

If we mean that over time there will emerge variations in the individuals of a given species and that some of these variants will be better adapted for survival and will therefore tend to predominate in the population – what could be called *microevolution* – then there is no argument. This phenomenon was observed by Darwin and it is an established scientific fact.

If, however, we mean that one form of life will, over time, gradually evolve into higher and very different forms of life – what could be called *macroevolution* – then we are no longer in the realm of scientifically proven fact but rather in that of theory. Sir Frederick Hoyle comments: "Well, as common sense would suggest, the Darwinian theory is correct in the small, but not in the large. Rabbits come from other slightly different rabbits, not from either [primeval] soup or potatoes. Where they come from in the first place is a problem yet to be solved, like much else of a cosmic scale."¹⁷

Very importantly, the fossil record does not show evidence of the gradual transition from one form of life to another. Darwin himself admitted that the lack of fossils of intermediate varieties "perhaps is the most obvious and gravest objection which can be urged against my theory."¹⁸ Over a century after Darwin, evolutionary biologist Stephen Jay Gould commented on the lack of fossil evidence: "The extreme rarity of transitional forms in the fossil record persists as the trade secret of palaeontology."¹⁹ Moreover, he notes that the fossil record shows two features which are particularly inconsistent with the idea that species gradually evolved. One is *stasis*, the fact that most species show no directional change during their time on earth: "They appear in the fossil record looking pretty much the same as when they disappear; morphological change is usually limited and directionless." The other is *sudden appearance*: "In any local area a species does not arise gradually by the steady transformation of its ancestors; it appears all at once and 'fully formed'."²⁰

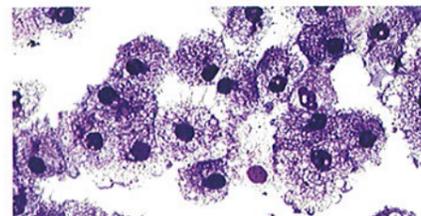
Even if scientists should one day be able to show conclusively that evolution does take place from one form of life to another radically different one, this will still not do away with the need for God. It will simply mean that God created life in the first place and that he wrote into its genetic code the plan for its eventual evolution into other forms. In short, God and evolution are compatible. Francis Collins, Director of the Human Genome Project, likes to refer to this as Biologos: Bios (the realm of the living) through Logos (word, mind or intelligence).²¹

The origin of life

One of the biggest problems for those who don't believe in God is the origin of life. Indeed, it is one of the most fascinating questions in the whole realm of science. Billions of years after the "Big Bang" life suddenly appeared. How did it begin?

Microbiologist Michael Denton says that the break between the non-living and the living world "represents the most dramatic and fundamental of all the discontinuities in nature. Between a living cell and the most highly ordered non-biological systems, such as a crystal or a snowflake, there is a chasm as vast and absolute as it is possible to conceive."²² He describes the complexity of even the tiniest of bacterial cells, weighing less than a trillionth of a gram, as "a veritable microminiaturized factory containing thousands of exquisitely designed pieces of intricate molecular machinery, made up altogether of 100 thousand million atoms, far more complicated than any machine built by man and absolutely without parallel in the non-living world."²³ What is more, the "factory" can reproduce its entire structure in a matter of hours.

Denton goes on to ask whether such a factory could possibly have resulted from chance. "Is it really credible that random processes could have constructed a reality, the smallest element of which – a functional protein or gene – is complex beyond our own creative capacities, a reality which is the very antithesis of chance,



which excels in every sense anything produced by the intelligence of man?"²⁴ Biologist Michael Behe adds: "To a person who does not feel obliged to restrict his search to unintelligent causes, the straightforward conclusion is that many biochemical systems were designed. They were designed not by the laws of nature, not by chance and necessity; rather, they were planned... Life on earth at its most fundamental level, in its most critical components, is the product of intelligent activity."²⁵

