

## **The Three Failures of Creationism: Logic, Rhetoric, and Science**

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## Anticreationism for Students

**The Three Failures of Creationism: Logic, Rhetoric, and Science.** Walter M. Fitch. University of California Press, 2012. 194 pp., illus. \$24.95 (ISBN 9780520270534 paper).

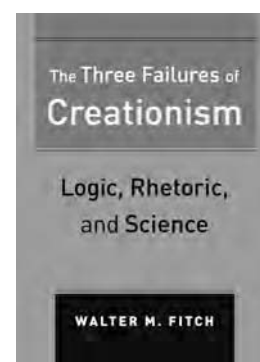
*The Three Failures of Creationism: Logic, Rhetoric, and Science* is Walter Monroe Fitch's attempt to help resolve the perennial American problem of creationism by presenting major creationist arguments, along with his rebuttals, to "intelligent high school seniors or college freshmen or sophomores" who would like a "relatively fair" discussion of those arguments (p. 1). Fitch, who died one year before the book's publication, was motivated by "the failure of scientists to present clearly what they do and why" (p. 1). He wanted to show the usefulness of logic in addressing scientific questions, to explain how the scientific method is employed in studying evolution, and to counter the misconception that "evolutionary biology and reasonable religious beliefs" are incompatible (p. 151). However, this threefold purpose was meant to serve Fitch's primary goal, which was to show that whereas "biological evolution is a scientific study,... creationism, intelligent design, and irreducible complexity are not scientific" (p. 2). Although the quality of his presentation is uneven, Fitch generally succeeds in conveying this message.

A member of the National Academy of Sciences and other prestigious organizations, Fitch founded the field of molecular phylogenetics and helped to advance the understanding of evolutionary change at the molecular level. He developed methods of creating phylogenetic trees based on physical and genetic relationships among species. He also cofounded the Society for Molecular Biology and Evolution and the journal *Molecular Biology and Evolution*, serving as its editor for a decade.

According to Fitch, a student's understanding of the nature of science is hindered partly by an unfamiliarity with the logic of scientific reasoning. He therefore offers a survey of basic deductive and inductive logic, including an explanation of the fallacies and rhetorical devices that creationists frequently employ. For example, he explains the fallacy of equivocation using a syllogism based on creationists' persistent misunderstanding of the term *theory*. Whereas standard logic textbooks typically illustrate this fallacy with trivial examples, Fitch demonstrates its seriousness by showing the two very different arguments—one invalid and one valid—that result, respectively, from defining *theory* as "only a guess," as creationists do, and defining it scientifically as "a well-supported explanation of many observations" (pp. 10–12). His treatment of logic also includes occasional imprecisions, such as defining *genetic fallacy* as "arguing against an idea on the basis of the proponent's personal character" (p. 14), which properly defines the more specific *ad hominem fallacy*. Fitch too narrowly defines *deduction* as "reasoning from the general to the particular" and *induction* as "reasoning from the particular to the general" (p. 42), although he states correctly elsewhere that "the conclusion of a valid deduction *must* be true if the premises are true, whereas an induction *may* be correct but is not proven" (p. 8).

The most basic issues in both science and religion revolve around epistemological questions concerning what *knowing* properly means. Fitch addresses these questions in his book by proposing seven ways of knowing: experience, observation, logic, authority, intuition, revelation, and faith. This is followed by his outline of four areas of knowledge: theology, ethics, esthetics, and logic/epistemology.

Fitch's discussion here could have been improved by more precise philosophical analysis and terminology. For example, his definition of *logic* as a "mathematical subject" (p. 30) will probably convey to students the idea that logic incorporates mathematics. Although it can be mathematics-like (e.g., propositional logic proofs), mathematics is not integral to logic (as many philosophy majors can happily attest). More seriously, Fitch conflates logic with epistemology and erroneously defines *logic/epistemology* as "the study of matter and energy and their interactions" (p. 38)—that is, as physics. Logic and epistemology are not natural sciences but separate branches of philosophy, with epistemology comprising different—and not necessarily compatible—definitions of *knowledge*. This confusion leads Fitch to say *epistemological* when he means *empirical*: "Theology has no authority in the area of the epistemological study of the material world" (p. 39).



