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Astrotheology and the ETI Myth

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Abstract *The task of* astrotheology *is to speculate on the theological, cultural, and ethical implications of space exploration, especially the exploration of astrobiologists into the (1) origin of life; (2) a second genesis of life; and (3) expansion of life beyond earth. When assumptions within the field of astrobiology are examined, we find that the Darwinian model of evolutionary development is imaginatively projected onto extrasolar planets; and this model includes a built-in doctrine of progress. The assumption of progress within evolution permits astrobiologists to look forward to contact with an extraterrestrial civilization that is more intelligent and more advanced than that on earth. Such an extraterrestrial civilization will allegedly have an advanced science that can save earth from its primitive and under-evolved propensity for violence. However, no empirical evidence for a more highly evolved or advanced civilization currently exists, despite these beliefs. The theologian labels the constellation of scientific assumptions here the "ETI myth." Astrotheology celebrates hard-nosed empirical science and even encourages space exploration; but the mythical assumptions regarding the doctrine of progress within evolution are here given critical analysis.*

Key words: Astrotheology; Exotheology; Astrobiology; Extraterrestrial non-intelligent life; Extraterrestrial intelligent life; SETI; ETI myth; Peters ETI Religious Crisis Survey

Introduction

How should theologians reflect on the religious implications of what might be the imminent discovery of extraterrestrial life? Will it make a difference if this extraterrestrial life is intelligent or not? Will it make a difference if this extraterrestrial life form is superior to us, perhaps more intelligent than we human earthlings?

In order to ready the theologian to engage in such speculative reflection, we need theologians to partner with the scientists working in the relatively new and exciting field of astrobiology. When contact is made with life beyond earth, the astrobiologists are most likely to announce it to our world.

Astrobiology is the scientific study of biological processes on earth, and beyond.[1] NASA's *Astrobiology Roadmap* of 2003 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?[2] According to Christopher McKay at NASA Ames Research Center, "Astrobiology

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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."[3]

Within the encompassing field of astrobiology, we should distinguish between unintelligent and intelligent life. The field of exobiology focuses on the discovery of microbial or biologically simple forms of life, non-intelligent life forms. At the risk of insulting Martian microbes, we will refer to them as ETNL, extraterrestrial non-intelligent life. We will distinguish the search for ETNL—commonly called *exobiology*—from the search for extraterrestrial *intelligent* life, from which the SETI project gets its name. In what follows, I plan to use the acronyms ETI or ETIL to refer to extraterrestrial intelligent life.

Exotheology is the name I had once given for that branch of theology that reflects upon extraterrestrial life, both biologically simple and intelligent.[4] This was adapted from the scientific term, *exobiology*, first introduced by Joshua Lederberg in 1960.[5] Today exobiology is one branch within the encompassing field of astrobiology. If, then, we wish to engage in theological speculation on the prospects of both extraterrestrial non-intelligent and intelligent life, we might refer to this enterprise as *Astro Theology* or, better, *Astrotheology*.[6] Even if *exotheology* and *astrotheology* may be interchangeable for the time being, perhaps the latter should eventually supplant the former. In sum, the task of *Astrotheology* is to reflect on the theological, cultural, and ethical implications of extraterrestrial life.

In what follows, I will look briefly at the implications of ETNL. Then, I will turn to the larger question of ETIL and the assumptions with which many astrobiologists begin their inquiry. Among these assumptions is the inclusion of the origin of life right along with adaptation and diversification of life in Charles Darwin's theory of evolution. Darwin's theory dealt solely with life's adaptation and diversification; but astrobiologists require an explanation for life's origin as well. They assume the grand cosmos is biophilic—that is, it loves life and that life is likely to be plentiful among the stars. What this means for the theologian is that religious reflection will have to deal not just with the subject of ETIL but also the evolutionary assumptions that structure the astrobiologist's research agenda.

> The matter before exotheology [or astrotheology] is not a simple one of reflecting directly on what scientists know or say. What we consider scientific knowledge is frequently mixed up with myth. The line between science and myth is blurred, at least in the field of astrobiology. This is because astrobiology relies upon a number of assumptions regarding the theory of evolution, assumptions that are unproven yet decisively important. In what follows, I will employ the term *ETI Myth* to refer to the belief that extraterrestrial intelligent beings exist and, further, they are more advanced than earthlings in evolution and technological progress are. Sometimes the myth includes still more; it includes trust in the evolutionary advance of intelligence and science, suggesting that more highly evolved ETIL could bring scientific salvation to planet earth. This is a belief without any empirical evidence. Yet it is such a potent belief that it structures research and interpretation of space phenomena.

The employment of such assumptions in itself belongs within the sphere of reputable science, to be sure. However, when assumptions begin to take on the

structure of a worldview and elicit a passionate hope for a scientific savior, we have entered the domain of myth. In this case, the science becomes a surrogate religion, a replacement for traditional religion. The exotheologian needs to discriminate between science and myth in order to pursue a rational response to the prospect of ETI.

When we turn to theological responses, I will ask whether people who have faith in God should believe the ETI myth. I will answer in the negative. The negative applies not to the question of whether extraterrestrial beings exist. Rather, it applies to the implicit belief that a more highly evolved science can save earth's humanity from its own self-inflicted demise. Terrestrial science, even if augmented by extraterrestrial science, is insufficient for the human race to heal itself. To reflections on ETNL, ETIL, science, and myth, we now turn.

Theological Reflections on ETNL

As we just said, exobiology focuses on the discovery of microbial or biologically simple forms of life, extraterrestrial non-intelligent life, or ETNL. Astro ethicists are concerned about exobiological contamination, actually two directional contamination. *Forward contamination* would consist of earth intrusion into the ecosphere of another world. By landing either a robotic probe or our own astronauts on Mars or a similar planet, the context that supports whatever life form exists might be subject to alteration, perhaps deleterious alteration. *Back contamination* could result from bringing life samples back to earth, altering earth's ecosphere, and perhaps poisoning some of us. Astro ethicists are busy devising preparatory principles to rely upon when the first news of ETNL breaks.

What might be the theological implications of ETNL? Margaret Race at SETI opens up this question.

> If we find evidence for past or present *Earth-like* life on Mars, it would be extremely interesting scientifically, but less so theologically or philosophically because it could be explained as the result of dispersal between neighboring bodies; the panspermia idea would then be a strong hypothesis. If, however, Martian life were found to use a completely different biochemistry, it would be suggestive of an independent origin of life, with significant philosophical and theological implications.[7]

Now, just what is the logic of Race's suggestion here?

If ETNL on Mars or another neighbor within our solar system were found to be earthlike, then it would support the panspermia hypothesis. The idea of panspermia suggests that the planet earth as well as Mars was seeded with a primitive life form coming from a common source in space. The source in space is unidentified; but the hypothesis includes the assumption that all life forms both on earth and elsewhere in our solar neighborhood are kin to one another. Life on earth would be part and parcel of extraterrestrial life.

Race is hinting that continuity in life would be less challenging to traditional Western theology than discontinuity—that is, a second genesis elsewhere might be more upsetting to traditional religion than a single genesis, which we earthlings

share with our space neighbors. So, perhaps we should ask, if life originated independently on earth and elsewhere, would this mean a loss of significance for life on earth? Does our theology presuppose earth-centeredness and earth-life-centeredness? And would it be upset if life—even ETNL—would begin to grow without earth's influence?

James Heiser, a Lutheran bishop and founding member of the Mars Society, writes, "if evidence of life is discovered on Mars ... the potential theological impact of such a discovery will hinge on whether such life is indigenous (a second Genesis) or whether it originated on Earth, and spread by panspermia."[8] Finding transplanted earth life on Mars would have zero theological implications, adds Heiser; but a second genesis of life on Mars "would signal the victory of the 'greater glory' position" held by some Christians—that is, some Christians believe that the more life we find in the universe the greater the attestation to God's glory.

As I read the Bible, a unique genesis of life restricted to earth does not seem to be implied by biblical accounts of creation. The worldview of the ancient Hebrews at the time the Bible was written certainly assumed that earth is the center and that the stars in our sky look down upon us. This worldview has changed, of course. Our modern image of the cosmos with billions of possible worlds is a recent development; yet, our modern word, *cosmos*, was still the word used in the Bible to describe God's creation. "For God so loved the world (κοσμος, *cosmos*)," says John 3:16, "that God gave his only begotten son ... " Perhaps the biblical image of the cosmos was smaller than ours, yet the word "world" still referred to the totality of created reality for the Bible just as it does for us today. Biblical theology was never a strictly earth-bound theology.

Oh, yes, there are exceptions. Thomas Aquinas argued that the concept of perfection implied that there could be one and only one world, our earth. Nevertheless, many other medieval theologians could speculate about the existence of other worlds among the stars where life would be flourishing. God would have been the author of such life there just as God is the author of life here. John Buridan (1295–1358), for example, held "from faith that just as God made this world, so he could make another or several worlds."[9] Moreover, relevant to our discussion of exobiology, these other worlds might have different elements and could obey different laws of nature; and they could produce different results. With the advent of Copernican heliocentrism, many theologians along with scientists began to speculate about life among the stars. In my own study of this matter, I could find both acceptance and rejection of the extraterrestrial hypothesis in the history of theological thought, with the preponderance of speculative opinion favoring the existence of separate worlds among the stars.[10]

On the contemporary scene, theological speculation positively embraces the prospect of ETIL. "How can we rule out that life may have developed elsewhere?" Jose Gabriel Funes, Director of the Vatican Observatory, told *L'Observatore Romano*. "Just as we consider earthly creatures as 'a brother,' and 'sister,' why should we not talk about an 'extraterrestrial brother'? It would still be part of creation."[11]

Even though the sharp distinction between ETNL and ETIL is necessary for the pursuit of astrobiology, it would seem to me that previous theological acceptance

of ETIL should suffice to cover what might happen should we discover ETNL. Physicist-theologian and member of the Royal Astronomical Society, David Wilkinson, speaks directly to this matter: "The biblical faith sees the natural world as part of God's rich creation, where he exhibits diversity, extravagance, and beauty. Bacteria on Mars would simply be part of this great creation tapestry."[12] In sum, I do not forecast much in the way of theological upset over a discovery of ETNL, at least within the Christian tradition.

