

On Life in the Universe

von John Byl

Abstract:

The possibility of extra-terrestrial life and intelligence is examined. It is found that the scientific case for extra-terrestrial intelligence is very weak; theological considerations render it improbable, but not definitely impossible. The case against more primitive extra-terrestrial life is much weaker..

Is the earth the only cradle of life in the physical universe? Is man alone? Or are there intelligent extra-terrestrial beings (other than spiritual beings such as angels and demons) somewhere in outer space?

Many people believe that such creatures do exist and that life is widespread throughout the universe. In 1992 the US space agency NASA launched a major project to search for extra-terrestrial intelligence. This project, called SETI (short for: Search for Extra-Terrestrial Intelligence) uses radio telescopes around the world to examine distant stars for signals that might be of artificial origin. Thus far the results have been completely negative. Nevertheless, it is worthwhile to examine the case for extra-terrestrial life and intelligence, taking into account both scientific and theological considerations.

A Brief History of ETI

Speculations about the possibility of extra-terrestrial life (ETL) and intelligence (ETI) have a long history. They can be traced back to at least the Greek philosopher Democritus (ca.460-370 B.C.), who believed that there were an infinite number of worlds, each with a central, inhabited planet. He was convinced that also the Moon was populated. However, belief in ETI was not popular in ancient times; nor, for that matter, in the medieval world, whose finite, hierarchical cosmology had no place for other inhabited planets, although the existence of legions of angels - and demons - was acknowledged.

The big boost for ETI came with the advent of the Copernican revolution in the 16th century. With the demotion of the earth to just another planet, there was no longer any reason to believe that it was unique in either composition or function. Hence the astronomer Johannes Kepler, among many others, thought that the Sun, the planets, and particularly the Moon, were populated with a variety of creatures.

By the end of the 18th century belief in ETI was very common in the scientific community. The demonstration of the absence of a lunar atmosphere had by this time ruled out the possibility of lunar intelligence. But this merely transported the presumed presence of ETI to other celestial objects. The influential German philosopher Immanuel Kant (1755) wrote a treatise describing in some detail the various life forms allegedly inhabiting the planets in our solar system.

For a long time the prime candidate for ETI was the planet Mars. Interest peaked in the early 20th century when astronomer Percival Lowell announced that he had actually observed canals on Mars. However, such extravagant claims

were soon discounted by most professional astronomers, who failed to discern these observational features. Since then the search for ETI has abandoned the solar system in favour of the nearby stars. It is widely hoped that, in the near future, more sensitive radio telescopes will be able to detect evidence of advanced celestial civilizations.

The Scientific Case for ETI

How strong is the scientific case for ETI? Estimates vary considerably. During the last few years, there has been a lively debate between scientists who believe the existence of ETI to be widespread and those who think it to be very rare, with man perhaps being unique.

The optimists assert that many stars have planets, that a good fraction of those planets are suitable for life, that life will in fact develop on a sizeable proportion of such inhabitable planets, and, finally, that a significant number of these life-bearing planets will produce intelligent societies. Even if the fraction in each step is on the small side (say, 1 out of 100), the huge number of stars in our Galaxy alone, estimated at about 300 billion, would still leave us with a potential of approximately 3000 intelligent civilizations in our Galaxy. The chances are that many of these are much more advanced than us.

On the other hand, the pessimists point out that all of the above factors are highly uncertain, that attaching numbers to them is no more than guessing, and that, in fact, some of the required steps in the chain seem to be extremely unlikely - if not impossible - on the basis of current scientific knowledge.

Let us examine some of the most important links in the chain.

1. Habitable Planets

How many stars have planets? No one knows. Planets around other stars would be too far away to be observed directly by an earth-based telescope. Therefore the techniques for detecting such planets must be indirect. The prime method is to search for wobbles, caused by the gravitational attraction of the planet, in the motion of a star. From time to time such wobbles had been claimed to have been observed and corresponding planetary systems were deduced from these. Until recently, all such reports turned out to be false alarms. The „wobbles“ were due to observational problems. In the last few years, however, the situation has changed. Glanz (1997) reports that at least 9 planets have been discovered. Although these planets are associated with sun-like stars, they are all of a

huge, Jupiter-like size, and much closer to their star than had been predicted by standard theories of planet formation. These planets would certainly not support presently known forms of life. Nevertheless, their discovery renders more plausible the possible existence of smaller, earth-like planets, which are less likely to cause observable wobbles in the parent star, and hence remain invisible to us.

