

**Book Review: Mammalian Evolutionary Morphology. A Tribute to Frederick S. Szalay. EJ Sargis and M Dagosto, Eds. 2008. Springer.**

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**Abstract:**

It is a great pleasure to review a volume honoring Fred Szalay's many outstanding contributions to vertebrate paleontology and evolutionary morphology. The latest entry in Springer's Vertebrate Paleobiology and Paleoanthropology series is a fitting tribute to a giant of our field whose influence continues to be felt as a result of his body of work and the work of his students and colleagues, many of whom are represented in the list of contributors to and editors of this volume. In the spirit of full disclosure I should state that as a graduate student in the 1980s with interests in primate functional morphology and evolution, I spent long hours and exerted much effort trying to master the complex rhetoric and forceful argumentation of Fred's many publications, especially those on morphological and phylogenetic aspects of Paleocene and Eocene primates. Mixed with the pleasure of reviewing this wonderful tribute to Fred, however, is my sadness at noting the volume's dedication to the memory of Dr. Justine A. Salton, Fred's last Ph.D. student who died at far too young an age, only three months after defending her dissertation. Justine was an exceptionally promising young scholar and a friend to the editors, many of the contributors, and to this reviewer, and this volume serves as a fitting tribute to her life and scientific accomplishments.

**Keywords:** book reviews | Fred Szalay | vertebrate paleontology | evolutionary morphology | paleobiology

**Article:**

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Mammalian Evolutionary Morphology comprises a preface written by the editors, a complete listing of Szalay's published work, and two sections of nine chapters each, dedicated to studies of non-primate mammals and to primates, respectively. In their preface, editors Sargis and Dagosto provide a fascinating overview of Fred's life and career, as well as a systematic analysis of his contributions to our science. They suggest that his impact can be best understood in three major research areas: primate functional morphology, mammalian evolutionary morphology, and the theory and practice of phylogeny reconstruction. For each of these three areas, they provide a concise narrative summary of Szalay's work, highlighting his major publications and the conclusions drawn therein. This topical organization provides a kind of scaffold for the entire volume, as the editors tell us how each of the individual chapters fits into or contributes to these different themes. But the real accomplishment of the editors and the authors is that together, they have created a book that celebrates the scientific work of Fred Szalay by re-engaging with questions, issues, and problematic taxa that he himself worked on years or decades ago. He must be very proud to reflect on the many advances in our understanding of these topics illustrated by the work of his former students, colleagues, and friends in this volume.

Two of the nine chapters in Part One involve analyses of functional morphology and locomotor behavior of living mammals: Kear et al. explore hind limb proportions among four different clades of kangaroo, while Salton and Sargis describe the functional morphology of the forelimb of tenrecs in relation to several different types of locomotion. As in many of the papers in this exquisitely well-produced volume, the anatomical photographs in Salton and Sargis' paper are of the highest quality and will be very useful to scholars interested in comparative analyses. The other seven articles in Part One deal with fossil assemblages ranging from the Cretaceous to the Pleistocene of North and South America. Davis et al. describe the earliest known Deltatheroidea from the middle Cretaceous of Oklahoma and suggest a North American origin and later dispersal to Asia of these "elegant little carnivores" (p. 21), previously best known from the Late Cretaceous of Asia. Argot's review of the history of discovery and paleontological interpretations of the giant ground sloth *Megatherium*, a Pleistocene xenarthran from South America, is reminiscent of and will appeal to fans of Rudwick's (1992) classic, *Scenes from Deep Time*. Other South American fossils are discussed by Bergqvist (condylarths from the Paleocene Itaboraí Basin of Brazil) and by Shockey and Anaya (Deseadan age mammals from