Contact Optimists versus Unique Earthers

Of the three fundamental questions asked by astrobiologists, the question of the second genesis of ETIL, is the one we ask next. We ask about the possibility that intelligent living creatures currently inhabit earthlike planets somewhere in the cosmos. To date no empirical evidence exists that extraterrestrial intelligence exists. Despite more than three decades of active SETI (Search for Extraterrestrial Intelligence) research, no radio or visual contact has occurred. If we rely solely on empirical evidence, then we have no reason to believe that anyone else is out there.

We may call this the *improbability problem*. Space researchers are divided into two camps to deal with the improbability problem. The *Contact Optimists* contend that simple reasoning would suggest that the universe should be teeming with life. Those holding the *Uniqueness Hypothesis* (or the "rare earth" position), in contrast, suggest that the earth is probably the first and only home for a technological civilization. Until recently, the lack of empirical evidence combined with the high improbability of a repeat of earth's evolutionary history seemed to give the edge to the uniqueness hypothesis, to the unique earthers.[13]

The unique earth hypothesis depends on the assumption of the improbability that just the right prebiotic contingencies would fall into place to make the spring from non-life to life possible, along with the low probability that the contingencies that made the evolution of intelligent life on earth could be repeated in sequence. "In conflict with the thinking of those who see a straight line from the origin of life to intelligent man," writes Ernst Mayr, "I have shown that at each level of this pathway there were scores, if not hundreds, of branching points and separately evolving phyletic lines, with only a single one in each case forming the ancestral lineage that ultimately gave rise to Man."[14] Each branch of evolutionary change is contingent, due to chance and not design. No principle of progress from simple life forms to intelligence is built into evolution. "An evolutionist is impressed by the incredible improbability of intelligent life ever to have evolved, even on earth," adds Mayr.[15] In sum, even if a second genesis of life were to occur on an extrasolar planet, the probability that it would progress into a form that mimics intelligence on earth is virtually nil.

Contact optimists do not necessarily embrace the "straight line" from life's origin to intelligence that Mayr assumes. Carl Sagan and Frank Drake acknowledge that evolutionary contingencies do not guarantee in all cases that intelligence will develop. Yet, rather than a straight line, they propose a variant line that might

get us to a parallel stage. "There might be a kind of biological law decreeing that there are many paths to intelligence and high technology, and that every inhabited planet, if it is given enough time and it does not destroy itself, will arrive at a similar result. The biology on other planets is of course expected to be different from our own because of the statistical nature of the evolutionary process and the adaptability of life. The science and engineering, however, may be quite similar to ours, because any civilization engaged in interstellar radio communication, no matter where it exists, must contend with the same laws of physics, astronomy, and radio technology that we do."[16] Even though we cannot describe evolutionary advance as a straight line, we can predict that many civilizations may have followed a different line yet they still pass through where we are now to end up in a much more advanced state.

Neither the straight line nor the variant line to intelligence and beyond to science and technology will fit with our understanding of biological evolution, argue some prominent evolutionary biologists. Stephen Jay Gould and Francisco Ayala, for example, have argued that if you replay earth's evolutionary tape again and again, it will never produce the same result.[17] What we know as human intelligence is so improbable elsewhere that it must be unique to our earth, they conclude. "The chemical origin of life seemed to depend on such an improbable sequence of events, similar to throwing a die over and over and getting a six every time, that biologists were inclined to think that life elsewhere must be a very rare occurrence," comments David Darling.[18]

Contact optimists, while recognizing the improbability problem, counter with the idea of big numbers. Since the number of possible locations in this vast universe for evolution to get started is so large, the number of possible repeats of earth's biological history is also large. In contrast to the unique earth biologists, contact optimism has grown among astronomers. "Most of the speculation about life in the universe came from astronomers, who were generally positive about the idea simply because they thought there were probably so many planets around. With billions of potential homes, surely life couldn't be that scarce," comments Darling.[19] He concludes, "Almost beyond doubt, life exists elsewhere."[20]

The Speculations of the Contact Optimists

Now, contact optimists, like theologians, can speculate; and speculate they do. Today's star searchers can rely on a dramatic form of speculation known as the Drake equation. The *Drake Equation*, first formulated by Frank Drake in 1961 (National Radio Astronomy Observatory in Green Bank, West Virginia), looks like this: $N = N^* f_p n_e f_l f_i f_c f_L$.

N^* = the number of stars in the Milky Way Galaxy.
f_p = the fraction of stars with planets around them.
n_e = the number of planets per star
f_l = the fraction of planets in n_e where life evolves
f_i = the fraction of f_l where intelligent life evolves

f_c = the fraction of f_i that communicate
f_L = the fraction of the planet's life during which communication happen
N = the number of communicating civilizations in the galaxy.[21]

The real value of the Drake equation is not in knowing the numerical equivalent of N. Rather, the value is that here we have a template for structuring research and filtering incoming data. As research advances, new numbers can be plugged in. The calculations will change as new information is gathered. As of the present moment, NASA estimates that 10^{21} planets exist in the universe, of which 10^{10} might be earthlike.[22] George Coyne estimates that there are 10^{17} earthlike planets in the universe.[23] The mere appeal to such big numbers persuades many astrobiologists that contact optimism is justified.

The sense that discovery of ETI is imminent has grown conspicuously since 1995, when the first planet was found around a star similar to our sun, 51 Pegasi. As technology increased to measure gravitational effects of suspected planets on their respective stars, so has the number of identified planets. These planets cannot be seen directly, but their gravitational pull can be detected by the wobble they cause on their star. Evidence of more than three hundred extra-solar planets is now in.[24] As one might expect, larger planets will likely be discovered first; and those already logged seem to be Jupiter sized objects orbiting quite close to their equivalent to our sun.

Although it is not clear exactly what a planet needs to have in order to generate life or to sustain life that comes first as a visitor, astrobiologists are looking for a planet that is earth size, metal rich, and sufficiently distant from its respective sun in order to provide liquid water. It might need to provide molecular oxygen and ozone, according to NASA's roadmap. To fit within the biophilic range, such a planet should be like the porridge Goldilocks preferred to eat, not too hot and not too cold. A Goldilocks planet would find itself in a Circumstellar Habitable Zone (CHZ). Such a planet would need to remain stable and safe for a long period of time, perhaps earth years numbered in the billions. To date, no empirical evidence that a Goldilocks planet exists is in; even though speculative considerations make many astrobiologists optimistic.[25]

In sum, big numbers give comfort to the contact optimists. It would be ridiculous to think that we on earth are alone in the universe, according to this point of view. "If you just think for a moment about those vast numbers of other worlds you should be rocking with laughter if anyone suggests that the Universe is peopled only by us," writes columnist Bernard Levin.[26] With the threat of being laughed at, unique earthers should be intimidated by big numbers.

The Place of Evolution in the ETI Myth

Before drawing out the implications of astrobiological speculations for theology, let us follow a brief detour into the ETI myth regarding extraterrestrials. The Goldilocks assumption marks one way that science contributes to such a myth. As I have said, at work in contemporary culture is the *ETI myth*: the belief that

extraterrestrial intelligent beings exist and, further, they are more advanced in evolution and technological progress. It is a belief without any empirical evidence. Yet it is such a potent belief that it structures research and interpretation of space phenomena.

Such a myth is a cultural construct, a window frame, so to speak, through which we look in order to view the world out there. In ancient times, myths were stories about how the gods had created the world in the beginning; and this beginning explains why things are the way they are in our contemporary experience. In the modern world, we think of ourselves as turning to science rather than myth to explain the origin of things. Yet, what ancient myth and modern science have in common is that they both provide a worldview, a frame for understanding and explaining what we experience. Alternatively, to say it a bit more precisely, science contributes to the myths we modern people believe. At work in modern culture is an identifiable framework—a myth, if you will—within which we cast the questions we pose to the mysteries evoked by our experience with outer space.

The first and salient feature of the ETI myth is the imaginary exportation of the theory of evolution to other planets or possible habitats in space. There is nothing unscientific about this imaginary exportation, to be sure; it is the most reasonable thing to advance a hypothesis regarding what is not known based on what is known. If we know that life could originate here on earth and could speciate through evolution, then it is reasonable to project that these processes might have occurred more than once in this vast universe. When SETI scientists and other astrobiologists develop the idea of evolution on other worlds, however, they load their concept of evolution down with auxiliary commitments such as the doctrine of progress, the connection between progress and advance in intelligence, and the connection between advance in intelligence with near utopian versions of science, technology, health, and peace. These auxiliary commitments are not warranted by the present state of empirical knowledge about evolution on earth let alone on other imaginary planetary habitats.

The trail of SETI reasoning is worth looking at in a bit more detail. First, SETI is selective. SETI is listening to the skies in hopes of hearing a signal emitted from an extraterrestrial intelligent source. Non-intelligent or less intelligent beings may live elsewhere in the universe, to be sure; but the only ones likely to be sending signals are those with advanced technology.

