

Theological Implications of Possible Extraterrestrial Life

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Human fascination with the topic of extraterrestrial life is demonstrated by two phenomena. First, there is the continuing popularity of science fiction involving extraterrestrial beings in books, movies, and television programs like Star Trek. Robert Short attributes this to a search for meaning by the multitudes who have lots of knowledge about everything, but little understanding of what it is all about.¹ Second, the continuing stream of claims of sighting UFO's (unidentified flying objects), indicating a tenacious belief in extraterrestrials, despite all rational explanations for UFOs.² With a mixture of curiosity and fear people wonder: Are we alone in this vast universe or not? Here I shall address the question: "If advanced beings elsewhere in the universe do exist, what does this mean for Christian theology?"

1. From Speculation to Search

The Greek philosophers Leucippus, Democritus, and Epicurus (480-270 BC) already speculated about the existence of life outside the Earth.³ The Roman poet Lucretius wrote in *De Rerum Natura* (c.70 BC): So we must realize that there are other worlds in other parts of the universe, with races of different men and different animals. In the totality of creation no thing is unique.⁴ Plato (c.310 BC) and Aristotle (c.330 BC), on the other hand, opposed the possibility of extraterrestrial life, which led the early Christian theologians Augustine (c. 400), Albertus Magnus (c.1250), Thomas Aquinas (1273) and his contemporary Roger Bacon also to reject the idea. This changed after Etienne Tempier, bishop of Paris, issued in 1277 a list of condemnations of doctrines that seemed to limit God's power, one of them being the idea that God could not create many worlds. This led to renewed discussion of the matter in the 14th century. After a critical discussion of the arguments of Aristotle and Aquinas, William of Ockham (c.1320), Jean Buridan (c.1340), Nicole Oresme (c.1350) and others judged that a plurality of worlds was not impossible. Later Willem van Vorilong (d.1463) and Nikolaus of Cusa (1440) published treatises in which they defended the idea of a plurality of worlds.

The advent of the Copernican view of the solar system seemed to make the existence of extraterrestrial life more likely. While Galileo, Descartes and Kepler retained a cautious attitude, Giordano Bruno heartily embraced the idea in his 1584 treatise *On the Infinite Universe and Worlds*.⁵ Other 17th century pluralists were Tommaso Campanella, John Wilkins, Bernard de Fontenelle (1686), Richard Bentley (1693) and Christiaan Huygens (1698). Voltaire, in the satirical work *Micromégas* (1752), has two giants, one from the star Sirius and the other from the planet Saturn, visit the Earth in order to impress upon the reader how small the Earth must be in relation to the rest of the cosmos.⁶ During the 19th century the idea of plural worlds became popular, both among atheists like Thomas Paine and evangelicals like Thomas Chalmers and Thomas Dick.³ Enthusiastic defenders of extraterrestrial life were the astronomers Richard Proctor (1870) and Camille Flammarion (1862). Their attitude is well summarized by American astronomer and popularizer of science Simon Newcomb, who argued in an article for Harper's Magazine on "Life in the Universe" (1905) that if Earth is a representative planet orbiting a representative star then life must be abundant throughout the universe.⁷

In a recent book entitled *If the Universe is Teeming with AliensWhere is Everybody?*, Stephen Webb⁸ considers three possibilities: (1) they do not exist; (2) they exist but do not communicate; (3) they are here already. He believes (1), but does not consider the possibility that they are technically incapable of interstellar travel like we are. In another recent book Jack Cohen and Ian Stewart⁹ claim that our scientific way to answer the question is wrong. Their approach is, however, more science-fiction than science. They claim that our present cosmology is wrong, that there exists a multitude of universes, and that "the (initial) vacuum of space-time might possess sufficient complexity to organize itself into some form of life by carrying out a complete thermodynamic work cycle", such that aliens might have lived through the

inflation (the rapid and large expansion assumed to have occurred immediately after the Big Bang). The idea that living beings as we know them could exist, let alone survive, in the very early universe, is scientifically untenable. Moreover, they neglect the fact that the multiverse idea cannot be proven scientifically and that therefore our search for extraterrestrial life must be limited to the only universe we can study on the basis of the laws of physics and chemistry that have been shown to be valid everywhere in this universe.

