

One-eyed darwinism

Philip Kitcher

The Blind Watchmaker. By Richard Dawkins. Longman: 1986. Pp. 332. £12.95. To be published in the United States on 24 November by W.W. Norton, \$18.95.

To Richard Dawkins it is always *the* problem. How are we to account for the complex design in nature, the intricacy of fit between organism and environment that once moved William Paley to propose the analogy of finding a watch on the beach, and thereupon build an argument for the existence of a Creator? Dawkins admires Paley's appreciation of a great mystery, even though he has no sympathy for Paley's theological solution. Thanks to Darwin, we have no need of that hypothesis. The preordained unfolding of the Creator's plan is replaced by the action of natural selection, the blind watchmaker of Dawkins's title.

Dawkins believes, with considerable justice, that the theory of evolution by natural selection is widely misunderstood, and part of his project is to explain that theory in a manner that will demonstrate its power to solve Paley's puzzle. *The Blind Watchmaker* contains passages of exposition that deserve sustained applause. The third chapter begins by distinguishing clearly between single-step selection and cumulative selection, and proceeds through some ingenious and illuminating computer simulations which make plain how cumulative selection can give rise to striking and unanticipated modifications of an original form. It is tempting to suggest that Dawkins's program should be made widely available, to schoolchildren and to eminent astrophysicists, so that the rumbling complaint that compares the effects of selection to a tornado sweeping through a junkyard may finally be laid to rest.

No less brilliant is the discussion at the end of Chapter 4, in which Dawkins the sensitive naturalist replaces Dawkins the clever computer hacker. In 15 pages, he reviews the standard examples of convergent evolution (and some lesser known cases) in prose that makes them extraordinarily vivid. Chapter 5 provides a clear and entertaining account of the elements of contemporary genetics, and Chapter 6 an outline of Cairns-Smith's hypothesis about the origins of life and a useful response to those who claim that the occurrence of life on our planet is so improbable

that it signals a miracle. The next two chapters reveal the ways in which natural selection can work constructively to yield "a building up of complexity that has more in common with addition than with subtraction" (p.169). Particularly admirable is Dawkins's lucid presentation of Lande's complex ideas about runaway sexual selection, a discussion in which Dawkins

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was assisted by Alan Grafen.

The six central chapters of *The Blind Watchmaker* thus constitute a compelling exposition of the main themes of contemporary neo-darwinism, indeed the most compelling presentation of those themes that I know. The stylistic talents that won a broad readership for *The Selfish Gene* are fully in evidence here. But Dawkins aims not only to present what is uncontroversial amongst evolutionary biologists but also to take a stand on matters that continue to spark professional debate. In the end, *The Blind Watchmaker* tries to articulate a particular version of neo-darwinism, and in this part of his enterprise Dawkins is far less successful.

The last three chapters take up three main areas of disagreement in contemporary evolutionary theory. Dawkins considers the proposal that the theory of punctuated equilibria provides an expansion of neo-darwinism, the continuing controversies in systematics, and an assortment of positions that emphasize alternatives to selection as agents of evolutionary change. In this part of the book the real issues are never joined. Dawkins sees clearly that some of the most strident criticisms of neo-darwinism caricature the position that they advertise themselves as attacking. But his own defence is to identify untenable extremes and to portray the version of neo-darwinism that he favours as occupying the sensible middle ground.

I will concentrate on Dawkins's attempt to deflate the punctuationalist challenge to neo-darwinism. His strategy here is to analyse the three main claims advanced by the punctuationalists, showing that, under analysis, Gould, Eldredge, Stanley and others do not stray very far from neo-darwinian orthodoxy. The success of this strategy depends on how far the analysis proceeds. Eldredge and Gould made a proposal about the geometry of phylogenetic trees: evolution consists of long periods of stasis punctuated by short bursts of speciation. Dawkins fastens on the idea that speciation occurs "suddenly", and argues that the rates envisaged are consonant with those admitted by gradualists. But this is to bypass the main point of difference. Punctuationalists contend that evolutionary changes are concentrated around episodes of speciation, and they are (to say the least) sceptical about the importance of either morphological change or speciation within unbroken lineages.

In discussing punctuationalist claims about the mechanisms underlying stasis and speciation, Dawkins also finds only what is orthodox. The idea that small molecular substitutions may have large phenotypic effects is, he claims, a part of mainstream neo-darwinism. Thus, the punctuationalist emphasis on the importance of modified developmental pathways in speciation can be assimilated into the reigning orthodoxy. The issue here is closely related to that in the chapter where Dawkins considers the complaint that neo-darwinians overemphasize the importance of natural selection in evolution and fail to appreciate the role of developmental constraints.

