

Panspermia: What It Is and Why It Matters

1. Introduction

1.1. Description of Panspermia

The term panspermia comes from two Greek words: “pan,” which means “all” and “sperma,” which means “seed.”¹ Panspermia is actually an umbrella term that describes any scientific theory that posits that all life as we know it on earth began in outer space.² The idea therefore assumes that life exists elsewhere in the universe, perhaps even abundantly, and that such life was a catalyst to life on earth. Positing that life began in outer space, though, says little.

Broadly-defined panspermia can actually be thought of in two ways by scientists. An “extreme” view of panspermia, also known as cosmic ancestry, contends life has always existed everywhere in the universe. In this view, life was not transported to earth and has no single origin. As the earth was formed in the wake of the Big Bang, living microbes, themselves formed after it took up residence on the new planet. The same process was repeated throughout the universe in countless places. The second view is more common, that earth at one time did not have life, and so the ingredients for life came from elsewhere in space.

How living microbes from space came to the earth to spawn terrestrial life as we know it is debated by panspermia theorists. Options once again are categorized in two ways: undirected or non-intelligent panspermia, and directed or intelligent panspermia. Undirected panspermia presumes that the ingredients of life came to earth apart from any sort of intelligence, divine or extraterrestrial. The process was completely random. Directed or intelligent panspermia conjectures that a non-terrestrial intelligence, either divine or extraterrestrial, served as catalyst for the seeding of life.

Undirected and directed panspermia can be further nuanced by how proponents imagine the seeding of life indeed occurred. Undirected panspermia theorists often appeal to meteor and asteroid impact or radiation pressure for the interplanetary transfer of the

¹ Related terms include “exogenesis” which, like panspermia, describes the hypothesis that life on earth originated (“genesis”) outside (“exo”) earth in space. It differs from panspermia in that its claims are less comprehensive (i.e., it does not claim that *all* life on earth originated from space). “Astrobiology” and “exobiology,” though part of the panspermia discussion, are terms that refer to the study of extraterrestrial life (in any form). These terms make no claim that such life is or would be related to life forms on earth, or that extraterrestrial life was a cause of life on earth.

² For a general introduction to panspermia, see “Panspermia,” *New Scientist* 189:2541 (3/4/2006): 54; David Warmflash, “Did Life Come from Another World?” *Scientific American* 293:5 (Nov. 2005): 64-71. Examples of more technical treatments would be Ashwini Kumar Lal, “Origin of Life,” *Astrophysics & Space Science* 317:3/4 (June 2008): 267-278; Chandra Wickramasinghe, “The Universe: A Cryogenic Habitat for Microbial Life,” *Cryobiology* 48:2 (Apr 2004): 113ff.

basic elements of life to earth.³ More recently, the so-called “red rain” phenomenon of Kerala, India, which began in 2001, has garnered much attention from panspermia scientists.⁴

Undirected panspermia has a long history in science, antedating the invention of space travel by over one hundred years. As one source notes:

Panspermia began to assume a more scientific form through the proposals of Berzelius (1834), Richter (1865), Thomson (Lord Kelvin) (1871), and Helmholtz (1871), finally reaching the level of a detailed, widely-discussed hypothesis through the efforts of the Swedish chemist Svante Arrhenius. Originally in 1903, but then to a wider audience through a popular book in 1908, Arrhenius urged that life in the form of spores could survive in space and be spread from one planetary system to another by means of radiation pressure.⁵

Directed panspermia proponents are few in number, as this mechanistic option calls for intelligent intention of the seeding of life on earth. Once again, this idea can be further refined into two variants. The first propounds that the intelligent agents behind the deliberate seeding of life on earth and other planets are intelligent extraterrestrials.⁶ This theory was first seriously put forth in 1973 by Nobel Prize winner Dr. Francis Crick, along with Dr. Leslie Orgel of the Salk Institute. Crick and Orgel suggested that the seeds of life may have been purposely dispersed by an advanced extraterrestrial civilization, possibly on space craft. Crick, whose Nobel Prize was earned (with Dr. James D. Watson) for the discovery of the double helix structure of DNA, further posited that small “grains” containing DNA may have been fired randomly by extraterrestrials throughout space, perhaps by a civilization facing annihilation, or hoping to terraform planets for

³ On proposed mechanisms for undirected panspermia, see P. Weber and Greenberg, “Can Spores Survive in Interstellar Space?” *Nature* 316 (1985): 403–407; H. J. Melosh, “The Rocky Road to Panspermia” *Nature* 332 (1988): 687–688;

⁴ G. Louis, “The Red Rain Phenomenon of Kerala and Its Possible Extraterrestrial Origin,” *Astrophysics and Space Science* 302:1-4 (2006): 175-187. Excerpts of the abstract for this article read as follows: “A red rain phenomenon occurred in Kerala, India starting from 25th July 2001, in which the rainwater appeared coloured in various localized places that are spread over a few hundred kilometers in Kerala. Maximum cases were reported during the first 10 days and isolated cases were found to occur for about 2 months. The striking red colouration of the rainwater was found to be due to the suspension of microscopic red particles having the appearance of biological cells. These particles have no similarity with usual desert dust. . . . An analysis of this strange phenomenon further shows that the conventional atmospheric transport processes like dust storms etc. cannot explain this phenomenon. The electron microscopic study of the red particles shows fine cell structure indicating their biological cell like nature. EDAX analysis shows that the major elements present in these cell like particles are carbon and oxygen. Strangely, a test for DNA using Ethidium Bromide dye fluorescence technique indicates absence of DNA in these cells. In the context of a suspected link between a meteor airburst event and the red rain, the possibility for the extraterrestrial origin of these particles from cometary fragments is discussed.”