During the 20th century the advent of our modern observational techniques and of space travel has changed the picture considerably. We are now forced to conclude that in our solar system no advanced life exists outside Earth, although microbial life may perhaps have arisen on early Mars, later to be extinguished by climate change.¹⁰ So for the existence of advanced extraterrestrial life we must look to planets beyond the solar system. However, evidence for the existence of extrasolar planets has only accumulated in the past 40 years, but of the 100 planets detected so far none seems a likely candidate for the development of life.¹¹ Visiting an extrasolar planet to look for advanced life is technically impossible: a manned return flight to the nearest star, Alpha Centauri, at 20% of the speed of light (about the highest speed achievable with any current spacecraft) would take 44 years and require for the launch 300 times the total worldwide annual energy production.¹²

This means that we have to choose a simpler but indirect approach in the search for extraterrestrial intelligence (SETI). The approach adopted by the SETI Institute (Mountain View, California) is based on the assumption that advanced extraterrestrials, if existing, will have radio and television broadcasts like we do (no irony intended!). Radio and television carrier waves and radiation from large radar installations are known to spread into space to a great depth. There is also the possibility that the extraterrestrials may transmit directed signals. The SETI Institute is presently completing the Phoenix project, a targeted search for microwave signals from 1000 selected sun-like stars within 100 light years from the Earth, which might have an earthlike planet that might have permitted the development of intelligent beings.¹³ The double 'might have' indicates how great the uncertainty is, not even counting the problem of synchronicity (or lack of it) of any extraterrestrial civilization with human civilization. Observations are made with a radio telescope, equipped with an ultrasensitive detector with automatic signal processing by a smart software system.¹⁴ A frequency range of 1-3 GHz (gigahertz, a billion vibrations per second) is chosen, since in this range there is minimal interference from celestial and terrestrial microwave radiation. In ten years of operation of the project, borrowing time on existing radiotelescopes, more than half of the 1000 targeted stars have now been fully observed, but no significant signals have been detected.¹⁵ In 60 trillion observations with the 26-m Harvard META telescope only 11 unexplained signals were found; 9 of these were not observed again in a supersensitive follow-up, two remain to be repeated.¹⁶ Even if none of these stars would yield a significant signal, we could still not conclude that advanced extraterrestrial life is absent, since there are billions of stars at greater distances than 100 light years. A novel project, the Allen project, is being developed that will employ a dedicated array of 350 small (6 m. diam.) radiotelescopes, providing greater sensitivity and 100-1000 times greater speed of search; it is expected to be fully operational by 2010. Another approach, an optical search aimed at detecting laser flashes from communication of extraterrestrials with their spacecraft or space colonies, is beginning to be employed.

2. Paucity of Theological Data

No references to extraterrestrial life are found in biblical or non-biblical creation stories.¹⁷ The two biblical creation stories in the book of Genesis (Gen.2 from 900 BC; Gen.1 from 550 BC) speak only about creation of living beings on this planet. Nowhere else in the Bible is extraterrestrial life mentioned, if we exclude angels, the immaterial messengers between heaven and earth. A passage like Jn.10:16 (I have other sheep that do not belong to this fold)¹⁸ is normally thought to refer to the Gentiles, while 1 Peter 3:18-20 (in which also he went and made a proclamation to the spirits in prison, who in former times did not obey) seems to refer to people who died before the time of Jesus, rather than to extraterrestrials.

Tradition (the body of teaching of the early Church) is also silent about extraterrestrial life. This silence is hardly surprising, since (1) the biblical message is "economic" in the sense that it is directed to our life on this planet in preparation for the future life; (2) the geocentric worldview was dominant until the 16th century, when it was overturned by the work of the great astronomers Copernicus, Kepler, and Galileo; (3) the scientific insight in the prebiotic formation of life and the possibility of its arising