Second, it follows that SETI is not making judgments about ETI in general, but focuses rather on those intelligent beings capable of sending radio signals. To be sophisticated enough to devise a signal emitting technology, an extraterrestrial civilization must have been evolving for a long time. We here on earth developed radio only a century or so ago; so if we are to make contact with ETI they must be at least as old as we earthlings and perhaps even older.

Third, here is the logic that leads to the salvation myth (salvation through progress): with increase in evolutionary age comes an increase in technology; with increase in technology comes social changes appropriate to sustaining such a technology, perhaps even a social peacefulness that provides the stability to sustain such a technology for thousands or millions of years. Benevolence would become a necessary ingredient among such beings in order to prevent annihilating

themselves. The disposition toward benevolence accompanies a lengthy evolutionary history and the development of advanced technology. This means that whatever ETI share with us on earth will have the equivalent of redemptive if not salvific value.

"Any alien civilization the SETI researchers might discover is likely to be much older, and presumably wiser than ours," writes Paul Davies. "Indeed, it might have achieved our level of science and technology millions or billions of years ago ... it is more likely that any civilization that had surpassed us scientifically would have improved on our level of moral development, too. One may even speculate that an advanced alien society would sooner or later find some way to genetically eliminate evil behavior, resulting in a race of saintly beings."[27] What is being said here is that evolution is progressive; it leads to the development of science and technology; and it leads to advances in morality. Note that the advance beyond evil in Davies' scenario is not achieved spiritually, but genetically—that is, scientifically. In short, science saves.[28] Might we think of such a scenario as mythical?

This salvific aspect of the myth reveals more of its shape as we read what Sagan and Drake write: contact with extraterrestrials "would inevitably enrich mankind beyond imagination."[29] Frank Drake dreams about this enrichment. "Everything we know says there are other civilizations out there to be found. The discovery of such civilizations would enrich our civilization with valuable information about science, technology, and sociology. This information could directly improve our abilities to conserve and to deal with sociological problems—poverty for example. Cheap energy is another potential benefit of discovery, as are advancements in medicine."[30] Note how this optimism extends well beyond mere contact with ETIL. It includes optimism regarding the solution to "sociological" problems such as poverty and energy while giving us a leap forward in medicine. What Drake believes is that science is salvific, and extraterrestrial science would be even more salvific than earth's science.

Drake's speculations extend even to imagining that ETI have achieved immortality. This immortality is the product of advanced medical research, not spiritual achievement. Alien intelligences live in a medical utopia, forever free of disease.[31] Medical science has immortality in its future, and ETI have arrived at this future in advance of us. If ETI creatures engage us on earth, they may save us from death.

Drake's logic continues. If ETI have attained immortality, then they are likely to avoid vulnerability to dying in accidents or war. They probably have developed safety mechanisms beyond what we have. They probably have found ways to avoid war. They have progressed through the nuclear age, survived, and now live safely in peace. Alien intelligence can provide for earth what we cannot provide for ourselves, namely, an end to war. Progressive evolution has taken ETI to levels of civilized utopia that we can imagine but, at our stage of evolution, cannot yet attain. Might contact with extraterrestrial science speed up terrestrial salvation?

SETI critic Edward Regis dubs such evolutionary optimism as belief in "salvation from the Stars."[32] What comes packaged in scientific language is secularized religion. Atheist cosmologist and science fiction writer, Fred Hoyle,

saw the underlying motivation for belief in ETI: the desire for salvation coming from the stars, but salvation based upon science and not religion. What we are here calling the ETI myth includes "the expectation that we are going to be saved from ourselves by some miraculous interstellar intervention."[33]

The ETI myth is constructed on a foundation of evolutionary theory, a particular variant of evolutionary theory. This variant assumes the doctrine of progress and a prediction of future salvation through increased evolution, a much-disputed assumption. Evolutionary biologists who are critical of ETI searchers focus on four points. According to George Basalla, astrobiologists (1) mistakenly "portray evolution as a fixed process with preprogrammed goals"; (2) fail to acknowledge the significance of "the contingent nature of organic evolution—mutations and unpredictable ecological changes [that] make the evolutionary process dependent on a chain of random circumstances"; (3) take for granted that intelligence is an inevitable emergent:, whereas most evolutionary biologists "see high intelligence as a rare event in the history of life"; and (4) are so given to anthropomorphic projection that they underestimate how much difference could characterize an alternative evolutionary path to intelligent life.[34] My point here is this: the ETI myth, which orients some theoreticians in the astrobiological community is based upon a scientifically disputable version of evolutionary theory. This is not a theological argument against the ETI myth. Rather, it is an observation that the ETI myth has taken speculative liberties that extend well beyond what the most cautious version of science should warrant.

These speculative liberties in the ETI myth have incorporated a secularized variant of ancient apocalyptic religious symbols. Lewis White Beck derisively describes the field we know as astrobiology as a "modern equivalent of angelology and Utopia or of demonology and apocalypse." Then with a flair he exclaims, "*exobiology recapitulates eschatology.*"[35] After reviewing SETI's critics, Basalla remarks, "Despite all their scientific trappings, the extraterrestrials discussed by scientists are as imaginary as the spirits and gods of religion or myth."[36]

This negative judgment on the work of astrobiology is not what I stress or even embrace here. I enthusiastically support the search for ETNL and ETIL. I enthusiastically embrace the scientific work of SETI. What I wish to point out is merely that in this field of science we find sublimated religious hopes, secularized language to express religious sensibilities. Human hopes rise up from deep within the human soul, and these hopes can express themselves in scientific language as well as religious language. Contemporary astrobiologists work with assumptions that, at least in part, are mythical in character. We will now look at these assumptions in more detail.

Should We Use the Term "Myth" to Describe Astrobiology?

Let us pause before we proceed with our analysis. Let us ask, should we use the term "myth" to describe what is going on in astrobiology? The work of Albert Harrison at the University of California at Davis gives us an opportunity to examine this question. First, like Frank Drake, Harrison commits himself to

approach the question of ETIL from "within the framework of science and view the evolution of life and civilizations as orderly processes that proceed within broad natural limits."[37] Working within these "natural limits," Harrison finds he can speculate about an intelligent civilization that might have evolved longer than our own. "Thus, a fundamentally positive picture emerges when we extrapolate from life on Earth: there are trends toward democracies, the end of war, and the evolution of supranational systems that impose order on individual nation-states. This suggests that our newfound neighbors will be peaceful, and this should affect our decision about how to respond to them."[38] In sum, advances in evolution lead to democracy and peace. Might it follow that we could ask our newfound space neighbors if they might share with us the fruits of their evolutionary advances in democracy and peace?

Harrison acknowledges how this line of thinking attributes god-like qualities to ETIL. "Two assumptions make it tempting to attribute extraterrestrials with god-like qualities. The first assumption is that any extraterrestrial civilization that we will find is likely to be older than our own .... The second assumption is that extraterrestrial civilizations will be benign, even benevolent ... [they] are less likely to be subject to repression and political violence, more likely to have their basic needs for food and shelter satisfied, and more likely to develop economic surpluses that encourage trade" rather than war.[39] Should we expect that evolutionary progress on either earth or elsewhere could take us to "a world without war"? Yes.

Now, this looks like myth. Harrison denies that it is myth. Why? Because science and myth do not mix, he says.

> SETI is not to be confused with religion and myth, so any superficial similarities among extraterrestrial radio-astronomers, God, ancient astronauts, and space brothers have to be taken with a huge grain of salt. God, if He exists, is supernatural. Extraterrestrials would be the product of biological evolution.... Most importantly of all: for religious people God is a given, but for scientists extraterrestrials are hypothetical, at least pending empirical verification. [40]

In his haste to eschew brushing science with mythical paint, Harrison is overlooking the central role played here by the idea that evolution and science lead to peace if not salvation. Despite the fact that evolution is founded on natural selection and survival-of-the-fittest, and that modern science has produced atomic bombs and other weapons of mass destruction, SETI scientists look forward to altruism, benevolence, and salvation. This structure of assumptions is what is the key to the application of the term "myth" in this instance. Although Harrison identifies myth with a supernatural God rather than biological ETIL, it appears that in this myth biological ETIL come to play the role that supernatural deliverers played in past myths. SETI science looks like a secularized form of religion.

Let me explain. Archaic or premodern myths were stories about gods or other supranatural beings who established the world we experience and who promised redemption in some cases. Even though the modern world replete with natural science sought to replace supranatural deities with belief in natural forces, the mythical mind did not disappear. Rather, it transmuted supranatural gods into

natural forces. The idea of progress, for example, appears to be a natural force that replaces the will of the otherwise capricious Olympian gods. Modern people believe they can trust in the invisible force of progress; and frameworks for interpreting the unknown and for predicting the future rely upon this myth. What would help Harrison is to see that myths can come in secularized form; and the ETI myth—a variant on the myth of progress—provides an example.

This belief among astrobiologists that ETIL might bring peace on earth takes the form of a secular eschatology—that is, a belief that progress will lead eventually to ultimate transformation. Such an eschatology requires a faith-affirmation, just as a religious eschatology does. To call it "scientific" only buries this hidden fact. Martin Marty alerts us to how this works.

> The secular philosopher of history who deals with a *telos* is also making a faith-affirmation. Strictly speaking, he is dealing with the future as it has actually occurred: he is reporting on events which have not occurred and concerning which he cannot have historical knowledge as if he has such knowledge. Ordinarily, of course, this faith-affirmation comes disguised as empirical inquiry or commonsense observation.[41]

What distinguishes the secular eschatology of SETI is the belief that the future is already embedded in our evolutionary past, a *telos* or entelechy that will lead ineluctably to the scientific equivalent of salvation. This takes as much faith-affirmation as found in any traditional religion.

