ters are devoted to triconodonts (Jenkins and Crompton), docodonts (D. G. Kron), and multituberculates (Clemens and Kielan-Jaworowska). Discussed next are symmetrodonts (M. J. Cassiliano and Clemens), the paraphyletic "eupantotheres" (M. J. Kraus), the origin of the tribosphenic molar and metatherian and eutherian dental formulas (T. M. Bown and Kraus), and theria of metatherian-eutherian grade (Kielan-Jaworowska, J. G. Eaton, and Bown). Regarding this last "group," I would prefer to call them Theria, *incertae sedis*. Discussed next are marsupials (Clemens) and, finally, eutherians (Kielan-Jaworowska, Bown, and Lillegraven).

The book closes with a long and fascinating hypothetical discussion of reproduction in Mesozoic mammals (Lillegraven), followed by a well-researched but possibly oversimplified summary of Mesozoic paleogeography in the light of plate tectonics (Lillegraven, Kraus, and Bown) and a brief comment on living and Tertiary fossil monotremes (Clemens). Although the monotremes are not yet known from the Mesozoic, they must have had a long history throughout that era in spite of some strident claims to the contrary.

Not only is much previous thought summarized in this book, many glimpses are given of work in progress on unpublished discoveries. Thus, in the next few years we can expect publication of new Chinese, Russian, and Mongolian Mesozoic materials from sites recently discovered in northern and eastern Asia, as well as from an early Jurassic site from peninsular India. Mammal-producing late Cretaceous localities have also been found in France and Portugal. Another facet of current exploration is that taxa previously known from poor or incomplete material are becoming represented by much better specimens than before, such as a recently collected partial docodont skeleton from the Jurassic of Scotland, a "eupantothere" skeleton from Portugal, and amphilestid cranial and postcranial material from the early Cretaceous of Montana.

As a final note, it is a pleasure to report that the enormous amount of work that went into organizing, writing, editing, and copy editing this volume was contributed gratis. The authors' proceeds will be donated to a special fund of the Geological Museum of the University of Wyoming for the support of graduate education in vertebrate paleontology.

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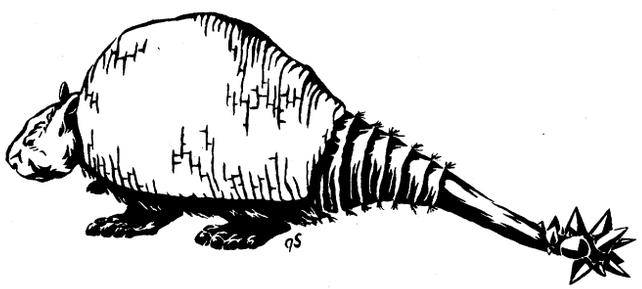
A Fortuitous Experiment

Splendid Isolation. The Curious History of South American Mammals. GEORGE GAYLORD SIMPSON. Yale University Press, New Haven, Conn., 1980. x, 266 pp., illus. $17.50.

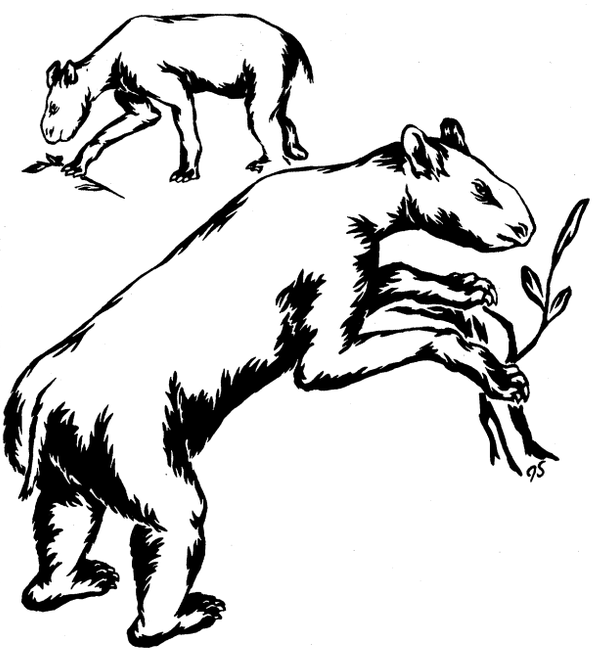
Charles Darwin, in his *Voyage of the Beagle*, was particularly perplexed by the fossil and living mammals of South America. Why, he wondered, were extinct species more numerous than those now living? "This wonderful relationship in the same continent between the dead and the living, will, I do not doubt, hereafter throw more light on the appearance of organic beings on our earth, and their disappearance from it, than any other class of facts." Darwin's prediction has come true, and the observations made during his epic voyage contributed significantly to the development of his theory of organic evolution.

