

# Problems with Panspermia or Extraterrestrial Origin of Life Scenarios

As found on the IDEA Center website at <http://www.ideacenter.org>

Panspermia is the theory that microorganisms or biochemical compounds from outer space are responsible for originating life on Earth and possibly in other parts of the universe where suitable atmospheric conditions exist. Essentially, it is a hypothesis which states that life on earth came from outer space. It has been popularized in countless science fiction works, however some scientists, including the discoverer of the structure of DNA, Francis Crick, have advocated panspermia. There are generally about 3 different "flavors" of panspermia:

1. **Naturalistic Panspermia where life evolves on another planet, and naturally gets ejected off the planet and come to rest on earth.**
2. **Directed Panspermia where intelligent life on other planets intentionally seeded other planets with their own form of life.**
3. **Intelligent Design Panspermia, where intelligent beings from another planet came to earth and designed life here.**

Each type of panspermia will be briefly discussed below:

## **1. Naturalistic Panspermia where life evolves on another planet, and naturally gets ejected off the planet and come to rest on earth.**

Naturalistic panspermia has gained popularity because some have recognized that life on earth appears very soon after the origin of conditions which would allow it to exist. Many scientists believed that if life had originated on earth it would have taken many hundreds of millions, or even billions of years to do so. Life appears perhaps less than 200 million after the origin of conditions at which life could exist. One scientist calls this period a geological "instant." The great rapidity with which it arose made some speculate that the galaxy is teeming with the spores of life just waiting to find a fertile planet to grow and evolve. Among scientists, the notion that life arose naturally in an extraterrestrial environment and then naturally made its way to "seed earth" is not very widely accepted. However, this form of panspermia is more commonly accepted than forms 2 and 3, where intelligent extraterrestrial life played a role. Scientists apparently like to keep intelligent causation out of the picture.

It is interesting to note that these ideas that the "universe is teeming with spores of life" stem from the notion that life could originate naturally in the first place. Though this has not been established, scientists typically simply assume that life arose naturally and then proceed to reason as follows. If the reasoning doesn't seem to make sense, it is not because you are misunderstanding it. If it does make sense, read on:

1. Life exists, therefore it must have arisen naturally.
2. If it originated naturally, then the chemical origin of life must have not been highly improbable.
3. If the natural chemical origin of life is not improbable, then it must be happening elsewhere.
4. Therefore life must exist elsewhere in the universe and it is likely that it exists in a lot of places.

This reasoning makes certain unstated assumptions. At the outset, this sort of reasoning assumes that if life exists, it must have arisen naturally. It then uses that assumption to justify that the notion life can arise naturally quite easily under favorable conditions. This reasoning puts the cart before the horse, for it has never been demonstrated that life can arise naturally given any set of conditions. If the implicit presupposition that life arose naturally is questioned and not taken for granted, then perhaps there is no reason to presume that life is common or exists nearly everywhere, via natural means, in the universe. This often-unstated reasoning--an assumption that life can arise naturally--underlies much of the popular scientific and pseudo-scientific talk among scientists that life exists in outer space. We must question the assumption that life can arise naturally and ask if life really can originate naturally before we can take naturalistic panspermia for granted.

This style of reasoning also leads some to conclude that if intelligent life exists (as it does on earth) it must arise naturally, and easily, and has encouraged those who are fans of extra-terrestrial creators, who believe in "Directed Panspermia" (forms 2 and 3, discussed below) to affirm their faith in the existence of intelligent life elsewhere. But for naturalistic

panspermia-ists (those who are "type 1"), they assume that the universe is filled with life because they assume it arose naturally in the first place.

