

an appendix that occupies nearly a third of the entire volume.

The criteria upon which Lyster bases his judgement that the four treaties he principally addresses are in fact the most important are unstated. All are indeed global, open for signature by any nation of the world, but only two, the World Heritage Convention and CITES (the Endangered Species Convention), have the adherence of a majority of the world's nations. The Migratory Species Convention may be the most recent of international conservation initiatives, but with only 15 party states and no real accomplishments to date, Lyster's claim that it occupies part of the "centrepiece of international wildlife law" is premature at best. The Wetlands Convention, though it has served to direct attention to a particularly pressing problem, is notable mostly for its failure to create clear, enforceable obligations. While it is dealt with elsewhere in the book, the International Convention for the Regulation of Whaling might more properly have been included in the centrepiece if world attention and actual results were the criteria for that uncertain distinction.

A recurring theme throughout the book is the wide, sometimes enormous, gap that separates the aims and apparently literal meaning of most of these treaties and their actual implementation. For example, the World Heritage Convention tries to come to grips with the reality that many of the world's great cultural and natural resources are in the countries least able financially to assure their protection or forego the short-term benefits associated with their exploitation. The mechanism fashioned to answer this dilemma is, through the creation of a trust fund, to transfer wealth from the developed to the developing world for purposes of conservation. Though there is nearly universal agreement that such a transfer is needed if the intentions of the Convention are to be realized, the actual amounts of money made available for the purpose have been so small as to undermine any confidence that the commitment to the principle is anything more than cosmetic. Beyond noting the fact of such gaps between promise and performance, Lyster does not delve into explanations or suggest possible solutions.

His book stands, however, as an impressive survey of some of the efforts at international cooperation made over the past century to stem the loss of wildlife. It is, at the same time, a depressing reminder of how short many of those efforts have fallen. □

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• Reviews of *Mind and the New Physics* by Fred Alan Wolf, *the Dialectical Biologist* by Richard Levins and Richard Lewontin, and *The Background of Ecology* by Robert P. McIntosh will appear in future issues of *Nature*.

More Darwinian detractors

Mark Ridley

Evolution: A Theory in Crisis. By Michael Denton. *Burnett, London: 1985. Pp.368. £17.50. To be published in the United States in April 1986 by Adler & Adler, Washington, DC.*

Creation and Evolution: The Facts and Fallacies. By Alan Hayward. *Triangle, London: 1985. Pp.232. Pbk £2.75.*

Adam and Evolution. By Michael Pitman. *Rider, London: 1985. Pp.268. £9.95.*

Evolutionary Theory: The Unfinished Synthesis. By Robert G.B. Reid. *Croom Helm/Cornell University Press: 1985. Pp.405. £25, \$34.50.*

WRITING a review of some long since forgotten anti-Darwinian work in this journal 95 years ago, Raphael Meldola remarked that "it is hardly necessary to say that many of the most weighty objections have been culled from the writings of Darwin himself". *Toutes ces la même chose.* Another four books published during 1985 now confirm that Mr Darwin's critics are as active, and their procedures the same, as ever. I do not think it is worth replying to them here. Readers of *Nature* can scarcely need to be put right on these old issues; and, anyhow, Darwin himself and many others have dealt with them at the length they deserve. How can I hope to succeed with three authors (Denton, Hayward and Pitman) who, like the Victorian astronomer Sir John Herschel, think that evolution by natural selection is the "law of higgledy-piggledy" — a "random search mechanism" (Denton), of "pure chance" (Hayward and Pitman)? Or with another author (Reid) who, like the Duke of Argyll, thinks that there must be some grave defect in Darwin's theory, because it personifies Nature in its analogy with artificial selection?

Denton, Hayward, Pitman and Reid, then, are opposed to the Darwinian theory. The first three of them (as we shall see) object to it for similar reasons; but they differ in what they would put in its place. Hayward is a creationist and Christian. Pitman is a creationist too, and probably a Christian one, although he has heretical leanings towards the dualistic (not trinitarian) wisdom of the East and an enthusiasm for music mysticism. Denton's purpose is purely destructive: he has no alternative to offer. Reid thinks he has a secular alternative, which we shall come to. His is the only book of the four that is written in a cerebral style, for an audience of professionals of some kind. Denton, Hayward and Pitman all write for uninformed readers, the latter two in the kind of short, didactic sentences and superficially patient tone that, in Britain, one associates with the closed minds of their

school. Denton has a different style. His pen is constantly running out of control. Every few pages he treats us to some more or less silly exaggeration. The preface sets the tone by telling us that "every aspect of evolution theory is being debated with intensity", at conferences, in journals and in the Natural History Museum in London. Denton may think that exaggeration is a necessary part of popular writing. If so, he is wrong.

