

Theories of evolution*

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1 A history of the theories

There have been several theories of evolution, one possibly dating back nearly 2,500 years to the time of Plato. In his dialogue *The Symposium* (1951), or ‘The Booze-Up,’ Plato presents the Athenian comic playwright, Aristophanes, as sending up a theory of evolution. Aristophanes was famous for his send-ups — ‘Clouducuckooland’ is the name of the paradise Socrates is creating in his send-up of Socrates. So it seems highly likely that Plato was getting Aristophanes to send up a contemporary theory of evolution which his readers would have recognised.

But the first modern theory of note was that of Erasmus Darwin (1803). Darwin, who lived from 1731 to 1802, was a GP in Lichfield and then in Derby and a member of the Lunar Society (Ugnow, 2002), a group of progressive thinkers who met on the Monday evening nearest to the full moon so that there would be light for their carriages when they went home. A poet and amateur botanist, he translated Linnaeus’ work on the classification of plants from Latin into English (von Linné, 1787) and took an interest in many aspects of science. His theory became the basis for other theories of evolution and, even as recently as the early 1990s, a now largely discounted aspect of his theory featured in one of David Attenborough’s BBC series.

The next important theory was that of Jean-Baptiste Lamarck (1744–1829), like Erasmus Darwin, a botanist; he argued that organisms have a tendency to move from the simple to the complex and that many evolutionary changes reflect adaptations to the environment which are then passed on to their descendants. He developed his theories over a period of twenty years but they met with scepticism in many quarters, in part because evolution does not generally happen fast enough for it to be passed directly from one generation to another. However, recent research mentioned by Bruce Hood during the 2011 Royal Institution Christmas Lecture suggests that this mechanism of evolution may occur in some cases.

Another contributor to the debates was Robert Chambers (1844) who claimed to have discovered evidence of design in the laws governing the evolution of life.

However, he was soon overtaken by the publication of *On the origin of the species by natural selection* (1859) by Charles Darwin (1809–82), grandson of Erasmus. Crudely speaking, evolution occurs when nature makes a ‘mistake’ which turns out to be advantageous to the organism. This made a lot more sense of the long periods over which evolutionary changes appeared to take effect.

Charles Darwin had extended discussions with Michael Faraday, a member of a fundamentalist Christian sect who had become world famous for his scientific experiments and lectures at the Royal Institution, who was not against him presenting his findings at the Royal Institution though he later privately expressed reservations about them. The book was warmly welcomed by

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Frederick Temple, later to become Archbishop of Canterbury (Parker, 1860), not least because it filled a gap in previous accounts of evolution by providing a clear mechanism for evolution. It was also welcomed by Jews (Cantor, 2011) and by Muslims (İhsanoğlu, 2011).

All this was to change in 1874 with the publication by John William Draper of his *History of the conflict between religion and science*, an attack on the Roman Catholic church but one which exacerbated an existing split in Christian opinion, between those who saw no conflict between science and religion and those who, like Baden Powell, Savilian Professor of Geometry at Oxford University and father of the founder of the Scouting movement, saw them as completely separate disciplines, addressing different questions (Parker, 1860), while other Christians retreated to insisting on the literal truth of the Bible. Though neither Jews (Cantor, 2011) nor Muslims (İhsanoğlu, 2011) saw any relevance in Draper's arguments to their own situations and his arguments have long since been discredited, authors like Richard Dawkins (2006) and Christopher Hitchens (2007) continue to tread this path of using science to attack religion.

However, Charles Darwin's theory is by no means the last word on evolution. In 1995 Lynn Margulis (1938–2011) and her son, Dorion Sagan (b. 1959), published *What is life?* a completely new account of the evolution of the earth drawing on the very latest research in which they reject natural selection as inadequate to explain evolution.¹ They point out that 98% of known species are extinct and argue that the key characteristic of those which have survived is cooperation. There are two forms of life: replicating life and metabolising life; viruses can replicate but they cannot metabolise — so they have to enter a host cell in order to survive. Bacteria can metabolise and, rather than replicating, they survive by merging and co-operating; we all have mitochondrial DNA which is an ancient bacterium which merged with cells which subsequently developed into the human race; the colour rods in our eyes are also ancient bacteria which we took in because they could create signals from different wavelengths of light which enabled our brains to see colour. Every mother knows that her baby needs 'friendly bacteria' to invade the baby's gut to enable it to digest vitamins and we know that, if we take a course of antibiotics that kills off these 'friendly bacteria,' we may need to take vitamin supplements.

