PARADISE LOST AND THE COSMOLOGICAL REVOLUTION

This volume brings John Milton's *Paradise Lost* into dialogue with the challenges of cosmology and the world of Galileo, whom Milton met and admired: a Universe encompassing space travel, an Earth that participates vibrantly in the cosmic dance, and stars that might be "world[s] / Of destined habitation." Milton's bold depiction of our Universe as merely a small part of a larger Multiverse allows the removal of Hell from Earth's center to a location far off in the abyss of Chaos. In this wide-ranging work, Dennis Danielson lucidly unfolds early modern cosmological debates, engaging not only Galileo but also Copernicus, Tycho Brahe, Kepler, and the English Copernicans, thus placing Milton at a rich crossroads of epic poetry and the history of science.

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Foreword and acknowledgments

The chapters in this book appear in the order in which they were written. The book's themes *felt* as if they were unfolding in a logical order – one that I trust is also evident to readers. Chapter 1 offers astronomical and cosmological background, highlighting elements to which John Milton and many of his age responded. Chapter 2 seeks to address one of the boldest aspects of the imagined world of *Paradise Lost*; indeed, the vocabulary of "world" and "Universe" is inadequate to describe the larger Multiverse within which Milton situates Hell, Heaven, and our Cosmos. Zooming in on that Universe in Chapter 3, we not only examine Copernicus's cosmological challenge to the model described in Chapter 1 but also glimpse the range of proposals offered by cosmological bricoleurs through the middle of the seventeenth century. Chapter 4 addresses the first exhilarating telescopic discoveries of Galileo and the deep-seated resistance of a figure such as Francis Bacon to accepting Galileo's Copernican conclusions. However, Chapter 5 shows Galileo's influential binary of the "two chief world systems, Ptolemaic and Copernican," to be anachronistic and tendentious, offering a rhetorical and scientific backdrop against which Milton's apparent tentativeness about Copernican cosmology is seen to be more deft and responsible than many have thought. Chapter 6 examines the Sun's location, symbolism, and theology amid the cosmological debates and offers an appreciation of Milton's treatment of solar themes. Milton's exuberantly Galilean treatment of Earth – a wandering star whose affinity with the rest of the Universe poetically sexualizes and enlivens the heavens – is examined in Chapter 7. Chapter 8 extends the discussion of Earth's role in a living, perhaps extraterrestrially populated, navigable, and purposeful Cosmos. These chapters are liberally punctuated with close readings of Milton's own challenging and beautiful cosmological passages. The epilogue concludes by offering remarks on the position and achievement of *Paradise Lost* as a node of cosmological reflection in the seventeenth century and perhaps for the future.

I would like to think that almost any curious, intelligent person might find interesting a discussion of the greatest epic in the English language interwoven with aspects of a truly momentous set of developments in humankind's understanding of the Universe. In addressing a hoped-for wide audience with inevitably varied backgrounds, however, I might occasionally, in my pedantic way, tell students of Milton or aficionados of the history of science things they already know. Should this happen, I beg my readers' kind forbearance.

Already the recipient of much kindness, I wish to record thanks to the Social Sciences and Humanities Research Council of Canada for a grant supporting the research that went into this book. I am also grateful to the Alexander von Humboldt Foundation for awarding me the Konrad Adenauer Forschungspreis in 2011–12. This permitted me seasons of appropriately monklike concentration in Munich, during which much of the book was composed. In addition, I offer thanks to Janet Henshaw Danielson, Christopher Graney, Javier Ibáñez, and John Leonard for reading parts of my manuscript and suggesting improvements, likewise to Ray Ryan at Cambridge University Press for his interest and encouragement, and to the press's three anonymous readers for their generous, helpful critique. For wonderful teachers and mentors over the years – four of whom I seek to honor in the dedication – I am also deeply grateful. Nothing can convey sufficient thanks to my immediate family, especially Janet. I alone am to thank for whatever faults remain in this book, the writing of which has been for me an inexpressible privilege. *Soli Deo gloria*.

Note on text and usage

I follow the style of the International Astronomical Union in capitalizing Earth, Sun, Moon, Universe, Cosmos, etc., when these designate a single astronomical entity (parallel to the standard usage, whereby one capitalizes Mercury, Venus, and the proper names of other planets). When a word is generic or plural, however, it is not capitalized (e.g., "Galileo discovered Jupiter's four moons," "Humans are created from earth," etc.).