Now, to say that SETI is a secular religion is not necessarily to disparage it. SETI is becoming a form of culture, just as is traditional religion has done. We must grant that human aspirations for meeting our survival needs and for establishing world peace are authentic and wholesome. These aspirations can come to expression in many forms, traditional religion as well as disguised secular substitutes for religion.

Evolutionary Theory as Both Science and Myth

What we are seeing here is that the backbone assumption of the ETI myth is the Darwinian model of evolution; and the rib assumptions—many of which are doubted by evolutionary biologists—include the following: life must evolve where conditions are right; evolution is progressive; progress leads to higher intelligence; higher intelligence leads to science; science leads to peace; and, one more observation: science is more highly evolved than religion. Where our astrobiologists stand today, they assume, is on the pinnacle of earth's evolution. They are straining to look into outer space to see if they can see what might be even more highly evolved. Science represents the most advanced stage in earth's evolution; and scientific astrobiologists just might be the ones to lead all earth's life forms forward to still higher development.

Let us look more closely at one of these rib assumptions: life must evolve wherever the conditions are right; and there simply must be extraterrestrial

planets where this is possible. "Life is the product of deterministic forces," writes biologist Christian de Duve.

> Life was bound to arise under the prevailing conditions, and it will arise similarly wherever and whenever the same conditions obtain. There is hardly any room for 'lucky accidents' in the gradual, multistep process whereby life originated. This conclusion is compellingly enforced when one considers the development of life as a chemical process.[42]

As long as the right chemical conditions exist somewhere in outer space—in the Goldilocks location—we can expect life to evolve and develop and progress. Perhaps, some day we will meet this extraterrestrial life form. At the level of assumption, this evolutionary belief has worked its way into the ETI myth.

Christian de Duve speculates, based on the Green Bank equation of 1961 (see the Drake equation above) that

> ... the figure of about one million 'habitable' planets per galaxy is considered not unreasonable. Even if this value were overestimated by several orders of magnitude, it would still add up to trillions of potential cradles for life. If my reading of the evidence is correct, this means that trillions of planets exist that have borne, bear, or will bear life. The universe is awash with life.[43]

With such contact optimists speculating without empirical evidence that the universe is teeming with life, it is easy to imagine our culture developing images of just what that life might be like.

Nobel Laureate de Duve continues, feeding the myth with apparent scientific veracity. "My conclusion: We are not alone. Perhaps not every biosphere in the universe has evolved or will evolve thinking brains. But a significant subset of existing biospheres have achieved intelligence, or are on the way to it, some, perhaps in a form more advanced than our own."[44] When science becomes mythologized, we consider that our partners in outer space could be more highly evolved—"more advanced"—than we are.

Carl Sagan similarly embraced the ETI myth, recognizing that it is based on speculation rather than sufficient empirical evidence to deem it scientific. First in his book and posthumously in the Hollywood movie starring Jodi Foster, *Contact*, Sagan dramatically portrayed science as replacing religion in announcing salvation for the human intellect if not for our world.[45] Yet, despite his sacralizing of scientific progress, Sagan was aware that the contingencies pointed out by evolutionary biologists challenge his working assumptions. Hopes for ETI salvation fall short of solid science.

> I would guess that the Universe is filled with beings far more intelligent, far more advanced than we are. But, of course, I might be wrong. Such a conclusion is at best based on a plausibility argument, derived from the numbers of planets, the ubiquity of organic matter, the immense timescales available for evolution, and so on. It is not a scientific demonstration.[46]

Philosopher of Biology Michael Ruse bluntly blunts the assumption that evolution inevitably leads to progress in intelligence. "There is absolutely no

guarantee of an upward progression on our hypothetical planet to intelligent life forms .... evolution of intelligence is not a necessary consequence of life appearing: not at all."[47] Despite such doubt, astrobiologists press onward.

What we find in the community of astrobiology are scientists who have taken a number of non-empirical and speculative steps from the Drake equation to myth-like images of ETI more advanced in intelligence and even in spirituality. Might these more advanced intelligences represent our own future? Might they speed up earth's evolution and transcendence of our own past?

Is SETI science? Or, is it religion? Michael A. G. Michaud would still defend SETI as science. "Although SETI shares some qualities and some goals with religion, its method is different. The scientific search attempts to confirm belief by experiment, not revelation."[48] Perhaps we should think of SETI as working from within a projected worldview, informed but not constrained by the Darwinian picture of evolution, embellished by the doctrine of progress, and inspired by hopes for a secularized eschatology that looks for a scientized salvation.

How a Theologian Reads Myth

When it comes to theological discernment, one must first ask the question: does myth count in theology? No. Most theologians are willing to interpret myths, but certainly not willing to believe them in their literal form.[49] Myths tell us about human anxieties and propensities, to be sure; but they do not tell us about the reality of God. It is the task of the theologian to say: do not believe this myth! Or, at least avoid believing it with a high degree of confidence. Science has not demonstrated that it can save us from self-destruction, whether it is terrestrial or extraterrestrial science.

The core of the myth is found in the embeddedness of the doctrine of progress within the cultural view of evolution. For an example of theological caution regarding the version of evolution that incorporates the doctrine of progress, we might turn to the principal spokesperson of American Liberal Protestantism during the first half of the twentieth century, Harry Emerson Fosdick. Fosdick is remembered for, among other things, his strong stand against fundamentalism, and his program for integrating modern science with ancient belief. Fosdick embraced the scientific aspects of Darwinian evolution; but he asked for realism rather than naiveté when treating social progress. With signs of damage already and yet to be done by Spencer's social Darwinism, Fosdick was worried that society would forget about an intransigent reality, namely, sin. What sinful human persons might do is unpredictable. At any moment, what might have begun as progressive might be reversed. Regression if not destruction might ensue.

Already in 1922, Fosdick wrote:

> This evolving cosmos has been pictured as a fool-proof world where men could make and love their lies, with their souls dead and their stomachs well alive, with selfish profit the motive of their economic order and narrow nationalism the slogan of their patriotism, and where still, escaping the consequences, they could live in a progressive society .... All the progress this world will ever know waits upon the

> conquest of sin. Strange as it may sound to the ears of this modern age, long tickled by the amiable idiocies of evolution popularly misinterpreted, this generation's deepest need is not these dithyrambic songs about inevitable progress, but a fresh sense of personal and social sin.[50]

Realism requires a recognition of human sin and the role of violence in the natural world; and a doctrine of progress—even when projected onto civilizations among the stars—which fails to recognize this looks more like fabricated myth than it does genuine science. Genuine science, realistic science, sticks to observations and cautious theorizing; it is not given to extravagant claims that look more like fanciful dreams than cautious extrapolations.

Now we might ask, is science itself subject to sin. Yes. To put it another way, this realism regarding the stubbornness of sin applies to the role science plays in society, just as it applies to any other human enterprise. Science, just like all other human enterprises, is fallen. Despite the marvels of the new knowledge gained and new technology produced, science has become subject to the funding of jingoists and the ambitions of militarists. Advances in scientific knowledge lead frequently to equal advances in the breadth and efficiency of murder, mayhem, and mass destruction. Each decade marks a new level of global terror due to advances in nuclear and biochemical weaponry. This spiral is beyond political control, religious control, moral control, and beyond self-control. If the ETI myth suggests that augmenting terrestrial science with extraterrestrial science will provide this control, the theologian must simply shrug and say, where is the evidence for such a belief?

The blind alley into which the myth—especially the belief in progress—I call the "eschatological problem."[51] The myth proposes that if we in our generation simply make the right choice that, with the advance of science, we in the human race can advance from warring destruction to a state of world peace. Yet, the theologian should ask, how do we get from here to there? Can a leopard change its spots so easily? If scientists got us into the present mess, how can we expect scientists to liberate us from this mess? If we have evolved to this point, why should we think that more evolving would save us?

Salvific healing, according to the Christian theologian, comes from divine grace granted us within the setting of our fallen life on earth. The cross and resurrection of Jesus Christ symbolize the presence of this saving grace. In the cross, we see God's identification with the victims of human violence. In the resurrection, we see God's promise that we will not forever be locked into the spiral of violence. Unambiguous healing—even world peace—will come to us only as an eschatological transformation, as an act of God. More science will not save us. It is a delusion to think that it will. The theologian, like the rest of us, should welcome and even celebrate the triumphs of science; but these triumphs should not delude us into thinking that science will save us from our human propensity for self-destruction.

Will Terrestrial Religion Collapse When We Meet ETIL?

Returning to the ETI myth within astrobiology, we note how it includes a prediction about the demise of terrestrial religion, especially biblical Christianity.

The standard answer to those who look at terrestrial religion from the outside is this: if we gain conclusive knowledge that we are not alone in the universe, this will shatter all current religious belief systems. Ancient beliefs in the God of Israel and other beliefs in personal gods will be crushed under the weight of new cosmic knowledge. Why does it appear that our religious traditions are so fragile? Allegedly, because our inherited religious traditions are terrestrial, earthbound, parochial, narrow, and atavistic. This is quite a set of assumptions, but we find them at work within the worldview of many astrobiologists.

