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ASTROTHEOLOGY: A CONSTRUCTIVE PROPOSAL

by Ted Peters

Abstract. As we envision constructive undertakings in the field of religion and science for the next decade, the emerging agenda of *astrotheology* is opening up a new theater for enquiry. Astrotheology provides a critical theological response to the field of astrobiology while critically assessing exciting new research on life in our solar system and the discovery of exoplanets. This article proposes four tasks for the astrotheologian: deliberate on (1) the scope of creation: is God's creation Earth-centric or does it include the entire cosmos? (2) the question whether a single divine incarnation on Earth suffices for the cosmos or whether multiple incarnations—one for each inhabited planet—is required; (3) whether astrobiologists and other space scientists are sticking to their science or smuggling in ideology; and (4) readying terrestrial life for contact with extraterrestrial life by enumerating issues to be taken up by *astroethics*.

Keywords: astrobiology; astroethics; astrotheology; evolution; extraterrestrial life; incarnation

Might we say that the mid-1960s provided a procreative moment, a moment so pregnant with potential that it birthed an entirely new generation of children? *Zygon: Journal of Religion and Science* was born in 1966. The journal gets its name from the zygote, receiving DNA from its two parents: religion and science. The same year, Barbour (1966) published his book, *Issues in Science and Religion*, and a nascent new field began its life. Its moniker is *Religion and Science*, sometimes *Theology and Science*.

In the decades since, this child of the 1960s has enjoyed adolescence and is now maturing. The field is also procreating a subsequent generation that

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is moving out of the parents' house and into the wider world. European and American scholars now join those of Asia and Africa at family reunions, which include Christians, Jews, Muslims, Hindus, naturalists, atheists, and the spiritual-but-not-religious from all over the globe. The time is right to ask: what will the next 10 years bring?

The generativity of the field promises that we can expect new things, new progeny. With this in mind, let me ask: should we welcome the future passively or try actively to shape it? Should we employ our own reproductive technology, so to speak, to genetically engineer the next generation of scholarship in Religion & Science? I tend toward taking action to guide the future, while maintaining a cautious awareness of unforeseen contingencies that will unavoidably humble our Promethean inclinations.

To be more specific, here I would like to offer a constructive proposal for a new branch on the Science and Religion trunk, namely, astrotheology. In what follows I will define this subfield and propose four tasks to guide our research and thinking for the next decade, or at least half decade.

My colleagues and I at the Center for Theology and the Natural Sciences (CTNS) in Berkeley, California, have begun surveying the landscape to see whether some constructive work in astrotheology might be desirable, viable, and possible. In this setting, I write as a Christian theologian for whom understanding the physical world through telescopes and microscopes enhances our understanding of God's resplendent creation. I begin where Augustine and Anselm began, with the methodological assumption that faith seeks understanding, *fides quaerens intellectum*. Because the initial movement here is from astrobiology toward enhanced theological understanding, I can easily imagine that scholars from other religious traditions might find this method instructive for their respective theological commitments.

In what follows I will describe the field of astrobiology and show why we are in a period of growing excitement about the universe, especially the prospect of discovering extraterrestrial life. Next will come a definition of *astrotheology* and an introduction to its sister field, *astroethics*. With these definitions in mind, I will then lead us through four initial tasks that should occupy the field of astrotheology for the next half decade or more.

EXCITEMENT IN ASTROBIOLOGY

Exoplanet mania is spreading. NASA's Kepler Explorer along with other data gathering tools at this writing have nominated between 4,000 and 5,000 candidates for exoplanet status, including more than a thousand confirmed planets orbiting stars within our Milky Way (Exoplanet Orbit Database 2014). The Holy Grail, of course, would be to find an Earth-sized planet in the habitable zone (HZ) that could sustain life. Like Goldilocks eating the bears' porridge, the HZ must not be too cold or too hot; it

must be just right. SETI (Search for Extraterrestrial Intelligence Institute) scientists after 50 years are still listening for radio signals broadcast from distant civilizations. Any day now!

