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James E. Christie

# From Influence to Inhabitation

The Transformation of Astrobiology in  
the Early Modern Period

 Springer

## FROM INFLUENCE TO INHABITATION

James E. Christie

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The Transformation of Astrobiology  
in the Early Modern Period

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James E. Christie  
Sydney, Australia

ISSN 0066-6610

ISSN 2215-0307 (electronic)

International Archives of the History of Ideas Archives internationales d'histoire des idées

ISBN 978-3-030-22168-3

ISBN 978-3-030-22169-0 (eBook)

<https://doi.org/10.1007/978-3-030-22169-0>

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*To my parents, John and Kathryn*

# Preface

It is often said that ‘Are we alone in the universe?’ is one of humanity’s oldest and most profound questions. The problem with this statement, as a student of intellectual history might point out, is that the concepts of ‘we’, ‘alone’ and ‘universe’ are not culturally or temporally constant. We know what *we* mean by the question. Is there life (as we know it) somewhere other than on the earth? This question has a relatively long history, and it’s a history that has been gaining more attention since new discoveries—the detection of planets orbiting around other stars and of living creatures surviving in extreme environments here on earth—reignited scientific and popular interest in the possibility of alien life. Journalistic platforms are now wont to publicise any scientific findings that give even a hint of potential extraterrestrial habitability. On some of these platforms, you can also read your horoscope.

The idea for this book arose when, with a background in the history of astrology, I began to read about the history of the extraterrestrial life debate. As I studied this history, I began to perceive connections, both abstract and specific, productive and conflicting, between the traditions of astrology and cosmic pluralism, and thus a research project was born. This book is the first result of that research. It presents a long view of the historical interactions between the astrological tradition and the ‘plurality of worlds’ philosophy from the classical period up to the Enlightenment, with a focus on the period 1580–1700. It is not intended to be, nor could it be, exhaustive in terms of either the instances or the forms of these interactions. It is intended rather to provide a historical and methodological framework, demonstrating the advantages of studying these traditions in tandem and making suggestions towards a historical narrative that future research may develop or indeed disrupt.

To that end, the two main theses of the work attempt to establish that there were causal influences linking the opposite trajectories of astrology and pluralism in the long seventeenth century. These connections have been seldom studied or appreciated by historians of either discipline, yet they are pertinent to both. Readers interested in the history of astrology, for example, will hopefully come to appreciate the relevance of the ‘plurality of worlds’ philosophy to their discipline, e.g. how ideas about extraterrestrial life could be both augmentative and restrictive to models of celestial influence. Many other questions are raised along the way, concerning such

subjects as celestial motions and activities, the uniformity and diversity of nature, the cosmic status of humanity and the varying associations of both astrology and pluralism to the issue of atheism. On all these fronts, I hope this book will spark debate and invite further research and analysis.

Today, scientific engagement with the question of extraterrestrial life falls within the discipline of astrobiology. As a discipline, its history is short, having been founded only in the 1990s. In terms of its subject matter, however, the history of astrobiology is often considered synonymous with that of the extraterrestrial life debate. Thus, its point of origin is usually traced to the astronomical revolution of the sixteenth and seventeenth centuries. Readers more concerned with this history will discover a new side to the story, i.e. the various ways that this early development was affected by the astrological tradition within which and against which it evolved.

In the view of some, the current astrobiological revolution encompasses more than just the science. It represents a striving for a more complete cosmology, a true ‘cosmic perspective’ that can answer the question of how terrestrial life and humanity fit into the universal picture. This is why I decided to subtitle the book ‘The Transformation of Astrobiology in the Early Modern Period’. There was, of course, no such thing as early modern astrobiology. The discussion on this front is thus largely confined to sections in the introduction and conclusion where historicity is briefly subordinated to a historian’s attempt at anthropology. Those who are interested will hopefully find food for thought concerning historical and contemporary confluences of astronomy and biology. Others who find such anachronisms objectionable may wish to skip over those sections and enjoy what is, essentially, a history of early modern natural philosophy.

Many individual authors and philosophers are discussed in this book, and in most cases, novel contributions are made to the study of these figures per se. In some instances, though, it is simply a case of looking at these sources through the compound lens of astrology and pluralism. Despite the broad chronology, an attempt is still made where possible to provide a thick history, with long quotations—especially when there is no available English translation—and original language in the footnotes. This is done with the intention that the book might serve as a useful resource to a wide range of readers.

There are many people requiring recognition and thanks for the role they played in the making of this work. First of all, I must acknowledge all the scholars whose work laid the foundation for my own. I am especially indebted to Guido Giglioni and Charles Burnett for their expert guidance and encouragement. I am also grateful for the advice received from colleagues, too numerous to mention, at The Warburg Institute and elsewhere. And thanks must go, of course, to Jasmin and to my family and friends for their unwavering support and belief.



