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The Great American Biotic Interchange

A South American Perspective

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Pleistocene continental beds cropping out in the coastal cliffs south of Miramar, Buenos Aires Province. Note the chimango, a terrestrial bird at the *left*, and a gull, a marine bird at the *right*. Photo by Esteban Soibelzon

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The most emblematic South American mammals are the guanaco, the tapir, and the spectacled bear. However, the closest ancestors of these animals did not originate in the continent: They were recent immigrants from North America.

Yes, we got a problem: The evidence is at the bottom of the bottle and we are not drunks

Preface

The Great American Biotic Interchange (GABI) between North and South America is one of the most important events in the history of land mammals. The first authors that considered the interchange between the Americas were Wallace, Ameghino, and few others as early as the second half of the nineteenth century. Notwithstanding that a huge effort was made by thousands of paleontologists, zoologists, botanists, geologists, and professionals of other disciplines, we are far from having a precise panorama about one of the most important events in the history of mammals.

However, we are confident that a more complete survey of mammal bearing units in southern South America as well as discovering others in the central and northern Andes and Central America will give us the factual evidence for proposing, confirming, or rejecting many hypotheses. Moreover, the expanding molecular studies will provide the minimum age for the origin of many endemic clades of North American families whose first appearance is not adequately explained.

In this book, we consider the extinction of megafauna in South America as a part of GABI. Several paleontologists (including the authors of this book) are commited to the study of the process that modified permanently the composition and distribution of land mammals in South America. The entrance of hunter-gatherers at the end of the Pleistocene occasioned the spectacular extinction of megafauna. However, this process is being completed by modern man. For this, research on recent distribution of vertebrates in South America has to be accelerated. During the last twentieth and twenty-first centuries, terrestrial and aquatic environments changed radically because modern human activities occasioned extinction, pseudoextinction, and alteration of distribution of many mammals. This disruption might make conventional and molecular studies of historical patterns and relationships between different lineages extremely difficult. However, fossils are still in the rocks. They are waiting for us to find them, unearth them, and make them drops of light for explaining the origin of a treasure in danger: the richest land mammal fauna of the world.

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Contents

Chapter 1
Introduction

Abstract The Great American Biotic Interchange (GABI) between North and South America is one of the most important events in the history of land mammals. The interchange occurred in several phases during more than nine million years. The oldest genera of North American origin in southern South America occur in beds of Late Miocene age. However, the major episodes of mammalian dispersal from North America appear to have occurred from the Marplatan (Latest Pliocene–Early Pleistocene) to the Lujanian (Late Pleistocene–Early Holocene). In this book, we focus on mammals of southern South America, where the most important and richest localities with fossil vertebrates of Late Miocene–Holocene age were reported.

Keywords Chronology · Mammal · Panama isthmus · Endemic · Immigrant · Biogeography · Macroevolution · Neogene · Quaternary

During most of the Cenozoic, South America was isolated from the other continents excepting for a non-permanent land connection with east Antarctica that probably lasted until the Late Paleocene (Reguero et al. 2014). Afterward, during the period of isolation, a very singular mammalian fauna evolved in South America and only primate and rodent waif immigrants reached South America from Africa (Ameghino 1889; Simpson 1980; Poux et al. 2006; Flynn et al. 2007).

The insularity of South America finished when the Panamá isthmus was permanently established in southern Central America by the end of Cenozoic (ca. 2.8 Ma; Woodburne 2010) or perhaps even earlier (Prothero et al. 2014). Every continental collision or terrestrial connection between two previously isolated great continents should generate an important biogeographic event. Certainly, the mixing of North American and South American continental faunas was one of the most important episodes in the history of mammals (Ameghino 1910; Scott 1937; Simpson 1950; Woodburne et al. 2006; Woodburne 2010). This faunal interchange was named the Great American Biotic Interchange (GABI, "Gran Intercambio Biótico Americano" in Spanish, GIBA) by Webb (1985).

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