

Is There a Purpose in Evolution?

Review of Michael Behe, Darwin's Black Box:
The Biochemical Challenge to Evolution.

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The black box in question is the "molecular machine" of the cell, about which Darwin could have known nothing when in 1868 he put forward the theory which bears his name. Behe's argument is that the degree of complexity which is revealed at this level is so great that it cannot *in principle* have evolved merely through natural selection. Thus he believes that Darwin's theory of natural selection is incomplete and cannot be invoked as a universal explanation of how evolution has happened. *Darwin's Black Box* sets out to show how the internal workings of the cell point inexorably to a design or purposive factor of some unknown kind.

This was the one conclusion that Darwin himself hoped would not be forced upon evolutionary biology by future evidence, for, as he said explicitly in *The Origin of Species*,

if it could be demonstrated that any complex organ existed which could not possibly have been formed by numerous, successive, slight modifications, my theory would absolutely break down.

Behe's book has received such passionately different reviews, particularly in America, that one may suspect that something more than a scientific theory is involved. Fundamentalist Christians have seized upon it to justify their belief in the literal truth of the Bible, while professional biologists have reacted with varying degrees of "Oh no, not that old chestnut again!" The *New Scientist* (16. 8. 96) reviewer dismissed it as "just the latest, and no doubt not the last, attempt to put God back into nature", accused the author of "falling back on the old, limp idea of `design'" and warned readers "not to be fooled." The review in *Trends in Ecology and Evolution* (4. 4. 97) opens with, "What is so sad about this book is that the author thinks he ... is contributing to science," and in general castigates Behe for using "intellectually dishonest double standards" and the "empty, religious notion of `intelligent design'" and in general for "being ignorant of evolutionary biology." Grudgingly, he admits to finding "relatively few factual errors", but suspects that "as a Catholic, Behe prefers the illusion of an intelligent biochemist creator to mutations and the blind gropings of macromolecules." This is despite Behe's argument that the facts are so compelling that they leave no room for preference, whatever one's temperament or religious bias. Indeed, this is the whole point of the book.

After such broadsides - “empty, ignorant, dishonest, limp, sad” - the non-specialist reader may be forgiven for withdrawing and leaving the battlefield to the professionals, but too much is at stake here, and the book's avowed purpose is to present the facts so simply that the central issue can be appreciated by any thoughtful reader. That the facts themselves seem to be generally conceded suggests that accusations of biological ignorance are really expressions of unhappiness about the way the author has interpreted them.

Behe's method is to intersperse the tough technical bits with simple and often humorous analogies, but the sheer weight of biochemical data on which his thesis draws works against him. Furthermore, the method of popularization is of its nature vulnerable, unless the author is a very eminent authority, and Behe is no more than an associate professor in an average American university. But facts are facts, and if those he presents are not seriously questioned, it is really the coherence of his argument that is at issue. If his logic is accepted, then one does not need to be a microbiologist to accept his conclusions. Even being a biologist from another field does not necessarily qualify one to judge on the argument, for microbiology concerns electro-chemical events on what the author calls a "Lilliputian" scale, far below where, say, a plant or marine biologist would normally need to go.

Behe's argument that cell function cannot be explained without recourse to some design factor poses an acute dilemma for biology: does the “irreducible complexity” of the cell at molecular level compel a radical extension or revision of accepted orthodoxy? The great challenge to scientific integrity, it has been said, is to “allow an ugly fact to kill a beautiful theory”, but we are dealing here not with a theory but a whole scientific paradigm, and that will make resistance to the “ugly fact” all the stronger. Behe's argument may or may not convince, but it adds significantly to other evidence that neo-Darwinism is becoming "no more nor less than the great cosmogenic myth of the Twentieth Century". The phrase is from *Evolution: A Theory in Crisis* by Michael Denton, who uses the word "myth" more pejoratively than romantically. Denton is an agnostic and thus cannot be accused of having a hidden religious agenda. Neo-Darwinism - natural selection combined with mechanical gene replication and random mutation - is unquestionably a beautiful theory: it is powerful, simple, elegant and productive - the very ideal of science. Its explanatory power has been continually reinforced by new discoveries which have demonstrated the astonishing things that a blindly winnowing nature can “create”, so much so that any evidence of design is now routinely dismissed, might even say “exorcised”, by calling it “apparent design”, thus in effect making the theory invulnerable. Nevertheless, its proven predictive power would caution against a hasty conclusion that it cannot ultimately explain any biological phenomena. Hence there is an understandable response from professional biologists to call for more faith and for patience until new evidence or insight will show how recalcitrant facts such as Behe present can be explained in strictly deterministic terms.