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# Chapter 1

## Introduction: Astrology, Extraterrestrial Life and Astrobiology



*Astrobiology recognises that it is difficult to develop a full understanding of life on Earth without understanding its links to the cosmic environment.*

(Cockell 2015, 4)

**Abstract** The history of astrology and the history of the extraterrestrial life debate are largely kept separate, for reasons both chronological and historiographical. In fact, there was a large period of overlap in which many historical actors seriously considered and wrote on the concepts of both celestial influence and celestial inhabitation. The history of astrobiology, understood broadly as the study of ‘life in a cosmic context’, offers a potential avenue for exploring the relationships between astrology and cosmic pluralism in the early modern period. The two main theses of the book are presented: (a) that evolving theories of celestial influence in the sixteenth and seventeenth centuries encouraged speculation about extraterrestrial life, and (b) that as the seventeenth century progressed, certain thinkers began to consciously oppose the concepts of influence and inhabitation as rival teleological models for astronomical cosmology, with the latter emerging triumphant. The rest of the chapter comprises a literature review, a section on terminology, and a section on methodology, assessing the usefulness of Kuhn’s ‘paradigms’ and Lovejoy’s ‘unit-ideas’ in approaching the subject matter.

**Keywords** Astrology · Astrobiology · Extraterrestrial life · Plurality of worlds · Pluralism · Teleology

## 1.1 The Aim of the Work

This book presents a conjoined and comparative history of astrology and the philosophical tradition related to the idea of a ‘plurality of worlds’ in the early modern period. In doing so, it suggests new research areas for both histories, as well as a potential new direction for the history of astrobiology, the modern scientific discipline which encompasses the search for extraterrestrial (ET) life. The idea that life, in a form some way comparable to life on earth, may exist on another celestial body has been a subject of great scientific and cultural interest for the past several centuries. Prior to the seventeenth century, however, this idea was a minority view within the Western intellectual tradition. In medieval and early modern cosmology, the celestial bodies were more often understood in terms of the influences they were thought to exert upon the terrestrial realm. The sixteenth and seventeenth centuries saw the decline of the monopoly of Aristotelian physics and Ptolemaic astronomy in the domain of Western natural philosophy. The astronomical discoveries and innovations of such figures as Galileo, Kepler and Newton laid the foundations for what would become our modern understanding of the universe and the place of the earth within it. Part of this transition involved the decline or marginalisation of astrology, the dismantling of the celestial causal chain of Aristotelian cosmology and the dismissal of any planetary or astral influence outside of light, heat and gravitation.<sup>1</sup> Another part involved the adoption, or re-adoption, of the cosmological view concerning the existence of a plurality of worlds in the universe (hereafter ‘pluralism’). In this instance, pluralism refers to the belief that some or all of the celestial bodies are similar in nature to the earth and inhabited by living creatures.<sup>2</sup>

These two phenomena are usually dealt with separately in historical scholarship, largely because the same period represents the *terminus ad quem* for the serious study of astrology and the *terminus a quo* for the growing acceptance of pluralism. Nevertheless, both trends are considered as consequences of a Copernican cosmology and hallmarks of a modern worldview. The modern delineation between these two strands of historical enquiry (i.e. the history of astrology and the history of pluralism) may be detrimental, both to our understanding of celestial philosophy at any given time, as well as to our appreciation of cosmological change over longer periods. While it is of course a truism to say that early modern science or natural philosophy was more holistic than disciplinary, there are particularly good reasons to consider astrology and pluralism in tandem. The most general and obvious similarity is that both concepts meld astronomy and the life sciences. Astrology is concerned with the effect of the celestial realm on terrestrial phenomena, including biological generation (celestial influence), while pluralism is predicated on the possible existence of biological processes in the heavens (celestial inhabitation).

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<sup>1</sup>For recent engagements with this topic, see the various contributions in Granada et al. 2016, and also Vermij and Hirai 2017. See also Whitfield 2001, 177–87; Rutkin 2006, 2018; Vermij 2014.

<sup>2</sup>The main monograph works on this subject are Lovejoy 1948; Dick 1982; Guthke 1983; Crowe 1986.

Aristotle, in his work *On the Parts of Animals*, twice compared the science of the stars to the science of living objects. The first comparison argues that mortal animals, just as much as the heavens, are products of a defining cause or principle (*PA*, I.1, 641b13–21). Actions in the celestial and the biological world can be investigated and understood in the same way, according to the theory that ‘whenever there is plainly some final end, to which a motion tends should nothing stand in the way, we always say that such final end is the aim or purpose of the motion’ (*PA*, I.1, 641b24–26; Aristotle 1882, 8). That is, both sciences can be approached teleologically. Aristotle then juxtaposed the two sciences: the heavens are more divine than plants or animals, yet our knowledge of the latter is far more certain. The two sciences thus complement each other. The ‘greater nearness and affinity to us’ of living creatures balance ‘the loftier interest of the heavenly things that are the objects of the higher philosophy’ (*PA*, I.5, 645a1–4; Aristotle 1882, 16).<sup>3</sup> Aristotle even acknowledges the less glamorous nature of biology when compared to astronomy, but reassures the philosophical reader that it will provide similar pleasures by revealing the links of causation and the artistic spirit that underlies all things.