⁵ “Panspermia,” *The Internet Encyclopedia of Science*. Accessed March 23, 2009 at <http://www.daviddarling.info/encyclopedia/P/panspermia.html>.

⁶ F. H. Crick and L. E. Orgel, “Directed Panspermia,” *Icarus* 19 (1973): 341-348. Crick later authored the book *Life Itself: Its Origin and Nature* (Simon and Schuster, 1981).

later colonization.⁷ The second directed panspermia variant proposes that life was seeded from space under the providential direction of God. Several scientists intellectually aligned with the Intelligent Design theory of origins have written in defense of directed panspermia as part of God's grand design of the universe and for life within it. Much like theistic evolutionists see evolution as a tool in God's hand for creating life on earth, theistic scientists see in directed panspermia the intentional seeding of the ingredients for evolution on earth.⁸

These brief definitions call for some summary conclusions:

- Panspermia concerns the extraterrestrial origin of the fundamental building blocks of life or the primordial life forms that mark the commencement of the evolutionary process.
- Panspermia is therefore not about the process of evolution so much as it is about an explanation for how evolution became possible, on earth or anywhere else.
- One cannot embrace panspermia and reject evolution. The idea of mature advanced life forms being transported through space is an absurdity. Panspermia presumes the evolution of whatever was seeded on earth from space.
- Creation is not incompatible with panspermia if creation is conceived as a divine act that brought all matter into existence. Such a creationist is then free to speculate how the ingredients for life were formed and, with respect to panspermia, distributed throughout the universe and to earth so that life could evolve. Creationism that rejects evolution completely cannot accommodate panspermia and has no use for the theory.

1.2. Significance of the Idea

The notion of panspermia, mainly of the undirected variety, is firmly entrenched in the scientific community and the wider popular culture. This is easily demonstrated by tracking the dissemination of the idea through published material.

With respect to the technical literature produced by the scientific community, extensive databases such as Science Direct™, which indexes over 2,500 peer-reviewed journals in all areas of the sciences, are quite useful.

⁷ Crick and Orgel in part opted for directed panspermia due to their pessimism that random evolution could account for the complexity of DNA. They later tempered their view of directed panspermia (but did not dismiss it) in the wake of advances in biology that postulated an "RNA World" could possibly account for the origin of life on earth.

⁸ R. B. Sheldon and R. B. Hoover, "The Cometary Biosphere" in *Instruments, Methods, and Missions for Astrobiology X*, Hoover, Levin, Rosanov eds. *Proc. of SPIE Vol. 6694* (Bellingham, WA) pp 6694-0H, 2007; R. B. Sheldon and R. B. Hoover, "Cosmological Evolution: Spatial Relativity and the Speed of Life" in *Instruments, Methods, and Missions for Astrobiology XI*, Hoover, Levin, Rosanov eds. *Proc. of SPIE Vol. 7097* (Bellingham, WA) pp 7097-41, 2008. Dr. Robert Sheldon is a NASA physicist and proponent of intelligent design (see http://procrustes.blogtownhall.com/2006/09/23/cosmologists_panic!.thtml and <http://www.uncommondescent.com/intelligent-design/life-on-mars-id-and-a-prediction/>).

ScienceDirect
College Edition

Home Browse Search My Settings Alerts Help

Quick Search All fields Author
 ? search tips Journal/book title Volume Issue Page

Add to my Quick Links

Journals Books [Advanced Search](#) | [Expert Search](#)

Enter terms using Boolean connectors (e.g. "heart attack" AND stress)

Term(s): panspermia

Source: All journals Include Articles in Press

Select one or more:

Subject: **- All Sciences -**
 Agricultural and Biological Sciences
 Arts and Humanities
 Biochemistry, Genetics and Molecular Biology

Hold down the Ctrl key (or ⌘ key) to select multiple entries.

Limit by document type:
 Article Short Communication Book Review Publisher's Note
 Review Article Correspondence, Letter Product Review Erratum
 Short Survey Discussion Editorial

Dates: All Years 2004 to: Present

Search **Clear** **Recall Search** [? Search Tips](#)

The chart below illustrates how many articles that included various search terms (with Boolean operators) in the introduction to this essay were published in the last five years (2005-2009) in the technical literature.

Search Term(s)	Articles
"panspermia"	60
"extraterrestrial" AND "life" AND "origin"	757
"exobiology" OR "astrobiology" AND "earth" AND "origin"	897

Moving to popular media, Lexis-Nexus is the premier research database of major U.S. and world publications and newswire services.

LexisNexis[®] Academic

Search Sources

General News Legal Business People

Easy Search™

Search
 > Easy Search™
 > Power Search

Terms & Conditions - Use of this service is subject to [Terms & Conditions](#)

Search terms: Search

Search within

- Major U.S. and World Publications
- Major World Publications (non-English)
- News Wire Services
- TV and Radio Broadcast Transcripts
- Blogs
- Web Publications
- Company
- SEC Filings
- Legal

Specify date: Jan 08 2004 To Jan 08 2009

Links
[LexisNexis Wiki](#)

How do I...?
[Know where to start?](#)

View tutorials
[Overview](#)
[Selecting Sources](#)
[Working with Results](#)
[More...](#)

Related Products
[Congressional](#)
[Statistical](#)

The chart below illustrates how many articles that included various search terms (with Boolean operators) in the introduction to this essay were published in the last five years (2005-2009).

Search Term(s)	Articles appearing in U.S. and World Newspapers and Newswires	Articles appearing in U.S. and World Newspapers, Newswires plus Internet Publications, Television and Radio Transcripts
"panspermia"	87	113
"extraterrestrial" AND "life" AND "origin"	455	563
"exobiology" OR "astrobiology" AND "earth" AND "origin"	221	339

Taking the largest of these search results (563 articles) over the course of the last five years, the general public is exposed to the idea of life being seeded from space once every three days. This influence is actually multiplied with the advent of blogging.

