EXTRATERRESTRIAL LIFE: A STUDY OF THE INTELLECTUAL CONTEXT OF EMANUEL SWEDENBORG'S *EARTHS IN THE UNIVERSE*

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INTRODUCTION

A. Purpose

This study is intended as an examination of the early modern debate over extraterrestrial life as it relates to Emanuel Swedenborg. Through such a study I hope to help people gain a better appreciation of the issues Swedenborg addresses in his *Earths in the Universe,*[1] and thus help them gain greater delight and use in reading it.

B. Outline

The structure of this paper is as follows: The first of two chapters consists in a survey of the history of the debate over a plurality of worlds from the time of the Greek philosophers up until the eighteenth century. My focus here will be on the development of the issues that came to be most central to the debate as it appears in Swedenborg's time.

[1] The original Latin text of Emanuel Swedenborg's *Earths in the Universe* appeared in 1758 under the title *De Telluribus in Mundo nostro Solari, quae vocantur Planetae, et de Telluribus in Coelo Astrifero; deque illarum Incolis; turn despiritihus et angelis ihi; ex auditis et visis* (London: John Lewis, 1758). This work consisted primarily of modified extracts from Swedenborg's previously published *Arcana Coelestia* (London: John Lewis, 1749-56). These original *Arcana* passages were, in turn, drawn from a personal journal of spiritual experiences which Swedenborg kept (published first at Tuebingen in the 1840's by Johannes F. I. Tafel under the title *Diarium Spirituale).* The most recent (3rd) Latin edition of *De Telluribus* juxtaposes the text of the first Latin edition with parallel passages from *Arcana Coelestia* and *Diarium Spirituale.* This three-column version of *De Telluribus* was edited by Lisa Hyatt (now Lisa Hyatt Cooper), and published by the Academy of the New Church Press at Bryn Athyn, Pennsylvania in 1980. Note that portions of *Diarium Spirtuale* appearing in this publication are not those of any standard edition, but were prepared *ad hoc* by Lisa Hyatt and J. Durban Odhner, present editor of the third Latin edition of *Diarium Spirituale* (published as *Experientiae Spirituales* [Bryn Athyn: Academy of the New Church Press, 1984—1st vol. only as of Sept. 1984].

By explaining the development of the issues central to the eighteenth-century debate over a plurality of worlds, I hope to lay the groundwork for an analysis of Swedenborg's own approach to the subject. This analysis, which forms the topic of the second chapter, is intended not only to highlight the ways in which Swedenborg was influenced by his intellectual environment, but also to reveal the truly distinctive aspects of his system.

By showing how Swedenborg's contemporaries influenced him, and by drawing out those aspects of Swedenborg's ideas on extraterrestrial life that distinguish him from others in his day, I wish to provide a firm footing for future historical and theological discussion of this topic. In this way, I hope to fulfill my main purpose of helping my readers to enter more fully into the world of Swedenborg's writings.

HISTORICAL BACKGROUND OF THE DEBATE OVER EXTRATERRESTRIAL LIFE

A. The Early History of the Debate

The question of whether there is more than one inhabited world is probably much older than written records of it indicate. However, the first time we actually see this question being systematically raised and debated is in the five or six hundred years immediately preceding the Christian era. During this period an immense flowering of genius occurred in the Greek world, and it is here that the foundation for Western cosmological speculation of the next thousand years was laid.

While the question of extraterrestrial life was addressed directly by some, it was usually introduced in conjunction with cosmology. So, for instance, when Democritus, Epicurus, Lucretius, and others reasoned that the universe behaved according to the chance movements of atoms in a void, they drew in as a corollary the idea that these atoms may have concatenated to form more than one world.[2] And the Pythagoreans, who placed a sister earth opposite ours, considered this second earth to have inhabitants.[3]

[2] Titus Lucretius, *De Rerum Natura,* William Ellery Leonard and Stanley Barney Smith eds. (Madison, Wisconsin: Univ. of Wisconsin Press, 1968), book II, lines 1048-89 (p. 405-408).

[3] Grant McColley, "The Seventeenth-Century Doctrine of a Plurality of Worlds," *Annals of Science,* vol. I (1936), p. 386.

Although groups such as the Pythagoreans at various times held considerable influence, most people in Hellenistic and Roman times believed, or else came to believe, that the earth was at the center of the cosmos, and that the various celestial bodies were merely little "lights" that circled around it. One of the great promulgators of this system was Aristotle.

It should be noted that this scheme was not that of the ancient Jews. In Genesis the sky is called a *rāqîa*, from the root 'rq,' which means 'to pound or hammer out.' The sky was therefore seen by the ancient Jews as a hard object, what is called in the Septuagint a *steréoma,* that is, 'something firm or hard; a firmament.' Above the *rāqîa*, were that portion of the primordial waters which had been separated from the "waters under the earth."[5] Somewhere up there above the clouds was also the throne of God (fig.1)[6]

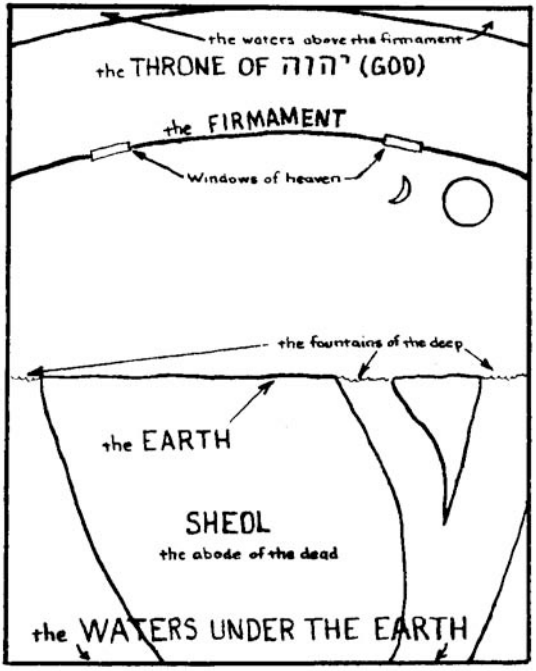


Fig. 1. The ancient Jewish conception of the world.

[4] Job 9:8, for instance.
[5] Genesis 1:6-7.
[6] Psalm 11:4, 33:13; Isaiah 14:12-14.

Interestingly, after the beginning of the eleventh century, when texts of many ancient philosophers were again made known in Europe, Aristotle's cosmology became mysteriously fused amongst Christians with the cosmology of the Bible. The spheres which had been envisioned by Aristotle as holding the various celestial "lights" were seen by the Christians, in accord with Genesis 1:6-7,[7] as either liquid or crystal, or somehow made of a clear, water-like substance.[8] Moreover they asserted that God's throne must stand above the highest crystal sphere, that of the stars. Here also were the angels and the other nobler orders of being (fig. 2).[9]

In addition to mixing the Bible with Aristotelian cosmology, the western Christians of the Middle Ages and Renaissance also bolstered their system with Aristotelian metaphysics and logic. So for instance, they argued, with Aristotle, that the earth was made of four coarse elements (earth, air, fire, and water), while the heavens were made of a pure element that was perfect and never underwent change.[10] The earth therefore naturally fell to the "lowest" or central point of the *kostnos.*[11] This scheme pro-

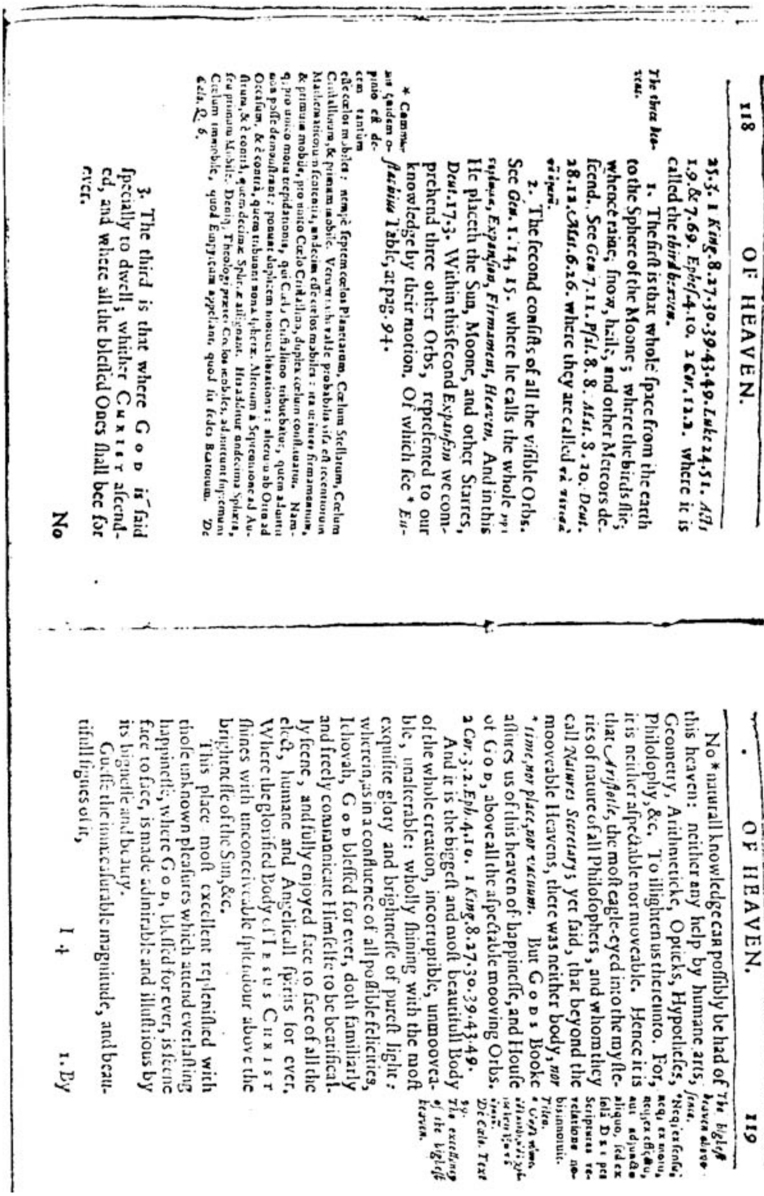
[7] See Ezekiel 1:22.