In the mid 1990s, a new discipline was founded which similarly unites astronomy and biology under a common goal, in which the certainty and nearness-to-hand of the one balance the (arguably) more speculative nature of the other. This discipline is astrobiology, a flourishing science which has largely replaced the field of ‘exobiology’, an earlier disciplinary label coined by Joshua Lederberg (1925–2008) in 1960 to describe the scientific search for ET life.<sup>4</sup> Astrobiology operates through a variety of research projects, funded primarily by NASA, and as a scientific discipline it benefits from broad appeal and exposure, especially in regards to the search for potentially habitable exoplanets and, indeed, the not yet exhausted search for life within our solar system.<sup>5</sup> With the development of a science comes, inexorably, the history of that science. This decade has seen a concerted attempt to establish the history and philosophy of astrobiology ‘as a research field in its own right’ (Dunér et al. 2013, 3). This history, when it searches for origins prior to the space age, has largely been equated with the history of the ‘plurality of worlds’ philosophy and the ET life debate. If we consider historical usages of the word ‘astrobiology’, however, as well as the modern disciplinary description, we can find considerable scope to expand the history of astrobiology, and pluralism in general, into related fields such as astrology.<sup>6</sup>

According to the Oxford English Dictionary, astrobiology was a term first used in publications put out by the Koreshan Unity, an American sect which followed the

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<sup>3</sup>On this topic, see also Leunissen 2009.

<sup>4</sup>For the modern history of astrobiology, see Dick and Strick 2005.

<sup>5</sup>NASA operates in tandem with many partner agencies and organisations. As a starting point, see the NASA Astrobiology website. Homepage, Astrobiology, <https://astrobiology.nasa.gov/> [accessed 10 November 2017].

<sup>6</sup>There have been some recent attempts to look at the history of other aspects of astrobiology, such as theories of panspermia and the origins of life more generally. However, they contain little discussion of the early modern period. See Temple 2007; Demets 2012; Dunér et al. 2016.

teachings of the eclectic nineteenth-century physician and alchemist, Cyrus Teed (1839–1908).<sup>7</sup> In his usage, astro-biology was a science which studied the ‘regulation of human affairs by the clock-work of the cosmos’ (Teed 1908). Around the same time, the French philosopher Henry Lagrèsille, active at the turn of the century, used the term in his metaphysical work *Le fonctionnisme universel* (‘On Universal Functionism’, Lagrèsille 1902). Lagrèsille, who in this work described functions from the atomic to the stellar level as creations of the free activity of spirit, used the word astrobiology to mean a ‘qualitative law of energy’ (*loi qualitative de l’énergie*) (Lagrèsille 1902, 540–41). ‘I am afraid that neither the philosopher nor the scientist will care much for this book’, remarked one reviewer, ‘but the theosophist may find it edifying’ (Morrison 1903).

In the 1930s the term was used with a different meaning by the French historian René Berthelot (1872–1960), who used it to describe an intermediate stage in human cosmological development. In between ‘savage animism and modern science’, astrobiology combined a vitalistic (or anthropomorphic) interpretation of the heavens with a desire to formulate laws that governed their motion and influence on terrestrial phenomena (Philosophical Periodicals 1934, 269; Berthelot 1938). All these historical usages are more closely connected to astrology than to the search for ET life. It was only in the mid-twentieth century that it took on this new meaning. It was used in several published works and astronomical conferences in a sense synonymous to Lederberg’s ‘exobiology’, or a similar now-disused term ‘xenobiology’ (Catling 2013, 4). Yet in French it retained the meaning given by Berthelot, and it was used by the historian of philosophy Paul-Henri Michel (1894–1964) to describe Giordano Bruno’s animistic cosmology (Michel 1973, 216). Then, in the 1990s, it took on its current scientific meaning, defined by NASA as the study of the origins, evolution, distribution, and future of life in the universe.<sup>8</sup> Astrobiology now denotes an expanded and interdisciplinary science, combining the search for ET life with the study of terrestrial biology—especially its origins, evolution, and occurrence in extreme environments—in an attempt to understand the very nature of life itself within a larger cosmological context.

It is in this shorter and more general definition, ‘the study of life in a cosmic context’ (Catling 2013, 2), that astrobiology is most obviously connected to the astrological tradition. Consider this passage from a textbook on astrobiology:

Astrobiology recognises that it is difficult to develop a full understanding of life on Earth without understanding its links to the cosmic environment. The Earth seems like a tranquil place. However, it is subjected to the vagaries of its astronomical environment. For example, a leading hypothesis for the extinction of the dinosaurs is an asteroid or comet impact about 65 million years ago. This hypothesis underscores the fact that to understand past life on Earth we need to understand how the astronomical environment may have influenced life (Cockell 2015, 4).

Leaving aside mention of dinosaurs, this quote could easily be used as an astrological manifesto from the ancient, medieval or early modern periods. Indeed, the

<sup>7</sup> ‘astro-, comb. form’, *OED Online*. Oxford University Press [accessed 12 January 2017].

