The Storyteller and the Scientist

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Joint review of
Climbing Mount Improbable
By Richard Dawkins
and
Darwin's Black Box
by Michael Behe

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Richard Dawkins began *The Blind Watchmaker*, his influential restatement of Darwinism, with the observation that "Biology is the study of complicated things that give the appearance of having been designed for a purpose." May we consider the possibility that living organisms give that appearance because they actually *were* designed? Dawkins, who is virtually the defining example of an uncompromising scientific materialist, meets that suggestion with the scorn he thinks it deserves. The point of evolutionary science, he says, is to explain how complex things get made from a simple start. An unevolved Designer who is presumably more complex than the things he designs just doesn't fit into that picture. In *Climbing Mount Improbable* Dawkins calls organisms "designoids" -- meaning things that look exactly as if they were designed but must actually have been crafted by the "blind watchmaker" -- i.e.., the mindless Darwinian forces of mutation and selection.

Biochemist Michael Behe answers that the blind watchmaker thesis is a relic of a nineteenth century science which lacked the understanding of biological mechanisms that recent advances in molecular biology have provided. The biologists who established the still-dominant Darwinian orthodoxy thought of the cell as an undifferentiated blob of "protoplasm." Like a child imagining he might construct an airplane out of cardboard boxes and pieces of wood, they could blithely propose materialist evolutionary scenarios for biological systems because they had no idea of how those systems actually work. The organism (and especially the cell) was to them a "black box" -- a machine which does wonderful things by some mechanism nobody knows.

Behe explains that biochemists are now able to explore part of the insides of that black box, and what they find inside is "irreducible complexity." A system is irreducibly complex if it is "composed of several well-matched, interacting parts that contribute to the basic function, wherein the removal of any one of the parts causes the system to effectively cease functioning." Life at the molecular level is replete with such systems, and biochemists do not even attempt to explain how any one of them could have come into existence by the Darwinian mechanism. The result of biochemical investigation of cellular mechanisms, according to Behe, "is a loud, clear, piercing cry of 'Design!'"

The Behe argument is as revolutionary for our time as Darwin's argument was for his. If true, it presages not just a change in a scientific theory, but an overthrow of the worldview that has dominated intellectual life ever since the triumph of Darwinism, the metaphysical doctrine of scientific materialism or naturalism. A lot is at stake, and not just in science. But can a fair scientific test be devised to judge the competing merits of the positions staked out by Dawkins and Behe? Not if the Designer is ruled out by *a priori* philosophical dogma, but Dawkins has said that his position is falsifiable:

> "One hundred and twenty-five years [after the publication of Charles Darwin's masterpiece, *On the Origin of Species*], we know a lot more about animals and plants than Darwin did, and still not a single case is known to me of a complex organ that could not have been formed by numerous successive slight modifications. I do not believe that such a case will ever be found. If it is -- it'll have to be a *really* complex organ, and... you have to be sophisticated about what you mean by 'slight' -- I shall cease to believe in Darwinism." [Richard Dawkins, *The Blind Watchmaker*, p.91]

Dawkins agrees that even a single irrefutable case of irreducibly complexity would be fatal to Darwinism. Behe argues that there are many cases of irreducible complexity to be found at the molecular level, with more being discovered as the science progresses. What is more, he argues that the existence of irreducible complexity is *implicitly* accepted by the entire worldwide community of molecular biologists.

I emphasize that word "implicitly," because most prominent molecular biologists definitely would not concede the point *explicitly*. Molecular biology is dominated by metaphysical materialists, many of whom will proclaim to every journalist in sight that their discipline confirms Darwinism in every detail. What molecular biology has to say is determined not by what the biologists say to a popular audience, however, or even to each other in conversation, but by what they publish in the leading scientific journals. Behe reports that what they do not *ever* publish in those journals is detailed scenarios of how even a single complex molecular system could have evolved by a Darwinian process.

In short, the irreducible complexity of molecular systems is controversial among molecular biologists when it is presented as an *idea* with philosophical consequences, and tacitly accepted as unpleasant reality when it remains in the world of innocent fact. When some tactless individual does raise the possibility of design at a biological gathering, perhaps after a few drinks, the auditors greet the remark with the embarrassed silence that might follow the disclosure of some shameful secret. To understand why Behe's argument is so uncontested in the realm of *fact*, and yet why so many scientists find the *concept* of irreducible complexity not only difficult to accept but even impossible to consider, we should start by summarizing the modern understanding of Darwinism, as set out by Richard Dawkins.

