

1 | Many Worlds

In this chapter, I consider Christian responses to the proposal that our world is one of many.¹ From this, among other things, will emerge the surprising lesson about relations between ‘theology and science’ that what sometimes held people back was the science of the day, not the theology. As the subject for a first chapter, it also usefully presents us with an area where the story is now settled: there *are* other planets – what these authors would call worlds – whether or not there is other life.² We will also see how discussion of a topic that remains limited to this globe – whether there would be humanity on the other side of the equator, and whether it would be related to us or not – provides a parallel to interest in other worlds, reaching back into the patristic period.

Questions about the extent of the cosmos, and whether life is to be found elsewhere within it, have been posed by philosophers and scientists for as far back as Western philosophy is recorded. Anaximander (c. 610–c. 546 BC) held that the cosmos is eternal, and

¹ On this topic, see Michael J. Crowe, *The Extraterrestrial Life Debate, 1750–1900* (Mineola, NY: Dover, 1999); Michael J. Crowe, ed., *The Extraterrestrial Life Debate: Antiquity to 1915 – A Source Book* (Notre Dame, IN: University of Notre Dame Press, 2008); Arnould, *Turbulences Dans l’univers*; Pierre Maurice Marie Duhem, *Medieval Cosmology: Theories of Infinity, Place, Time, Void, and the Plurality of Worlds*, trans. Roger Ariew (Chicago: University of Chicago Press, 1985).

² Recognising Peter Harrison’s work in *The Territories of Science and Religion* (Chicago: University of Chicago Press, 2015), we may do well to recognise that categories like ‘religion’ and ‘science’ are not unvarying over time. Nonetheless, the point I make here stands, that we will observe some unexpected relations between attention to theological sources and reflection on the character of physical reality in this story.

that it contains an infinite number of worlds, continually perishing and coming to be.³ Belief in the presence of countless worlds (known as ‘pluralism’ in this context), even an infinite number, was revived by atomist philosophers such as Democritus (c. 460–c. 370 BC) and Epicurus (341–270 BC).⁴ They held that some of these worlds were inhabited, as the Christian theologian Hippolytus of Rome recorded:

Democritus ... spoke as if the things that are were in constant motion in the void; and that there are innumerable worlds, which differ in size. In some worlds there is no sun and moon, in others they are larger than in our world, and in others more numerous. The intervals between the worlds are unequal; in some parts there are more worlds, in others fewer; some are increasing, some at their height, some decreasing; in some parts they are arising, in others failing. There are some worlds devoid of living creatures or plants or any moisture.⁵

Epicurus, however, departed from Democritus in supposing that every one of these worlds would be inhabited. Early Christian writers were aware of some of this tradition. Basil the Great refers to them, for instance, in his *Homilies on the Six Days of Creation*, writing that “There are among them [‘Greek sages’] some who say there are infinite heavens and worlds’.⁶

³ The sources for Anaximander’s position include Simplicius, *Commentary on Aristotle’s Physics*, 1121, 5–9 and Cicero, *On the Nature of the Gods* (I, 10, 25). Cited by Mark Brake, *Alien Life Imagined: Communicating the Science and Culture of Astrobiology* (Cambridge: Cambridge University Press, 2012), 12.

⁴ Jacques Arnould considers antiquity in *Turbulences Dans l’univers*, 35–45. Michael Crowe collects and discusses texts from antiquity in *Extraterrestrial Life Debate – Source Book*, 3–13. For a brief survey of secondary literature, see Klaas J. Kraay, ‘Introduction’, in *God and the Multiverse: Scientific, Philosophical, and Theological Perspectives* (London: Routledge, 2014), 15, n. 6.

⁵ On Democritus and Epicurus, see Brake, *Alien Life Imagined*, 24.

⁶ Basil, *Homilies on the Six Days of Creation*, III.3, translation from *The Treatise de Spiritu Sancto, the Nine Homilies of the Hexaemeron and the Letters of Saint Basil the Great*, trans. Blomfield Jackson (Edinburgh: T&T Clark, 1895), 66. A translator’s footnote (66, n. 1) gives Anaximander (Diogenes Laertius, *Lives of Eminent Philosophers*, II.1.2) and Democritus (*Lives*, IX, 44).

Plato offered a different view of cosmic life, which would be influential among many Christian writers: that the cosmos as a whole is a living being, animated by a world soul.⁷ However, he also held the world to which we belong to be the only one, out of likeness to its archetype (which must itself be single and unique, since multiplicity in the archetype would then call for a yet more ultimate exemplar).⁸ This is rather an unusual argument for Plato to make, given that his account of exemplarity more generally imagines many physical copies of each perfect exemplar. He also held the stars to be living beings or ‘heavenly gods’: the ‘fixed stars’ are ‘living beings divine and everlasting’, and the ‘wandering stars’, or planets, are ‘visible and generated gods’.⁹

Aristotle followed Plato in holding to only one world, on the physical basis that he could not imagine more than one centre of gravity to which all solid matter would be drawn, nor more than one worldly circumference that the element of fire would seek.¹⁰ He was more circumspect than Plato about the stars and planets as living beings, but wrote nonetheless that ‘We think of the stars as mere bodies ... entirely inanimate; but we should rather conceive of them as enjoying life and action ... We must, then, think of the action of the stars as similar to that of animals and plants’.¹¹ Among later classical writers, Lucretius (c. 99–c. 55 BC) proposed multiple

⁷ *Timaeus* 34A–37C. Kepler wrote that ‘we freely enquire what the nature of each mind may be, particularly if in the heart of the world it plays the part of the soul of the world, and is more tightly tied to the nature of things’ (*The Harmony of the World*, trans. Eric J. Aiton, Alistair Matheson Duncan, and Judith Veronica Field (Philadelphia: American Philosophical Association, 1997), 495).

⁸ Plato, *Timaeus*, 31a–b.

⁹ Plato, *Republic*, 508a, translation from *Republic*, trans. Robin Waterfield (Oxford: Oxford University Press, 1994), 234; *Timaeus* 40b, 40d, translation from *Plato’s Cosmology: The Timaeus of Plato*, trans. Francis Macdonald Cornford (Indianapolis, IN: Hackett, 1997), 118, 135.

¹⁰ Aristotle, *On the Heavens*, I.8, 276b and, more widely, I.8–9.