elsewhere in the universe dates from only the last 50 years. As mentioned earlier, in the pre-Copernican era only Nikolaus of Cusa and his contemporary Willem van Vorilong clearly expressed a belief in advanced extraterrestrials.^{3,19} Even after the overturn of the geocentric model in the 16th century the picture does not change much. Giordano Bruno (1584) maintained the likelihood of the existence of extraterrestrial beings, "no less nobly" than humans, but made himself guilty of pantheistic immanentism and ended at the stake in 1600. In his *On the Infinite Universe and Worlds* (1584) he presents a fictitious dialogue between Burchio (B) and Fracastorio (F): "B: Then the other worlds are inhabited like our own? F: If not exactly as our own, and if not more nobly, at least no less inhabited and no less nobly".⁵ Tommaso Campanella, in his *Apologia pro Galileo* (1622), rejected Aquinas' objection against a multitude of worlds by the argument that it concerns many small systems within one large system. He claims that the inhabitants, not descending from Adam, do not need salvation unless they have committed other sins. De Fontenelle, in his *Conversations on the Plurality of Worlds* (1686), maintains: "The moon, says I, is inhabited, because she is like the earth; and the other planets are inhabited, because they are like the moon".²⁰ Christiaan Huygens (1629-95) left a very speculative work *Cosmotheoros*, in which he claims the presence of water on Jupiter, Saturn, Venus, and Mercury, and thus of all kinds of plants and animals, and even creatures endowed with reason, created as described for humans in Gen.1, and having both virtues and vices like us.²¹

Among contemporary theologians there seems to be a lack of interest in the matter of possible extraterrestrial life. This may be due to two factors: the geocentric model has lingered on in our thinking as a result of our human self-centeredness, and the divorce between science and theology since Darwin's time has placed the question of extraterrestrial life outside the view of most theologians.¹⁹ These two factors may well explain why such prominent contemporary theologians, like Karl Barth, Emil Brunner, Hans Küng, John Macquarrie, Wolfhart Pannenberg, Jürgen Moltmann, Edward Schillebeeckx, Keith Ward, and even scientist-theologians Arthur Peacocke and John Polkinghorne have not considered the possibility of extraterrestrial life in their theological works. Willem Drees mentions only T.M. Hesburgh, E.L. Mascall, Paul Tillich, H. Berkhof, A. Ford, and S.L. Jaki as contemporary theologians who are willing to accept the possibility of extraterrestrial life.¹⁹ To them may be added Teilhard de Chardin, who left an unpublished and not very helpful paper on the topic.²² Over against them, Drees cites several lesser known theologians, like U. Köhler, L.J. van Holk, J.J. Buskes, E.A. Milne, P.J. Roscam Abbing, and A.J. Burgess, who argue for the physical and/or theological uniqueness of life on Earth.¹⁹

The near absence of sound theological reflection on this topic in Bible and Tradition, and by prominent contemporary theologians, as apparent from the reviews of Crowe³ and Drees,¹⁹ necessitates some pioneer work in formulating a theology of extraterrestrial life. In particular, the implications for Christ's redemptive work should be considered. A book edited by Steven J. Dick²³ offers little help in this; the chapters by Ernan McMullin²⁴ and George V. Coyne²⁵ only list the questions to be addressed, and the principles for a 'cosmotheology' offered by Dick²⁶ hardly represent a Christian theology. Before turning to the theological implications of possible advanced life beyond Earth, I first consider the likelihood of its occurrence and the characteristics such life might acquire.

3. Possibility of Extraterrestrial Life

The laboratory experiments of Stanley Miller and Harold C. Urey gave us some idea how life may have arisen on the Earth from inorganic material.^{27,28} Shortly after its formation Earth must have had an atmosphere, which lacked oxygen and contained nitrogen, carbon dioxide and small amounts of hydrogen, methane and ammonia originating from volcanic eruptions. These gases can, in the presence of a suitable energy source, form compounds like hydrogen cyanide, formaldehyde, and acetaldehyde, which can serve as intermediates in the formation of aminoacids, the building blocks of proteins. The building blocks of other essential compounds of a living cell may also have been formed in this way. The absence of oxygen protected these compounds from oxidation. On these grounds a tentative scenario for the origin of the first living cell can be sketched. The currently favored location for this process is the area around hydrothermal vents in the ocean bottom. The presence of the above intermediates in interstellar space, and of aminoacids of extraterrestrial origin in meteorites, suggests that life can have arisen elsewhere in the universe by a process resembling the prebiotic evolution on Earth.