2. Life By Chance

It is still a huge step from habitable planets to the actual formation of life on a planet. Thus far no life has been found by any space probes to the planets in our solar system. Until recently it was widely believed that Mars might harbour, if not canal-builders, at least some more primitive form of life. This hope was ruled out by tests by the Viking spacecraft, which landed on Mars in 1976, although some scientists still insist that the results were inconclusive.

Another means of searching for ETL is by examining extra-terrestrial rocks for signs of primitive life forms. Moon rock returned by the Apollo astronauts yielded no evidence for life.

Much excitement was therefore generated in August of 1996, when NASA scientists announced the discovery of what they believed was evidence for primitive life on Mars. A meteorite, found in Antarctica and thought to have come from Mars, contained microscopic carbonate globules that resembled bacteria found on earth. Unfortunately, it has since been determined that these globules could be due to other, inanimate causes. Even if definite signs of life had been found, and even if it could be shown these originated before the meteor reached the earth, the result would be inconclusive. It was thought that an asteroid striking Mars could displace material into space, some of which, like the meteor in question, might fall on earth. But if life can be transplanted from Mars to Earth via an asteroid impact, the same mechanism could have brought life from Earth to Mars. Hence an independent source of life on Mars would still be unproven.

How likely is it, from a naturalist, evolutionary perspective, for life to evolve from non-life? Many complicated molecules have been observed in interstellar space. These include water, methane, ammonia, methyl and ethyl alcohol, and formic acid. It has been found that exposing a mixture of water vapour, methane and ammonia to ultra-violet light can lead to the formation of amino acids. Traces of amino acids have been found in some meteorites. Thus it is likely that amino acids are fairly numerous in the universe. The difficulty is getting beyond these to actual life.

Terrestrial organisms consist of two types of molecules, whose interaction results in life. The first are proteins, which make up the organism. The second are nucleic acids, such as DNA, which provide information for the structure of the organism and the means to pass on this information in reproduction. Proteins consist of amino acids; DNA consists of very long strands of bases. Both are composed of very intricate combinations of carbon, hydrogen, oxygen, nitrogen and a few other common atoms.

Granted the existence of amino acids and bases, it is quite another matter for these to combine randomly in just the right manner so as to form a complete cell. The

probability of this occurring by chance is virtually zero. Fred Hoyle (1983) finds it so improbable that life on earth could have evolved by chance that he postulates life arose in vast interstellar gas clouds. Most evolutionary biologists consider the emergence of life from non-life to be immensely improbable and have generally been sceptical of the possibility of ETI. An estimate (Hart 1982:23) of the probability of life occurring by chance on an inhabitable planet, under the most favourable conditions, puts it as less than 10^{-32} (i.e., one out of hundred million trillion). Paul Davies (1995:28) estimates the odds against random permutations of molecules assembling DNA as about 10^{4000} to one against! This is about the same as tossing a coin and getting heads 130,000 times in a row. At that rate he concludes that, over ten billion years, we wouldn't expect to find another DNA molecule in the observable universe.

3. Higher Forms of Life

Another bottleneck occurs when moving from single-celled organisms to more advanced forms of life. According to Crawford (1997), single-cell organisms appeared one billion years after the earth was formed, whereas it took over three billion years for multicellular animal life to evolve. Furthermore, the evolution of multicellular animals from single-celled organisms allegedly occurred only once in history. He concludes that the evolution of complex life is therefore a lot more difficult than the initial development of life itself.

A further concern raised by Crawford is the emergence of intelligence. Many thousands of species, supposedly evolving over many millions of years, have resulted in only one sufficiently intelligent to develop technology and culture. This implies that, even given the existence of multi-cellular life, the evolutionary emergence of intelligence is very unlikely.

4. Self-Organizing Matter

Such pessimistic estimates have in turn been challenged by the optimists, who claim that our present grasp of the evolutionary mechanism is incomplete. They hope that further developments will vindicate their belief that evolution is much more probable than currently believed. After all, they ask, if life has evolved here, on this insignificant planet, why not elsewhere as well?

Paul Davies (1995) argues that the origin of life was not a miracle, nor a stupendously improbable accident, but rather the inevitable outworking of certain "self-organizing" properties of matter. Davies considers both life and consciousness to be fundamental „emergent“ properties of nature, natural consequences of the laws of physics which emerge in a physical system once it reaches a certain level of complexity. As such, he believes that life should be plentiful throughout the universe.

