

The Search for Extra-terrestrial Life: Historical and Theological Perspectives

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Resumo

Desde o início, as ideias acerca da vida extra-terrestre continuam significados metafísicos e religiosos. Estudos históricos, como os de Steven Dick e Michael Crowe, mostraram que as referências ao extra-terrestre ajudavam a tornar a astronomia mais atractiva, sendo discutidos exaustivamente. A confiança na existência de vida inteligente algures no universo não é uma descoberta recente, pois em meados do século XIX o filósofo escocês Thomas Dick calculou a população total do nosso sistema solar. Assim, em função das implicações metafísicas e teológicas da vida extra-terrestre, que têm influenciado o conteúdo das teorias astronómicas, podemos perguntar-nos se existe alguma coisa nova a ser dita à luz das nossas actuais especulações.

Introduction

In the conclusion to his book *The Fifth Miracle*, the popular science writer Paul Davies comments on the search for life elsewhere in the universe. The search for extraterrestrials, he suggests, is the “testing ground for two diametrically opposed world views” [Davies 1998, 255]. One is the world view of “orthodox science, with its nihilistic philosophy of the pointless universe, of impersonal laws oblivious of ends, a cosmos in which life and mind, science and art, hope and fear, are but fluky incidental embellishments on a tapestry of irreversible cosmic corruption”. The alternative view he

describes as “undeniably romantic but perhaps true nevertheless”. This is the vision of a “self-organizing and self-complexifying universe, governed by ingenious laws that encourage matter to evolve towards life and consciousness” [Davies 1998, 256]. To find life elsewhere in the universe, especially if there were a lot of it, would support the second view more than the first.

Faced with such a choice, I suspect that many religious thinkers might begin to feel uncomfortable. The nihilistic worldview that Davies associates with orthodox science would be particularly objectionable. But the alternative might also be unattractive. The idea of “ingenious” laws might be suggestive of divine ingenuity. Yet to speak of a *self-organizing* and a *self-complexifying* universe seems to imply a completely autonomous system operating independently of any transcendent power. Faced with the choice Davies describes, a Christian theologian might feel compelled to embrace extra-terrestrial life, in order to escape from the pointless universe of “orthodox science”. Yet to do so would bring its own problems. Within the Christian tradition the gravitational pull of anthropocentric concepts has been very strong. It has also been reinforced by the doctrine that human beings were made in the image of God and therefore uniquely privileged in the universe. Theologically speaking, there is an uncomfortable dilemma. We may populate other worlds to make our own less accidental, less pointless; but, in our embrace of intelligent aliens, do we not shake the older foundations of faith?

This dilemma, I shall argue, is not new. The possibility of extra-terrestrial life has been debated since antiquity and for centuries Christian theology has shown an ambivalent attitude towards the person of ET. Historical scholarship has much to teach us about the issues. It also helps us to understand the reasons why speculation about life on other worlds has recurred in many generations. I shall therefore begin with a few perspectives from recent historical research. It will then be possible to expose the tensions and divisions within the Christian tradition as different thinkers have addressed the problems in radically different ways. The question I wish to address is whether the modern search for signs of intelligent life has introduced anything significantly new into the discussion. Claims for the immensely important implications of new discoveries are often made. On closer inspection they introduce nuances that have been assessed many times before. But, unlike the author of the book of Ecclesiastes, I shall not conclude that there is nothing new under the sun. Beyond the sun, exciting new discoveries are constantly being made, reinvigorating a debate that

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touches many aspects of discourse about science and religion. My final question will be whether there are new contexts today in which extraterrestrials may still maintain a high profile.