While the astrophysicists and astronomers are searching other stars for extrasolar planets, exobiologists and their colleagues are searching our own solar system for microbial life. Biosignatures beckon space explorers to Mars and the moons of both Jupiter and Saturn. Any day now!

Using the word *astrobiology* somewhat loosely will provide access to a wide array of approaches to space exploration. This term will stand as a cipher covering astronomy, astrophysics, cosmology, exobiology, and other space sciences. This term *astrobiology* arose among scientists in the 1990s, in part to supersede the term coined previously by Carl Sagan, *exobiology*. Astrobiology is exobiology, plus more. According to Chris Impey, who directs astrobiological research at the University of Arizona, astrobiology is “the study of the origin, nature, and evolution of life on Earth and beyond” (Impey 2007, 42). NASA’s *Astrobiology Roadmap* of 2003 with its updates orients the field around three fundamental questions: (1) How does life begin and evolve? (2) Does life exist elsewhere in the universe? (3) What is the future of life on Earth and beyond? (NASA 2014) According to Christopher McKay at NASA Ames Research Center, “Astrobiology has within it three broad questions that have deep philosophical as well as scientific import. These are the origin of life, the search for a second genesis of life, and the expansion of life beyond Earth” (McKay 2000, 45). As NASA researcher McKay makes clear, built right into astrobiological thinking are questions that will lead toward philosophical and even theological queries. Among space researchers ethical questions are rising, giving birth to the field of astroethics that tackles moral issues arising from space exploration. Like ripe fruit on a tree, these questions and issues should be picked, eaten, and enjoyed.

EXCITEMENT IN ASTROTHEOLOGY

Some theologians are already picking the astrobiological fruit. Physicist turned astrobiologist Paul Davies laid his challenge to both scientists and theologians in a 2010 book, *The Eerie Silence: Renewing our Search for Alien Intelligence* (Davies 2010). Notre Dame dogmatician Thomas F. O’Meara published *Vast Universe: Extraterrestrials and Christian Revelation* (O’Meara 2012); and in 2013 physicist and theologian David Wilkinson released *Science, Religion, and the Search for Extraterrestrial Intelligence*, followed by Boston University ethicist John Hart’s *Cosmic Commons* (2013). Constance Bertka has alerted us “that integrating what SETI or astrobiology learns about the universe into Christian worldviews will at minimum be a long and convoluted process with more than one likely outcome” (Bertka 2013, 338). We can expect multiple tastes in astrotheology—perhaps an intellectual fruit salad—rather than just one.

Astrotheology, as I see it, is an interpretation of astrobiology, and, of course, it is much more. Here is the definition I along with my CTNS colleagues are working with: *Astrotheology is that branch of theology that provides a critical analysis of the contemporary space sciences combined with an explication of classic doctrines such as creation and Christology for the purpose of constructing a comprehensive and meaningful understanding of our human situation within an astonishingly immense cosmos* (Peters 2013a, d).

This use of the term *astrotheology* relies on the etymology, where *astro* directs our attention to the heavens and *theology* to the study of claims about the divine. The term *astrotheology* comes from the Greek: $\alpha\sigma\tau\rho\omicron$, *astro*, “constellation” plus $\Theta\acute{\epsilon}\omicron\varsigma$, *theos*, “God”; and $\lambda\acute{o}\gamma\omicron\varsigma$, *logos*, “knowledge.” We prefix *theology* with *astro* to create a multidisciplinary branch of theology that takes up the relationship between God and the creation, especially the creation of the universe over time. Our picture of God’s work over time is informed by the natural sciences, particularly cosmology, astronomy, and evolutionary biology.

