

provide clock-based dates for the origin of the gibbon lineage (13–15 myr), a postulated *larconcolor-syndactylus* trichotomy (4–5 myr), and the radiation of the *lar* group (0.5–1.0 myr). Citing the extreme karyotypic diversity in *Hylobates* (second only to *Cercopithecus* among catarrhine primates), they suggest that chromosomal rearrangements of structural genes in small, tight-knit populations could have triggered speciation events. Radiations within Hylobatidae, then, might be attributable to chance rather than natural selection and could have occurred without electrophoretically detectable changes in structural genes or substantial changes in morphology. The particularly interesting taxonomic problem of the geographically widespread *lar* group is considered from the standpoint of natural hybridization by Brockelman and Gittins and on the basis of regional covariation of song and pelage patterns by Marshall et al. In a rigorous analysis of craniometric data combined with a lucid synthesis of all other lines of evidence, Creel and Preuschoft show that the morphological and biochemical homogeneity of extant gibbons indicates that they are products of a relatively recent radiation; however, they find no evidence that permits a choice between fossil- and clock-based dates for the origin of the gibbon lineage.

The papers on functional morphology do not share a unifying theme or approach. Most were written after the conference at the editors' invitation and deal largely with the locomotor system. Hollihn reviews the literature on primate bimanual suspension, and the biochemical advantages of forelimb elongation on hylobatid brachiation are discussed by Preuschoft and Demes. Kinesiological analyses of brachiation and bipedalism are presented by Jungers and Stern and by Ishida et al., respectively (the latter in a summary of previously published work). In their discussions on allometry of the primate postcranial skeleton, Jungers and Aiello agree that determination of scaling trends by interspecific analysis is only a preliminary step in

the interpretation of morphology. However, they differ sharply over the validity of functional explanations of interspecific differences in body proportions based on scaling to adult body size. Two excellent chapters that discuss the hylobatid dentition as an integrated functional complex conclude this section (by Maier and by Fleagle and Kitahara-Frisch).

Although free-ranging hylobatids are relatively numerous and widespread throughout the western half of the world's most extensive block of rain forest, their immediate future is threatened by continued habitat destruction. With the exception of new surveys of *H. hoolock* in Bangladesh (Gittins) and *H. moloch* in Java (Kappeler), no updated estimates of habitat areas or population sizes are provided in the section on conservation biology, but it appears that as many as five species (*H. hoolock*, *H. klossii*, *H. moloch*, *H. pileatus*, and *H. concolor*) may have already reached relict status (Brockelman and Chivers). In addition to evaluations of management strategies in the wild and breeding efforts on captive animals, this section presents complete census data of gibbon species in European (Schilling) and North American (Mootnick) zoos.

Reduced to its many tables, charts, figures and maps, this book would be a highly valuable compilation of data. The juxtaposition of conflicting interpretations of data and of complementary analyses of different lines of evidence makes it the single most important reference on hylobatid apes available. Its usefulness is further enhanced by succinct summaries or introductions for each section, extensive cross-referencing within the text, author and subject indices, and a 45-page bibliography that includes references as recent as 1983.

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BEYOND NEO-DARWINISM. Edited by M.W. Ho and P.T. Saunders. Orlando, Florida: Academic Press. 1984. xiv + 376 pp., figures, tables, references, index. \$40.00 (cloth).

If overreaction to the point of misrepresentation can produce a balanced response, then there is reason to hope that this book may have some value. As a critique of what most biologists would identify as neo-Darwinism,

however, it is so relentlessly unbalanced as to warrant being judged unfair if not positively untrue.

There are 14 chapters written by different authors. These range from a concern with the origin of organic molecules—and life itself—to considerations of the nature of mind and artificial intelligence. Aside from the caricature of neo-Darwinism, the common theme that runs with varying strength throughout the volume is the stress on the dynamics of developmental processes themselves and the extent to which these have been neglected in modern evolutionary thinking.

This is most clearly discussed by one of the editors, Peter T. Saunders, in "Development and Evolution," which is arguably the most useful chapter in the book. His conclusion that "evolutionary biologists will have to become accustomed to considering the epigenetic aspects of the problems they are studying" and that "developmental biologists [should be] encouraged to discuss the possible evolutionary significance of their work" (p. 261) is a positive message that all can contemplate with profit and provides a refreshing contrast to the resolute negativism of much of the rest of the book. A heightened awareness of developmental biology could add some much-needed perspective to considerations of variation in such things as the meaning of the mandibular torus, epicanthic folds, peroneus attachments, and brow ridge form to name just a few anthropological examples of traits that have frequently been treated with the kind of mental myopia that the authors attribute to all of neo-Darwinism.

The source of the authors' curiously narrow conception of neo-Darwinism is never noted, beyond the brief mention by Ho and Saunders in the first sentence of their introductory chapter that the synthesis began with R.A. Fisher's *Genetical Theory of Natural Selection* in 1930 (p. 3). Fisher is mentioned just once again in passing later in another chapter, but it would appear that his ghost pervades the volume as a whole. Fisher did indeed maintain that evolution is driven by natural selection alone working on randomly occurring mutations, but to claim that this is the sum total of neo-Darwinism is a gross misrepresentation and ample reason for Mayr to remark that the book is characterized by an "appalling ignorance of the literature" (Mayr, 1984, p. 1251).