One location that has inspired hope in panspermia for some exobiologists (biologists who study extra-terrestrial life) is Jupiter's moon, Europa, which appears to have ice-caps on its surface which they hope could be the cover for a subsurface ocean. Never mind the fact that Europa is exceedingly colder than earth and we really have no direct evidence of its subsurface conditions, the fact that it could have liquid water has led some origin of life theorists to contend that life might exist on Europa. But again, the same reasoning has been employed here: Scientists assume life can evolve on earth in the presence of water, and therefore it could evolve elsewhere where conditions are appropriate (i.e. there is water). The truth is that we know very little about Europa, and it is possible that conditions there are totally inhospitable to any forms of life, much less to evolving life. However, if it is true that there is liquid water on Europa, then such a location faces the major obstacle that polymerization--a crucial step in the origin of life where complex proteins and other molecules must be created--cannot take place in an aqueous solution, like a giant subsurface ocean. The origin of life must be assumed to be possible, and difficulties ignored, for scientists to put their hope in such extraterrestrial bodies like Europa.

Even if life could originate naturally, there are many difficulties faced by a theory which states that life entered earth from outer-space. The trip through the upper atmosphere would be extremely harsh upon any life-form, and it is difficult to imagine how life could survive such high temperatures and extreme pressures upon entry to the earth, and then upon impact with the surface.

Some have tried. Though it has been noted that the trip through space would subject any microorganisms to intense amounts of radiation from the sun (Chyba, C. and Sagan, C., 1988, *Nature*, 355, 125), others have countered that life could have been protected by being encased in a carbonaceous meteorite which would shield the life from cosmic rays (see Panspermia revisited by John Gribben for references). If this is the case, then microorganisms could be blasted out of a solar system during the "red giant" phase of a star to land on a planet far far away. (note the huge improbability, )

The implication is that somehow this microorganism must land on a planet, perhaps in another solar system, suitable for life. Given the size of the universe and the vastness of space compared with the size of miniscule planets, the odds of a sun shooting out a meteorite in a random direction to land on any planetary body, much less one suitable for life, appear extraordinarily small. However, if the microorganisms entered into a proto-solar system, then the theory states that they could land on some newly formed planet accreting out of the proto-solar system cloud. This is what some have stated they believe happened on earth. The problem with this scenario is that most studies of whether or not any meaningful amounts of organic material could survive entry and impact on to the earth indicate that it would be impossible for any life under any condition to survive entry.

According to Jeffrey Bada, director of the NASA Specialized Center of Research and Training (NSCORT) in Exobiology at Scripps Institution for Oceanography, a paper (SURVIVABILITY OF SMALL BIOMOLECULES DURING EXTRATERRESTRIAL DELIVERY: SIMULATION EXPERIMENTS ON AMINO ACID PYROLYSIS, Basiuk and Doua, *Planetary Space Science* 47:577- 584, 1999), found that most meteorites would simply get too hot and would destroy most amino acids and organic material during entry to the earth's atmosphere. In this paper, the only possible way to get significant organic material to earth was through interplanetary dust particles (IDPs). Bada himself later heated IDP's and found that during entry they can easily heat up to 1200 C, easily hot enough to destroy most organic material. Apparently the only amino acid that ever remained during Bada's realistic simulations was glycine. Bada called this "bad news" if you are interested in originating life based upon material from outer-space. (See a report on Bada's talk at UCSD on June 10, 2003 at <http://www.arn.org/docs2/news/ucsdoriginoflife062003.htm>.)

Thus, assuming life can evolve elsewhere, the greatest obstacle to panspermia appears to be actually being aimed at a earth, and then getting the material on to earth through extreme heat in what might very well through an explosive and catastrophic impact that typically causes mass-extinctions, or through extreme heat caused by the entry of IDP's. Panspermia must make a very long and improbable trip, and then take a lot of heat to work.

## **2. Directed Panspermia where intelligent life on other planets intentionally seeded other planets with their own form of life.**

This is the form of panspermia advocated by Francis Crick in *Life Itself*. Dr. Crick speculates that a race of space aliens seeking to find a home for forms of life on their dying planet could shoot life into space on rockets, hoping to seed the universe with life. Perhaps a rocket landed on earth. Of course this is a totally untestable and unfalsifiable hypothesis--but critics have stated that it is unlikely that life could have survived such a trip through space. However, what is more

interesting about this hypothesis is its reasons for being proposed.