¹¹ Aristotle, *On the Heavens*, II.12, 292a. Translation from ‘On the Heavens’, in *Complete Works of Aristotle: The Revised Oxford Translation*, ed. J. Barnes, trans. J. L. Stocks, vol. 1 (Princeton, NJ: Princeton University Press, 1984), 481.

inhabited worlds in *De rerum natura*, while Lucian of Samosata (AD c. 125–after 180) explored ideas of multiple inhabited planets, with travel and war between them, in his novel *A True Story*.¹²

Theology and Science: Openness and Limitation

In turning to Christian writers (or indeed Jewish and Muslim writers), it is tempting to view their opinions on these matters as driven by theology rather than scientific concerns. In fact, they were often deeply interested in knowing and thinking about the nature of the physical world. For example, the Jewish philosopher and theologian Maimonides (Moses ben Maimon, 1135 or 1138–1204) was well-informed about aspects of astronomy, appreciating the scale of the solar system, for instance. He estimated the distance between the Earth and Jupiter to be around 125,000,000 miles.¹³ He was close: the distance is 365,000,000 to 600,000,000 miles, depending on the relative positions of the Earth and Jupiter on their orbits. As another example, Aquinas, while generally not as directly interested in matters of science as his teacher, Albert the Great (c. 1200–1280), appreciated that ‘as astronomers say, there are many stars larger than the moon’.¹⁴

The question of multiple worlds – taken at the time to mean a concentric system of spheres centred on Earth (or on another ‘Earth’) – had come to new prominence in the thirteenth century

¹² ‘You are bound to confess that there are other worlds in other regions and different races of men [*varias hominum gentis*] and generations of wild beasts’ (Lucretius, *De Rerum Natura*, trans. W. H. D. Rouse and Martin F. Smith (Cambridge, MA: Harvard University Press, 1924), book 2, lines 1075–76, pp. 178–79; Lucian, *A True Story* in *Lucian: Volume 1*, trans. Austin Morris Harmon (Cambridge, MA: Harvard University Press, 2006).

¹³ Moses Maimonides, *The Guide of the Perplexed*, trans. Shlomo Pines, vol. 2, 2 vols (Chicago; London: University of Chicago Press, 1974), III.14, quoted by Lamm, ‘Religious Implications’, 6.

¹⁴ *Summa Theologiae* (hereafter *ST*) I.70.1 *obj.* 5. On this not contradicting the description of the moon as a ‘great light’ (Gen. 1.16), see *ad* 5, and I.70.1 *ad* 3.

with the rediscovery of Aristotle. Strikingly, when that idea was rejected, as it often was, that was as much on scientific as theological grounds. Aristotle's science was thought to preclude the existence of other worlds. Theological principles, however, might go either way on this question: on the one hand, there seemed to be something appropriate about there being only one world, its singleness reflecting the one God; on the other, a greater, perhaps even infinite, number of worlds seemed to reflect the plenitude of God, and fit well with the reluctance of theologians to suggest any impediment to the power of God – a reluctance that would only grow with time.

Across the thirteenth century and into the fourteenth, we see a gradual softening towards the idea of many worlds.¹⁵ For an early medieval thinker such as William of Auvergne (c. 1180/90–1249), God simply could not have created any other worlds, whether finite or infinite in number, and 'this impossibility is not a defect in God, nor a defect issuing from God, rather it is a defect on the part of the world, which cannot exist in multiples'. He likened this to the 'impossibility' for God to know the square root of two ('the relation of the diagonal of a square to its side'), which might strike us today as placing an odd and unnecessary limit on God's knowledge.¹⁶

Albert was only slightly more open. His discussion of this topic in his *Commentary on Aristotle's Concerning the Heaven and the Earth* opens with the arresting claim that 'Since one of the most wonderful and noblest questions concerning nature is whether the world is one, or whether there are many worlds, and this is a question the human mind desires to understand per se, it seems fitting for us to

¹⁵ O'Meara lists four church fathers who may seem to discuss 'the divine power creating other worlds or with the existence of intelligent beings in or on heavenly bodies' (Thomas O'Meara, *Vast Universe*, 67). These passages, however, are in fact each either obscure or almost certainly about angels, and therefore offer little in terms of an acceptance of other, distinct physical dwelling places for life in the cosmos.

¹⁶ William of Auvergne, 'De Universo', in *Guilielmi Alverni Episcopi Parisiensis, Opera Omnia*, vol. 1 (Frankfurt am Maine: Minerva, 1963), prima pars principalis, pars I, ch. 16, fol. 100a–b (facsimile of Hotot, 1679). Translation from Duhem, *Medieval Cosmology*, 444.

inquire about it'.¹⁷ His argument is somewhat circuitous, but not complicated. He grants the cogency of those who argue for more than one world on the basis of divine power: 'there could be many worlds, although there are not, because God could have made them, had he wished to, and still could make them if he wished: again this I do not dispute'.¹⁸ The impediment to multiple worlds would again lie not on the side of God, but on the side of physical reality: in its 'parts, and its essential and proximal causes'.¹⁹ For instance, Albert thought that the rotating spheres of many worlds would come to touch one another, and therefore impede each other's motion.

Albert concluded that 'on account of what belongs to the nature of the world' – a scientific consideration, rather than a theological one – 'it is not possible for multiple worlds to come about, even if we to hold that God were to have the power to do it'.²⁰ Presumably, it could happen as a miracle, maybe an ongoing one, or if God had created a different sort of universe. A distinction between what is impossible on the part of the character of creation as it is, in contrast to what is possible as an express exercise of the power of God, had been set out earlier by Michael Scot (1175–c.1232): 'God can do this, but nature cannot withstand it. The impossibility of the plurality of worlds results from the nature of the world itself, from its proximate and essential causes; God, however, can make several worlds if he so wishes'.²¹ (Such comments, however, seem to lack the last word in clarity.) Later, as we will see, writers would come to discount any sense of the impossibility of multiple worlds on the part of physics.

For Albert, even were a universe of many worlds possible, it would lack fittingness – a theme that will recur across this book – since it would

¹⁷ Albert the Great, *Commentary on De Caelo et Mundo*, book 1, tr. III, ch. 1, in *Opera Omnia*, ed. Borgnet, vol. 9 (Paris: Vives, 1890), 65, my translation here and below.

¹⁸ Albert, *Commentary on De Caelo et Mundo*, book 1, tr. III, ch. 6, p. 80.