[8] Thomas Campanella, "The Defense of Galileo," Grant McColley transl.. *Smith College Studies in History,* vol. XXII, no. 3-4 (April-July 1937), p. 56-64, especially 58-9. The original Latin version of this work is difficult to come by {*Apologia Pro Galileo* [Frankfurt, 1622]; note, though, the reprint *Apologia di Galileo* [Turin, 1968|).

[9] Among these higher orders of being were angels (that is, *messengers),* cherubim, seraphim, and sons of God (c.f. Genesis 6:2, Job 1:6). Although belief in such beings was integral to the mythology of the ancient Jews, later Christians, following Aristotle, also deduced the existence of higher beings on rational and theological grounds. For a discussion of this topic, see Arthus O. Lovejoy's *The Great Chain of Being* (Cambridge: Harvard Univ. Press, 1936), p. 58-9. For a general, though tendentious, discussion of Christian cosmology, see Andrew D. White's *History of the Warfare of Science with Theology in Christendom* (originally publ. 1896; reprint. New York: Dover Publications, Inc., I960), p. 89-208.

[10] According to Aristotle, each element had its proper place, the four elements belonging below the sphere of the moon (the *mundus sublunaris),* and the celestial element belonging above them. See Campanella's *Defense,* p. 56-64, esp. 58. See also Albertus Magnus,' *De Caelo et Mundo,* liber 1, tract. 1, esp. cap. 1, 2, and 8.

[11] According to Aristotle, the natural place for the element earth was at the center, with water, air, and then fire above. These elements extended no further than the sphere of the moon. For a discussion of Aristotelian cosmology as it relates to the question of a plurality of



118 OF HEAVEN.

25.5. 1 *King*.8.27.30.39.43.49. *Luke* 24.51. *Acts* 1.9.& 7.69. *Ephes*.4.10. 2 *Cor*.12.2. where it is called the *third heaven*.

The three heavens. 1. The first is that whole space from the earth to the Sphere of the Moone; where the birds flie; whence raine, snow, haile, and other Meteors descend. See *Gen*.7.11. *Psal*.8.8. *Mat*.8.20. *Deut*.28.12. *Mat*.6.26. where they are called τὰ πετεινὰ τοῦ οὐρανοῦ.

2. The second consists of all the visible Orbs. See *Gen*.1.14, 15. where he calls the whole στερέωμα, *Expansion, Firmament, Heaven*. And in this He placeth the Sun, Moone, and other Starres, *Deut*.17.3. Within this second *Expansion* we comprehend three other Orbs, represented to our knowledge by their motion. Of which see * *Eustachius* Table, at pag. 94.

* Communis quidem opinio est decem tantum esse coelos mobiles: nempe septem coelos Planetarum, Coelum Stellatum, Coelum Cristallinum, & primum mobile. Verum tibi valde probabilis visa est recentiorum Mathematicorum sententia, undecim esse coelos mobiles: ita ut inter firmamentum, & primum mobile, pro unico Coelo Cristallino, duplex coelum constituatur. Namq; pro unico motu trepidationis, qui Coelo Cristallino tribuebatur, quem adjutti non posse demonstrant: ponunt duplicem motum librationis: alterum ab Orto ad Occasum, & è contrà, quem tribuunt nona sphærae. Alterum à Septentrione ad Austrum, & è contrà, quem decimæ Sphæræ assignant. His additur undecima Sphæra, seu primum Mobile. Deniq; Theologi præter Coelos mobiles, admittunt supremum Coelum immobile, quod Empyræum appellant, quod sit sedes Beatorum. *De Coelo, Q.* 6.

3. The third is that where God is said specially to dwell; whither Christ ascended, and where all the blessed Ones shall bee for ever.

No

OF HEAVEN. 119

No * naturall knowledge can possibly be had of this heaven: neither any help by humane arts, Geometry, Arithmeticke, Opticks, Hypotheses, Philosophy, &c. To illighten us thereunto. For, it is neither aspectable nor moveable. Hence it is that *Aristotle*, the most eagle-eyed into the mysteries of nature of all Philosophers, and whom they call *Natures Secretary*; yet said, that beyond the mooveable Heavens, there was neither body, *nor* * *time, nor place, nor vacuum*. But Gods Booke assures us of this heaven of happinesse, and House of God, above all the aspectable mooving Orbs. 2 *Cor*.3.2. *Eph*.4.10. 1 *King*.8.27.30.39.43.49.

The biggest heaven above sense.

*Neq; ex sensu, neq; ex motu, neq; ex effectu, aut adjuncto aliquo, sed ex sola Dei per Scripturas revelatione notius innotuit. *Titleo.*

* Οὔτε τόπος, οὔτε κενὸν, οὔτε χρόνος ἐστὶν ἔξω τοῦ οὐρανοῦ. *De Cælo. Text* 99.

The excellency of the biggest heaven.

And it is the biggest and most beautifull Body of the whole creation, incorruptible, unmooveable, unalterable: wholly shining with the most exquisite glory and brightnesse of purest light: wherein, as in a confluence of all possible felicities, Iehovah, God blessed for ever, doth familiarly and freely communicate Himselfe to be beatifically seene, and fully enjoyed face to face of all the elect, humane and Angelicall spirits for ever. Where the glorified Body of Iesus Christ shines with unconceiveable splendour above the brightnesse of the Sun, &c.

This place most excellent replenished with those unknown pleasures which attend everlasting happinesse, where God, blessed for ever, is seene face to face, is made admirable and illustrious by its bignesse and beauty.

Guesse the immeasurable magnitude, and beautifull signes of it,

I 4 1. By

Fig. 2. An example of how Aristotle and the Bible were combined. This document is taken from a relatively late work by Robert Bolton, entitled *Mr. Bolton's Last and Learned Works of the Foure Last Things* (3rd. ed., London, 1635).

vided the Christians of the Middle Ages with a ready rationale against heliocentricity (that is, against a sun-centered model of the solar system). Moreover their idea of perfection in the heavens and coarseness upon the earth allowed them ready confirmation of their religious belief in a heaven above and a loathsome hell beneath. [12]

There are many other ways in which Aristotle became welded to Christian theology, cosmology, and biblical interpretation, but I will pass over these, looking at only one more which is particularly relevant to this study.

What I am here referring to is Aristotle's maxim that what is infinite cannot be moved, as motion implies change of place, and change of place implies finite extent. When applied to the physical universe, this maxim required the conclusion that the cosmos was finite, for the crystal spheres were thought to *move around the earth,* and so could not be infinite. This maxim also implied that more than one world was an impossibility. For another world would mean another earth surrounded by concentric crystal spheres. Between this world and ours would be nothing. Since, according to Aristotle, nature cannot contain a void or vacuum, the existence of two or more separate worlds implied an impossible condition in nature, and therefore could not be. If more than one world did exist, they would come together, and the various earths would gravitate to one central position.[13]

worlds, see Steven J. Dick's *Plurality of Worlds* (Cambridge; Cambridge Univ. Press, 1982), p. 13-19, esp. p. 19 note 31. See also Francis Godwin's *The Man in the Moone: or a Discourse of a Voyage thither by Domingo Gonsales, the Speedy Messenger* (London, 1638), p. 65ff.