Crick basically proposed directed panspermia because he looked at the state of origin of life theories on earth, and determined that it was highly unlikely that life could have originated naturally on earth. Indeed, many advocates of panspermia do so because they believe that life could not have originated on earth (see Crick, F. H. C. and Orgel, L. E., 1973, *Icarus*, 19, 341.). Crick, an atheist, then turned to outerspace to preserve a naturalistic mechanism for the origin of life on earth. Thus, this theory is interestingly the result of one scientist who rejected mainstream naturalistic theories on the origin of life. The theory itself appears to have a religious motivation: to escape belief in a Creator-God. Perhaps obviously, Crick's hypothesis only shifts back the question, "Well how did the aliens come to exist?" Perhaps Crick hopes that conditions on their planet were more favorable for naturalistic evolution, so that a fully naturalistic account of life on earth could be retained. Such an untestable hope is clearly the result of philosophy and faith--not data.

### **3. Intelligent Design Panspermia, where intelligent beings from another planet came to earth and designed life here.**

If one accepts that life on earth was designed, the problem with this theory is that although it might explain the design of life on earth, it cannot explain the design of extra-terrestrial components of the universe which are crucial to our existence. As noted in our Anthropic Principles page, there appears to be a design of the universe, going all the way back to a creation event implicated in the Big Bang theory. The extreme "fine-tuning" of the universe must be explained, along with the design of life on earth. Such extra-terrestrial beings would presumably be incapable of altering the constants of the entire universe to make it hospitable for life--especially if such fine-tuning was a precondition for their own existence. In other words, the extra-terrestrials themselves would also need to live in our life-hospitable universe, and thus there must be an extra-universal, or "supernatural" designer which also is responsible for the design of nature. Thus, if extra-terrestrials designed life on earth, then where did the design of the universe come from? Intelligent design panspermia does not purport to answer this question.

Additionally, asserting that extra-terrestrials designed life on earth only pushes back the question, "where did the extra-terrestrials come from?" While they may have been designed, or may have evolved, at some point it would be scientifically and philosophically satisfying to determine the ultimate origin of life in the universe. Perhaps it's beyond investigation, but perhaps hints of the answer lie in the fact that the universe seems to be designed for life by something outside of it--a supernatural designer.

#### **What is the IDEA Center's Position on Panspermia?**

The IDEA Center recognizes that there are a very small number of individuals in the intelligent design movement who believe that life was designed, but by extraterrestrials, perhaps through some panspermia-like process. We believe that scientific investigations into the nature of the designer are at this point completely philosophical or religious issues which cannot be decided by science. Thus, we consider such claims to be non-scientific, and pseudo-religious speculation. However, it is worth taking a look at this question. Physicist Fred Hoyle once said, "A common sense interpretation of the facts suggests that a superintellect has monkeyed with physics, as well as with chemistry and biology, and that there are no blind forces worth speaking about in nature. The numbers one calculates from the facts seem to me so overwhelming as to put this conclusion almost beyond question." (Hoyle F., 'The Universe: Some Past and Present Reflections,' University of Cardiff, 1982, p16, in Davies P.C.W., "The Accidental Universe," [1982], Cambridge University Press: Cambridge UK, 1983, reprint, p.118). When it comes to religious questions, the IDEA Center's staff and founders believe that compelling evidence shows that the universe was as a whole designed by a "superintellect" that was not natural. A natural (i.e. within-the-universe extra-terrestrial) being could not have "monkeyed" with the laws of nature on a universe-wide scale. Since, we feel that design extends from microbiology to the huge expanses of the universe, the designer must also go beyond the scale of the universe. In short, we believe the universe, and the life within it, were designed by an Intelligent Being--God. However, we realize that this is a religious or philosophical claim, and not necessarily a scientific one. We find many philosophical and religious arguments that God did design the universe. Regardless of one's religious perspective, we believe that the scientific evidence does imply that life and the universe were designed. This can be concluded scientifically without getting into religious or philosophical questions about the identity of the designer.

Some ideas for this article were taken from an excellent summary written by John Gribbin, of Astronomy Centre, University of Sussex, in *Panspermia Revisited*. [http://xxx.lanl.gov/PS\\_cache/astro-ph/pdf/9909/9909013.pdf](http://xxx.lanl.gov/PS_cache/astro-ph/pdf/9909/9909013.pdf)