George Gaylord Simpson, doyen of American paleontologists, has devoted a significant part of his career to unraveling the history of South American mammals. He demonstrated that this history "can be considered as an experiment without a laboratory, fortuitously provided by nature." In *Splendid Isolation*, Simpson documents the history, discusses controversial points, highlights interesting and unusual features, identifies problems in our knowledge of the record, and emphasizes those matters that warrant further study. Above all, he clarifies the primary role that South American mammals have had in demonstrating that organic evolution indeed occurred.

During most of the Age of Mammals (65 million years ago to present), South America was, as Australia is today, an island continent. The absence of continuous land connections between South America and any other continent caused evolution there to occur in a closed system and its fauna to evolve in "splendid



"Restoration of *Doedicurus*, a Pleistocene glyptodont, modified from a painting by Horsfall for [W. B.] Scott." The glyptodonts "were the most heavily armored mammals that ever lived. . . . The tail was evidently a formidable weapon of defense. It would seem that between this weapon and their armor they would be immune to attack, yet for unknown reasons they all became extinct." [From *Splendid Isolation*]



"Restorations of the early Miocene (Santacrucian) genus *Homalodotherium*, strange, clawed 'ungulate' of the notoungulate suborder Toxodonta." Although "it borders on fantasy that an animal certainly to be classified among the Ungulata . . . should have claws . . . this is not unique. In a time range overlapping that of the homalodotheres in South America there was a large group of clawed Ungulata called chalicotheres [that] ranged over all the continents other than South America, Australia, and Antarctica." [From *Splendid Isolation*]

isolation." As a result, weird and curious animals developed that were unique to the continent, including giant sloths, tanklike glyptodonts, and sabertooth marsupials.

These bizarre creatures evolved from groups present in South America at the beginning of the Age of Mammals. Simpson discusses the origin of these initial inhabitants: marsupials, edentates, and ungulates. He contends that some or all may have been present in South America at the time of isolation, or that they may have come from North America by chance dispersal across sea barriers after isolation began. He also entertains the possibility that marsupials dispersed there from Australia by way of Antarctica. Simpson's deciphering of the biogeographic history of these groups is based on their fossil record and on knowledge of past continental relationships.

To make this history even more fascinating, isolation was not complete. Sometime during the late Eocene (about 40 million years ago) caviomorph rodents and primates colonized the South American continent and initiated a second phase of that continent's land-mammal history. Some workers believe that one or both groups dispersed to South America from North America across sea barriers; others contend that they came from Africa. Simpson dissects the evidence and reasoning behind these views and concludes that to resolve the issues we need "less debate and more discovery."

The last phase in the history of South American mammals is marked by an extraordinary event, the Great American Interchange, which began about 8 million years ago. During this time an intermingling of the long-separated North and South American land mammal faunas occurred, reaching a climax during the emergence of the Panamanian land bridge about 3 million years ago and continuing to the present.