[12] Strictly speaking, Aristotelian cosmology could not have permitted a region of fire beneath the earth, since the natural place of earth was at the center. Nevertheless, the idea of our earth at the bottom of the pit, so to speak, made it seem the natural place for hell. See Isaiah 14:12-15. See also Grant McColley's "The Ross-Wilkins Controversy," *Annals of Science,* vol. 3, no. 2 (April 15, 1938), p. 160-61. One should be careful not to confuse Hebrew *sheol* with English "hell." *Sheol* is a dark and gloomy region underground, where *all* dead people were said to go. The idea that some went to a heaven or paradise was not known to the early church of Israel. However, later tannaitic Jews and Christians interpreted *sheol* as "hell." This accounts for the belief that hell was located underground.

[13] In other words, the earths would move to what was for Aristotle their proper location at the center of a single world; see note 11 above. See

In spite of the opposition to the notion of a plurality of worlds inherent in Aristotelian principles, Christian ideas of God often dictated the opposite conclusion. For if God was infinite and infinitely creative, why should his creation have been finite? Surely, many reasoned, God has not confined life to one small earth, for this body is nothing in comparison to his immeasurable greatness.[14]

Because of the contradiction implied by a belief in an infinitely creative and powerful God alongside a belief in the cosmology of Aristotle, there arose a debate amongst Christians over the possibility of a plurality of inhabited worlds. The see-saw never seems to have swung long to either side, though, until the very nature of the debate was altered by the appearance in 1530 of the book *De Revolutionibus Orbium Caelestium,* by Nicolaus Copernicus.

After Copernicus the very meaning of the term "world" began to change, and the conceptual basis of the former debate melted away. What was left was only the problem of a single, immense, and possibly populated *universe.*[15] The process by which the

also Grant McColley's "The Seventeenth-Century Doctrine of a Plurality of Worlds," p. 391, 396, and elsewhere. See also Albertus Magnus' *De Caelo et Mundo,* liber 1, tract. 3, cap. 1-5.

[14] In his *Great Chain of Being,* Arthur O. Lovejoy discusses this and many other inherent tensions in Christian theology. Although there are many aspects of this work which remain matters of dispute, it provides a brilliantly comprehensive overview of the contradictions which were, and are, embedded in Christian concepts of the Deity and of his motives in creating the universe. See especially page 52ff.

[13] In other words, after Copernicus, the idea that the "world" was a ball, with the earth in the middle, and a starry shell on the outside, slowly gave way to the idea that there was only one world of indefinite size, and that within this one world were many solar systems. This change is discussed by Grant McColley in his "Seventeenth-Century Doctrine of a Plurality of Worlds," p. 402-406. See also Campanella's *Defense,* p. 64. But note that Copernicus himself conceived of the world as bounded by an outer shell (discussed by Alexander Koyre in *From Closed World to Infinite Universe* [Baltimore, 1957], p. 31). It also should be mentioned that as early as the fifteenth century Nicolaus of Cusa maintained a belief in a centerless universe, although his nominal adherence to Aristotelian cosmology prevented him from giving this theory clear articulation. See his *De Docta Ignorantia,* book II, chap. IX. Of interest to Swedenborg scholars is Robert Hindmarsh's humorous story about a pious but narrow-minded acquaintance of his who advocated Ptolemaic/Aristotelian cosmology even in the late eighteenth century. See Hindmarsh's *Rise and Progress of the New Jerusalem Church* (London, 1861), p. 135n.

debate was reduced to these terms will be discussed in the following section.

B. Copernicanism

As we have seen in the previous section, the framework of the debate over a plurality of worlds for pre-Copernican Christians was largely that of a biblicized Aristotle. When the people of this era discussed the question of other inhabited worlds, they meant by the term "world" an earth surrounded by crystal spheres, beyond which was the kingdom of heaven. The idea that the earth was actually a planet, or that the sun was a star, had occurred to only a few.

While the debate over a plurality of worlds went on, the basic intellectual climate in Europe was changing. Many new manuscripts of ancient philosophers like Plato were found, and overall there was both a heightening of interest in the classics and a mild increase in freedom of thought.

Alongside this rebirth or *renaissance* of classical learning there was also a great increase in Europe's wealth. Amidst this prosperity there arose a new class of professionals and educated men, who not only stood outside the Aristotelian scholastic tradition, but who often stood outside the clergy of the established church(es).

Among the new intellectuals were certain astronomers. Instead of being merely interested in traditional philosophical/theological speculation and abstract debate, these proto-scientists were interested in preparing exact tables of planetary motions and eclipses. Although a great deal of this work was undertaken for the sake of astrology or calendars, the people involved were often of a distinctly empirical turn of mind.

Naturally such individuals would not have cared so much for what Aristotle had to say about the world as for better methods of calculating its movements. And if a heliocentric model of the world was mathematically superior, they would have been far less resistant than the Aristotelian schoolmen in adopting it.[16]

Though formally trained in canon law, and thus nominally connected with the church, Nicolaus Copernicus was, in effect, one of these new intellectuals. Through his largely mathematical

[16] Swedenborg discusses the character of Aristotle's later Christian followers (the "Scholastics") in *Arcana Coelestia,* paragraph 4658.

work *De Revolutionibus Orbium Caelestium,* he became the great popularizer of the ancient heliocentric notion of the world (fig. 3). In spite of the quantitative nature of Copernicus' theory,

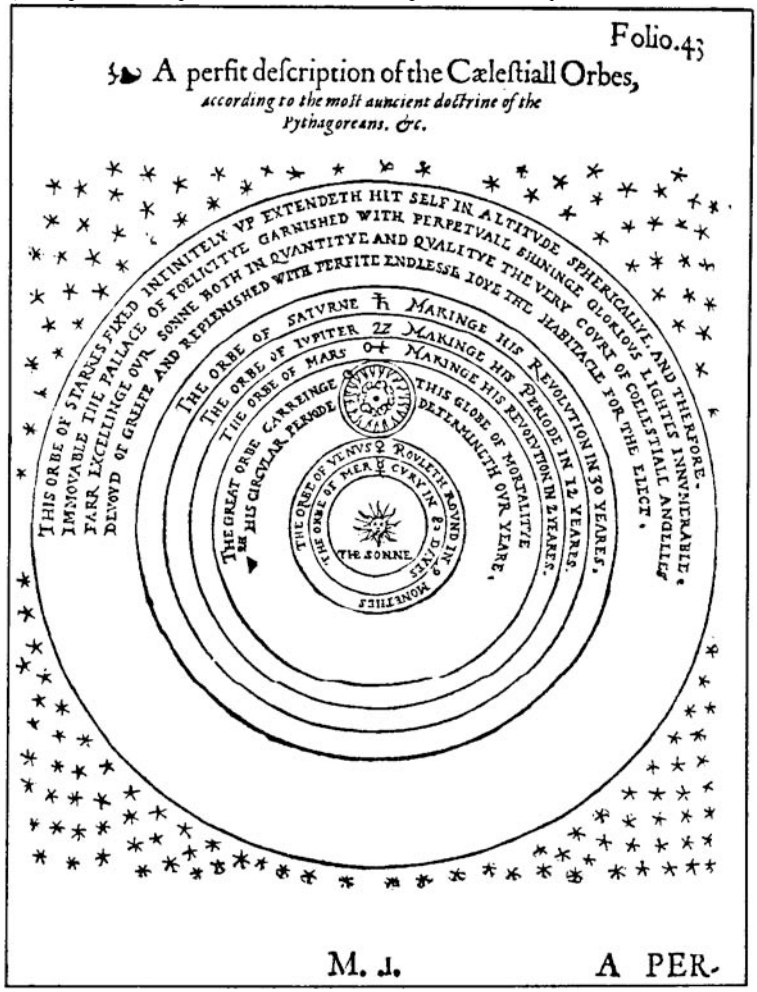


Fig. 3. The Copernican universe as conceived by Thomas Digges in his *Perfit Description* (see note 17). Note his portrayal of the stars as spaced intermittently beyond the eighth sphere; although often interpreted this way, this is not Copernicus' actual belief. Copernicus himself seems to have thought the stars to lie *on* the eighth sphere (see note 15). Reprinted from the *Huntington Library Bulletin* (April, 1934), p. 78, with the permission of Harvard University Press.

people tended not to refer to it as a mathematical model, but rather solely as a revival of certain classical philosophical systems, such as that of Pythagorus.[17] Similarly, when people argued against the heliocentric theory, they seldom delved deeply into mathematical questions, but refuted it on the basis of ancient Aristotelian physics and the Bible.

This often blind reliance on the thoughts of bygone ages was quite characteristic of the Renaissance and early modern period, especially with regard to cosmological speculation. And as long as this mentality remained a potent force, those that accepted the Copernican theory realized that they would have to give more than just mathematical proofs of their ideas.