Even an atheist like Sir Frederick Hoyle admitted as much when he pondered how the first living thing came to exist. He and mathematician Chandra Wickramasinghe set out to calculate the probability of the simplest living thing forming itself by chance in the "prehistoric soup". They knew it had to be composed of hundreds of thousands of proteins, each in turn composed of long chains of amino acids in exactly the right place to give rise to life. They came up with a probability of one in 10^{40,000}, an infinitesimal probability, and concluded that life could not possibly have arisen by chance. Hoyle famously compared the odds against the spontaneous formation of life with the odds of a tornado blowing through a junkyard producing a 747 jet aircraft.²⁶ That led him to admit that life indeed needed a creator, whom he called a "super-intellect" in outer space.

More recently, philosopher Anthony Flew gave

as a reason for his conversion to belief in God after 50 years of atheism that the study of DNA has shown, "by the almost unbelievable complexity of the arrangements which are needed to produce life, that intelligence must have been involved."²⁷

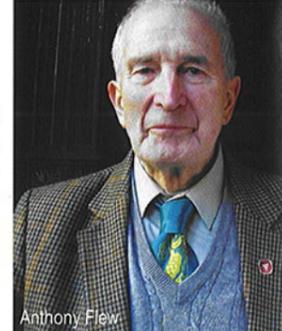
What do we conclude from all this? That science hasn't buried God. If anything, the latest findings have only served to strengthen all the more the need for an intelligent creator and designer of the universe.

Questions for discussion

1. Why do you think it is that after hundreds of years of the most eminent scientists believing in God, it is only now that many scientists proclaim themselves atheists?
2. Albert Einstein, one of the greatest minds of the twentieth century, speaks of the order of the universe as a "miracle". Why does he say this, and why does this order lead to belief in God?
3. The article says that it takes more faith to believe that the fine-tuned, ordered, universe resulted from chance than to believe that it was created by God. Do you agree?
4. The origin and complexity of the simplest living thing is a reality that has baffled scientists. Do you personally believe this complexity could have arisen by chance?

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²Cited in J. Lennox, *God's Undertaker*, Oxford, Lion Hudson, 2009, p. 21.
³Cited in *ibid.*, p. 21.
⁴Sth 1, q. 2, a. 3.
⁵M. Sheehan, *Apologetics and Catholic Doctrine*, London, Baronius Press, 2009, pp. 31-33.
⁶Is there a God?, Oxford, Oxford University Press, 1996, p. 68.
⁷J. Lennox, *op.cit.*, p. 48.
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⁹Letters to Solovine, New York, Philosophical Library, 1987, p. 131. Cited by J. Lennox, *op.cit.*, pp. 59, 61.
¹⁰God, Chance and Necessity, Oxford, One World Publications, 1996, p. 1.
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¹⁴Is there a God?, Oxford, Oxford University Press, 1996, p. 68.
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¹⁶The Blind Watchmaker, Longmans, London, 1986, p. 14.
¹⁷The Mathematics of Evolution, Weston Publications, Cardiff, 1987, p. 9.
¹⁸The Origin of Species, World's Classics Edition, Oxford, Oxford University Press, 1985, p. 227.
¹⁹"Evolution's Erratic Pace", *Natural History* 86, 1977.
²⁰The Episodic Nature of Evolutionary Change in the Panda's Thumb, New York, W.W. Norton, 1985 (as cited in J. Lennox, *op.cit.*, p. 114).
²¹Cl. J. Lennox, *op.cit.*, p. 121.
²²Evolution – a Theory in Crisis, Bethesda Maryland, Adler & Adler, 1986, pp. 249-50.
²³*Ibid.* p. 250.
²⁴*Ibid.* p. 342.
²⁵M. Behe, *The Edge of Evolution: the search for the limits of Darwinism*, New York, Free Press, 2007, p. 193.
²⁶The Intelligent Universe, London, Michael Joseph, 1983, p. 19.
²⁷BBC Radio 4 interview, 10 December 2004.



