sequent misdeeds. An addictive feature of these monographs is the pair of contrasting world maps provided, showing the animal's range "before" and "after" the onset of globe-trotting; the temptation, which I suspect few will resist, is to thumb ahead for a furtive peep to discover whether your favourite species suffers the stigma of far-flung black blobs scattered improperly across the "after" maps. The text itself is an enjoyable blend of biology and history, and is written in a precise and scholarly style. Although the author does not dwell on the implications for ecological theory of the effects of different immigrants on their new habitats, his text draws attention to the extraordinary interest of the process of invasion, and the many "unnatural" experiments that have been inadvertently established worldwide.

The history of three canids illustrates the scope of the book and the variation in the examples it documents. Red foxes were introduced to Australia in the late nineteenth century, in numbers generally no greater than two's and three's, by would-be huntsmen. Their progress can be charted in detail year by year from local records, until they are now widespread to

the extent that tens of thousands of descendants of the original few are killed annually. (Incidentally, British foxes were also shipped across to populate the eastern United States, and foxes from Spain were imported to bolster the numbers in Britain.) Then there is the raccoon dog, which originated in the Far East. For them, the scale of the operation was quite different. Between 1929 and 1967, 8,651 were released in European Russia by those with an eye on their pelts — in 1947 alone, 1,147 gravid females were let loose in the Caucasus. Each of these cases differs from that of the dingo, which was probably shipped to Australia some 3,000 years ago and so must soon qualify for honorary citizenship.

Although essentially a reference volume, this book has the "Guinness Book of Records" type of appeal to a browser. Apart from serving its main purpose, it will doubtless provide an abundance of worthwhile "Did you know . . . ?" gambits for both amateur and professional naturalists. □

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Animals and plants first

Michael J. Bean

International Wildlife Law. By Simon Lyster. *Grotius, Llandyssul, Dyfed SA44 4BQ, UK: 1985. Pp.470. Hbk £25, \$37; pbk £12, \$17.50.*

THE earliest efforts at international cooperation in the conservation of living resources date back well into the nineteenth century. Since then, the number of international treaties and agreements aimed at conserving wildlife has grown steadily. Not until Simon Lyster's book, however, has anyone tried to offer a comprehensive analysis of that body of law. The result is a compelling display of legal scholarship that should reward scientists interested in policy matters and conservationists around the world.

This is a book by a British lawyer about international conservation law. It escapes, however, the trap of appealing only to a narrow audience of similar specialists. After an introductory chapter that provides a layman's overview of certain general principles and characteristics of international law, Lyster turns his attention to a series of wildlife treaties. For each of these he offers some historical background, including a discussion of the problems that the treaty was intended to address, a detailed analysis of the terms of the treaty, and an assessment of the treaty's actual implementation and effects.

The most remarkable aspect of the book is its sheer scope. It is not limited to the treaties of a particular country or geographical region, and reaches out across ocean barriers to encompass the Convention on Nature Protection and Wildlife Preservation in the Western Hemisphere (1940), the African Convention on the Conservation of Nature and Natural Resources (1968), a pact of 1969 among Andean nations for the conservation of the vicuna, an agreement of 1973 among circumpolar nations for the conservation of the polar bear, numerous European treaties for the conservation of birds and other wildlife, and yet other initiatives.

The most thorough analysis in the book is devoted to four treaties of the 1970s that Lyster calls "the centrepiece of international wildlife law": the Convention on Wetlands of International Importance Especially as Waterfowl Habitat (1971); the Convention Concerning the Protection of the World Cultural and Natural Heritage (1972); the Convention on International Trade in Endangered Species of Wild Fauna and Flora (1973); and the Convention on the Conservation of Migratory Species of Wild Animals (1979). The complete texts of these and eight other treaties are reprinted in full in

Botanical spread

Brian Mathew

A Guide to the Vegetation of Britain and Europe. By Oleg Polunin and Martin Walters. *Oxford University Press: 1985. Pp.284. £17.50, \$25.*

AMID the dense rash of wild-flower books dealing with the flora of Britain and Europe at the species level, it is refreshing to be presented with a volume devoted to whole communities of plants. Polunin and Walters are probably accurate in claiming that this is the first attempt to bring together all the information on the subject at a layman's level, although, as they acknowledge, there are many other detailed works covering individual countries or regions.

Accordingly, a helpful bibliography has been included, divided into vegetation types, for those who wish to pursue any interesting points raised in the text. For internal reference, the reader is also well provided for, with indexes to Latin names, English names and plant communities, and a useful glossary (although I was surprised to find no mention, here or in the index, to the commonly used term "downland"). Conservationists, who now tend to put as much emphasis upon the preserva-

tion of habitats as of individual species, will find much useful material is provided, and there is a descriptive list of the Nature Reserves and National Parks throughout Europe.

The opening chapters deal with the all-important subjects of soils and climates, which have a great bearing on the plant cover, and there is an interesting summary of the history of Europe's vegetation from the earliest fossil records onwards. The bulk of the book consists of 14 chapters devoted to different regional zones — Arctic, Mediterranean, Central Europe and so on — and, within these, there are subdivisions down to communities with examples of the species to be found in them. The text is supported by many good line drawings and a few rather poorly reproduced monochrome photographs; the latter, however, are more than compensated for by the 110 excellent colour plates of vegetation types.

The authors have faced a difficult task, and it is not surprising that the book may appear bitty at first sight. As with most aspects of the botanical world, the demarcation lines are often ill-defined and there is much overlap, for example between *maquis* and *garigue*, with several different types of each of these. To have presented an over-classified statement of the situation would have led to many inaccuracies, and it is to the particular credit of Walters and Polunin, given the intended audience of their book, that they have struck the right balance between the superficial and the overlearned. □

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● *Flowering Plants of the World*, consultant editor V. H. Heywood, which was published in 1978 by Oxford University Press and has been out of print, has been re-issued by Croom Helm in Britain and Prentice-Hall in the United States. Price is £19.95, \$39.95.

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