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978-0-521-19461-7 - Early Miocene Paleobiology in Patagonia: High-Latitude Paleocommunities of the Santa Cruz Formation

Edited by Sergio F. Vizcaíno, Richard F. Kay and M. Susana Bargo

Frontmatter

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Early Miocene Paleobiology in Patagonia High-Latitude Paleocommunities of the Santa Cruz Formation

Coastal exposures of the Santa Cruz Formation in southern Patagonia have been a fertile ground for recovery of Early Miocene vertebrates for more than 100 years: studies began in the 1840s when specimens were sent for study to Charles Darwin. The formation is noted for yielding remarkably complete specimens, and a richly varied taxonomic assemblage very different from other continents, owing to the long isolation of South America.

This volume presents the most comprehensive compilation yet of important mammalian groups from the Santa Cruz Formation. It includes the most recent fossil finds as well as important new interpretations based on 10 years of fieldwork by the editors. A key focus is placed on the paleoclimate and paleoenvironment during the time of deposition in the Middle Miocene Climatic Optimum (MMCO) between 17 and 15 million years ago – a warm interval dissimilar to the modern climate of Patagonia. Using newly recovered phytoliths, and plant macrofossils, together with invertebrates, amphibians, and reptiles, the authors present the first reconstruction of what climatic conditions were like for this most southerly continental record of the MMCO. They also present important new evidence of the geochronological age, habits, and community structures of fossil bird and mammal species.

Academic researchers and graduate students in paleontology, paleobiology, paleoecology, stratigraphy, climatology, and geochronology will all find this a valuable resource of information about this fascinating geological formation.

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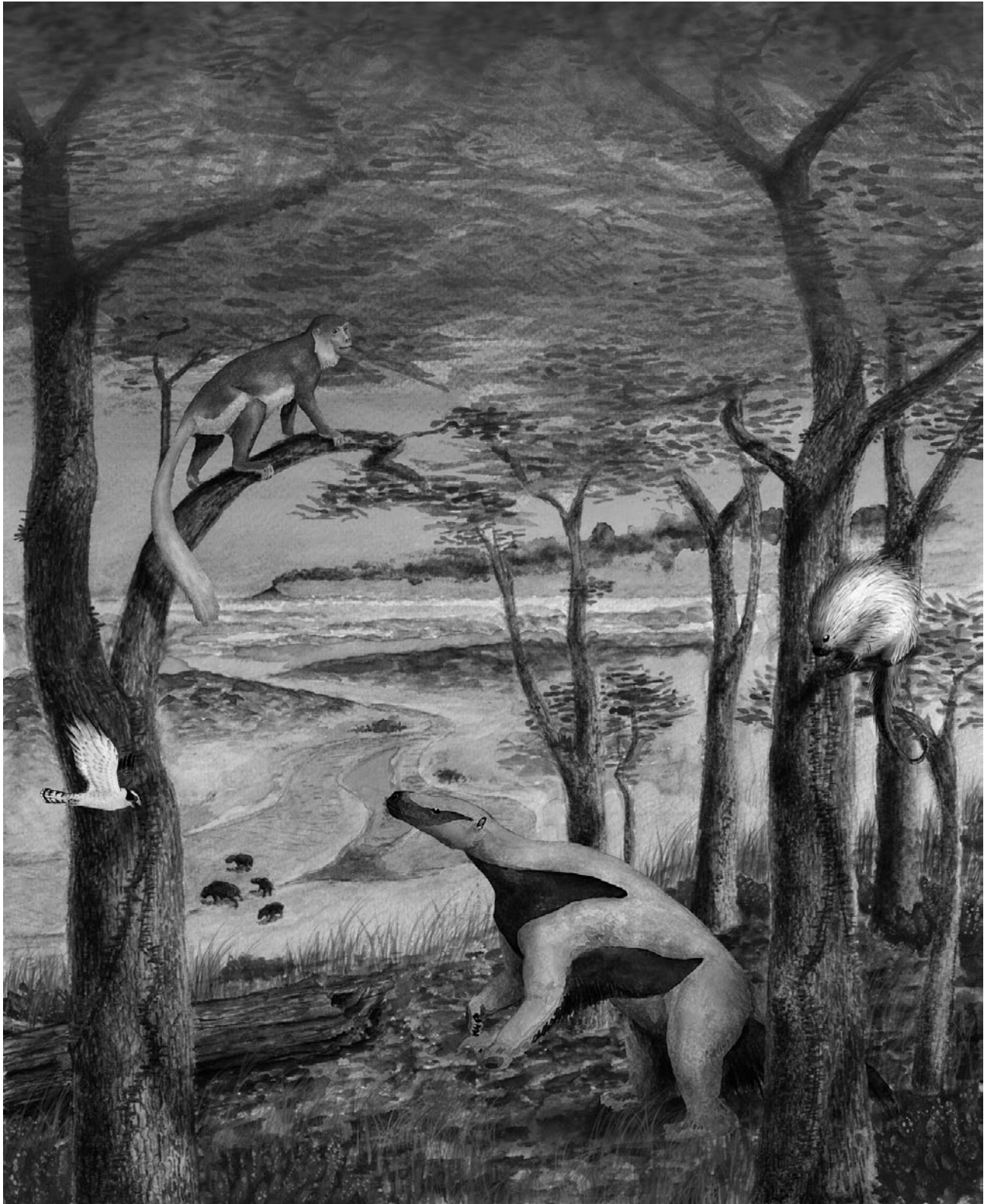
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Contents