Extraterrestrials and their uses

In antiquity the postulation of other inhabited worlds was associated with the atomists Democritus, Leucippus and Epicurus. Their worldview, captured in Lucretius's poem *De Rerum Natura*, stood in sharp contrast to the popular religious beliefs of their day. As Lucretius put it, nature could run by itself and had no need of gods. Worlds came into being and passed out of being by collisions and combinations of atoms. There was no steering arm of divine providence, no intervention by the gods. In sixteenth-century Europe, when the text of Lucretius was rediscovered and passed through many editions, atomism and the possibility of many worlds were linked together. This means that one use for extraterrestrials was to attack the Christian religion. They were assembled for that same purpose in works of social criticism, as when Cyrano de Bergerac described the state of civilisation on the moon (1657) and the sun (1662). It was an ingenious device to expose what was defective in earthly society [Cyrano de Bergerac, 1687]. When a visitor from Earth asks his audience what they think of Moses, they burst into laughter.

An impulse to discuss extraterrestrials came from the science of astronomy itself, especially after the Copernican innovation. In the new sun-centred universe, the Earth became a planet, inviting the suggestion that other planets, like the Earth, might be inhabited. Much of Galileo's defence of the Copernican system was grounded in the analogies he drew between Earth and the planets. His contemporary, Johannes Kepler, was perfectly willing to admit other civilisations in the solar system, though he could not renounce the idea that the human race was the most privileged –especially since it occupied the central orbit among the planets [Rosen 1965]. A critical point is that discussion of extraterrestrials became an attractive device in the teaching and popularisation of astronomy. From the time of Kepler to the present, the question whether life might be possible on Mars or other planets has been the perfect vehicle for introducing information on the physics and chemistry of heavenly bodies. Serious astronomers have sometimes

dismissed talk of extraterrestrials precisely because it has always been speculative. But one interesting result of historical research has been the realisation that beliefs about a plurality of worlds have actually shaped the content of astronomical science and have sometimes inspired new research programmes. For example, Descartes's conviction that the stars are suns resembling our own sun appears to have been reinforced and certainly popularised by the belief in many planetary systems [Dick 1982, 106-41]. The immense success of Fontenelle's *Entretiens sur la pluralité des mondes* (1686) ensured that, from the late-seventeenth century onwards, extraterrestrials were admitted into polite society.

The interplay between the physics of astronomy and the metaphysics of multiple worlds has often been subtle. It has sometimes worked to the advantage of astronomy, sometimes to its detriment. In a recent analysis of four case studies, Michael Crowe has argued that the giant telescopes that enabled William Herschel to identify some two thousand five hundred nebulae had been built in the first place to satisfy his curiosity about life on the moon. Less productively, Herschel also believed that the *sun* is inhabited. This required the theory that the sun and stars are cool Earth-like spheres surrounded by a bright glowing layer. Sunspots, on this somewhat eccentric view, were simply openings in the surface layer, allowing glimpses of the cool interior. Crowe's other examples include William Whewell, the Cambridge philosopher whose doubts about extraterrestrials shaped his interpretation of the nebulae. Whewell rejected the idea that they were distant island-universes containing many worlds. They were rather stars in the process of formation, offering no foothold for life. Crowe's argument is that Christian convictions lay behind Whewell's unease, particularly his understanding of God's Incarnation in the person of Christ and what that meant for the Earth as a unique theatre of redemption. A similar sensibility is shown in another of Crowe's subjects, Edward Walter Maunder who, early in the twentieth century, rejected the evidence for Martian life based on the appearance of the canals made famous by Giovanni Schiaparelli and Percival Lowell [Crowe 2001]. I have drawn attention to Crowe's study because it shows how difficult it is to generalise about the consequences for science when metaphysical and religious predispositions colour and even shape what is acceptable. It reminds us that heated debates about life on other worlds are not new and that theological preferences have found expression in scientific debate. Edward Maunder's extermination of the

Martians went hand in hand with his membership of a small Pentecostal church. He was convinced that “it was no mere lucky chance that brought together so many qualifications, each of them essential to our welfare, in this planet of ours, whilst larger, brighter orbs possess no such fitness for our use” [Maunder 1882, 172]. It was the contrast that threw into relief the “infinite care” with which the Earth had been fashioned. Maunder’s conservative religious position does not coincide with either of the two worldviews defined by Paul Davies and with which I began. For Maunder and many Christian thinkers there are deep religious meanings in the drama of human life on Earth without having to populate the heavens in order to preserve a sense of purpose. Let us look a little more closely at the theological issues.

