(triconodontids with amphilestid affinities) and Gondwanian origins (autralosphenids). (2) Late Gondwanian (late Cretaceous-medial Paleocene): strong endemism in most lineages of Pangeic (Dryolestida) and Gondwanian (Gondwanatheria) origins, and first records of therians. (3) Early South American (late Paleocene-latest Eocene): strong radiations within Metatheria and Eutheria. (4) Late South American (early Oligocene-late Miocene): standardization of relatively few lineages among metatherians, strong radiation of hypsodont types among South American native «ungulates». Finally (5) Interamerican (late Miocene-Recent): mixture of North and South American therian lineages, progressive decline of native faunas. Among the biotic and abiotic events that triggered these phases there are: the last global warming event at the beginning of the late Cretaceous (between phases 1 and 2); an intermittent bridge between North and South America by the late Cretaceous, favoring the First American Biotic Interchange (FABI), and the K-T extinction event (between 2 and 3); global cooling and full widening of the Circumpolar Antarctic Current, and arrival of platyrrhines and caviomorphs (between 3 and 4), and the beginning of the Great American Biotic Interchange (GABI) and full influence of the Andean uplift (between 4 and 5).

CENOZOIC ANDEAN FAUNAS: SHEDDING NEW LIGHT ON SOUTH AMERICAN MAMMAL EVOLUTION, BIOGEOGRAPHY, ENVIRONMENTS, AND TECTONICS

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For almost 200 years, knowledge of South American fossil mammals was derived largely from the remarkable, but gap-riddled record from Argentine lowland, high-latitude sites. This sequence led to a picture of a few dramatic changes punctuating a generally steady series of evolutionary and environmental transitions (G.G. Simpson's «3-stratum» concept). There is growing evidence, however, of greater complexity than had been envisioned in the responses of Cenozoic mammal faunas to global and regional biogeographic, climatic, tectonic, sea level, ecological, and environmental changes. Broader availability of data from tectonically active regions like the Andes, as well as the tropics, are leading to greater understanding of both regional and continent-wide patterns of change and possible causal processes. Important Tertiary mammal faunas from the Andean highlands are now known from Chile, Bolivia, Colombia, Ecuador and elsewhere. Examples of these range in age across the early Paleocene (Tiupampa, Bolivia), Eocene to middle Miocene (a series of sites in the Abanico Formation, central Chile), early Oligocene (Salla, Bolivia; with other Miocene-Pliocene sites elsewhere in the Bolivian Altiplano), early Miocene (Pampa Castillo [Patagonia] and Chucal [Altiplano], Chile), and middle Miocene (LaVenta, Colombia). In contrast to many lowland temperate sequences, some of these are precisely dated because of their Andean setting and associated volcaniclastics, and some include paleobotanical, sedimentological and stable isotope evidence complementing mammal-based environmental inferences. Here we review biogeographic, paleoenvironmental and tectonic implications of early to middle Cenozoic Andean mammal faunas, emphasizing those from Chile. For example, the ~ 31.5 Ma Tinguiririca Fauna, representing an entirely new South American Land Mammal «Age», contains the oldest known caviomorph rodents and provides the earliest global evidence of open grassland habitats. Evidence from both Tinguiririca caviomorphs and the 20.1 Ma platyrrhine primate Chilecebus from central Chile support African origins for these two autochthonous South American immigrant clades.

ON THE EVOLUTION OF LARGE SIZE IN MAMMALIAN HERBIVORES OF CENOZOIC FAUNAS OF SOUTH AMERICA

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One of the major features of the continental Cenozoic faunas of South America is the presence of native lineages of herbivorous mammals, and among them the largest representatives of each fauna. Here, we analyze the evolution of the large body size of these mammals in relation to their taxonomic richness. During the Casamayoran Age (middle Eocene), notoungulates exhibit the greatest diversity of genera with forms larger than 100 kg. During the Deseadan (late Oligocene), notoungulates, astrapotheres and pyrotheres are roughly equally represented (33% each), and only pyrotheres surpassed 500 kg. During the Santacrucian (early-middle Miocene) notoungulates dominated large-bodied forms (66%) and only astrapotheres surpassed 500 kg. During the Laventan (late Miocene), some xenarthrans (Tardigrada) equaled notoungulates and astrapotheres (all 33%), but only tardigrades and astrapothres included members above 500 kg (50% each). During the Ensenadan and Lujanian (Pleistocene) native ungulates declined notably (ca. 10% of the overall diversity), xenarthrans (Tardigrada and Cingulata) exceeded 40% and 50% of the large-bodied forms in each age, most of them being strict megamammals (i.e. above 1000 kg). The remaining taxa are caviomorph rodents and lineages of boreal provenance (proboscideans, artiodactyls and perissodactyls). In general, but particularly for those faunas in which xenarthrans are dominant, the abundance of megamammals distantly related to living counterparts raises problems in interpreting their paleobiology. Particularly for the Pleistocene, communities dominated by megamammals of very low metabolism (xenarthrans) have no counterpart in living faunas. Hence, paleoecological reconstructions lack strict analogues and alternative approaches must be used.