2. Evaluation of the Panspermia Hypothesis

2.1. Framing the Issue

Although many scientists will say the odds that intelligent extraterrestrial life exists in the universe are reasonable, due mostly to the sheer number of places where life could evolve, the mainstream scientific community has not brought forth any evidence that

intelligent extraterrestrial life actually exists.⁹ Projects such as SETI (the Search for Extraterrestrial Intelligence) are seeking evidence through radio signal contact, such efforts have to this point been a failure. This means that serious discussion of panspermia focuses on models that posit the random distribution and presence of microbial life in the universe and its journey to earth.

The validity of panspermia as an explanation for the presence of life on earth depends on several questions:

- (1) Is there evidence for microbial life in space?
- (2) Is there evidence that microbial life from space made its way to earth?
- (3) Is there any way to be sure that the primordial life on earth from which more advanced life forms are thought to have evolved could not have been on earth all along, never having been in space?

2.2. Is There Extraterrestrial Microbial Life?

To date there is no conclusive proof for the extraterrestrial microbial life that is critical to panspermia hypothesis. As such, the dominant paradigm in the modern scientific community is that life on earth evolved on earth. Despite the lack of firm proof for the hypothesis as a whole, there is evidence of at least some possible extraterrestrial contribution to terrestrial biology.

Pre-biotic chemicals of the type that most modern scientists presume to have been present at the beginning of evolution have been detected in interstellar clouds, comets, and meteorites. This gives panspermia theorists hope that some of the chemical raw ingredients for life may have come from space in addition to being manufactured on earth. The presence of these elements, though, falls short of actual microbial life forms.

A 2008 analysis of isotopic ratios of organic compounds found in the Murchison meteorite indicated non-terrestrial origin and not terrestrial contamination—but these are only isotopes, not life forms. The Red Rain of Kerala, initially thought to have been colored by fallout from a hypothetical meteor burst, has failed to provide evidence for extraterrestrial life. A study by the government of India found the coloration was likely caused by terrestrial alga. A subsequent study showed that the micro-organisms in the red rain had unusual properties (e.g., the ability to grow at 300 degrees C) and that, historically, red rain could be associated with meteorite falls. However, the same study also indicated other terrestrial possibilities, and so the evidence for extraterrestrial origin is uncertain.¹⁰ In 2001 geologist Bruno D'Argenio and molecular biologist Giuseppe Geraci from the University of Naples claimed they had found live extraterrestrial bacteria

⁹ This is equally the case for researchers outside the mainstream public scientific community. Claims abound for the reality of intelligent aliens but no hard data has been produced which cannot be accounted for in terms of terrestrial origin.

¹⁰ Patrick McCafferty, "Bloody rain again! Red rain and meteors in history and myth," *International Journal of Astrobiology* (2008).

inside a meteorite. The researchers claimed extraterrestrial origin for the bacteria since the sample was sterilized at high temperatures and washed with alcohol and yet survived. Other scientists argued that “Earth bacteria could have invaded the rock to depths that were not affected by the heat or alcohol.”¹¹

The most promising option for interstellar travel has been the discovery of meteorites on earth that have almost certainly come from the surface of Mars. These meteorites have been dubbed the “SNC” meteorites, named after the initials of the places where the first three were found: Shergotty, India in 1865, Chassigny, France in 1815, and Nahkla, Egypt in 1911.¹² There are more SNC meteorites than these three, however. The term encompasses meteorites that share the characteristics of their namesakes. The most compelling evidence for Martian origins for these meteorites comes from EETA 79001, an SNC meteorite found in Antarctica in 1980. When scientists examined tiny samples of gas trapped in EETA 79001, its composition was an exact match to the Martian atmosphere as analyzed by the Viking landers.¹³

The most famous Martian meteorite, ALH84001, which received global attention in 1996 when it was put forth as containing fossilized bacterial life, is still not accepted as credible evidence for extraterrestrial life.



The presumed bacteria are considered by most scientists to have been possibly formed abiotically from organic molecules. This uncertainty in how these fossils were formed means ALH840001 is not proof of extraterrestrial life. Whether the organic molecules

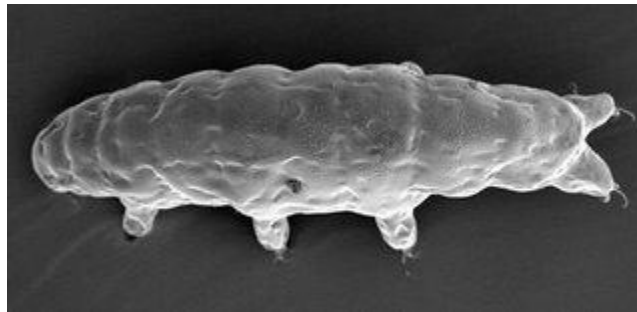
¹¹ Debora MacKenzie, “Are They Aliens or Just Humble Earthlings?” *New Scientist* 2291 (May 19, 2001).

¹² “Panspermia” and “SNC Meteorites,” *The Internet Encyclopedia of Science*. Accessed March 23, 2009 at <http://www.daviddarling.info/encyclopedia/P/panspermia.html>.

