Intelligent Design Creationism and Its Critics: Philosophical, Theological, and Scientific Perspectives edited by Robert T. Pennock. Cambridge, MA: MIT Press, 2001. 805 pp. $110.00 (cloth). ISBN 0262162040. $45.00 (paper). ISBN 0262661241.

Ronald Numbers' classic history of creationism is subtitled "The Evolution of Scientific Creationism" (Numbers, 1992). As Numbers implies, it is instructive to view the vagaries of creationism in the 20th century with a Darwinian eye. Arising from the primordial ooze of fundamentalism early in the last century, creationism first flexed its muscles at the Scopes Trial in 1925. The coverage of the trial by the national press, particularly H.L. Mencken's acidulous reports, portrayed antievolutionists as slack-jawed yokels—an image that still rankles. Stung by Mencken's merciless lampoon of fundamentalists as "anthropoid rabble," and their champion William Jennings Bryan as "the tin-pot Pope of the Coca Cola belt," creationists retreated. Biding time in its native habitat of fundamentalist churches, tent revivals, and Bible colleges, creationism quietly mutated into "scientific creationism" and emerged in its new form with the publication of *The Genesis Flood* by John Whitcomb and Henry Morris in 1961. "Scientific creationism," as articulated by proponents such as Morris and Duane Gish, attempted to disassociate itself from Biblical creationism and put itself on scientific grounds.

"Scientific Creationism" was still too close to religious fundamentalism to succeed, however. Various courts found the "creation model" to be a thinly disguised version of the Book of Genesis, and therefore unfit to be taught in public schools. Outcompeted in the courts, creationism mutated once again, assuming its latest form "Intelligent Design Creationism" (IDC). IDC is certainly the slickest and most sophisticated species of creationism to date. Unlike the "young earth" creationists, proponents of IDC (Philip Kitcher terms them "neo-creos") do not deny that the earth is billions of years old. Also, since they are not bound to an inerrantist interpretation of the Bible, they do not have to go to some of the preposterous lengths of their fundamentalist brethren—like trying to explain the fossil record with Noah's flood. It remains to be seen whether IDC will succeed in its efforts to displace naturalism and evolutionary theory and occupy the coveted niches of academic respectability.

Robert T. Pennock's massive and excellently edited anthology examines the major issues associated with IDC. One thing Pennock's volume makes clear is that sneers about hayseeds no longer apply. As Philip Kitcher puts it in his essay in this volume, "creationism is no longer hick, but *chic*" (258). IDC has gained the support of a number of reputable scholars and scientists—including, alas, a few noted philosophers whom I had previously regarded with deep respect. Another thing this book makes absolutely clear is that IDC is no more credible than were any of the earlier strains of creationism. Pennock allows the most articulate voices supporting IDC to have a full and fair say. Critics respond by patiently unearthing the hyperbole, inaccuracies, half-truths, fallacies, and

misrepresentations that constitute the case for IDC. Mencken quipped "a single horselaugh is worth a thousand syllogisms." But the careful, informed, and detailed analyses of IDC offered here show just how devastating first-rate intellectual critique can be. This anthology, along with Pennock's earlier work, *Tower of Babel* (1999), and the recent books by Kenneth Miller (1999) and Niles Eldredge (2000), should serve as tombstones for the IDC movement.

Certainly the most visible proponent of IDC has been Berkeley professor of law Phillip Johnson. Here he has an exchange with Pennock on the subject of evolutionary naturalism. Johnson makes a perfunctory stab at evolution by mentioning a few of the standard arguments. However, his real target is what he regards as the dogmatic metaphysical naturalism that he says evolutionists have promoted in the name of science. For Johnson, the real problem with evolution is not just that it is "evidence challenged," but that creationist alternatives are summarily dismissed because of an *a priori* commitment to metaphysical naturalism. In other words, if we assume, as did Carl Sagan in the opening monologue of his famous television series, that "the cosmos is all that is or ever was or ever will be," then we shall also assume that life began and developed by purely naturalistic means. Alternative hypotheses postulating intelligent design will simply be ruled inadmissible no matter how flimsy the evidence for naturalistic theories.