There, Dawkins concludes by claiming that "all serious Darwinians" would agree that "we can't afford to ignore the con-

straints on evolution that embryology imposes" (p.311). But although, like Dawkins, most neo-darwinians are now prepared to declare that the power of selection to shape a phenotypic trait is limited by developmental factors, the critics of orthodox neo-darwinism argue that in practice this declaration is forgotten and that explanations of phenotypic traits effectively suppose that natural selection is omnipotent. The debate should centre not on the extreme "Mutationist" who figures in Dawkins's pages, but on the relative importance of various agents of evolutionary change.

Dawkins's failure to identify the real question in this case is reflected in a failure to deal adequately with the punctuationalists' account of stasis, and he is led to canvass extraordinary possibilities in interpreting their views. Allegedly, punctuationalists believe that species "actively resist change" (p.247), and Dawkins has little trouble in rebutting one obvious reading of this phrase. Charity easily finds alternative interpretations. If there are indeed strong developmental constraints, then throughout most of the history of a species there may be very few options to exercise selection. Only when the environment changes radically, disrupting the mechanisms that typically buffer ontogenesis, will hitherto cryptic variation become apparent and will there be a possibility for evolutionary experimentation. Whether or not scenarios of this kind prevail in the history of life, the claim that they do represents an important challenge to the vision of stately unfolding that permeates orthodox neo-darwinism.

Dawkins's discussion of the third plank in the punctuationalists' platform, the thesis that many macroevolutionary trends are the result of processes of species selection, is extremely brief, and the brevity is significant. Instead of presenting his reasons for thinking that species selection is not very important in evolution, Dawkins refers the reader to his previous book, *The Extended Phenotype*. This was a wise decision that would have been advisable at many other places in the last three chapters of *The Blind Watchmaker*, for *The Extended Phenotype* treats the leading controversies in a far more satisfying way than does the new book. However Dawkins does add to his reference another argument that is in tune with the main theme of *The Blind Watchmaker*. Species selection, he contends, cannot account for complex adaptations.

At this point, the sources of the successes and the shortcomings of *The Blind Watchmaker* click into place. Punctuationalists will want to combat the argument, alluded to but not presented, for the thesis that species selection is unimportant in evolution, but they may be quite unworried by the charge that species selection cannot account for complex adaptations.

Part of their case is that the prevalence of complex adaptations in the history of life has been exaggerated by orthodox neo-darwinians. *The Blind Watchmaker*, which makes the explanation of complex adaptations central to the neo-darwinian enterprise, sets up from the beginning a framework in which the character of the interesting debates within contemporary evolutionary theory cannot be made clear.

The book starts with an attempt to present Paley's puzzle. Dawkins would like his readers to feel the grip of the problem of explaining organic complexity, and he would like to present that problem in a way that does not prefigure the darwinian solution. But how exactly is the notion of a well-designed, complex object to be characterized? Dawkins displays great ingenuity in his effort to avoid the trivializing answer that explicitly defines a complex adaptation as the product of a history of selection. For those who view neo-darwinism as flawed by its overemphasis on adaptation, his struggles are likely to seem hopeless. They will suggest that the problem is to define a class which will turn out to include just those traits whose presence is to be understood in terms of a history of individual selection without making use of ideas that would have been unavailable to Paley (or any other pre-darwinian impressed with the apparent design of organisms). But, claim the anti-adaptationists, cases of apparent design are a motley. Some, but by no means all of them, are to be understood in terms of the action of individual selection. Only by introducing the concept of selection explicitly into our characterization of the class of "well-designed complex objects" can we manage to present Paley's problem in a way that allows for Dawkins's preferred darwinian solution. Hence, Dawkins's emphasis on the evolutionary explanation of "complexity" disguises an unargued commitment to the view that the problem of adaptation is central to evolutionary theory, and a corresponding slighting of important alternatives. For Richard Dawkins — but not for all sophisticated evolutionists and, arguably, not for Darwin — it is always *the* problem.

For all my reservations, I am confident that *The Blind Watchmaker* will do much good. At its heart is a remarkable account of some of the most important ideas in the history of science. Dawkins should clear up many more misapprehensions than he fosters, and his readers should gain a sense of the excitement of contemporary evolutionary biology. If they are moved to read further, then their initial acquisition of prejudices is likely to be corrected. The details, we may hope, will come later. □

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