¹³ *Ibid.*

were created by non-biological extraterrestrial processes or are the result of contamination by Antarctic ice is still hotly debated.¹⁴

More recently, the survival of tiny tardigrades has renewed optimism in panspermia. As summarized on Space.com, “Tardigrades are speck-sized things, less than 1.5 millimeters long. They live on wet lichens and mosses, but when their environment dries out, they just wait for a return of water. They also resist heat, cold and radiation.”¹⁵



An analogy with sea monkeys (brine shrimp) is often drawn to illustrate the ability of tardigrades to survive without water. Tests conducted in space that involved exposing the tardigrades to ten days of exposure to solar radiation supports the idea that simple life forms could survive such radiation in space, since it demonstrates that animals such as tardigrades could travel through space on meteors and survive. This survival is key to the theory of panspermia.

Lastly, recent discoveries on Mars have served to keep panspermia alive as a theory. The Phoenix Mars Lander directly sampled ice in Martian soil in 2008.¹⁶ NASA reports elsewhere that, “Recent high-resolution imagery from the *Mars Global Surveyor* Mars Orbiter Camera and the *Mars Odyssey* THEMIS reveals numerous examples of branched valleys that form tightly-packed, integrated drainage systems.”¹⁷ This evidence and similar points of analysis strongly suggest that water was at one time abundant on Mars and smaller unfrozen amounts may still be found on the planet’s surface. Water, of course, is necessary for life as we know it. Even if there is currently water on Mars, the ultraviolet light currently bombarding is an impediment to living organisms being present therein. This circumstance does not rule out life on Mars in the distant past, however.

¹⁴ Bada, J. L.; Glavin, D. P.; McDonald, G. D.; Becker, L. (1998). "A Search for Endogenous Amino Acids in Martian Meteorite ALH84001". *Science* 279 (5349): 362–365; Becker L., Glavin D. P., Bada J. L. (1997). "Polycyclic aromatic hydrocarbons (PAHs) in Antarctic Martian meteorites, carbonaceous chondrites, and polar ice". *Geochimica et Cosmochimica Acta* 61: 475–481.

¹⁵ [no author], “Creature Survives Naked in Space,” September 8, 2008, <http://www.space.com/scienceastronomy/080908-space-creature.html>.

¹⁶ NASA, “NASA Spacecraft Confirms Martian Water, Mission Extended,” (July 31, 2008); Phoenix Mars Lander page on the NASA website: http://www.nasa.gov/mission_pages/phoenix/news/phoenix-20080731.html.

¹⁷ Vivien Gornitz, “Mars: Signs of a Watery Past,” Science Briefs, Goddard Institute for Space Studies (2004), http://www.giss.nasa.gov/research/briefs/gornitz_07/.

3. *The Importance of Panspermia*

It has already been noted that panspermia is not inherently incompatible with a theistic view of creation, given that view of creation not insist on a traditional, literal creation week of six solar days. But if panspermia would not alter the stand-off between those who believe in a Creator and those who do not, of what importance is it? The answer lies in understanding what many people would do with panspermia were it validated by scientific discovery.

Before describing how the public might respond to proof of panspermia, it is useful to be reminded of how difficult it would be to prove the theory. Even if life in space is found and is indisputable, that would not prove panspermia as a hypothesis. Recall the other elements involved:

- (1) Is there evidence for microbial life in space?
- (2) Is there evidence that microbial life from space made its way to earth?
- (3) Is there any way to be sure that the primordial life on earth from which more advanced life forms are thought to have evolved could not have been on earth all along, never having been in space?

Discovering extraterrestrial life forms only affirms the first question. To be sure, an affirmative answer to the first question improves the odds of affirmative answers to the next two issues, but they are far from being considered likely. The second and third items *must* be demonstrated for the panspermia hypothesis to be proven, and this is no easy task.

But let's assume that someday panspermia transitions from a hypothesis to an indisputable scientific reality. How would such validation influence thinking and worldview? What kinds of things would we hear people say after scientists offer evidence to the public that extraterrestrial microbial life made the journey through space and had something to do with life here?

3.1. "Panspermia Renders a Belief in Creation Passé"

This is arguably the most weak-minded conclusion that could be drawn in the wake of proof for panspermia. Frankly, this conclusion could only be drawn by someone completely unacquainted with the academic discussion on the interface of science and religion. Unfortunately, there are many people who would fall into that category. Since many Christians, even those whose approach to theology is quite conservative, take non-literalist or non-traditional views of Genesis, it would be false to assume that Christianity and belief in divine creation rises or falls with respect to panspermia.¹⁸

¹⁸ My own experience while a graduate student at the University of Wisconsin, Madison from 1995-2004 is illustrative of this statement. While in Madison, my wife and I were members of a theologically conservative reformed church. The congregation was largely composed of university professors and graduate students, most of whom were in the hard sciences. The congregation was home to the heads of the botany and environmental studies departments, two research physicists, two engineering professors, and

But what would be the fate of a more literal reading of Genesis if panspermia is proven?

It may surprise readers that it is not difficult to take most of Genesis at face value and come out with a theistic evolutionary view. Most traditional literalist approaches to Genesis proceed along certain assumptions:

- Genesis 1:1-3 is linked to the first day of Genesis, so that Genesis 1:1-5 must be seen as Day 1.
- Since the Hebrew word for “day” (*yom*) with a numerical adjective refers to a solar day, the days of Genesis must be a series of 24-hour solar days *and* the entirety of creation as it occurred in real time must be accounted for in that series of six days.
- A consistently literal interpretation of Genesis 1-2 rules out any view of creation other than the traditional six solar day view.
- There is no language in Genesis that could possibly account for the production of life in any way other than special creation.

All of these assumptions are flawed. That does not mean, however, that the traditional view of six solar day creation is wrong. It simply means it is not the only view that can be held by taking the text at face value.

