could have, following the majority, and not having an insider's knowledge of the palaeontology, in particular of the basicranium, which Martin dismisses. Whether these characteristics actually did develop quickly is another matter, but it certainly took a very few million years for hominids to radiate from an ape stock — why should it have been much longer for Euprimates to emerge from archaic primates?

Martin's chapter and a half on primate molecular evidence provides a competent and critical review, yet most of the issues he raises are moot, as he focuses almost exclusively on protein data. Martin's broad criticisms of many assumptions of molecular evolutionary analyses seem to be sound, and the section stands as a thoughtful summary of the state of molecular systematics before nucleotide sequencing became common. Martin puts somewhat more faith than me in the idiosyncratic analysis of chromosomal R-bands, and in a DNA hybridization analysis of lemurs published in 1980,

which drew conclusions from small differences in the extent of DNA renaturation, rather than from differences in the thermal stability of the DNA hybrids.

The book is illustrated skillfully by the line drawings of Anne-Elise Martin. My only criticism of the general scope of the work, and it is a minor one, is that only in the first chapter are we shown primates as whole entities. Throughout the rest of the book they are presented in bits and pieces — skulls, teeth, chromosomes — which tends to give most of the volume a cold and analytical feeling. What is largely lacking is a presentation of primates *alive*: eating, jumping, metabolizing, reproducing, so brilliantly captured in the illustrations by Nash and others in Fleagle's book. But for this minor criticism, Martin's book remains an extraordinary accomplishment, a monumental synthesis which I anticipate will be a standard work for years to come. □

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The future perfect

Brian Bertram

Conservation for the Twenty-First Century.

Edited by David Western and Mary Pearl. Oxford University Press: 1989. Pp.365. £30, \$36.95.

"CONSERVATION 2100" was a symposium held in October 1986, convened by that admirably wide-ranging organization, the New York Zoological Society. The 32 authors of the papers in this resulting volume have in common considerable expertise in fields relevant to the conservation of wildlife. They were asked to take a long view: they have done so, and collectively a very broad one as well. A well-edited collection of thoughtful, quotable papers is the result, which makes a valuable contribution to the debate on how to tackle the problems of conservation.

Predictions are always difficult — especially about the future. One relatively optimistic example here is that by the year 2100 the world's human population will have levelled off to between 8 and 13 thousand million people, with growth rates being very uneven in different parts of the world. There are also some appalling projections, such as a Mexico City of 30 million inhabitants. The assumption is that population control will be correlated with a rise in living standards, and the point is forcefully made that "the problem of excessive population growth will not be solved in the uterus but in the human

mind". It is considered that "producing enough food will be a trivial problem late next century when population levels off". This will be possible mainly by increasing agricultural production by intensification rather than by expansion of agricultural land — indeed it is postulated that much land at present cultivated may become available for wildlife. It is envisaged that nature will "emerge from an environmental bottleneck late in the twenty-first century".

This apparently orderly situation does of course depend on relative stability in most of the world, an absence of large-scale catastrophes, major wars or wide-scale civil unrest. These may not be wholly realistic assumptions, but it is scarcely possible to incorporate the alternatives into sensible planning.

In this human-pressurized world of the future, the growing field of conservation biology will become increasingly important. The rate of extinction of species is accelerating, caused by the 'evil quartet' of overkill, habitat destruction, introduced species and chains of extinction. It is estimated that by the turn of the present century, human activities could have wiped out 15–25 per cent of all species. We need to know much more about the evolutionary potential of organisms — how species and genes adapt and evolve in changing circumstances. Natural communities and ecosystems are highly complex, and the loss of some species may have dramatic effects on the ecological balance within an ecosystem.

Management of nature will become increasingly necessary, indeed inevitable. Strong cases are made that it should be

carried out not only inside the limited protected areas which will persist, or outside such areas in some form of relationship with human activities, but also *ex situ* in zoos, botanical gardens, artificial reserves and refrigerators. The agenda for the future calls for great improvements in all these areas — for an expansion of protected land, for corrective management, for integrated land use that incorporates both human and wildlife interests, and for more and better *ex situ* methods.

But "the extinction crisis has reached the point where it is no longer possible for thoughtful people to consider the situation manageable by professional wildlife managers and park professionals alone. In order to conserve significant diversity in the earth's biological resources beyond the year 2100, action is needed by society as a whole". It must be recognized that without some action our downhill slide will continue, resulting not just in the disappearance of some 'nice' animals, but in the weakening of the whole ecological basis of our existence.

The conservation agenda calls for a broadened mandate: "conservation is seen now as just one more in a varied group of special-interest lobbies. The task before conservationists is a transformation from that status to one of a social force capable of bridging and uniting diverse interests by identifying joint solutions to common problems". Conservation is not seen as opposed to development; rather, both are essential, because "the one 'pollutant' that threatens above all others to destroy our environment . . . is the permanent, pervasive condition of poverty". Western and his colleagues believe that "one immediate task is to address international economic imbalances", and that conservation has to be linked with improvements in human welfare.

If these selected points sound naive to some, the book as a whole most emphatically does not. It is written by realists who know what they are talking about. Since the 1986 symposium, there have been dramatic changes in attitudes throughout the world, both an overturning of apparently accepted values in eastern Europe and a far wider appreciation of the realities of impending climatic change. Attitudes and aspirations can change fast. We have to learn how to limit individual hopes, and how a more affluent population in a free society can be educated to refrain from making excessive use of the world's resources. And we have to hope that it is not naive to be prepared to work towards such changes in thought in the century ahead. □

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