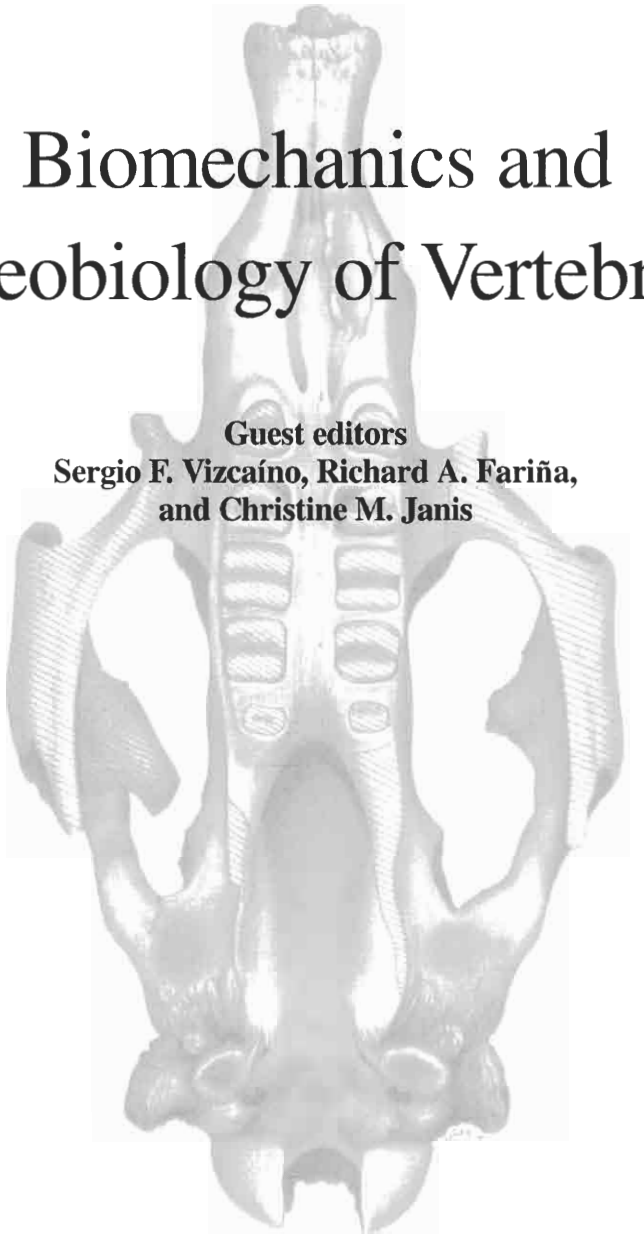
We dedicate this volume to memory of
J. John Sepkoski Jr. (1948–1999)

Biomechanics and Palaeobiology of Vertebrates

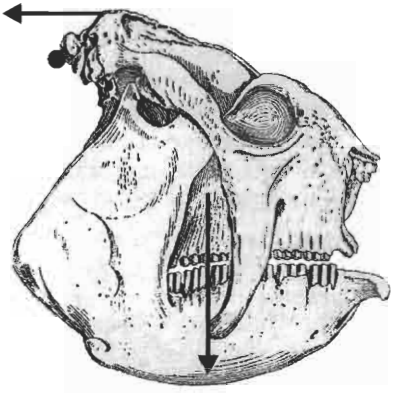


Guest editors
Sergio F. Vizcaíno, Richard A. Fariña,
and Christine M. Janis

This issue contains an invited paper by Christine M. Janis and Julia C. Keller, and Proceedings of the Symposium in Biomechanics and Palaeobiology, held in Bahía Blanca, Argentina, on 5 and 6 October 1998. The cost of publication of this issue was partially met by Agencia Nacional de Promoción Científica y Tecnológica (Argentina) PICT-06348.

Proceedings of the Symposium on Biomechanics and Palaeobiology

held in Bahía Blanca, Argentina,
on the 5th and 6th of October 1998



The Symposium was part of the 7th Argentinian Congress on
Biostratigraphy and Palaeontology

ACTA PALAEONTOLOGICA POLONICA

Vol. 46, No. 2, pp. 135–136, Warszawa 2001

Introduction

In the words of Professor McNeill Alexander, one of the most prominent figures in the field, biomechanics is the approach to the understanding of living organisms or their parts similar to the way that engineers approach their subject, by the application of the basic principles of Newtonian physics. In the past several years biomechanics has been applied to the study of fossil vertebrates, with a remarkable impact on our understanding about life in the past, and so contributing to the advancement of this area of palaeobiology. With this application of biomechanics, it has been possible to propose new interpretations of the functional biology of extinct organisms that differ from those based on the direct comparison with living analogues. This is especially important for the understanding of extinct animals that do not have living analogues, which is the case for many of the South American mammals considered in some of the contributions in this volume.

Most studies in this discipline have focussed on fossil vertebrates of Europe and North America, with emphasis on dinosaurs and their relatives. Also, the remarkable South American fossil vertebrates have caught the attention of a large number of both Argentinian and foreign scholars since the first *Megatherium* was found in the banks of Luján River in 1778. The great majority of work on these South American forms has been related to the description of new taxa and the study of their phylogenetic relationships and stratigraphic location. In general, until recently the palaeobiological aspects have not been extensively discussed, or at best they have been analysed only through the comparison with living species.

