De revolutionibus orbium coelestium 1.4; cf. Pl. Ti. 34a.

¹⁰¹ Harmonice Mundi 4.1, in Gesammelte Werke, vol. 6, Harmonice Mundi, ed. Max Caspar (Munich: Beck, 1940), 221; Johannes Kepler, *The Harmony of the World*, trans. E. J. Aiton, A. M. Duncan, and J. V. Field (Philadelphia: American Philosophical Society, 1997), 301. See Albert van der Schoot, "Kepler's search for form and proportion", *Renaissance Studies* 15 (2001), 59–78, at 60.

¹⁰² Rhonda Martens, "A Commentary on Genesis, Plato's *Timaeus* and Kepler's Astronomy", in Reydams-Schils (ed.), *Plato's Timaeus as Cultural Icon*, 251–266.

downplayed it as a hypothetical construct intended to "save the phenomena". Jonathan Regier's chapter explores how and why Johannes Kepler, bolstering the heliocentric view of the Copernican revolution, persisted in defending the Timaean belief in the harmony of the world, even though his well-known first law, published in his *Astronomia Nova*, that the planets revolve around the single focus of the sun in elliptical orbits, challenged parts of the *Timaeus*. These two chapters re-evaluate how far ideas about cosmology from the Timaeus commentary tradition, especially from Ficino's *Compendium*, played a role in the birth of modern science.¹⁰³

4.3 Timaean Cosmology as a Model for Conceptions of Medicine, Human Nature, and Ethics

As part of the creation myth, Plato explained that the creator "divided [the mixture from which he created the World Soul] into souls equal in number with the stars, and distributed them, each soul to its several star".¹⁰⁴ In the commentary tradition, this passage of the *Timaeus* was elaborated into a world view in which the World Soul was taken as a model for the human soul and as the macrocosm for the microcosm of man.¹⁰⁵ The substance of the human soul and body were conceived to be composed of the same harmonic proportions as

¹⁰³ On this theme, see, for example, Michael J.B. Allen, "The Ficinian *Timaeus* and Renaissance Science", in Reydams-Schils (ed.), *Plato's Timaeus as Cultural Icon*, 238–250; James Hankins, "The Study of the *Timaeus* in Early Renaissance Italy", in Anthony Grafton and Nancy Siraisi (eds.). *Natural Particulars: Nature and the Disciplines in Renaissance Europe* (Cambridge, MA: MIT Press, 1999), 77–119 (reprinted in Hankins, *Humanism and Platonism in the Italian Renaissance* (Rome, 2003-4), vol. 2, 93–142; idem, "Galileo, Ficino, and Renaissance Platonism", in Jill Kraye and M.W.F. Stone (eds.), *Humanism and Early Modern Philosophy* (London: Routledge, 2000), 209–237; and Barbara Bartocci, "Paolo Beni and Galileo Galilei: the Classical Tradition and the Reception of the Astronomical Revolution", *Rivista di storia della filosofia* 71 (2016), 423–452.

¹⁰⁴ Pl. *Ti*. 41d.

¹⁰⁵ On ideas about human nature, ethics and medicine in the *Timaeus*, see Myles F. Burnyeat, "Plato on Why Mathematics is Good for the Soul", in T. J. Smiley (ed.), *Mathematics and Necessity: Essays in the History of Philosophy* (Oxford: Oxford University Press, 1999), 87–113.

the World Soul and world body and to possess the same harmonious motions.¹⁰⁶ Human souls were of a lower order than the World Soul: incarnation as well as negative experiences of life such as diseases could bring them down. Yet human beings were equally capable of becoming co-creators of their own nature: by living a good life, they could restore the original perfect harmony of body and soul.

This intellectual tradition is illustrated by the title page of Robert Fludd's *Utriusque cosmi* ... *historia* (*The History of the Two Cosmoi*, 1617), which depicts man as a world of its own that is called the microcosm because it displays a miniature pattern of all the parts of the macrocosm (Fig. 1.3).

[Insert Fig. 1.3 here]

Fig. 1.3. The Human Being regarded as a Universe in Miniature. Line engraving by T. deBry, 1617. Title page of Robert Fludd, *Utriusque Cosmi ... Historia*. Courtesy of theWellcome Institute Library, London.