I use American punctuation and spelling except for the word *storey*. Part of my historical account concerns the traditional distinction between upper and lower storeys of the Universe and retaining that spelling helps keep architectural or cosmological structures from being confused with narratives or stories.

In transcriptions of Latin and English texts, I have retained original capitalization and spelling but have regularized i/j, u/v, and long "s" and have expanded abbreviations, such as those formed with superscripts, tildes, ampersands, and the like. I have not adhered to the seventeenth-century convention of italicizing proper names.

In citations of writings in which no published translation is indicated, the translation is my own. For some lesser-known works, I provide the original Latin in the footnotes. For better-known authors whose original works are readily available on the World Wide Web (e.g., Copernicus, Gilbert, Galileo, Bacon), I quote either my own or a standard published translation – with references to or strategic samples of the original only when these seem to be of particular interest. For biblical quotations, I have chosen to use the King James (or Authorized) version. One is always wise, of course, given enough time, to consult the original languages and other translations. All quotations from *Paradise Lost* (*PL*) are from the Modern Library Classics edition, edited by William Kerrigan, John Rumrich, and Stephen M. Fallon.

Preface: A cosmical epic

> In poems, equally as in philosophic disquisitions, genius produces the strongest impressions of novelty, while it rescues the most admitted truths from the impotence caused by the very circumstance of their universal admission. Truths, of all others the most awful and mysterious, yet being, at the same time, of universal interest, are too often considered as *so* true, that they lose all the life and efficiency of truth, and lie bed-ridden in the dormitory of the soul, side by side with the most despised and exploded errors.
>
> Samuel Taylor Coleridge, *Biographia Literaria*[1]

> The decisive thing [about the 1969 Moon landing] is that it brought to an end the Copernican trauma of the Earth's having the status of a mere point – of the annihilation of its importance by the enormity [*Übergröße*] of the universe. . . . The successive increases in the disproportion between the Earth and the universe, between man and totality, have lost their significance. . . . One can also put it this way: Equivalence is established between the microscopic and the telescopic sides of reality – absence of difference, in a sense that no longer has any tinge of Pascal's abysses of the infinities.
>
> Hans Blumenberg, *The Genesis of the Copernican World*[2]

One of the glories of Milton is that, like other great poets, he permits us to see significant things afresh – perhaps even to see things we have never quite seen before. The notion of recuperation, of renovation, and of "repair[ing] the ruines"[3] stands at the threshold of his early treatise *Of Education* and it can be seen as the essence of *Paradise Lost*. Famously, the prospect of a regained paradise, of a restoration of humankind, appears in the fifth line of that epic, even before the story of loss quite gets under way. One must not,

[1] S. T. Coleridge, *Biographia Literaria* (New York, 1834), p. 56.
[2] Hans Blumenberg, *The Genesis of the Copernican World*, trans. Robert M. Wallace (Cambridge, MA: MIT Press, 1987), pp. 678–9; cf. Blumenberg's original, *Die Genesis der kopernikanischen Welt* (Frankfurt: Suhrkamp, 1975), pp. 786–7.
[3] *Of Education* (London, 1644), the preface to Samuel Hartlib.

of course, minimize the depths of loss that Milton explicitly or implicitly explores: humankind's fall and exile from paradise; our loss of harmonious communion with God, with angels, with Earth, with each other; our forfeiture of cosmic mobility and of immortality; and Milton's own sorrows arising from losses physical, political, ecclesiastical, and domestic. However, in *Paradise Lost*, we are surprised not only by sin but also by joy, by bliss, by wonder. The "awful and mysterious" truths (in Coleridge's words) are not merely or always terrifying; they are often exhilarating. For Milton, those truths include the delicate sheen left behind by "Minims of nature" – by lowly worms – "Streaking the ground with sinuous trace" (7.482, 481) as well as awe-inspiring and poignant glimpses of our Earth viewed from the Sun or of our entire Cosmos caught sight of from outer Chaos. Milton's "argument" is as much about a rescue as it is about a loss. And for Milton, there is no unbridgeable gulf between the microscopic and the macroscopic or between small things of human interest and grand things of universal interest.