Is There a Staircase Up Mount Improbable?

Everybody agrees that organisms are extremely complex. As Dawkins puts it with his usual rhetorical skill:

> Physics books may be complicated, but ... the objects and phenomena that a physics book describes are simpler than a single cell in the body of its author. And the author consists of trillions of those cells, many of them different from each other, organized with intricate architecture and precision-engineering into a working machine capable of writing a book.... Each nucleus... contains a digitally coded database larger, in information content, that all 30 volumes of the *Encyclopedia Britannica* put together. And this figure is for *each* cell, not all the cells of the body put together.

That informational complexity is the summit of the "Mount Improbable" of his title. The living world contains innumerable such mountains of complexity, and the Darwinist must show how they can all be reached without the aid of a miraculous leap or a boost from some pre-existing intelligence. Just as a mountain climber cannot jump to the top of the Matterhorn, a (relatively) simple organism like a bacterium cannot even conceivably become a complex plant or animal except in very gradual stages. Fossil experts like Stephen Jay Gould sometimes distinguish between "evolution" and "gradualism," primarily because they are trying to square the former with a the fossil record does not reflect a pattern of gradual transformations, but evolution has to be gradual when it is employed to explain how an unintelligent process assembled all that complex genetic information.

If the blind watchmaker thesis is true, there must be a gradually ascending staircase from the base all the way to the summit. To restate the metaphor in biological language, there must have existed a continuous series of viable intermediate forms between the first replicating organism (whose origin is another subject) all the way to every complex type of organ system and organism that has ever existed. Each step upwards in complexity has to be at least slightly fitter (at leaving descendants) than its predecessor, and the gap between the steps must be no wider than can be bridged by random mutation. On the whole that means *tiny* mutations because, according to Dawkins, mutations large enough to have visible effects are nearly always harmful. The gradual steps have to be virtually omnipresent; a few plausible sections of staircase here and there up the face of the mountain are not enough. As Dawkins concedes, even a single unclimbable precipice spoils the theory -- although the difficulty in proving that any one precipice is truly unclimbable means that a great many examples will have to be considered.

Because of his philosophical starting point (science goes from simple to complex), Dawkins does not regard the existence of the staircase as something whose existence needs to be proved, but rather as a logical necessity that only needs to be illustrated. The illustrations consist primarily of imaginative stories and computer simulations. Here, for example, is a synopsis of the Dawkins theory on the evolution of flight:

> To begin with, an ancestor like an ordinary squirrel, living up trees without any special gliding membrane, leaps across short gaps. [It could leap further if it had something to slow a fall.] So natural selection favors individuals with slightly pouchy skin around the arm or leg joints, and this becomes the norm.... Now any individuals with an even larger skin web can leap a few inches further. So in later generations this extension of skin becomes the norm, and so on.... It is easy to imagine true flapping flight evolving from repetition of the muscular movements used to control glide direction, so average time to landing is gradually postponed over evolutionary time.

> Some biologists, however, prefer to see long-distance downhill gliding as the dead end of the tree-jumping line of evolution. True flight, they think, began on the ground rather than up trees.... There are some mammals such as kangaroos that propel themselves very fast on two legs, leaving their arms free to evolve in other directions.... But bipedal mammals don't seem to have taken the next step and evolved the power of flight. The only true flying mammals are bats, and their wing membrane incorporates the back legs as well as the arms.... Perhaps birds began flying by leaping off the ground, while bats began by gliding out of trees. Or perhaps birds too began by gliding out of trees. The debate continues. [108-113]

Many biologists call this kind of "explanation" a *Just-So Story* because it belongs to the realm of children's literature, not science. Dawkins is like the little boy who thought he could make an airplane by adding something that looks like a pair of wings to something that looks like a fuselage. How do you make a bat? No problem, boys and girls, and no need to consider the complications of biochemistry, physiology, and development. Just wait for a squirrel population to grow wings, which it might do one way or another.

Dawkins's computer simulations of evolution have even less connection to biological reality. A computer program can be *designed* (the word deserves emphasis here) to do just about anything, including to mutate stick figures that look vaguely like animals (or trees) into all kinds of shapes. The eminent Darwinist John Maynard Smith dismissed the much more sophisticated computer simulations of Stuart Kauffmann as "fact- free science," because they have no connection to real biological mechanisms.