This would have to be outside our solar system, as it is now generally agreed that the

Earth is the only planet in our solar system on which advanced life exists. Beyond the solar system there are billions of stars, some of which resemble our Sun in size, age and luminosity, and these may well have planets. Direct observation of such planets has so far been impossible, because of the small angular separation between even a nearby star and its planet and the large luminosity difference between them. Indirect evidence for the presence of a planet can, however, be obtained from the detection of small motions of the star ("wobble") due to the orbiting planet. On the basis of such indirect observations some 100 extrasolar planets have been discovered in the last 40 years, but in view of their large size and elliptic orbits it is very unlikely that advanced life could have arisen on any of these planets.¹¹

In view of the very large number of stars in the universe, it is, however, likely that there exist some earth-like planets outside our solar system. With more sensitive techniques than currently available such planets may yet be detected. Any such planet will have to satisfy numerous requirements in order to permit development and maintenance of life on it. A list of 32 such requirements has been presented, including that it be a star of between 0.4 to 1.4 solar mass, stable in radiation and temperature for at least the past 4 billion years (the length of time it took for the development of human life on Earth), and a variability of no more than 5% in the distance between star and planet.²⁹ The first and last of these requirements may eliminate 99.9% of all candidates. With all further requirements this may leave a very small percentage of fitting candidates. Yet, in view of the very large number of stars we cannot rule out that there are some. What can we predict about the nature of the advanced life that could have developed on such a planet?

4. Nature of Extraterrestrial Life (If Existing)

Everywhere in the universe the same chemical elements are present as on Earth. Hydrogen and helium were formed in the initial explosion (big bang), the elements up to iron by nuclear fusion in stars, and the elements heavier than iron probably by neutron capture during supernova explosions. As far as we know, the earthly physical and chemical laws are valid throughout the universe. We can therefore make some predictions about extraterrestrial life. Such life will be based, like all earthly life, on carbon chemistry, since carbon is the only element able to form the long-chain compounds (e.g., DNA, RNA, proteins) that are essential for the complex processes of growth and replication of living cells.³⁰

It is estimated that during 4 billion years of biological evolution on Earth some 2 billion species arose, of which only some 2 million 'successful' ones, one in a thousand, have survived. This suggests that in the evolutionary process all possible life forms have been explored. Moreover, all existing species on Earth have basically the same biochemistry, the same DNA-based replication system, and the same genetic code. Therefore, it seems likely that advanced extraterrestrial creatures (if existing) would not be radically different from *Homo sapiens* in physiology and biochemistry. I would expect these creatures to have brains and neuronal systems resembling ours, and thus to have similar thought processes. S.L. Jaki comes to the same conclusion on theological grounds.³¹ I would further expect these creatures to be mortal as we are, since biological evolution cannot take place without the life cycle.

It also seems likely to me that in extraterrestrial development of life the same DNA-replication/transcription system would be selected as on Earth, since this is the only system that has arisen in the two billion species that have lived on Earth. Actually, it is unlikely that DNA replication was already operating in the early stage of the prebiotic evolution, since it requires the presence of enzymes, which are proteins, and their production requires the transcription of DNA via RNA. This chicken-and-egg problem may have been resolved by the discovery in the 1980s that RNA has some enzyme capabilities.^{32,33} This has suggested the idea of an initial 'RNA-world', in which RNA arose, which formed the enzymes needed for the formation of DNA, which then took over transcription and replication. This has then led to the much more versatile and better protected DNA-replication/transcription system currently operating in all earthly life forms. That of sixteen possible nucleotides only four, labeled A, T, G, and C, occur in all earthly DNA, may be due to the fact that these four provide the lowest incidence of replication errors.³⁴

Another interesting point is the fact that amino acids and many other biomolecules can occur in two mirror-image forms, but that living organisms on Earth have only one of these forms, the L-form in the case of amino acids. This form must have been selected early in the prebiotic process, since without this stereospecificity of the building blocks there would be no viable replication system, no workable enzymes, no metabolism: life would not exist. Amino acids found in the Murchison meteorite,

thought to have come from the asteroid belt between Mars and Jupiter, are predominantly of the L-form.³⁵ Since extensive tests have excluded the possibility of contamination by earthly material, this suggests that the preference for the L-form already existed in the universe before life on Earth originated.³⁶ This means that amino acids of extraterrestrial beings would probably even have the same stereospecificity as those of earthly creatures.³⁷