None of the authors is an evolutionary biologist. Denton is a biochemist; Reid a philosophical physiologist; Hayward a retired physicist; Pitman "has an MA in classics". They would not think this a disadvantage. A Darwinian education (they believe) cripples the mind, filling it with emotional prejudices. Hayward accordingly prefers the unbiased view of the "outside observer", and Bernard Stonehouse without irony recommends Pitman to us as follows: "his unorthodox background must have helped Michael Pitman to write this book; it might not have occurred to one formed in a more conventional mould".

Their procedure is to sift through the writings of Darwin, and such popular secondary and tertiary sources as Stephen Gould's essays, *New Scientist* and even *The Guardian*. From this material, they seize upon the bits that look like difficulties for Darwinism, and ignore everything else. Then, after surrounding the difficulties with schoolroom rhetoric, sub-Kuhnian psychobabble and suitably simplified Victorian history, they send the whole to press. As argument, indeed, all four books are sad stuff. The reasoning I shall come to, but mark well the style. Denton is especially keen on the device (it must have a technical name) "even Darwin-Simpson-Sir Peter Medawar admits—concedes—acknowledges that . . .", which he places before each attenuated quotation, in order to reverse their meanings. I similarly found myself, in Hayward, "grudgingly admitting" something that in reality I unhesitatingly espouse. Denton's characterization of Lyell provides another example. "For most of his life", we are told — and this is all we are told — "[he] was vigorously opposed to the idea of evolution".

So why do Denton, Hayward and Pitman object to the neo-Darwinian theory? Their case (the arguments of the three are similar) is essentially Victorian. It plays on two main "difficulties": "chance" and "gaps". Natural selection, they all allow, can cause small changes in simple adaptations; but they deny that it can cause large changes among types and the evolution of complex adaptations like the vertebrate eye. "Different processes altogether may be involved, and here Darwin's strength fails" (Pitman). As they have identified natural selection with chance, they deduce (correctly) that it could not in principle produce large directed changes. Only the premise is wrong. In the Darwinian

theory, natural selection is not a chance process and complex adaptations evolve in many small changes. That possibility they either silently ignore, or misunderstand and quickly brush aside.

Then we have the problem of gaps. There are gaps between the classes of modern forms, and those well-publicized gaps in the fossil record. The origin of life is an example. According to these authors, it would not be possible for evolution by natural selection to cross the gap between the non-living and the living. After all, where are the intermediate forms? They have not been found, even though, according to Pitman, "billions of dollars are spent annually in attempts to demonstrate abiogenesis under laboratory conditions". Pitman also quotes Francis Crick, who "admits" that "regarding the origin of life we often find 'too much speculation running after too few facts'"; but speculative pursuit is as ill-advised when the aim is to demonstrate a negative, as a positive, conclusion. Darwin's own remarks about difficult transitional stages — that they are a problem of the imagination, and not of the reason — is silently ignored, but implicitly illustrated.

The theory of "punctuated equilibrium" of Eldredge and Gould here again does time for the creationist cause; but the Darwinian view (and that of Eldredge and Gould although they do not like to say so), that the gaps of the fossil record are due to its incompleteness, is scarcely discussed. The gradualism of Darwin, which applies not to rates of evolution but to the evolu-

tion of complex adaptation, is misunderstood by all the authors.

They have other objections too. For instance, they have all learned, from the popularizations of Sir Karl Popper and others, that natural selection is a circular argument (although Denton has still to learn from Pitman that Popper has "to some degree relaxed his position in a way that favours Darwinism"). And Denton thinks that natural selection cannot explain homology, including serial homology which "cannot by any stretch of the imagination be explained by descent from a common ancestor".

In the case of the two main objections I have dealt with, the authors have neglected the answers put forward by Darwin and his followers. Why should this be? Maybe they are unaware of them. Maybe they think only the devil needs an advocate. The texts, however, point to a third reason. The typical Darwinian of these pages is a man incapable of rational argument. Neo-Darwinism (we are told) is an "article of faith" (Pitman), a "belief-web" (Reid), a "paradigm" of "illusion" and "dogma" (Denton). It is believed in, and defended against critics, only because of "emotional commitment" and "extra-scientific factors", which are to be understood by the "sociology of knowledge". When the dogmas of neo-Darwinism are threatened, for instance by neo-Lamarckism, its fanatical adherents do not react with rational scepticism, about dubious factual claims. They remorselessly persecute the poor heretics, until they are driven into suicide or emigration, and

then trumpet their triumph in a ritual of collective orthodoxy. The doctrine of neo-Darwinism is thus seen as establishment cant, not rational science, and therefore hardly merits serious consideration. The critic may save himself the trouble, and ignore it.

