

Darwin's Black Box
Michael J. Behe

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“There has been virtually no attempt to account for the origin of specific, complex biomolecular systems, much less any progress.” (P. x)

Chapter 1: Lilliputian Biology

“For the record, I have no reason to doubt that the universe is the billions of years old that physicists say it is.” (5)

“*Black box* is a whimsical term for a device that does something, but whose inner workings are mysterious ...” (6)

“... *macroevolution* describes changes that appear to require large jumps.” (14)

“Scientists of the nineteenth century ... concluded that the eye could function only if it were nearly intact.” (16)

“Unfortunately, gradual development of the human eye appeared to be impossible...” (16)

Darwin ... “did not even try to explain where his starting point—the relatively simple light-sensitive spot—came from.” (18)

What Darwin thought was simple are “staggeringly complicated biochemical processes...” (22)

“... before the invention of the microscope naturalists thought that insects had no internal organs.” (23)

“... for the Darwinian theory of evolution to be true, it has to account for the molecular structure of life. It is the purpose of this book to show that it does not.” (25)

Chapter 2: Nuts and Bolts

Lynn Margulis, U of Massachusetts, “asks the molecular biologists in the audience to name a single, unambiguous example of the formation of a new species by the accumulation of mutations. Her challenge goes unmet.” She says, “Neo-Darwinism ... is in a complete funk.” (26)

Paleontologist Niles Eldredge (1995), “Evolution cannot forever be going on somewhere else. Yet that’s how the fossil record has struck many a forlorn paleontologist looking to learn something about evolution.” (27)

“Gould has argued that the rapid rate of appearance of new life forms demands a mechanism other than natural selection for its explanation.” (27f.)

“Nineteenth-century physicists thought the earth was only about a hundred million years old. . . .” “With the discovery of the biological Big Bang, however, the window of time for life to go from simple to complex has shrunk to much less than nineteenth-century estimates of the earth’s age.” (28)

English biologists Mae-Wan Ho and Peter Saunders (1979) complain about neo-Darwinism that “the successes of the theory are limited to the minutiae of evolution. . . .” (28)

Jerry Coyne on neo-Darwinism: “its theoretical foundations and the experimental evidence supporting it are weak.” (29)

“Information theorist Hubert Yockey argues that the information needed to begin life could not have developed by chance.” (29)

“But scientists, like everybody else, base most of their opinions on the word of other people. Of the great majority who accept Darwinism, most (though not all) do so based on authority.” (30)

“The bombardier beetle is a favorite of creationists. . . . explain how it could have evolved gradually.” (33)

“How could complex biochemical systems be gradually produced?” (34)

Charles Darwin: “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.” (*Origin of Species*, 6th ed., 1872, 1988, New York: New York University Press, p. 154) (39)

“irreducibly complex” (39)

Richard Dawkins: “Evolution is very possibly not, in actual fact, always gradual. But it must be gradual when it is being used to explain the coming into existence of complicated, apparently designed objects, like eyes. For if it is not gradual in these cases, it ceases to have any explanatory power at all. Without gradualness in these cases, we are back to miracle, which is simply a synonym for the total absence of explanation.” (R. Dawkins, *River Out of Eden*, 1995, New York: Basic Books, p. 83) (40)

“In biochemistry, a mutation is a change in DNA.” (40)

“What a mutation cannot do is change all the instructions in one step—say, to build a fax machine instead of a radio.” (41)

“... we need to distinguish between a *physical* precursor and a *conceptual* precursor.” (43)

A conceptual precursor: skateboard, toy wagon, bicycle, motorcycle, automobile, airplane, jet plane, and space shuttle. (43)

However, “there is no example in history of a complex change in a product occurring in this manner.” That is, the manner that would turn a bicycle into a motorcycle. (44)

“Darwinian evolution requires physical precursors.” (45)

“A simple list of components of a mousetrap is necessary, but not sufficient, to make a functioning mousetrap.” (45)

“In order to be a candidate for natural selection a system must have *minimal function*: the ability to accomplish a task in physically realistic circumstances.” (45)

“Performance can be unsuitable for either of two reasons.” First, doesn’t get the job done. Second, not sufficiently efficient. The flagellum has to move enough to propel the cell through the fluid. (45f.)