We are encouraged by *Zygon*’s editor Willem Drees’s description of a theistic naturalist: “Any theist has good reasons to be a naturalist If this world is God’s creation, any knowledge we have of this world is knowledge of God’s creation. God is not to be found so much in the lacuna in our current knowledge, in the gaps, but rather in what we have uncovered Nature, religiously spoken of as creation, is not opposed to God, but rather God’s gift” (Drees 2006, 115). The description of the universe supplied by the astrobiologist just may enhance and extend the theologian’s picture of God’s created world. This method we at CTNS would dub a *Theology of Nature*. “Where theology is reconstructed in light of science,” says CTNS founder and director, Robert John Russell, “we have a theology of nature” (Russell 2012, 72).

FOUR TASKS PROPOSED FOR THE ASTROTHEOLOGIAN

Although we could easily imagine a long to-do list for the astrotheologian, I would like to start with merely four: (1) Christian theologians along with intellectual leaders in each religious tradition need to reflect on the scope of creation and settle the pesky issue of geocentrism; (2) the astrotheologian should set the parameters within which the ongoing debates over Christology (Person of Christ) and soteriology (Work of Christ) are carried on; (3) theologians should analyze and critique astrobiology and related sciences from within, exposing extrascientific assumptions and interpreting the larger value of the scientific enterprise; and (4) theologians should cooperate with leaders of multiple religious traditions and scientists to prepare the public for the eventuality of extraterrestrial contact by helping to develop astroethics (Peters 2013a, d). Each of these deserves a bit of elaboration.

1. The scope of creation and the problem of geocentrism.
 - a. Big Bang and the anthropic principle
 - b. Geocentrism and anthropocentrism
2. Christology and soteriology
 - a. Does incarnation theology make the Christian faith absurd?
 - a. A single Earth incarnation versus multiple planet-specific incarnations
3. Critique the space sciences
 - a. Correct the scientific picture of what happens in religion
 - a. Correct the sciences from within when importing extrascientific ideology
4. Astroethics
 - a. Astroethics for microbial life in our solar ghetto
 - a. Astroethics for intelligent life in the larger Milky Way metropolis

First, Christian theologians along with intellectual leaders in each religious tradition need to reflect on the scope of creation and settle the pesky issue of geocentrism. Just how is God related to the creation? By God's creation, do we refer only to this tiny blue dot lost in the immensity of dark space lit up by billions of stars in billions of galaxies? Or, is the God of ancient Israel also the creator, sustainer, and redeemer of all that has been and all that is yet to be? If the latter, then we have got a great deal of imaginative thinking to do if we want to paint a single picture with all of reality in it. This comprehensive picture or metanarrative must include, among other items, Big Bang cosmogony and the question of extraterrestrial life.

We will start with subtask 1a: the Big Bang and the question of fine tuning. When asking physicists to unpack the significance (or nonsignificance) of the anthropic principle—why were the initial conditions at the Big Bang so finely tuned that the evolution of life became possible or even inevitable?—theologians must ask whether a divine hand was active, or still is active, in the natural world. Does this divine hand mold the clay of creation into a world that centers itself on the human creature made in God's image? Do we have here a justification for geocentrism or anthropocentrism?

The anthropic principle represents a Goldilocks contingency. It seems too good to be true! So, our religious hearts palpitate as we try to fill the physical gap with a divine plug. However, a simple appeal to a divine designer or a necessary being will not stop every conceptual leak. Paul Davies points to an effluent: the theologian cannot coherently appeal to a necessary being to explain contingent being. If a natural explanation for contingent physical reality seems absurd, then so does an appeal to a

necessary divine creator. Davies asks: who created the creator the way the creator is? Of course, theologians assume that they had resolved the “who created God?” question centuries ago. Yet, it’s back again. Davies places the challenge at the theologian’s feet: “Christians, like all monotheists, believe in *one* God . . . God did *not necessarily* create the universe as it is, but instead merely *chose* to do so. But now the alarm bells ring. Can a necessary being act in a manner that is not necessary? Does that make sense? On the face of it, it doesn’t. If God is necessarily as God is, then God’s choices are necessarily as they are, and the freedom of choice evaporates . . . Confused? I certainly am” (Davies 2006, 203–04). Can the astrotheologian help Davies—and the astrotheologian himself or herself—through this confusion?