*The Three Failures of Creationism* is strongest in its discussion of the nature of science and the application of logic to the scientific process, as in the respective roles of inductive and deductive reasoning in developing and testing hypotheses. Fitch combines basic science instruction with an analysis of creationist mistakes. In chapter 3

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("Some simple math and statistics"), he shows how to calculate the probabilities of inherited traits, using as an example the alleles for pigmentation in a population of flowers. He explains fossil-dating methods and shows the importance of Occam's razor in avoiding creationist miscalculations concerning Earth's age. He demonstrates how base sequences of DNA are used to determine ancestral relationships in the construction of phylogenetic trees. After explaining molecular clocks and the roles of mutation and natural selection in speciation, Fitch concludes with six "intriguing observations" of the fossil record (e.g., a continuing increase in diversity and complexity) and 10 requirements for explaining these observations scientifically.

In chapter 4 ("Young-Earth' creationism"), the only chapter devoted exclusively to critiquing creationism, Fitch reviews the standard litany of problems stemming from biblical literalism, such as the meaning of the Hebrew word for *day* and the contradictions between Genesis 1 and Genesis 2. Although intelligent design is a form of old-Earth creationism, he includes it here, commenting briefly on William Dembski's rejection of the criticism that *intelligent design* implies *optimal design* and more extensively on Michael Behe's concept of *irreducible complexity*. After briefly discussing the anthropic principle, Fitch resumes his critique of well-known creationist claims such as the impossibility of macroevolution, the supposed absence of transitional fossils, and the equation of evolution with atheism. He devotes some time at the end of the chapter to theological issues and, in an epilogue, gives the last word to St. Augustine by offering a short excerpt from *The Literal Meaning of Genesis* (1982), in which Augustine warned fellow Christians against biblical literalism.

The book contains some copy-editing errors, including an incorrect death date of 1832 for Charles Darwin. Fitch provides a glossary and a reference list of standard creationist and anticreationist works, along with classic and contemporary science

sources. Given the intended audience of scientifically and theologically naive students, the references are somewhat dated and uneven. For example, Fitch includes a 1983 graduate-level monograph on hemoglobin, whereas a book such as biologist Joel W. Martin's *The Prism and the Rainbow* (2010), an explanation of evolution for Christian students, would have been a helpful addition.

*The Three Failures of Creationism* presents no new or unique material. Although some parts will be accessible to students, other parts (e.g., the previously mentioned chapter 3) are probably beyond the comprehension and attention span of many of the high school seniors and college undergraduates who are Fitch's target audience. The book also lacks a coherent structure, which makes Fitch's discussion difficult to follow. On the whole, other critiques of creationism and introductions to evolution are available that will be more helpful to students.

### References cited

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 Saint Augustine. 1982. *The Literal Meaning of Genesis*, vol. 1. Taylor JH, trans. Ancient Christian Writers, vol. 41. Paulist Press.

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### FROM FINS TO LEGS AND BACK AGAIN

**Return to the Sea: The Life and Evolutionary Times of Marine Mammals.** Annalisa Berta. University of California Press, 2012. 224 pp., illus. \$44.95 (ISBN 9780520270572 cloth).

**S**ome 55 million years ago, in the Early Eocene epoch, a number of mammals forsook their terrestrial

homes to return to life in the sea, beginning one of the strangest and most interesting chapters in evolutionary history. They were the ancestors of today's marine mammals, which (unlike fishes and most other aquatic creatures) arose from land-living, air-breathing animals. On the shallow shores of the ancient Tethys Sea, which stretched across what is now southern Asia and the Middle East, slender, cat-sized creatures gave rise to the cetaceans (whales, dolphins, and porpoises), and squat, elongate elephant relatives evolved into sirenians (manatees and dugongs). These and other fascinating creatures are described in Annalisa Berta's wide-ranging and fact-packed new book, *Return to the Sea: The Life and Evolutionary Times of Marine Mammals*.

Berta is a professor of biology at San Diego State University, where she specializes in vertebrate morphology and evolution—fields of expertise that figure prominently in this engaging tour through the highlights of marine mammal history. How did these ancestors survive the tremendous challenges of their new environment? In turns serious and playful, Berta outlines many of the extraordinary adaptations that enabled these animals—and their living descendants—to survive and thrive. For example, walruses have countercurrent heat exchangers in their flippers, and the males make gong-like sounds to attract females. Blue whales are born with rudimentary teeth, which are later reabsorbed, before they grow 300 plates of filtering baleen, which are made of the same keratin as are in our hair and fingernails. Sperm whales can dive close to two miles deep and can stay below the surface for over two hours, all on a single breath of air. Abundant facts are woven into a compelling story of the history and biology of marine mammals that will delight while it informs readers.

Berta writes in an engaging, jargon-free style, which makes the book readily accessible to students and teachers at both the graduate and the undergraduate levels, but it is especially