The first assumption is easily challenged (but not undone) by Hebrew syntax. In fact, the Hebrew syntax (sentence structure) of the first three verses is the real key to understanding what the biblical account can sustain in terms of creation viewpoints. I have written on this topic for the non-specialist elsewhere, so it is sufficient here to merely point out that the syntax of the first three verses demonstrates decisively that Gen 1:1-3 can indeed be separated from 1:4-5 (and so the Genesis 1:1-5 unit is not at all certain).¹⁹ Syntax also allows an indefinite period of time to *precede* Genesis 1:1, meaning that Genesis 1:1-3 describes a return by God to material he had created earlier. Genesis 1 may therefore describe a fashioning of already existent material. This would allow millions of years to pass before we even get to Genesis 1:1. This is not an allegorical interpretation; it is an interpretation that would be borne out of a face-value exegesis of the text according to the rules of Hebrew syntax.

The issue of the days is complicated, especially since it requires solar days before the sun is created (Day 4). Others have written much on this problem, so there is no need to rehearse the issue here.²⁰ Rather, I want to address the second proposition along with the third. Since the third proposition above is problematic, readers may do well to re-examine which parts of Genesis to take literally (including “day”) and which to take less than (or

doctoral students in the fields of geology, artificial intelligence, and chemistry. We also had several medical students. Most of these individuals were elders or deacons in the church, and I knew all of them personally. To my knowledge, none of them were traditional solar-day creationists. All of them were serious, theologically-literate Christians.

¹⁹ See http://www.michaelsheiser.com/Genesis_1_and_creation.pdf.

²⁰ See <http://www.asa3.org/ASA/topics/Bible-Science/index.html#Age%20of%20Earth>.

more than) literally. What do I mean? Simply that the traditional literalist view of creation assumes its approach is consistent, but it is not. A truly consistently literal reading of Genesis 1-2 would result in a flat round earth, over which a solid dome rests, upon which the stars are fixed.²¹ In other words, a completely literal view of Genesis 1-2 would result in the same sort of cosmology as the rest of the ancient Near East, particularly Mesopotamia and Egypt. The reality is that *everyone* who claims to be a literalist makes exceptions. The only question is why one person's exceptions are more "faithful" to the text than someone else's. Two people may be "90 percent literal" in their interpretation, but the one person who does not attribute a literal meaning to "day" (*yom*) is roundly criticized by the one who does. And yet who is more faithfully literal? Neither, especially when compared to the person who takes it all literally, as described above. By what litmus test is your 90 percent literal spiritually or hermeneutically superior to the other person's? The traditional view does not own literalism, and should stop pretending it does.

Lastly, the fourth proposition fails to take verses like Genesis 1:24 *literally*:

And God said, "Let the earth bring forth living creatures according to their kinds—livestock and creeping things and beasts of the earth according to their kinds." And it was so.

A literal, face-value reading of this verse has the earth (not animals) producing living creatures. The text does not say God created these creatures out of nothing, or by the spoken word alone. It says the earth brought forth these life forms. It would be easy for a theistic evolutionist or a Christian scientist who has factored a proven panspermia theory into his worldview to say that this language in Scripture, taken literally, suggests that God had designed the earth itself to somehow contain the "ingredients" for life. There is nothing non-literal about this reading; it simply filters a literal reading through the filter of a particular scientific conclusion. This is the sort of hermeneutical tactic that one could employ in the wake of panspermia as fact without surrendering a face value reading of Genesis.

The point here is not to pontificate on how Genesis 1-2 should be interpreted. Rather, it is to say that those who favor literal interpretation of Genesis need to be honest about the fact that many interpreters often criticized by literalists really interpret the Bible with the same method: taking some things literal and others not. Instead of insisting that their use of literalism is the only way to do literal interpretation, traditional six solar day creationists ought to take comfort in the fact that one can still do literal interpretation while taking some things non-literally. This will be quite helpful to traditionalists should panspermia become a factual reality. Christians who insist on only one version of

²¹ See for example, Paul H. Seely, "The Geographical Meaning of "Earth" and "Seas" in Genesis 1:10," *WTJ* 59:2 (1997): 231-255; idem, "The Firmament and the Water Above : The Meaning of "The Water Above the Firmament" in Gen 1:6-8," (Part 1) *WTJ* 53:2 (Fall 1991): 227-240; idem, "The Firmament and the Water Above : The Meaning of "The Water Above the Firmament" in Gen 1:6-8," (Part 2) *WTJ* 54:1 (Spr 1992): 31-46; Luis J. Stadelmann, *The Hebrew Conception of the World* (Analecta Biblica 39; Rome: Pontifical Biblical Institute, 1970).

literalism risk trapping themselves in a fallacious either-or decision in the wake of proof for panspermia. If there only acceptable literalism of the type articulated by so many apologists and creationist organizations, that view will have no way to accommodate a genuine panspermia reality. In the either-or trap, some Christians may think the choice would come down to either rejecting the reality of panspermia science or rejecting the Bible as something untrustworthy since it cannot conform to their particular pre-conception of what “literal interpretation” entails. This is a needless tension.

3.2. “Random, Darwinistic Evolution is Supported or Proven by Panspermia”

The key word here is “random,” as it betrays a position that has no place for a divine Creator. Simply put, if panspermia were declared fact tomorrow, thousands of Christian scientists would simply add it their theistic evolutionary model as a divine mechanism.²² It would do absolutely nothing to eradicate a Creator. But I speak here of people who have genuinely thought through the issue of how evolution and biblical theology might intersect. On a popular level, the picture is quite different.

Consider the analogy of evolution without panspermia. Although Darwin’s theory of evolution is no actual threat to a multitude of Christians, millions of people from all walks of life and educational levels believe erroneously that evolution proves there is no God. By analogy, even though panspermia would do little to convince a theistic scientist to dismiss his or her belief in God, millions will be led to conclude that panspermia adds to the evidence that there is no God since it will be perceived as lending credence to random evolutionary forces. This application of a certified panspermia theory, however illogical, would nonetheless be as common as the specious extrapolations made in regard to evolution.

