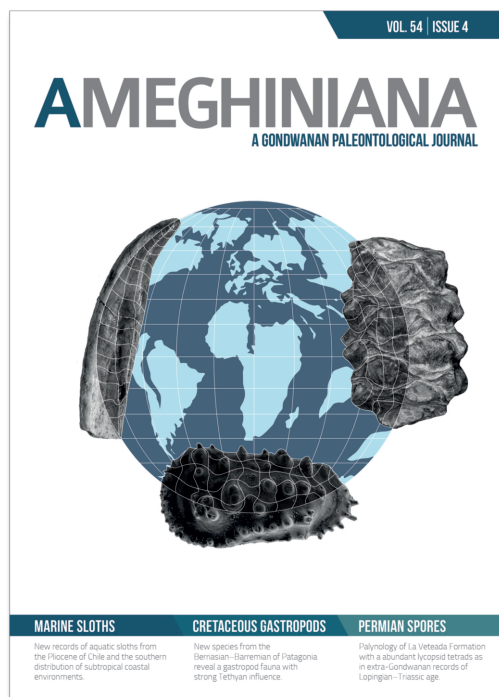




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FOSSIL HORSES OF SOUTH AMERICA. PHYLOGENY, SYSTEMICS AND ECOLOGY

José Luis Prado and María Teresa Alberdi. Springer, The Latin American Studies Book Series, 150 pp, 2017. ISBN 978-3-319-55876-9

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Horses are among living mammals that have attracted humans since ancient cultures. The domestication of horses provided a great support to human beings for both hard tasks and mobility, making easier the development of some works and the interrelationships among human settlements. But, before that, the history of horses is long and diverse, constituting one of the best known groups of fossil mammals. The amounts of remains that are usually found in paleontological sites of Cenozoic age have allowed establishing their evolutionary trends, as well as a detailed geographic and biostratigraphic distribution through time. Although horses are presently known everywhere, they did not reach South America until recently, geologically speaking, that is about 3.5 million years ago, when the Panamá Isthmus was established, allowing a huge faunal interchange known as the Great American Biotic Interchange. Despite their 'short' history, South American horses rapidly dispersed and diversified, and they are the object of the present book. José Luis Prado and María Teresa Alberdi present the state of the art of the history of South American equids, mainly based on their own researches throughout several decades of collaboration. As a whole, this book is a useful tool for students and professionals interested in the evolution of South American horses, as it provides detailed data on systematics, methodologies, biostratigraphic and geographic distributions, and paleobiological inferences.

After a short preface, the authors have divided the contents into seven chapters, with two final appendices. Each chapter includes an abstract, summarizing the main items, some key words, and the bibliographic references cited in it. Tables, charts, and illustrations are adequate (although quality is not uniform throughout the book) and complement the respective texts for a better understanding.

Chapter 1 is a short introduction on the importance of horses, the extant species and their distribution, and the fossil record. Previous books on fossil equids are cited, including a first Spanish version of the same authors on the

South American record, to which this new book adds recent data and several aspects of the paleontological studies; in addition, the present English version makes it available to a broader public.

Chapter 2 is the longest one and concerns Nomenclature and Taxonomy. On the one hand, it deals with terminology, measurements, morphological features, and statistical analyses used in the study of cranial, dental, and postcranial remains of fossil equids, which allows the establishment of valid taxa within the group based on a large data set coming from different South American localities. A special discussion refers to the validity of the subgenus *Equus* (*Amerhippus*), classically applied to the South American species of *Equus*. On the other hand, the results of these studies are reflected in the taxonomic arrangement of the fossil representatives, recognizing two genera, *Hippidion* and *Equus*, each one with three species. Synonyms, type specimens, studied material, geographic and stratigraphic distributions, diagnosis, and a short discussion are provided for each recognized species.

Chapter 3 summarizes a great number of institutions housing paleontological collections in which remains of South American horses have been revised by the authors throughout many years of research. Together with names and material, the publications derived from their studies are also mentioned.

Chapter 4 refers to the phylogenetic relationships among equids. A compilation is provided from the old evolutionary schemes, mainly based on the progressive reduction of lateral digits or two long bones—ulna and fibula—to the recent cladistic analyses based on both morphological and molecular data. Subsequent to these analyses, different taxonomic arrangements below the family level (subfamilies, tribes, genera) are proposed.

In chapter 5, biostratigraphic and biogeographic hypotheses concerning horses are exposed. Different studies have established the processes of vicariance and dispersion

suffered by equids throughout the Cenozoic; they have been related, in turn, to major climatic events and environmental changes, and are exposed in a chronological order following the established scheme of land mammal ages. Concerning South American horses, two main migratory routes were proposed from North to South, one along the Andes Range and another along the eastern coastal edge. The species recorded from each path reveal different adaptations and habit preferences.

Paleobiological aspects of South American horses are presented in Chapter 6. They mainly refer to diet and body mass of the recognized species. The source of information to infer paleodiets is the study of carbon and oxygen stable isotopes in teeth and bones. The authors explain how these isotopes are incorporated to the body through the ingested vegetation and water. Results of carbon isotopes permit establishing whether the diet of a species was restricted or not to a specific kind of plants. In turn, oxygen isotopes from the consumed water provide information on environmental conditions mainly concerning temperature but also altitudinal or latitudinal differences. With respect to body mass, estimations are based on statistical analyses derived from linear and areal measurements of both teeth and bones. In general, autopodial elements are the best predictors of the skeleton for estimating body mass of fossil equids. These body mass estimations allow inferring evolutionary patterns that are correlated, in turn, with major climatic changes.

Chapter 7 deals with the extinction event of the Pleistocene megamammals, including horses. Particularly for South American equids and other mammals, both climatic changes and the arrival of human beings have been considered as probable causes of their extinction.

The book ends with two complementary appendices. Appendix A provides the list of South American localities with *Hippidion* and/or *Equus*, and Appendix B presents all data on stable isotopes obtained from samples of different species of South American Equidae.

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