On the basis of our present scientific evidence I consider the development of intelligent life elsewhere in the cosmos, resembling that on Earth, a definite possibility. However, I shall refrain from assessing its probability, on the one hand because we cannot reliably calculate it. Chaos theory shows that it is difficult, if not impossible, to predict the behavior of complex systems in the course of time.³⁸ Moreover, multiplying the probabilities of each separate step in a process like the origin of life may greatly underrate its actual likelihood, because of the occurrence of processes of self-organization, e.g., in membrane formation and the adoption of specific 3-dimensional structures by large biomolecules like DNA, RNA and proteins. We must also bear in mind that the methodology used in the SETI project allows the detection only of advanced extraterrestrials that have developed television or radar one or more centuries ahead of us.

5. Theological Considerations: Bottom-Up

I have presented arguments for assuming that advanced extraterrestrial beings, if existing, would show considerable likeness to us, in physiological and even mental processes. Because religious awareness is common to all humans through the ages,³⁹ we may then expect this to occur also in extraterrestrials. This makes it meaningful to trace the development of religious awareness in humans. I call this 'bottom-up' theological considerations, because we look at the process from the creaturely side, from nature to supernature.

The earliest evidence for religious awareness in humans is presented by Neandertal burial places with evidence of ritual, dating from about 100,000 years ago.⁴⁰ Three stages of religious development are commonly distinguished: animism, polytheism, and monotheism.^{41,42} Primitive, nomadic humans were utterly dependent on nature, saw nature as sacred, and every natural object - trees, streams, rocks - as endowed with a spirit. These spirits were thought not only to control the existence of its object (a tree spirit makes the tree grow and spread its branches; a stream spirit makes the water flow) but indirectly also to influence human life by providing shade, water, and so forth. Rituals were used to ensure the favor of these spirits and to ward off evil. This is animism. Gradually, the spirits of animism came to be seen as deities with a personality, whom one had to please with gifts and sacrifices, in order to survive. Deities were then given a name, and were usually associated with forces of nature, like storm, rain, and thunder. In addition, tribes commonly adopted a territorial god, like the Baals and Els in Canaan that appear frequently in the Old Testament. In a further development one deity came to be seen as more powerful than the others, like the creator god featured in the creation stories of many peoples.⁴³ This is polytheism. In the Old Testament we can trace the extended struggle that it took for the people of Israel to advance from polytheism to monotheism.⁴⁴ It is interesting to note that the polytheistic religions of Egypt, Greece and Rome did not experience this transition, but that it only occurred among the people of tiny Israel.⁴⁵ During the Exodus the Israelites had chosen Yahweh, the territorial wilderness god from Mount Horeb, as their guide and protector, but still only a tribal god. After many instances of apostasy (see the books of Judges, Kings, Chronicles) their experience during the Babylonian exile led to the conviction that Yahweh is the universal, omnipresent God, the God of all peoples, Jews and Gentiles (Is.49:6). They began to see him as the Creator of everything that is, the eternal and only God (Isa.43: 10; 45:5-7,18), to whom the cosmic forces are small and insignificant (Isa.40:12-15,28). Yet, they also come to experience him as a loving and caring God (Isa.40: 11), who seeks to have a personal relationship with his human creatures and who gives them the Law to live by. This posed the question, How can the perfect Yahweh forgive transgressions of his divine Law by his creatures without compromising his perfect justice? Initially this led to the image of a vengeful god, who ruthlessly punishes the sinner. The prophet Jeremiah sought the solution in replacing the old covenant of Mount Horeb by a new covenant "written upon the heart" (Jer.31:31-34), but he failed to overcome the problem that to the ancient mind a valid covenant requires the blood of a sacrifice. Other prophets predict the coming of a Messiah (Mic.5:2-5; Zech.9:9-10), the suffering servant in Second Isaiah (Isa. 42:1-4, 50:4-9, 52:13-53:12), who will bring reconciliation between Yahweh and his people. Here ends the evolution of religious thinking in the Old