3.3. “Panspermia Removes and Usurps the Arguments of Intelligent Design Theorists”

This outcome appears more serious, though upon close inspection, it need not be considered problematic. Many intelligent design theorists and traditional creation apologists frequently use the “anthropic principle” to defend creationism. Briefly stated, the anthropic principle suggests that that the fundamental constants of physics, astronomy, biology, and chemistry are *fine-tuned* to allow life as we know it to exist, and perhaps only to exist on earth.

If panspermia were proven, this principle is, to some extent, undermined, since circumstances for life formerly considered utterly unique would in fact not be unique at all, and they may in fact be common. This could have the effect of making the universe and life appear “less designed,” but it would be any easy turn to just say that panspermia indicates *more* design to the universe. If the former is the focus, someone might assume that there is less need of intelligence for understanding how everything came to be. If the latter, one must admit that humanity may not be unique, and earth’s simpler life forms are certainly not unique.

²² Note my example in footnote 18.

Another way the anthropic principle might be undermined is for someone to point out that nothing in the presumed design of the universe and earth *requires* intelligent human life to be a result. The universe and earth would still be ideally suited to sustain carbon-based life as we know it even if there were no humans. Further, if human life were never found elsewhere in the universe, then we would know that humanity was not the designed destiny of all the so-called “anthropic” parameters. The reader should know that this cuts both ways: just because life can sprout somewhere else in space does not require the conclusion that intelligent life will be part of what results *anywhere*. To dismiss the anthropic principle on such a basis, one would have to prove that panspermia and its ensuing evolutionary processes unfailingly lead to intelligent life.

The suitability of other locations in the universe for life that would be part of a validated panspermia hypothesis might then be used to argue either that “design for life” does not require one to believe there is a personal creator-designer that planned panspermia and evolution for the sake of humankind. This objection over-reaches the data and logically implodes. It relies on analyzing and confounding the intent of a Creator to prove there is no Creator!

3.4. “If Panspermia is Real, then Intelligent Extraterrestrial Life Must Exist Elsewhere, and so the Image of God Teaching in the Bible is False”

The first part of this objection is related to the alleged undermining of the anthropic principle noted above. I will not repeat the refutation here.

It is of course an extrapolation that proof of panspermia at a microbial level invariably means that intelligent extraterrestrial life would be extant, but people will be more than willing to make such a leap. Indeed, they have been conditioned to do so by science fiction writing and major media. The extrapolation would simply be based on analogy with how panspermia presumably worked on earth. Given this leap in logic, humankind would not be unique. Would that mean the biblical teaching that humankind was created in God’s image is false?

The answer to this question would be “yes”—given the traditional, ubiquitous definition for the image of God in most of Christian theology. The problem is that definition is terribly flawed, and so it is a straw man to this panspermia objection. Many Christians, however, would not realize this, and so the discovery of intelligent extraterrestrial life would be problematic to them. The solution is not to jettison the Bible; it is to have an accurate understanding of what the image of God means. Once that is the case, this objection is completely hollow. I have written on this topic elsewhere, and so I will only sketch the outlines of what the image really means here.²³

To begin, it will be necessary to alert readers to why the traditional definitions of the image of God ought to be discarded. The image of God doctrine comes from Genesis 1:26-27, where we are told that God created humankind “in his image.” Readers who

²³ See the fourth chapter in my book, *The Myth That is True* (in progress at the time of this writing).

have been studying the Bible for any length of time have likely heard or read definitions of what exactly the image means. The definition that is typically offered is something along the lines of the image of God being intelligence, rationality, emotions, the ability to commune with God, self-awareness, language capability, the presence of a soul, a conscience, or free will.

These are poor definitions that inadvertently disallow Christians to be consistently pro-life in their ethics, much less provide a defense against the panspermia argument we are presently engaging. The reason is simple. None of those definition candidates apply to simple-celled human life or of life in the womb in the early stages of development. The conceived contents of a woman's womb, when composed of little more than cells or tissue prior to brain development, has *none* of these capabilities. One might object that some or all of these are potentially present in life from the moment of fertilization. All this objection accomplishes is the flawed idea that the contents of the womb are therefore *potentially* in God's image, but not actually so until one or more of these abilities are resident. Why defend the unborn, for example, in the first trimester, until they are *actual* imagers? Since the image of God is the basis for the Christian idea of human personhood and this the sanctity of life, if the life in a woman's womb remains only potential and not actual in terms of the image, then the argument for the personhood of what is in the womb evaporates. The deficiency of these proposals undercuts a sanctity of life ethical foundation.

Genesis teaches us several things about the image of God, and *all* of what we learn from the text must be accounted for in any discussion of what "the image" means. First, both men and women are equally included in what I'll call for now "divine image bearing." Second, divine image bearing is what makes humankind distinct from the rest of the Genesis creation (i.e., plants and animals and, for our purposes, intelligent extraterrestrials). Third, there is something about the image that makes mankind "like" God in some way. Fourth, there is nothing in the text to suggest that the image has been or can be bestowed incrementally or partially. This alone undermines any definition of the image that is not immediately possessed by all humans from the moment of their conception. You're either created as God's image bearer or you aren't. One cannot speak of being "partly" created in God's image or "potentially" bearing the image.