Now, let’s turn to subtask 1b: the question of the existence of extraterrestrial intelligent life and the purported concern we have over anthropocentrism and its twin sister, geocentrism. “Human beings are not the center of the Universe,” Wilkinson reminds us. “In fact, it is the human belief that we are the center of all things that the Bible calls sin” (Wilkinson 2013, 148). If we must decenter our terrestrial self-understanding, the most effective first step will be to make a simple observation: our universe is big. Really Big! More: our universe just may be populated with sentient and intelligent beings within and beyond the Milky Way.

A rumor is going around that might deserve the attention of the astrotheologian. According to this rumor, pre-Copernican Europeans had relied upon a belief that the planet Earth was in the center of the universe. This geocentrism allegedly supported their *hubris*, their pride-of-place as earthlings and as human beings, presuming the human race to rank highest among the living creatures. Today, both nontheologians and theologians worry that a geocentric or anthropocentric religion will suffer drastically if a new relationship with extraterrestrials challenges this persistent belief system.

Theologian Cynthia Crysdale believes the rumor. She worries about the impact on our self-understanding of contact with ETI. “We have faced this dilemma before: Copernicus and Galileo dethroned the human. Darwin made us mere coincidences of evolution. Slowly the human race is discovering that we’re not the center of the universe, but that both space and time are so vast that we are mere blips on the screen. This . . . won’t go down lightly” (Crysdale 2007, 201).

Philip Hefner provides a more detailed analysis of the rumor. “Copernicus took Earth out of the center of the solar system. Darwin removed the human species from the center of the evolution of life. Harlow Shapley discovered that our solar system is on the periphery of its galaxy . . . there is no *center*, as such, to the universe . . . We believe that God is the center of reality, but we humans are certainly not the center—in either time or space. . . . In this experience of de-centeredness we will gain new insights into God and into God’s will for us” (Hefner 1996, 16–17).

The rumor is that our ancestors and the atavistic believers among us today are geocentric and perhaps even anthropocentric; but Crysedale and Hefner would ask us for theological reasons to decenter and to accept our proper place in this nearly unfathomably big cosmos.

The fact that this rumor persists and that theologians such as Crysedale and Hefner believe the rumor provide sufficient reason for the astrotheologian to put the question on his or her to-do list: is it, in fact, the case that religious people are geocentric and anthropocentric? (Peters 2011, 2013b)

This first task of astrotheology provides an instance of a more general principle: theology should be open to self-revision when prompted by new knowledge about our world. Even more to the point, the astrotheologian should strive for greater specificity when describing God's relationship to the world, the big world of the cosmos. "It is insufficient to simply claim that there is some kind of relatedness between God and the world," writes Sweden's Archbishop Antje Jackelén; "Instead, the *how* of the relatedness of God to the world must be discussed in theological terms" (Jackelén 2005, 85). Cosmological concepts such as Big Bang, fine tuning, geocentrism versus heliocentrism, and the prospect of extraterrestrial life press the astrotheologian with the question: how?

Second, the astrotheologian should set the parameters within which the ongoing debates over Christology (person of Christ) and soteriology (work of Christ) are carried on. More crudely put: the astrotheologian should ask whether it makes more sense to posit a single incarnation on Earth or multiple incarnations, each a planet-specific incarnation. The question of multiple incarnations is a reasonable one, but not if the option to rely upon a single incarnation appears to justify geocentrism or Earth chauvinism. Let me try to clarify what is at stake here.

The logic of the question looks like this. If Christians claim that God becoming incarnate in Jesus Christ constitutes the decisive divine act of revelation or salvation, then must this incarnate activity be repeated on every planet for every intelligent species? Does Christian theology require a planet-hopping Christ? And, if billions of such habitable planets host life, will this require billions of incarnations? For those who answer negatively while affirming that God's redemptive act on Earth suffices for the entire cosmos, would this return us to the abhorred geocentrism?