“... the ‘light-sensitive spot’ with which Dawkins begins his case is itself a multicelled organ, each of whose cells makes the complexity of a motorcycle or television set look paltry in comparison.” (46f.)

“It is the requirements of the structure-function relationship itself that block Darwinian-style evolution.” (47)

Chapter 3: Row, Row, Row Your Boat

“... the pieces of a swimming system must be matched to each other to have at least minimal function.” (57) You have to control the timing and direction of the paddle strokes. (58)

“The cilium is quite a complicated structure.” (59)

“The basic strategy of biochemistry in this century has been to take apart molecule systems and try to put them back together. The strategy has yielded enormous insights into the operations of the cell.” (63)

“... the cilium is irreducibly complex...” “All systems that move by padding—ranging from my daughter’s toy fish to the propeller of a ship—fail if any one of the components is absent.” (65)

“In the past several decades, probably ten thousand papers have been published concerning cilia.” (67)

“... one would expect that the evolution of the cilium would be the subject of a significant number of papers in the professional literature.” (67)

“In the past two decades, however, only two articles even attempted to suggest a model for the evolution of the cilium that takes into account real mechanical considerations.” “... the two papers disagree with each other...” “Neither paper discusses crucial quantitative details, or possible problems...” (68)

On the evolution of the cilium, “Nobody knows.” (69)

The flagellum (70ff.) “It is irreducibly complex.” (72) “Yet here again, the evolutionary literature is totally missing.” “... no scientist has *ever* published a model to account for the gradual evolution of this extraordinary molecular machine.” (72)

“... a cilium contains over *two hundred different kinds of proteins*; the actual complexity of the cilium is enormously greater than what we have considered.” “The bacterial flagellum in addition to the proteins already discussed, requires about forty other proteins for function.” (72)

“As the number of required parts increases, the difficulty of gradually putting the system together skyrockets...” (73)

Chapter 4: Rube Goldberg in the Blood

“... blood clotting is a very complex, intricately woven system consisting of a score of interdependent protein parts.” (78)

“But imagine the greater difficulty of landing a plane on autopilot—with no conscious agent to guide it! Blood clotting is on autopilot, and blood clotting requires extreme precision.” (78)

“... the blood-clotting system is called a *cascade*—a system where one component activates another component, which activates a third component, and so on.” (82) “... the clotting cascade has to be turned off at some point ...” (85)

“... irreducibly complex...” “... the removal of any one of the parts causes the system effectively to cease functioning.” (86)

“... such a slightly simplified system cannot change gradually into the more complex, intact system.” (87)

“Several scientists have devoted much effort to wondering how blood coagulation might have evolved.” (89) “... a person must show that the function of the system could ‘have been formed by numerous successive, slight modifications.’” (90)

“A gene for protein might be duplicated by a random mutation, but it does not just ‘happen’ to also have sophisticated new properties.” (94) “The third problem in the blood-coagulation scenario is that it avoids the crucial issues of how much, how fast, when, and where.” (94)

“... by Doolittle’s own account no blood clotting appears until at least the third step.” (95)

“Such an event (i.e. getting TPA) would not be expected to happen even if the universe’s ten-billion year life were compressed into a single second and relived every second for ten billion years. But the situation is actually much worse: ... mutation and natural selection would *tend to eliminate it*.” (96)

“Yet the article (by Doolittle) does not explain to them how clotting might have originated and subsequently evolved; instead, it just tells a story. The fact is, *no one on earth has the vaguest idea how the coagulation cascade came to be*.” (97)

Chapter 5: From Here to There

“Counting membranes and interior spaces, there are more than twenty different sections in a cell.” (103)

“In this chapter I will concentrate on the mechanisms a cell uses to get a protein to the cell’s garbage disposal, the lysosome.” (103)

“... gated transport ... is irreducibly complex.” (109)

“Attempts at a gradual evolution of the protein transport system are a recipe for extinction.” (114)
“Once again, if we looked in the literature for an explanation of the evolution of vesicular transport, we would be crushingly disappointed. Nothing is there.” (114) “A search to see what titles have both *evolution* and *vesicle* in them comes up completely empty.” (114)