Testament period, which brought the crucial transition from polytheism to monotheism. Six centuries later the Jewish followers of Jesus of Nazareth (again a small minority) recognize in this Jesus the promised Messiah, who through his death on the cross brings reconciliation, a new covenant. Through their experience of his resurrection they come to see him as the incarnate Son of God. The pentecostal experience in Jerusalem leads to the awareness of the Holy Spirit as our lasting link with God the Father. The Christian Church is born, which grows rapidly and spreads over the entire world. Ten centuries of evolving religious experience of Jews and Christians are recorded in the books of the Bible, Old and New Testament. During the first four centuries of our era the experience of the Apostles is formulated by the Church in the trinitarian monotheistic doctrine of the one God in three persons, Father-creator, Son-redeemer, Spirit-communicator. To me this is the deepest understanding of God that so far has developed in the human mind, even though the trinitarian nature of God remains a mysterious concept for us. 46

Along with this evolution of religious thought in humans went the evolution of moral awareness.⁴⁷ The first notion of morality can be seen in kin concern, reciprocity and altruistic behavior in higher animals⁴⁸ and in primitive humans. The first moral codes were developed by Egyptians and Babylonians. The precept of 'eye for eye, tooth for tooth' in the Babylonian Code of Hammurabi, where it was restricted to the elite, is taken over into Jewish law, where only foreigners are excluded (Ex.21:23-25). The Jewish code of law is summed up in the Decalogue (Ex.20:1-17), which is based on the covenant of Israel with Yahweh. Jesus affirmed and at the same time radicalized the Law (Mt.5:21-48), so that no human can hope to comply with it. From a moral code the Law has thus become a mirror showing us our brokenness, from which we can only be rescued by God's intervention in the saving death and resurrection of Jesus Christ. Having accepted this message, we may in joy and gratitude for our salvation follow the guidelines of the radicalized Law, knowing that the decisive step has been taken by God in Christ (Rom.3:20-26; 8:1-17). Morality has thus developed from group morality, without clear transcendent basis, through morality from a divine Law to morality out of gratitude for God's saving act in Christ. Christian morality, rooted in the life, death and resurrection of Jesus, invites all members of the human family to imitate him in their lives, and thus to share in his work of salvation. In this way kin concern, reciprocity, and altruism have evolved into a communal ethic with an emphasis on love (agape).

From the foregoing considerations it appears that religious experience with an associated moral awareness is a universal phenomenon among humans. It seems to me quite reasonable to assume that a similar religious evolution will take place in the development of any extraterrestrial advanced creatures. However, we must recognize that religious evolution on Earth has led to other faiths beside the Christian faith: continuing Judaism and Islam as closely related monotheistic religions, Hinduism and Buddhism as other forms of religion. Which kind of religion(s) may eventually have developed in any extraterrestrial culture can thus not be answered by bottom-up considerations. So I shall now move to top-down considerations, based on the Judeo-Christian image of God.

6. Theological Considerations: Top-Down

Religion can be seen as the result of the interaction between divine revelation and human experience. This means that the development of religious thinking among humans, described in the preceding section, can be considered to reflect the interaction of God's progressive self-revelation with increasing human understanding in human evolution. The experience of the presence of Yahweh with them during the Babylonian exile led the Jewish prophets, particularly Second Isaiah, to the conclusion that Yahweh is not only the God of Israel, but the Creator of the entire universe (Gen. 1 was written in the same period). Thus we may say that God is also the creator of any possibly existing extraterrestrials. He is the universal, omnipresent God of all peoples, Jews and Gentiles (Isa. 49:6), and thus also of any extraterrestrials. In the early Church Christ came to be seen as the cosmic Christ (Eph.1:20-23; Col.1:15-20; Heb.2:7-9), as the universal Redeemer ("that the world [kosmos] might be saved through him," Jn.3:17; "in Christ God was reconciling the world [kosmos]to himself, 2 Cor.5:19). This means that the creative work of the Father, the saving work of Christ and the communicative action of the Holy Spirit will apply just as much to any creatures on another planet as they do to us. Van Vorilong (c. 1450) already stated that Christ's death on Earth can bring salvation to the inhabitants of other worlds, even if there were an infinite number of these worlds.¹⁹ Then we may also expect that the one God of the universe will have made himself known to them, as he has

progressively revealed himself to us humans.