<sup>8</sup> The French still use the term ‘exobiologie’.

case of astrology illustrates a simple yet profound point: the modern science of astrobiology unites two fields of enquiry, astronomy and biology, which in fact only became separated following the Scientific Revolution in the early modern period, or perhaps even later still, following the disciplinisation efforts of William Whewell (1794–1866).<sup>9</sup> The importance of astrology to pre-modern medicine is the most palpable example of this unification, but the effect of the heavens on biological processes had much wider scientific, philosophical, agricultural and cultural ramifications.

All this is to say, that the history of astrobiology may provide the perfect vehicle to connect the more established histories of astrology and pluralism. The historical coincidence of meanings, with astrobiology being used in different senses synonymous with astrology, presents an opportunity to write a deeper contextual history of attempts to understand life in reference to perceptions of the cosmos.<sup>10</sup> This is of course borrowed territory from what we might call the history of ‘cosmology’ or ‘cultural astronomy’. Framing it as a history of astrobiology, a modern field, is an attempt to create a compromise between relevance and relativism—to risk anachronism in the hope of drawing out meaningful associations between modern and pre-modern pursuits of knowledge.<sup>11</sup> It is a history of astrobiology purely in an abstracted, interpretative sense, intended both to contextualise the historical narrative to which modern astrobiology lays claim, and to suggest a form of continuity underlying the astronomical upheavals of the early modern period. The more concrete, historical aim of this research, meanwhile, is to probe the links between theories of celestial influence and celestial inhabitation in early modern natural philosophy. There is rich ground for enquiry, due to the simple fact that most figures in the early history of pluralism were either practicing astrologers or wrote about the nature of celestial influence. These natural philosophers first began to extend generation and corruption to the heavens at a time when those very processes were still causally tied to celestial influence.

The results of research conducted thus far have led to two main theses. The first argument is that, in its infancy, pluralism was in fact encouraged by evolving astrological theories. This evolution was stimulated by elements of Platonic and Stoic philosophy as well as by post-Copernican reforms. A belief in ET life was thus nurtured by concepts of the ubiquity and necessity of celestial influence which survived, at least for a time, the dismantling of the Aristotelian/Ptolemaic cosmos. The twin notions of influence and inhabitation could combine to provide significant explanatory power for the cosmological alternatives to Aristotle that arose in the time

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<sup>9</sup>See Sandoz 2016. Astrobiology prides itself on its trans-, multi- and/or interdisciplinary nature. See Santos et al. 2016.

<sup>10</sup>This is not to say that the use of ‘astrobiology’ as a disciplinary title implies that it has anything in common *per se* with historical or contemporary usages that are largely incongruent. The point is rather that the combination of the two roots ‘astro’ and ‘bio’ can signify various different ideas and activities, and we might draw interesting comparisons between them.

<sup>11</sup>On this point, see Chalmers 2016, 28: ‘Our current knowledge provides us with a way of putting questions to history, a strategy that need not be problematic provided there are ways of ensuring that it is history that provides the answers.’

between Nicholas of Cusa and Newton, especially in terms of the motion and order of the celestial bodies. This argument will be the focus of Chaps. 2, 3, and 4. Chapter 2 takes the form of a broad survey of the interplay of astrological and pluralist ideas from Plutarch to Giordano Bruno, while Chaps. 3 and 4 are case studies of William Gilbert (1544–1603) and Johannes Kepler (1571–1640) respectively. The point to be made is that celestial influence and celestial inhabitation were not mutually exclusive concepts. In the attempt to build a new cosmology as robust and descriptive as that of Aristotle and Ptolemy, philosophers in the early modern period used both ideas, separately or together, to define a teleologically satisfying world-view.

This symbiosis of astrological and pluralist themes will be further explored in Chap. 5, which again takes the form of a broad survey, this time for the period between Kepler and Newton. This is partly a non-argumentative exploration of the interesting and productive ways that influence and inhabitation combined in attempts to create a viable, non-Aristotelian cosmology, but it is also intended to demonstrate that no history of celestial physics in this period can be complete without appreciating the affinity between these two concepts. Accompanying this survey is a closer look at the philosophical systems of Kenelm Digby (1603–1655) and Thomas White (1593–1676), and the refutation of White's cosmology by Thomas Hobbes (1588–1679). This brief analysis will serve to highlight some of the implications of a mechanistic approach to biological and physical forces for theories of celestial influence and inhabitation. It will also serve as an introduction to the second argument of this book—that throughout the seventeenth century certain thinkers began to consciously oppose influence and inhabitation as rival teleological paradigms of astronomical cosmology.