¹⁹ *Ibid.*, p. 81.

²⁰ *Ibid.*

²¹ Michael Scot, *Eximii atque: excellentissimi physicorum motuum cursusque* (Bologna: Justinianum de Ruberia, 1495), vol. 2, 146, translation from Duhem, *Medieval Cosmology*, 443.

set up a plurality of places or communities between which exchange would not be possible, yet the good of the whole is constituted by the interrelation of its parts. In writing this, Albert appears to assume that any other worlds would be inhabited, since isolation would stand particularly against ‘civic interchange’ (*commercione civium*).²²

In Aquinas we again find *scientific* arguments against many worlds, not least that bodies are attracted to one another – or, rather, he thinks, to the centre of our Earth – such that a multiplicity of worlds would eventually produce a collision.²³ Other arguments are more theological. Like Albert, he objected to worlds between which there could be no relation or interchange, since ‘whatever things come from God, have relation of order to each other, and to God Himself’.²⁴ To deny that the world is one would therefore be to deny that it is an interrelated whole, and therefore that there is an ‘ordaining wisdom’. He notes that for atomists such as Democritus, many worlds come about by chance, precisely without providence.

As I have noted, however, theological arguments could also seem to run the other way. Aquinas considered the fascinating objection that ‘nature does what is best and much more does God. But it is better for there to be many worlds than one, because many good things are better than a few. Therefore many worlds have been made by God’.²⁵ His reply was that more is not actually a good in itself (what he calls a ‘material multitude’): more is only better if it serves some purpose beyond extent (such as the augmentation of the excellence of the thing itself – its form). Indeed, offering a *reductio ad absurdum*, he points out that the more-is-better approach would ‘tend to infinity’, which he thought undid itself, since ‘the infinite is opposed to the notion of end’. That statement illustrates just how suspicious mediaeval Aristotelians were of the notion of a realised infinitude. Aquinas also distrusted the

²² Albert, *Commentary on De Caelo et Mundo* book 1, tr. III, ch. 6, p. 81.

²³ *ST I.47.3 ad 3*.

²⁴ *ST I.47.3*.

²⁵ *ST I.47.3 obj. 2*.

idea of multiple worlds on the basis that duplication of this world seemed futile, while additional novel worlds would not actually be new ‘worlds’ as much as additional parts of what would then count as a single wider whole:

If God were to make other worlds, He would make them either like or unlike this world. If entirely alike, they would be in vain – and that conflicts with His wisdom. If unlike, none of them would comprehend in itself every nature of sensible body; consequently no one of them would be perfect, but one perfect world would result from all of them.²⁶

Other figures would also deny that God could create many worlds, but that denial became increasingly controversial as the thirteenth century drew on.²⁷ This is the crucial juncture for the acceptance of the possibility of multiple worlds in Western Christianity. That God had not created other worlds remained uncontroversial, but that God *could* not – a position advanced by Aristotle’s most forthright and total advocates – provoked a backlash, most notably in the list of 219 propositions condemned by Étienne Tempier, Archbishop of Paris, in 1277. Among them we read that it must be denied that ‘the first cause cannot make more than one world’, as also that one must not deny the possibility of newness on the part of the action of God.²⁸

²⁶ Aquinas, Thomas, *Exposition of Aristotle’s Treatise on the Heavens*, trans. Fabian R. Larcher and Pierre H. Conway (Columbus, OH: College of St Mary of the Springs, 1963), book I, ch. 9, lect. 19, n. 197.

²⁷ Arnould lists Michael Scott, William of Auvergne, and Roger Bacon as other thirteenth century deniers (*Turbulences Dans l’univers*, 49).

²⁸ Propositions 27 and 22. Numbering from Pierre Mandonnet, *Siger de Brabant et l’averroïsme Latin Au XIIIe Siècle*, vol. 2 (Louvain: Institut Supérieur De Philosophie, 1908), 175–91. In an earlier numbering system, these are proposition 34 and 48. The condemnations are translated in Ralph Lerner and Muhsin Mahdi, eds., *Medieval Political Philosophy: A Sourcebook* (Ithaca, NY: Cornell University Press, 1972), 335–54. For a discussion, see Rik van Nieuwenhove, ‘The Condemnations of 1277’, ch. 15, in *An Introduction to Medieval Theology* (Cambridge: Cambridge University

Although at least one prominent Franciscan, Francis Bacon, would oppose belief in many worlds, others were central to a trend to respond to the Parisian condemnations by embracing the possibility of a plurality of worlds.²⁹ Bonaventure (1221–1274) taught emphatically that God could create a plurality of worlds. He took it for granted that God could also make another world in another place, and indeed could ‘make a hundred worlds in different locations’.³⁰ Richard of Middleton (c. 1249–1308) illustrates a significant ease with the prospect of worlds that are independent from each other, in contrast to Albert and Aquinas and their worries on that score. Richard could write that ‘I understand by universe a set of things a single surface contains’. On that basis, ‘In the same fashion that the earth of our universe rests naturally in the centre of the first universe, the earth of the second universe would rest naturally in the centre of the universe to which it belongs’. They would be happily and distinctly bounded, and matter placed anywhere within a ‘universe’ (or discrete portion of it) would tend towards the local centre.³¹

Press, 2012) and Edward Grant, ‘The Condemnation of 1277, God’s Absolute Power, and Physical Thought in the Late Middle Ages’, *Viator* 10 (1979): 211–44. Among those holding to the ‘non-impossibility’ of multiple worlds in the thirteenth century, Arnould lists Geoffrey of Fontaine, Henry the Great, Richard of Middleton, William of Ware, John of Bassols, and Thomas of Strasbourg, followed by John Buridan and William of Ockham in the fourteenth (*Turbulences Dans l’univers*, 51–53).

²⁹ Duhem, *Medieval Cosmology*, 444–46.

³⁰ *Commentaria in Quatuor Libros Sententiarum*, I, D. 44, art 1, q. 4, Opera Omnia, 1882, I, 780, quoted by Grant McColley and H. W Miller, ‘Saint Bonaventure, Francis Mayron, William Vorilong, and the Doctrine of a Plurality of Worlds’, *Speculum* 12, no. 3 (1937): 387.