Plants formed alliances with insects and other animals to spread their spores and fruit; crocodiles allow birds to clean their teeth for them; we have made great relationships with cats and dogs and horses, who will do things for us in return for being cared for, and with the grass family, who provide wheat and rice and barley, among other things. Indeed, by bribing us with their produce, the grass family have tempted us to plant them all over the world, even if it means cutting down the Amazon rainforests to do so.

2 The key issues

Though attacks on theories of evolution by fundamentalist Christians (Whitcomb and Morris, 1962), fundamentalist Orthodox Jews (Cantor, 2011) and fundamentalist Muslims (İhsanoğlu, 2011) have increased in the last fifty years, there is now more clarity about the issues of timescale, the relationship of human beings to other parts of creation and free will.

2.1 Timescale

Until the twentieth century, most scientists believed that the universe was timeless and therefore that, at a particular point in time, God had decided to create the world we know within an

¹An interesting aspect of Margulis and Sagan's account is that the sequence, if not the timescale, they describe for the evolution of life on earth is very similar to that in Genesis 1:1–2:4.

already existing universe. All that geological discoveries and the theories of evolution had done was to push back the starting time of God's work.

However, the idea that the earth has existed for longer than a literal reading of the Bible would suggest had been put forward several hundred years earlier by the Jewish doctor and philosopher, Maimonides (1135–1204) and Thomas Bradwardine, a mathematician at Merton College, Oxford, who later became Archbishop of Canterbury and died in 1345 during the Black Death, had used mathematical arguments for the infinity of space and therefore of time in order to prove that the earth's age was not finite (North, 2000). We now know that he was wrong about the earth's age but he was working within the Aristotelian worldview in which the universe is timeless. The important point is that a mediaeval Christian could safely argue that a literal reading of the Bible did not represent reality.

While exploring the Blue John caves in Derbyshire with Erasmus Darwin, Matthew Boulton, another member of the Lunar Society, had suggested that the layers of compressed rock they could see represented geological ages (Uglow, 2002). Ideas such as there having been a gap between 'In the beginning ...' (Gn 1:1) and the first day or that the days in Genesis 1 represented epochs were taken up by English geologists in the early nineteenth century before evolution became a controversial topic (Brooke, 2011).

Then in 1927 George Lemaître (1894–1966), a Belgian Catholic priest who had studied at Cambridge under Arthur Eddington, published an article in a Belgian journal in which he argued that the universe had started very small and then expanded at a constant rate ever since. Einstein disagreed with him, preferring the traditional Aristotelian view that the universe had existed in the same state for ever, and Fred Hoyle, another supporter of the 'steady state' view of the universe, rather contemptuously dismissed Lemaître's ideas as the 'big bang' theory. The name stuck and no serious scientist now dismisses it. One advantage for Christians is that it gives the universe an origin and a starting date and therefore makes more sense of the idea that God created the universe at a particular point in time than the traditional 'steady state' view of the universe in which God was supposed to have intervened in a pre-existing timeless universe. The main change since Lemaître published his article is that the start of the universe is now estimated to have been 14 billion years ago.

It is perhaps worth noting that no theory of evolution has ever excluded God as creator; even Margulis and Sagan, who outline a possible theory for the generation of life, do not attempt to explain where the chemicals that made life originally came from. The timescale problem was never really in the theory of evolution but in the idea that the universe was timeless and the argument was about when the earth had been created within that timeless universe. Once it became clear that the universe had a starting point, the question became when it had started.

2.1.1 Fine tuning

An aspect of the 'big bang' theory which has increasingly come to fascinate scientists is that the numbers involved in the expansion of the universe are very finely tuned — a slight change in any of six key ratios (Rees, 2000) and we would not have the universe we have today. Though not a believer, Martin Rees, the Astronomer Royal, concedes that the level of fine tuning in the universe could well be explained by the actions of a creator.

2.2 Our relationship with the rest of creation

An idea which troubled some people, both Christian and non-Christian, particularly after the publication of Charles Darwin's theory, was that human beings might not be a special creation

of God, separate from the animals. As Margulis and Sagan (1995) show, in many aspects of life we are no different from at least one other species of animal; the only areas in which we appear to be significantly different are in our mathematical abilities, which appear to far exceed those of any animal species (Dehaene, 1999),² and in our capacity for spirituality, something which currently divides scientists.