For more than a century now, critic Walter Raleigh's comment that *Paradise Lost* is "a monument to dead ideas,"[4] regardless of whether he intended it as hostile, has typified a sleepy neglect of the magnificence and vibrancy of the cosmic canvas that Milton unfurls in his epic. It is true that significant (although sometimes equivocal) contributions toward an understanding of Milton's engagement with astronomy and cosmography were offered in the first two-thirds of the twentieth century by such critics as Allan Gilbert, Grant McColley, Marjorie Nicolson, and Walter Clyde Curry. And there have been other similarly equivocal contributions in more recent decades.[5] But no one has yet mounted the full rescue mission required if we are to experience and to relish the astonishing engagement of the plot, persons, and poetry of *Paradise Lost* with the Cosmos – to recognize it, in David Masson's apt words, as "a cosmical epic which was without a precedent and remains without a parallel."[6]

It is not only critics who have contributed to the neglect of Milton's "universal interest." With some few exceptions, historians of science and popularizers have for centuries fallen into clichés and generalizations about

[4] Walter Raleigh, *Milton* (London, 1900), p. 88.

[5] As I shall acknowledge more fully later, John Leonard's *Faithful Labourers: A Reception History of Paradise Lost, 1667–1970* (New York: Oxford University Press, 2013) [henceforth cited as *FL*], especially Chapter 11 (pp. 705–819), has done an exceptional job of evaluating critical responses to astronomical issues in *Paradise Lost* and hence of clearing the ground for a study such as this one.

[6] David Masson, *The Life of John Milton: Narrated in Connexion With the Political, Ecclesiastical, and Literary History of His Time*, 7 vols. (London: Macmillan, 1859–1894), 6:535.

the shape and meaning of the cosmological revolution that stretched roughly from Copernicus to Newton. Most notably, the story of the rise of heliocentrism has been told with uncritical Whiggish assumptions about struggles between the forward looking and the backward looking, between the scientific and the religious, between enlightened and obscurantist. Against such a monochrome backdrop, it is little wonder that Milton is readily lumped together with traditional defenders of "the discarded image"[7] – of the model of the Universe usually associated with the name of Ptolemy. But such oversimplifications concerning the rise of Copernicanism – some of them already starting to take hold in the mid-seventeenth century – too easily desensitize us to the depth and complexity of debates still going on (and for good scientific reasons) when Milton wrote *Paradise Lost* and, thus, to the colorful richness of Milton's cosmic imagination.

Part of the somnolence I am describing is simply something that happens with the passage of time, with the changes that take place within a language, and, as Coleridge indicates, with the loss of "life and efficiency" that accompanies years of repetition and habituation. My ambition in this book is to help cast off that sleepiness through carefully attending to what Milton wrote and to how his cosmological context engaged him and was engaged by him. According to late nineteenth-century German philosopher Wilhelm Dilthey, the historian shares with the poet a capacity to apprehend and reenact a complex of thoughts, feelings, circumstances, and characters in such a way that readers may relive or experience (*nacherleben*) a world from which they would otherwise be quite cut off – a "world that stretches our horizon of lived human possibility otherwise inaccessible to us."[8] Milton is indeed that kind of poet and my aim is to serve as his accessory by facilitating the kind of historical understanding Dilthey adumbrates.

It is a commonplace of Milton criticism that to deepen one's understanding of the debates with which Milton was surrounded – for example, regarding politics, theology, or poetic theory – also potentially deepens one's appreciation of his works. In this respect, what the present study attempts is hardly different methodologically from much else that has contributed to the ongoing conversation about Milton amid his milieu.

[7] I borrow the phrase from C. S. Lewis, *The Discarded Image: An Introduction to Medieval and Renaissance Literature* (Cambridge: Cambridge University Press, 1964), one of the most eloquent and sympathetic expositions of that model.

[8] Wilhelm Dilthey, *Plan der Fortsetzung zum Aufbau der geschichtlichen Welt in den Geisteswissenschaften; Gesammelte Schriften* 7 (Göttingen: Teubner, 1958): 215–16.