Classical Christian theology has come under assault by critics who see the concept of divine incarnation as vulnerable, fragile, and flimsy. During the Enlightenment's age of reason, Thomas Paine attacked traditional Christian belief for its geocentric narrowness by firing arrows flaming with speculations about extraterrestrial life. Because of the Christian commitment to divine incarnation in the earthly Jesus, he contended, this faith will crumble and disintegrate when the existence of ET is confirmed. "To believe that God created a plurality of worlds, at least as numerous as what we called stars, renders the Christian system of faith at once little

and ridiculous, and scatters it in the mind like feathers in the air” (Crowe 2008, 224).

In our own era, Paul Davies continues to afflict Christian dogma with Paine by calling the idea of incarnation absurd. “The difficulties are particularly acute for Christianity, which postulates that Jesus Christ was God incarnate whose mission was to provide salvation for man on Earth. The prospect of a host of alien Christs systematically visiting every inhabited planet in the physical form of the local creatures has a rather absurd aspect” (Davies 1983).

In response to subtask 2a regarding the possible absurdity of the Christian christological claim, it would behoove the astrotheologian to point out that the question of intelligent life on other worlds has frequently been debated in Christian history; and so has the question of multiple incarnations. For good sound reasons, Parisian scholastic Thomas Aquinas argued for a single world while John Buridan argued for many worlds (Dick 1982, 25–30). In our own era, Paul Tillich and Wolfhart Pannenberg both affirm the likelihood of extraterrestrial life on other worlds, the former arguing for multiple incarnations while the latter thinks that the single incarnation on Earth will suffice for the cosmos. Those theologians engaged in the debate do not feel the sense of absurdity attributed to them by Paine or Davies. This disjunction between theologians inside the church and critics outside the church should give the astrotheologian pause: perhaps, we have an issue here worthy of addressing.

Turning to subtask 2b—which makes more sense: a single divine incarnation on Earth or multiple incarnations, one for each intelligent species?—it seems to me that the question depends in part on whether one thinks of soteriology in terms of revelation or in terms of atonement. If the work of Christ is primarily that of a teacher who reveals the truth about God, then one would tend to embrace multiple incarnations, one for each intelligent species whom God wishes to invite into the divine fellowship. If, on the other hand, one thinks of the work of Christ in terms of atonement—as an ontological work of redemption accomplished on behalf of the entire fallen creation—then a single incarnation drama would suffice. Thinking this matter through with transparency is one of the services the astrotheologian can render.

Third, theologians should analyze and critique astrobiology and related space sciences from within, exposing extrascientific assumptions and interpreting the larger value of the scientific enterprise. Although scientists should be respected and honored for what they know and for what they promise, scientific claims should not be given a free pass. Scientific claims should be subjected to critical review by religious thinkers.

The theological critique of science by identifying blind assumptions targets two domains: first, mistaken images held within the scientific community of theological matters and, second, assumptions and trajectories that

frame the scientific picture itself. Regarding the first, Heidelberg theologian Michael Welker speaks forcefully: “Theology can and must challenge the natural sciences to correct their false perceptions of theological themes and contents” (Welker 2012, 14). Michael Crowe proceeds to do just this. “It is sometimes suggested that the discovery of extraterrestrial life would cause great consternation in religious denominations. The reality is that some denominations would view such a discovery not as a disruption of their beliefs, but rather as a confirmation” (Crowe 2008, 328–29). We might number this subtask 3a: correct the mistaken ideas held by scientists regarding what religious people actually believe and think.