³¹ Richard of Middleton, *Commentary on the Sentences*, book 1, dist. 43, art. 1, q. 4, from *Magistri Ricardi de Mediavilla, Seraphici Ord. Min. Convent. Super Quatuor Libros Sententiarum, Petri Lombardi Quaestiones Subtilissimae*, vol. 1 (Brescia: Vincentium Sabbium, 1591), 392b–393a, translation from Duhem, *Medieval Cosmology*, 452. As Duhem notes, at stake here, in the later Middle Ages, are notions of gravity and attraction, between the Aristotelian idea of bodies moving to their own ‘proper place’ – such as the Earth, for the element of earth – and a more general account of attraction, which Duhem diagnoses as more Platonic (Ibid., 472–79).

Richard's contemporary William of Ware (or William Varon) made a useful distinction between meanings of the term 'world'. It can mean 'the universality of creatures taken all together', in which case, there could be no other worlds: they would be 'only a portion of the [wider] universe'. Alternatively, it can mean 'another celestial sphere', which is how he chooses to use it.³² William also offers a helpful analysis of the non-impossibility of plural worlds (in the second sense) approached variously in terms of 'the Producer', 'what is produced' anew, and 'the world already created'.³³

William of Ockham (1285–1347) again held that God could make other worlds, and indeed could 'make a world better than this one'. He offered a pair of refutations to counterarguments from Aristotle that would turn up across this literature. The first is that while our cosmos might contain all the matter of *this cosmos*, that does not prevent God from creating other matter elsewhere, and thus other things. God can make any number of individuals of a given species on Earth, and since 'God is not constrained to produce them in this world; He can produce them outside this world, and thereby make another world in the same fashion that He made this world'.³⁴ The second angle is the one we saw in Richard of Middleton, about the non-attraction of independent universes. Matter in one world is attracted within that world, and matter in another, within that one.³⁵

Among these Franciscans, we should consider finally William of Vaurouillon (c. 1392–1463/64).³⁶ He distinguished two questions,

³² William of Ware, *Guillelmi Varronis Seu de Waria in IV Sententiarum Libros Commentarius* (Bibliothèque Municipale de Bordeaux, MS 163), book 2, q. 8, fol. 96, col. C, translation from Duhem, *Medieval Cosmology*, 455.

³³ William of Ware, *ibid.*, translation from Duhem, *ibid.*

³⁴ William of Ockham, *Scriptum in Librum Primum Sententiarum (Ordinatio), Distinctiones 19–48*, ed. Girard Etzkorn and Franciscus Kelley (St Bonaventure, NY: Franciscan Institute, 1979), dist. 44, q. unica, p. 655, translation from Duhem, *Medieval Cosmology*, 462–63.

³⁵ Ockham, *In Librum Primum Sententiarum*, dist. 44, q. unica, pp. 657–58.

³⁶ McColley and Miller, 'Plurality of Worlds', 386, n. 2. They call him William Vorilong.

answering positively to both: whether God could create an infinite number of worlds, and whether God could make an infinitude of worlds better than this one.

If it be inquired whether a whole world is able to be made more perfect than this universe, I answer that not one world alone, but that infinite worlds, more perfect than this one, lie hid in the mind of God. If Democritus, who posits actual infinite worlds, rightly understood this fact, he would have understood rightly. If it then is asked how the second world cleaves to this one, I answer that it would be possible for the species [i.e. character – not living ‘species’] of this world to be distinguished from that of the other world. If it be further inquired where it could exist, I answer that it would be able to be placed above any part of the heaven, south, or north, east or west ...³⁷

Vaurouillon is often cited in theological discussions of astrobiology as the first theologian to discuss themes such as sin, salvation, and multiple Incarnations (however briefly).³⁸ I will return to him in Chapter 13.

The fifteenth century also brings us to Nicholas of Cusa (1401–1464), Cardinal and Bishop of Brixen, notable in *On Learned Ignorance* (completed in 1440) not only for his advocacy of a plurality of worlds but also for his relativisation of the Earth: “Therefore, the earth is a noble star which has a light and a heat and an influence that are distinct and different from [that of] all other stars, just as each star differs from each other star with respect to its light, its

³⁷ Guillelmus Vorrilong, *Guillelmus Vorrillong Super Quattuor Libris Sententiarum Nouiter Correctus [et] Apostillatus*, 1502, book 1, dist. 44, f72r, translation from McColley and Miller, ‘Plurality of Worlds’, 387.

³⁸ McColley and Miller write that de Vaurouillon ‘was sufficiently impressed by this probability [the existence of more than one world] to so re-interpret fundamental Christian beliefs that they were not in conflict with the idea of more than one inhabited globe’ (McColley and Miller, ‘Plurality of Worlds’, 389). This goes too far: he does not reinterpret doctrine to fit the possibility of another world; he makes assumptions about another world (for instance that there would be no sin) to fit with existing doctrine. They also seem to me to go too far when they suggest that his text ‘indicates a tendency toward belief in an actual plurality of populated worlds’ (ibid.). That underestimates the capacity of the scholastic mind to ask hypothetical questions, and to give hypothetical answers.

nature, and its influence'.³⁹ Nor did he consider inhabitation only hypothetically, writing that 'The regions of the other stars are similar to this, for we believe that none of them is deprived of inhabitants'. We see this in his argument that we should not imagine that life beyond Earth is necessarily more capable than we are.

[We cannot rightly claim to know] that our portion of the world is the habitation of men and animals and vegetables which are proportionally less noble [than] the inhabitants in the region of the sun and of the other stars. For although God is the center and circumference of all stellar regions and although natures of different nobility proceed from Him and inhabit each region (lest so many places in the heavens and on the stars be empty and lest only the earth – presumably among the lesser things – be inhabited), nevertheless with regard to the intellectual natures a nobler and more perfect nature cannot, it seems, be given (even if there are inhabitants of another kind on other stars) than the intellectual nature which dwells both here on earth and in its own region.⁴⁰

As Duhem notes, there is something remarkable going on here, namely that

the first time in Western Christianity that one heard someone speak about the plurality of inhabited worlds [actual worlds, actually inhabited] it was proposed by a theologian who has spoken at an ecumenical council a few years before. The person who sought to reflect upon the characteristics of the sun and moon ... had the confidence of the popes; the highest ecclesiastical honours were bestowed upon him. There can be no greater proof of the extreme liberality of the Catholic church during the close of the Middle Ages towards the meditations of the philosopher and the experiments of the physicist.⁴¹

³⁹ Nicholas of Cusa, *Nicholas of Cusa on Learned Ignorance: A Translation and an Appraisal of De Docta Ignorantia*, trans. Jasper Hopkins (Minnesota, MN: Arthur J. Banning Press, 1985), II.12, p. 94. Interpolations in Hopkins' translation.