Theological ambivalence

Within the Christian traditions, both Catholic and Protestant, attitudes towards extraterrestrial life have been diverse, divisive and ambivalent. Scholastic philosophers often had to balance on a tight-rope. In antiquity Aristotle had argued that there could only be one cosmos. But this was a dogma condemned among many others by Etienne Tempier, bishop of Paris, in 1277. Henceforth it would be dangerous to suggest that an omnipotent God could *not* have made more worlds had He wished to do so. But to assert that He had in fact made more was even more dangerous, as Giordano Bruno discovered to his cost. There has been a lot of discussion concerning Bruno’s execution and whether his belief in an infinite universe containing an infinite plurality of worlds was a significant heresy. Perhaps he was burned at the stake as a magician, as Frances Yates proposed [Yates 1964] or because of the many blasphemies with which he was charged? Maurice Finocchiaro has recently discounted these possibilities because Bruno denied that he had been guilty of deviation on such matters as the person of Christ. On theological matters he professed a willingness to submit to the authority of his Church. It was the philosophical issues on which he refused to move. Bruno stubbornly maintained that it was *not* heretical to propose an infinite universe containing an infinite plurality of worlds. According to Finocchiaro it was his refusal to submit on this point that, in the eyes of his judges, confirmed a more comprehensive guilt [Finocchiaro 2002, 81-2].

If this interpretation is correct, it raises the question how Bruno could be so confident that an infinite plurality of worlds ought not to be condemned as heretical. Part of the answer may lie in the argument he used to defend his position. For Bruno it was not enough that an omnipotent God *could* have made many worlds. An infinitely powerful God would surely have exercised and expressed that power in creating an infinite number of worlds? His judges did not agree but we see here the makings of both divisiveness and ambivalence within the Christian church. Bruno’s argument was an extension of scholastic reasoning [Westman 1977] and variants of it would later find favour with Christian pluralists. More conservative minds would side with the sentiment expressed by the Dutch philosopher Gerhard De Vries: to invoke God’s omnipotence to sanction men on the moon was the “common refuge of those who presumed to defend absurd and false opinions of every kind as truth” [Cited by Dick 1982, 122].

The nature and relevance of biblical authority contributed to another source of ambivalence. There is no doubt that extraterrestrial life was often excluded on biblical grounds. The architect of Lutheran educational priorities, Philip Melanchthon, favoured astronomical and mathematical studies but his Protestant scholasticism militated against a plurality of worlds [Dillenberger 1961]. The Bible indicated that, after the labour of Creation, God had rested on the seventh day. He had not begun work on other worlds. Melanchthon’s resistance also sprang from his reflections on Christ’s death and resurrection: “it must not be imagined that there are many worlds, because it must not be imagined that Christ died and was resurrected more often” [Dick 1982, 89]. Evidently the question whether Christ might have to visit every inhabited world led to an uncomfortable train of thought.

However, the use of the Bible to dismiss extra-terrestrials was by no means universal among Christian scholars. The most active populariser of Copernican cosmology in England, John Wilkins, agreed that the Bible said nothing about life on other worlds. But this was a fact that could be turned to advantage. The silence of the Bible was simply explained since the Scriptures were concerned only with God’s involvement in human history. Precisely because it said nothing about extra-terrestrial life, it could not be used to rule out the possibility [Wilkins 1638]. Wilkins was writing in the middle of the seventeenth century when it was increasingly difficult to believe that all significant knowledge was either contained in or indicated by Scripture. By the middle of the nineteenth-century, when other habitable

worlds were widely accepted, the Bible was even used to uphold them. In his book *More Worlds than One* [1854], the Scottish physicist and evangelical Christian David Brewster exploited Christ's remark that "in my Father's house are many mansions", and Christ's reference to "other sheep, not of this fold". The silence of scripture, once a source of ambiguity, was for Brewster not a real silence. There were hints of many mansions in the universe [Brooke 1977].