This argument will be progressed in Chap. 6, which will look at the enmity towards astrology expressed by several prominent advocates for pluralism, finishing with a study of the de-astrologising tendencies within the tradition of Newtonian natural theology. The conclusion of this book looks ahead, proposing new ways to consider the scientific and cultural trajectory of pluralism over the last three centuries up until the present day. In the eighteenth century, it will be suggested, pluralism, and the increasing belief in ET life, *replaced* astrology in a certain sense. That is to say, it assumed many of the cosmological, cultural, and psychological functions which were previously performed by astrology. It fulfilled the teleological requirements of the New Astronomy. Put simply, God did not create the planets and the stars in order to influence the earth but rather as abodes for a myriad of other creatures. But more than this, it took astrology's place as the conjectural or speculative side of astronomy. In this sense, it served, and continues to serve, as an impetus for the astronomical sciences and a vehicle for popular engagement with the celestial realm.

The demonstration of these arguments will, it is hoped, contribute to the history of both astrology and pluralism. In the medieval and Renaissance periods astrology was considered by many to be the queen of the sciences, embodying the ultimate utility of mathematical and astronomical studies. The recent special issue of *Early Science and Medicine* on the marginalisation of astrology presents a consensus view, perhaps unsurprisingly, that this is a process not well enough understood (Vermij and Hirai 2017). A step towards a better understanding can be taken by



appreciating the appeal of pluralism and how it came to be placed in juxtaposition to astrology. At the same time, the history of our modern obsession with life elsewhere in the universe can be enriched by examining how the new paradigm, to use Kuhnian phrasing, grew out of the old. In effect, this research aims to build a bridge between the ‘antiquarianism’ of the history of astrology and the ‘presentism’ of the history of pluralism.<sup>12</sup>

## 1.2 Two Histories

The history of pluralism, or the ET life debate, was the focus of several monograph studies in the twentieth century. Arthur Lovejoy’s famous work *The Great Chain of Being* (1936) used pluralism as a case study to advocate his new methodology for a history of ideas. His main argument was that the driving force behind the change from the medieval to the modern cosmos was not Copernicanism or scientific astronomy, but rather the revival of certain Platonic metaphysical preconceptions (Lovejoy 1948, 99). One such Platonic conception, treated by Lovejoy as a ‘unit-idea’, was the Principle of Plenitude, which dictated, to put it briefly, that the infinite power and goodness of the creator must be realised in an infinite creation. Whatever can be, is. Alexandre Koyré agreed to some extent with Lovejoy’s emphasis on Platonism, but his own famous work, *From the Closed World to the Infinite Universe* (Koyré 1957), placed much more emphasis on Copernicus and the improvement of mathematical astronomy.<sup>13</sup>

Koyré’s mild rebuttal was strengthened implicitly by Stephen J. Dick in his 1982 book *Plurality of Worlds: The Origins of the Extraterrestrial Life Debate from Democritus to Kant*, which takes its approach from the history of science and accentuates the role played by observational evidence. This work, insightful and broad in scope, remains effectively the standard text on the pre-modern history of pluralism. Its sequel, chronologically speaking, is Michael Crowe’s *The Extraterrestrial Life Debate, 1750–1900: The Idea of a Plurality of Worlds from Kant to Lowell* (1986). He disagreed slightly with Dick, arguing that the huge gaps between observation

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<sup>12</sup>In his review of the English translation of Guthke’s *Der Mythos der Neuzeit*, David Lux alluded to the dangers of treating history as a ‘pursuit of origins’, an approach championed by the ‘New History’ school of the early twentieth century: ‘As critics of the New History pointed out all too clearly, an avowed presentism very often yields a telescopic effect, one in which the historian’s emphasis on modernity and progress can overpower important subtleties and nuances of historical action’ (Lux 1994, 121). The pejoratives ‘antiquarian’ and ‘presentist’ are used here only for rhetorical purposes, to highlight the potential benefits of a conjoined and comparative history. There is of course an irony in proposing an early modern history of astrobiology as an antidote to presentism. It is left to the reader to judge whether this is a useful hypocrisy.

<sup>13</sup>Paolo L. Rossi argued that the history of the dispute about inhabited worlds did not coincide with the narratives of either Lovejoy or Koyré, nor with the history of imaginary voyages, but was rather a history *sui generis*. See Rossi 1972, 157. The foundational text for histories of lunar voyage literature is Nicolson 1948.

and belief regarding questions of ET life suggest that religious and philosophical factors, such as teleology and the principle of plenitude, played the primary role. It is unlikely that this disagreement on emphasis can be resolved, as it relies heavily on subjective choices of which historical figures, and which parts of their work, to prioritise in the history of pluralism.

In between the works by Dick and Crowe, the German literary and cultural historian Karl S. Guthke published *Der Mythos der Neuzeit: Das Thema der Mehrheit der Welten in Literatur- und Geistesgeschichte von der Kopernikanischen Wende bis zur Science Fiction* ('The Myth of Modern Times: The Theme of a Plurality of Worlds in Literary and Intellectual History from the Copernican Revolution to Science Fiction', 1983).<sup>14</sup> Guthke's main argument, and the reason for the inclusion of literature, is that the belief in a plurality of inhabited worlds has become, as the title suggests, the predominate 'myth' of modernity—a 'new gospel' (Guthke 1990, 35).<sup>15</sup> He identifies many drives towards pluralism, such as religious thinking, philosophy, analogy, observation, as well as imagination and fiction. His focus on the anthropological dimensions of the belief in pluralism, both in its modern and early modern periods, is a welcome addition to the scientific and philosophical histories.