Anthony Flew

GOD and SCIENCE



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For many people, science and belief in God seem to be opposed to one another. Fr John Flader examines the issues and shows how science actually reinforces belief.



of the great scientists since the Renaissance, among them Pascal, Boyle, Newton, Faraday, Mendel, Pasteur and Kelvin. Kepler wrote: "The chief aim of all investigations of the external world should be to discover the rational order which has been imposed on it by God, and which he revealed to us in the language of mathematics."³ In short, it was precisely belief in a rational God, who left us a universe that

Some would say that with advances in science and our growing control over nature, we no longer need a "God of the gaps" to explain what we don't understand and, what is more, belief in God is for simple-minded people anyway. Prominent atheists like Richard Dawkins and Christopher Hitchens would rush to agree. But the matter is not so simple.

Putting it in the form of a question, are we humans and the universe, with its billions of galaxies on one hand and the intricately complex microscopic structure of living things on the other, simply the result of chance, of irrational forces acting on matter in an unguided way, as the atheists would have it? Or, on the contrary, is there an intelligent, all powerful being that has created the universe and given it its order and purpose?

Science and belief in God

Contrary to what some may think, science and belief in God are not opposed to each other. In fact, it has been the belief in God as the cause of the order in the universe that has led to the rapid progress in science in the Western world. Sir Alfred North Whitehead (1861–1947), British philosopher and mathematician, posed the question of how scientific knowledge could have expanded so quickly in the years leading up to Sir Isaac Newton's *Principia Mathematica* in 1700. He answered: "Modern science must come from the medieval insistence on the rationality of God."¹ C.S. Lewis says the same: "Men became scientific because they expected law in nature and they expected law in nature because they believed in a lawgiver."²

Francis Bacon (1561-1626), regarded by many as the father of modern science, taught that God has provided us with two books, the book of nature and the book of the Bible, and he considered that a truly educated person should study both. Mathematician and astronomer Johannes Kepler (1571-1630) shared the same conviction, as did many



Francis Bacon

is ordered and can be studied by the human intellect, that provided the foundation for the prodigious scientific advances of the last few centuries.

Moreover, just as belief in God has aided science, so the study of the laws of nature has led back to belief in God, who is the cause of the order which scientists study. This indeed was one of the five arguments for the existence of God proposed by St Thomas Aquinas (1225-1274) in his *Summa Theologiae*.⁴ Explained simply, the argument states that where we find order or purpose, we know that there is an intelligent cause of that order or purpose. We find order and purpose in nature and therefore there must be a supremely intelligent and all powerful being who is the cause, and this being we call God.

Archbishop Michael Sheehan, in his popular *Apologetics and Catholic Doctrine*, recently revised by Fr Peter Joseph, uses the analogy of the camera, which has various parts all working together to produce a photograph. No one would say that the camera put itself together by chance. Yet the human eye is far more complex than a camera. It too must have been put together by an intelligent designer, who can only be God.⁵ Sir Isaac Newton reflects this thinking in his *Opticks*, written in 1721: "How are the bodies of animals to be contrived with so much art, and for what ends were their natural parts? Was the eye contrived without skill in optics, and the ear without knowledge of sounds? ... Does it not appear from phenomena that there is a Being incorporeal, living, intelligent...?"