As such, an attack was directed by these individuals upon the foundation of their opponents' edifice: Aristotle. Fortunately for the Copernicans, several celestial events occurred in the sixteenth and early seventeenth centuries which helped this process along. Among these were the appearance of "new stars" in two constellations, and the accurate charting of comets' orbits.[18]

The appearance of "new stars" was favorable towards the Copernicans because it tended to nullify the Aristotelian distinction between a coarse earth and a perfect, unchangeable heaven. Many astronomers, such as Johannes Kepler, reasoned that the same substances present here on earth were also present in the heavens, and that the appearance of new stars in the heavens could be explained in terms of the behavior of the four mutable earthly elements.[19]

[17] Take, for instance, the paraphrase of Copernicus' work written by Thomas Digges entitled *A Perfit Description of the Caelestiall Orbes according to the most aunciente doctrine of the Pythagoreans, latelye revived by Copernicus...* (London, 1576). Figure 3 is taken from this work. There is also the later attack on Copernicus by Fromund entitled *Anti-Aristarchus sive Orbis Terrae Immobilis, in quo deeretum S. Congregationis S. R. E. Cardinal, an. M. DC. XVI adversus Pythagorico-Copernicanos editum defenditur* (Antwerp, 1631). Care should be taken by modern scholars not to overemphasize Copernicus' indebtedness to classical philosophy, not to exaggerate his genius for mathematical theorization about empirical observations.

[18] There were also arguments against Aristotle based on the incompatibility of his physics with certain elements of Christian tradition and the Bible. See section D of this chapter for a discussion of some of these objections to Aristotle.

[19] *Stellae novae,* or 'new stars,' are today called *novas.* Novas are characterized by a rapid increase in brightness, followed by a decline. One nova appeared in the constellation Cassiopia in 1572. About thirty years

Also serving to break down the earth-heavens distinction was the accurate charting of the paths of comets. Specifically, when it was observed that the orbits of comets crossed the orbits of the planets, heliocentrists had yet another reason for claiming that the heavens were not made of any pure immutable substance, but were made of the four coarse, changeable elements found here on earth. For a perfect and changeless heaven should contain no intermittently reappearing projectiles whose orbits brought them crashing through the crystal spheres, but should instead maintain itself in perfect sphericity and order to eternity. The very presence of comets amongst the planets thus tended to break down the earth-heavens dichotomy, and make all things seem subject to variation and change.[20]

Examples of this view occur not only in the now famous astronomical writings of the day, but also in those of minor figures. This is especially true in England, where ideas of a heliocentric universe caught on quite early.[21] For instance in 1605 Thomas Lydiat, a mathematician and astronomer at Oxford, published a treatise called *Praelectio Astronomien de Naturn Coeli & Conditionibus Elementorum* in which he argued, among other things, that the four elements were present in the heavens. Although he adduces many arguments in favor of this view, he saw his most powerful as being based upon observation of comets. For instance on page 24 he remarks,

> We nevertheless must seek better and clearer [proof that the heavens are of a nature similar to that of the earth]. Such proof may be seen in observations on comets offered to us by the most celebrated astronomers of our age within about the last thirty years....

later, another appeared in Serpentarius. This latter nova became the subject of Johannes Kepler's 1606 treatise *De Stella Nova in Pede Serpentarii,* in which he argued against the Aristotelian earth-heavens distinction. Kepler's point was that if the heavens were of a fifth, unchangeable element, the appearance of new stars would be impossible.

[20] Previously it had been thought that comets could not exist above the sphere of the moon. See, for instance, Bernard le Bovier de Fontenelle's *Etretiens sur la Pluralié* des Mondes (Paris, 1686); English translation by Joseph Glanville under the title *A Plurality of Worlds* (London, 1688. My copy is a new edition by Nonesuch Press, 1929), p. 22. See note 39.

[21] On sixteenth-century English astronomy, see Francis Johnson's "The influence of Thomas Digges on the progress of modern astronomy in Sixteenth-Century England," *Osiris,* vol. I, p. 390-410.

The effect such treatises as Lydiat's had was to make the universe seem more uniform in its composition and behavior. Once the idea of uniformity in creation arose, it became a powerful argument that the earth held no special status in creation, but was merely a small part of a vast scheme.

Further confirmation of this notion of similarity between the earth and the heavens was found near the turn of the seventeenth century in Galileo's observation of Jupiter's moons.[22] In addition, the sun was found to have spots, and to turn on its axis.[23] Such observations made certain "analogies" irresistible. If Jupiter had moons, then maybe it was like the earth. Maybe in fact the earth was one of the planets, rotating about the sun like all the others.[24] Moreover, if the sun turned on its axis, then why not the earth? And if the earth turned, then the motion of the stars was only an appearance.

Let me point out here that the attribution of daily rotation to the earth was a particularly important step. For if the stars were proven *stationary,* then the old Aristotelian dictum that "what is infinite cannot be moved" could no longer be used to argue that the apparent motion of the stars implied a finite cosmos.

As concepts of uniformity and analogy were applied more and more to the universe, people began to project their speculations farther outward. Within our own solar system the principle of analogy led some to assert that dark areas of our moon were actually seas, and that the light areas were dry land. Analogy also led them to think that the rest of the planets might be inhabited. Notions of uniformity and analogy even persuaded a few that the universe held innumerable solar systems like our own, and that it therefore held countless possibilities for intelligent life.[25]

[22] Galileo Galilei's *Sidereus Nuncius* (Venice, 1610) was the first public report of such observations.

[23] Telescopic observation that Jupiter also turned on its axis lent support to this assertion. Grant McColley, "Nathaniel Carpenter and the'Philosophia Libera'," *Popular Astronomy,* vol. XLVII (1940), p. 144.

[24] *Ibid.,* p. 142. In addition to the argument for the earth's daily rotation based on analogy, there was also the argument that nature does nothing the harder way. Why should the vast sphere of the stars rotate when it would be so much simpler to attribute this rotation to the earth?

[25] Examples of analogical "proof" of extraterrestrial life are discussed in Steven J. Dick's *Plurality of Worlds.* See, for instance, page 130. Note also in general Arthur O. Lovejoy's *Great Chain of Being.* Deduction of the existence of extraterrestrial life from theological principles of unity and infinity in God's creation is exemplified in the works of Giordano

It was during this time that the first true science fiction stories began to come out.[20] What is fascinating for us about these stories is how their authors often charged their theories and speculations with theological messages. For the sake of both entertainment and illustration, I would like to adduce one example of this genre that in some respects parallels Swedenborg's *Earths in the Universe.*

This particular tale, entitled *Man in the Moone: A Discourse of a Voyage thither...,*[27] begins with an ingenious but volatile Spaniard named Domingo Gonsales, who has been forced to flee his native land to escape persecution for a murder. After some time abroad, while on a voyage across the Atlantic, Gonsales is left stranded with a servant on an isolated island to recover from an illness.

In efforts to facilitate rapid communication between the somewhat distant dwelling places of himself and his servant, Gonsales makes an unheard of innovation. He gathers together some large birds, and trains them to haul messages from one house to the other. Sensing the obvious possibilities, Gonsales attempts to make himself the cargo. In his endeavor he meets with good success.

A short time after this breakthrough, Gonsales and his servant are picked up by a passing ship. Travelling in a convoy, the ship and its companions are soon attacked by several English vessels. In the heat of the battle, Gonsales brings his birds up from the hold, harnesses them to his cargo carrier, and then climbs in himself. As the ship heads down to its doom, Gonsales is carried upward by his birds to safety.

Seeking the nearest possible refuge these birds alight, with Gonsales, atop a peak jutting up from a nearby island. His troubles worsen, though, when he runs afoul of the native inhabitants of the

Bruno. On this subject, see Dorothea Singer's *Giordano Bruno: His Life and Thought, with an annotated translation of his Work on the Infinite Universe and Worlds* (New York, 1950). See also *The Infinite Worlds of Giordano Bruno* by Antoinette Mann Peterson (Springfield, Illinois, 1970). But note the scathing review of this work by W. H. Donahue in *Journal for the History of Astronomy,* vol. 2, p. 204-5.

[26] Further impetus towards the appearance of this genre in England came from the translation of Lucian's fantasies into the vernacular (first in 1634). See Marjorie Nicholson's article "Cosmic voyages," in the *Dictionary of the History of Ideas,* Philip P. Wiener ed. (New York: Charles Scribner's Sons, 1968), p. 524.

[27] Francis Godwin, *Man in the Moone: or a Discourse of a Voyage thither by Domingo Gonsales The speedy Messenger* (London, 1638), new edition by Grant McColley in *Smith College Studies in Modern Languages,* vol. XIX, no. 1 (October, 1937), p. 1-48.

island. Hoping that his birds will again save him, he alights once more. However, instead of bringing him to land, they climb upward farther and farther and still farther.