The prevailing logic seems to go like this: once we speculate with big numbers about life on other planets, then the Christian faith looks ridiculous. Once we make contact with EITL, the Christian faith will collapse. The Christian faith is destined for collapse because it falsely believes that either it would be impossible for ETIL to exist, or it would collapse because the more highly evolved ETIL would present us with a religious vision superior to our less evolved belief system. The first of these two I would call the de-centering argument, and the second the higher evolution argument.

According to the *de-centering argument*, biblical religion is pre-Copernican.[52] Christians, allegedly, believe they are at the center of creation; therefore, allegedly, Christians must deny the existence of ETIL. So, if we find that ETIL exist, Christian dogma will be falsified. Worse, the human race will be knocked out of its center just as the sun was knocked out of its center by Copernicus. In this argument, the idea of the center is figurative, not literal. Earth's *Homo sapiens* are allegedly the center of God's creation because of our special relationship with God. This special relationship is tied up to the *imago dei*. We on earth believe we are created in God's image (Genesis 1:26–29). So finding other intelligent beings—perhaps also created in the divine image—would marginalize us. To become marginalized by discovery of ETIL would falsify our inherited dogma and bury biblical religion. So the de-centering argument alleges. Yet, we might ask, does this criticism commit the straw man fallacy? Does the Christian religion actually teach that earth's humans are in the center? No, retorts David Wilkinson: the Christian religion has never placed the human race in the center. "God is the centre of all things and we are creatures given status by his love ... [de-centering] is not a problem for biblical Christianity."[53]

Robert John Russell proceeds to make a subtle yet significant additional point regarding the apparent marginalization of earth, a marginalization that could be due either to finding ETIL elsewhere or to finding ourselves alone in the universe as well. In either case, we earthlings still participate in the physical conditions of all creation; we share in the same star dust and the same laws of nature that are uniform throughout the vast universe. All the universe is present here with us; and we have become aware of our connectedness to the whole of what is real. "Our existence is intricately connected to the precise way in which our universe as a whole exists as it does. If we hold that God is the Creator of *this* universe, we are indeed claiming something very special about humanity, much more special and precise than we dreamed of before."[54] What we see in Russell is how the dramatic dialectic between the smallness of our planet earth and the vastness of the magnificent universe provides our human race with a non-exclusive combination

of humility and grandeur. In sum, the forecast that de-centering would cause disintegration of biblical religion fails to understand the subtle strength and plasticity of the basic belief that we human beings share in the image of God.

More interesting for understanding the ETI myth within astrobiology is the use of the *higher evolution argument* against Christian beliefs. Theoretical physicist, cosmologist, and astrobiologist Paul Davies at Arizona State University, for example, makes all the assumptions of the ETI myth, including the assumption that advanced extraterrestrial civilizations will have evolved up and out of their respective religious histories into the stage of post-religious science. ETIL will be too smart to believe what earthlings believe. If ETIL visit us, their superior supra-religious beliefs will squash our more primitive biblical beliefs.

> It might be the case that aliens had discarded theology and religious practice long ago as primitive superstition and would rapidly convince us to do the same. Alternatively, if they retained a spiritual aspect to their existence, we would have to concede that it was likely to have developed to a degree far ahead of our own. If they practiced anything remotely like a religion, we should surely soon wish to abandon our own and be converted to theirs.[55]

Even with the possibility of extraterrestrial decimation of terrestrial religion, Davies also recognizes the possibility that creative theology might be able to adapt. "The discovery of extraterrestrial life would not have to be theologically devastating."[56]

The director of the Center for SETI Research in Mountain View, California, Jill Tarter, predicts confirmation of ETIL would be devastating to terrestrial theology. The god of terrestrial religion is our own invention, Tarter contends. It is possible to evolve and grow and get beyond our inherited belief in God. When projecting scenarios onto the history of extrasolar planets, she constructs an entire scenario based upon the Drake equation. Although to date no contact of any sort with extraterrestrial intelligent life has occurred, Tarter can imagine myriads of planets teeming with living beings. All will have evolved. In addition, if some got a start earlier than we on earth, they will have evolved further. Their technology will have progressed; and they may even have a technology sufficiently advanced to communicate with us. Further, she imagines that these extraterrestrial societies will have achieved a high degree of social harmony to support this advanced technology. Still further, if they have developed their own religion, it too will be more advanced than the religions we have on earth. Or, more likely, the "long-lived extraterrestrials either never had, or have outgrown, organized religion."[57] We can forecast, then, that contact between earth and ETIL will necessitate either the end of our inherited religious traditions or a new incorporation of a more universal worldview.

Steven Dick, NASA Chief Historian, makes the same evolutionary assumptions and foresees virtually the same scenario. Earth's ancient beliefs in a supernatural personal god just must go by the wayside. To take its place will be belief in a new God, a naturalist's God, built right into the universe. Dick welcomes the arrival of "the concept of a natural God—a God *in* the universe rather than outside it."[58]

Now, in my judgment, such debunking of terrestrial religious tradition is misleading and unfounded. It is misleading because it commits the fallacy of false alternatives: either believe in the ancient God of Israel or believe the speculative facts about ETIL. This is a false set of alternatives, because theologians both Christian and Jewish could easily absorb new knowledge regarding extraterrestrial life. Both Christians and Jews have debated the theological implications of many worlds since the middle ages, with increased interest during the post-Reformation and post-Copernican periods. Among major contemporary theologians, only a few address the issue of ETIL, but those who do are quite comfortable at integrating possible new knowledge on the subject.[59]

Knowledgeable proponents of the Christian faith in our own time—though in some cases siding with the unique/rare earthers—unambiguously embrace the potential presence of ETIL as a part of God's creation. Scientist-theologian David Wilkinson, for example, holds that "at present there is no strong evidence for extraterrestrial intelligence. [Yet,] as a scientist and a Christian I want to encourage the search for extraterrestrial life and intelligence."[60] He registers a level of enthusiasm about the speculative prospect of ETIL. "I believe that the discovery of extraterrestrial intelligence would be exciting for the Christian, for it would open up even more of the glory and stunning creativity of the God revealed to us in Jesus."[61] Similarly, Georgetown University theologian John Haught greets "encounter with alternative intelligent worlds" as an occasion "for theology to enlarge its sense of God and divine creativity."[62] Finally, SETI scientist Douglas Vakoch looks forward to the religious value of contact with ETI, because it will yield for us "a more humble, more realistic, and yet paradoxically more complete and more extensive understanding of our own place in the universe."[63]

Survey Evidence to the Contrary of the ETI Myth

ETI myth proponents project the demise of terrestrial religion, as we have seen; yet their forecasts seem unfounded. No evidence exists to support them. In fact, evidence to the contrary does exist. Victoria Alexander conducted a survey of US clergy regarding their religious responses to extraterrestrial life. She provided clergy from Protestant, Catholic, and Jewish congregations with a set of questions such as; would you agree "official confirmation of the discovery of an advanced, technologically superior extraterrestrial civilization would have severe negative effects on the country's moral, social, and religious foundations"? She tabulated her data and concluded: "In sharp contrast to the 'conventional wisdom' that religion would collapse, ministers surveyed do not feel their faith and the faith of their congregation would be threatened."[64] I suggest that when speculations are made by astrobiologists regarding the demise of terrestrial religion, they are most likely a product of their myth, not their science.

In the spring of 2008, with the help of research assistant Julie Froehlig, I conducted a similar survey that dealt with this issue in more detail. In the "Peters ETI Religious Crisis Survey" with 1325 respondents, we asked clergy, lay, and religious (monks, nuns, etc.), whether, in the event of confirmation of ETIL, a

respondent's own personal beliefs might confront a crisis; the beliefs of his or her tradition; the beliefs of other religious traditions; and numerous additional questions. No evidence of a widespread sense of threat to religion in any of these categories appeared. To the contrary, confidence that the new knowledge of ETIL would be incorporated into systems of religious belief was predominant.[65]

Note here in Question 3, for example, that among Roman Catholics, Mainline Protestants, Evangelical Protestants, Orthodox Christians, Mormons, Jews, and Buddhists in our study the vast majority expect no crisis to develop when learning of ETIL (Figure 1). Note further that this refers to their own personal religious belief, which may be distinguishable from the beliefs of the religious tradition with which they self-identify. What is significant, we believe, is this: if adherents to the world's religious traditions foresee no threat to their personal beliefs, then the burden of proof that such a threat exists lies on the shoulders of the proponents of the ETI myth.

Turning to the next question, Question 4 calls upon each individual believer to speak on behalf of his or her religious tradition (Figure 2). Note two things. First, again, the vast majority of adherents to our seven tested religious traditions (plus non-religious) perceive no threat of crisis when engaging ETIL. Second, the numbers differ slightly from Question 3 reviewed above: we see a fraction more in the agree/strongly agree category. Might we perceive here a slight worry that one's religious tradition is more vulnerable to a crisis than one's own personal belief?

