

## LITERATURE REVIEWS

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### EVOLUTION DEFENDED

ABUSING SCIENCE: THE CASE AGAINST CREATIONISM. 1982. Philip Kitcher. Cambridge, MA and London: MIT Press. 213 p.

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“This book is intended to be a manual for intellectual self-defense, something that can be consulted when the smiling advocates of Creationism launch their attack” (p 4). The purpose of Kitcher’s book is clearly stated. Although he does not accept a literal reading of Genesis, Kitcher is not trying to “debunk religion” (p 6). “My business is strictly with a political movement,” he says (p 6), aimed specifically at the “Moral Majority” and the Institute for Creation Research (p 1, 6). His strategy is first to refute the criticisms of evolution by creationists and then to turn these criticisms back at creationism.

Chapter one is a brief summary of the main tenets of evolutionary theory. According to Kitcher, “the main thesis of evolution is that species are not fixed and immutable” (p 7). Since Kitcher knows that creationists agree with this statement (p 143), this seems to be an odd way to begin explaining the differences. In chapter five, Kitcher examines creation theory itself to see how it measures up as science. The final two chapters are more concerned with the politics of the debate and the real reasons creationists are upset with evolutionary theory.

The criticisms of evolution by creationists discussed by Kitcher can be arranged into three main arguments: 1) evolution is not really science; 2) evolution is implausible on theoretical grounds; and 3) evolution is not well-supported by the evidence.

Four points are included in the argument that evolutionism is not true science. The first two points are that evolution cannot be proved and that it cannot be falsified. Kitcher’s response is that science is not a matter of proof, but of evidence (p 32-35). To him, the evidence clearly favors evolution. As for falsifiability, “naive falsifiability” is not a good criterion for science (p 42-44), but evolutionary theory has produced many hypotheses which are falsifiable (p 60-63). (Kitcher does not seem to notice that a hypothesis can be falsified without testing the theoretical setting in which the hypothesis was

generated). The third point is that evolutionary theory cannot predict the future. Kitcher responds that evolution does not claim to predict the future, but it does make (testable) predictions, such as the existence of marsupial fossils in Antarctica (p 80). To the criticism that evolution is tautological, Kitcher replies that although natural selection can be stated as a tautology, the principle of natural selection is not tautologous, and evolutionary theory is much more than natural selection (p 55-60).

The argument that evolution is implausible on theoretical grounds has three main components. The second law of thermodynamics states that “the entropy [disorder] of a closed system increases with time” (p 90). Creationists have used this law to support their contention that order will not be produced by random processes. Kitcher’s answer has two parts. Entropy can decrease in an open system (p 89-96). Since living things are not closed systems, they can increase in complexity (p 92). (Probabilities are not discussed in this context). The second part of the answer is that events which appear random are not necessarily chaotic. In fact, they may have a deterministic basis which would enable us to predict the outcome if we knew enough about the starting conditions (p 86). Kitcher here appears to be a reductionist (see also p 105-106). However, his attempts to defend the hypothesis of the abiotic origin of life seem half-hearted and unconvincing (p 75-78).

The other two points included in this second main argument are that mutations are harmful rather than helpful, and that even if organisms did change gradually by the accumulation of mutations, the changes required to account for the present diversity of living organisms would require far more time than anyone has postulated. Kitcher replies that whether a mutation is harmful or helpful depends on the genetic background and physical environment of the organism carrying it. The problem of lack of time is addressed by appeal to the familiar (and irrelevant) card-drawing scenario (p 103). Pick any 13 cards from a deck, then compute the probability of selecting them in that order. The probability is a very small number indeed. Yet that improbable event occurred. So evolution, although it may be improbable, has also occurred. Kitcher attributes the occurrence of such improbable events, including the evolution of horses (p 103) and the origin of life (p 105), to the inevitable result of the initial state of the system. It is not clear whether he believes that life and its diversity are the result of some kind of biochemical predestination.

The third creationist argument against evolution is that it is not well-supported by the evidence. Two principal criticisms are involved here. The failure of the fossil record to show a graded series connecting all forms of life is attributed by Kitcher to the nature of the fossil record. It is partial, with many missing time gaps, and it is biased, favoring certain taxonomic groups, especially those with hard parts which are easily preserved (p 107). Despite the incompleteness of the record, there are partial series of intermediates,

such as between fish and amphibians, reptiles and mammals, and reptiles and birds (p 108-117). The other criticism is that evolutionary novelties could not become established gradually because they would be selected against unless they were fully formed. Kitcher responds that complex structures can be formed gradually through natural selection if they are linked to a useful character, are partially useful, or are useful in a different way (p 119). (No examples are given).