⁴⁰ *Ibid.*, II.12, pp. 95–96.

⁴¹ Duhem, *Medieval Cosmology*, 510.

Into Modernity

A century and a half later, Giordano Bruno (1548–1600) also upheld the thesis of many worlds, but whereas Cusa was to receive high office in the church, Bruno was burnt at the stake. On that account, he has achieved of the status of being something of a martyr for science, not least for the idea of a widely inhabited universe.⁴² Recent scholarship has been more cautious, suggesting that the deviation of his thought from received Christian orthodoxy on doctrinal matters more easily explains the animosity of church authorities. Among the recusals he was forced to make, one concerned having identified God with matter (the theme is addressed in five out of the eight statements he was made to reject).⁴³ He also taught that God acts of necessity. The reports of the investigation of Bruno by the Inquisition record him saying at one point that ‘as a consequence of my philosophy, since God’s power is infinite it must necessarily produce effects that are equally infinite’.⁴⁴

Despite the thirteenth-century condemnations, which stressed that God *could* create other worlds, insisting that God *had* done so remained a position censured as heretical in Gregory XIII’s Corpus of Canon Law, as Alberto A. Martinez has pointed out. Bruno’s advocacy of actual, and inhabited, multiple worlds crossed that line, and so may have constituted part of what stood against him after all.⁴⁵ That Cusa fared differently likely rests on his more general alignment with traditional orthodoxy (although often in a highly creative way), and perhaps simply on the fact that the church was more confident and at peace in the mid-fifteenth century than it was at the cusp of the seventeenth.

⁴² Giordano Bruno, *De l’infinito universo et Mondi: All’illustrissimo Signor di Mauuissiero* (Venetia [London]: Charlewood, 1584).

⁴³ I am grateful to Dr Lucas Mix for this point.

⁴⁴ Concerning the second censured proposition.

⁴⁵ Alberto A. Martinez, *Burned Alive: Bruno, Galileo and the Inquisition* (London: Reaktion, 2018), 61.

Into the seventeenth century, the sense that the idea of multiple worlds threw up doctrinal questions was not lost on the churches. Martinez points to a Catholic index of heresies dating from shortly after the time of Bruno, stating that ‘we cannot assert that two or many worlds exist, since neither do we assert two or many Christs’.⁴⁶ Among the Protestant Reformers, both Martin Luther (1483–1546) and John Calvin (1509–1564) rejected the heliocentrism of Copernicus (1473–1543). In his *Table Talk*, Luther is reported to have seen the new science as a modish bid to grab attention:

There was mention of a certain new astrologer who wanted to prove that the earth moves and not the sky, the sun, and the moon. This would be as if somebody were riding on a cart or in a ship and imagined that he was standing still while the earth and the trees were moving. [To this Luther remarked] ‘So it goes now. Whoever wants to be clever must agree with nothing that others esteem. He must do something of his own. This is what that fellow does who wishes to turn the whole of astronomy upside down. Even in these things that are thrown into disorder I believe the Holy Scriptures, for Joshua commanded the sun to stand still, and not the earth’.⁴⁷

Calvin’s rejection is even more striking, given his otherwise generally outspoken advocacy of attention to science. In Chapter 5, we will see him taking up the position that the Bible is not to be treated as a textbook of astronomy, for which one needs to turn to those trained in that field. In a sermon on 1 Corinthians 10:19–24, however, he accuses those who ‘say that the sun does not move, and that it is the earth which shifts and turns’ of derangement and demonic possession:

⁴⁶ *Antidotum contra diversas omnium fere seculorum haereses* (Basel, 1528), p. 248; rev. L. Ricchieri, *Haereseologia* (Basel, 1556), 715, here quoting the *Contra Acephalos* of Rustici Diaconi, written between 553 and 564, published in *Rvstici Diaconi contra Acephalos*, ed. Sara Petri, 100 (Turnhout: Brepols, 2013).

⁴⁷ Martin Luther, *Luther’s Works, Volume 54 – Table Talk*, ed. Theodore Gerhardt Tappert, trans. Helmut T. Lehmann (Philadelphia: Fortress Press, 1967), 358–59. He cites Josh. 10.12.

When we see such minds we must indeed confess that the devil possess them, and that God sets them before us as mirrors, in order to keep us in his fear. So it is with all who argue out of pure malice, and who happily make a show of their imprudence. When they are told: 'That is hot,' they will reply: 'No, it is plainly cold.' When they are shown an object that is black, they will say that it is white, or vice versa. Just like the man who said that snow is black; for although it is perceived and known by all to be white, yet he clearly wished to contradict the fact. And so it is that they are madmen who would try to change the natural order, and even to dazzle eyes and benumb their senses.⁴⁸

Luther's protege Phillip Melancthon (1497–1560) went beyond astronomy, to address the prospect of other life, offering a stiff denunciation on grounds that echo the Christological concerns of the Catholic index of heresies just mentioned:

The Son of God is one: our master Jesus Christ, coming forth in this world, died and was resurrected only once. Nor did he manifest himself elsewhere, nor has he died or been resurrected elsewhere. We should not imagine many worlds because we ought not imagine that Christ died and was risen often; nor should it be thought that in any other world without the knowledge of the Son of God that people would be restored to eternal life.⁴⁹

Similarly aware of the potential Christological implications of life elsewhere was Galileo's Dominican defender Tommaso Campanella. In his *Apology for Galileo* (1622), he went out of his

⁴⁸ John Calvin, 'Sermon on 1 Corinthians 10:19–24', in *Ioannis Calvini opera quae supersunt omnia*, ed. Edouard Cunitz, Johann-Wilhelm Baum, and Eduard Wilhelm Eugen Reuss, vol. 49 (New York: Johnson, 1964), 677, translation from Robert White, 'Calvin and Copernicus: The Problem Reconsidered', *Calvin Theological Journal* 15, no. 2 (1980): 236–37.