Unfortunately, Davies provides no details of how the necessary complexity can be reached, what the actual conditions are for life and consciousness to „emerge“, or what the physical laws are that make such emergence inevitable. Merely to affirm that life must emerge, without

supplying any specifics, does not solve this profound problem.

A further weakness of Davies' position is that there is absolutely no scientific evidence to support it. Why have such "self-organizing" properties not been observed to function in any of the many scientific experiments that have sought to synthesize life? Why, in the evolutionary view, did life on Earth apparently originate only once? Davies' mysterious "emergent properties" seem highly magical: stupendous miracles that are all the more inexplicable in that they allegedly occur purely by themselves, without any need for a divine intervention. This is little more than wishful thinking.

5. *Where Are They?*

Another argument for the scarcity of ETI is the fact that our earth has, apparently, not been colonized by ET's. If ETI were common in our Galaxy, then it might be thought that at least one of the more advanced civilizations would have explored and colonized the Galaxy by now. Since we don't see ET's, and since there is no evidence that they have ever visited us (very few astronomers believe that UFO's are ET visitors!), it follows that ETI must be rare. The optimists have responded that perhaps these civilizations have no desire to colonize, or that perhaps they are keeping the earth as a nature preserve - a sort of cosmic zoo. Such options are rejected by the pessimists as being too implausible.

Motivation For Belief in ETI

Given the lack of scientific evidence for ETI, it is apparent that belief in ETI must rest on other, more philosophical considerations. Frank Tipler (1980:278), who believes that we are alone in the universe, sees a strong similarity between belief in ETI and belief in UFO's:

In fact, I suspect the psychological motivation of both beliefs to be the same, namely, the expectation that we are going to be saved from ourselves by some miraculous interstellar intervention...

He supports this conclusion by citations from numerous prominent supporters of ETI. Typical is the following statement from Carl Sagan (1979:276):

The translation of a radio message from the depths of space...holds the greatest promise of both practical and philosophical benefits. In particular, it is possible that among the first contents of such a message may be detailed descriptions for the avoidance of technological disaster, for a passage through adolescence to maturity...

In a similar vein, Harvard astrophysicist A.G.W. Cameron (1963:1) writes:

If we can...communicate with some of these (advanced ET) societies, then we can expect to obtain an enormous enrichment of all phases of our sciences and arts. perhaps we shall also receive

valuable lessons in the techniques of stable world government.

More recently, Paul Davies (1995) comments:

The interest in SETI among the general public stems in part, I maintain, from the need to find a wider context to their lives than this earthly existence provides. In an era when conventional religion is in sharp decline, the belief in super-advanced aliens...can provide some measure of comfort and inspiration...This sense of a religious quest may well extend to the scientists themselves, even though most of them are self-professed atheists.

It is ironic that man, even after having rejected God, still searches the heavens for his salvation.

Theological Considerations

The above arguments are all based upon the premise that man, and life in general, have an evolutionary origin. Before Darwin most of the ETI arguments were formulated in creationist terms. How does the case for ETI look if one assumes a direct creative origin of life and intelligence?

In the 17th century the newly invented telescope revealed many hitherto invisible stars. Since these could hardly serve as light-bearers for man, their purpose became the object of debate. Many contended that they functioned as suns for other intelligent beings, placed there by God. Furthermore, it was argued that, since two universes are better than one, and since the wise Creator always chose the best, there should be an infinite number of inhabited worlds. Anything less was considered unworthy of an infinite Creator.

We note in passing that, to creationists who believe the universe to be young, the lack of colonization objection to ETI is no longer valid. For then ET's would have had little time to develop and apply their exploration potential. On the other hand, the same consideration makes it extremely unlikely that, if civilizations similar to our own do exist, we would be able to observe them, let alone interact with them, in the near future.

1. The Absence of Biblical Evidence for ETI

A number of theological objections have been raised against the belief in ETI. First, if ET's exist, why are they not mentioned in Scripture? The Lutheran theologian Philip Melancthon (1497-1560) noted that after God had created the earth, sun, moon, and stars of our cosmos, He rested and created nothing more, least of all another cosmos. Melancthon pointed out that nowhere does Scripture mention the creation of man, or other life, outside of the earth (except, of course, the angels).

To this it was countered that the biblical account is directed towards man and his relationship to God. God may well have created other beings the existence of which He did not deem it necessary to inform us.