Guthke's thesis is a reminder of a very important point. The history of the plurality of worlds hypothesis, written in a time when it underpins so much of our cosmology, culture, and scientific endeavour, is accordingly written as the history of a winning idea; a 'truth'. As such it falls victim in some degree to the presentism, bias, and telescopic distortion that such historicism entails, although in fairness, this narrow focus should be forgiven as a consequence of the grand chronological scope of the principal works. There have since been some attempts to contextualise aspects of this long history. An article by Nathaniel Wolloch looks at seventeenth-century philosophers who theorised about ET life and compares this to the same philosophers' theories on animals (Wolloch 2002). These links between pluralist, theriophilic (pro-animal) and anti-theriophilic ideas are valuable, in Wolloch's view, for a better understanding of the issue of anthropocentrism in this period. This book will replicate his methodology to a certain extent for the links between pluralism, astrological and anti-astrological theories, with similar implications for our historical understanding of anthropocentrism.

As for astrology itself, its demise as a scientific discipline in the seventeenth century is usually considered as part of a wider development in Western civilisation often called the 'disenchantment of the world' or the 'decline of magic'. This latter phrase is of course part of the title of Keith Thomas' seminal work, which focused mainly on the historical situation in England, yet has in many ways set the terms of the debate more broadly in the decades since, especially with its integration of scientific, religious, and social factors (Thomas 1971).<sup>16</sup> His invocation of political and

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<sup>14</sup>The English translation has an altered title: Karl Siegfried Guthke, *The Last Frontier: Imagining Other Worlds, from the Copernican Revolution to Modern Science Fiction* (Guthke 1990).

<sup>15</sup>This idea is not original to Guthke. See Chernyshova 2004 [1972].

<sup>16</sup>The phrase 'disenchantment of the world' comes from the sociologist Max Weber (1864–1920). For an introduction to the historiography of disenchantment, see Walsham 2008.

social influences has since been developed further, especially by Patrick Curry, who focuses again primarily on England (Curry 1989). The story of astrology's demise in these cases obviously involves the identification of a divide, or at least a continuum, between low and high astrology, because we see that 'popular astrology' in some form has survived up until the present day.

High astrology, which would include what we might think of as 'scientific astrology', was assumed, by traditional histories of science, to have declined simply because it was disproved or discovered to be groundless. At the very least it did not conform to the definition of science as it was being developed in the seventeenth century. For Popper, astrology failed because it was unfalsifiable; for Kuhn, because it didn't fit the new paradigm (Popper 1965, 37; Kuhn 1970, 7). Others focus on the anti-astrological impact of certain key works disseminated in the sixteenth century, such as Giovanni Pico della Mirandola's *Disputationes adversus astrologiam divinatricem* ('Arguments against Divinatory Astrology', 1496), or Copernicus' *De revolutionibus orbium coelestium* ('On the Revolutions of the Celestial Spheres', 1543). This theory must somehow account, however, for the continuation of astrological science well into the seventeenth century by prominent philosophers and scientists, including Copernicans. More recent historians of science and astrology have taken a more multifaceted approach to the problem.<sup>17</sup> Some, such as Curry, have argued that the story of astrology's scientific marginalisation is not complete unless it takes into account how the new science or natural philosophy appropriated what were in fact astrological theories, and then made them 'safe' by a process of renaming and reinterpretation (Curry 1991, 282–85). John Henry has written about the contribution of magic and the occult sciences to the new philosophies, including especially the notion of action at a distance (Henry 2008).<sup>18</sup> This was followed by a 'fragmentation' which saw the appropriation of certain aspects and the abandonment of others into a redefined category of vulgar magic.

There are several more general works which have linked astrology and pluralism to some extent, or discussed them in a similar context.<sup>19</sup> One in particular is worth mentioning here, and that is Peter Harrison's *The Bible, Protestantism, and the Rise of Natural Science* (Harrison 1998). In this work, Harrison discusses the dilemma faced by the advocates of physico-theology who wanted to reconcile the new astronomy, with its increased dimensions and countless new and distant bodies, with the teleological tradition of natural philosophy. He comments that the 'decline of astrological prognostication and the related concept of celestial influences ... made the problem more acute' (Harrison 1998, 179). The suggestion is that the invocation of ET life as a teleological principle filled in a gap left by an already marginalised astrological tradition. While this was undoubtedly true in certain instances, it is definitely not the whole story. A closer look at the historical record will reveal that,

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<sup>17</sup> See in particular Granada et al. 2016; Vermij and Hirai 2017. Few historians engage with the subject of pluralism in this regard, one exception being Vermij 2016, although he comes to different conclusions.

<sup>18</sup> See also Hutchison 1982.