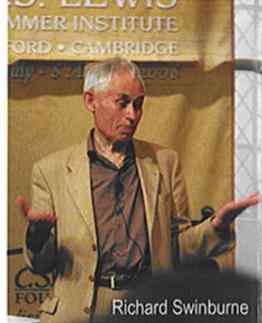
Contemporary philosopher Richard Swinburne agrees: "The very success of science in showing us how deeply ordered the natural world is provides strong grounds for believing that there is an even deeper cause for that order."⁶ Oxford Mathematics Professor John Lennox, on whose book *God's Undertaker - Has Science Buried God?* much of this article is based, sums it up: "The point to grasp here is that, because *God is not an alternative to science as an explanation*, he is not to be understood merely as a God of the gaps. On the contrary, he is the ground of all explanation: it is his existence which gives rise to the very possibility of explanation, scientific or otherwise."⁷

The universe and design

Returning to the question we posed at the beginning, has the universe with its billions of galaxies, each with billions of stars and other bodies, come about through chance, or is it the product of a supremely intelligent and all-powerful designer? Let us be clear that these are the only alternatives. There are people who argue for chance, like biologist George Gaylord Simpson, who says we are "the product of a mindless and purposeless natural process which did not have us in mind."⁸

As we saw before, the first thing we notice about the universe is that it is intelligible. That is, it has order, with laws that are universally valid and can be understood by the human mind. These laws can be formulated mathematically by scientists, like the law of gravity or the fact that two atoms of hydrogen will everywhere bind with one atom of oxygen to form water. If the universe were the product of chance we would not expect to find such order and intelligibility but only chaos. This led Albert Einstein to make the famous statement: "The most incomprehensible thing about the universe is that it is comprehensible." He went on to say that he considered this comprehensibility "a miracle" or "an eternal mystery", since in principle one would expect a chaotic world which could not be grasped by the mind. What is more, this miracle "is being constantly reinforced as our knowledge expands."⁹

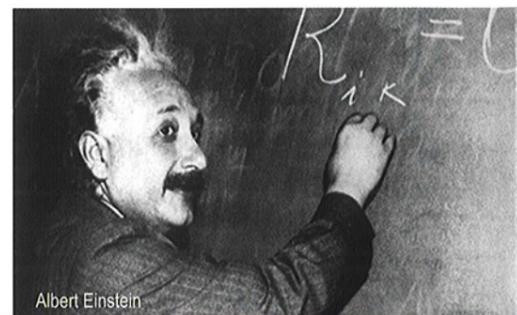
The fact that the universe can be understood by the human mind has led thinkers down the ages to conclude that the universe itself must be the product of intelligence. As philosopher Keith



Richard Swinburne



St Thomas Aquinas



Albert Einstein

"The very success of science in showing us how deeply ordered the natural world is provides strong grounds for believing that there is an even deeper cause for that order."

Philosopher Richard Swinburne

Ward puts it, "To the majority of those who have reflected deeply and written about the origin and nature of the universe, it has seemed that it points beyond itself to a source which is non-physical and of great intelligence and power. Almost all of the great classical philosophers – certainly Plato, Aristotle, Descartes, Leibnitz, Spinoza, Kant, Hegel, Locke, Berkeley – saw the origin of the universe as lying in a transcendent reality."¹⁰

Stephen Hawking, who occupies the professorial chair once held by Sir Isaac Newton at Cambridge and who is not known for his belief in God, once admitted in a television interview: "It is difficult to discuss the beginning of the universe without mentioning the concept of God. My work on the origin of the universe is on the borderline between science and religion, but I try to stay on the scientific side of the border. It is quite possible that God acts in ways that cannot be described by scientific laws."¹¹

The fine - tuning of the universe

One of the extraordinary aspects of the universe is that it seems to be not only ordered but "fine-tuned" to support life, human life in particular. This has come to be known as the "Anthropic Principle". For life to exist, for example, there must be an abundant supply of carbon, which is formed under very precise conditions. If the

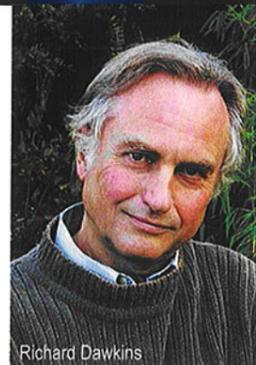
temperature differences between day and night would be too extreme; too fast and wind speeds would be catastrophic.¹³