But then the question arises: Would such extraterrestrial beings also be sinful and in need of salvation? Thomas Campanella (1616) did not think so: "They do not descend from Adam and thus are not tainted by his sin, so they do not need salvation, unless they have committed another sin".¹⁹ In this somewhat simplistic reasoning he bases himself on the doctrine of original sin, which is untenable in the light of our scientific insights about the origin of humankind and the weakness of its biblical and theological foundation. Over against this I claim, in agreement with most current theologians, that the story of the Fall in Gen. 3 does not concern a unique, historical event but describes in mythical form the condition common to all humans, namely, the human ambivalence of being both image bearers of God and sinners grasping for equality with God. In my opinion it is likely that this would also apply to any extraterrestrial creatures. I have three reasons for this assumption: (1) the expectation that such beings will have a similar way of thinking as humans possess; (2) such creatures will also have received freedom of will as an expression of God's love, giving them the possibility for disobedience; (3) in view of the operation of the remaining element of chaos in the entire universe these creatures will also be affected by it. The third reason refers to my chaos theology of creation.^{38,49} Briefly put, this poses an initial creation from chaos as in Gen.1 and 2 (rather than from "nothing"), a continuing creation (cosmic and biological evolution in scientific terms) with a remaining element of chaos (symbolized as sea in the Old Testament), which will be abolished on the last Day (...and the sea was no more, Rev.21:1). I consider the remaining element of chaos as the source of the physical and moral evil in the world.⁵⁰ Thus there seems to be good reason to expect extraterrestrials to be sinners just as much in need of salvation as we are. I would even claim that salvation and reconciliation will come to them at the same time as to us, namely when the cosmic Christ at his triumphant return will definitively banish the remaining element of chaos from the entire universe. Another question is: Would this require a repetition of Christ's incarnation, death and resurrection for our extraterrestrial brothers and sisters on their planet? Van Vorilong said that it would not be "fitting" if Christ would have to come to another world to die again.¹⁹ This is the expression of a sentiment, rather than a rational theological statement. E.L. Mascall has discussed the question in a more theological way.⁵¹ He first rejects the "extreme kenotic view", according to which in the incarnation Christ would have scaled down his divinity to the limits of humanhood; in which case the incarnation could hardly have taken place simultaneously on two different planets. He also rejects the idea of a second incarnation after Christ had already been taken up in glory. But, Mascall says, the orthodox view is that the incarnation is not the conversion of Godhead into human flesh, but rather the taking up of humanhood into Godhead, so there is no reason why another finite rational nature of inhabitants of another planet could not also be taken up in this way, in other words that several incarnations would be possible. Brian Hebblethwaite has argued against the possibility of multiple incarnations, but strangely, he believes that this also rules out the existence of advanced extraterrestrial life.⁵²

My answer to the question about multiple incarnations follows a different line of thinking, but also leads to the uniqueness of Christ's incarnation. Over the centuries popular Christian belief has narrowed down the significance of the incarnation to being merely the prelude to the salvation of us humans. With Paul, however, I recognize in Jesus the cosmic Christ (2 Cor.5:19).⁵³ This fits with our knowledge of cosmic evolution, popularly expressed in the phrase that we are made of 'stardust'. The hydrogen and helium resulting from the Big Bang produced through nuclear fusion and supernovae explosions all chemical elements, which during the explosions were ejected into interstellar space as cosmic dust. Eventually, local condensation and accretion of the cosmic dust cloud in our galaxy formed the Sun and planets of our solar system. Living cells were formed from these elements in the prebiotic evolution, and during the biological evolution all living beings, including ourselves, are formed from these elements through the uptake of food. In this way, we humans have part in, are united with the entire cosmos, are made of stardust. Jesus, being fully human, also shares in this cosmic union, and thus through the incarnation he becomes the cosmic Christ. Incarnation, death, and resurrection of Jesus Christ, taking place in Palestine 2000 years ago, are of cosmic significance and lasting validity. These epochal events bring salvation to us, who live 2000 years later in other parts of the planet, yes, to all humans who ever lived on Earth at any time and at any place. And not only to humans, but to the whole creation that "has been groaning in labor pains until now and waits with eager longing" for its final liberation, as Paul says (Rom. 8:19, 22). Why not then to creatures on another planet?