<sup>19</sup> Some examples are Roos 2001; Westman 2011; Omodeo 2014.

beyond the appearance of coincidence or correlation, there are positive causal connections linking the trajectories of the astrological and pluralist traditions.

That being said, the current discussion will not necessarily argue against any of the studies so far mentioned. Rather, the addition of astrology to the history of pluralism, and vice versa, suggests an extra dimension to the debate which expands on and complements certain existing historical theories. For example, Chapters 2, 3, and 4, detailing the support given to pluralism by Platonic theories of living celestial bodies exchanging mutual and sympathetic influences, can be seen as an extension of Lovejoy's thesis that the transition to a modern worldview was stimulated by a resurgent Platonism. It will add to these, however, a suggestion of the importance of Stoic philosophy. At the same time, some of the cosmological developments analysed by Dick and Crowe can be better understood contextually by reference to the field of astrology, which is under-represented in their studies. Our understanding of novel philosophies from the Renaissance and early modern periods which are pro-pluralism on some level will be enriched by an analysis of theories of celestial influence within those same philosophies. It will be shown that astrological ideas were not simply a casualty of the move from the closed world to the infinite universe, but in fact an active participant.

Building on these foundations, Chap. 5 will hopefully demonstrate the extent of common ground between the histories of astrology and pluralism in the seventeenth century. Early modern celestial physics encapsulated both influence and inhabitation, and so it is no surprise that the two ideas formed part of the same intellectual and cultural milieu. Chapters 6 and 7, which argue that pluralism was put in opposition to, and then replaced astrology, continue the line of research pursued by Guthke, tracing the cultural and anthropological aspects of a belief in pluralism and extraterrestrial life. The argument is really a more specific rephrasing of Guthke. Rather than the 'myth of modern times', this research suggests that pluralism and a belief in ET life are in some ways the 'astrology of modern times'.<sup>20</sup> This thesis can also be considered in Kuhnian terms, as an example of a paradigm shift.<sup>21</sup> Lynn Thorndike argued that, prior to Newton, astrology was a 'generally recognized and accepted ... universal natural law', while Dick believes that 'the idea that abundant life exists in the universe is more than another theory or hypothesis; it is sufficiently comprehensive to qualify as a worldview' (Thorndike 1955, 273; Dick 1996, 135). Can we therefore think of a paradigm shift from influence to inhabitation (or, to phrase it more colloquially, from astrology to aliens) occurring in the seventeenth and eighteenth centuries, with its roots in astronomy but branching far afield into society and culture? This thesis, if correct, suggests that there was no disenchantment in the early modern period, at least not astronomically speaking. What we find instead is the *terms* of enchantment metamorphosing in step with a changing cosmology.

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<sup>20</sup>You could of course say that astrology was the myth of pre-modern times. For an interesting discussion of myth and science more generally, see Carroll 1980.

<sup>21</sup>The concept of paradigm shift as a way to understand scientific change was developed in Kuhn 1962. The merits of applying the term in this context will be considered in Chap. 7.

Both astrology and pluralism satisfied the teleological requirements of astronomy, but, perhaps more importantly, they both provided what Kuhn would call ‘psychological satisfaction’ to their respective worldviews (Kuhn 1957, 7). This psychological aspect was in itself a motivating force, providing philosophers with ever more intriguing and pressing questions and problems. When Crowe argues that the search for clues of celestial inhabitation was a primary incentive for the building of large telescopes in the eighteenth century, and that embellishing astronomical works with ideas about extraterrestrial life was a way of interesting a broader public, he demonstrates that pluralism had taken astrology’s role as the ‘foolish daughter’ supporting her wise but poor mother astronomy (Crowe 1986, 555–56).<sup>22</sup> Rienk Vermij has suggested that astrology was abandoned because other scientific and cosmological problems were putting demands on astronomy (Vermij 2014, 171). It was the very real possibility of the existence of ET life, and the plethora of questions and dilemmas that it raised, that placed those demands and took centre stage, where it remains today.

This links to another possible approach: that of Gerard Holton’s emphasis on the thematic dimension of science. *Themata* for Holton are ‘non-scientific’ commitments which can provide the source of an induction or determine the choice or preselection of theories. ‘One result of this recognition’, argues Holton, ‘will be that the dichotomy between scientific and humanistic scholarship, which is undoubted and real at many levels, becomes far less impressive if one looks carefully at the construction of scientific theories’ (Holton 1988, 33). Taking heed of Lorraine Daston’s lament about the over-historicisation of the history of science (Daston 2016), this book will at least make suggestions for a psychological, sociological and anthropological approach to the history of astronomy. Astrology and pluralism, which bridge the divide between science and speculation, between the professional and the popular, are perfect candidates for such an approach. Stefan Helmreich, in his article on the astrobiological imagination, advocated a cultural historical approach which would aid in ‘understanding and uncovering the exuberance of such scientific enterprises as astrobiology, which chase after such overflowing objects as “life”’ (Helmreich 2006, 86). The centuries-long exuberance of astrological enterprise is perhaps the best model we have for such an understanding.