During Fisher's lifetime, by the power of his position and his personal dogmatism and intransigence, he did succeed in limiting the neo-Darwinian outlook in Britain to something like the view attacked in this book. However, in America, right from the beginning, neo-Darwinians such as Sewall Wright maintained a broader outlook. Wright, however, is barely mentioned, and not at all in terms of his long-standing refusal to accept Fisher's limited concept of evolutionary dynamics. The similarly broader outlooks of Dobzhansky, Simpson, and Mayr likewise are not mentioned.

Of more recent figures, George C. Williams is mentioned only briefly, and V.C. Wynne-Edwards and W.D. Hamilton are completely missing. Finally, there is only one very brief reference (in Matsuno's chapter) to the logic and implications of the "neutralist" school, an approach that is only "non-Darwinian" in the narrow Fisherian context of the authors assembled in this book. The molecular constraints and nonrandom consequences discussed in the neutralist literature, by Kimura, for example, are quite in keeping with the approach exemplified in the chapters by Sidney W. Fox, K. Matsuno, J.S. Wicken, Brian C. Goodwin, and Saunders. Fox, with interesting evidence for the self-ordering copolymerization of amino acid sets, mars his presentation with long, rambling, and repetitive denigrations of neo-Darwinism and claims that evolution is entirely produced by internal forces that are "deterministic" and "orthogenetic." He concludes that "evolution is thus endogenous" and uninfluenced by "outside agents" (read "natural selection"; p. 51).

In Vrba's chapter, despite the muddled verbiage and the fact that nothing is presented that has not been contained in her previous papers, the a priori commitment to "nonadaptive change," "directed speciation," "species selection," and punctualist cladistics is more apparent than ever. A somewhat similar exposition of Platonic essentialism embellished by the acceptance of rigid Aristotelian logic is presented by Gerry Webster in his defense of the biological use of "nested sets"—a stance that lets him describe his perspective as that of a "transcendental realist" (p. 207). This exemplifies the flirtation with mysticism that pervades many of the chapters, including the one on artificial intelligence by Margaret A. Boden in which her explicit "antireductionism" leads her to re-

gard her subject "not as mystical, merely as mysterious" (p. 328), a bit of juggling that is not entirely convincing.

There is not space to treat each of the chapters separately, but no review would be complete without a consideration of the attempt by Jeffrey W. Pollard to defend Edward J. Steele's complicated version of how acquired characters might become inherited. There is speculation of "retrovirus capture" of RNA from altered somatic cells, which in turn is copied by "virally encoded reverse transcriptase" into DNA, which then replaces parent DNA by recombination. As Pollard notes, "There is little data bearing on this point . . ." (p. 293). He goes on to suggest that "one may . . . hypothesize" processes that "may also involve" other things for which also there is no evidence as yet. John Maynard Smith was cautious indeed when he noted some years ago that Steele had not presented evidence that would justify a general model, and Pollard's treatment here has done nothing to change that assessment.

In summary, there is nothing that would contradict Stebbins and Ayala's recent conclusion that "most of the challenges can be

accommodated within the encompassing vision of the synthetic theory" (Stebbins and Ayala, 1985, p. 72). In fact, such a collection of detailed, energetic, and resolutely if not stridently hostile papers, each focusing on a different supposed failure of Darwin's views and each failing to convince, only reinforces our recognition of the durability and magnitude of the man's genius. One cannot exclude the technical possibility that someday neo-Darwinism will indeed need to be scrapped, but that time has not yet come and it certainly will not be in the manner favored by the editors and authors of *Beyond Neo-Darwinism*.

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LITERATURE CITED

- Mayr, E (1984) The triumph of evolutionary synthesis. *Times Literary Supplement*, November 2, pp 1261-1262.
 Stebbins, GL, and Ayala, FJ (1985) The evolution of Darwinism. *Sci. Am.* 253:72-82.

HOMINID EVOLUTION AND COMMUNITY ECOLOGY. Edited by R. Foley. Orlando, Florida: Academic Press. 1984. xiii + 296 pp., figures, tables, references, indices. \$37.50 (cloth).

This volume is part of the "Studies in Archeology" series and arises from a symposium on ecological models and paleoanthropological interpretation held in December, 1981, at the University of Reading. The stated theme of the book is that paleoanthropologists must interpret the fossil and archeological records from a paleoecological perspective (p. vii). With several exceptions, however, the authors in this book appear to be unaware of the fact that a paleoecological approach has been employed in paleoanthropology for over a decade and has now reached a sophisticated level, as documented by recent reviews and problem-oriented papers (Winterhalder, 1980, 1981; Martin and Klein, 1984). It is rather astonishing to read author after author in this volume solemnly averring that paleoclimate, community structure, coevolution, etc., are necessary components of paleoanthropological reconstruction. Curiously, the worst offender is the

editor, who contributes two of the 11 chapters. Instead of discussing the ecology of Plio/Pleistocene hominids, these two chapters are principally concerned with presenting basic information that can be obtained from any good textbook in evolutionary biology or evolutionary ecology. Addressing the problem of why primates "'come down from the trees,'" Foley argues that if primates are to be affected by a general mammalian trend for size increase within lineages, they must become partly terrestrial. This ignores several things: the fact that primates in general are large mammals; the fact that animals large even for primates are highly arboreal; and the fact that the arboreal/terrestrial transition is a complex problem that cannot be explained solely by size increase. Foley concludes his discussion of early hominid evolutionary ecology by stating that *Australopithecus* stands in the same niche relationship to *Theropithecus* as *Homo* does to *Papio*. There are no profound or novel evolutionary insights here.

Three chapters stand out from the rest of the book. Roberts presents a fine review paper on Pleistocene paleogeography and paleoclimatology, including recent evidence for