⁴⁹ *Initia Doctrinae Physicae: Dictata In Academia Witebergensi*. Witebergae: Crato, 1565. The text was republished in the *Corpus Reformatorum*, edited Carlos Gottlieb Bretschneider (Halis Saxonus, apud C. A. Schwetschke et fildum, 1846), columns 220–21, passage here from column 221, translation from Thomas O'Meara, *Vast Universe*, 6.

way to defuse any tension on that front, by arguing that if there are ‘humans living on other stars, they would not have been infected by the sin of Adam since they are not his descendants’.⁵⁰

Among outspoken opponents to the idea of multiple worlds, we also encounter the French Calvinist Lambert Daneau (c. 1530–c. 1590), who wrote ‘Fie upon this infinity or multitude of worlds. There is one and no more’. He thought the idea to be at least ‘foolish and childish’ and even ‘blasphemous’, since scripture recounts ‘the special visible works of God’ and it does so speaking of ‘this one world only’.⁵¹ English writers who opposed multiple worlds included Thomas Heywood (‘Manifest it is, that there is but one world’), John Swan, and George Hakewill.⁵² By the middle of the seventeenth century, however, ‘the conviction that our world alone was inhabited’ was ‘generally in retreat’.⁵³

In contrast to this, astrobiological discussion by Richard Baxter (1615–1691) deserves attention, both because it shows this much-loved writer fully embracing the idea of widespread life and because, far from worrying that this demotes human beings and the Earth, the idea is able to achieve significant positive theological work for him. On account of that, and of its picturesque style, I will quote it at some length:

it greatly quieteth my mind against this great objection of the numbers that are damned and cast off for ever, to consider how small a part

⁵⁰ Tommaso Campanella, *A Defense of Galileo, the Mathematician from Florence*, ed. and trans. Richard J. Blackwell (Notre Dame, IN: University of Notre Dame Press, 1994), 112. Campanella goes on to write that the inhabitants would not, in fact, be ‘humans’ but rather ‘beings of a different nature, who are similar to us but not the same as us’ (112–13).

⁵¹ Lambert Daneau, *The Wonderful Workmanship of the World* (London: Andrew Maunsell, 1578), 25–27.

⁵² Thomas Heywood, *The Hierarchie of the Blessed Angels* (London, 1635), 153–54; John Swan, *Speculum Mundi; or, A Glasse Representing the Face of the World* (Cambridge, 1635), 210–28; George Hakewill, *An Apologie of the Power and Providence of God in the Government of the World*, 3rd ed. (Oxford, 1635) – citations from David Cressy, ‘Early Modern Space Travel and the English Man in the Moon’, *American Historical Review* 111, no. 4 (1 October 2006): 965.

⁵³ Cressy, ‘Early Modern Space Travel’, 965.

this earth is of God's creation, as well as how sinful and impenitent. Ask any Astronomer, that hath considered the innumerable number of the fixed Stars and Planets, with their distances, and magnitude, and glory, and the uncertainty that we have whether there be not as many more, or an hundred or thousand times as many, unseen to man, as all those which we see (considering the defectiveness of man's sight, and the Planets [moons] about Jupiter, with the innumerable Stars in the Milky way, which the Tube [telescope] hath lately discovered, which man's eyes without it could not see,) I say, ask any man who knoweth these things, whether all this earth be any more in comparison of the whole creation, than one Prison is to a Kingdom or Empire, or the paring of one nail, or a little mole, or wart, or a hair, in comparison of the whole body. And if God should cast off all this earth, and use all the sinners in it as they deserve, it is no more sign of a want of benignity or mercy in him, than it is for a King to cast one subject of a million into a Jail, and to hang him for his murder, or treason, or rebellion; or for a man to kill one louse, which is but a molestation to the body which beareth it; or than it is to pare a mans nails, or cut off a wart, or a hair, or to pull out a rotten aking tooth. I know it is a thing uncertain and unrevealed to us, whether all these Globes be inhabited or not: but he that considereth, that there is scarce any uninhabitable place on earth, or in the water, or air, but men, or beasts, or birds, or fishes, or flies, or worms and moles do take up almost all, will think it a probability so near a certainty, as not to be much doubted of, that the vaster and more glorious parts of the Creation are not uninhabited; but that they have Inhabitants answerable to their magnitude and glory (as Palaces have other inhabitants than Cottages): and that there is a connaturality and agreeableness there as well as here, between the Region or Globe, and the inhabitants ... I make no question but our number to theirs is not one to a million at the most.⁵⁴

⁵⁴ Richard Baxter, *The Reasons of the Christian Religion* (London: R. White, for Fran. Titon, 1667), 388–89. In a marginal note, he cites the French Roman Catholic priest, philosopher and astronomer Pierre Gassendi (1592–1655): 'Of the probability of the habitation of the Planets, see *Gassendus* [his name in Latin], and his reasons, that

Such open-mindedness is seen in the work of John Wilkins (1614–1672), Master of Wadham College, Oxford and then Trinity College, Cambridge. Eventually Bishop of Chester, he was a keen experimentalist and a founding member of London’s Royal Society. His book of 1638, *A Discovery of a New World: Or a Discourse Tending to Prove, that ‘tis Probable There May be another Habitable World in the Moon* (to give around a third of the title) is a remarkable work of scholarship. Alongside extensive scientific treatments, page after page is filled with discussions, not only of Biblical texts and the Church Fathers, but also of Thomas Aquinas, Nicholas of Cusa, contemporary Jesuits, and the pagan writers of antiquity. Wilkins’ work on the nature of scriptural revelation, and how it bears – or not – upon scientific questions offers valuable lessons for the relation between science and theology today. We will turn to that in Chapter 5.

The English clergyman John Ray (1627–1705), sometimes called the father of British natural history, stands as another example. In his *Wisdom of God Manifested in the Works of the Creation* (1691), extraterrestrial life features as an uncontroversial aside:

Every fix’d star [in number ‘next to infinite’ or ‘innumerable as to us, or their number prodigiously great’] ... is a Sun or Sun-like Body, and in like manner incircled with a Chorus of Planets moving about it ... [and is] in all likelihood furnished with as great variety of corporeal Creatures, animate and inanimate, as the Earth, and all as different in Nature as they are in Place from the Terrestrial, and from each other.⁵⁵

From here on, books would continue to be published on theology and astronomy, some of which discussed the possibility of life

the inhabitants are not men of our species, but that the inhabitants are diversified as the habitations are, and other things in the universe’ (388). The reference seems to be to Petri Gassendi, ‘Syntagmatis Philosophici’, in *Opera Omnia*, vol. 4 (Florence: Cajetanum Tartini et Sanctem Franchi, 1727), 8–9.

