

Desperately seeking aliens

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Belief that intelligent life is commonplace in the Universe was taken for granted by scholars and scientists until well into the nineteenth century. Space travel since the late 1950s reignited the debate, which even now attracts discussion by serious, professional scientists. And although statisticians might lobby that life must surely exist somewhere in the Universe, the evolution of what we perceive as 'intelligent life' seems utterly improbable — elsewhere as well as on Earth. Can we free ourselves of our animist fantasies and accept that all alien forms of intelligent life are, and always have been, imaginary?

It is easy to imagine the existence of life elsewhere in the Universe. The key word here is 'imagine' — the human mind has been populated with gods and demons since time immemorial, products of an apparently insatiable craving for the exotic. And still we yearn, our dreams turning from the supernatural and animist to the popular culture of such inventions as Mickey Mouse and Bugs Bunny, Klingons and Vulcans, and, of course, the *Alien*. The fruitfulness of our imagination is surprising in view of the fact that the Universe itself has offered no help: so far, our search for signs of alien life has drawn a blank. As far as we know, consciousness has dawned nowhere but on our home planet, Earth. I shall argue the case that — for the moment, at least — all other forms of intelligent life are imaginary, as they always have been.

The case that intelligent life is rare in the Universe is logical, yet it is hardly more than a century old, and showing signs of waning in the face of scientific initiatives such as the founding of the NASA Astrobiology Institute, whose aim is to explore the conditions for life on Earth and elsewhere, and even in the commission of this article for a *Nature* Insight entitled 'Astrobiology — Life in the Universe', in which the possibilities of life elsewhere in the Universe are discussed by serious, professional scientists. In the face of millennia of desperation to find aliens, recent scepticism, such as Brownlee and Ward's book *Rare Earth*¹, might be taken for a *fin-de-siècle* aberration.

A history of belief

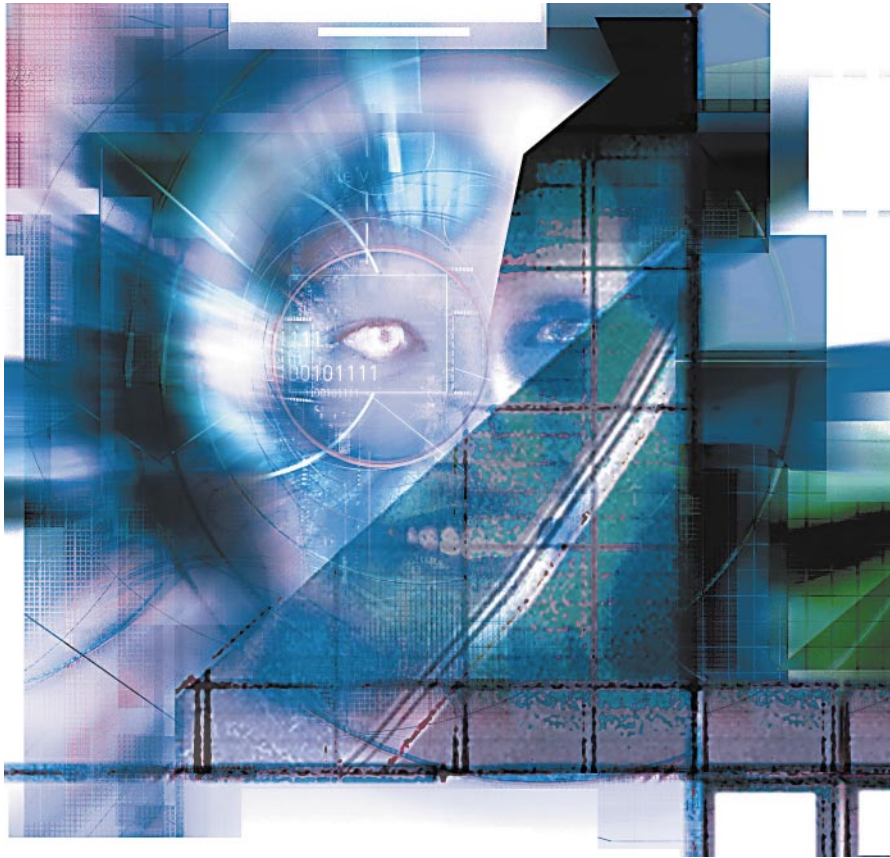
Serious speculation about life elsewhere was once commonplace. A few centuries ago, many scholars believed that intelligent life existed everywhere, and that an all-powerful God in his generosity had bestowed life on all the planets of the Solar System. This belief had firmest tenure on our neighbouring heavenly body, the Moon². We cannot tell how ancient this erroneous belief may be, but the first story to be set on the Moon is generally agreed to have been written in the second century AD by Lucian of Samosata, whose *True History* is a satire on travel writing.