Chapter 6: A Dangerous World

“In Darwinian evolution, only physical precursors count.” (118)
“... skin ... is not a physical precursor of the immune system.” (119)
“People who work with RNA wear gloves because human skin excretes an enzyme that chops up RNA. Why? It turns out that many viruses are made from RNA.” (119)
“... we make billions to trillions of them [antibodies]. Usually for any particular invader, it takes 100,000- to find one antibody that works.” (121)

“The entire B cell factory patrols the body.” “Now we have the factory close at hand to the invaders.” (122)

“The [problem of the origin of antibody diversity runs headlong into the requirements for minimal function.” (130) “To do any good, an antibody-generating system would need to generate a very large number of antibodies from the start.” (131) “... antibodies are only signals to other systems to destroy the marked object.” (131)

“Much of the actual killing of foreign cells that are marked by antibodies is done by the ‘complement’ system...” (132)

“The scientific literature has no answers to the question of the origin of the immune system.” (138)
“... whatever the mechanism, we know one thing: a system of self-toleration had to be present from the start of the immune system.” (139)

Chapter 7: Road Kill

“But some biochemical systems are not irreducibly complex.” (142)
“The mechanism that the cell uses to make AMP is automated, and as expected, it is far from simple.” (143)
“... if only the end product of a complicated biosynthetic pathway is used in the cell, how did the pathway evolve in steps?” (151)

“The problems with the A B C D theory are legion.” (152)
“First, except for Intermediate X, prebiotic synthesis experiments have yielded none of the intermediates in the biosynthesis of AMP.” (152)
Second, “Unless there was an enzyme guiding the use of the ATP energy pellet, the energy would be squandered. ... the enzymes needed to guide these steps would be required before the organism would have the chemical that is made in the next step of the pathway.” (153)
“A third problem ... is that some of the intermediates in the pathway are chemically unstable.” (153)

N. H. Horowitz, 1945: "... the most obvious implication of the facts would seem to be that a stepwise evolution of biosynthesis, by the selection of a single gene mutation at a time, is impossible." (154)
On his proposed hypothesis, "... no advance encourages his hypothesis." (154)
Nobel laureate Christian de Duve and Stuart Kauffman (155)

"No one has a clue how the AMP pathway developed." (159)

"Other examples of irreducible complexity abound..." (160)

Chapter 8: Publish or Perish

Journal of Molecular Evolution, established in 1971 (165), publishes in three categories: "chemical synthesis of molecules thought necessary for the origin of life, comparisons of DNA or protein sequences, and abstract mathematical models." (166)

Category 1: about ten percent of all papers, such as Stanley Miller's experiment

Klaus Dose: "More than 30 years of experimentation on the origin of life in the fields of chemical and molecular evolution had led to a better perception of the immensity of the problem of the origin of life on Earth rather than to its solution. At present all discussions on principal theories and experiments in the field either end in stalemate or in a confession of ignorance." (168)

"... if conditions on the ancient earth actually resembled Miller's unsuccessful attempts, then in reality no amino acids would have been produced." (169)

"Moreover, joining many amino acids together to form a protein with a useful biological activity is a much more difficult chemical problem than forming amino acids in the first place." (169) "... the presence of water strongly inhibits amino acids from forming proteins." (169) "... amino acids dissolve readily in water..." (170)

"... undirected chemical reactions overwhelmingly produce undesired products and shapeless goop on the bottom of the test tube." (171) Gerald Joyce and Leslie Orgel call RNA "the prebiotic chemists' nightmare." (171)

"In private many scientists admit that science has no explanation for the beginning of life." (172f.)

"... evolutionary biologists make no attempt to test evolutionary scenarios at the molecular level by experiment or calculation." (173)

Category 2: about five percent of the total papers, with the mathematics assuming, rather than demonstrating, a gradual, random process.

Category 3: more than 80 percent of all manuscripts

"... comparing sequences cannot show how a complex biochemical system achieved its function..." (175) "... comparing the sequences of letters in the instruction manuals will never tell us if a computer can be produced step-by-step starting from a typewriter." (175)

“In fact, none of the papers published in *JMF* over the entire course of its life as a journal has ever proposed a detailed model by which a complex biochemical system might have been produced in a gradual, step-by-step Darwinian fashion.” (176)

“In fact, evolutionary explanations even of systems that do not appear to be irreducibly complex, such as specific metabolic pathways, are missing from the literature.” (177)

Proceedings of the National Academy of Sciences: “But the great majority (about 85 percent) are concerned with sequence analysis... About 10 percent ... are mathematical studies ... No papers were published in *PNAS* that proposed detailed routes by which complex biochemical structures might have developed.” (178)

“... why is Darwinism nonetheless credible with many biochemists? A large part of the answer is that they have been taught as part of their biochemical training that Darwinism is true.” (179f.)