In chapter 5, Kitcher turns the arguments back onto the creationists. His criticisms of creationism can be divided into two main arguments: 1) creationism is not science; and 2) creationism is not well-supported by the evidence.

Several specific criticisms are used to support Kitcher's first argument. Creationism is not science because it does not permit tests of falsifiability, but appeals to the miraculous when problems are encountered (p 134, 181). Creationism is not based on observation, but on the Bible (p 180). Creationism has no explanatory value and virtually no problem-solving strategies (p 124-127, 171). Rather, creationists selectively borrow from evolutionary studies (p 144, 164). Finally, creationism has no theories of its own (p 126), but largely confines its activities to attacking evolutionism (p 126, 176).

The second argument, that creationism is not well-supported by the evidence, is illustrated with five examples. Kitcher asserts that the order of fossils in the rocks is not explained by the Genesis flood (p 131). In addition, there is no mechanism proposed for the flood (p 132). The next target is the concept of design. What is the "Grand Plan" of creation? asks Kitcher (p 138). Why did God need to design defenses against predators? (p 137). Next Kitcher questions the adequacy of dispersal from Ararat to explain the present biogeographical distribution of mammals (p 140-143). What scientific evidence is there for only one ark? Why did Australia become a stronghold for marsupials?

The fourth point which Kitcher wishes to discredit is the creationist belief that many original "kinds" of animals were created and that changes since creation have been limited to producing varieties of a "kind," but no new "kinds." Kitcher maintains that there is no substance to the creationist claim that microevolution and macroevolution are different processes (p 144). Even if a difference should be discovered, the "fact" of evolution would still not be refuted (p 150-151). Creationists are accused of "crude gerrymandering" in their definition of what constitutes a "kind" (p 153). Faced with inconsistencies in their application of the term, Kitcher accuses creationists of retreating into vagueness (p 154). The final criticism of creationism concerns the age of the earth (p 155-164). The evidence from radiometric dating is alleged to be consistent with the theory of evolution but not consistent with creation theory.

The final two chapters are based on Kitcher's conclusion (p 164) that creationism is not science at all. He does suggest (p 173, 174) that it might provide a useful classroom example of pseudoscience. He also asserts that if creationism is required in the public schools, then space should also be made available for other "sciences," such as those of the Muslims, Hindus, and even the Druids!

Perhaps the most damning comments made by Kitcher about creationists are found at the end of the book. He states that "for the Creationists, misleading quotation has become a way of life" (p 181). And, in rebuttal to the accusation of some creationists that evolution is the source of the evils of this world, Kitcher replies that "the most popular doctrine for use in rationalizing evil and immoral actions has surely been Christianity" (p 197), and supports the charge with a list which includes anti-Semitism, the Inquisition, witch-burning, and other church-sponsored activities. With this history in mind, it should not be surprising that the scientific community wishes to maintain its own identity separate from that of organized religion. However, it could be that such evils as Kitcher points to are not the result of religion, but of the human condition, to which scientists themselves are not immune.

How shall I evaluate the book? Kitcher has probably done as well as anyone in answering the challenge from creationists. His defense of evolution is spirited, even where it is weak. He has a tendency to make statements of victory without a convincing argument (e.g., p 115, 119, 144). (This may reflect differences in philosophies). His criticisms of creationism are of mixed validity. In arguing that creationism is based on religion, I must agree. Whether that excludes creationism from the realm of science depends on the definition of science. Evolutionists have defined science in such a way as to exclude God, but there is no requirement that it be so defined. The conclusion is contained in the definition. The criticism that the evidence does not support creation theory is unconvincing. Much of the evidence does not support any present theory, or can be explained by either theory. One can still make a choice as to which explanation of our existence makes the most sense. It seems reasonable to me to base this decision on evidence from all areas of one's experience. Like many others, Kitcher appears to miss the distinction between testing a paradigm and testing specific hypotheses generated from within that paradigm. Nevertheless, Kitcher has pointed out some areas of creation theory which need further study and development. It is hoped that research programs will be designed to test competing hypotheses and fill in some of the gaps in creation theory.