The Irreducible Complexity of Biochemistry

To move from Dawkins to Behe is like moving from the children's library to the laboratory. Do you want to know how vision might have evolved? Because the biochemistry of vision is a black box to Dawkins, he can speculate without impediment. There are well over 40 different types of eyes which, because of their fundamentally differing structure, must have evolved (whatever that means) separately. Some of these eyes are much simpler than others. All an evolutionary story-teller has to do is to start with the apparently simplest version, ignore the neural equipment that has to be present for an organism to make any use of a "photon receptor," and spin a charming tale about how a tiny primitive light-sensing cell might grow up to be a full-fledged eye. That's what Charles Darwin did in 1859, and Dawkins just repackages the same story.

Behe gives us just a bare start towards understanding what a biochemically-informed evolutionary theory has to explain:

> When light first strikes the retina a photon interacts with a molecule called 11-cis retinal, which rearranges within picoseconds to *trans*-retinal. (A picosecond is about the time it takes light to travel the breadth of a single human hair.) The change in the shape of the retinal molecule forces a change in the shape of the protein, rhodopsin, to which the retinal is tightly bound. The protein's metamorphosis alters its behavior. Now called metarhodopsin II, the protein sticks to another protein, called transducin. Before bumping into metarhodopsin II, transducin had tightly bound a small molecule called GDP. But

> when transducin interacts with metarhodopsin II, the GDP falls off, and a molecule called GTP binds to transducin. (GTP is closely related to, but critically different from, GDP.)

Whew! There's a lot more in *that* vein from Behe, including descriptions of the cilia propulsion system in bacteria, the basic biochemistry of the immune system, and the cell's intricate internal transport system. Don't get the idea that *Darwin's Black Box* is a difficult read, however; the technical passages are set apart from the witty and graceful main text to facilitate skimming. Readers don't have to take in all the details to see the point, which is that Darwinian storytelling simply doesn't work at the molecular level. Each biochemical system requires a stupefyingly complex set of components which affect each other in intricate ways. No component makes sense except as part of the system, and the system doesn't work unless everything is in place. That's irreducible complexity.

It is notoriously difficult to prove a negative. No matter how irreducible the complexity seems, a storyteller can always invoke concepts like "preadaptation" to bolster the materialist faith that a Darwinian solution is somewhere out there. Fervent statements of faith aren't science, however, and fact-free science doesn't (usually) get published in biochemical journals. The key point in Behe's argument is that there are *no* papers in scientific journals which set out detailed, testable scenarios of how these incredibly complex biochemical systems could be produced by Darwinian-style processes. The very few papers that even attempt to speculate about this subject rely heavily upon what scientists call "hand-waving." The journals of molecular evolution are full of papers documenting sequence comparisons, showing closer or more distant relationships between molecules. What they don't contain is papers documenting the existence of a Darwinian staircase up Mount Improbable. Until somebody fills the gap with scientific papers rather than stories, the best explanation for this situation is that the staircase doesn't exist.

Darwinism: Science or Philosophy?

Biochemists are not likely to challenge Behe in any fundamental way at the factual level. The scientific way to refute the irreducible complexity thesis is to publish the papers detailing how the complex biochemical systems could have evolved, and the scientists already would have done that if they could. The controversy will not be over the facts but over whether Behe has gone "outside of science" by attributing irreducible complexity in biology to "design" rather than to some undiscovered material (i.e., mindless) mechanism. Many scientists and philosophers think that a dedication to materialism is the defining characteristic of science.

Their argument is that an *a priori* adherence to materialism is necessary to protect the very existence of science. If design in biology is real, then the Designer also might be real, and scientific materialists contemplate this possibility (if at all) with outright panic. Science will come to a screeching halt, they insist, because everybody will stop doing experiments and just attribute all phenomena to the inscrutable will of God.

Nonsense. On the contrary, the concept that the universe is the product of a rational mind provides a far better metaphysical basis for scientific rationality than the competing concept that everything in the universe (including our minds) is ultimately based in the mindless movements of matter. Perhaps materialism was a liberating philosophy when the need was to escape from dogmas of religion, but today materialism itself is the dogma from which the mind needs to

escape. A rule that materialism should be professed *regardless of the evidence*, says Behe, is the equivalent of a rule that science may not contradict the teachings of a church. "It tries to place reality in a tidy box, but the universe will not be placed in a box."

Behe's fundamental principle is that "scientists should follow the physical evidence wherever it leads, with no artificial restrictions." Science has come as far as it has because scientists of the past were willing to describe the universe as it really is, rather than as the prejudices current in their times would have preferred it to be. The question is whether today's scientists have lost their nerve.

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Information on *Darwin's Black Box: The Biochemical Challenge to Evolution* by Michael J. Behe