Some light might be shed if we borrow data from another survey. A 2007 survey of more than 35,000 Americans conducted by the Pew Forum on Religion and Public Life uncovered a trend that may be indirectly relevant. Whereas

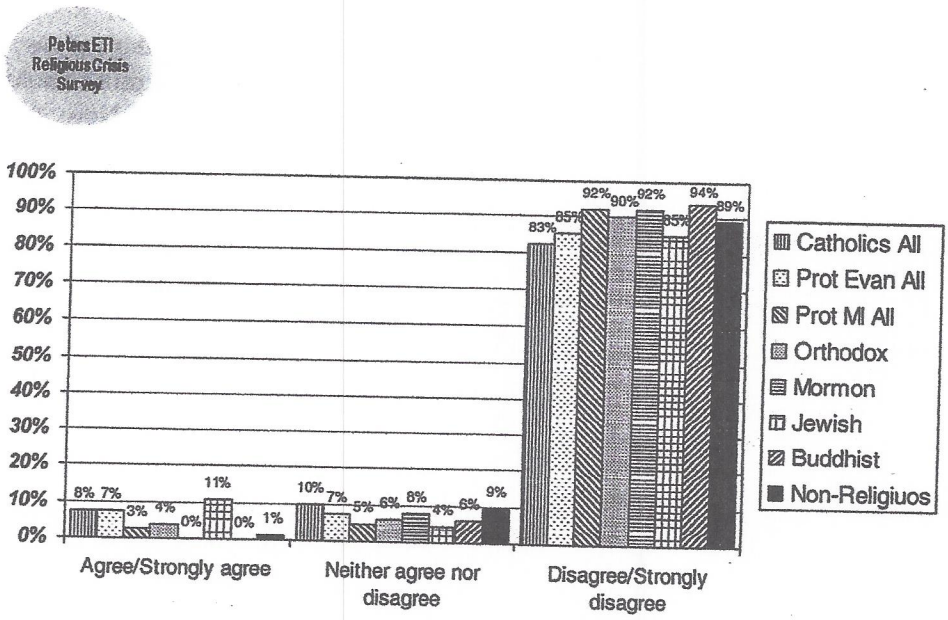

Figure 1 Q3. Official confirmation of the discovery of a civilization of intelligent beings living on another planet would so undercut my beliefs that my beliefs would face a crisis.

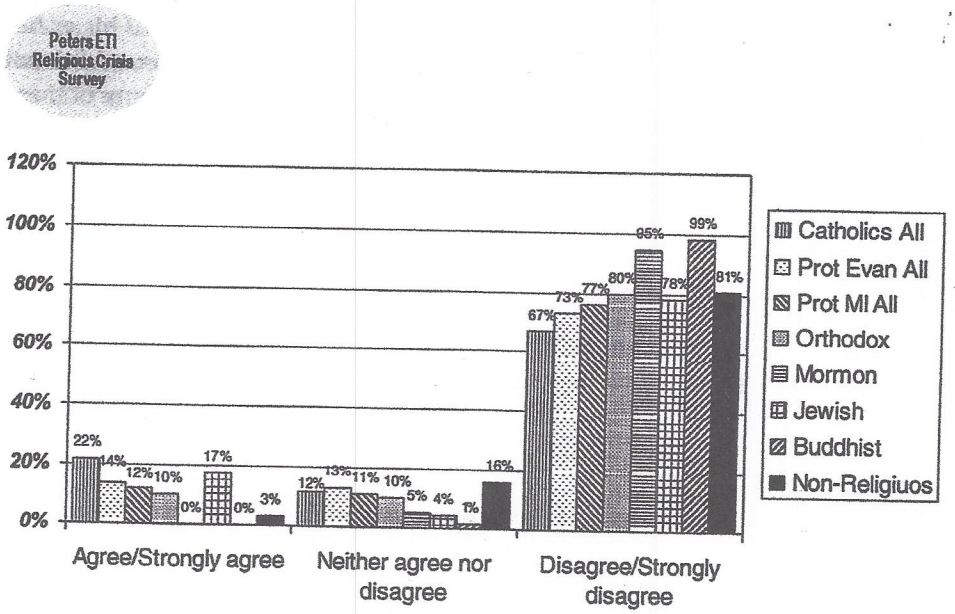

Figure 2 Q4. Official confirmation of the discovery of a civilization of intelligent beings living on another planet would so undercut the beliefs of my particular religious tradition that my religious tradition would face a crisis.

conventional wisdom might suggest that the more religiously zealous a person is the more intolerant he or she would be, this survey indicates that the opposite is true. Zealous Americans are tolerant, even welcoming religious perspectives that differ from their own. To the statement, "many religions can lead to eternal life," for example, 57% of Evangelical Protestants agreed as did 79% of Roman Catholics. So did the majority of Jews, Hindus, and Buddhists. What this suggests is "a broad trend toward tolerance and an ability among many Americans to hold beliefs that might contradict the doctrines of their professed faiths."[66] Now, this survey is limited to Americans and it does not test directly for openness toward ETI. However, if it is in fact the case that many religious people are capable of holding "beliefs that might contradict the doctrines of their professed faiths," then it might follow that those who welcome ETI into their worldview could do so even if they worry slightly about doctrinal fragility in their own respective religious tradition.

With this in mind, note what Question 5 might reveal (Figure 3). The majority remain in the disagree/strongly disagree category. Yet, the agree/strongly agree cluster is significantly higher than in question 3 and still higher than in 4. Those who identify with a major religious tradition give a modest degree of credence to the forecast that the world's religions—religions other than their own—might confront a crisis. *Some* degree of credence, only, we stress; yet, it is still worth noting. Could it be the case that an individual religious believer is slightly more worried about someone else's beliefs than his or her own?

The 69% agree/strongly agree spike suggests that non-believers predict problems for religion, while believers do not. Most likely, this is due to a misunderstanding non-believers have of believers.

Having noted this, let us give brief attention to the 205 non-religious persons who responded to the Peters ETI Religious Crisis Survey (Figure 4). In responding to Question 5, a significant majority (69%) of those who identify as non-religious, project a crisis for religion. This is twice the average of those who are affiliated

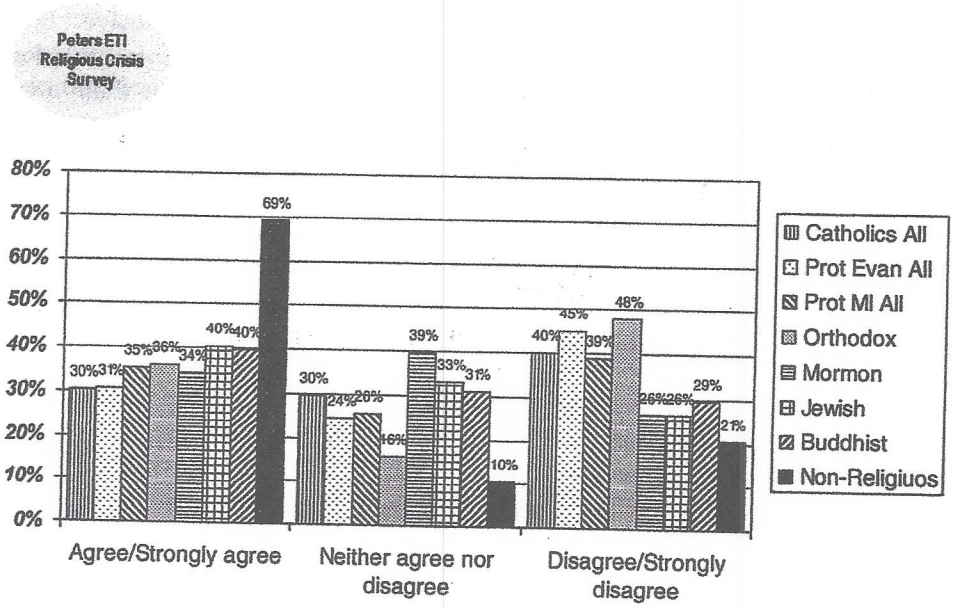

Figure 3 Q5. Even though my religious (or non-religious) viewpoint would remain unaffected, contact with extraterrestrials would so undercut traditional beliefs, that the world's religions would face a crisis.

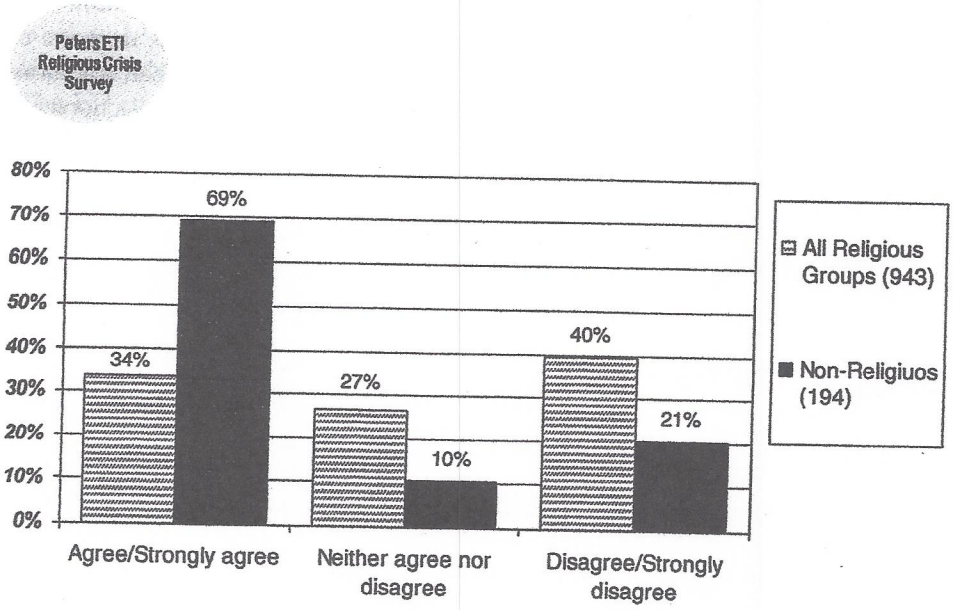

Figure 4 Q5. Even though my religious (or non-religious) viewpoint would remain unaffected, contact with extraterrestrials would so undercut traditional beliefs, that the world's religions would face a crisis.

with a religious group (34%). That is, the non-religious have a much more negative forecast for religion than do adherents to religion. What might this reveal? Could it reveal that many among the non-religious are working with a version of the ETI myth, at least the tenet that more highly evolved science displaces less highly evolved religion? As we did not test for the presence of the ETI myth directly, what we find here is at most suggestive, not conclusive.