Pennock replies, as have those similarly challenged at least back to T.H. Huxley, that the naturalism assumed by science is methodological and not metaphysical. That is, naturalism is a heuristic assumption that guides science, not an *a priori* fiat dictating how reality must turn out. Huxley was very clear on this point. He held that metaphysical materialism, the claim that all that ultimately exists is matter and physical forces, is just as groundless as the worst theological dogmas (Huxley, 1868, pp. 161–162). Huxley's argument in favor of methodological naturalism is epistemological; that is, it is based on a view of what humans can know and how they can know it. Speculations about ultimate reality are pointless. Naturalistic hypotheses explain in terms of entities or processes that are measurable, observable, or otherwise accessible to objective, public inquiry. Also, they connect with other observations and theories in ways that permit prediction, control, and a coherent, unified framework of explanation (Huxley, 1868). Pennock adds that testability relies upon the postulation of processes that occur in regular, lawlike ways (88). For instance, if optical phenomena were capricious rather than lawlike, telescopes would be utterly unreliable and astronomy would be impossible.

Huxley might have added that hypotheses postulating gods, demons, souls, *élan vital*, or other supernatural powers or entities tend to behave badly. Often they are untestable, because they postulate inscrutable processes, have no empirical content, or are insulated by an impenetrable swarm of *ad hoc* auxiliary hypotheses. Further, they postulate no "laws of supernature" permitting the prediction and explanation of phenomena. Recognizing the intractability and the obscurantist potential of such hypotheses, scientists well before Darwin decided

that they would seek explanations in terms of "secondary" (natural) causes and leave the "primary" (theistic) explanations to theologians (Gillespie, 1979).

These are cogent arguments for methodological naturalism. Scientists do dismiss supernaturalistic hypotheses, but this is not due to an *a priori* prejudice; it is a practical methodological prescription based upon a cogent philosophical rationale and adopted after long and bitter experience. Still, I think Pennock missed giving a stronger reply to Johnson: There is no reason *in principle* (though in practice problems abound) why a supernaturalistic hypothesis could not be scientifically evaluated *vis-à-vis* a naturalistic one (Schick, 2000). It has been done, in fact. In the final, glorious chapter of *The Origin of Species*, Darwin pits the hypothesis of special creation against his hypothesis of natural selection. Time and time again he shows that natural selection economically explains phenomena that no reasonably competent designer or minimally moral creator would produce. Darwin did not reject special creation because it conflicted with metaphysical or even methodological naturalism. He beat it in a fair fight.

One of the most troublesome objections hurled at Darwin after publication of *The Origin* had to do with the origin of "organs of extreme perfection." The eye, for instance, is a superb mechanism that integrates many intricately interacting parts into a functional whole. It is hard to imagine so delicate and complex a mechanism developing from the stepwise, trial-and-error tinkering of natural selection. In his 1996 book *Darwin's Black Box*, biochemist Michael Behe developed a sophisticated update of such an argument.

Behe thinks that at the cellular and biochemical levels we find instances of what he calls "irreducible complexity." An irreducibly complex structure or process is one composed of many interacting parts or subsystems which are individually necessary and jointly sufficient for the performance of the function of the whole. Take away any single component of an irreducibly complex entity or process and the whole thing ceases to function. It does not partially function or revert to some other function; it becomes totally useless. Natural selection operates by co-opting elements that already have a function, as in the case, abundantly documented in the fossil record, of the mammalian appropriation of bones from the reptilian jaw and their transformation into parts of the inner ear (Miller, 1999, pp. 138–139). However, the components of an irreducibly complex structure have no use at all by themselves, but only as parts of a fully functioning whole. Organisms do not keep useless bits of cellular or biochemical detritus lying about, so natural selection would have no raw material to develop into something irreducibly complex. If natural selection cannot bring about the irreducibly complex, Darwinism fails to account for many of the most important and basic features of organisms, and supernatural design seems to be the alternative.

An essay by Philip Kitcher and one co-authored by Matthew J. Brauer and David R. Brumbaugh offer acute criticisms of Behe's argument. Kitcher, with characteristic verve and wit, puts his finger on a problem not just for Behe, but for Johnson and all proponents of IDC: What precisely is the design hypothesis?