In the area of cosmology, however, the task may be even more daunting than it usually is, given historical changes in vocabulary. One can imagine, for example, placing a seventeenth-century and a twenty-first-century politician or theologian or poet together in a room and finding that they could, if perhaps with great effort, communicate with each other on some level about what it is that politicians, theologians, or poets actually do. Such a thought experiment is considerably harder to conduct in almost any area whose substance concerns what we now call *science*. The word *science* was indeed in use in Milton's day, although it did not mean then what it does today despite the persistence of some significant seventeenth-century roots. "Scientist," on the other hand, was a nineteenth-century coinage,[9] as was "Copernicanism." "Cosmology" itself does seem to have come into modest use in the mid-seventeenth century. But it is highly doubtful whether a present-day cosmologist would find much in common with anyone at all in the seventeenth century with regard to the methods, problems, and vocabulary of cosmology.[10] Too much has changed.

This is why I need to introduce in a relatively basic way the problems and lexicon of seventeenth-century cosmology – and to try, as much as one can, to peer behind more recent construals of science history, including popular binaries – most notably "Copernican vs. Ptolemaic" – with all the cultural and historical baggage it has come to entail. The discussion I pursue will not artificially eschew vocabulary developed after the seventeenth century, although I shall try to remain aware of terminological dangers, including that of anachronism. As the first two chapters implicitly argue, we need to revisit the cosmological background of Milton's age and, in a way that attends carefully to the canvas of creation he unfurls, crucially extend our lexicon so we might more adequately comprehend the structure and magnitude of the world Milton portrays.

The main piece of new vocabulary I will introduce to describe Milton's canvas of creation is "Multiverse." Although technically anachronistic, the term is highly useful for a discussion of Milton's cosmology, given that the synonyms "Universe" and "Cosmos" bespeak, respectively, unity and order and that, therefore, neither term can properly be employed to denote Milton's Chaos, which is boundless and disordered. "Multiverse" was first coined by William James in 1895 and is actively employed by cosmologists

[9] See Danielson, "Scientist's Birthright: How a New Name Embodied Ideals of Connection and Inclusiveness," *Nature* 410 (26 April 2001): 1030–31.

[10] I am speaking, of course, generally. It might be amusing to imagine possible exceptions, such as two holders of the Lucasian Chair in Mathematics at Cambridge – one from the late seventeenth century and a more recent holder from the early twenty-first century.

today.[11] Historically, it has occasionally been used pejoratively to substitute for "Universe" – to reflect a pessimistic view according to which the Universe, not living up to its name, shows signs of fragmentation. In relation to Milton, however, I shall use the term nonpejoratively to denote a maximal, comprehensive ensemble of potential cosmic components – some of which may be selected (or may have been selected) to make up the pieces of an actual universe or possibly more than one. This lexical maneuver protects "Universe" and "Cosmos" (whose main seventeenth-century synonym was simply "world") from being arbitrarily and incoherently employed to denote entities ordered and disordered.

This book, as will become evident, is more about Milton and his context than about Milton studies. My principal quarry is what Milton wrote and what he invites us to imagine – together with the strands of historical, scientific, and literary fabric that help make his achievement intelligible. I do not take as my principal task a developed critique of the history of the reception and interpretation of *Paradise Lost*. While valuing such reception history and particularly appreciating John Leonard's recent magisterial rooting out of persistent misreadings, I shall resist letting the long, intriguing course of the Miltonist conversation deflect attention from more primary and (in my view) even more interesting matters. Thus, for the most part, I shall foreground discussions and controversies that Milton was or might have been aware of – that he might reasonably be seen to be engaging in – and shall acknowledge a range of Milton critics' pertinent contributions on broadly cosmological issues chiefly, although still visibly, in the footnotes.

Before turning to those primary matters, however, I would like to comment on a handful of publications bearing on Milton's cosmology that have appeared since 1970 (the *terminus ad quem* of Leonard's *Faithful Labourers*) – my purpose being to illustrate tendencies I positively wish to avoid. The work most closely aligned to the present one in its scope and purpose is Harinder Singh Marjara's impressive *Contemplation of Created Things: Science in Paradise Lost*. Marjara sets out to situate Milton's ideas "in their scientific and metaphysical context, occasionally going back to their ancient and medieval roots."[12] Despite this laudable aim, however, Marjara's discussion is weakened by his tendency to assume, rather than

[11] One of the most comprehensive collections on this topic is *Universe or Multiverse?*, ed. Bernard Carr (Cambridge: Cambridge University Press, 2007).
[12] Harinder Singh Marjara, *Contemplation of Created Things: Science in Paradise Lost* (Toronto: University of Toronto Press, 1992), p. 13.

