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## *A non-theistic cosmology and natural history*

LAURENCE GOLDSTEIN

The Creationist alternative to explanations within evolutionary theory of such phenomena as the diversity of species and the fossil record has more or less been jettisoned, thanks, in no small part, to the painstaking efforts of philosophers such as Philip Kitcher (1982) who have exposed the paucity and sometimes the downright duplicity of the Creationists' arguments. But many theists, including some rather distinguished scientists, have remained unprepared to accept the theory of evolution, and an alternative called Intelligent Design (ID) has, in recent years, gained wide currency. ID does not insist on the literal truth of the Book of Genesis and hence is not wedded to the claim that the universe was brought into being

a mere 6,000 or so years ago. It does not insist that the stratification of fossil deposits in rock is an effect of the way in which the waters subsided after the Great Flood, so the discovery of the remnants of Noah's ark is not a priority for ID. Proponents of ID do not dispute the scientific evidence that existing species have, to a certain extent, evolved over the course of many generations, but they do question the credibility of the claim that existing complex organisms could have evolved from scratch. The crucial, and seemingly modest claim of ID is that it is simply unbelievable that complex organisms such as the human eye, or complex processes such as the Krebs cycle (in which energy useable by cells is extracted from food) could have come into being through a long evolutionary series of purely chance mutations unaided by any intelligent guidance.

It is easy enough to produce complex (and sometimes rather beautiful) shapes by a series of random alterations to an initially simple one,<sup>1</sup> but the evolution of a complex *organism* is a different matter, one that defies not only belief but also, apparently, evolutionary theory. An incipient wing, for example, would be a useless protruding bit of flesh, bone and gristle that, far from lifting the creature off the ground, would slow it down and provide a convenient grab-point for the jaws of voracious predators. This transitional structure would thus be a useless appendage, inhibiting, rather than improving, that creature's chances of survival and reproduction as compared with the chances of conspecifics not so lumbered. Therefore, according to evolutionary theory itself, birds should not have evolved. By contrast, ID holds that the wings of birds are the product of intelligent design and were created fully fledged and fully functional by God. Evolutionary theorists, most prominently Richard Dawkins (2004), have tried hard to demonstrate that intermediate forms on the evolutionary path to a complex structure could have thrived and multiplied, and, in the case of *some* organic structures, the explanation looks reasonable, and the evidence compelling. But it is fair to say that the argument has not yet been won, and not just because of the ignorance, truculence or dogmatism of its opponents. Proponents of ID have identified the weakest point, the sticking point, as they see it, of evolutionary theory.

The evolutionary theorist has, I shall argue, a decisive response to this problem of intermediate forms, but it involves abandoning a version of the most widely held cosmological theory concerning the origin of the universe. However, since that theory depends, unknown to most of its proponents, on a theistic assumption, its rejection would be consonant

<sup>1</sup> See <http://www.simonyi.ox.ac.uk/dawkins/WorldOfDawkins-archive/Dawkins/Work/Software/software.shtml> for information on the software available in connection with the Morph program mentioned in the appendix to Dawkins (1986).

with the non-theistic tenor of evolutionary theory. The cosmological theory to which I refer is popularly known as the Big Bang Theory. There are technical problems with this theory and joke-philosophical ones (how could there be a bang if *ex hypothesi* there was nobody around to hear it?) but I shall concentrate on a rather simple consideration.

According to the Big Bang theory, there was a particular point in time (the First Big Bang or BB1) when matter came into existence. Some proponents claim, more fancifully, that time itself came into existence at that time. Objects come into, and go out of existence, and the mistake of the latter view is to construe time itself as an object, an error exposed by Kant (1781, 'Transcendental Aesthetic', A31/B463–A33/B49). If an object came into existence at a certain time, then there was a time before that time when that object did not exist. But, if we think of time as an object that came into existence at a particular time, then we would be saying – absurdly – that there was a time before that particular time when time did not exist. (The other possibility is that time is an object that has existed for all time, but to what object could that second occurrence of the word 'time' refer?) We are obliged, therefore, to conclude that it is a mistake – a conceptual error – to think of time as having a beginning, and this holds true even if we do not conceive of time as an object. While it is plausible to think of the limits of *space* as being set by the farthest-flung objects, since, *ex hypothesi*, there is nothing beyond them (not a vast expanse of nothingness), there seems to be no parallel consideration for positing an end (or a beginning, or a 'birth'<sup>2</sup>) of *time*.