Lucian's travellers are carried by a waterspout in a Greek ship to the Moon. There they discover that the King of the Moon and the King of the Sun are at war over the issue of the colonization of Jupiter. Fantastic monsters are employed in battles on both sides. Such adventures have always been popular, at least from recent centuries onwards. One authority, Philip B. Gove, lists 215 books describing voyages to the Moon published in the eighteenth century alone³. Modes of transport have varied, from angels to migratory geese.

Science has always provided the most potent fuel for the imagination. Space fiction took off after Galileo published *The Starry Messenger* in 1610, conveying vividly the excitement of the moment when a man first looked through a telescope into space. Not only was the Moon no perfect sphere, as had been always thought, but was "just like the surface of the Earth itself, varied everywhere by mountains and valleys". Following his description of the Moon, Galileo went on to reveal his discovery that "there are not only three, but four, erratic sidereal bodies performing their revolutions round Jupiter". This observation of the four main jovian satellites overturned the old Aristotelian thinking, which had set the Earth at the centre of the Universe. Galileo's name became celebrated beyond his native Italy. No longer was it possible for informed people to believe that the Sun went round the Earth. Henceforth, the heliocentric version of our Solar System would prevail, and bring forth many celestial tales — generally satires or utopias. The telescope fathered both astronomy and fantasy. Just one example was *Man in the Moone* (1638) by the learned Bishop Francis Godwin of Hereford, which remained in print for more than two centuries and was much translated. Possibly because the bishop considered his book went against the teachings of the Church, it had to await publication until after his death.

That life in the Universe was, well, universal was taken for granted in the scientific sphere until well into the nineteenth century. William Whewell, the scientist who famously coined the word 'scientist', found it necessary to dispute the belief in universal life. His book *Of the Plurality of Worlds* was published anonymously in 1855. Not that Whewell's views did anything to stem the tide of aliens in fiction. Since the days of H. G. Wells, when cars replaced horses, writers have propagated aliens with increasing assurance. If aliens do not exist, it seems necessary to invent them. It is a nice irony of modern life that the prospects of finding real-life aliens have dimmed just as the 'realism' of fictional aliens has waxed. Perhaps the two are connected — and yet the pendulum could be swinging back sharply.

By the late 1950s, the idea of intelligent life on Mars or any other planet was unfashionable enough to be the subject of derision. The tide turned just two weeks after the Astronomer Royal, Sir Harold Spencer Jones, announced in 1957 that space travel was bunk — when the Soviet Union sent up the first Sputnik. (Jones later compounded his error by saying that he was talking about science fiction.) Once it was generally realized that large objects could travel through space, propelled by rocket motors, the gates were open for speculation about visits and visitations to and from Earth. It was a technological dream. From then



onwards, it seemed that most people in the West believed — as had the ancients — that all about us were unseen planets of stars abounding with life. For all Whewell's work, the notion of plurality of interplanetary life had returned. By the early 1960s, unthinking scepticism had turned to unthinking belief.

Earth's neighbours and beyond

Nothing except statistics supports the idea that life (or at least intelligent life) exists anywhere else but the Earth. The evidence in our own Solar System is decisively negative. The Moon as an abode of life was ruled out when it was discovered that it had no atmosphere. Elimination next for our shrouded neighbour Venus, of which the Swedish astronomer, Svante Arrhenius, deduced in 1917 that "everything on Venus is dripping wet"⁴. The surface, according to Arrhenius, was covered by swamps, in which low forms of life existed: "the organisms are nearly of the same kind all over the planet". (In a forgotten novel of 1956, *Escape to Venus*, S. Makepeace Lott is nearer the mark, speaking of "the battering of the gas storms which flung the suspended dust particles across the face of the planet at several hundred kilometres an hour".) With a mean surface temperature of 740 K, Venus is an unlikely abode of life.

