

## Book Reviews

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H. Butler

### The Embryology of the Lesser Galago (*Galago senegalensis*)

Contributions to Primatology, vol. 19

Karger, Basel 1983

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With the publication of this monograph on the embryology of the lesser galago by Prof. Harry Butler, we now have developmental data available at a comparable level for representatives of most of the major groups of primates (human, rhesus monkey, baboon, marmoset, and galago). Major ontogenetic features of the galago embryo are described and placed into developmental stages, which were worked out originally by Streeter for the human embryo. Such a uniform system for staging embryos, using the same criteria of gross and microscopic morphology, makes it easy for comparative investigators to identify tissues, organs, or organ systems that may be undergoing relatively accelerated or retarded growth during their ontogeny.

The book is well illustrated, both for the external morphology of the embryo, and for histological sections through selected tissues and organs. In addition to describing the embryonic stages, the author also presents a summary of his previously published studies on development of the placenta and fetal membranes in the lesser galago. As emphasized by Butler, the striking differences in placentation and fetal membrane development in the galago and other strepsirhines, when compared to Anthropoidea, apparently play an important role in the retardation of the onset of the embryonic period (defined as beginning with primitive streak formation), as well as in the great functional development of the mesonephric kidney in strepsirhines.

When describing some significant differences between development of the galago and human embryos, the author indirectly demonstrates the shortcomings of basing the staging of primate embryos on the human embryo as the standard reference point. He reports that both the vomeronasal organ and the me-

sonephric kidney are 'precociously' developed in the galago, in comparison to the human, and that, in the case of the mesonephros, it develops two stages earlier than it does in the human. From a comparative and evolutionary viewpoint, however, the development of these organs is relatively *retarded* and reduced in the human embryo, whereas these organs retain a primitive mammalian developmental pattern of size and functional complexity in the galago. Indeed, a knowledge of the developmental pattern of these organs in the galago and other less specialized mammalian embryos can provide insight into the manner in which the vomeronasal organ and mesonephros have been reduced during ontogeny and phylogeny in the human and catarrhine primates.

A final comment relates to the use as well as the limitations of this excellent monograph. One shortcoming of this and other works on the staging of primate embryos is the lack of uniform staging criteria for the significant *feral period* of development, which occupies more than two thirds of prenatal life in the human. Emphasis has been placed on the earlier *embryonic period* of development, because of the fact that most organ systems undergo their early organogenesis during this critical period. Nevertheless, there are other organs, including the external genitalia, gonads, dentition, and splanchnocranium, which exhibit little, if any, differentiation during the embryonic period. Moreover, there has been renewed interest in recent years for the use of ontogenetic data in the study and assessment of evolutionary relationships among primates and other mammals, and much of this interest has focused on aspects of cranioskeletal and dental development. It is hoped that the publication of this monograph on early development of the galago will stimulate other investigators to begin the arduous task of completing the description and staging of the fetal period of prenatal development in human and nonhuman primates.

Dr. Butler's monograph is highly recommended reading for students of mammalian embryology, as well as for specialists in more limited areas of primate developmental and functional morphology.

W.P. Luckett, San Juan, Puerto Rico

Russell L. Ciochon, Robert S. Corruccini  
**New Interpretations of Ape and Human  
 Ancestry**

Advances in Primatology  
 Plenum Press, New York 1983  
 888 pp.; \$95.– in USA and Canada,  
 \$114.– elsewhere  
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'In science, too, telling new stories will require skill as well as imagination.' So ends a recent fascinating article entitled 'Human Evolution as Narrative' [Landau, 1984]. The article begins by posing the question, 'have hero myths and folktales influenced our interpretation of the evolutionary past?' This is a disquieting question, one that few paleoanthropologists bother to ask, let alone answer. In this significant new addition to Plenum's *Advances in Primatology* series, editors Russ Ciochon and Rob Corruccini provide a unique opportunity for readers to ponder that question at least in terms of recent interpretations of ape and human ancestry.

While paleoanthropology may be viewed as narrative, an analogy with prizefighting is also sometimes apparent. Title contenders (fossils) are put forward by promoters (paleoanthropologists) for title shots (being considered the world's 'earliest hominid'). Whether or not the 'contender' deserves that 'title shot' is usually a matter of considerable debate. The trials and tribulations of one aging contender, *Ramapithecus* (and related forms), are a particular focus of attention for most of the contributors to this volume.

