

BOOK REVIEW

Why Study Fossils?

Review of *Evolutionary History of the Primates*, by Frederick S. Szalay and Eric Delson. New York and London: Academic Press, 1979, 580 pp, \$43.

Many primatologists earn their keep comparing the morphology, ecology, behavior, and distribution of living primates to determine how these are interrelated and how they shape individual and species fitness. History plays a role, of course, in determining primate morphology, ecology, behavior, and geography, and a common goal of comparative studies is to determine the sequence of historical events leading up to what we observe today. There are several (questionable) ways to infer evolutionary history from comparisons of living animals. One can assume that we (primatologists and the rest of humankind) represent the ultimate achievement of evolution and rank all other primates on a primitive-to-advanced scale depending on how perfectly they resemble us (but what if we aren't the ultimate goal of evolution?). One can assume that rare adaptations are special and thus advanced, and rank primates depending on how commonly or how rarely their characteristics appear in other organisms (but how can we be sure that unusual primates, like the tarsier, for example, aren't unusual because they are relicts—the rest of the order has passed them by?). One can assume that ontogeny recapitulates phylogeny, and try to determine evolutionary history by studying developmental stages in humans or other species (unfortunately, our ontogeny is a most imperfect record of our history—many stages probably aren't represented at all, and those that remain are very difficult to relate to adaptations in adults). One can construct complex matrices of biochemical distances separating extant species; properly interpreted, these may say something about relative recentness of common ancestry (but what do they tell of the morphology, ecology, behavior, or distribution of primates in the past?). Old newspapers tell more about life at the turn of the century than one can ever learn by listening to the radio—there is no substitute for historical records when studying history! This is why paleontologists study fossils. Fossils are the only direct evidence of primate morphology and distribution at a given time in the past. With suitable comparative study of living primates, fossils provide considerable insight into the ecology and behavior of extinct species as well.

Evolutionary History of the Primates is slightly less than its title promises. It might better have been entitled *A Handbook of Fossil Primates*; the Table of Contents doubles as a synoptic classification of all genera of living and fossil primates, and each genus with a fossil record receives a page or two of discussion and illustration. In this sense, the volume is a suitable companion to Napier and Napier's *A Handbook of Living Primates*. Szalay and Delson preface their work with a statement that anecdotes on personalities, histories of erudite debates and opinions, and other "literary (but non-scientific) sidelights" have been omitted. This is clearly a reference book (and a presumptuous one!) rather than a text.

In the Introduction, Szalay and Delson discuss the importance of sound taxonomy, especially the correct delineation of species based on the study of variation. They

emphasize that phylogenetic hypotheses should be as explicit as possible and be arranged in a time framework using all available geological and biostratigraphic evidence. Much of the remainder of the Introduction is devoted to biochronology of the Cenozoic—the 65 million years spanning all of primate history.

Living and fossil primates are here classified in three suborders: Plesiadapiformes, Strepsirhini, and Haplorhini. The first group, by comparison with living forms, is more rodent-like than primate-like in adaptations. The second group includes lemuroids, lorisooids, and Eocene-Miocene Adapidae. The third suborder includes *Tarsius* and its fossil allies (Omomyidae) together with platyrrhine and catarrhine higher primates. Grouping *Tarsius* with Platyrrhini and Catarrhini is based on a comparison of living forms, and this arrangement finds little justification in the fossil record.

Plesiadapiform primates include *Purgatorius ceratops*, supposedly the oldest primate known (from the latest Cretaceous of Montana). The figure on page 42 is the first adequate illustration of the holotype, a single lower molar, and in my opinion it is almost certainly that of a condylarth rather than a primate (the narrow talonid is most unlike that of early Paleocene *Purgatorius unio* illustrated on the same page). The remainder of the chapter on Plesiadapiformes provides a well-illustrated review of the dentition and known postcranial remains of these unusual primates.

The following chapter on Strepsirhini is a thorough review of Adapidae, Miocene Lorisoidea, and the subfossil Lemuroidea of Madagascar. Here, as elsewhere in the book, Szalay and Delson's interpretations of primate systematics and phylogeny differ from those of other authors and, in fairness, they usually present at least a literature reference to work with which they disagree. The reader would be well advised to study both sides of most issues before assuming that any one point of view is well established.

The chapter on Tarsiiformes reviews the extensive dental remains of Omomyidae. The postcranial anatomy of this family is reasonably well known and suggests that omomyids were highly specialized, *Tarsier*-like, hopping forms with fused tibiae-fibulae and elongated tarsal bones. Two genera included as Omomyidae *incertae sedis*, *Donrussellia* and *Hoanghoni*, are now usually placed in Adapidae (as Szalay himself argued in previous publications).

In 1976 I proposed that simian (or anthropoid) and lemuriform primates be classified together in the suborder Simiolemuriformes to emphasize that the fossil record indicates an Eocene-Oligocene convergence of primitive simian morphology with that of lemuriform Adapidae rather than tarsiiform Omomyidae, implying that Oligocene higher primates were probably descended from Lemuriformes and not Tarsiiformes. Szalay and Delson list the evidence supporting this hypothesis as it stood in 1973 (p 196). If anything, more recent discoveries have strengthened rather than weakened the link between adapids and primitive anthropoids (witness Szalay and Delson's classification of *Amphipithecus* in Adapidae *incertae sedis*, and *Pondaungia* and *Oligopithecus* in Catarrhini *incertae sedis*; these genera, their geological age, and the difficulty in fitting them into classifications contrasting "Strepsirhini" and "Haplorhini" are among the best evidence linking anthropoids to an adapid origin).

Extinct representatives of New World Ceboidea and Old World Cercopithecoidea are both given an extensive, well-illustrated treatment. In the section on Hominoidea, Simons' genus *Aegyptopithecus* is synonymized with *Propliopithecus* (although documentation for this is still "in preparation"). The proposed synonymy of *Aegyptopithecus* with *Propliopithecus* is a matter of subjective judgement, since there is no question that the type species of the two genera are distinct. Systematists rarely share the same experience, and questions like this are difficult to resolve to everyone's satisfaction. I personally would maintain the status quo and recognize both *Aegyptopithecus* and *Propliopithecus*.

The classification of Hominoidea is most unusual in that Hylobatinae, Ponginae, and Homininae are all included in the family Hominidae. This radical alteration of conventional taxa is an attempt, one assumes, to make the classification reflect one particular (if poorly documented) hypothesis of geneology—could any better case be made that classifications need not be and in many cases should not be a simple verbalization of phylogeny? Biological classifications are just an aid for communicating information about groups or organisms—such radical revision of the meaning of Hominidae is surely counterproductive and deserves simply to be ignored.

In the past two decades enormous advances have been made in understanding the functional morphology, ecology, and behavior of living primates; yet much remains to be learned. The record of extinct primates will never be as well known as that of extant forms, but the fossil record complements the modern record in adding a unique temporal perspective to our understanding of primate evolution. Szalay and Delson's *Evolutionary History of the Primates* is less of a synthesis of primate history than one might wish, but this is at least in part because interpretive paleoprimatology as a science is still in its infancy. The book, as it stands, is a very useful handbook that will facilitate research on fossil primates for many years to come.

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