| | | | |
|---|---------|-----|--|
| <i>List of contributors</i> | page vi | | |
| <i>Preface</i> | ix | | |
| 1 Background for a paleoecological study of the Santa Cruz Formation (late Early Miocene) on the Atlantic Coast of Patagonia | 1 | | |
| <i>Sergio F. Vizcaíno, Richard F. Kay, and M. Susana Bargo</i> | | | |
| 2 Tephrochronology of the Miocene Santa Cruz and Pinturas Formations, Argentina | 23 | | |
| <i>Michael E. Perkins, John G. Fleagle, Matthew T. Heizler, Barbara Nash, Thomas M. Bown, Adán A. Tauber, and Maria T. Dozo</i> | | | |
| 3 Absolute and relative ages of fossil localities in the Santa Cruz and Pinturas Formations | 41 | | |
| <i>John G. Fleagle, Michael E. Perkins, Matthew T. Heizler, Barbara Nash, Thomas M. Bown, Adán A. Tauber, Maria T. Dozo, and Marcelo F. Tejedor</i> | | | |
| 4 Sedimentology and paleoenvironment of the Santa Cruz Formation | 59 | | |
| <i>Sergio D. Matheos and M. Sol Raigemborn</i> | | | |
| 5 Oysters from the base of the Santa Cruz Formation (late Early Miocene) of Patagonia | 83 | | |
| <i>Miguel Griffin and Ana Parras</i> | | | |
| 6 Ichnology of distal overbank deposits of the Santa Cruz Formation (late Early Miocene): paleohydrologic and paleoclimatic significance | 91 | | |
| <i>Verónica Krapovickas</i> | | | |
| 7 Fossil plant studies from late Early Miocene of the Santa Cruz Formation: paleoecology and paleoclimatology at the passive margin of Patagonia, Argentina | 104 | | |
| <i>Mariana Brea, Alejandro F. Zucol, and Ari Iglesias</i> | | | |
| 8 Amphibians and squamate reptiles from the Santa Cruz Formation (late Early Miocene), Santa Cruz Province, Argentina: paleoenvironmental and paleobiological considerations | 129 | | |
| <i>Juan C. Fernicola and Adriana Albino</i> | | | |
| 9 Diversity and paleobiology of the Santacrucian birds | | 138 | |
| <i>Federico J. Degrange, Jorge I. Noriega, and Juan I. Areta</i> | | | |
| 10 Paleoecology of the Paucituberculata and Microbiotheria (Mammalia, Marsupialia) from the late Early Miocene of Patagonia | | 156 | |
| <i>María Alejandra Abello, Edgardo Ortiz-Jaureguizar, and Adriana M. Candela</i> | | | |
| 11 Paleoecology of the mammalian carnivores (Metatheria, Sparassodonta) of the Santa Cruz Formation (late Early Miocene) | | 173 | |
| <i>Francisco J. Prevosti, Analía M. Forasiepi, Marcos D. Ercoli, and Guillermo F. Turazzini</i> | | | |
| 12 Paleobiology of Santacrucian glyptodonts and armadillos (Xenarthra, Cingulata) | | 194 | |
| <i>Sergio F. Vizcaíno, Juan C. Fernicola, and M. Susana Bargo</i> | | | |
| 13 Paleobiology of the Santacrucian sloths and anteaters (Xenarthra, Pilosa) | | 216 | |
| <i>M. Susana Bargo, Néstor Toledo, and Sergio F. Vizcaíno</i> | | | |
| 14 Paleobiology of Santacrucian native ungulates (Meridiungulata: Astrapotheria, Litopterna and Notoungulata) | | 243 | |
| <i>Guillermo H. Cassini, Esperanza Cerdeño, Amalia L. Villafañe, and Nahuel A. Muñoz</i> | | | |
| 15 Paleobiology of Santacrucian caviomorph rodents: a morphofunctional approach | | 287 | |
| <i>Adriana M. Candela, Luciano L. Rasia, and María E. Pérez</i> | | | |
| 16 Paleobiology of Santacrucian primates | | 306 | |
| <i>Richard F. Kay, Jonathan M. G. Perry, Michael Malinzak, Kari L. Allen, E. Christopher Kirk, J. Michael Plavcan, and John G. Fleagle</i> | | | |
| 17 A review of the paleoenvironment and paleoecology of the Miocene Santa Cruz Formation | | 331 | |
| <i>Richard F. Kay, Sergio F. Vizcaíno, and M. Susana Bargo</i> | | | |
| <i>Index</i> | | 366 | |