In their efforts to explain away the cause of this fine-tuning of the universe, some scientists have proposed the "multiverse" theory, according to which there are many, possibly infinitely many parallel universes, so that it is only natural to expect that in one of them there would be life. But, rather than being science, such speculation smacks of the fantasy world of Star Trek. There is simply no evidence for other universes. Philosopher Richard Swinburne sums it up with a touch of humour: "To postulate a trillion-trillion other universes, rather than one God, in order to explain the orderliness of our universe, seems the height of irrationality."¹⁴

Frankly, to believe that the ordered, fine-tuned universe in which we live resulted from mere chance requires more faith than to believe that the world had an intelligent designer whom we call God. The first belief is not only faith but blind faith, since there is no evidence for it, whereas belief in God has as one of its foundations precisely the design we find all around us.

Perhaps the most well-known statement on design in nature comes from the eighteenth-century naturalist and theologian William Paley. He says that if asked why a stone came to be lying on the ground, one might answer that perhaps it had lain there forever. But if he found

discovered the "law" of natural selection, which for him explained the evolution and design of living things. Perhaps it was Darwin, more than anyone else, who "put the nail in God's coffin" in some people's minds, by arguing that, with natural selection, there is no longer a need to believe in God. For him and many other scientists, we no longer need God as the designer of nature – unguided, mindless evolutionary processes can do it all. What are we to make of this?



Richard Dawkins

Evolution and God

The first question we must ask is: Are God and evolution mutually incompatible? That is, does evolution exclude the need for God? Richard Dawkins thinks it does. He writes, using his famous description of the "blind watchmaker", "The only watchmaker in nature is the blind forces of physics... Natural selection, the blind, unconscious, automatic process which Darwin discovered, and which we now know is the explanation for the existence and apparently purposeful form of all life, has no



nuclear ground state energy levels necessary for the formation of carbon varied by more than one percent, the universe could not sustain life. This led prominent mathematician and astronomer Sir Frederick Hoyle to confess that nothing had shaken his atheism as much as this discovery, and that it looked as if "a superintellect has monkeyed with physics as well as with chemistry and biology" and that "there are no blind forces in nature worth talking about."¹²

Looking at more obvious facts, the distance of the earth from the sun is just right to support life. Any nearer and it would be too hot, any farther away and everything would freeze. A change of some two percent would mean the end of all life. Likewise, surface gravity and temperature have to be within a few per cent of what they are for the life-sustaining atmosphere to have the right mix of gases necessary for life. And the planet must rotate at just the right speed: too slow and

a watch on the ground such an answer would be absurd. "The watch must have had a maker: there must have existed ... an artificer ... who formed it for the purpose which we find it actually to answer; who comprehended its construction and designed its use... Every indication of contrivance, every manifestation of design, which existed in the watch, exists in the works of nature; with the difference, on the side of nature, of being greater or more, and that in a degree which exceeds all computation."¹⁵

In other words, if the complexity of a watch, with all its parts working together according to a wonderful design, implies the existence of an intelligent watchmaker, does not the far more complex world of nature, especially of living things, imply the existence of an intelligent designer? Some scientists would argue forcefully that the answer is no. Even Charles Darwin had great admiration for Paley's argument until he

purpose in mind... If it can be said to play the role of watchmaker in nature, it is that of the blind watchmaker."¹⁶

But there are problems with this. Firstly, natural selection presupposes the existence of the universe and of life. But how did the universe come to be in the first place? And how did life begin? Secondly, while the process of natural selection is itself blind and purposeless, it follows the laws of nature written into living things. Where do those laws come from and why are there laws instead of chaos? Laws, fixed patterns of behaviour, simply do not result from chaos or chance.

At this point it is helpful to distinguish what we mean by evolution or natural selection.

Contrary to what some may think, science and belief in God are not opposed to each other. In fact, it has been the belief in God, who is the cause of the order in the universe, that has led to the rapid progress in science in the Western world.