Now, we turn to subtask 3b, namely, a theological critique of what is going on within science proper. It is one thing to correct what scientists think about religion. It is another to correct what scientists think about their own science. The theologian has no quarrel with solid scientific research, to be sure; but, when extrascientific or ideological commitments smuggle their way into scientific thinking, then the theologian needs to blow the whistle and call “foul.” The particular problem afoot, the astrotheologian should point out, has to do with the role that evolutionary theory plays in the astrobiological worldview. Evolution gets overinterpreted when imaginatively exported to other worlds in the heavens. This overinterpretation is caused by the infusion of progress into the idea evolution. When we add to this fusion a concept of deep time—speculating that an extraterrestrial civilization may have evolved and progressed longer than life on Earth—the result is an intellectual spectacle. We envision our own future coming to us from another world.

To get at this overinterpreted extraterrestrialized Darwinism, I suggest we look again at the question of teleology. Can we expect evolution over time to progress toward advanced intelligence? Can we expect that whenever prebiotic chemistry is present on an exoplanet that life will spring forth and develop into intelligent creatures replete with science and technology? Can we expect that a civilization on an exoplanet that has been evolving longer than life on Earth will be more complex, more intelligent, and more advanced in science and technology? No, say the majority of evolutionary biologists. This grand expectation misunderstands evolutionary biology.

Renowned evolutionary biologist Francisco J. Ayala speaks for the hard-nosed consensus. “The evidence of the fossil record is against any directing force, external or immanent, leading the evolutionary process toward specified goals. Teleology . . . is, then, appropriately rejected in biology as a category of explanation” (Ayala 2000, 19). In short, don’t look for progress in nature.

Theorist Terrence Deacon explains why we stumble over this. “The idea of progress in evolution is an unnoticed habit left over from a misinformed common sense, from seeing the world in terms of *design*. The problem is that our intuitive model for evolution is borrowed from the history of

technological change, which has been a cumulative process, adding more and more tidbits of know-how to the growing mass of devices, practices, and records each day. In contrast, biological evolution is not additive, except in some very limited ways . . . Evolution is an irreversible process, a process of increasing diversification and distribution. Only in this sense does evolution exhibit a consistent direction” (Deacon 1997, 29). In short, we on Earth are the products of an evolution without progress; and we would be mistaken if we assume that it has been progressive or designed or purposive.

The enduring problem, however, is that the concept of progress, “although hidden, stands ready to influence the ways that theorists might fill evidential gaps between data and meaning” (Ruse 1996, 484). When progress becomes infused into evolution and then projected on to other worlds in the heavens, a scientized image grows of a more advanced extraterrestrial civilization that could save Earth from the threat of self-destruction through nuclear war or ecocide. This hope for salvation through evolutionary advance is articulated by Carl Sagan and Frank Drake who write: contact with extraterrestrials “would inevitably enrich mankind beyond imagination” (Sagan and Drake 1997). Should we look to the skies to see if a utopia might be falling our way?

What we find all too frequently among space scientists is the expectation—call it a “hope”—that exoplanetary life will have evolved longer than life on Earth so that we can envision an extraterrestrial civilization much more advanced and willing to share its advances with Earthlings. A more advanced extraterrestrial civilization might save Earth from our backwardness, our primitivism, our inability to climb out of the kingdom of animal brutality and into the kingdom of alien peace, justice, and harmony.

Realistically, such an eschatological vision common to space scientists and their surrounding culture cannot be justified on the basis of what we know about the working of natural selection in the evolutionary process here on Earth. Imaginatively exporting evolutionary progress to exoplanets may lift our expectations beyond what existing scientific knowledge can justify. Such a secular eschatology may be inspiring, but scientific it is not. Rather, it’s the attempt by scientists to practice theology without a license (Peters 2009).