argue, that certain elements formed part of Milton's intellectual furniture. He states that "the framework [of Milton's ideas] was basically Aristotelian" and goes on to worry repeatedly about how the poet conforms to or diverges from a peripatetic position. While praising Milton's description of Chaos as a realm extending endlessly beyond the bounds of our finite Universe, Marjara accordingly frames this achievement by saying that Milton "sacrifices the compatibility of his universe with his Aristotelianism" (p. 107). Moreover, Marjara's assumptions about Milton's basic Aristotelianism naturally appear to lend credence to other assumptions about "his geocentrism" and its supposed affinity to anthropocentrism (p. 135) – mistaken attributions, as I shall argue, in spite of how frequently they have been applied to Milton over the centuries. To its credit, Marjara's learned book aims to resist any simplistic construal of Milton as "old-fashioned" (p. 14). But by unnecessarily shackling Milton with tenets of a science either already or about to be discredited, Marjara in effect "retreats to a defense of Milton based on poetic license" and ends up "damn[ing] with faint ambiguities."[13]

Indeed, very few critics succeed in transcending the persistent progressivist binary that portrays individual characters on the stage of history as playing roles that are either backward looking or forward looking (the former, in keeping with the modernist paradigm, of course being bad and the latter being good). The true picture is seldom that simple and often much more interesting than the binary suggests. To acknowledge and celebrate the genuine progress and achievements of science since the time of Copernicus need not entail what Antonio Pérez-Ramos has called an "ideology of success" nor justify the habit of treating "allegiance to Copernicanism ... as *the* mark of modernity and progressiveness."[14] Much more will be said in Chapters 6 and 7 about modernity's paradoxically self-congratulatory tendencies as they relate to the historiography of science and in particular of Copernicanism. But while probing and praising Milton's achievement, I explicitly eschew attempts to make him a hero of the rise of science or to engage in "Whiggish ancestor-chasing" (Pérez-Ramos, p. 198), as if identifying his sources or influences could adequately perform the task of authentic assessment and interpretation.

[13] Stephen Fallon, his review of Marjara, *The Journal of English and Germanic Philology*, 93.3 (July 1994): 428–31; and Diane Kelsey McColley, "Milton and Nature: Greener Readings" (Review Article), *Huntington Library Quarterly*, 62.3/4 (1999): 423–44 (p. 432).

[14] Antonio Pérez-Ramos, "Francis Bacon and Astronomical Inquiry," *British Journal for the History of Science* 23.2 (June 1990): 197–205 (pp. 197, 199).

Perhaps the most compact illustration of how complex the imagined march of science can actually be is the case of Francis Bacon (1561–1626), to which I shall return in Chapter 4. In 1667, the year *Paradise Lost* was first published, Bacon was already being hailed by Abraham Cowley in the verse preface to Thomas Sprat's *History of the Royal Society* as a pioneer of the new science:

> *Bacon*, like *Moses*, led us forth at last,
> The barren Wilderness he past,
> Did on the very Border stand
> Of the blest promis'd Land,
> And from the Mountains Top of his Exalted Wit,
> Saw it himself, and shew'd us it.[15]

As we shall see, however, despite this near apotheosis of Bacon as Mosaic deliverer of natural philosophy, he had in fact openly dismissed Copernicanism as "the speculations of one who cares not what fictions he introduces into nature, provided his calculations answer."[16]

But some Miltonists continue to practice "ancestor chasing" – one of the most notable recent contributions in the area of Milton's cosmology fingering Bacon as just such an ancestor. Catherine Gimelli Martin has called Milton "perhaps the most Baconian poet of the seventeenth century," and throughout her long and often helpful article, she repeats her thesis concerning that affinity.[17] While this may be a slightly more fruitful approach than labeling Milton "basically Aristotelian," there is scarcely any firm evidence supporting it; it seems something more asserted than properly argued. Milton and Bacon may indeed share a vocal dislike for things monkish and scholastic; moreover, both vigorously seek to interpret experience independent of preconceived orthodoxies or idolatries. But their sharing certain antipathies does not confirm Martin's contention, and one worries that linking Milton to Bacon may be unduly motivated by a desire to have some of Bacon's

[15] Abraham Cowley, "To the Royal Society," lines 93–8; in Thomas Sprat, *The History of the Royal-Society of London, For the Improving of Natural Knowledge* (London, 1667), sig. B2^{v}.