There are still other problems with the traditional view. Among the list of proposed answers to what the image is are a number of *abilities* or *properties*: intelligence, rationality, emotions, communing with God, self-awareness, language capability, and free will. It is a fact of biology and psychology (specifically the field of animal cognition) that animals possess *some* of these abilities, albeit not as fully. This means that these abilities are not unique to humans.²⁴ It matters not that humans possess them more fully, since animals have been shown to score higher on intelligence tests than very young humans, such as toddlers. Moreover, humans who suffer from various forms of

²⁴ See http://en.wikipedia.org/wiki/Animal_cognition, The Animal Cognition Network, <http://www.animalcognition.net/home.html>, and the scholarly scientific journal, *Animal Cognition*. For an academic introduction to the field, see D. R. Griffin, *Animal minds* (Chicago: University of Chicago Press, 1992).

retardation would score less than certain animals on intelligence tests.²⁵ Animals can learn to do things contrary to their nature, they can show emotion, and they have language (we have no reason to assume language must be *across* species to be real, as opposed to *within* species).²⁶

Even the statement that human God was breathed into by God and thus became a “living soul” (Hebrew, *nephesh*; Gen 2:7) fails these tests. The former doesn’t work because animals also possess the *nephesh*, the Hebrew word translated “soul” in Genesis 2:7 (“and the man became a living *soul*”). For example, in Genesis 1:20 when we read that God made swarms of “living creatures,” the Hebrew text underlying “creatures” is *nephesh*. The term means “conscious life” or “animate life” as opposed to something like plant life, and there are other clear examples where animals are described with the same word.²⁷ The objection that humankind also has a spirit, not just a *nephesh* fails, since the terms are used interchangeably in the Bible to describe the same properties, behaviors, and emotions.²⁸ There are also the general difficulties with the trichotomous (three parts: body, soul, spirit) view of man.²⁹ My point here is not that humans don’t have a soul. They certainly do, and it is linked to personhood in biblical theology. My point is only that the soul isn’t the image.

The correct view of what the image means is based on a point of Hebrew grammar, specifically a special function of the preposition “in” with respect to the phrase “in the image of God.” In our own English language—and we don’t often think about our own language in such detail—we use the preposition “in” to denote many different ideas. That is, “in” doesn’t always mean the same thing when we use that word. For example, if I say, “put the dishes *in* the sink,” I am using the preposition to denote *location*. If I say, “I broke the mirror *in* pieces,” I am using “in” to denote the *result* of some action or accident. If I say, “I work *in* education,” I am using the preposition to denote that I was *as* a teacher or principal, or some other administrative capacity.

This last example is the key to understanding what the Hebrew preposition usually translated “in” means in Gen 1:26—and that will in turn unlock the meaning of image bearing. The idea I want to put forth is that humankind was created as God’s image. In other words, the preposition tells us that humans work *as* God’s imagers—that they work *in the capacity of* God’s representatives. The image is therefore not a thing put in us; it is something we *are*. It is not a thing; it is a divinely-ordained or status. Don’t think of it as a noun; think of it as a *verb*. Being created as God’s imagers means we are God’s representatives on earth. Humans were created to rule and care for the earth as God

²⁵ For example, which would make a better guide for a blind person: an adult service dog or a toddler or severely retarded child? There are many other obvious analogies and examples in the literature.

²⁶ Artificial intelligence has achieved some of these properties as well.

²⁷ See Gen 1:21, 24, 30. Genesis 1:30 is interesting in that the text tells refers to the “living *nephesh*” as being *in* animals.

²⁸ See 1 Sam. 1:15; Job 7:11; Isa 26:9. Compare Matt. 6:25 and 10:28 (“body and soul”) with Eccl. 12:7 and 1 Cor. 5:3, 5 (“body and spirit”). Death is described as giving up the soul (Gen. 35:18; 1 Kings 17:21; Acts 15:26) and as giving up the spirit (Ps. 31:5; Luke 23:46).

²⁹ See Millard Erickson, *Christian Theology*, second ed. (Grand Rapids: Baker Book House, 1998): 537-557.

would if he were physically present. It is as though *we are Him* when it comes to overseeing His earth. If you are human, then, you are an imager of God, regardless of your abilities. Nothing else—including intelligent extraterrestrials—has been given this status on earth. Humankind is the unique imager of God on earth, and so it matters not if there are other intelligent beings in the universe.

3.5. “If We Discover that Panspermia is Real, and that there are Intelligent Extraterrestrials, then it is Possible that God Used Highly-Evolved Extraterrestrials (Who May be What Religions Call Angels) to Put us Here”

This is, in my view, the most significant response to the hypothetical scenario put forth in this essay, where panspermia is eventually proven true. The chain of thought would proceed as follows. Once panspermia moves from hypothesis to scientific fact (or is perceived to have made that transition), the idea that the universe is teeming with life will move from a statistical probability to scientific truth. If life is floating around in the vast reaches of space, and we know that some of it was the catalyst for our own evolution, the existence of intelligent life forms elsewhere in space will seem almost self-evident. And from this idea it is but a short intellectual distance to the notion that these other evolved intelligent life forms could have reached our level of intelligence long before we did. Perhaps, the extrapolation may go, these highly evolved beings had something to do with our own evolution or even our existence.

At this point there would be a divergence. Some would stop the extrapolation and have a Creator God using extraterrestrials (angels) as creative agents. This would be the easiest way for people of faith to align intelligent panspermia to their faith, especially if they are members of the “book religions” (Christianity, Judaism, and Islam). Others will want to press for a naturalistic God, himself the product of evolution, but still the subsequent spreader of life elsewhere in the universe.

While many scientists and thinkers would see through the leaps in logic driving this string of ideas and conclusions, multitudes on the “popular” level will not. It is also fair to say that some scientists, certainly not immune to illogic, would want to draw the same conclusion. This is not slippery-slope paranoia. Proof of the plausibility of this concern is abundant in popular media, particular television and feature films. The most recent example, complete with compelling special effects, is the movie *Knowing* (2009), starring Nicholas Cage.³⁰ This thinking and its presumed implications have been fodder for the entertainment industry for decades.³¹

³⁰ For a fairly detailed description of the film, see <http://www.themoviespoiler.com/Spoilers/knowning.html>. An earlier feature film *Mission to Mars* (2000) makes the case for intelligent panspermia, though it is less explicit with respect to planting human life on earth.