The journey ends, after some days of flight, with Gonsales' arrival on the moon. There he finds a whole new world, and meets fantastic beings which far exceed him in stature, wisdom, and morality.

For the rest of the story, the author gives detailed descriptions of lunar life. His main effort seems to be to contrast the meager and self-serving attitude of his protagonist with the nobility of lunar beings he comes into contact with. In addition, the author emphasizes the fact that all of these beings worship the same God as Gonsales. For instance, in one place, he has Gonsales uttering the name Jesus, ironically in a curse. No sooner did Gonsales do this than

> young and old fell all down upon their knees, (at which [he] not a little rejoyced) holding up both their hands on high, and repeating all certaine words which [he] understood not. [28]

What is interesting in this for us is the way the author shapes his tale to make a theological point. Apparently the author wishes us to imbibe greater humility, and an understanding that we earthlings have no especially high status in a vast universe, populated with worshippers of the one God.

The theme of this story is in general illustrative of the complete change of focus in cosmological and theological speculation about the universe that took place during the course of the sixteenth and seventeenth centuries. Rather than seeing the earth as the center of the *world,* people were beginning to see it as only one minor part of the *universe.*

However, it must be emphasized that this change did not happen overnight. In fact, throughout much of the seventeenth century opposition to these ideas ran strong. What eventually brought victory to believers in a vast, populated Copernican[20] universe was the

[28] Godwin's *Man in the Moone,* pages 72-3 of the original ed., p. 28 of McColley's ed. (see note 27). This passage reflects the kind of piety we associate with biblical passages like Philippians 2:10, 11.

[20] So as to simplify the discussion, I have represented Copernicianism as the major rival to Aristotelianism. However, it should be noted that for many years these were only two of several competing systems. Grant McColley "Nicholas Reymers and the Fourth System of the World," *Popular Astronomy,* vol. XLVI (1938), p. 25-31.

emergence of certain cosmological and theological systems of thought that attributed immensity, uniformity, and purpose to the universe. Such systems gave organization to what had previously been only interesting speculations, and put into attractive and understandable form ideas of a universe filled with innumerable solar systems and with countless possibilities for intelligent life.

The story of these cosmological and theological systems forms the subject of the two following sections of this chapter.

C. Cartesianism

Among the many intellectual currents flowing through the seventeenth century was the effort on the part of many individuals do away with so-called *occult qualities.* Occult qualities were forces or essences said to operate through material things, causing them to behave as they did. For instance, the "attractive" essence of the stomach was said to draw food down the gullet and through the digestive system. For thousands of years, such concepts had served philosophers well. However, a new spirit of mechanism and of differentiation between spirit and matter arose in which explanations founded on "hidden" principles were thought to be inadequate.

The greatest single force in popularizing such attitudes was the rise of Cartesianism. Descartes and his followers posited a radical distinction between mind and body, essence and matter, and did not permit explanations of material effects based upon occult qualities. For them, all had to be explained mechanically and geometrically.

This frame of mind had enormous impact on the thought of the day, for mechanical explanation required dissection, experimentation, and above all, clear and visible analyses of natural effects. Those adhering to this method of reasoning were therefore not inclined towards abstruse speculation unless such speculation provided plain explanations of things.[30]

[30] Cartesians, as a rule, wanted "clear and distinct" ideas of things, and though they were open to lofty speculation, they did not favor speculation based upon mysteries or hidden principles. See Descartes' *Principia Philosophiae,* pars prima. This predisposition also comes clearly to the surface in many Cartesians' writings. See, for instance, Henricus Regius' *Brevis Explicatio Mentis Humanae...* (Utrecht, 1657 [A revision of an earlier work by Peter Wassenarius]), paragraph 2.

A fairly typical example of this mentality, as applied to cosmology, may be found in a passage from William Brent's *Discourse upon the Nature of Eternity* (London, 1674).[31] I quote Brent here because his words illustrate what would require several pages for me to describe in the abstract:

> The Spots we discover in the Sun, the Valleys in the Moon, and Stars [moons] that move in an Epicycle about the Planet *Jupiter,* had been eternally concealed from all Mankinde had not the invention of *Galileus* Perspectives,[32] by aiding the weakness of our Sight, discovered them unto our Eyes. And I am verily perswaded, that all those rare Effects of Nature which we now attribute to Sympathy, to Antypathy, or to other occult Causes, are indeed onely Material qualities, but too subtle to be perceived by our Senses....[33]

As is clear from such pronouncements, the rise of mechanism, in conjunction with the Copernican universe, had very strong effects on cosmological speculation.

The most important milestone in this movement toward applying mechanistic principles to cosmology came as early as 1643, when Descartes published his *Principia.* Although by the 1640's many individuals had been won over to heliocentricity, none had yet systematized this viewpoint into a grand mechanistic cosmology. With the publication of Descartes' *Principia,* such a system became available.[34]

[31] The first edition was published in 1655, while Brent, an attorney associated with Gray's Inn, was imprisoned in the "Gate-house." Although some have supposed that Cartesian influence did not penetrate England until much later, their views have been discredited. See Marjorie Nicholson's "Early Stage of Cartesianism in England," *Studies in Philology,* vol. 26 (1929), p. 356-374. In England, Francis Bacon's ideas also contributed to the downfall of occult qualities.

[32] The *perspective glass* is evidently the name given to an early optical device which extended the range of human vision in a manner similar to that of the telescope. However, with the advent of the telescope, this former invention was superceded, and the term *perspective glass* came to mean simply "telescope."

[33] Brent's *Discourse,* p. 2.

[34] Steven J. Dick, *Plurality of Worlds,* p. 108. Dick argues, I believe rightly, that it was Descartes, and not figures like Giordano Bruno, who proved to be the chief vehicle by which the notion of a plurality of worlds was spread (p. 109-110).

Essentially, Descartes envisioned a universe in which each star stood at the center of a huge vortex or whirl, which rotated around it in a slow circular motion. Moreover, Descartes portrayed the universe as a patchwork of these vortices (fig. 4).

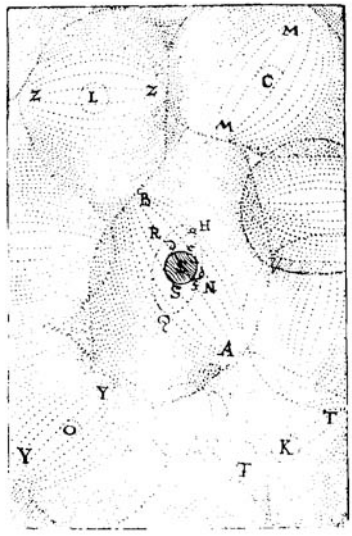


Fig. 4. The universe as portrayed in Descartes' *Principia.* Each of the spheres Z, M, T, Y, and AB is a vortex with a sun at its center (L, C, K, O, S). The question of satellites is never discussed by Descartes, who leaves this matter open to interpretation.

The mechanical simplicity of such a system was irresistible to many. In spite of the problems it raised,[35] Cartesian cosmology held its ground for nearly a hundred years before its influence finally waned.[36]

With the spread and later wide acceptance of Cartesian cosmology, the notion of uniformity in the universe crept into many hitherto untouched minds.[37] For with a universe full of vortices, each of which held a central sun (and presumably several satellites), it was quite odd to think that only a single planet within a single one of these vortices should be inhabited. In spite of this obvious inference, Descartes and many of his followers were hesitant to admit the likelihood of extraterrestrial life. Whether this is on account of

[35] A good discussion of these problems may be found in Augustus Clissold's introduction to his translation of Swedenborg's *Principia,* published in London, 1846, and reprinted by the Swedenborg Scientific Association, Bryn Athyn, Pennsylvania, in 1976.

[36] Clissold (see note 35), as many other Swedenborgians, continued to defend this system even into the mid-nineteenth century.

[37] See note 34. See also Dick's *Plurality of Worlds*, chapter 5.

possible persecution or on account of some more subtle factor is unclear. What is clear, though, is that by the late seventeenth and eighteenth centuries the theory of a plurality of worlds was thought inseparable from a Cartesian view of the universe.