The outer circle in this depiction represents the macrocosm, from the exterior sphere of the fixed stars through the seven planetary spheres to four unmarked spheres which designate the elements.¹⁰⁷ The inner circle represents the microcosm of man. Its representation with arms and legs extended to the outline of the circle shows clearly the merging of this idea with the ideal "Vitruvian man" portrayed by Leonardo da Vinci and others, which Francesco Giorgi in his *Harmonia Mundi* had presented as a symbol of the divine and human proportions of architecture and music.¹⁰⁸ To illustrate the close connection between the human souls and the

¹⁰⁶ Pl. *Ti*. 69b.

¹⁰⁷ Joscelyn Godwin, *Robert Fludd: Hermetic Philosopher and Surveyor of Two Worlds* (Boulder: Shambhala, 1979), 68–69.

¹⁰⁸ Frances Yates, *The Theatre of the World* (London: Routledge & Kegan Paul, 1969), 43; Susan Visvanathan, "Medieval Music and Shakespeare's Sonnets", in *Wisdom of Community: Essays on History, Social*

stars explained in the *Timaeus*, the signs of the zodiac, equivalent to the fixed stars in the macrocosm, rule the different parts of the human being from the head (Aries) to the feet (Pisces), as indicated in the circle within which man is inscribed. The planets, Sun, and Moon in the macrocosm correspond to the spirit and soul situated in man's head. To the elements and their qualities in the macrocosm correspond the four humours, organs, and temperaments of Galenic medicine: fire and heat to the heart; blood and the sanguineous temperament, air, and dryness to the liver; yellow bile and choleric temperament, water, and humidity to the brain; phlegm and the phlegmatic temperament, earth, and cold to the stomach and intestines; and black bile and the melancholic temperament to the spleen.¹⁰⁹ The macrocosm and microcosm of man are turned with a rope by the winged figure of Time, who carries an hourglass on his head, the "moving likeness of eternity" of the *Timaeus*, "an everlasting likeness moving according to number".¹¹⁰ Fludd's figure absorbs the Timaean belief that harmonious motions and changes in the human body and soul are regulated according to the rules of the harmonic structure of the World Soul.¹¹¹

Within the history of medicine, the strictly non-medical content of the *Timaeus* prompted the argument that bodily rhythms in general and the pulse in particular corresponded with the harmonic structure of the World Soul, and that the pulse corresponded in a special way with its harmonious motions.¹¹² Calcidius commented on the presentation of music at 47d as a means to restore a human being to its original harmonious state, that the soul's "natural activity consists of rhythms and modes, but the latter fade owing to soul's association with body", and "that the souls of many are consequently deprived of modulation

Transformation and Culture (New Delhi: Bloomsbury, 2022), 219–233, at 222. See further Temple, Chapter 14, below.

¹⁰⁹ Galen, *On the Natural Faculties*, 2.8-9, 107–142K, trans. Arthur J. Brock, LCL 71 (1916), 166–219. ¹¹⁰ Pl. *Ti*. 37d.

¹¹¹ Pl. Ti. 35a–36b.

¹¹² Nancy G. Siraisi, *Medieval & Early Renaissance Medicine: An Introduction to Knowledge and Practice* (Chicago: University of Chicago Press, 1990), 114–139.

[tuning to the harmony of the World Soul]".¹¹³ Later, however, other scholars saw the body as more than an impediment to the harmony of the soul. They formulated theories in which bodily harmonies were conceptualized as expressions of spiritual harmonies. Augustine, for example, in his *De musica* (*On Music*), expressed the belief that the rhythms of the pulse and of breathing in the human body are produced by the soul, in which number, or rhythm, is inherent: "even if I do not doubt that the different pulses of the veins and the intervals of breathing are produced according to the constitution of the bodies, who would dare to deny that they are produced by an activity of the soul?"¹¹⁴

