

# PAST AND PRESENT DISTRIBUTIONS OF ARMADILLOS (XENARTHRA, DASYPODIDAE AND CHLAMYPHORIDAE) EXPLAINED BY PALEOCLIMATES AND FOSSIL RECORD

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## RESUMO

Several climatic fluctuations occurred during the Cenozoic; some of them were drastic while others were more gradual, but both have deep effects on the biotas. Armadillos have an old history and faunal replacement and/or local extinctions were detected, linked with climatic fluctuations. Physiological characteristics like high thermal conductance, low metabolic rates and body temperature largely determine their distribution. Current species of Dasypodinae and Tolypeutinae are found in tropical to subtropical regions, while Euphractinae is found from subtropical to temperate-cold zones in South America. First dasypodids come from the early Eocene (Itaboraian and Riochican South American Land Mammal Ages), when the warmest Cenozoic temperatures were recorded. These faunas show the greatest diversity of Astegotheriini (Dasypodinae), which progressively decreased in diversity towards the Late Eocene while the first Euphractinae are recorded. During the global cooling of the late Eocene-early Oligocene occurred a faunal turnover of Dasypodinae by Euphractinae as they established as the most varied group of armadillos in high latitudes, while Astegotheriini have not been recorded in southern South America, except for a single species during the late Oligocene. This sequence is well recorded in Patagonia, but some evidence shows that in low latitudes the diversity and changes were different than the patagonian pattern. During the late Miocene (Chasicuan and Huayquerian stages), biogeographic connections between Pampean Region (Argentina) and northwest Argentina are sustained on the diversity of Euphractinae. Likewise, the development of open environments in lower latitudes allowed the expansion of *Propraopus* and *Dasypus* (Dasypodinae) to the Brazilian Guiana. Interglacial cycles, with warm and humid climates favored the northward expansion, reaching southern USA and to the south, into evergreen forests of central Brazil, Mesopotamia, and Humid Argentinian Chaco. During glacial Quaternary, Euphractinae and Tolypeutinae moved more than once to the eastern Pampean Region, and Dasypodinae moved northward to central Brazil or further north to the Guiana Region, entering North America during the "Great American Biotic Interchange" (Late Pliocene). During interglacial periods some armadillos went extinct locally (e.g. *Tolypeutes* and *Zaedyus* in the southeast Pampean Region) and/or moved to Patagonia (*Zaedyus*), central Argentina (*Tolypeutes matacus*, *Chaetophractus vellerosus*), or from the north to Mesopotamia and the Pampean Region (*Dasypus*). Since the late Pleistocene-early Holocene, human activity has strongly impacted armadillos. Currently, the eastern Pampean Region is characterized by the couple *C. villosus*-*D. hybridus*, but during the Pleistocene was *Z. pichiy*-*T. matacus* while *Z. pichiy*-*C. villosus* characterized early-middle Holocene. Also, earlier dates of these two species are well known through the archaeological record. Results presented here are the product of integrative investigation projects, which includes a long temporal (Eocene to Holocene) and regional range (Argentina: Patagonia, Pampean Region, Northwest; Bolivia: Tarija; Brasil; Tocantins) and educational workshops (at schools and museums) into the study areas. This work serves as evidence that paleozoological studies can be used to assess responses of biological systems to large scale perturbations and it is also the basis to study future species distributions, in order to identify endangered species and establish management actions.

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