

BODY SIZE DISTRIBUTIONS OF MIDDLE CENOZOIC SOUTH AMERICAN MAMMAL FAUNAS

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A cenogram is a graphical representation of the body size distribution of non-volant, non-carnivorous mammals from a single locality. It is constructed by plotting the natural log of the body mass for each species versus the rank order of body mass for that species. In Recent mammal communities, cenogram shape tends to correlate with habitat. Cenograms of closed habitats tend to show no gaps in the body size distribution whereas cenograms of more open habitats tend to show a gap among medium-sized species (500-8000 g). The slope for large mammals (> 8 kg) tends to be greater in more arid environments.

Cenograms were calculated for mammal faunas from the Casamayoran (?early Eocene), "Tinguirirican" (late Eocene - early Oligocene), Santacrucian (late early Miocene), and Laventan (middle Miocene) South American Land Mammal Ages. Body mass estimates for fossil ungulates, rodents, and marsupials were based on separate regressions of body mass on upper first molar length (upper second molar length for marsupials) using data from extant representatives of each group. A wide range of modern ungulates were used as a proxy for endemic South American ungulates and only caviomorph rodents were used for calculating rodent regressions. Body masses for xenarthrans were based on estimates taken from the literature (sloths and glyptodonts) or on regressions of body mass on skull length (armadillos, anteaters.)

Although the sampled paleofaunas span a large range of time and presumably represent different environments, no significant differences in cenogram shape are apparent. Cenograms from all faunas demonstrate a gradual decrease in body mass from large to small-bodied forms, suggesting a relatively closed forest habitat in all cases. Additionally, the slope for large mammals is similar to the slope for smaller mammals in all faunas, suggesting more mesic habitats. However, since many of the large representatives of these faunas are xenarthrans, the group for which body mass estimates are most tentative, conclusions drawn from the slope of the large mammals should be considered provisional.

These findings contrast with morphological evidence from ungulates (hypsodonty indices and locomotor adaptations) that suggest more open habitats were present in South America, especially during the Santacrucian. If South American paleocommunities have no close modern analogs, however, it is possible both lines of evidence are correct; the habitats sampled may actually have different vegetational structures but may not exhibit changes in cenogram shape due to greater-than-expected diversities of medium-sized terrestrial mammals. Investigations of body size distributions for other South American paleocommunities and better body-size estimates for extinct xenarthrans should help determine if this is the case.