The *Timaeus* was an important source for anatomical, physiological, and medical knowledge in the ancient, medieval, and Renaissance worlds and helped to formulate major concepts such as the humours and complexion (*complexio*).¹¹⁵ Scholars such as Galen used complexion for the mixture of the four elements in the human body; a healthy complexion was defined as a good balance, proportioned mixture, or harmony, between them. In addition, knowledge of human anatomy and physiology from the *Timaeus* was an important factor in the controversy between Galenists and Aristotelians about the principal members of a human body.¹¹⁶ On the basis of *Timaeus* 41d and 69d–72d, Galenists argued that three principal members – the brain, heart, and liver – each governed a distinct group of organs and functions. The Aristotelians, on the other hand, were convinced that the heart as the source of heat and life ruled the entire body. These conflicting theories were based on the different Platonic and Aristotelian views of the soul, which ultimately defined what human nature and health were or should be, and how mental and physical diseases should be cured. In the *Timaeus*, Plato argued that many diseases could be prevented or remedied by healthy lifestyle

¹¹³ Calc. Comm. 267; Magee, 542–545.

¹¹⁴ Augustine, *De musica* 6.3, in *De musica liber VI*, ed. Martin Jacobsson (Stockholm: Almqvist & Wiksell International, 2002), 14–15.

¹¹⁵ Siraisi, Medieval & Early Renaissance Medicine, 97–106.

¹¹⁶ Siraisi, Medieval & Early Renaissance Medicine, 107–109.

based on regimen and exercise. In his view, disorders caused by a disproportion between the human soul and body should be corrected, not by the intrusive action of medicaments, but by training the soul and body.¹¹⁷

The emphasis here on training and regimen, that is, on staying physically and mentally healthy and avoiding the need for drugs, is central to Plato's ethics. He believed that physical and mental health or sickness were associated with goodness or badness.¹¹⁸ This view laid the foundation for later theories about healthy living (*mens sana in corpore sano*) and about spiritual and religious forms of medicine.¹¹⁹

Traces of these controversies appear in Ficino's *Compendium*. Commenting on *Timaeus* 78b–80a, Ficino notes Plato's and Galen's ideas about the respiratory system and adds: "I agree ... with Galen when he protects Plato from his calumniators, who blame him, as if he would have said that drink entirely flows together through the rough trachea into the lung: a reproach, which would not even appear in the wildest dreams of a drunkard."¹²⁰ While Plato's general theories on human nature were often highly regarded and associated with Christian beliefs in the immortality of the human soul, but his explanations of human anatomy and physiology were often contradicted by doctors from the Aristotelian school.

In the following century, Vesalius too used the *Timaeus* as a source for his *De humani corporis fabrica* (*On the Structure of the Human Body*).¹²¹ Vesalius' book explains the work of Nature and the Creator in the human body and tries to update knowledge found in Plato and Galen against the backdrop of sixteenth-century views on human nature and medicine.¹²² In particular, Vesalius' work is testament to his study of Galen's Platonic treatise *De placitis*

¹¹⁷ Pl. *Ti.* 87b–89c.

¹¹⁸ Pl. *Ti.* 87d.

¹¹⁹ Juv. 10.356. See Ingomar Weiler, "Physiognomische Überlegungen zu Mens sana in corpore sano", in Claudia Klodt (ed.), *Satura lanx: Festschrift für Werner A. Krenkel zum 70. Geburtstag* (Hildesheim: Olms, 1996), 153–168.

¹²⁰ Ficino, *Compendium in Timaeum*, in *Commentarium in Platonem* (Florence: Laurentius de Alopa, 1496), chapter 46, 79v.

¹²¹ Andreas Vesalius, *De humani corporis fabrica libri septem* (Basel: Ioh. Oporinus, 1543).

¹²² Nancy G. Siraisi, Medicine and the Italian Universities, 1250-1600 (Leiden: Brill, 2001), 262–286.