In sum, people who embrace a traditional religious belief system do not fear for their own personal belief; nor are they particularly worried about their own respective religious tradition. A shred of evidence suggests that believers in one religious tradition might be more inclined to impute fragility to other religions to which they do not subscribe or about which they know little. Our central finding is this: *the hypothesis that the major religious traditions of our world will confront a crisis let alone a collapse is not confirmed by the Peters ETI Religious Crisis Survey.* Furthermore, it appears that non-religious persons are much more likely to deem religion fragile and crisis prone than those who hold religious beliefs.

Conclusion

This essay has been an exploration in exotheology—or, better said, in Astrotheology—that is, we have been speculating on the theological implications of possible contact with ETNL or ETIL. We have found that theological speculation regarding possible contact with extraterrestrial life forms requires a critical stance regarding the science of astrobiology.

It is necessary to distinguished between the raw core of astrobiology's search for a second genesis, on the one hand, and the cultural overlays of the ETI myth, on the other hand. What we find in the ETI myth is a complex speculation that projects a repeat of earth's evolutionary history stretched out by the doctrine of progress so that ETILs are imagined as beings more highly evolved than we, more advanced, and superior not only in science but in morality. These projections are most satisfying to some terrestrial scientists because they paint a picture of science as our world's savior, revealing the hidden religious dimensions built into scientific speculation. The self-congratulatory self-image of the scientist is projected onto the screen of outer space, so that the scientists' image of themselves returns from the heavens to earth to save us. Astrobiologists have a vested interest in propagating this myth, because under the guise of inquirers they slip into the role of prophets. My theological recommendation is that we avoid believing this myth, at least with a high level of confidence, even if it is touted by some of the most respected of scientists in our society.

From the point of view of the theologian, the ETI myth does not warrant confident belief for three reasons. First, the history of science on earth has been ambiguous. Even though science has brought us modern medicine that saves lives, it has brought us the atomic bomb and the terror of the nuclear arms race. No precedent exists that science on its own can heal itself and become benign, let alone salvific. Second, the theory of evolution as currently employed by biologists resists the doctrine of progress. There is no built-in principle of advance

At most, one can find reason to affirm growth in complexity within biological evolution, but definitely not something we might wish to call "advance." The idea of progress over time is an ideological import into the theory. Therefore, to paint a picture of ETIL as more advanced in science and morality is to speculate well beyond the limits of even what the theory of evolution would permit. Third, as of yet no empirical evidence for the existence of ETIL exists. Yes, that evidence may appear in the future. At that moment when we actually encounter ETIL, however, we may be in for some surprises. ETIL might be quite different than we expect. All this leads us to treat the ETI myth with caution, not rejecting it out of hand but recognizing that its plausibility hangs on a very thin thread.

Despite this theological demure, it does not follow that the wider public should become cynical or withdraw support for the efforts of our astrobiologists to explore other worlds. Terrestrial curiosity for what is out there gives expression to an authentic human thirst for the kind of knowledge that expands our horizons. Perhaps no other field among the sciences can tantalize the human imagination more than astrobiology; and what our astrobiolgists might eventually discover could become earth shaking in importance. The hard science of the astrobiologists should be supported, and the discoveries of the astrobiologists should be celebrated. If the ETI myth proves itself to be fertile in designing research protocols and in making new discoveries, even religious supporters should be willing to applaud and congratulate.

The task of the theologian, I think, is twofold. On the one hand, like others who appreciate modern culture, the theologian should rally support for science at its best and offer religiously meaningful interpretations of what we learn about the magnificent cosmos, which God has made our home. On the other hand, the theologian should offer a prophetic critique of secular idols, of secular substitutes for classic religious symbols. This prophetic task requires a critical analysis of the worldview within which astrobiology works. The theologian should discriminate between what passes the test as fertile science and what only charades as science. The ETI myth, it should be pointed out, may look like science but it is in fact a secularized expression of religious hope, minus what is necessary for any hope, namely, trust in God.

This critique makes the ETI myth neither wrong nor pernicious. The critique simply judges that the myth is not in itself science. It might even be true—at least in the sense that an advanced civilization of intelligent beings could bring technical, cultural, and maybe even moral progress to earth. If someday the ETI myth becomes confirmed as true, it will be due to a lucky guess. Moreover, we might very well be thankful for its truth. The problem with the ETI myth is not its truth or falsity; rather, the problem is that it is a utopian projection of the values of the terrestrial scientific community onto an imaginary civilization to be found among the stars. It is not a scrupulous extrapolation based upon what we know about life in the natural world. Worse, because many in the scientific community fail to acknowledge the myth at work in their own worldview, they grant scientific authority to this myth when criticizing traditional religious beliefs.

When it comes to the centuries old debate within Christian theology regarding life on other worlds, we need to address the question of whether Christian

theology could absorb new knowledge regarding neighbors living in other star systems. Those who contend that the Christian worldview is too brittle or too fragile to adapt to this new knowledge underestimate the degree of adaptation that has already taken place. The theory that the Christian religion would collapse when shocked by ETIL has insufficient evidence to support it. What Christian theology can absorb is authentic scientific knowledge regarding what may or may not be the case regarding ETNL or ETIL. What theologians need to interpret is the ETI myth; and they need to interpret this myth without mistakenly thinking that myth is science.

Endnotes

1 The term *astrobiology* comes from the Greek: αστρο, *astro*, "constellation"; βίος, *bios*, "life"; and λόγος, *logos*, "knowledge." It is the interdisciplinary study of life in the universe, combining aspects of astronomy, biology and geology. It is focused primarily on the study of the origin, distribution, and evolution of life. Given the influx of new information about planetary systems around other stars, its mandate has expanded beyond the study of *exobiology*, from the Greek: ἔξω, *exo*, "outside." See the University of Arizona project, "Astrobiology and the Sacred: Implications of Life Beyond Earth," http://scienceandreligion.arizona.edu/project.html (accessed December 13, 2008).

2 NASA, *Astrobiology Roadmap*, see updated versions: http://astrobiology.arc.nasa.gov/roadmap/ (accessed December 13, 2008).

3 Christopher McKay, "Astrobiology: The Search for Life Beyond the Earth," in *Many Worlds: The New Universe, Extraterrestrial Life and the Theological Implications*, ed. Steven Dick (Philadelphia and London: Templeton Foundation Press, 2000), 45.

4 Elsewhere I have introduced the work of exotheology in chapter 6 of Ted Peters, "Exotheology: Speculations on Extraterrestrial Life," *Science, Theology, and Ethics* (Aldershot UK: Ashgate, 2003), 121–136.

5 Joshua Lederberg, "Exobiology: Approaches to Life beyond the Earth," *Science* 132 (August 12, 1960): 398.

6 Whether we call it "exotheology" or "astrotheology," this differs from "cosmotheology" as proposed in Steven Dick's essay, "Cosmotheology: Theological Implications of the New Universe," in *Many Worlds*, 200.

7 Margaret Race, "Societal and Ethical Concerns," in *Planets and Life: The Emerging Science of Astrobiology*, eds Woodruff T. Sullivan, III and John A. Baross (Cambridge UK: Cambridge University Press, 2007), 483–497, 493.

8 James D. Heiser, *A Shining City on a Higher Hill: Christianity and the Next New World* (Bynum TX: Repristination Press, 2006) 46.

9 John Buridan, *Questiones super libris quattuor de caelo et mundo*, cited by Steven J. Dick, *Plurality of Worlds*, Cambridge: Cambridge University Press, 1982, 29. Dick also provides an illuminating history of thought on the question of extraterrestrial inquiry by philosophers and theologians.

10 Peters, *Science, Theology, and Ethics*, chapter 6.

11 Ariel David, "Vatican: It's OK to believe in aliens" AP story, May 13, 2008. http://news.yahoo.com/s/ap/20080513/ap_on_re_eu/vatican_aliens (accessed May 14, 2008).

12 David Wilkinson, *Alone in the Universe?* (Crowborough UK: Monarch Publications, 1997), 122.

13 Glen David Brin, "The Great Silence: the Controversy Concerning Extraterrestrial Intelligent Life," *Quarterly Journal of the Royal Astronomical Society* 24 (1983): 283–309.

14 Ernst Mayr, "The Probability of Extraterrestrial Intelligent Life," in *Extraterrestrials: Science and Alien Intelligence*, ed. Edward Regis, Jr. (Cambridge: Cambridge University Press, 1985), 27.