2. Christ's Incarnation and ETI

The foremost theological objection to ETI has, however, always been centered on the uniqueness of Christ's incarnation. This dates back to at least the Church Father Augustine (354-430). Augustine was concerned with opposing the cyclical view of history - the notion that history repeats itself in an endless cycle - current in his day. On the basis of such biblical texts as "for Christ also hath once suffered for sins" (I Peter 3:18) and "Christ being raised from the dead dieth no more...he died unto sin once" (Romans 6:9-10), he concluded in *The City of God* (Bk.XII, Ch.14) that the historical process of creation, fall, and redemption could occur but once. This argument was extended by Albertus Magnus (1206-1280) to refute also the idea of a multitude of worlds in space, rather than time. Melancthon, too, in his rejection of ETI, contended that Christ could die only once and that man in other worlds could be saved only through knowledge of Christ.

The question of the uniqueness of Christ's sacrifice doesn't appear to bother most modern liberal theologians who discuss ETI. The acceptance of an evolutionary origin of man, and the corresponding rejection of the historicity of Adam and his fall, opens the possibility that man's history could well be essentially repeated elsewhere. Paul Tillich and Dean Inge, for example, both suggest that the incarnation of Christ is not unique and could re-occur on other planets.

The cosmologist E.A. Milne (1952) resolved the paradox between the uniqueness of Christ and the plurality of worlds by proposing that knowledge of the incarnation on earth could be transmitted to other planets via radio signals. On this he was criticized by the theologian E.L.Mascall (1956), who contended that salvation is not dependent upon our knowledge of Christ's incarnation. On the other hand, Mascall doubted that Christ's having been made man would suffice to make him the saviour also of other, extraterrestrial, beings. He suggested that the incarnation could be repeated on other planets.

Recently John Davis (1997) argues that the Christology of Colossians 1:15-20 is sufficiently vast in scope to provide a basis for the redemption of fallen beings anywhere in the universe, without the need for any additional incarnations or atonements. Referring to the Westminster Confession of Faith (1647, Ch.8: v, vi), where the redemptive benefits of the death of Christ are said not to be limited by time, but apply to the elect of all ages, Davis remarks:

If the atonement can be understood as not being limited in time, it can just as readily be understood as not limited by space or distance. Christ assumed in the incarnation a true and complete human nature that he might represent man as the covenant head of a redeemed people. By extension, it could be postulated that the human nature of Homo Sapiens could be designated by God to represent the nature of all sentient, embodied beings.

I don't find this argument very compelling. An atonement unlimited in time, applying to all the elect offspring of Adam, is quite distinct from an atonement

applying to all, unrelated, intelligent beings throughout space. It is clear from Scripture that there exists a necessary connection between the first Adam and the second Adam, Christ. For Christ's sacrifice to be sufficient it is essential that Christ have a human nature. As the Heidelberg Catechism (1563) puts it,

God will not punish another creature for the sin which man has committed. (Lord's Day 5)

He (Christ) must be true man because the justice of God requires that the same human nature which has sinned should pay for sin. (Lord's Day 6)

The main pertinent biblical reference is found in Hebrews 2:14-17:

Forasmuch then as the children are partakers of flesh and blood, he also himself likewise took part of the same...For verily he took not on him the nature of angels; but he took on him the seed of Abraham. Wherefore in all things it behoved him to be made like unto his brethren, that he might be a merciful and faithful high priest in things pertaining to God, to make reconciliation for the sins of the people.

It follows that, since ET's, like the angels, are not descendants of Adam and thus share neither his nature nor guilt, Christ's sacrifice is of no avail to them. The uniqueness of Christ's incarnation implies the uniqueness also of man as the only creature to be thereby saved from the consequences of his sinfulness. Of course, this does not, by itself, imply that ET's can't exist, but only rules out their possible redemption through Christ's incarnation.

The notion of unredeemed species is not without precedent. Of the other known species of intelligent beings - angels - we know that there is no redemption for those who fall. Even for fallen man, the redemption is effective only for the elect minority. Why, then, should it be thought necessary that ET's be redeemed?

As to Davis' reference to Col.1:15-20, the Bible makes clear that Christ's reconciliation of all things to himself does not imply that all creatures are to be redeemed. Rather, it concerns Christ's victory over Satan and sin, with the resultant cleansing of creation under the dominion of Christ.