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Frontmatter

[More information](#)

viii

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Preface

In 1520 Ferdinand Magellan (Fernão Magalhães, 1480–1521), a Portuguese explorer in the service of the Spanish crown, was surveying the coast of a land inhabited by huge natives whom he called *patagones* (big feet). From this name, the land later became known as Patagonia. On September 14 of that same year, the day of the Feast of the Exaltation of the Holy Cross (Exaltación de la Santa Cruz), the fleet reached the mouth of the river that Magellan named Santa Cruz. In Magellan's times, as remains true today, Patagonia east of the Andes was mostly a cold, windy, arid steppe with choiques (Darwin's rheas) and guanacos as its most conspicuous wild animals. Before the arrival of Europeans, this territory was occupied by natives belonging to the *tehuelche* culture, nomadic hunters of choiques and guanacos. Over the course of time, the name Santa Cruz came to be associated with all of the continental territory of the Argentine Republic south of the 46° S parallel.

Santa Cruz has not always been the cold and windy place just described. About 17 million years ago (Early Miocene), the Andes were much lower and the humid winds from the west allowed the eastward extension, to the present Atlantic coast and beyond, of forest and grasslands very similar to those existing today on the piedmont and the lower slopes on both sides of the cordillera. But in contrast to the present, these forests and grasslands were inhabited by a plethora of mammals and birds mostly belonging to long extinct or greatly reduced lineages, and many of the surviving relatives of those earlier occupants are now restricted to the tropical regions of South America. Among the herbivores were bizarre forms such as glyptodonts, ground sloths, and giant tapir-like astrapotheres, and others belonging to extinct orders of mammals resembling small horses, cattle, sheep, and hares. Bear-like marsupials and terror birds reigned among the carnivores. Among the descendants of these early inhabitants are anteaters, armadillos, porcupines, and monkeys. The aim of this volume is to study the biology of the different species of this fauna to interpret their ecological interactions and better understand the environment in which they lived, at a time interval that ranks among the Earth's warmest periods over the past 34 million years, and during which South America was physically separated from other continental land masses.

The remains of this unique fauna are recorded in sedimentary rocks that are abundantly exposed throughout the Province and, not surprisingly, known by geologists as the Santa Cruz Formation. South of the mouth of the Río Santa

Cruz, the Atlantic coastal exposures of this formation between the Ríos Coyle and Gallegos provide the best specimens for our purposes.

To achieve our goals we performed continued intensive collecting during the Austral summers of 2003 to the present (2012). The geology and fossils were studied by an assembled team of colleagues from different institutions and with varied fields of expertise, including sedimentology, geochronology, ichnology, and invertebrate and vertebrate paleontology. Paleontologists constituted the largest group, including experts on amphibians, reptiles, birds, marsupials, xenarthrans, ungulates, rodents, and primates. The contributions presented in this volume represent to a large degree original research on subjects that had barely been treated previously, if not completely ignored, for the rocks and the biota of the Santa Cruz Formation. Parts of the research developed in certain chapters constitute the core of doctoral dissertations of several of our former students, who have now become colleagues.

We are grateful to many persons and institutions for making possible the publication of this volume.

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