⁵⁵ John Ray, *The Wisdom of God Manifested in the Works of the Creation* (London: Samuel Smith, 1691), part I, 18–19.

elsewhere, although without a great deal of theological depth.⁵⁶ As Jacques Arnould has written, ‘the plurality of worlds passed from a status of heresy to that of a powerful argument for the rhetoric of natural theology’.⁵⁷ As an example of how much the topic of life elsewhere remained in public view, consider this exchange from Anthony Trollope’s (1815–1882) *Barchester Towers* (1857). Wanting his characters to appear up-to-date and sophisticated, reflecting the conversations of the drawing rooms of their time, he has them discuss life elsewhere in the solar system and its theological ramifications.

“Are you a Whewellite or a Brewsterite, or a t’othermanite, Mrs. Bold?” said Charlotte, who knew a little about everything, and had read about a third of each of the books to which she alluded.

“Oh!” said Eleanor; “I have not read any of the books, but I feel sure that there is one man in the moon at least, if not more.”

“You don’t believe in the pulpy gelatinous matter?” said Bertie.

“I heard about that,” said Eleanor; “and I really think it’s almost wicked to talk in such a manner. How can we argue about God’s power in the other stars from the laws which he has given for our rule in this one?”

“How, indeed!” said Bertie. “Why shouldn’t there be a race of salamanders in Venus? and even if there be nothing but fish in Jupiter, why shouldn’t the fish there be as wide awake as the men and women here?”

“That would be saying very little for them,” said Charlotte. “I am for Dr. Whewell myself; for I do not think that men and women are

⁵⁶ Principal examples include William Derham (1657–1735), *Astro-Theology: Or a Demonstration of the Being and Attributes of God, from a Survey of the Heavens* (London: W. Innys, 1714); William Whiston (1667–1752), *Astronomical Principles of Religion, Natural and Revealed* (London: J. Senex and W. Taylor, 1717); and Christian Huygens, *Cosmotheoros* (The Hague: Adriaan Moetjens, 1698), translated as *The Celestial Worlds Discover’d* (London: Timothy Childe, 1698), with no translator identified.

⁵⁷ Arnould, *Turbulences Dans l’univers*, 83, my translation.

worth being repeated in such countless worlds. There may be souls in other stars, but I doubt their having any bodies attached to them.”⁵⁸

Theological ruminations on other worlds or the implications of life elsewhere in the universe, then, are not new; indeed, they go back, more or less continually, to the middle of the fifteenth century. A great many responses, often from writers of considerable note in their own time, have been receptive, confident, and positive. Alongside that, we encounter contentions that such life would pose a threat to the principal tenets of the faith, but these arguments cannot be said to have had the upper hand since the seventeenth century. This is little appreciated. Consider Carl Sagan, for instance, a significant scientific figure in the development of astrobiology, and someone whose writing and broadcasting helped to define the role of the contemporary scientific public intellectual. In his influential *Pale Blue Dot*, he was still able to ask

How is it that hardly any major religion has looked at science and concluded, ‘this is better than we thought!’ The universe is much bigger than our prophets said, grander, more subtle, more elegant. Instead they say, ‘no, no, no’. My god is a little god and I want him to stay that way. A religion, old or new, that stressed the magnificence of the universe as revealed by modern science might be able to draw forth reserves of reverence and awe hardly topped by the conventional faiths.⁵⁹

Acknowledging Sagan’s standing as a scientist, as a statement about history this is simply wrong, and seems to betray a complete

⁵⁸ Anthony Trollope, *Barchester Towers*, ed. John Bowen (Oxford: Oxford University Press, 2014), ch. 6. Trollope’s characters will have been reading Whewell’s *Of the Plurality of Worlds* (London: John W. Parker and Son, 1853) and the reply by Sir David Brewster, *More Worlds Than One: The Creed of the Philosopher and the Hope of the Christian*, Corrected and Enlarged Edition (London: Murray, 1854). Whewell writes about ‘boneless, watery, pulpy creatures’ (183) and ‘aqueous, gelatinous creatures’ (185) on Saturn and Jupiter. On this exchange, see Arnould, *Turbulences dans L’Univers*, 98–101. Whewell had initially supported the idea of extraterrestrial life, but later rejected it on Christological and soteriological grounds.

⁵⁹ Carl Sagan, *Pale Blue Dot: A Vision of the Human Future in Space* (London: Headline, 1995), 50.

unawareness of a tradition of theological writing that stretches (among Christians) from the fifteenth century and before, right up to Sagan's own time. Judaism has its own deeply considered discussion of the question, stretching back even further.⁶⁰

The Antipodes

In closing this chapter, I will turn to the fascinating case of the antipodes. This posed questions to writers from quite early in Christian history about the possibility of life elsewhere, without requiring their imagination to leave the Earth.

For Biblical and Patristic writers, the cosmos was the sum of the earthly realm within which we live, plus the encircling vault of heaven. Whether there could be more to physical reality than that, actually or potentially, was not a matter of any great deal of speculation. Even supposing the cosmos to consist only of the Earth and the heavens, however, the question of life elsewhere presented itself to early Christian writers in the form of the antipodes. As Richard J. Blackwell recounts, the term has its roots in “what is across from our feet,” and referred to both the people and the places located in what we now call the Western hemisphere.⁶¹ The idea finds its origin in Western thought among the Pythagoreans, who proposed a world corresponding to our own on the other side of the Earth.⁶² The word ‘antipodes’ itself seem to have been

⁶⁰ See Lamm, ‘Religious Implications’; Howard Smith, ‘Alone in the Universe’, *Zygon* 51, no. 2 (June 2016): 497–519; Norbert M. Samuelson, ‘Jewish Theology Meets the Alien’, in *Astrotheology: Science and Theology Meet Extraterrestrial Life*, ed. Ted Peters et al. (Eugene, OR: Cascade, 2018), 208–15.

⁶¹ Translator’s note in Campanella, *Defense of Galileo*, 138, n. 60. Its etymology is not, as some have written, a reference to creatures with feet at the other end of their bodies from us, but to those who dwell opposite to where our feet stand.