Salla in Bolivia), while O'Sullivan analyzes phalangeal indices among Oligo-Miocene equids from North America and suggests that these indices can provide useful phylogenetic information. But the two high points of Part One are, for this reviewer, the papers by Penkrot et al. and by Polly. Penkrot and co-authors describe some beautifully preserved and associated postcranials of two condylarths from the Big Horn Basin of Wyoming, *Apheliscus* and *Haplomylus*. In addition to a very convincing (and wonderfully illustrated) functional analysis of the postcranial skeletons of these taxa, the authors present a controversial but strongly-supported hypothesis that these forms are most closely related to *Macroscelidea*, and suggest a North American origin of *Afrotheria*. Polly's work on the ankle of carnivorans is arguable the best example in this volume of a modern updated version of the kind of analysis for which Fred Szalay is famous. With the same careful attention to the details of functional morphology and the analysis of form-function complexes, Polly uses laser scanning and 3-dimensional geometric morphometrics in his analysis of form, function, and phylogeny in the ankle of pinnipeds and other carnivorans. As did Szalay many years ago, Polly recognizes that all morphological features reflect the importance of both "heritage" and "habitus", and points out the nature of this false dichotomy in the details of his analysis of the calcaneus and astragalus.

In Part Two, the topical focus of this volume shifts to the Order Primates, and a series of issues that were vociferously debated by Fred Szalay and many of his contemporaries two and three decades ago are revisited by some of the leading paleoprimatologists of a younger generation. The result is a state-of-the-art guide to many significant controversies in primate paleontology, in particular those surrounding the origins of primates and of anthropoids. Several papers in this section deal with the functional morphology of living primates, but they all consider the phylogenetic context within which functional morphology must be viewed if it is to be a truly evolutionary science. Maier presents a masterful anatomical analysis of serial sections through the middle ear of primates and other mammals to determine that the position of the chorda tympani relative to the *M. tensor tympani* is an anthropoid synapomorphy. Sargis et al. explore the evolution of terrestriality among guenons in light of molecular phylogenetic evidence and suggest that contrary to earlier studies terrestriality seems to have evolved only once among these Old World monkeys. Harcourt-Smith et al. describe a promising approach to distinguishing between individuals and taxa in paleontological settings through the use of laser scanning and geometric morphometrics to compare the congruence of joint surfaces of the tibia and talus of hominoids. Warshaw's contribution is a beautifully designed comparative study of the composition and proportion of primary tissue types at midshaft in a large sample of primate long bones representing strepsirhines, tarsiers, and ceboids. Her detailed and wide-ranging analyses provide a heretofore much-needed baseline of bone histology for the Primates that will provide fertile ground for the further development and testing of adaptive, life history, and phylogenetic hypotheses relating primate bone form and function.

The rest of Part Two comprises primarily paleontological contributions. Godinot and Couette provide a new analysis of diversity in size and shape of adapine skulls from the Eocene of

Europe, while Dagosto et al. describe tiny primate tibias from the Eocene of Shanghuang, China, all of which represent haplorhines with estimated body mass at less than 50 g, as small or smaller than the modern mouse lemur, *Microcebus*. Rosenberger et al. present a new and sure to be controversial view of the evolution of postorbital closure and anthropoid origins. They argue that *Rooneyia* has an incipient postorbital septum formed by an extension of the frontal process that provides a suitable evolutionary precursor to the anthropoid orbital septum. They reclassify *Rooneyia* on the basis of this purported synapomorphy as a haplorhine and a protoanthropoid, arguing that similarities in the postorbital region between anthropoids and tarsiers and between *Tarsius* and *Rooneyia* are convergent.

The strongest articles in Part Two are, in this reviewer's opinion, the contributions by Silcox and by Boyer and Bloch, both of which return to questions that Fred Szalay worked on decades ago but that are still far from consensus. Silcox provides a critical review of ideas on the composition and biogeographic origins of the Order Primates. She argues a strong case for inclusion of plesiadapiforms (but not of dermopterans) with Euprimates in an Order Primates that is essentially the same as that supported by Szalay through his entire career. Silcox also suggests a more cautious approach than Beard's "unequivocal" attribution of Asia as the source for Euprimates, suggesting that a North American, European, or even African origin should still be considered. Boyer and Bloch apply critical insight to another issue of great interest to primate paleontologists, namely the locomotor behavior of paromomyid and micromomyid members of Plesiadapiformes. With the aid of some beautiful and painstakingly-prepared new skeletons of Paleocene plesiadapiforms from the Bighorn Basin, they argue for an arboreal, vertical clinging, exudate feeding adaptation among paromomyids and a more scansorial adaptation among micromomyids.

I highly recommend this excellent volume to both students and scholars of vertebrate paleontology, functional morphology, and mammalian evolution. And Fred, congratulations for a job well-done!