We see this trend towards tying Cartesianism to the theory of extraterrestrial life beginning as far back as 1646, two years after the appearance of the *Principia.* It was then that Henry More published his *Democritus Platonissans,* a treatise propounding the doctrine of an infinite number of worlds. Tying More's work into Cartesian cosmology, Steven Dick notes that

> More, who was one of the earliest to embrace important elements of Cartesian thought, extended Descartes' belief that every star was a sun to the doctrine that every star was the center of a solar system, and *explicitly held that Descartes's cosmology led to a belief in infinite worlds* [emphasis mine].[38]

Bernard le Bovier de Fontenelle is another who attached Cartesian cosmology to a belief in a plurality of worlds. In his *Entretiens sur la Pluralite* **des Mondes** (Paris, 1686), a treatise arguing for the existence of extraterrestrial life, Fontenelle lays the following eulogy at the feet of Descartes:

> When the Heavens were a little blue arch, stuck with stars, methought the universe was too strait and close; I was almost stifled for want of air; but now it is enlarged in height and breadth and a thousand vortices taken in....[39]

Statements tying Cartesianism to a belief in extraterrestrial life become more frequent and more explicit after the turn of the century. For instance in 1769, Père Malebranche remarked:

> We know very well that in admitting an infinite number of inhabited planets we are teaching nothing new to real Cartesians.[40]

[38] *Ibid.,* p. 117.

[39] Bernard le Bovier de Fontenelle, *Etretiens sur In Pluralité* des Mondes (Paris, 1686), translated by Joseph Glanville under the title *A Plurality of Worlds* (London, 1688; my copy is a new edition by Nonesuch Press, 1929), p. 115. Quoted in Lovejoy's *Great Chain of Being,* p. 132-133. NB: copy of Glanville's transl. (London, 1719 edition) in the Swedenborgiana Reference Library at Bryn Athyn, Pennsylvania.

[40] *Traité de l' Infini Créé,* p. 74. Quoted in Lovejoy's *Great Chain of Being,* p. 139.

In sum, the uniformity attributed to the universe of Descartes' *Principia* had a great effect upon peoples' attitudes towards extraterrestrial life. As was mentioned above, it was odd to think that amidst innumerable, roughly similar solar systems there should be only one inhabited planet. Whether or not Descartes and his immediate followers drew this conclusion, it is clear that the belief in extraterrestrial life became associated with Cartesianism, and by this means was quietly introduced into the mainstream of seventeenth and eighteenth-century thought.[41]

D. Natural Theology

Although religious figures became by the late seventeenth century some of the most persuasive supporters of the theory of a plurality of worlds, before this time they had, for the most part, opposed such a notion. The reasons why this opposition arose, as well as the reasons for its ultimate subsidence, are an integral part of the history behind the eighteenth-century concept of extraterrestrial life.

The story of religious opposition to the new astronomy begins, as does almost everything else in this period, with Aristotle. Although the Renaissance made certain inroads into the traditional admixture of biblical and Aristotelian doctrines, by Copernicus' time Christian thought still largely rested upon this dual foundation.

It was also about Copernicus' time that the Reformers began to break away from the Catholic Church, and to initiate confessional and theological war upon the papacy. In response to these conditions, there came a noticeable tightening of the formerly more free reins given by the Church to philosophers and theologians.

Needless to say, the sixteenth century was not a time for astronomers to expect tremendous freedom of thought from ecclesiastical authorities. This is especially true in view of the fact that the new heliocentric astronomy directly opposed Aristotelian physics, which had become so bound up with Christian

[41] Emphasis here is on Descartes, and not on figures like Giordano Bruno, who, though known, did not contribute cosmological or theological systems that ever became widely enough accepted to have great influence (see note 34). The Cartesian system, as it relates to the changing concept of the universe, is discussed ably by Alexander Koyre in his *From the Closed World to the Infinite Universe* (Baltimore, 1957), chapter 5.

doctrine. In effect, insistence on a heliocentric model of the solar system was a direct attack on the authority and prestige of the established spiritual leaders.

Given the intolerance of the period, and the offensiveness of anti-Aristotelian cosmology, it is no surprise that dissenters like Giordano Bruno were put to death, or, as Galileo, effectively silenced.

In response to this self-destructive state of affairs, certain mavericks began to construct apologies on behalf of the new astronomy. Perhaps the most famous of these apologies is Thomas Campanella's *Apologia Pro Galileo* (Frankfurt, 1622).

In his *Apologia,* Campanella argued that Aristotle was not unanimously followed by the church fathers.[42] Moreover he pointed out that Aristotle's cosmology contradicted much of what was said in the Bible.[43] Finally, he stated that the Bible itself spoke *ad vulgi captum,*[44] that is, according to the limited apprehension of the masses.

This last assertion was by far the most devastating. For once Aristotle and the church fathers had been cast aside as mutually contradictory, all that was left in defense of traditional cosmological doctrine was the assertion that the new heliocentric astronomy contradicted the Bible.[45] However, if the Bible had been accommodated, not to physical reality, but to *the simple view of reality peculiar to the ancient Jews and Christians,* then its literal state-

[42] Campanella shows that church tradition is not unanimous in its support of any one cosmological system. See his *Defense,* p. 21-25. Note also that certain Neo-Platonists, such as Nicolaus of Cusa, who lived during the comparatively open-minded fifteenth century, held cosmological views compatible with those of the sixteenth and seventeenth-century "heretics." See Cusa's *De Docta Ignorantia,* book II.

[43] Campanella's *Defense,* p. 56-64.

[44] On the clash between Scriptural literalism and new astronomy see McColley's introduction to Campanella's *Defense,* p. xx-xxix, and also the text, p. 26-7. Note also A. D. White's general discussion in his *History of the Warfare...,* p. 126ff.

[45] Problem passages included all those that speak of the creation of only one world (Genesis 1, John 1:10, for instance), those that speak of the sun as moving around the earth (Psalm 19:6, 93:1; Ecclestiastes 1, etc.), those that speak of the earth as unmoving (Psalm 104:5, and others), and those that speak of the heavens as hard (Genesis 1:7, Job 26:7).

ments could not be considered inviolable, and so could not be used in an attack upon the new astronomy.

To a certain extent, this battle resembles the nineteenth and twentieth-century conflict over scriptural literalism and evolution. The debate over extraterrestrial life and the new astronomy may thus be viewed as a seventeenth and eighteenth-century equivalent to our twentieth-century Scopes Trial.

It is interesting to note that with regard to scriptural interpretation, Campanella was taking no liberties with church traditions. The principle that the Bible was written *ad vulgi captum* had been present in hellenized Christian and Jewish doctrine over a thousand years before.[46]

Many of the Latin-speaking fathers seem also to have adopted this principle, making a division between the literal facts of Scripture and the lesson within these facts. For instance, Augustine is reported to have said that

> it is greatly to be guarded against, and is pernicious and shameful for a Christian to speak of physical phenomena as if he were discussing scripture. Because of this practice, some infidel will declaim him foolishly.[47]

Augustine here warns us against tying cosmology or science to theology, because doing so makes the truths of religion subject to the facts of physical reality, and thus opens these truths to ridicule and dispute on empirical grounds.

Evidently Christians were coming under attack in Augustine's day for their adherence to the biblical picture of the universe. Augustine simply wished his fellow believers to learn to distinguish between the Bible's scientific assumptions and its moral

[46] See Philip Rollinson's *Classical Theories of Allegory and Christian Culture* (Pittsburgh: Duquesne Univ. Pr., 1981). A good general discussion of "allegory" in Greek, Jewish, and Christian traditions may be found in the *Encyclopedia of Religious Knowledge,* James Hastings ed. (New York, 1951), vol. I, under the heading "Alexandrian Theology."

[47] This quotation is taken from Campanella's *Defense,* p. 34. A brief perusal of Augustine's the *Literal Meaning of Genesis,* John Hammond transí. (New York: Newman Press, 1982), did not reveal to me the source of the quote, although similar passages abound (e.g. vol. I, pages 42-60). Note also Thomas Burnet's use of a similar quotation from Augustine in his *Sacred Theory of the Earth* (my copy Glasgow, 1753), preface, xv.

import. For us this is interesting because it parallels somewhat the situation of New Churchmen today, who must decide whether Swedenborg's science must be accepted along with his theological message.

Be that as it may, the tradition that revelation cannot always be taken at face value has had a long history. And this history did not die with the fall of Mediterranean Graeco-Roman civilization. Many of the later Scholastics had a great deal to say on the matter. For instance, in his *De Casu Diaboli,* St. Anselm remarks:

> When we read in the sacred books, or else speak in accordance with them, that God commits evil, or renders something nonexistent, see that you do not think, "I deny the thing on account of what is said," or else, "I am offended at its being said in this way." For we ought not cling to the impropriety in the *words*...so much as we long for the propriety of the *truth,* which lies beneath the varied forms of expression [emphasis mine].[48]

The same sort of reasoning may be found in the writings of John Calvin. In discussing the problem of how in some passages of Scripture God promises to guard Israel, while in others he threatens them, Calvin argues that

> the closer we approach [God], the more intimately He views us, as if we are somehow placing ourselves beneath His eyes. This is not to say that anything is ever concealed or hidden from Him, but rather that *scripture merely speaks as humans customarily do* [emphasis mine].[48]

Erasmus, the great humanistic scholar of the sixteenth century, also notes that:

[48] The original is rhetorically quite difficult to render in English, and so is here supplied:

Vide ne ullatenus putes, cum in divinis libris legimus aut cum sucundum illos dicimus deum facere malum aut facere non esse, quia negem propter quod dicitur, aut reprehendam quia ita dicitur. Sed non tantum debemus inhaerere improprietati verborum veritatem tegenti, quantum inhiare proprietati veritatis sub multimodo genere locutionum latenti. [49] *loanni Calvitii Optra quae Supersutit Omnia,* Guilielmus Baum, Eduardus Cunitz, and Eduardus Reuss eds. (Berolini, 1900), vol. 43, p. 161.