Hippocratis et Platonis (On the Doctrines of Hippocrates and Plato). Ficino had also studied this source, but the Greek and Latin editions of Galen's work printed in Paris between 1525 and 1536 prompted a particular revival of interest at this time. Galen's work was summarised by Johann Guinther von Andernach (1505–1574), Vesalius' teacher, in his Institutiones, which inspired Vesalius to write his Fabrica, and the many Latin translations of Galen's works by Guinther von Andernach included the De placitis Hippocratis et Platonis in 1534.¹²³ That treatise includes, for example, a Timaean account of the work of the Demiurge (opifex) in shaping human anatomy: "If you enumerate the purposes of the [anatomical] structure and then find each of them perfectly executed, you will have a clear view of his greatness; I refer to the divine craftsman."¹²⁴ The idea in *Timaeus* 47b–d that man is born to contemplate both the nature of the cosmos and human nature is reflected in Vesalius' Fabrica in an example of purposive design in human anatomy taken straight from Galen. Vesalius explains that the lower belly and the bowels are created to hold food and drink so that the body would not crave fresh nourishment too soon and have time for philosophy in accordance with the most divine part of his nature; Galen's source for the last idea was probably *Timaeus* 73a.¹²⁵ Both Ficino and Vesalius used the *Timaeus* to formulate a Christian account of the human body and soul.

These examples illustrate that scholars of human nature and medicine who consulted the *Timaeus* as a source of knowledge sometimes had difficulty in making sense of its

¹²³ Claudii Galeni Pergameni De Hippocratis et Platonis placitis opus eruditvm, et philosophis & medicis utilissimum, nouem libris (quorum primus desideratur) nunc latinitate donatum, trans. Johann Guinther von Andernach (Paris: Simon de Colines, 1534). See Stefania Fortuna, "Editions and Translations of Galen from 1490 to 1540", in Tarrant (ed.), Brill's Companion to the Reception of Galen, 437–452, at 445.

¹²⁴ Gal. De Placitis Hippocratis et Platonis 9.8, in Galen, On the Doctrines of Hippocrates and Plato, ed. Phillip De Lacy (Berlin: Akademie-Verlag, 1978–84), II, 13–14. On the Renaissance reception of the treatise, see Vivian Nutton, 'De Placitis Hippocratis et Platonis in the Renaissance', in Paola Manulli and Mario Vegetti (eds.), Le opere psicologiche di Galeno: atti del terzo colloquio galenico internazionale, Pavia, 10-12 Settembre 1986 (Naples: Bibliopolis, 1988), 281–309. Quoted in Siraisi, Medicine and the Italian Universities, 279.
 ¹²⁵ Vesalius, De Humani Corporis Fabrica libri septem (Basel: Johannes Oporinus, 1543), 1.12, 96. Quoted in Siraisi, Medicine and the Italian Universities, 263. For the new digitized version of the Fabrica, see https://www.vesaliusfabrica.com/en/original-fabrica/the-art-of-the-fabrica/newly-digitized-1543-edition.html.

anatomical and physiological explanations. Nonetheless, as this book sets out in further detail, the dialogue continued to provide knowledge and inspiration for theories about the human soul and body and the connections between them, and about healing. The dialogue inspired both philosophy of the body and medicine of the soul. In its Latin reception, Galen and his views on human nature and medical cures were an important focus, while in the Byzantine reception the cure and salvation of the soul were the subject of many theories.¹²⁶

Three chapters in particular discuss the place of the *Timaeus* in the study of anatomical and physiological theory and medicine. Robert Vinkesteijn shows how in his reading of the dialogue Galen attempted to distinguish between scientific knowledge and more speculative positions in Plato's dialogue. Frederick Lauritzen explores the Byzantine use of the *Timaeus* to formulate conceptions of mental and physical health and disease and theories of bodily and spiritual healing. Finally, Jacqueline Vons analyses how Vesalius presented a new view of human nature out of the *Timaeus*. Together, they illustrate the creative uses of Plato's *Timaeus* to shape the discipline of medicine from late antiquity to the early modern era.

4.4 Architecture: Rewriting Plato: from Demiurge Craftsman to Designing Architect

The classic example of the influence of the *Timaeus* on the design of an actual building is the plan of the church of San Francesco della Vigna in Venice by the Renaissance philosopher Francesco Giorgi or Zorzi (1466–1540).¹²⁷ Giorgi tried to build the fabric of the church with

¹²⁶ See Barbara Zipser, 'Galen in Byzantine *iatrosophia*', in *Brill's Companion to the Reception of Galen*, 111– 123. For the later reception of Galen, see now Matteo Favaretti Camposampiero and Emanuela Scribano (eds.), *Galen and the Early Moderns* (Cham: Springer International, 2022).