3. The Uniqueness of Man

Even if Davis's argument were valid, it would still imply that man is in a special relation to God, since, from among all possible creatures, Christ chose to take on the specific form of man. This brings us to a further argument against ET's: the special position of man in the universe. According to Genesis 1, man alone was created in the image of God, and man alone was appointed to have dominion over creation. Even stars were created primarily to serve as lights and signs for man. Finally, at the end of times, Christ returns to the *earth*, the abode of man, to judge living and dead. Man is to judge the angels (I Cor.6:3). The New Jerusalem comes down from heaven to

earth. All this reinforces the special place of man in God's creation.

Hence, in the extremely unlikely event that intelligent beings do exist on other planets, we can conclude, on the basis of the biblical account of salvation, that either they have not fallen from grace or, less happily, that, like the angels, there is no redemption for those who fell.

4. Extra-terrestrial Life

What about primitive extraterrestrial life? The celestial bodies, created on the fourth day, contain at least some material such as light, water, earthly elements, atmospheric gases, apparently identical to that created on the earth in the previous days. Why, then, could they not contain also primitive forms of life, such as vegetation, which were created on the third day? Nevertheless, it must be recalled that the prime purpose of earth vegetation is to serve as food for more advanced forms of earthly life, such as man and beast (Gen.1:29-30). No mention is made here of non-earthly vegetation. It would seem that there is no purpose to creating primitive forms of life elsewhere unless this would serve higher forms of life there. Similarly, what would be the function of higher forms of life, such as animals, in the absence of intelligent life, such as man?

The detection of ETL would certainly generate fewer theological questions than would the detection of ETI. On the other hand, the actual detection of ETL is much more difficult. Searches for ETL are essentially limited, at least for the next few decades, to within our own solar system, where the most likely places have already been ruled out.

Conclusions

In conclusion we note that there is no scientific evidence in support of the belief in ETI. On the contrary, there has been no sign of life of any form on any of our planets. All searches for ETI have yielded purely negative results. Searches for interstellar life, scanning nearby stars for radio signals or noise indicative of civilization, have virtually ruled out the possibility of advanced civilized life within a hundred light years. To span greater distances even an extremely fast rocket travelling at a tenth of the speed of light would take longer than a millennium, and radio dialogues would have century-long gaps. Thus, for all practical purposes, communication with extra-terrestrial civilizations can be ruled out.

From an evolutionary perspective, the odds are so heavily stacked against the chance occurrence of life, particularly intelligent life, that the existence of ETI must be considered extremely improbable.

Creationist arguments for ETI are strongly dependent upon our views regarding the nature of God and His relation to his cosmos. Theological considerations based on biblical revelation weigh very heavily against the presence of ETI, but not conclusively so. In a young universe, it is very improbable that ETI, even if it existed, would be detected in the near future.

The case against more primitive forms of extra-terrestrial life is much weaker. Arguing against the existence of ETL are its absence in the biblical creation account and the question as to what purpose the creation of ETL would

serve, given the non-existence of ETI. But, again, these considerations do not definitely rule out ETL.

REFERENCES

- Cameron, A.G.W. 1963, *Interstellar Communication*. New York: Benjamin.
- Crawford, Ian 1997, "Galactic Civilizations: A Reply". *Astronomy & Geophysics* **38** (Issue 6): 19.
- Davies, Paul 1995, *Are We Alone: Philosophical Implications of the Discovery of Extraterrestrial Life*. New York: BasicBooks.
- Davis, John Jefferson 1997, "Search for Extraterrestrial Intelligence and the Christian Doctrine of Redemption". *Science & Christian Belief* **9** (No.1): 21-34.
- Glanz, James 1997, "Worlds Around Other Stars Shake Planet Birth Theory". *Science* **276**: 1336-1339.
- Hart, Michael H. 1982, *Extraterrestrials - Where are They?* New York: Pergamon Press.
- Hoyle, Fred 1983, *The Intelligent Universe*. New York: Holt, Rinehart and Winston. 1983
- Kant, Immanuel 1755, *Allgemeine Naturgeschichte und Theorie des Himmels*. An English translation of this can be found by Stanley L. Jaki in Wolfgang Yourgrau & Allen D. Beck (eds.), *Cosmology, History, and Theology*. New York: Plenum Press, 1977. pp.387-403.
- Milne, A.E. 1952, *Modern Cosmology and the Christian Idea of God*. Oxford: Clarendon.
- Sagan, Carl 1979, *Broca's Brain*. New York: Random House.
- Tipler, Frank J. 1980, "ETI Beings do not Exist". *Quarterly Journal of the Royal Astronomical Society* **21**:278.



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