Already critics of space science have arisen to clarify the difference between solid science and secular myths of extraterrestrial redemption, which, in fact, obliquely express a terrestrial veneration of science and technology. Evangelical James Herrick, for example, contends that science fiction influences science proper, and this has led to a myth in the heart of science itself. He uses the term “Myth of the Extraterrestrials” to refer to “the idea that intelligent extraterrestrials exist and that interaction with them will inaugurate a new era in human existence” (Herrick 2008, 51). Spiritually

deprived modern culture is thirsting for superior entities in space who can save our planet and, according to Herrick, this is a poor substitute for the classic God of theism and its genuine promise of redemption. Herrick fears that the ETI myth—replete with the alleged evolutionary promise that we can employ science and technology to achieve our own redemption and that our more highly evolved ETI neighbors are already where we are going—will replace the Christian faith, not augment it. “This is the Christian church’s challenge today—to reclaim its story and tell it in such a way that it stands out among all the others as authentic, as the Great Story that other stories have often sought to imitate” (Herrick 2008, 252).

In order to avoid the risk of confusion, please let me clarify the issue. The issue is not whether or not extraterrestrial life—either microbial or intelligent life—exists. Nor is the issue whether or not traditional Christianity or any other traditional religion will be able to adapt to learning that we share our galaxy with newly discovered neighbors. Nor is the issue whether or not Darwinian evolution is subject to critique by religious Luddites or other naysayers. Rather, the issue has to do with what counts as reliable scientific research on questions surrounding extraterrestrial life. The theologian must stand for science as science, not for science supporting a secular eschatology. No warrant exists for astrobiology to prophesy an evolutionary future on this planet or any other planet that leads to utopia or even near utopia. When space scientists attempt to perform the tasks of religion—to practice theology without a license—it’s time to blow the whistle.

Again, please make no mistake. My criticism arises out of a deeper applause, celebration, and near reverence for the best science. I believe astrobiology and sister fields should be celebrated for the fertile science that continues to produce new knowledge about our immense and complex universe. However, this celebration is limited to science that remains science. The theologian should offer a critique when science drifts toward disguised ideology or substitute religion.

Fourth, theologians and religious intellectuals should cooperate with leaders of multiple religious traditions and scientists to address ethical issues associated with space exploration and to prepare the public for the eventuality of extraterrestrial contact. No one can predict with precision exactly what is coming. If the day of extraterrestrial contact arrives, rethinking our terrestrial worldviews should follow. This is likely to be complex, not simple. Social psychologist Albert Harrison recognizes that “we cannot simply incorporate extraterrestrial ideas without thinking them through, because our systems (supranational, societal, and organismic) have highly interrelated parts, so changes in one arena yield changes in another” (Harrison 1997, 298). Religion is one of those parts, perhaps even foundational for revised worldview construction. John Hart foresees that “the collaboration of scientists, ethicists, and theologians will enhance both

reflection on Contact, and terrestrial-extraterrestrial interaction when Contact occurs” (Hart 2010, 390). Cooperation and collaboration are the watchwords.

This fourth task leads the astrotheologian beyond theology into ethics, astroethics. “Good religion is evidenced by its fruit: good behavior,” says *Zygon’s* founding editor, Ralph Wendell Burhoe (Burhoe 2005, 800). In this case, the theologian turned ethicist must consider challenges directed from space toward Earth as a whole, as a single planetary society. Then, the theologian must ask how a tradition-informed ethical vision can provide a haven for healthy social behavior.

Of the anticipated scenarios, contact with intelligent creatures from outer space is the most dramatic. But it’s not the only one. There are many other scenarios regarding space exploration that are less dramatic, yet every one still calls for scrupulous ethical attention. We will divide these ethical issues into two categories: first, space exploration looking for ETNL or stupid life within our solar ghetto and, second, contact with ETI or civilizations elsewhere in the Milky Way metropolis. Pursuing both of these redounds to a new understanding of who we are on planet Earth. We need to think of Earth as a single planetary society dealing in concert with one another to address off-Earth concerns. Space is not the private property of one nation, one profession such as science, one religion, one ideology, or any other terrestrial entity in competition with others. The community of moral deliberation on space matters needs to be the entire human community. Might the flip side of addressing outer space be the unification of all humankind on our planet?