What kind of designer? Designed how and for what purpose? As Bertrand Russell pointed out long ago, if the designer's ultimate aim was to create humans, why all of the endless ages of useless trilobites, mammoths, and diplodoci? Why not, as the young-earth creationists have always insisted, simply create everything at once (or at most over six days)? How did birds, say, originate for proponents of IDC? Perhaps it was something like this: One fine spring morning in the late Jurassic God said *"fiat aves!"* and POOF! *Archaeopteryx* emerged from a blaze of light. If it did not happen like this, what was the designer's *modus operandi?* Kitcher suggests (282), as did Asa Gray in the 19th century, that perhaps God providentially arranged for the appropriate variations to arise in the right populations at just the right time in the history of life. In other words, as one wag said of Gray's hypothesis, perhaps there was creation on the installment plan.

Proponents of IDC, taking advantage of the debates over the mechanisms of evolution, have often belabored evolutionists for postulating evolution without specifying the exact mechanisms. Surely then they have a concomitant responsibility to answer the sorts of questions posed above about hypothetical designers. Yet, as Kitcher notes, they leave things very vague. Their silence on these points is telling. Clearly, despite their disavowal of Biblicism, they have in mind not a generic designer, but a specific Designer—the God of Abraham, Isaac, and Jacob. As Kitcher implies, IDC is not really so far from country-bumpkin creationism as its advocates want us to think.

Kitcher, Brauer, and Brumbaugh make a number of telling points against Behe. Their strongest arguments show that "irreducible complexity" is not so irreducible after all. Behe proffers instances of purportedly irreducible complexity and then asks how possibly it could have been built up from simpler constituents. Taking Behe's instance of the bacterial flagellum, Kitcher shows very easily how possibly it could have evolved from protein constituents already present in the cell (263–264; see also Miller, 1999, pp. 140–143). When proponents of IDC demand "How possibly?" and are shown how possibly, they usually shift the question to "How really?" This is dirty pool, as Kitcher points out (264). Yet as Brauer and Brumbaugh show (316–322), rapidly advancing biological research is presently revealing how apparently "irreducible" systems and structures did evolve.

This is a big book and many other aspects of the debate over IDC are included. In this review I have only been able to offer a small sampling of the arguments and issues contained. William Dembski is probably the next best-known proponent of IDC after Johnson and Behe. His sophisticated arguments using information theory are presented here and criticized by Peter Godfrey-Smith, Branden Fitelson, Christopher Stephens, and Elliott Sober. The theological implications of the IDC controversy are thoroughly discussed by such luminaries as Alvin Plantinga, Nancy Murphy, Arthur Peacocke, and Howard J. Van Till. In all of these discussions, which range over a very wide set of issues, the intellectual level is high and many insights are offered that transcend the IDC controversy. This is

certainly a "must have" book for anyone interested in the ongoing debates over evolution and creationism or the relations between science and religion. I believe that any reader, on either side of the debate, will join me in thanking the editor for his superb job in bringing these materials together.

KEITH M. PARSONS
Dept. of Philosophy
University of Houston, Clear Lake
Houston, TX 77058

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Finding Darwin's God: A Scientist's Search for Common Ground Between God and Evolution by Kenneth R. Miller. New York: HarperCollins, 1999. xiii + 338 pp. $25.00 (cloth), ISBN 0-060-175-931; $14.00 (paper), ISBN 0-06093-049-7.

Kenneth R. Miller is a cell biologist at Brown University, co-author of widely used high school and college biology textbooks, author of articles in diverse scientific journals and magazines, and my own choice as the most effective defender of evolution in the tricky business of debating creationists. He is also a devout Roman Catholic. This book is his attempt to explain these dual commitments to his students and to others who might be inclined to judge them as incompatible.

Miller's book is one of two main texts, along with one written by myself, in my college course on Science and Religion. I chose his book for four reasons. First, it is a breezy, engaging, often personalized, yet lucid read. Second, biological evolution is the chief scientific stumbling block for many students. Miller does an excellent job of explaining why the basic claims of evolution are not controversial within the scientific community, and why that community finds no merit in various creationist challenges to evolution. (I believe that