⁶² “There are also antipodes, and our “down” is their “up” (Diogenes Laertius, *Lives of Eminent Philosophers*, book 8, ch. 2, n. 25, on Pythagoras), translation from Diogenes

coined by Cicero (106–43 BC).⁶³ As a realm often thought to be entirely cut off from the regions known to European writers, it would truly be an ‘other world’, possibly with its own life.

Among Christian writers, antipodean inhabitants were discussed and dismissed by Lactantius (AD c. 250–c. 325), on the grounds that look rather ridiculous today, given our appreciation that gravity draws all towards the centre of the Earth, without any other absolute sense of up or down. ‘Is there any one so senseless as to believe that there are men whose footsteps are higher than their heads?’, Lactantius asks, ‘or that the things which with us are in a recumbent position, with them hang in an inverted direction? That the crops and trees grow downwards? that the rains, and snow, and hail fall upwards to the earth?’⁶⁴ He records precisely a gravitational solution to this challenge, offered by advocates for the antipodes: ‘they reply that such is the nature of things, that heavy bodies are borne to the middle, and that they are all joined together towards the middle, as we see spokes in a wheel; but that the bodies which are light, as mist, smoke, and fire, are borne away from the middle, so as to seek the heaven’. Unfortunately, he considered such ideas to be the work of those who ‘when they have once erred, consistently persevere in their folly, and defend one vain thing by another’.

Lactantius thought that universal inhabitancy would follow were the Earth spherical but – unlike a good many ancient writers – he denied that it was.⁶⁵ If the heavens were spherical, then

Laertius, *Lives of Eminent Philosophers*, trans. Robert Drew Hicks, vol. 2 (Cambridge, MA: Harvard University Press, 2005), 343.

⁶³ Cicero, *Academia*, II.123.

⁶⁴ Lactantius, *Divine Institutes* III.24, translation from Alexander Roberts and James Donaldson, eds., *Ante-Nicene Fathers – Volume VII: Fathers of the Third and Fourth Centuries*, trans. William Fletcher (Edinburgh: T&T Clark, 1994), 94.

⁶⁵ For a summary of the principal sources through which Christianity inherited the idea of a spherical Earth from antiquity, see Alison Peden, ‘The Medieval Antipodes’, *History Today*, December 1995.

the earth also itself must be like a globe; for that could not possibly be anything but round, which was held enclosed by that which was round... And if this were so, that last consequence also followed, that there would be no part of the earth uninhabited by men and the other animals. Thus the rotundity of the earth leads, in addition, to the invention of those suspended antipodes.⁶⁶

Lactantius might therefore have been warmer towards the idea of the Antipodes, if he could have been convinced that the Earth is round.

Later, Augustine wrote in the *City of God* that ‘As for the fabled “antipodes”, men, that is, who live on the other side of the earth, where the sun rises when it sets for us, men who plant their footsteps opposite ours, there is no rational ground for such a belief’.⁶⁷ He supposed that if the other half of the Earth were geographically no different from the half we know, then it ‘cannot be devoid of human inhabitants’.⁶⁸ He did not, however, accept the premise. We need not, for instance, assume that there is dry land there: the seas may cover all of the land on the other half of the Earth. Augustine considered two principles to settle the matter: the truth of scripture, and the absurdity of supposing that anyone could cross that ‘vast expanse of ocean’ on a ship. The second point rules out the possibility of inhabitation from the stock of Adam and Eve, and he took the Biblical account to rule out an origin for human life distinct from the primordial parents of Genesis.⁶⁹

The idea of antipodeans was also rejected by Bede (672/3–735) and Isidore of Seville (c. 560–636).⁷⁰ In a letter to Boniface of 748, Pope Zachary threatened a priest named Vergil, later Bishop of Salzburg,

⁶⁶ Lactantius, *Divine Institutes* III.24, p. 94.

⁶⁷ Augustine, *City of God*, XVI.9, p. 664.

⁶⁸ Both he and Lactantius are adopting here something like the principle of mediocrity: that it is better to assume that things alike in one respect (e.g. geography) are also alike in another (e.g. in being inhabited).

⁶⁹ He also rejected that there might be people whom the Church could not reach to evangelise (*Letter* 199.12).

⁷⁰ Peden, ‘Medieval Antipodes’, 29.

with excommunication for teaching that ‘there is another world and other men beneath the earth’.⁷¹ Aquinas, to the best of my knowledge, did not address the topic,⁷² although his renowned teacher, Albert the Great, did. As one of the great scientifically inclined minds of the Middle Ages, we may not be surprised to read that he accepted that the antipodes could be habitable, and quite likely were.⁷³ Moreover, since one might get there by means of a sufficiently long journey, none of that need present any particular theological problems.⁷⁴ He also recognised that ‘up’ and ‘down’ are relative.

Conclusion

The message from discussions of the antipodes, as with other topics treated in this chapter, is again that questions that may seem to be novel are rarely entirely new to Christian thought. We have also seen that while Christian theology took a long time to come to the idea of many worlds – as much on the basis of faulty science as on theological grounds – when that was finally reversed, the idea was widely embraced by the end of early modernity. Alongside the antipodes, the other great analogy for life beyond Earth in Christian theology would be belief in angelic beings. We turn to that in the next chapter.

⁷¹ Ibid.

⁷² The Latin word *antipodes* does not occur in his corpus in any grammatical form.

The antipodes are discussed by Peter of Auvergne (1240–1304) in his continuation of Aquinas’s *Commentary on De caelo et mundo* (book 4, ch. 1), and in two commentaries – on Boethius’s *De consolatione philosophae* (book 2, ch. 3) and the Pseudo-Boethian work *De disciplina scholarium* (ch. 3) – by William Wheatley (d. after 1317), both for a time attributed to Aquinas.

⁷³ Albert the Great, *De natura locorum*, tract. I, ch. 6–10, in Albertus Magnus, *Opera Omnia*, 9:538–50, especially ch. 10, pp. 549–50. On this, see Daniel Joseph Kennedy, *St Thomas Aquinas and Medieval Philosophy* (New York: Encyclopedia Press, 1919), 42–43.

⁷⁴ Later, the topic was discussed by Campanella in *Defense of Galileo*, 53, 138, nn. 61, 62, nn. 63–6, who mentions Aquinas in the *ST* (presumably I.102.2 *ad* 4, where Aquinas quotes Aristotle, *Meteorology*, II.5), Avicenna, Ephrem, Anastasius of Sinai, and Moses of Syria (with no reference given for these).