37 authors have contributed to the success of the volume, which is divided into 7 major sections (and an extensive summary chapter by Ciochon). The chapters review the evidence of ape and human ancestry from the perspectives of paleontology and biostratigraphy, molecular biology, craniodental and postcranial morphology, and paleoenvironmental studies.

Corruccini and Ciochon open the volume with a concise overview of the subject which sets the stage for the following contributions. This is followed by an excellent contribution from Bernor reviewing the geochronology and zoogeography of Miocene hominoids. Of particular value here is his summary of the relevant European Miocene biostratigraphic evidence, data sometimes overshadowed by the East African and Siwalik discoveries of the past few years.

The second section reviews the most salient aspects of the molecular data bearing on human and ape ancestry. Goodman, Baba, and Darga review the amino acid sequence data for 5 proteins (alpha- and beta-hemoglobin, myoglobin, fibrinopeptides A and B, cytochrome c, and lens alpha-crystalline A). There are few surprises here – primates are depicted as a monophyletic group most closely related to Scandentia and Lagomorpha and divisible into Strepsirhini and Haplorhini. Hominoidea are also depicted as a monophyletic assemblage, but the protein sequence data cannot resolve the placement of *Pongo* within this group. This latter problem has been recently resolved by Templeton's [1983] statistical analyses of endonuclease restriction mapping sites and DNA sequencing data. Mai and Cronin provide valuable overviews of the chromosomal and macromolecular data, respectively; Kluge, in turn, attempts an integration of the molecular, karyological, and morphological evidence used to support the Great Apes (*Pongo*, *Pan*, *Gorilla*) as a monophyletic group, with *Homo* as the outlying sister group. However, he cannot rule out the possibility of *Homo* and the African apes forming a monophyletic group with *Pongo* the outlying sister group.

In a long appendix to Cronin's article, Vince Sarich provides a personal retrospective on his 2 decades in molecular anthropology. It is a powerful essay, not only for the historical perspective on the 'molecular clock' issue, but also for the stinging indictment leveled at the 'paleoanthropological establishment' of the past 20 years. It will seem painfully obvious to most readers that Sarich has defended his position with more scientific skill and objectivity than most detractors have mustered against him over these past years. Dispassionate reviewers of the future will probably consider Sarich to have had as profound an effect on paleoanthropology as any other scientist of the 20th century. Sarich's 'appendix' should be required reading for all paleoanthropology students for the serious questions he raises concerning the scientific credibility and objectivity of traditional paleontology.

The third section of the volume includes excellent papers by Fleagle and Kay, Ward and Pilbeam, Falk, and Gantt. Fleagle and Kay review the four species of 'dental apes' from the Oligocene of the Fayum and conclude that they are suitable ancestors for all later catarrhines, rather than being specifically related to hominoids as has been the prevailing opinion since their initial discovery. Hominoids, for these authors,

become the primitive catarrhines, and cercopithecoids are thus derived from a hominoid ancestor. Ward and Pilbeam provide significant new insights into maxillofacial morphology in Miocene hominoids. They have documented important differences in the morphological patterns of the subnasal alveolar process between African and Asian hominoids, pattern differences that can be traced back to Miocene forms like *Ramapithecus*. This progress in understanding complex maxillofacial morphology is quickly assuming major importance in phylogenetic reasoning, since it is now obvious that dental and gnathic anatomy alone will not resolve the phyletic interpretations of Miocene hominoids.

Gantt reviews his extensive work concerning enamel prism pattern and thickness in Neogene hominoids. An important conclusion resulting from part of his work is that the recent characterizations of 'dryomorphs' as thin-enameled and 'ramamorphs' as thick enameled is apparently not precise. What does this do to those who wish to describe character state polarities in enamel thickness? Also in this section, Dean Falk continues her perceptive reevaluations of hominoid endocranial casts, this time focusing on *Proconsul africanus*. Unlike most previous authors, she concludes that *P. africanus* does not have the sulcal pattern of a modern anthropoid, but rather that of a very primitive one. Interestingly enough, she finds the earliest example of a modern ape sulcal pattern in some of the South African australopithecines!