Albert Lehninger’s biochemistry textbook has just two citations out of 6,000 on evolution. “Apparently, though, evolution is rarely a relevant topic.” (181)

“... many textbooks ignore evolution completely.” (182) Includes Table 8-1.

“All scientists rely on authority for almost all of their scientific knowledge.” (185)

“Molecular evolution is not based on scientific authority.” (185)

“In effect, the theory of Darwinian molecular evolution has not published, and so it should perish.” (186)

Chapter 9: Intelligent Design

“Clearly, if something was not put together gradually, then it must have been put together quickly.” (187)

Lynn Margulis—advancement by cooperation and symbiosis (188)

Second alternative is complexity theory championed by Stuart Kauffman (189)

“... complexity theory began as a mathematical concept to describe the behavior of some computer programs, and its proponents have not yet succeeded in connecting it to real life.” (190)

“No proponent of complexity theory has yet gone into a laboratory, mixed a large variety of chemicals in a test tube, and looked to see if self-sustaining metabolic pathways spontaneously organize themselves.” (190)

“A controlled cellular environment does not permit the serendipitous interactions between chemicals (always unspecified) that Kauffman needs.” (191) “Like symbiosis theory, this aspect of complexity theory requires preexisting, already functional systems.” (192)

“There is an elephant in the roomful of scientists who are trying to explain the development of life. The elephant is labeled ‘intelligent design.’” (193)

“Design is simply the *purposeful arrangement of parts*.” (193)

“... we cannot know that something has *not* been designed.” (194)

“... design is evident when a number of separate, interacting components are ordered in such a way as to accomplish a function beyond the individual components. The greater the specificity of the interacting components required to produce the function, the greater is our confidence in the conclusion of design.” (194)

“Systems made entirely from natural components can also evince design.” (195)

“The conclusion that something was designed can be made quite independently of knowledge of the designer.” (197)

“Simple biochemical activities can be produced, but not the complicated systems we have discussed in this book.” (202)

Chapter 10: Questions about Design

Diogenes, “Such a distribution would not have been possible without Intelligence.” (210)

Socrates, “And can’t thou still doubt, Aristodemus, whether a disposition of parts like this should be the work of chance, or of wisdom and contrivance.” (211)

“Over the course of human history, most learned folks (and even more unlearned folks) have thought that design was evident in nature.” (211)

William Paley

“But exactly where, we may ask, was Paley refuted? ... It is surprising but true that the main argument of the discredited Paley has actually never been refuted. Neither Darwin nor Dawkins, neither science nor philosophy, has explained how an irreducibly complex system such as a watch might be produced without a designer.” (213)

Elliot Sober, University of Wisconsin, “Paley’s argument about organisms stands on its own, regardless of whether watches and organisms happen to be similar.” (217)

“... the argument from analogy is still valid; it was just twisted out of shape by Hume.” (218)

“In order to reach a conclusion based on an analogy, it is only necessary that the deduction flow out of the shared properties.” (218)

“Sober thinks that intelligent design is actually an inference to the best explanation, not an inductive argument.” (219)

“The analogy [of Dawkins] is offered in lieu of actual evidence...” (220)

“...the Dawkins-Sober scenario is actually an example of the very opposite: an intelligent agent directing the construction of an irreducibly complex system.” (221)

An objection against intelligent design—“the argument from imperfection.” (222)

Kenneth Miller, “...errors that no intelligent designer would have committed.” (222)

Wrong argument. ID “rests on the observation of highly specified, irreducible complexity...” (223)

“The argument from imperfection overlooks the possibility that the designer might have multiple motives, with engineering excellence oftentimes relegated to a secondary role.” (223)

“... the reasons that a designer would or would not do anything are virtually impossible to know unless the designer tells you specifically what those reasons are.” (223)

