

# INFERRING HABITAT FOR THE LATE EARLY MIOCENE SANTA CRUZ FAUNA (SANTA CRUZ PROVINCE, ARGENTINA) USING ECOLOGICAL DIVERSITY ANALYSIS

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The upper lower Miocene Santa Cruz Formation of southern Argentina has produced the largest and best-preserved sample of Tertiary mammals in South America. Charles Darwin was among the first to note the presence of Santa Cruz mammals (based on fossils found by Captain B.J. Sullivan) and important collections were later made by well-known collectors such as Carlos Ameghino, John Bell Hatcher, and Elmer Riggs. The degree to which Santa Cruz taxa have influenced understanding of pre-Pleistocene South American mammals cannot be overestimated; most genera from the fauna are represented by skulls and/or skeletons and many of these are the most completely known members of their families. Despite these incredibly rich Santa Cruz collections, few studies have explicitly attempted to reconstruct the environment in which these animals were living.

The present study used Ecological Diversity Analysis (EDA) to infer the habitat of the Santa Cruz Fauna. Three ecomorphological variables were used (body mass, locomotor style, and dietary preference), each subdivided into a varying number of categories (twelve, six, and five, respectively). A comparative dataset of 34 modern Neotropical mammal faunas was compiled and a discriminant model was constructed to distinguish among different modern habitats based on the percentage of taxa in seven ecomorphological categories (or combinations thereof). After reconstructing the ecomorphology of each Santa Cruz taxon, the discriminant model was used to infer the habitat of the lower biozone, the upper biozone, and the entire fauna. In all three cases, the faunas were interpreted with high probability as open habitats (similar to that of the Altiplano), though centroid distances far exceeded those of the modern faunas. This analysis suggests that the Santa Cruz fauna was highly dissimilar to any modern Neotropical fauna and that more appropriate models—if they exist at all—might be found in the Old World Tropics. It also highlights the need for detailed paleobiological reconstructions of South American taxa to increase the precision of this type of paleoecological analysis.