A proponent of a less fanciful version of the Big Bang theory might claim that, at some particular point in time (10 - 20 billion years ago is the current favourite estimate), matter came into existence from nothing. But this suggestion itself is hugely problematic. Why did this momentous event occur at that time rather than at any previous time when equally, *ex hypothesi*, there was nothing on the scene?<sup>3</sup> And how could something – a huge universe-inaugurating explosion – come from nothing? Kant (1781 'The Second Analogy', A189/B233 – A204/B249) claimed that the principle of causation is true a priori, but even quantum theory (which rejects that principle) does not countenance the spontaneous coming-into-being of something (some matter) from nothing. The view that something

<sup>2</sup> See the title of John Gribbin's (1999). Gribbin informs me that he shares Stephen Hawking's view that talk of time before the Big Bang is as conceptually confused as asking what is north of the North Pole.

<sup>3</sup> This consideration will not burden those who hold (with Aristotle) that time does not exist without change. For a defence of the contrary position, see Shoemaker (1969).

can come from nothing is a theistic one – God is the unique uncaused cause that can bring matter into existence without Himself being material.

If we reject this theistic view, then we arrive at the mind-bending but non-absurd hypothesis that the material universe has always existed.<sup>4</sup> Our universe may be limited in *space* (if the Big Bang theory is right, it is presently confined to a sphere of at most a mere 40 billion light years in diameter, so the chances of finding organic life like ours elsewhere in the universe may be remote) but it is not limited in *time*. We do not envisage all matter ever going out of existence – it will continue to exist for the infinite future – so we should be receptive to the idea that it has existed for the infinite past. What this means for the evolutionary theorist is that there has been plenty of time, not just 20 billion years, but *infinite* time, for false evolutionary starts. On millions and millions of occasions, unpromising intermediate forms of organism could have developed but disappeared because ambient conditions were not propitious for their survival and luck was not with them. But that on just one occasion, luckily evading all hazards, and given that the existing matter was not all inert, the run of transitional phases culminated in our present amazing world, can now be seen to be not a monumental improbability, but a racing certainty. Another way of guaranteeing such certainty is to again postulate an infinite history but with an infinite series of Big Bangs, each explosion creating a new universe and correlatively infinitely new opportunities for evolutionary processes to produce a wonderful variety of complex organisms – without any assistance from a supernatural intelligence.

A quick calculation, on the basis that a human generational cycle (equal to the average age at which female humans give birth) is 20 years, indicates that, since the last Big Bang, the longest possible chain of consecutive mutations is approximately one billion. And, so it has been claimed, a billion mutations are insufficient to generate a highly complex organism from primeval slime. This argument is fallacious: the ‘quick calculation’ is too quick. The generational cycle for present-day humans may be 20 years but, in the early stages of the human evolutionary process when the transitional forms were very simple, the generational cycle may have been just a few days, or even just a few hours. The result of the quick calculation may be out by a factor of between one hundred and one million.<sup>5</sup>

<sup>4</sup> In the 2005 online edition of *Science*, a sophisticated variant of this view, related to the old ‘Steady State’ theory, is defended by the physicists Paul Steinhardt and Neil Turok. See <http://www.princeton.edu/pr/pwb/02/0506/0506-cyclicuniverse.htm>.

<sup>5</sup> Useful critical comments from Peter Cave and Robin Taylor helped me to strengthen the original argument.

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