15 Ibid., 25.
16 Carl Sagan and Frank Drake, "The Search for Extraterrestrial Intelligence," *Scientific American* (January 6, 1997): http://www.sciam.com/article.cfm?id=000B35F3-A4B2-1C59-B882809EC588ED9F&print=true (accessed December 13, 2008).
17 Stephen Jay Gould, *Wonderful Life: The Burgess Shale and the Nature of History* (New York: W.W. Norton, 1989); Francisco J. Ayala, "The Evolution of Life on Earth and the Uniqueness of Humankind." in S. Moriggi and E. Sindoni, eds. *Perché esiste qualcosa invece di nulla? (Why There Is Something rather than Nothing?)* (ITACAlibri: Castel Bolognese, Italy, 2004), 57–77.
18 David Darling, *Life Everywhere: The Maverick Science of Astrobiology* (New York: Basic Books, 2001), 121.
19 Ibid.
20 Ibid., xi.
21 For the Drake Equation see: http://www.activemind.com/Mysterious/Topics/SETI/drake_equation.html (accessed December 13, 2008). The Drake Equation has been modified frequently in subsequent years, even if the overall optimism expands or contracts by the insertion of different numbers. See: Michael A. G. Michaud, *Contact with Alien Civilizations: Our Hopes and Fears about Encountering Extraterrestrials* (New York: Copernicus Books, 2007), 55–57.
22 NASA, *Astrobiology Roadmap*, p. 18.
23 George V. Coyne, S.J., "The Evolution of Intelligent Life on Earth and Possibly Elsewhere: Reflections from a Religious Tradition," in *Many Worlds*, 180.
24 To keep score on the discoveries of extrasolar planets see: http://planetquest.jpl.nasa.gov/ (accessed December 13, 2008).
25 To be habitat let alone biophilic, an environment requires a minimum of three conditions: (1) liquid water; (2) access to the elements out of which complex molecular structures can be constructed, mainly C,H,O,N,S; plus (3) an energy source that can drive metabolism. Susan W. Kieffer and Bruce M. Jakosky, "Enceladus—Oasis or Ice Ball," *Science* 320 (13 June 2008): 1432–1433, 1432.
26 Bernard Levin, *The Times* (August 22, 1995) cited in Wilkenson, *Alone in the Universe?* 137.
27 Paul Davies, "E.T. and God," *The Atlantic Monthly* (September 2003): 114–115.http://www.theatlantic.com/issues/2003/davies.htm (accessed December 13, 2008).
28 When we speak of science as salvific, the concept of salvation with which we work is a generic classical or philosophical concept. From the Greek *Sōzein* (to save), the idea of salvation includes rescue from a threatening situation or even liberation from an existing oppression. It also includes a keeping safe, so to speak, a guarding or protecting. This implies that the individual or community saved will embody appropriate virtues such as a moral sense, decency, honor, and memory of what is meaningful. See an interesting analysis of salvation in Michel Foucault, *The Hermeneutics of the Subject: Lectures at the College de France 1981–1982*, trans. Frédéric Gros (New York: Picador, 2005), 182.
29 Sagan and Drake, "The Search."
30 Cited by Diane Richards, "Interview with Dr. Frank Drake," *SETI Institute news*, 12:1 (First Quarter 2003): 5.
31 Frank D. Drake, "On Hands and Knees in Search of Elysium," *Technology Review* 78 (June 1976): 22–29.
32 Edward Regis, Jr., "SETI Debunked," *Extraterrestrials*, 243.
33 Fred Hoyle, *Monthly Notices of the Royal Astronomical Society*, 109:365 (1949), cited by Wilkinson, *Alone in the Universe?* 144.
34 George Basalla, *Civilized Life in the Universe* (Oxford and New York: Oxford University Press, 2006) 179.
35 Lewis White Beck, "Extraterrestrial Intelligent Life," *Extraterrestrials*, 13.
36 Basalla, *Civilized Life in the Universe*, 14.
37 Albert A. Harrison, *After Contact: The Human Response to Extraterrestrial Life* (New York and London, Plenum, 1997) ix.

38 Ibid., 312.
39 Albert A. Harrison, *Starstruck: Cosmic Visions in Science, Religion, and Folklore* (New York and Oxford, Berghan Books, 2007), 97–98.
40 Ibid., 97.
41 Martin E. Marty, "Non-Christian Eschatologies," in *Christian Hpe and the Future of Humanity*, ed. Franklin Sherman (Minneapolis: Augsburg, 1969), 32.
42 Christian de Duve, *Vital Dust: The Origin and Evolution of Life on Earth* (New York: Basic Books, 1995), xv.
43 Ibid., 121.
44 Ibid., 297.
45 Carl Sagan, *Contact* (New York: Pocket Books, 1985). Keay Davidson says the aliens depicted by Carl Sagan "were secular versions of the gods and angels he had long since abandoned." *Carl Sagan: A Life* (New York: Wiley, 1999), 30.
46 Carl Sagan, *Pale Blue Dot: A Vision of the Human Future in Space* (New York: Random House, 1994), 33. Sagan speculates not only about the scientific advances of ETI, but also wonders what might happen if visiting ETI would find human beings delicious to eat. "Why transport large numbers of us to alien restaurants? The freightage is enormous. Wouldn't it be better just to steal a few humans, sequence our amino acids or whatever else is the source of our delectability, and then just synthesize the identical food product from scratch?" Ibid., 353.
47 Michael Ruse, "Is Rape Wrong on Andromeda? An Introduction to Extraterrestrial Evolution, Science, and Morality," *Extraterrestrials*, 50.
48 Michaud, *Contact with Alien Civilizations*, 203.
49 Rudolph Bultmann gave us the term *de-mythologizing*. "Its aim is not to eliminate the mythological statements but to interpret them." Whether the myth is ancient or modern, the theologian does not accept a myth literally. A myth must be interpreted in light of what God reveals regarding divine grace and salvation. Rudolph Bultmann, *Jesus Christ and Mythology* (New York: Charles Scribner's Sons, 1958), 18.
50 Harry Emerson Fosdick, *Christianity and Progress* (New York and London: Fleming H. Revell Company, 1922), 175.
51 See: Ted Peters, *Futures—Human and Divine* (Louisville KY: Westminster John Knox Press, 1977).
52 George Basalla refers to the de-centering argument as "the principle of mediocrity," according to which "there is nothing special about the Earth. The sequence of chemical reactions that nurtured life early in the history of the Earth, and the biological and cultural evolution of terrestrial life, happened elsewhere in the universe, leading to similar results. The evolution of extraterrestrial life follows a predicable path. It produces intelligent creatures who develop technologies of travel and communications similar to those found on Earth." George Basalla, *Civilized Life in the Universe*, 9. Peter D. Ward and Donald Brownles have written against the Principle of Mediocrity in *Rare Earth: Why Complex Life is Uncommon in the Universe* (New York: Copernicus Books, 2000). Accordingly, even if the universe is teaming with primitive microbial life, we cannot expect highly evolved intelligent life. Earth is rare if not unique on this count. James Heiser offers a theological interpretation of the unique earth or rare earthy hypothesis: "the understanding that life is rare and precious fits well with a biblical understanding that care for the Earth is a *stewardship* entrusted to humanity." James Heiser, *A City on a Higher Hill*, 49, author's italics.
53 Wilkinson, *Alone in the Universe?* 124. Wilkinson reiterates the logic of the de-centering argument, p. 19.
54 Robert John Russell, *Cosmology from Alpha to Omega: The Creative Mutual Interaction of Theology and Science* (Minneapolis: Fortress Press, 2007), 286–289, Russell's italics.
55 Paul Davies, *Are We Alone?* (London: Penguin, 1995), 37.
56 Davies, "E.T. and God," 118.

57 Jill Cornell Tarter, "SETI and the Religions of the Universe," in *Many Worlds*, 146. Davies says, "Tarter's dismissal is rather naïve ... Though many religious movements have come and gone throughout history, some sort of spirituality seems to be part of human nature." "E.T. and God," 118.

58 Dick, "Cosmotheology," 202. "The effect on non-Adamist religions would be less than on those that teach salvation through a single God-head." "Extraterrestrial Life," in *Encyclopedia of Science and Religion*, ed. J. Wentzel Vrede van Huyssteen, 2 volumes (New York: Macmillan, 2003), 1:318.

59 Rational debate over the existence and relevance of extraterrestrial beings has imbued Christian theology since the middle ages; and it continued right down into the modern era of astronomy. "The extent of the debate is suggested by the fact that, by 1916, more than 140 books (not counting works of science fiction) and thousands of articles addressing this issue had already appeared .... Not least surprising is the fact that authors found ways to marshal extraterrestrials in support of, or in opposition to, Christianity, deism, atheism, and dozens of other creeds and philosophies." Michael J. Crowe, "The Plurality of Worlds and Extraterrestrial Life," *The History of Science and Religion in the Western Tradition: An Encyclopedia*, ed. Gary B. Ferngren (New York and London: Garland Publishing, 2000), 343.

60 Wilkinson, *Alone in the Universe?* 138.

61 Ibid., 136.

62 John F. Haught, *Science and Religion: From Conflict to Conversation* (Mahwah NJ: Paulist Press, 1995), 297.

63 Douglas A. Vakoch, "Framing Spiritual Principles for Interstellar Communications: Roman Catholic Views," *Science and Spirit* 10 (November–December 1999): 21.

64 Victoria Alexander, "Extraterrestrial Life and Religion," in *UFO Religions*, ed. James R. Lewis (Amherst NY: Prometheus Books, 2003), 360. The survey conducted by D. A. Vakoch and Y. S. Lee, "Reactions to Receipt of a Message from Extraterrestrial Intelligence: A Cross-Cultural Empirical Study," *Acta Astronomica* 46:10–12 (2000): 737–744, is partially relevant, because it suggests that Fundamentalist Christians might confront at crisis at confirmation of ETIL. The Alexander survey does not cull out Fundamentalists; and the Peters survey incorporates fundamentalists into the more comprehensive category of Evangelical Protestants.

65 The summary report and all raw data for the *Peters ETI Religious Crisis Survey* of 2008 can be accessed at the following web site: http://www.counterbalance.org.etsurvey.html (accessed December 13, 2008).

66 Neela Banerjee, "Survey Shows U.S. Religious Tolerance," *The New York Times* (June 24, 2008). http://www.nytimes.com/2008/06/24us/24religion.html?ex=1214971200&en=fa48d8d17f (accessed June 24, 2008).

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