At the heart of the theological debate has been the doctrine of Incarnation. We have already seen Melancthon's discomfort at the thought that Christ might have to visit other worlds. The problem runs quite deep because it is in the nature of the concept of Incarnation that the human Jesus of Nazareth could not be understood as God incarnate for an extra-terrestrial species. As the Catholic theologian Denis Edwards has asserted, "if an extraterrestrial community is to experience incarnation, this would seem to require that God be revealed in extraterrestrial flesh" [Edwards 2000]. Here we can detect another source of ambivalence among Christian commentators. When John Wilkins addressed the issues in seventeenth-century England he minimised the threat from other worlds by observing that they might not be occupied by intelligent life. He added that, even if they were, that life might not be human. Even if it was, it might be a form of human life that had not fallen from grace. And even if it had fallen from grace, why should Christ's death on Earth not be efficacious for their redemption? But it is precisely this last conjecture – the universal significance of Christ's death and resurrection – that highlights the dilemma. How would the fallen on other worlds know of Christ's redeeming work? Given what one can only assume to be their very different *histories*, how could Christ's life on Earth have the same significance for them? Denis Edwards has again pinpointed the problem:

It is hard to see how they can be thought of as sharing our earthly economy. If this is so, then, we cannot rule out that God might deal with them according to an economy that is distinct from ours, and we need to allow that this economy could involve some form of incarnation [Edwards 2000].

While the admission of other incarnations has often been resisted, more open views have also been countenanced by Christian thinkers. Thomas Aquinas, while arguing for a single unified cosmos, nevertheless insisted that

more than one incarnation must be considered possible for God [O'Meara 1999]. His contemporary, the Franciscan theologian Bonaventure, allowed that God could make a hundred worlds like ours and could also have made a world that embraced them all. He even considered that other worlds might have existed in time frames prior to our own [Edwards 2000]. The depth of the metaphysical debates of the past can still take us by surprise.

Divisions within the Christian tradition can also be exposed by reference to natural theology. In his *Astro-Theology* of 1714, William Derham rejoiced in the possibility of multiple worlds because to take the idea seriously was spiritually liberating: it marked an emancipation from the naïve view that everything had been made for the benefit of man. The affirmation of other worlds was sometimes helpful in the construction of an intelligible universe. Galileo's telescopic observations had posed an acute problem: what purpose could there be for the many stars invisible to the naked eye? One way of protecting a teleological reading of nature was to imagine that stars, of no use to us, did after all have a purpose if they shone on their own planetary worlds. This way of rationalising what would otherwise seem gratuitous elements of creation goes a long way towards explaining the popularity of extraterrestrials in eighteenth and early nineteenth-century works of natural theology. As David Brewster argued in his dispute with William Whewell, for God to have created so many suns with no worlds of their own to illuminate would be unthinkable. It would leave serious flaws in the economy of creation. It would be as if a railway entrepreneur sent trains running all over Europe having many carriages illuminated but only one occupied. It would be terribly wasteful [Brooke 1977]. Whewell took a very different view, partly because of his Christological concerns, partly because he saw how the assumption of inhabited worlds could easily be used to promote a naturalistic evolutionary philosophy that was theologically dangerous.

The debate between Brewster and Whewell took place in the 1850s before Charles Darwin's *Origin of Species* was published. But a naturalistic theory of human evolution had already reached a large public. In 1844 a book was published anonymously with the title *Vestiges of the Natural History of Creation*. Its author, Robert Chambers, proposed that there was a law of development in the biological world similar to Newton's law of gravitation in the physical. Although Chambers ascribed the law to a deity, his thesis was shocking to many because it treated mental phenomena and human behaviour as if they were rooted in material causes. Whewell's