[16] *The Works of Francis Bacon*, ed. James Spedding et al., 15 vols. (London: Longman, 1857), 10:427–8; 7:304: *ejus sunt viri qui quidvis in natura fingere, modo calculi bene cedant, nihil putet*. The work cited is Bacon's *Descriptio Globi Intellectualis*, composed probably in 1612 but published only posthumously, in Amsterdam, in 1653.

[17] Catherine Gimelli Martin, "'What If the Sun Be Centre to the World?': Milton's Epistemology, Cosmology, and Paradise of Fools Reconsidered," *Modern Philology* 99.2 (Nov. 2001): 231–65 (p. 231).

prestige as "the hero of the revolution in scientific method"[18] rub off on the often scientifically undervalued epic poet.

Against such an attempted renovation of Milton's scientific credentials, William Poole has responded with his "Milton and Science: A Caveat."[19] Poole's stimulating short essay casts doubt on Martin's cheerfully arranged affiliation between Milton and Bacon. Poole's is a generally wise, heavily documented admonition against exaggerating the depth of Milton's contact with the new science or the new scientists. However, although he claims not to be consigning Milton "back to the dustbin of the old science," Poole declares "it must be conceded that the epic nonetheless upholds the Ptolemaic model as dominant" (p. 28). This claim constitutes quite precisely a consignment to a dustbin, although it is a consignment decreed rather than argued. In spite of his largely astute critique of those who press the case for a "forward looking" Milton, Poole thus, in spite of his efforts to encourage a more rigorously contextualized reading of Milton, ends his discussion by offering something much like the backward-looking poet portrayed by so many earlier critics.

A further example of ancestor-chasing is worth mentioning here because it still often afflicts not only Milton studies but also the historiography of cosmology more generally. One of the most colorful characters in sixteenth-century intellectual history is undoubtedly Giordano Bruno, whose caché was cemented by the fact that on February 17, 1600, the Roman Inquisition burnt him at the stake. In his place of execution, Rome's Campo de' Fiori, there still stands a statue of Bruno, erected in 1889, whose inscription includes the words "A Bruno Il Secolo da lui Divinato" ("To Bruno, from the generation he foresaw [or divined]") – itself a concise instance of ancestor appropriation. Few scholars any longer give credence to the notion that Bruno was burnt for his cosmology or his Copernicanism. Indeed, Ernan McMullin has shown how poorly Bruno understood Copernicus, commenting that "to call Bruno a 'Copernican' requires one to empty the label of all content save the assertion that the earth and planets move around the sun."[20] Frances Yates, the twentieth century's most influential interpreter of Bruno, referring to Bruno's *La Cena de le Ceneri* (*The Ash Wednesday Supper*, written in England and

[18] The phrase, quoted by Martin (p. 234), is William Whewell's, from *Philosophy of the Inductive Sciences Founded Upon Their History*, 2d ed., 2 vols. (London, 1857), 2:230.

[19] William Poole, "Milton and Science: A Caveat," *Milton Quarterly* 38.1 (March 2004): 18–34. With "the newer school of criticism," Poole associates Kester Svendsen, Stephen Fallon, Harinder Singh Marjara, John Rogers, Karen Edwards, and Martin.

[20] Ernan McMullin, "Bruno and Copernicus," *Isis* 78.1 (Mar., 1987): 55–74.

published in 1584), commented that "Copernicus might have well bought up and destroyed all copies of the *Cena* had he been alive."[21] The dominant current in Bruno's thought was in fact Hermeticism, a mystical, ultimately pantheistic amalgam of ideas based on the supposedly Mosaic-era writings of Hermes Trismegistus. Bruno used pantheism's identification of God and Cosmos to undermine Aristotle's doctrine of the finitude of the Universe, for "it is fitting that an inaccessible divine countenance should have an infinite likeness with infinite parts – such as those countless worlds I have postulated. . . . There must be innumerable individuals such as those great creatures are (of which our earth is one – the divine mother who gave birth to us, nourishes us, and will finally receive us again into herself). [And] to encompass these innumerable creatures requires an infinite space."[22] Bruno's pantheistic presumption that life is present everywhere in the universe, combined with his affection for atomism, led him to postulate a homogeneous Cosmos with stars and earths distributed throughout empty space. Such an account may superficially appear to anticipate (for example) Newtonian absolute space, but philosophically it more anticipates New Age than new science.[23]

Yet Bruno still keeps getting dragged into otherwise worthwhile discussions of Milton and science. Setting aside the raw incompossibility of the claims and methods, for example, of Galileo and Bruno (even the most recent space telescopes cannot penetrate to nor justify conclusions about infinity), we should recognize that the spirit and aims of Bruno's mystically tinged cosmology evince very little affinity indeed with modern science.