This abundance and diversity of large-sized forms represent a fertile soil for biomechanical studies, as large body size has consequences for many aspects of an animal's biology, in particular locomotion, modes of food intake and ecological relationships. Thus, it can safely be stated that the South American fossil taxa offer important subjects for original research.

We were convinced that the application of biomechanics to fossil vertebrates generates an important impact on the interpretation of the life forms of the past, which in turn contributes to the view of the evolution of life on Earth. With this in mind, we decided to endure the hardships of the production of new, broadly-based publication that related to these issues. We hope that this project will contribute to the advancement of the palaeobiological studies of extinct vertebrates and the reinterpretation of their palaeoecological framework, as well as to the climatic-environmental evolution in South America. Finally, the extension of these approaches to modern faunas may enable inference of long term ecological changes.

This volume gathers the proceedings of the Symposium on Biomechanics and Palaeobiology, held in Bahía Blanca, Argentina, on 5 and 6 October 1998, as a part of the 7th Argentinian Congress on Biostratigraphy and Palaeontology. As convenors, we intended to widen its scope as much as possible, rather than confining its subject to

mammalian or land vertebrate palaeobiology following our own preferences. That was the reason why we specifically invited several contributors that worked on fish, invertebrate and plants to present their contributions, as well as inviting Prof. Jack Sepkoski to join us as a plenary lecturer. In his usual generous manner, Jack accepted this invitation and, given his immense prestige, it was very easy to convince the Congress organisers to fund his journey.

We are proud to claim that the symposium was a success. Seventeen contributions were presented in three oral sessions, authored by 28 people based in 8 countries, and attended by a large and active public. Unfortunately, last minute problems prevented the attendance of one invertebrate palaeontologist and one palaeobotanist, and thus the symposium was restricted to vertebrates. This was more than compensated by the plenary lecture on extinctions given by Jack, as well as an improvised workshop on the same subject, also convened by him.

As a result of that success, we thought it would be a good idea to pursue publication of the contributions as full papers. All participants met informally to discuss this, and Jack suggested that *Acta Palaeontologica Polonica* could be an appropriate place to publish these papers, which should be refereed according to the rigorous guidelines of that journal. After the appropriate consultations, the authors were invited to submit their manuscripts. Some of them had already sent the contents of their presentation to other journals, so declined to join this project. The remaining manuscripts went through the whole editorial process and are here presented. Very sadly, Jack, who had committed himself to review the manuscripts, passed away some time after the manuscripts had been received. We not only lost an incredibly generous, intelligent and good natured acquaintance, but also a decisive collaborator. Following Prof. Kielan-Jaworowska's advice, we decided to invite Prof. Christine M. Janis to complete our team. At first we were reluctant to follow that suggestion, as we were afraid that Christine's grief, as Jack's widow, would be overwhelming. However, Christine accepted our offer, and her contribution raised the quality of the papers enormously. Christine was responsible for correction and improvement of the English of the papers published in this volume. Furthermore, she added a paper of her own to this volume, co-authored with her student, Julia Keller.

We would not like to finish these preliminary words without expressing our gratitude to the following people: the organisers of the congress, who agreed to financially support Jack's travel and who were very helpful during the meeting; the editors of *Acta Palaeontologica Polonica*, who went through the hard working of preparing a heterogeneous volume in order to reach a high quality standard; the authors, who received their critiques with patience and with an eagerness to address them; and the reviewers, who generously gave of their time in making a tough job for the authors.

Finally, we wish to dedicate this volume to the memory of Jack Sepkoski, as our tribute to a person who was one of the greatest palaeontologists of all times, as well as someone who was a vibrant example of generosity and of a healthy ambition to to ensure the progression of science in all of the diverse corners of the planet.

Sergio F. Vizcaíno
Richard A. Fariña

Acknowledgements

We would like to express our sincere thanks to the following scientists who have assisted us by providing referees' reports on papers published in this volume:

Mariano Bond, Jennifer Clack, Per Christiansen, Gerry De Iuliis, Robert J. Emry, James O. Farlow, Colleen Farmer, Greg McDonald, Nick Milne, Storrs L. Olson, Paul Palmqvist, Daniel Panario, Jean-Claude Rage, John M. Robinson, Gustavo Scillato-Yané, Jeff Thomason, Eduardo P. Tonni, Blaire Van Valkenburgh, David Webb, and five anonymous reviewers.

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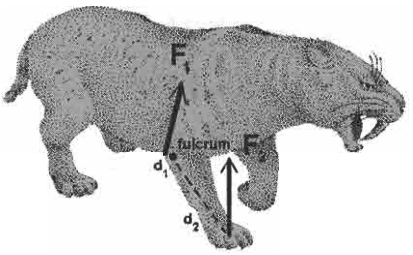

symposium on biomechanics and palaeobiology

Bahía Blanca, October 1998