colleague at Trinity College Cambridge, Adam Sedgwick, described the book as a work of “base materialism” that destroyed the basis for moral responsibility. It was the kind of book that created a dilemma for scholars. If one attacked it, as Sedgwick did in an extravagantly long review, one only succeeded in drawing attention to it. As James Secord has recently shown, *Vestiges* was read everywhere – from coffee houses to colleges, from drawing rooms to railway carriages [Secord 2000]. Although its many readers read it differently, there was a message for those interested in a plurality of worlds. Given the right material conditions on other worlds, the same law of development that produced life on Earth would have led to the emergence of comparable life elsewhere. Echoing earlier attacks on Christianity by deists such as Tom Paine, Chambers associated a plurality of worlds with a naturalistic metaphysics that he knew would be an embarrassment to certain Christian sensibilities. I believe that Whewell saw more clearly into the future than many of his contemporaries. He saw that any evidence for extraterrestrial life could now be turned into evidence for an evolutionary account of human origins. He foresaw the correlation enshrined in the less nihilistic of Paul Davies’s two worldviews. He foresaw that it might be possible to argue for a law, biased in some way towards the production of life in many cosmic niches. But such a prospect was distasteful because, in the last analysis, Whewell could not accept that the human mind, with its ability to uncover scientific truth, was the product of merely natural forces. In this he was not alone. The same can be said of Darwin’s mentor Charles Lyell and of Darwin’s co-founder of the theory of natural selection, Alfred Russel Wallace.

From the past to the present

It may be tempting to dismiss the debates of the past because they took place without the advantage of modern scientific instruments and without the luxury of sophisticated programmes for the detection of portentous signals. But given the richness of the earlier discussions it is time to ask whether modern resources have introduced anything radically new. Newspaper headlines often imply that they have; but on closer inspection the arguments produced seem nothing more than variants of what has gone before. There is an old joke that one of the strongest arguments for belief in

the intelligence of life elsewhere in the universe is that it has chosen *not* to visit us! That, too, must not be forgotten.

Any suggestion that we might have to contemplate the prospect of extraterrestrial intelligence more seriously today than in previous centuries hardly bears examination. When Whewell questioned the evidence for ET in 1853 he was attacking a belief that had become firmly entrenched within popular scientific culture. Just a few years earlier the Scottish evangelical writer Thomas Dick had published his estimate of the total population of the solar system, which included the inhabitants of Saturn’s rings. Extraterrestrials were more prevalent in 1837 than now, even though no films had been made about them. Dick allocated a population to each planet according to its size, and with eloquent precision calculated a total population of 21,891,974,404,480 [Dick 1837; Crowe 1986, 199]. Surely our modern science has taught us to be less, not more, credulous.

It could be claimed, reasonably enough, that recent science has helped to sustain the vision by giving us more real planets to play with. After centuries of speculation we have at last identified planets orbiting other suns. Speaking of this development, the British Astronomer Royal, Sir Martin Rees, has recently noted that “We shall be especially interested in possible ‘twins’ of our Earth – planets the same size as ours, orbiting other Sun-like stars, and with climates where water neither boils nor stays frozen.” He adds that “by analysing such a planet’s faint light, we could infer whether it might have a biosphere”. His question is whether some of these planets could “harbour life-forms far more interesting than anything we might find on Mars”. His answer, however, still looks to the future:

I think biologists will understand enough about life’s origins to be able to tell us whether it is a fluke, or whether it is near-inevitable in the kind of initial ‘soup’ expected on a young planet. They might even have answered the harder question: what are the odds against it evolving into something that we would recognise as intelligent? [Rees 2003]

If we ask whether the debate has been transformed by the discovery of these new planets, there is perhaps one sense in which it has. It is no longer possible to hold any kind of metaphysical predisposition against their reality – the *kind* of metaphysical predisposition that Stanley Jaki exposed among thinkers previously committed to their reality [Jaki 1978]. In other respects it is difficult to detect any decisive change. The majority of the new

planets appear to be too close to their stars or to have orbits of such a shape that it would be unduly optimistic to populate them [*Nature* 17 April 2003, 659]. Decisive evidence remains as elusive as ever. In the quotation above the astronomer looks to the biologist for help, reminding us again of the two possibilities supposed by Paul Davies. Yet the issue might not prove so easily resolvable. On the view that life on earth is a lucky fluke, it is a fluke that could presumably still occur elsewhere.