There is evidence that people who have a settled belief system live longer and are healthier and less prone to mental illness than people without a settled belief system (Williams and Sternthal, 2007) suggesting that our capacity for spirituality may give us an evolutionary advantage. But investigations in this area are still at too early a stage to come to any firm conclusions other than that, from a Christian point of view, having a capacity for spirituality is consistent with the idea that we might be intended to have a relationship with God.

Linked to the idea that human beings are a special creation of God is the idea that we should have mastery over nature (Gn 1:26), an idea taken up by Francis Bacon (1561–1626) who argued that science would enable us to regain the mastery we had lost since we were excluded from the Garden of Eden (Brooke, 2011). However, Lynn White (1967) challenged the Baconian view that, in giving human beings ‘dominion’ over the earth (Gn 1:28), God had given human beings the right to exercise ‘dominion’ in whatever way they saw fit and Fritjof Capra (1982) argued that it has led to the wholesale destruction of the earth’s resources; rather we need to find a way to be in harmony with nature. This debate continues to be played out in the global warming debates with some people, both Christians and non-Christians, arguing that human beings have the technology to solve the problems of global warming and others arguing that we will never be able to ‘master’ these problems with technology, only by learning to live more in harmony with nature.

2.3 Free will

Apart from Lamarck’s and Margulis and Sagan’s, most theories of evolution exclude any possibility of choice in evolution — yet, however it originally emerged, there must have been an element of choice in the decision of a crocodile not to close its mouth on a bird that was cleaning its teeth. That does not mean that all evolution arises from meaningful choice; as Watson and Lovelock (1983) demonstrated in their *Daisyworld* model, some evolutionary behaviour can take place without any conscious choice by an organism.

However, unless you are an ultra-Calvinist, believing that God has already predestined all those who will join Him in eternal life and therefore untroubled that God may have set in motion a determined universe, the lack of free will in most models of evolution presents a difficulty for Christians who believe that we have to make a choice to follow God and daily choices about whether we will be obedient to His commands. It is also inconsistent with what science has revealed in the last half of the twentieth century about the amount of ‘indeterminacy,’ or randomness, in the universe. Einstein famously remarked, when he heard about quantum mechanics, that God does not play dice with the universe. Yet we now know that a universe without a degree of randomness would very quickly stop working — you would not, for example, be able to fry an egg if the surface of the hot fat did not behave randomly.

So, even if a lot of our behaviour can be explained without recourse to free will, for example, as a result of the way we were brought up, and a lot of the behaviour of the universe can be explained in terms of universal ‘natural’ laws, at least some of our behaviour, like some of the behaviour of the universe, cannot be explained in this way. Just as permitting a degree of randomness in the

²John Polkinghorne (2010) makes the point that, without this ability, we would not be able to understand and appreciate the beautiful mathematical equations which underpin the universe.

universe may have been an essential part of its design, so permitting a degree of free will may also have been an essential part of God's design.

3 Concluding remarks

In summary, then, no theory of evolution has ever excluded God as a creator and the currently accepted theory of the origin of the universe assumes a starting place and a time for it. The key debates over evolution — about the relationship of human beings to the rest of creation and the existence of free will — continue to be scientific as well as religious debates, suggesting that the argument that science and religion address different issues does not stand up to close scrutiny.

In one sense it does not matter whether God created the universe 14 billion years ago or did so six or seven³ thousand years ago but made it look as if it was created 14 billion years ago, as suggested by Philip Henry Gosse (1857) who saw it as the only way of reconciling his work as a geologist and his faith. While the second explanation raises some interesting theological questions, not least why God would want to deceive human beings, we can never be sure whether He did one or the other. The date is irrelevant to our faith which is based on events which took place around 2,000 years ago, long after the creation of the earth.

Finally, don't forget the advice of scientist and Presbyterian elder, James Clarke Maxwell (1831–79) (Brooke, 2011): never base biblical exegesis on science; the science might change!

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³The Septuagint, that is, the Greek translation of the Old Testament, and the Jewish historian Josephus place the creation over a 1,000 years earlier than Ussher's calculation of 4004 BC.

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