So to Mars, the planet on which most expectations of finding life were pinned. In 1909, astronomer Percival Lowell — self-delusive finder of martian canals —

published the well-reasoned *Mars as the Abode of Life*. It must have seemed reasonable at that period to believe in life on our dry neighbouring planet, when the previous century had uncovered evidence of a staggering abundance of life, never previously dreamed of and flourishing over millions of years, in the strata of terrestrial rock. If a monstrous fossil reptile in the ancient sandstone, why not a little green man on Mars?

But no. Since Lowell's day, Mariners and Vikings have called on Mars. Dust and rocks are all they have found. Mars is a bleak, stony place: dry, with only the thinnest of atmospheres. Viking revealed the martian surface as a highly inhospitable environment for life. The finding of microscopic impressions in a meteorite, believed to be of martian origin, and which might, in some circumstances, have been fossils, has been controversial.

Venus, Earth and Mars lie in the Sun's 'comfort zone'. Beyond Mars stretches a gulf of space, with the gas giants beyond it — surely, there can be no hope for life out there? But the Galileo spacecraft has produced strong evidence that beneath the icy and broken surface of Europa, one of the four galilean Moons of Jupiter, lies an ocean⁵, warmed by the gravitational pull of Jupiter. What might we anticipate there? Intelligent shrimps? Intellectual fish? We can but hope — but there is still a line to be drawn between hope and conviction.

And beyond the Solar System? Our Galaxy contains approximately 200 billion

stars. Surely some of them must have planets that sustain life? It is not an unreasonable conjecture, given the numbers. Although we have no evidence that any of the now several dozen known extrasolar planetary systems⁶ have suitable conditions for life of the kind we might recognize as such, the numbers could give us hope.

Improbable evolution of intelligence

But statistical casuistry works both ways, as is shown by the improbability of intelligent life appearing on the only planet we know well — the Earth. Although life appeared on Earth at least 3.8 billion years ago, not long after the planet itself formed (see the review in this issue by Nisbet and Sleep, pages 1083–1091), it took another 3.2 billion years before the appearance of complex, multicellular life forms large enough to be viewed without a microscope. Intelligence (as we perhaps mistakenly understand it) has developed only in the past few tens of thousands of years. According to Ward and Brownlee¹, microbial life in our Galaxy might be common, but complex, multicellular life will be extremely rare.

Each of the steps — between the appearance of life and the evolution of intelligence — reveals its complexity, helped on or deterred by coincidences and catastrophes. Moreover, there might have been only one time propitious for creating the rudiments of life: later might have been too late. Given its evolution through a number of precarious episodes, we perceive that 'intelligent life' is an uncharacteristic effect, not merely in our own Solar System but more universally. In fact, it seems utterly improbable — elsewhere as well as here.

This knowledge has not deterred serious-minded people from attempting to make contact with intelligences elsewhere in the Galaxy⁷. The Search for Extraterrestrial Intelligence (SETI) programme was set up in the 1960s, although so far no one or nothing has answered its signals (see the review in this issue by Wilson, pages 1110–1114). Nor have we heard any signals from elsewhere.

A challenge to the consensus of universal biological ubiquity was presented in 1986 by John D. Barrow and Frank J. Tipler in *The Anthropic Cosmological Principle*⁸, a powerful sequel to Whewell's argument. Using many disciplines, the authors argue that, by an element of design, ours is the only planet that houses cognate beings. Their argument is complex, encompassing the stability of stars and the eccentricities of water, on which life and its origins depend heavily. In sum, it leaves human cognition with a large responsibility for acting as the consciousness of the Universe.

C. O. Lovejoy is quoted as saying: "Man is not only a unique animal, but the end product of a completely unique evolutionary pathway, the elements of which are

traceable at least to the beginnings of the Cenozoic.”⁹ This pathway is defined by the evolutionary biologist Ernst Mayr. Speaking of the principal divisions (or phyla) in the animal kingdom, he says that the kingdom “consists of about 25 major branches... Only one of them developed real intelligence, the chordates. There are numerous classes in the chordates, I would guess more than 50 of them, but only one of them (the mammals) developed real intelligence, as in Man. The mammals consist of 20-odd orders. Only one of them, the primates, acquiring intelligence, and among the well over 100 species of primates only one, Man, has the kind of intelligence that would permit the development of advanced technology... An evolution of intelligence is not probable.”¹⁰

The blessing of science

We understand that optimism and imagination help to propel science. Nevertheless, we are entitled to ask whether assumptions about alien life are unscientific. Aliens are the staple diet of modern entertainment, but these are, in the main, contemporary fairy stories, and none the worse for that. However, their relationship with real science is ambiguous. Imaginary aliens are many and diverse, but provide little help in any current comprehension of understanding the Universe: rather than assisting us, aliens impede understanding. Their air of seeming rationality, of being the product of scientific thinking, is spurious. Where, then, do aliens originate, and how has our desperate search for aliens come to find itself on any serious scientific agenda?