A claim might be made to the effect that new discoveries concerning life on Earth have made it more probable that life of some kind could exist elsewhere. This is a reference to the organisms that have been named “extremophiles” because they can survive in the most extreme conditions found on Earth. We now know of microbes that can survive under Antarctic ice-sheets, in extremes of alkalinity, under intense radiation and under intense pressure. If they can cope with such extremes need we be so precipitate in dismissing the physical matrices of other planets as inhospitable? The possible significance of these resilient superbugs has been described by Paul Davies:

Some superbugs seem to be extraordinarily ancient and primitive, and there is a growing feeling among scientists that they could be living fossils, the nearest thing alive to the universal ancestor. If so, the rigorous conditions in which they thrive, although extreme to us, might be indicative of what Earth was like 3.8 billion years ago [Davies 1998, 146].

As rhetoric in favour of life elsewhere, however, there is nothing new in the argument. In the nineteenth-century debate between Brewster and Whewell, Brewster used essentially the same argument to maintain a healthy population on other worlds. Wherever one looked on Earth, life of some kind seemed able to survive, however extreme the conditions. Brewster even gave the argument a theological flourish by insisting that an omnipotent God would be able to devise life forms different from those found on Earth yet adapted to the extreme conditions of other spheres [Brooke 1977].

A further claim might be that what we know about the age of planets in other star systems has transformed the terms of the debate. The recent discovery of a gas giant, 800 times the size of Earth and formed apparently some 13 billion years ago, has attracted the attention of science journalists. This planet orbits a double star in the M4 cluster visible in the direction of

the constellation Scorpio. The fact that it was formed just a billion years after the ‘big bang’ has encouraged speculation that planets could form much more readily than is generally believed. That would increase the probability of finding some with Earth-like characteristics. Could the first life in the universe have evolved 13 billion years ago on the earliest planets and then become extinct? It is the possibility of extinction that captured the newspaper headlines. One headline was “Old planet shows ET may be dead”. This was sensational news. And yet it adds very little to the terms of the debate as conducted during the nineteenth century. The point was made then that recent advances in paleontology showed that Earth itself had been devoid of life for much of its history. Many species had also become extinct. The inference was drawn then that other worlds might not be inhabited now, though they might once have been. Or they might not be inhabited now but could be in the future [Miller 1855]. Either way, the prospect of conversation with a *living* ET had to be moderated.

Modern critics of the SETI project have found in science itself a justification for their scepticism. A warning note had been sounded by the evolutionary biologist George Simpson as early as 1964: “The assumption, so freely made by astronomers, physicists, and some biochemists, that once life gets started anywhere, humanoids will eventually and inevitably appear is plainly false” [Simpson 1964]. Why? Because humans are themselves the product of countless historical accidents. More recently Carl Sagan was faced with same objection from evolutionary biology. In a debate with Ernst Mayr he was confronted with the fact that on Earth, among millions of lineages or organisms, and perhaps 50 billion speciation events, only one had led to high intelligence [Davies 1998, 255]. Another sceptic, Stephen Jay Gould, has become well known for his thought experiment that even if the evolutionary tape were played again on Earth, the chance of anything like a human being emerging would be effectively nil.

How new is this sceptical argument? Once again it had been presaged in the past, by an earlier evolutionary biologist Alfred Russel Wallace. In an appendix (1904) to his discussion of *Man’s Place in the Universe* (1903), Wallace challenged those who blithely assumed that intelligent beings similar to man would appear in planets whose physical configuration was similar to that of the Earth. Their assumption was facile because the course of evolution on Earth had depended on repeated processes of divergence from common ancestors, each step contingent on the contingencies that had preceded

it. Wallace emphasised the “number of very complex and antecedently improbable conditions which are absolutely essential for the development of higher forms of life from the elements that exist upon the earth or are known to exist in the universe”. One had to recognise “the enormous rate at which improbability increases with each additional condition which is itself improbable” [Crowe 1986, 531]. Superficially it may seem strange that one of the first proponents of a naturalistic theory of evolution should have turned the theory against intelligent extraterrestrials. But his position is all the more interesting because he again falls outside the two competing worldviews as presented by Paul Davies. For Wallace there was a definite bias towards the production of human intelligence on Earth. He found this conclusion all the more compelling because of the absence he proposed elsewhere. Unlike predecessors who had contrasted the finely tuned Earth with the barren heavens, Wallace was not writing as a Christian. But he had taken an interest in spiritualism and had concluded that the evolution of the human mind was only explicable if there had been some form of guiding intelligence behind the evolutionary process [Kottler 1974]. On this point he had diverged from Darwin, to the latter’s consternation.