The universe is a single system, evolving in a process where the simple leads to the

complex: inorganic matter leads to organic matter, organic matter to living matter, living matter to mind or spirit. The highest principle of unity in our universe is spirit. This insight led William Temple to introduce the concept of the sacramental universe.⁵⁴ In a sacrament the spiritual and the material are intimately related, with spirit being first and last and with matter being the effective expression of spirit. Likewise, in the universe God expresses himself in absolute supremacy and freedom through the evolution of matter to life and of life to human spirit, which is then united through the divine love in the kingdom of God.

On the basis of my earlier argumentation that extraterrestrials, if they exist, will strongly resemble us in body and mind, I suggest that they also will participate in the reconciliation brought about by Christ's incarnation, death and resurrection 2000 years ago in Palestine, without necessarily requiring a repetition of these events on their planet. And as God has made the message of Christ's saving work heard in all times and in all corners of our planet, so he will also bring it in an appropriate way to any of his creatures on another planet: God's communicative Spirit fills the entire world. They will then also be offered the opportunity to participate in the New Creation that we expect to be part of. If we should never succeed in meeting them in this world, then we shall certainly meet them in the next world – at least if they exist! This will not require any radical change in our theology, merely the willingness on our part to share with them not only the unique place in the cosmos that we had assumed for ourselves, but also our salvation. All this I believe to follow logically from our present scientific insights and from a reasonable extrapolation of Christian theology.

What if none of the search projects detects any signal from an advanced civilization outside our solar system? A negative finding would not be conclusive: we may have to look further into the universe with its billions of stars or find entirely different ways of searching for the existence of extraterrestrials. And what if the findings continue to be negative, and the scientific community comes to the conclusion that we do seem to be alone in this vast universe? Then we must remind ourselves of the fact that even if advanced creatures arose only on Earth, this still required the vast universe of which we are part: gravity would have made a smaller universe collapse far too soon to permit prebiotic and biological evolution to proceed to the point of the arrival of Homo sapiens. Then we must praise and thank God for his willingness to create this immense cosmos in order to allow us to arise in it.

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“Theological Implications of Possible Extraterrestrial Life.” *Sewanee Theological Review* 4: 420–435. Google Scholar. Carter, Brandon, and William H. McCrea. 1983. “The Anthropic Principle and Its Implications for Biological Evolution.” *Royal Society of London Philosophical Transactions Series A* 310 (1512): 347–363. Google Scholar. Chequers, James, Stephen Joseph, and Debbie Diduca. 1996. “Belief in Extraterrestrial Life, UFO-related Beliefs, and Schizotypal Personality.” *Personality and Individual Differences* 23 (3): 519–521. Google Scholar. 2011. “Bayesian Analysis of the Astrobiological Implications of Life’s Early Emergence on Earth.” *Proceedings of the National Academy of Sciences of the United States of America (PNAS)*. 109 (2): 395–400. Google Scholar. extraterrestrial life - Christian theology - Cultural dimensions of searching for extraterrestrial life. The implications of possible contact with other intelligent forms of life can easily be grasped. It is certainly expected that after communicating with other intelligent forms of life one would desire to check our knowledge of the laws that govern the physical universe (some of which could be unknown to us), get some information regarding the cosmic context of the human species, gain insight on the origin and diffusion of life, including the possibility of its. Extraterrestrial life contexts re-propose the intervention of mediators from faraway worlds, the delivery of moral messages that awaken in human beings the existential questions that ordinary terrestrial life has made dormant. The possible existence of extraterrestrials has provoked more than five centuries of theological speculation on how these beings, if they exist, relate to God. A certain stream of thought present in these debates argues that the eventual discovery of aliens would obligate human Christians to evangelize them for the salvation of their souls. Life and Intelligence Far from Earth: Formulating Theological Issues In Many Worlds, The New Universe, Extraterrestrial Life, and the Theological Implications. Jan 2000. 151-75.