³¹ See Derek Michael Donovan, “Angels and Extraterrestrials in Contemporary Dramatic and Filmic Literature,” unpublished dissertation, Stephen F. Austin University, 1996. Donovan’s thesis abstract states: “This study examines portrayals of angels and extraterrestrial aliens in the popular entertainment forms of the theatre and film of the twentieth century. It focuses primarily on those works produced after 1947, when a spectacular sighting of several unidentified flying objects (UFOs) by private businessman Kenneth Arnold caught the attention of America and indeed the world. . . . This study points out thematic

The first perspective produces a viewpoint of origins to which our culture is well-suited. In the post-Christian world in which we are now living, assuming the extrapolation of panspermia described here, this view will be cast as a reasoned, scientifically-possible understanding not only of who we are and how we got here, but also why religion must have a place at the intellectual table. It will redefine God and faith while allowing people to retain God and faith in both literal and more imaginative terms. It paves the way for a true merging of science and religion. It will be the paradigm that allows the atheist to tolerate religion, and allows literalist Bible-readers, the eastern Buddhist, and the pagan to all simultaneously parse the new science the same way. This might in turn be useful fodder for a global religion.

How is this possible?

The atheist and agnostic will have to admit that vastly superior beings to humanity very likely exist and that it is certainly possible they visited earth in the past. The stories in the Bible and other ancient documents that speak of God or gods fashioning humanity from the dust of the ground and other human material may be primitive ways of describing what is known as fact after panspermia becomes a reality. While not believing in the God of the Bible, who is certainly set apart from creation, atheist scientists could see how traditional religions somehow had the knowledge of intelligent panspermia first, though ancient people lacked the vocabulary to express it the way science does. They may seek to prod the religious toward seeing the God behind the extraterrestrials as an extraterrestrial himself, but even without that point everyone is talking the same language: there is now an intelligence behind how life got here. Indeed, this is precisely the angle the famous atheist scientist Richard Dawkins was blithely suggesting in the movie *Expelled!*³²

Buddhists and pagans already have no trouble with evolution or the idea of an ultimate intelligence in the universe. Panspermia augments these ideas. Both of these belief systems, though having definite distinctions, nevertheless have already married the natural and the spiritual, so that there is no need to distinguish one from the other. Naturalistic deities that are the product of evolution, and presumably having command over natural forces, would be welcome.

Those who take the Bible seriously and literally would also be able to accommodate intelligent panspermia. Since there is more than one approach to literalism, this requires a bit of explanation. For example, Christians and Jews who embrace theistic evolution could see intelligent extraterrestrials as agents of God in the grand divine design for life on earth. Perhaps angels, since they are created beings and therefore made of *something*, are in fact extraterrestrials. If angels cannot be described this way, then they are merely

similarities in several angel- and extraterrestrial-related plays and films, many of which present their otherworldly characters as benevolent, wise creatures who advise and otherwise assist mankind through the trials and tribulations of modern life.”

³² See <http://www.youtube.com/watch?v=hxsOrBa0ECE>.

their own category—and that does nothing to undermine God’s use of extraterrestrials in the creation of life if He deemed that desirable.

More traditional creationists might be influenced to look for extraterrestrials in face-value statements of the Bible such as the plurals of Genesis 1:26 (“let *us* make humankind in *our* image”). True, the verbs of creation in the Bible are always singular, but that may be the writer’s way of giving God all the credit. God could still have used other agents to do his bidding.³³ Perhaps, someone will propose, the use of extraterrestrials by God is the answer to the question of why the Hebrew plural noun *elohim* is singularized in the Hebrew Bible and frequently made to stand for the God of Israel. Maybe the singular means the plural, as in the Qur’an’s habit of using “we” to refer to Allah. For Muslims this is a very easy transition to make. Ideas such as this will make it easier for literalist Jewish and Christian Bible-believers to embrace intelligent panspermia and keep their faith in the same stroke.

4. *Conclusion*

Readers need to recall that I am parsing an extrapolation of panspermia that lacks logical coherence and scientific basis, even if undirected panspermia is indeed valid. I expect that in the near future, science will propound some version of undirected panspermia and the kind of intellectual ripple effect I’ve outlined here. How far will the ripples extend? Since so many people now are willing to entertain the idea of ancient astronauts, it seems quite reasonable to suggest many more will join that bandwagon in the wake of a panspermia declaration.

In such a hypothetical extrapolation, it is worth asking, with the fundamentalist-literalist believer of book religions in the panspermia fold, whether there is any discernible obstacle to articulating a global religion that honors the cosmologies of all faiths, united as they are under the reality of panspermia and extraterrestrial influence. This intellectual scenario, of course, is presently the stuff of imagination.³⁴ But even now it should be easy for the reader to see how encompassing, persuasive, and powerful this set of ideas would be. Panspermia is without question a critical issue facing the Church of today—and tomorrow.

³³ The plurals of Genesis 1:26 should not be taken to speak of the Trinity, since plural language used elsewhere in the Bible in similar contexts cannot speak of the Trinity without avoiding explicit heresy. See my website, <http://www.thedivinecouncil.com> as well as Chapters 1 and 4 in my book, *The Myth that is True* (n progress at the time of this writing).

³⁴ The sequel to my novel, *The Façade*, will have this intellectual scenario as a centerpiece. The sequel will be entitled, *The Portent*.