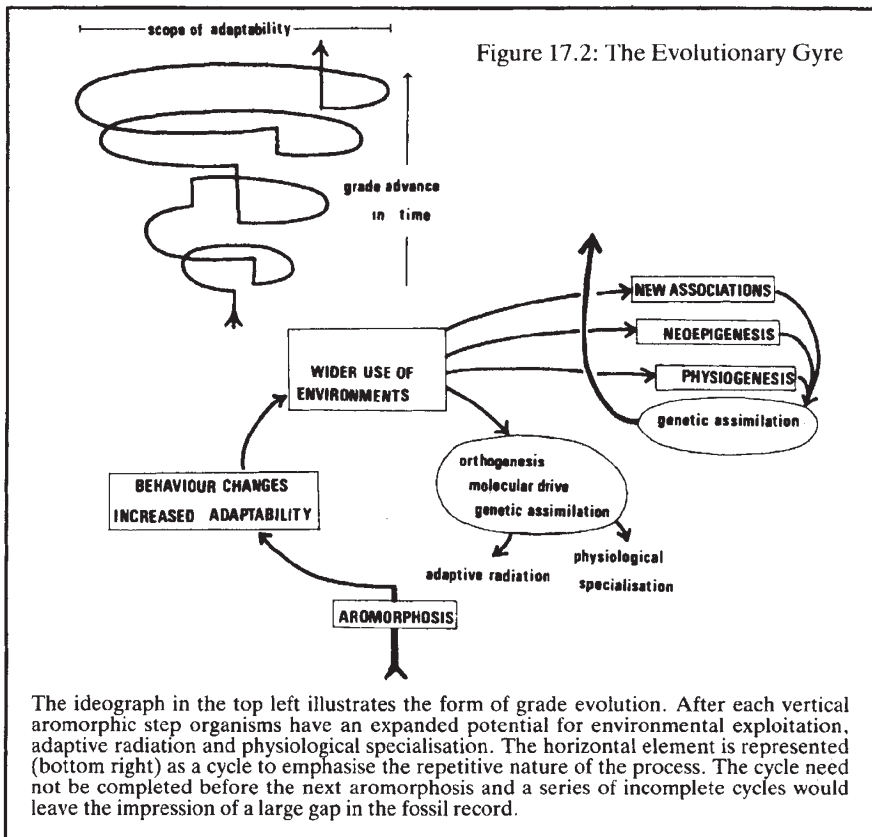
Reid is a rather different kettle of fish. His purpose is not, for the most part, destructive. He does include a chapter on some of the "difficulties" in Darwinism, and he notices others from time to time. The main problem, he believes, is that Darwinism is "reductionist" and has therefore "shied away from explaining the emergence of meaningful wholes from individually meaningless parts". It also suffers from two previously unnoticed defects: a new kind of circularity, and the "homeostasis paradox" ("if homeostasis is characterized as constancy, and evolution characterized as change, how did the homeostatic condition evolve?"). The circular argument is this:

Descent by modification through natural selection was Darwin's slogan. This linkage of two independent ideas was the core of Darwin's thesis and claim to originality, although it involved the circular argument that evolution occurs because of natural selection, therefore natural selection must operate; natural selection operates, therefore evolution must result.

Reid does not name names here, which is a pity because I cannot think of anyone who has fallen into this error.

But Reid's main purpose, as I have said, is positive. He was woken from his Darwinian slumbers by the student rebellions of the late 1960s and a reading of Thomas Kuhn. He duly discovered an alternative paradigm, of holists, and it is his aim in his book to introduce us to them. He has arranged people such as Driesch, Woodger, Bergson and von Bertalanffy into convenient groups; for each he gives some biographical details and summarizes their attitudes. They are in favour of emergence, integrative hierarchies and all that sort of thing. Anyone who is looking for an introduction to these people may find the book useful. But no one else will, because it is neither historical nor argumentative; it does not put their opinions in context nor does it try to show us that they were right.

Reid ends by expounding his own holistic alternative. It defies short summary, but fortunately he illustrates it with some figures, the most important of which is reproduced (left). Reid does not like neo-Darwinians, who do not treat all his friends and their enthusiasms with sufficient gravity. But now we have an opportunity to set things right. We should add the "evolutionary gyre" to our introductory lectures, expose our students to the alternative paradigm, and treat it with the seriousness it deserves. □



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