> it is the custom of the scriptures quite often to enclose sublime mysteries within vile acts.[50]

This longstanding belief that Scripture has a deeper sense within it, and that one is not to take its statements always at face value, was adopted by Copernicans in defense of their belief in a cosmology that contradicted the plain sense of Scripture. Examples of these tactics abound. For instance, the much persecuted Galileo once wrote to Christina Lotheringa.

> And first they have endeavored...to divulge an opinion...that these Propositions [that the earth orbits the sun, etc.] are contrary to the Holy Letters and consequently Damnable and Heretical.... [But the statements that the earth stands still and the sun orbits] were in that manner pronounced by the Sacred Scriptures that they might be accommodated to the Capacity of the Vulgar, who are very rude and unlearned....[51]

Unfortunately, Galileo's belief in a heliocentric, populated solar system not only opposed the Bible, but it also went against many traditional theological dogmas.

First of all, there was the problem of the atonement. Christ's coming was said to reconcile God's judgment with his mercy, and make it possible for those believing in Christ to have their sinfulness covered over and forgiven. For Catholics this "saving" power of Christ (and of the Saints, too) was dispensed by the Church. In Protestantism, salvation was dispensed by immediate divine activity. In both cases, though, this sinfulness was said to have been inherited from Adam.

This dogma created obvious problems for the theory of a plurality of worlds. If sinfulness was indeed inherited from Adam, then would intelligent races of beings on other worlds have fallen on their own? And if so, would Christ then have had

[50] *Desiderii Erasmi Opera Omnia* (Hildesheim: Georg Olms Verlagsbuchhandlung, 1962 [re-print of 1704 edition]), vol. 5, p. 870A.

[51] Taken from "Epistle to Her Serene Highnesse Christina Lotheringa.../'as translated by Thomas Salisbury in *Mathematical Collections and Translations* (London, 1661). Quoted in McColley's introduction to Campanella's *Defense,* p. xvii. See also Grant McColley "The Ross-Wilkins Controversy," *Annals of Science,* vol. 3, no. 2 (April 15, 1938), p. 177. Note also Olaf Pedersen's "Galileo and Trent," *Journal of the History of Astronomy,* vol. 14, pt. 1 (February 1983), p. 21.

to live and die among them?[52] Such questions upset in some measure the theological *status quo,* and made what was thought to be a universal event seem only a mild ripple in the immensity of the universe.[53] It is therefore no surprise that ecclesiastical authorities generally opposed the doctrine of a plurality of worlds.

The idea of extraterrestrial life also ran up against a kind of cosmic egoism which saw man as a special object of creation. For according to the Bible, the celestial orbs were intended merely as lights for the earth,[54] and man himself was made to be the tender of God's paradise.[55] Moreover, all things in the world were thought to have been created for man's benefit, and thus man was seen as the pinnacle of creation, created in the "image and likeness" of God.[56]

Examples of such thinking abound. One need only open books written in the sixteenth and seventeenth centuries and read. For instance, Nicodemus Frischlin, in his *De Astronomiae Arte* (Frankfurt, 1586), remarks that the purpose of astronomy is

> a knowledge of the heavenly motions and times of the year. For God wished these torches to cast their light, and to be carried about in a circular motion, so that they might be for us 'signs and times, days and years' (Genesis 1:14).[57]

As regards Man in general, it was said that he was

> created by [God] out of nothing, after his own likeness; that he might serve [God] with obedience and perserverance, during his temporal being, and be the witness and partaker of [God's] glory in ETERNITY.[58]

[52] Campanella adduces this as a major objection to Galileo's belief in other populated worlds. See the *Defense,* p. 66, and also White's *History of the Warfare...,* p. 134.

[53] New Church preacher, writer, and apologist, Samuel Noble, devotes lecture XXVII of his *Important Doctrines of the True Christian Religion* (London, 1846) to this question, using it as an opportunity to attack the traditional doctrine of the atonement. See also his *Astronomical Doctrine of a Plurality of Worlds*...(London, 1828).

[54] Genesis 1:14.

[55] Genesis 2:15.

[56] Genesis 1:27.

[57] *De Astronomiae Arte,* liber primus, cap. I, p. 1.

[58] William Brent, *Discourse on the Nature of Eternity...*(London, 1674), p. 22.

Interestingly, theologians had long taught that *God had no need of the world,*[59] coarse and rude as it was. And so in contrast to this self-aggrandizing view of humanity, there also existed a view of man as a vile little creature, who could not possibly be the sole object of God's designs.[60] Thomas Robinson, for instance, says with assurance that

> it cannot be imagined that the Wise Creator...should be so fond of a piece of dull, stupid Matter, as to create all those innumerable [celestial objects]...for no other end or purpose than distinguishing of Days, Months, Seasons, or Years, and for casting a dark glimmering light to us poor Mortals.[61]

Robinson's cosmological modesty is of the sort that easily links up with the old notion that God's immensity and infinite creativity could not have rested merely in the creation of one populated globe (see section A). This idea of God as an omnipotent, omnipresent, and infinitely productive maker of a vast, unsearchable universe tended to come out in the form of an Old Testament piety of nature—the sort of mentality that was strongly attracted to passages in the Bible like:

> The heavens are telling the glory of God; and the firmament showeth his handiwork! [Psalm 19:1]

Such a view of nature is evident in many mid and late seventeenth-century documents like James Corss's *Ouranoskopia* (Edinburg, 1662). At the outset of his work, Corss casts a stone at the clergy:

> The judgement of the *Divines* is unanimous, *viz*. that the Earth is immoveably fixed, and that its the sun that moves. But although the judgement of the *Divines* concurs in it, yet I am not altogether of their opinion....[62]

Almost as if to say that disagreement with the "divines" does not imply irreligiousness, but rather greater admiration of the Deity in the marvels of nature, Corss adds,

> Having now spoken of the Coelestial *Oeconomy* of the Planetarie Spheres, I am drowned in a sea of Admiration and Contemplation

[59] Discussed in Lovejoys *Great Chain of Being,* p. 55.

[60] *ibid.,* p. 101-102. Also, Nicolausof Cusa, *DeDoctalgnorantia,* bookII,chapter XII.

[61] Thomas Robinson, *New Observations on the Natural History of this World* (London, 1696), p. 8.

[62] *Ouranoskopia,* p. 6.

> to behold, and seriously consider...the Proportion, Scituation [sic], Magnitude, Transcendent Glory and Luster, Stupendious and Constant Order of the Visible Coelestial Hosts of Almighty God....[63]

With the rise of an attitude on the part of many that the new discoveries of astronomy, far from detracting from Christian faith, actually provided proof of Gods existence, many divines began to accept the new notions of an immense, populated universe.

This idea that God's existence and attributes are evinced in the wonders of creation is known loosely as *Natural Theology*. Although in many ways the principles of Natural Theology never quite harmonized with traditional doctrines, it nevertheless became a weapon in the hands of those who wished to confute atheism.[64]

In sum, then, the relationship between science and theology went through a complete inversion during the seventeenth century. From its initial opposition to Aristotle and the Bible, we see science finally rising to a position as the handmaid of religion. Ultimately science became one of the single greatest proofs of God's existence, as well as of his majesty and glory.

This is not to say that all religious men by the year 1700 avowed the existence of extraterrestrial life.[65] It is to say, however, that cosmological and theological systems embracing such notions had by this time gained much respect. We may thus safely infer that by Swedenborg's time the theory of an infinite, or at least of an *indefinite,*

[63] *Ibid.*, p. 7. For an example of how such "piety of nature" led naturally to a belief in multiple inhabited worlds, see Richard Blackmore's *Paraphrase on the Book of Job* (London, 1700), preface, p. 28-9.

[64] See, for example, Richard Bentley's *Confutation of Atheism from the Origin and Frame of the World* (London, 1692), which advocates the theory of a plurality of worlds.