We address subtask 4a when we take up the first category: exploration within our solar ghetto. A number of issues stand up and demand our attention. We will list just a few to get started. (1) *Planetary protection*. If we find microbial life on Mars or a moon orbiting Saturn, then what? Do we bring samples back to Earth? If we do, are we risking contaminating Earth with a virus for which we earthlings have no ammonal resistance? Could it wipe out the human race? What are the risks? Do we have a responsibility to protect Planet Earth? And, in addition, do we have a responsibility to protect the ecosystem of discovered life forms in their native habitats? Should we invoke a policy of avoiding contamination, either back contamination of Earth or forward contamination of off-Earth sides with terrestrial microbes?

Planetary protection is just the first in a long list. Here are a few more issues confronting our global society that might benefit from serious thinking through by religious leaders. (2) *Space debris*. Currently, about 22,000 pieces of space junk in the form of dead satellite parts are orbiting Earth. We have turned our upper atmosphere into a trash dump. Do we want to pollute extraterrestrial space just as we have our terrestrial nest? (3) *Satellite surveillance*. The surveillance power of satellites is increasing, and nobody

has been asked to grant permission to be spied on. Might this intelligence gathering violate the rights of individuals or nations? (4) *Scientific privilege vs. space profit*. Up until this point, most funding for space exploration has come from governments who support scientific research. Now, however, the private sector is lifting off. Prospectors are looking to mine asteroids and travel agencies are looking to establish tour bus routes on the Moon. Whereas the scientific community tends toward protecting off-Earth sites from human influence, money-making enterprises will operate with a different ethic. Does this matter? (5) *Weaponization of space*. The United Nations has ruled that outer space belongs to the common heritage of humankind and nations are not allowed to use space for military purposes. How might a global society stop nations such as the United States or China from taking advantage of their lead in technology to defy this policy and place defensive or offensive weapons in orbit? More to come.

We address subtask 4b when we take up the second category: contact with intelligent aliens who live elsewhere in the Milky Way metropolis (Peters 2013c). Here, we can imagine three types of creatures who might become our new neighbors. The first would be extraterrestrial beings who are intelligent, but less intelligent than we are. What ethical principles might obtain? Should we treat such aliens as we now treat our animals? The second would be extraterrestrial beings who are approximately as intelligent as we are. Would this require us to treat them with dignity? Would it make a moral difference to us if the aliens are hostile or if they are benevolent? The third would be extraterrestrial beings who are superior to us in intelligence. If these intelligent beings are hostile, might they enslave us? Might we have to adopt a slave ethic and impose it on ourselves? Or, if these super-intelligent aliens turn out to be benevolent, might we have to adopt an ethic of gratitude? Just what scenarios would aid us in preparing mentally and culturally for what might happen?

Planetary readiness informed by wisdom drawn from Earth's historic religious traditions is being called for here. Secular or scientific anticipations are not enough. Religious readiness will be helpful to both religious and nonreligious sectors alike.

CONCLUSION

Scholars in the field of religion and science may be well prepared to anticipate what might be coming by way of space exploration, and they just might have the opportunity to lead us in thinking through some knotty theological questions while contributing to a global discussion of ethical issues. To ready ourselves for the new tasks this might lay upon us, I have suggested the cultivation of a new field within systematic theology: astrotheology.

In this article, I have described the field of astrobiology within the context of growing public and scientific excitement about the universe,

especially the prospect of discovering extraterrestrial life. I offered a working definition of *astrotheology* and its sister field, *astroethics*. With these definitions in mind, I led us through four initial tasks that should occupy the field of astrotheology for the next half decade or more: (1) reflect on the scope of creation and settle the pesky issue of geocentrism; (2) set the parameters within which to deal with the question of single versus multiple incarnations; (3) analyze and critique astrobiology and related sciences; and (4) prepare the public for the eventuality of extraterrestrial contact by engaging in astroethics.

Taking up these four tasks with their subtasks will keep the astrotheologian occupied for some time. And, when we finally meet either microbial or intelligent ET, the astrotheologian will be prepared for an exciting new adventure and even newer ways of thinking. Any day now!

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