Three conclusions are I think permissible from these various examples. One is that the two competing worldviews as described by Paul Davies do not exhaust the possibilities. A *contrast* between what is found on Earth and what might be found in the heavens has served the “romantic” view he describes, albeit it in a circumscribed space. A second conclusion is that there is no simple correlation between theological positions and attitudes towards ET. The diversity and ambivalence that I have tried to illustrate suggest the absence of relations of entailment. My third and more provocative conclusion is that the basic philosophical and theological issues have been rehearsed so many times in the past that we should be suspicious of apocalyptic claims made for the present.

New contexts for ET

Rather than finish on that cynical note, I should like to refer briefly to four contexts in which extra-terrestrials may take on a new lease of life. The most obvious context is that of telescopic improvement. One of the missions in which the Vatican Observatory Research Group is involved is to

use the large binocular telescope under construction at the University of Arizona to take pictures of extrasolar planets. Reporting an interview with Father George Coyne, Director of the Vatican Observatory, Margaret Wertheim notes a “lovely twist of fate” – that the Roman Catholic Church has paved the way for instruments that may finally enable us to detect life on other worlds [Wertheim 2003]. She is particularly startled by Coyne’s reference to stars as God’s sperm. Asked whether he believes there will be other populated worlds, he replied that stars, like sperm, have the potential to produce life; but, also like sperm, few may fulfil their potential. The analogy is striking, though again not radically new. When Whewell resisted the dogma of extra-terrestrial life one hundred and fifty years ago, he drew similar analogies between the physical processes of worlds in the making and the abortive aspects of organic reproduction [Whewell 1853, Brooke 1977].

Do such references to unrealised potential, or to abortive features of creation undermine arguments for design? Attempts to revive a natural theology constitute a second context in which discussion of ET continues to be relevant. Modern scientific theory makes it extremely difficult to believe in a God whose relationship to evolutionary processes is that of a micro-manager. But those who wish to argue for design may still claim that a universe was designed in which it was possible for intelligent life to evolve *somewhere*; the location did not have to be the Earth.

The ‘intelligent design’ movement that has recently gained momentum in the United States provides a third context in which ET has made an appearance. Here the question is different: can criteria be specified for the *detection* of ‘intelligent design’ in the world? If there are features of biological systems that exhibit what Michael Behe has called “irreducible complexity”, if they cannot be explained either by chance or by natural laws, then is it not reasonable to posit the role of intelligent design? [Behe 1996]. This is a deeply problematic argument [Miller 1999], with which I have little sympathy; but the claim that it is ‘scientific’ to search for intelligent design is sometimes justified by reference to the SETI project. If it is ‘scientific’ to look for traces of extraterrestrial intelligences in world-systems we do not know, why should it not be ‘scientific’ to look for traces of intelligence in the biological systems we do know?

My fourth context is defined by the continuing interest in the anthropic coincidences – in the seemingly remarkable fact that for intelligent life to

have evolved at all several physical parameters had to lie within an extremely narrow range. The fact that such an improbable combination of values occurred at all has been claimed as evidence for design. To that kind of argument there is always the possibility of an Epicurean response – that countless universes may have come into existence, very few proving viable or productive of life. Instead of speaking of design we should count our lucky stars. In one respect we have then come full circle, because the issue in antiquity was not so much whether there are other intelligent races within our one universe but whether there might be many completely separate universes (more strictly separate *cosmoi*). The difficulty, now as then, is simply this: if by definition these other universes are truly separate, how can we know anything about them and the worlds they *might* contain?

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