A footnote by Catherine Gimelli Martin affords an instructive cautionary instance of how Bruno's supposed influence may worm its way into discussions of Milton. Having claimed that Milton's science is "heavily permeated with Neoplatonic forms of thought" descending ultimately from Nicholas of Cusa – "probably . . . via the voluminous propagandizing of Giordano Bruno" – Martin offers the following note: "Both Harris Fletcher . . . and Frances Yates . . . have found connections

[21] Frances A. Yates, *Giordano Bruno and the Hermetic Tradition* (Chicago: University of Chicago Press, 1964), p. ix.

[22] *The Book of the Cosmos: Imagining the Universe From Heraclitus to Hawking*, ed. Dennis Danielson (hereafter *BOTC*), p. 142; my translation (with kind advice from Arielle Saiber) from *De l'infinito universo et Mondi*, 1584; original text reprinted in *Le opere italiane di Giordano Bruno* (Göttingen, 1888).

[23] It would be wrong, of course, to deny *any* connection between Hermeticism and a figure such as Newton.

between Milton and Bruno" (Martin, p. 263). Martin's note offers no specific citation of Yates – only the title of her book. But if one searches that volume, one indeed finds a reference to Milton and Bruno. Yates quotes *Il Penseroso*:

> Or let my Lamp at midnight hour,
> Be seen in som high lonely Towr,
> Where I may oft out-watch the Bear,
> With thrice great Hermes, or unsphear
> The spirit of Plato to unfold
> What Worlds, or what vast Regions hold
> The immortal mind that hath forsook
> Her mansion in this fleshly nook. . . .
> (ll. 85–92)

Yates comments: "These lines (which to my mind have a Brunian ring through the mention of the Bear, where the reform of the heavens begins in *Spaccio*) brilliantly suggest the atmosphere of the Hermetic trance" (Yates, p. 280). Who could object to Yates's hearing a "Brunian ring" in these early lines of Milton? But this scarcely justifies the assertion that she actually "finds a connection" between Milton and Bruno.

Moving on to Fletcher, one in fact finds him offering the following tenuous line of reasoning. He points out that Milton's father (John Milton Sr.), Alexander Gill the Elder (who became headmaster of St. Paul's School), John Florio (eventual translator of Montaigne), and Bruno were in 1583 "perhaps all at Oxford at the same time." As he openly concedes, "it is a fascinating but vain speculation to suggest that the elder Milton knew the other three." Nevertheless, in the next breath, Fletcher avers that "such a suggestion is revealing in connection with the father's urging of the boy Milton to learn the Continental vernaculars. . . . Through Bruno and Florio, the elder Milton, if he was at Oxford, would have been impressed by the linguistic interests centering in these two Italians."[24] Thus does a "vain speculation" instantly become a "suggestion" – one that is "revealing" – and then in turn, decades later, becomes in the hands of Martin a "connection" between a visiting Italian writer and Milton, whose father might have breathed the same Oxford air with Bruno in 1583 – a quarter-century before the future epic poet was born.

[24] Harris Francis Fletcher, *The Intellectual Development of John Milton*, 2 vols. (Urbana: University of Illinois Press, 1956), 1:302.

Enough about ancestor-chasing – except only this: Often, in thought as well as in life, we simply do not know our own ancestors, even though we do have them, as did Milton. However, it is not to belittle the influence of ancestors to suggest that the story of influence is seldom the most interesting one to tell or to hear. In this book, I shall try to situate Milton and *Paradise Lost* nonreductively in a wider culture of thought, replete with influences, that stretches backward and forward in time – indeed, to the present day – and to examine and illuminate his poem's rich engagement with astronomy and cosmology.