“... proponents of the argument from imperfection frequently use their psychological evaluation of the designer as positive evidence for undirected evolution.” (224) Darwinists sometimes base arguments “solely on an emotional feeling of the way things ought to be.” (224)

Vestigial organs, Ken Miller, “... because we have not yet discovered a use for a structure does not mean that no use exists.” (226) “... even if pseudogenes have no function, evolution has ‘explained’ nothing about how pseudogenes arose.” (226) Third, Miller confuses the theory of ID with the theory that the earth is young. (227)

Chapter 11: Science, Philosophy, Religion

“... a curious, embarrassed silence surrounds the stark complexity of the cell.” “... many explicitly admit the obvious but then stare at the ground, shake their heads, and let it go at that.” “The dilemma is that while one side of the elephant is labeled intelligent design, the other side might be labeled God.” (233)

Richard Dickerson’s “argument is not itself a scientific one... the argument is philosophy.” (239)

“Dickerson mentions just one rule, the one disbarring the supernatural. Where did he get it?” Not from science. Philosophy. (240)

A. S. Eddington, “Philosophically, the notion of an abrupt beginning to the present order of Nature is repugnant to me...” (244)

“A few, like Einstein before them, didn’t like the extra-scientific implications of the theory and labored to develop alternatives.” (244)

“... Hoyle, like Eddington, thought that the Big Bang strongly implied the supernatural and found the prospect extremely distasteful.” (245)

Bubble universes, imaginary time, anthropic universes, etc. “are metaphysical postulates, no more accessible to experimental investigation than an admittedly supernatural being. They do science no good. Their only use is as an escape hatch from the supernatural.” (247)

Francis Crick: “Directed Panspermia” in a 1973 article. (248)

Crick “... judges the undirected origin of the life to be a virtually insurmountable obstacle, but he wants a naturalistic explanation.” (248)

John Maddox, the editor of *Nature*, has written in his journal that “it may not be long before the practice of religion must be regarded as anti-science.” (250)

“In his recent book *Darwin’s Dangerous Idea*, philosopher Daniel Dennett compares religious believers—90 percent of the population—to wild animals who may have to be caged...” (250)

Afterword

“... a decade after the publication of *Darwin’s Black Box* the scientific argument for design is stronger than ever.” (255)

“Most proteins in the cell are now known to work as teams of half a dozen or more, rather than by themselves.” “Now a new, unimagined category of nucleic acids called micro RNAs has been discovered that helps control many genes.” “... it is getting exponentially more complex.” (256)

“Like Pennock, Miller concocted his own, private definition of irreducible complexity, and then argued against that.” (259)

“The *system* is irreducible, not the *parts*.” (261)

“Orr’s abstract argument says absolutely nothing about the concrete sorts of examples I cited...” (263)

Dawkins ... “insists that the appearance of design ... is *overpowering*: ‘Yet the living results of natural selection overwhelmingly impress us with the appearance of design as if by a master watchmaker, impress us with the illusion of design and planning.’ R. Dawkins, *The Blind Watchmaker*, 1986, Norton, New York, p. 21. (264)

“... much to the consternation of Darwinian biologists, the bulk of the public rejects unintelligent processes as sufficient explanations for life.” (266)

“So a goodly fraction of the scientific community is highly motivated to discredit design.” (266)

“... nothing remotely approaching such an evolutionary account of the cilium has been developed. Darwinian theory has remained dead in the water.” (267)

“All sciences begin with speculation; only Darwinism routinely ends with it.” (268)

“Neither the TTSS, the flagellum, nor any transitions between them have been soberly investigated in a Darwinian framework in the professional science literature.” (268)

From chapter 8: “There is no publication in the scientific literature—in prestigious journals, specialty journals, or books—that describes how molecular evolution of any real, complex, biochemical system either did occur or even might have occurred. There are assertions that such evolution occurred, but absolutely none are supported by pertinent experiments or calculation.” (270)

Coyne “avoids engaging the real arguments of intelligent design.” (270f.)

“... University of Chicago microbiologist James Shapiro, ‘There are no detailed Darwinian accounts for the evolution of any fundamental biochemical or cellular system, only a variety of wishful speculations.’ Ten years later, nothing has changed. Call them wishful speculations or call them plausible scenarios—both just mean a lack of real answers.” (271)

“... polls show that the great majority of the public already is convinced of design.” (272)