[65] Note that in Nobles *Important Doctrines* (see note 53), he still assumes some opposition to the theory of a plurality of worlds, although he believes that the doctrine had a *firm hold on the popular imagination* (p. 466). That Noble was reporting popular sentiments accurately is confirmed by the statements of his fellow countryman of a century earlier, Edmund Halley (of comet fame). See Halley's "Account of the Cause of the change of the Variation of the Magnet...," in *Miscellanea Curiosa* (3rd ed.; London, 1626), vol. I, p. 56. See also the pious attempt at rationalizing the theory of extraterrestrial life as being in accord with scripture in Joseph Raphson's *Demonstratio de Deo*...(London, 1710), epistola decima. Evidently this theory had become popular enough that Raphson felt it desirable to find scriptural warrant for it.

populated universe had become familiar to every educated man in touch with current opinion on religion as well as cosmology and astronomy.

E. A World in the Moone

As we have seen in the foregoing sections, the Copernican model of the universe had a great effect on the debate over extraterrestrial life. First, it spawned the realization that our earth was a planet. Then it led to the hypothesis that our sun was a star. Once people supposed that our sun was a star, it was then quite natural for them to think that the stars, like our sun, might be surrounded by planets. And given that our earth was just one tiny speck in what was then conceived to be an immense conglomeration of solar systems, it was only a small step further to conjecture that the earth was not the only inhabited orb.

The question should be asked, though: Did a belief in extraterrestrial life generally also imply a belief that every planet is inhabited? We certainly find this assumption in Swedenborg's theological works. Was this assumption prevalent in his day? To answer this question, I propose to give a rough sketch of the debate over life on the moon in the seventeenth and eighteenth centuries.

During the early seventeenth century, when the excitement of the Copernican universe was beginning to stir the imaginations of some of the learned, it became more and more common to hear it said that the planets and stars must have been created for better reason than simply to shine on the earth. Moreover, it was also seen as an insult to God's infinity and omnipotence to restrict the creation of life to a single planet. Accordingly, many came to believe strongly that these other orbs must have been created to sustain their own inhabitants, for in this way they could be given a purpose worthy of God and his infinity.[66]

This strong belief in extraterrestrial life was supported by the hypothesis of Galileo, Kepler, and later astronomers, that the moon had water. This inference was based on the observation that the dark areas of the moon looked like seas, while the light areas looked like dry land.[67] Further confirmation of the belief in

[66] See Palingenius' *Zodiacus Vitae* (Basel, 1557 ed.), book VIII, 160. Discussed in Lovejoy's *Great Chain of Being*, p. 115.

[67] In spite of the sensation Galileo's descriptions of the lunar landscape stirred up, his studies were actually only a confirmation of what some classical philosophers had long before suspected. Interestingly, Aristotle

life on other planets, especially the moon, came through observations which at the time seemed to demonstrate the existence of an atmosphere around the moon.[68] Thus through these "scientific" observations, a bit of imagination, and a strong theological prejudice, many of the learned in the seventeenth century convinced themselves of the existence of lunar inhabitants. Of course, not everyone in this period believed in extraterrestrial life. Nevertheless, up until the mid-seventeenth century, those that did believe in extraterrestrial life generally placed it on the moon.

Remarkably, many of the individuals who came out openly in favor of the theory of a plurality of worlds before 1650 were the "insular" Englishmen. My suspicion is that the war-torn Continent, beset by famine, military pressure, and ecclesiastical intolerance was not a particularly fertile area for radical cosmological speculation. However, with the end of the Thirty-Years' War, and the recovery of much of the Continent from its formerly depressed state, we find scholars there once again supporting the notion of a plurality of inhabited worlds.

A good example of this may be seen in Otto von Guericke's *Experimenta Nova* (Amsterdam, 1672), in which he outlines a belief in a plurality of worlds based on his unwillingness to confine God's omnipotence to the creation of life on only one planet, and on his desire to attribute a greater purpose to the heavens than simply to shine on the earth (by now this sort of reasoning should seem familiar).[69]

Notably, in spite of von Guericke's sentiments in favor of extraterrestrial life, he did *not* place it on the moon. He felt that life required frequent alternations in sunlight, and more extended alternations in the general climate. The earth had this in its days and seasons; the moon, though, had only its month-long orbit around the earth. Thus its alternations in sunlight would have been too long and its seasons (mostly dependent on its day) too short. In von

had opposed these notions, saying that the apparent irregularities of the moon were only reflections of the earth's features on a smooth surface. This topic is discussed in Marjorie Nicholson's "A World in the *Moon,*" *Smith College Studies in Modern Languages,* vol. XVII, no. 2 (January, 1936), p. 2, 15.

[68] Michael Maestlin, *Disputatio de Multifariis Motuum Planetarum in Coelo* (1606); discussed by Steven Dick in *Plurality of Worlds,* p. 82-84.

[69] *Experimenta Nova,* p. 216.

Guericke's opinion, then, life would not have been likely to exist on the moon.[70]

About twenty years after von Guericke's *Experimenta Nova,* there appeared a treatise on a plurality of worlds by Christiaan Huygens, published in English as *Celestial Worlds Discover'd* (London, 1798). In it the author speculated about the various forms life on other worlds might take. Though obviously favorable to the concept of extraterrestrial life, he still opposed the idea that it could exist on the moon.

Huygens' reasons for denying the existence of lunar life are basically scientific ones. First of all, he noted that, by virtue of its immediate occultation of stars, the moon had no atmosphere. More importantly, though, he saw that the so-called seas on the moon had irregular surfaces—not smooth like true bodies of water. He therefore doubted the existence of water on the moon, and so also the existence of life.[71]

In spite of learned conjecture by men like Huygens, there also arose a belief that the moon was inhabited by a race of beings accommodated to their peculiar lunar environment. So despite arguments against water on the moon, William Durham (to name one person) in his immensely popular *Astro-Theology* argued that all planets everywhere are inhabited.[72]

In spite of the attempts of people like Durham to rationalize the existence of life on every planet, many still remained skeptical. Eric Engman, for instance, denied lunar life in his *Dissertatio*

[70] *Ibid.,* p. 179-182.

[71] *Celestial Worlds Discover'd* (London, 1698 ed.), p. 129-132. Note that Christian Wolff, a philosopher (for a time) greatly admired by Swedenborg, disagreed with Huygens over the presence of water on the moon. The dark spots within the lunar "seas" were interpreted by Wolff as deeper waters *(Vertieferungen).* Wolff also evidently mistook the sun's corona, visible during solar eclipses, as being evidence of a *lunar* atmosphere. See his *Vernünftige Gedancken von den Würckungen der Natur* (Halle, 1723), p. 202-4. On Wolff's theological reasons for wanting to place water (and thus life) on the moon, see note 81.

[72] *Astro-Theology* (1st ed., 1715; my ed. [13th] Edinburg, 1769), preliminary discourse. Durham's theory of extraterrestrial life bears a resemblance to that outlined two-and-a-half centuries before in Nicolaus of Cusa's *De Docta Ignorantia,* book II, chapter XII. Some today continue to hold this view, saying that although moon exploration has revealed no evidence of life there, not all forms of life may be perceptible to our senses, and thus the moon might still be inhabited.

Astronomica-physica de Luna non habitabili (Upsala, 1740), about which Steven Dick remarks:

> ...Engman emphasized that the observations of Christiaan Huygens of cavities on those dark spots were sufficient to disprove the water hypothesis. The absence of water and an atmosphere, Engman concluded, precluded clouds, rivers, and streams on the moon, notwithstanding the reported observations of Kepler and other astronomers. Neither did observation reveal forests, nor, least of all, cities on the moon.[73]

Because of the existence of much disagreement over the question of lunar life, it is clear that Swedenborg would not have been prejudiced one way or the other.[74] Other learned men of his day held various opinions on this subject. Swedenborg's views were thus the result, not so much of assumptions endemic to his intellectual environment, as of his own individual reflections and beliefs. This is not to say that Swedenborg was uninfluenced by others; rather that his selective acceptance of current theories on extraterrestrial life represents an analysis of the wide range of thought on this issue, and a careful mapping out of his own particular views.

(To be continued)

[73] *Plurality of Worlds,* p. 182.

[74] The very presence of an active debate over whether the moon is inhabited, especially in Upsala, reveals the misconception Steve Koke labors under when he claims that Swedenborg, as his contemporaries, probably would have simply assumed that "all other planets in our Solar ystem are like our own." My quotation is from Koke's "The Problem of Swedenborg's 'Earths'," *The Messenger* (Swedenborg Press, New York), vol. 186, no. 11, p. 165. In fairness to Koke, though, it should be pointed out that Wolff made a strong case for the similarity of *all* orbs to the earth. Doubtless this had much impact on Swedenborg. See notes 71 and 81, as well as Wolff's *Institutiones Philosophiae Wolffianae* (Frankfurt & Leipzig, 1746), tomus prior, p. 416.