¹²⁷ Rudolf Wittkower, *Architectural Principles in the Age of Humanism* [1949] (New York, London: W.W. Norton & Company, 1971, 155–157.

the harmonious proportions of the World Soul, because he believed that by imitating the Architect of the Cosmos he could create a building, in which human beings could experience the harmony, order, and beauty of the universe. As this book demonstrates, he thereby stood in a long tradition of thinkers who used the *Timaeus* as a source for ideas about architecture.

Although the *Timaeus* does not make explicit the relationship of Plato's use of proportion theory to architecture, there are hints both here and in the Critias that architects might be expected to employ geometrically based proportions modelled after the creation of the universe and its components. A key passage is the first appearance of the Demiurge in the *Timaeus*, in which is explained that He "uses a model ... in fashioning the form and quality of his work".¹²⁸ It may be obvious in retrospect that this comparison of the formation of the universe to an artist following a model lends itself to adoption by architects to conceptualize their designs. Yet the image of the Demiurge as an architect is not overt in Plato's text. The sense of demiurge here is like that of the workman mentioned by Socrates in the Philebus, who paints pictures in our souls.¹²⁹ Terminology from carpentry and painting colours the picture of the Creator of the world as "maker" and of the "likeness" and "model" in relation to which his work is "fashioned".¹³⁰ Plato's image, however, is ambiguous and has the potential to go beyond those fields. None of the three later passages in which the Demiurge appears by name is explicitly architectural, but each could be accommodated to such an understanding.¹³¹ Even though at the close of the dialogue Plato declares the cosmos to be not a structure but "a visible living creature", later readers could bring out hints of the materiality of the cosmos to strengthen the architectural analogy. Plato's image of the spherical shape of that "living

¹²⁸ Pl. *Ti*. 28a–b.

¹²⁹ Pl. *Phileb*. 39b; cf. Simone de Oliveira Gonçalves Bondarczuk, "O demiurgo da alma como um ζωγράφοs: estudo do excerto 38b–39c do 'Filebo'", in Maria de Fátima Silva, Maria do Céu Fialho, and Maria das Graças de Moraes Augusto (efs.), *Casas, património, civilização: "nomos" versus "physis" no pensamento grego*, Humanitas Supplementum, 62 (Coimbra: Impr. Da Universidade de Coimbra, 2019), 195–209.
¹³⁰ Pl. *Ti.* 28c–29b.

¹³¹ Pl. *Ti*. 41a.

creature that was to embrace all living creatures within itself", "turned" on the lathe as by a carpenter, would become an image of architectural perfection; and architects later interpreted the use of geometrical proportions to create the World Soul and lesser souls as a paradigm for architectural design.¹³² For the moment, however, the primary images of Plato's text were from carpentry and mimetic art, and the architectural reading of the *Timaeus* no more than implicit.

It was not long before readers began to flesh out those architectural implications. In the first century B.C.E., there was a clear tendency to see the creation of the world in an architectural sense, which has been described as an "upgrading of the demiurgic metaphor".¹³³ Epicureans rejected the Platonic vision precisely because of its apparent architectural analogy which they regarded as implausible. In Cicero's *De Natura Deorum* (*On the Nature of the Gods*), Velleius tells his audience to expect from him no "fabricated ideas or bilge, no workman or builder of the world, the god from Plato's *Timaeus*".¹³⁴ Parodying Plato's account, he mocked the apparent difference between the creation of the world and human constructions: "With what mental vision was your Plato able to observe that erection of such a large structure by means of which he makes the world be built and constructed by a god?" He continued by asking: "What contrivance or iron implements or crowbars or scaffolding were used, what assistants were there in such a great project? How then

¹³² Pl. *Ti.* 92c ("living creature"); 33b (sphere); and 35b–36b (proportions of the world soul). For more on the last passage and the argument about its relation to Greek theory in architecture and music, see Edmund Thomas, 'Beyond the Cosmos: the creation of music out of architecture in Magna Graecia', in Pierre Destree (ed.), *The Beauties of Song. Aesthetic Appreciations of Music in the Greek and Roman World* (Cambridge: Cambridge University Press, forthcoming).