This book, while focusing largely on the long seventeenth century, attempts to establish patterns over an even longer time frame. An apology must therefore be made for the inevitable generalisations and cursory treatment of important historical themes and figures. Even though this essay is an attempt, in some degree, to contextualise the history of the ET life debate, the large period covered means that it is just as guilty of a biased selection and prioritisation of sources. To lessen the need for such an apology, it should be made clear that this book is only intended to demonstrate that interactions between astrology and pluralism formed part of the historical trajectories of both traditions. It will be enough to establish that these two particular trends—that questions concerning celestial influence stimulated ideas about possi-

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<sup>22</sup>The depiction of astrology as the foolish daughter of astronomy was made by Kepler in his *Tertius interveniens* (1610). See Kepler 1937–, IV, 161.

ble inhabitation, and that the latter contributed to the forces responsible for astrology's decline—were important, but not universal, factors in the history of early modern natural philosophy and cosmology.

### 1.3 Clarifying Terms

We have already (over-)defined astrobiology. The anachronistic application of this term will be minimised in the body of this work so as not to distract from the attempt to appreciate this history *in situ*. There are several other terms which need clarification before we can proceed. 'Pluralism' is used in this context only as shorthand for the philosophical doctrine that posits a multiplicity of worlds, and so should not be confused with any other sort of pluralism. It should also be noted that this history is concerned almost exclusively with that variety of pluralism which theorises about other earth-like worlds within this one universe—worlds in which generation and corruption occur in a way analogous to the earth. It is not concerned so much with theories of a plurality of *kosmoi* separated by place or time. While pluralism will be the most common and general term employed, discussion will also focus on extraterrestrial (ET) or alien life. Both these expressions are anachronisms, and bring with them associations from modern popular culture and science fiction. Nevertheless, they are retained partly because this book, especially in the later chapters, is interested in exactly those broader cultural manifestations and ramifications of pluralism.

This brings up the question of what does and does not qualify as ET life. Like the modern science of astrobiology, this book will use terrestrial life as the example to be applied to life as a more general concept. That is to say, ET life is considered in the form of plants and animals which are corporeal and which live (and die) on the other celestial globes. This therefore excludes planetary intelligences, planetary souls, angels, demons, daemons, gods, and others of the like. This is not an airtight rule, however, and discussion of these forms of life will be necessary from time to time, and indeed the distinction is quite often blurred in the sources themselves. There was, with notable exceptions, very little discussion in this period of what life on other celestial bodies might look like. We will, however, come across interesting and pertinent ideas related to this, such as the tension between plenitude and the uniformity of nature, and the question of what it actually is to be human in a universe with more than one inhabited planet.

What exactly is meant by the term 'astrology' is quite often debated and confused in the scholarship. Many subdivisions were categorised throughout the classical, medieval and Renaissance periods, and even more have been applied by modern historians. We have already mentioned high and low astrology, which is of course a modern delineation. Isidore of Seville (560–636) distinguished between 'natural astrology' and 'superstitious astrology' in his *Etymologies* (III.27). Superstitious astrology is more accurately referred to as 'judicial astrology', and the division is usually considered to separate the influence of the heavens over the natural world



from its influence over humans and human events, which impinged on free will. A distinction can also be made between practical astrology and different levels of astrological theory, that is, theory oriented towards practice and theory concerning celestial influence as a subject of natural philosophy.<sup>23</sup> It is this last meaning which is the focus of the current discussion. Lemay called it theoretical, learned astrology. Others, including Darrel Rutkin in his PhD dissertation, have called it ‘scientific astrology’ (Lemay 1987, 60–63; Rutkin 2002, 21–22).<sup>24</sup> Rutkin has since switched his emphasis onto an ‘astrologizing Aristotelian natural philosophy’ (Rutkin 2006, 2015, 2018). To this list might be added, as we will see, an ‘astrologizing Platonic/Stoic natural philosophy’. For the sake of simplicity and brevity, however, this book will often use the term ‘astrology’ by itself, on the understanding that it does not refer, in general, to practice or practical theory.

In the light of such possible confusions, both terminological and philosophical, one can see the attraction of Lovejoy’s unit-ideas. If we allow ourselves, with an appropriate awareness of the limits of applicability, to use the same method, we could isolate two such unit-ideas for use in this book: the Principle of Influence and the Principle of Inhabitation. The first principle would be the reduction of astrology to two basic questions: Are the celestial bodies causes? And if so, what effects do they have? The latter principle would be the notion that, simply put, there are mortal living beings on other celestial bodies. A comparative history of these notions, beliefs, principles, unit-ideas, paradigms, *endoxai*, however we might like to think of them, is what is attempted here. It begins with an agonisingly brief description of the history of each from the classical period to the end of the sixteenth century, and with a slightly closer look at some examples of contact between them. The first such contact is made by Plutarch.

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<sup>23</sup> For a discussion of the terminology, see Rutkin 2002, 20–22.

<sup>24</sup> See also North 1986; Lindberg 1992, 74–90; Grant 1994, chap. 19.