It is tempting and almost unavoidable to conjecture that the disappearance of some native South American groups was a consequence of the interchange. Placental carnivores (dogs, cats) appeared and marsupial carnivores became extinct. Was this the result of competitive exclusion in which marsupials were the losers? And can a case be made also for extinction of South American ungulates as a result of competition with North American invaders? The consequences of mingling, interactions of the faunas, their integration into faunas of different compositions, and finally establishment of present faunas are vividly discussed by Simpson. Refreshing insights into such topics as ecological relays and faunal turnover are also presented.

Splendid Isolation is a semitechnical work written for the educated layperson. The style and approach are similar to those of some of the author's earlier books such as *Life of the Past, Horses, The Geography of Evolution*, and *Penguins*. The book is divided into 17 chapters with 14 tables and 43 figures.

I found the book informative and a good updated synthesis of the subject. Simpson's success is in large part due to his approach, which has been one of arbitrator rather than promoter with respect to controversial issues. His position on debated issues is nevertheless evident, while at the same time he gives due attention to the views of others. A book of this type has long been needed, and *Splendid Isolation* is a welcome contribution from the field's leading authority.

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The Order Primates

Evolutionary History of the Primates. FREDERICK S. SZALAY and ERIC DELSON. Academic Press, New York, 1979. xvi, 580 pp., illus. $45.

This encyclopedic review of fossil primates will be an indispensable reference for anyone with a professional interest in primate evolution. As Szalay and Delson make clear in their preface, the book is intended for that professional audience and presupposes a solid background in comparative anatomy and evolutionary biology. Readers who are not already acquainted with paracristids, mesocuneiforms, and wear facet 10n will be simply bewildered by much of the text, which uses these and similar terms without definition or illustration. This for-professionals-only approach is partly a matter of principle with the authors, who tell us that they wanted to present primate paleobiology as a self-sufficient discipline instead of a mere introduction to modern primate diversity or an account of human origins. Unfortunately, this approach also seems to have been dictated partly by considerations of economy. Large stretches of the text have been assembled by merely pasting together verbatim transcriptions of the authors' technical publications, right down to the misspellings (for example, *Absarokius "abotti"*). Because the competences, concerns, and convictions of the two authors differ, the result is a somewhat disjointed collage in which Szalay's and Delson's separate contributions are easily distinguished.

The book's primary value to researchers is as a comprehensive systematic catalog of fossil primates. As such, it succeeds brilliantly. Every extinct genus is presented with a complete account of the traits that distinguish it, the species included in it, and the names that have been applied to it. Extant genera receive similar but sketchier treatment. All this is accompanied by copious drawings and photographs, which make up almost 40 percent of the book. The pictures in Szalay's half of the book (the part dealing with prosimians) are uniformly excellent; several are little masterpieces of biological illustration. Every fossil locality from which primates have been recovered is listed and assigned an absolute date in the introduction—and listed again under the name of every species of primate it has yielded. Complete citations are given for all taxonomic names, including the rejected groupings and invalid synonyms, so that the book provides researchers with a comprehensive bibliography of primate systematics from 1758 to 1979.

Compared to these signal virtues, the book's faults are minor though numerous. If *Evolutionary History of the Primates* were written for an audience of nonspecialists, its defects would not be worth mentioning. But its authors intend it as a contribution to the technical literature; and so it seems appropriate to note some of the things that may raise the hackles of their peers.

Szalay and Delson offer a systematic revision of the order Primates. Since both are too sensible to be ideological Hennigians, that revision abounds in wastebasket taxa—Plesiadapiformes, Strepsirhini, Adapiformes, and so on. But both of them have been too much influenced by New York cladism to feel entirely comfortable with this, and so they are seized periodically with spasms of cladistic virtue that prompt them to name clades that others have not noticed, not believed in, or not thought worth naming. The most irritating example is their expansion of the family Hominidae to include all living and fossil apes—except the Fayum forms and the pliopithecines, which are dumped into a hominoid wastebasket labeled Pliopithecidae. This useless novelty, which just exchanges one wastebasket for another, will be widely ignored; but the authors will presumably cling to it for a decade or