¹³³ David T. Runia, Philo of Alexandria, *On the Creation of the Cosmos according to Moses* (Leiden: Brill, 2001), 140–141; cf. id., *Philo of Alexandria and the Timaeus of Plato* (Leiden: Brill, 1996), 165–169. For the relation of this conception to ideas of architecture in the Roman world, see Edmund Thomas, *Monumentality and the Roman Empire: Architecture in the Antonine Age* (Oxford: Oxford University Press, 2007), 20–21. ¹³⁴ Cic. *D. Nat.* 1.8.18. The translation 'craftsman-god' in *Cicero, The Nature of the Gods*, ed. P. G. Walsh

⁽Oxford: Oxford University Press, 1998), 9 neglects the metaphor in Cicero's opificem aedificatoremque mundi.

were earth, air, fire, and water capable of obeying and submitting to the purpose of the architect?"¹³⁵

This rhetorical hyperbole and parodic representation of cosmic architecture hints at how readily contemporary philosophers perceived the universe created by Plato's Demiurge as an architect's design. In Cicero's own partial version of Plato's text written a few months previously, he claimed that "there is nothing more beautiful than the world or more outstanding than its builder", betraying the centrality of the architectural analogy to his understanding of the *Timaeus*.¹³⁶ A little later, the architect Vitruvius imagined the arrangement of poles in the universe by the "power of nature" as an architectural design (*architectata*).¹³⁷

By the first century C.E., the Jewish thinker Philo of Alexandria reiterated the architectural rendering of the *Timaeus* as analogous to the "stones, timbers, and instruments" employed by a craftsman (*dêmiourgon*) in building a city.¹³⁸ In his *De Opificio Mundi*, commenting on the Hexaëmeron, he likened God's creation of the universe to an architect designing a Roman provincial city, who "first sketches in his mind almost all the parts of the city to be completed, sanctuaries, gymnasia, ... foundations of houses and other public buildings", and then, "after receiving in his own soul, as if in wax, the several figures of these objects, carries around the image of a city which is the creation of his mind" and "begins to build the city of stones and timber, keeping his eye on his pattern and making the visible and tangible objects correspond in each case to the incorporeal ideas".¹³⁹ In his *Allegorical Interpretation of Genesis*, he explains the belief that the wonders of nature were created by

¹³⁵ Cic. D. Nat. 1.18-19.

¹³⁶ Cic. *Tim.* 7. On the composition of Cicero's *Timaeus* translation and his *De Natura Deorum* in 45 B.C.E. and the relative dating of the two works, see David Sedley, "Cicero and the *Timaeus*", in Malcolm Schofield (ed.), *Aristotle, Plato, and Pythagoreanism in the first century B.C.: new directions for philosophy* (Cambridge: Cambridge University Press, 2013), 187–205.

¹³⁷ Vitr. *De Arch*. 9.1.2.

¹³⁸ Philo, Cher. 125–7.

¹³⁹ Ibid. 1.17–20.

God through an analogy with the admiration of earthly works of architects: "Just as someone enters a very large building or a city, when he looks on this universe and sees ... planets and fixed stars moving in rhythmical harmony ..., floods of water and air ordered within its boundary, and ... living creatures, ... plants and fruits in great variety, he will surely argue that these have not been wrought without consummate art, but that the Maker of this whole universe was and is God'.¹⁴⁰ Philo's lyrical vision of the creation, in *De praemiis et poenis (On Rewards and Punishments)* compares the natural beauties of the world to the sights of a city viewed for the first time.¹⁴¹

The architectural conception of Plato's Demiurge formulated by scholars like Philo became enshrined in Middle and Neoplatonism. In the mid-second century, Apuleius saw the God of the *Timaeus*, incorporeal and one, as "the creator and builder of all things".¹⁴² Even those who otherwise conceptualized the Demiurge differently, like the second-century philosopher Atticus, who imagined him as a craftsman of furniture, cited the parallel with builders repairing their constructions to answer Aristotle's objection that the world could not be created from nothing, suggesting that this was evidence that the world could not only be created anew, but restored and preserved.¹⁴³

In the fourth century, Calcidius referred explicitly to "the architect God" assigning parts of the soul to mortals and translated the Greek *dêmiourgos* by the Latin *opifex* ("craftsman"), which Cicero had used alongside the more explicit *aedificator* ("builder").¹⁴⁴

¹⁴⁰ Philo, Leg. Alleg. 3.32.97–99, trans. F. H. Colson and G. H. Whitaker, LCL 226 (1929), adapted.