The postcranial evidence from Oligo-Miocene hominoids is reviewed by Fleagle, Walker and Pickford, McHenry and Corruccini, Morbeck, and Rose. The authors squeeze every ounce of information out of the admittedly meagre data (except in the case of *P. africanus* where the data are more complete thanks to the fieldwork efforts of Alan Walker and Martin Pickford). The bottom line is that, in the Miocene at least, there is no postcranial evidence for the 'specialized' locomotor habits of modern day anthropoids (i.e., brachiation, knuckle-walking, or bipedalism).

Section 5, evidence from paleoenvironmental studies, includes contributions from Pickford on environments of the lower and middle Miocene hominoids of Western Kenya, Andrews on the natural history of *Sivapithecus* and Kortlandt on certain 'facts and fallacies concerning Miocene Ape Habitats'. These are 3 outstanding contributions which show how exciting the synthesis of paleoecology, geology, paleontology and anatomy can really be in the hands of skilled, cre-

ative investigators. Pickford, who has the most uncanny knack for finding Miocene primate fossils of anyone who ever put on Clark's desert boots, provides data on the ecological preferences of hominoids in Western Kenya, based largely on associated gastropod assemblages. Andrew's paper, which should become a classic, is the finest example of how one might apply modern zoological techniques to the fossil primate record. Kortlandt, always the iconoclast, doesn't disappoint in his contribution. In spite of an unnecessarily critical tone throughout, one still admires the scope and intensity of his scholarship. Interestingly, both Andrews and Kortlandt conclude that 'traditional' views on Miocene hominoid primate paleoecology could be in error. Specifically, Andrews associates at least some of the *Sivapithecus* material with warm, temperate, deciduous woodland, and Kortlandt argues that the climate of eastern Africa must have been substantially drier than that of the equatorial belt in central and western Africa in the early Miocene.

Section 6, entitled 'descriptive analyses of Siwalik Miocene hominoids' just skims the surface of the wealth of data available on this topic. It is regrettable in this regard that the Siwalik hominoids have never been fully monographed. For this section of the volume, von Koenigswald and Dehm finally get around to describing the Siwalik hominoids they discovered several decades ago! Both Chopra and Prasad review past significant discoveries of Siwalik hominoids, including the recently discovered fossil hylobatid from the middle Siwaliks.

The last, and longest, section of the volume has contributions by Kay and Simons, de Bonis, Wolpoff, Zihlman and Lowenstein, Greenfield, Boaz, and White, Johanson and Kimbel. Kay and Simons present an extensive and well argued case for synonymizing *Sivapithecus* and *Ramapithecus* (with the former genus name taking precedence) and for linking *Sivapithecus* with *Australopithecus* as a separate clade from other hominoids. As thoughtful as their presentation is, their phyletic conclusions seem to be losing ground if one takes the 'majority' view of the contributors to this volume as being representative of the paleoanthropological community as a whole, i.e., that the *Ramapithecus-Sivapithecus* group is not specifically and exclusively connected to later hominids. Kay and Simons' view is also tentatively shared by de Bonis. De Bonis is the only contributor, however, to argue for a specific link between European *Dryopithecus* and *Pan*. Wolpoff, Boaz, and Greenfield discuss various

scenarios of the 'late divergence hypothesis' while Zihlman and Lowenstein review the concept of the pygmy chimpanzee as an appropriate model for elucidating the transition from ape to human. The section ends with detailed comparisons of *A. afarensis* and *A. africanus* by White, Johanson and Kimbel.

Ciochon concludes the volume with an excellent summary of the 29 contributions. A most valuable feature of his summary chapter is an extensive table listing 208 (count 'em!) morphological characters of the 11 hominoid morphotypes he recognizes in his summary cladogram.

Russ Ciochon and Rob Corruccini deserve a great deal of praise for bringing to life such an excellent compilation of recent interpretations of ape and hu-

man ancestry. Joy Meyers also deserves a special round of applause for preparation of the 4 valuable indexes (author, taxonomic, specimen, and subject). This volume should find a welcome home on every paleoanthropologist's bookshelf.

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Templeton, A.: Phylogenetic inference from restriction endonuclease cleavage site maps with particular reference to the evolution of humans and the apes. *Evolution* 37: 221-244 (1983).

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