It needs to be said that although Behe has broken ranks with current orthodoxy, his data is not the only kind to cast doubt on the absolute comprehensiveness of the neo-Darwinian theory. The universal explanation that life, the species and everything evolved simply through "chance and necessity" hinges so critically upon the happy chance of mutation that mutation has

become the scientific equivalent of the theologian's "god of the gaps". Even Max Delbrück, a co-founder of molecular biology and Nobel Laureate, once wryly remarked that DNA has become for biologists what the unmoved mover was for Aristotle and mediaeval philosophers.

Supporting evidence for Behe's thesis that there is evidence of a design factor in nature comes from such diverse fields as palaeontology and parasitology. The nutritional chemist Michael Crawford has argued (notably in *The Driving Force*) that genetic transcription is not fully mechanical but is critically affected by the complex chemistry of the environment. Most telling perhaps is the now classic experiment of Cairns, Overbaugh, et al. (reported in *Nature* 335, 142 1988) showing how bacteria can mutate with a purpose when conditions change. As in Behe's case, the authors did not set out to challenge neoDarwinism, and only reluctantly accepted the conclusions to which their experimental results led them. To the credit of biologists, the latter findings have not been buried (see, e.g. "Adaptive Mutation: the Debate Goes On", *Science* 269, July 21, 1995). Unfortunately, we have no rule of thumb, no mental scales which will automatically tip when the weight of evidence has passed a critical point, and hence increasing evidence is as likely to bring forth increasingly strong denial as change of stance.

The two great strengths of science as a truth system valid for all time are its rejection of pseudo-explanation in terms of occult forces but also its willingness to accept facts as they are seen - "like a child", in T. H. Huxley's famous phrase. In the latter respect it has something vitally important to teach religion. Now it would seem that these two principles are in conflict in biology. Must one be given up to retain the other, and, if so, what new kind of science might emerge? Cosmology seems able to reconcile them: one of the keynote papers of the 1995 annual convention of the American Association for the Advancement of Science was entitled "The Theological Implications of the Big Bang." Can evolutionary biology address its theological dilemma so openly?

I do not feel that Bethe addresses satisfactorily this underlying issue which his book raises, but then he writes as a practising biologist, not a philosopher of science. Nearly half a century ago C.H. Waddington suggested that we need a metabiology, but it was not until 1985 that the journal *Biology and Philosophy* appeared. Purposive evolution has, however, always been an embarrassing guest at the bio-philosophical feast, and Pittendrigh invented the term "teleonomy" to clothe it in some respectable Darwinian garb. The change of label did not, however, fool the arch-Darwinian Jacques Monod, who called it "a profoundly ambiguous concept". It would be probably true to say that this ambiguity has kept the problem at bay until now. In 1988 Ernst Mayr, raised awareness of it *Towards a New Philosophy of Biology*, recognizing that biology could not help but be the "study of end-directed processes", but did not offer any help in resolving the dilemma of treating the processes themselves as if they were purely random happenings.

That debate still lies ahead, and whatever criticism may be levelled at Bethe, he must at least be credited with helping to ensure that the dilemma has not gone away. Let it be assumed, simply as a thought experiment, that there could be a purposive factor involved in evolution, the consequences could be even more significant for religion than for science. Once empirical and statistical evidence

may have accumulated to favour such a hypothesis - i.e. of a real, not a mythical or legendary power at work in the world - the emphasis of religion must shift to the problem of how to communicate with it. Traditional religion has too long assumed that the answer to this is obvious.

I believe that any open-minded seeker of truth would gain from this book, but those for whom institutional truth takes priority in science will without doubt find it a very uncomfortable read.