¹⁴¹ Philo, *De praemiis et poenis* 41–42, in *Philonis Alexandrini opera quae supersunt*, ed. Leopold Cohn, vol. 5 (Berlin: Reimer, 1906; repr. Berlin: De Gruyter, 1962), 345.5–17.

¹⁴² Apul. De Plat. 1.5 (following Oudentorp's generally accepted emendation of *extractor* to *exstructor*); cf. 1.11 (*architectus*). *Imperial Plato: Albinus, Maximus, Apuleius: text and translation, with an introduction and commentary*, ed. Ryan C. Fowler (Las Vegas: Parmenides Publishing, 2016), 152 and 171 with notes.

¹⁴³ Procl. *In Ti.* I. 366.9–13 = Atticus fr. 13, in George Boys-Stones (ed.), *Platonist Philosophy* (Cambridge: Cambridge University Press, 2018), no. 6Q.

¹⁴⁴ Calc. *Comm.* 137: *iussu et ordinatione architecti dei*; Magee, 347. Calc. *Ti.* 28c (translated as "craftsman" by Magee, 43); cf. Cic. *D. Nat.* 1.8.18; Quint. 2.15.4: *dicens esse rhetoricen persuadendi opificem, id est* πειθοῦς δημιουργόν.

There is also a parallel analogy here to sculpture, not architecture. Yet it was no ordinary sculpture which Calcidius cited to explain the two senses of form in *Timaeus* 51b, the one "by which matter is adorned" and the one "in the likeness of which the form assigned to matter is made". He pointed to the statue of the Capitoline Jupiter at Rome, the "one form in the ivory and another which the artist Apollonius absorbed in his mind and by directing his mental gaze toward it gave polished form to the ivory".¹⁴⁵ Whether or not this Apollonius is the Athenian, son of Nestor, whose signature is on the Belvedere Torso, or his sculpture was intended for Sulla's rebuilding of the temple and meant to emulate Phidias' statue of Zeus at Olympia, Calcidius' choice of this statue to illustrate the creation of the universe gains traction from its representation of Jupiter king of the gods in his greatest temple in antiquity.¹⁴⁶

The analogy between temple and universe is important in the reception history of the *Timaeus*. In allusion to the end of Plato's dialogue, Plutarch describes the universe as "a most holy temple and most worthy of a god; into it man is introduced through birth as a spectator ... of those sensible representations of knowable things that the divine mind, says Plato, has revealed'.¹⁴⁷ Around the same time, Dio Chrysostom too pictured the universe as "not a little building erected by the Athenians for the reception of a small company, but ... a varied and cunningly wrought creation".¹⁴⁸ In the medieval period, builders of churches followed Augustine, who cited Plato's statement of the pleasure of God on the completion of his perfect creation and echoed the biblical conception of God as architect and mathematician, arranging

¹⁴⁵ Calc. *Comm.* 337; trans. Magee, 653–655. Cf. *Comm.* 343 (Magee, 665), explaining *Ti.* 51d–52a by the example of re-used sculpture.

¹⁴⁶ Sheldon Nodelman, 'The portrait of Brutus the Tyrannicide', *Ancient Portraits in the J. Paul Getty Museum*, 1 (1987), 41–86.

¹⁴⁷ Plut. De tranq. anim. 477c-d: trans. W. C. Helmbold (LCL 337, 1939), 239. Cf. Pl. Ti. 92c.