An intimacy with the non-human is a fundamental human trait. A vast population of ghosts, ghouls and other mythical creatures has accompanied humankind through the ages, haunting its woods, houses and graveyards. Among their attractions is that they are free of the physical laws that govern humans. In particular, they are at least partly immune to gravity and

death (a tradition continued among mythical cartoon creatures such as Tom and Jerry).

Above these minions, as religion outranks superstition, are assembled an even more formidable array of fictitious beings, the gods and goddesses of our inner world. What a collection they are! Belief in them beggars belief: adorned with snakes and skulls, they arrive to impose restrictive laws for human conduct, laws that frequently include whom we should or should not sleep with, and the preservation of life and the sacrifice of it. Coming from a generation which listened to damnation preached every Sunday, brought up to believe in a cloudy Heaven and the fiery torment of Hell (ruled over by a horned and unpleasant Satan), I now recoil from the cruelty of the pulpit, and can but marvel at the entire range of weird deities.

We do not believe in fairies any more, nor do we find it necessary to blaspheme against Baal. But it seems that we are born animists. Parents heap a variety of totemistic animals on their children: *Tyrannosaurus rex* is to be found sharing the cot with Winnie the Pooh. As children talk to their stuffed toys, so adults talk to their pets and pray to one or more members of an invented pantheon.

The latest manifestation of this creaking floorboard in the brain, the alien arriving here from outer space, is the most interesting. Such an event could conceivably happen, and may be regarded indulgently as more supposition than superstition. Much work has been done to render this magical visit plausible. In the 1960s television drama *A for Andromeda*, written by John Elliott and Fred Hoyle, radio signals emanating from the Andromeda Galaxy are picked up by the then new radio telescope at Jodrell Bank, near Manchester, United Kingdom. The signals include directions for the construction of a computer. This computer enables the scientists to build a beautiful alien woman (the first appearance on our screens of Julie Christie). *A for Andromeda*, broadcast hardly

an eyeblink beyond the launch of the first Sputnik, marks the emergence of alien life from fantasy into cool scientific reality, given the blessing of a computer. Science fiction infiltrates science itself.

Julie Christie, if memory serves, was gracious and a source of wisdom in her alien avatar. Sometimes, aliens arrive to save us from our own follies. More frequently, they come to invade and destroy us. Such thinking forms a continuity with our ancient dreads of demons, ever hostile to human life.

Let us suppose that aliens are, as I have suggested, merely the latest example of a form of animism at work: or possibly the immature echoes of our own selves, free of time and gravity. So let us suppose further that no one will ever visit or call — because no one is there to call. We, the entire riotous biomass of Earth, are alone on our small planet.

The implications of such a situation are formidable. Scientifically and philosophically, a change of attitude would be demanded. In *A Defence of Poetry* (1821), Shelley states that “man, having enslaved the elements, remains himself a slave”. Could we but free ourselves from those atavistic fancies here enumerated, humankind might consider it not impossible that we should go into the Galaxy with the intention of becoming its consciousness. □

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4. Arrhenius, S. *The Destinies of the Stars* (transl. Fries, J. E.) (Putnam's, New York, 1918).
5. Carr, M. H. Evidence for a subsurface ocean on Europa, *Nature* **391**, 363–365 (1998).
6. The search for extrasolar planets <<http://exoplanets.org>>.
7. Heidmann, J. *Extraterrestrial Intelligence* (Cambridge Univ. Press, Cambridge, 1995).
8. Barrow, J. D. & Tipler, F. J. *The Anthropic Cosmological Principle* (Clarendon Press, Oxford, 1986).
9. Lovejoy, C. O. in *Life in the Universe* (ed. Billingham, J.) (MIT Press, Cambridge, MA, 1981).
10. Mayr, E. Letter to Frank Tipler, December 1982. Quoted in Barrow, J. D. & Tipler, F. J. *The Anthropic Cosmological Principle* (Clarendon Press, Oxford, 1986).