¹⁴⁸ Dio Chrys. Or. 12.34.

his Creation "by measure and number and weight" (*Wisdom* 11:21), and saw their creations correspondingly as imitations of the divine masterplan.¹⁴⁹

The presence of harmonic proportion in medieval buildings such as churches is common knowledge, but the role of the *Timaeus* in the history of medieval architecture is complex. In this period, architectural design had to reflect cosmic order and harmony, and, in analogy with the creation of the cosmos by the divine Architect, the medieval architect used arithmetic and geometry as point of departure for his buildings. Harmonic proportions and geometric forms served as both a model for developing the design and structure of buildings and a symbolic language to associate architectural design with the harmonic structure of the World Soul (*Timaeus* 35a–36d) and to give meaning to it.

By the Renaissance, architects commented explicitly on the harmonic structure of the World Soul described in *Tim*aeus 35b–36b and tried to emulate God's design of the universe in microcosm. Since man was made in God's image, the proportions exemplified in the human body (*musica humana*) should reflect the divine harmony, order, and beauty of the macrocosm (*musica mundana*). Drawings by Francesco di Giorgio (1439–1501) illustrate how such 'human music' could be used to design a church (Fig. 1.4).

[Insert Fig. 1.4 here.]

Fig 1.4. Francesco di Giorgio, design for a church based on the concept of *musica humana*. Drawing from the Codex Magliabechiano, Biblioteca Nazionale, Florence. Image: public domain.

¹⁴⁹ August. *De civ. D.* 11.21. For cathedral architecture as "a microcosm in stone and artwork of the whole cosmos", see Philip Sheldrake, *The Spiritual City: Theology, Spirituality and the Urban* (Malden, MA: Wiley Blackwell, 2014), 60.

Yet, while Francesco di Giorgio's inspiration from ideas about cosmic and human music in the *Timaeus* commentary tradition is not in doubt, many questions remain about the influence of the *Timaeus* on the discipline of architecture in antiquity, the Middle Ages, and the Renaissance.

The three chapters in this book that discuss the discipline of architecture continue this debate, exploring how in the built architecture of later antiquity, the Middle Ages, and the Renaissance reinforced these conceptual shifts, and vice versa, in the understanding of Plato's Demiurge and His creation by adapting concepts of cosmology and harmony from the Timaeus. Edmund Thomas pursues the inspiration of Plato's text for architects in the later Roman Empire, particularly Aelius Nicon of Pergamon, for whose son Galen architecture took the place of music in the quadrivium, showing the art of construction as both a variety of musical harmonics and an independent discipline.¹⁵⁰ He shows how Nicon's theoretical writings on geometry, framed within an account of cosmic order based on the Timaeus, were adapted by sixth-century Neoplatonists to reconcile Platonic and biblical accounts of Creation. Subsequently, John Hendrix crucially takes further our understanding of the legacy of the *Timaeus* on the medieval conception of God as divine architect by showing how its influence is detectable in the very structure of churches, even in the absence of an explicit link between the dialogue and architecture. His arguments based on architectural observation of analogies between the structures of early Gothic vaulting at Durham and Lincoln complement the evidence for the awareness of the *Timaeus* and other philosophical texts at these intellectual centres. His chapter also tallies with Nicholas Temple's closer focus on the Timaean roots of Italian fifteenth-century architecture. Temple examines how Plato's dialogue shaped developments in the conceptualisation of pictorial space in fifteenth-century

¹⁵⁰ Galen, *De propriorum animi cuiuslibet affectuum dignotione et curatione*, in *Galeni de propriorum animi cuiuslibet affectuum dignotione et curatione*, ed. W. de Boer, Corpus Medicorum Graecorum 5.4.1.1 (Leipzig: 1937) 3–37 (= Kühn, vol. 5, 42.5–6).

Florence and argues that the imagination of spatial perspectives in this period rested on a comparison of the human observer in space with the infinite vision of the divine Creator.

Through its cross-disciplinary focus on these four key areas of learning in pre-modern Europe, this book demonstrates how, from the time of its composition long into the early modern period, the *Timaeus* remained not only a text for philosophers, but one of formative instruction and relevance for a wide range of intellectual and cultural fields. We hope that the wide range of application that this formative text has offered writers and artists for thinking about the world, human psychology, and human creations will continue long into the future.

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