Comparison between Pleistocene Horse (Equus, Perissodactyla) Populations from Sonora, Mexico and Rancho La Brea, Southern California and Testing Bergmann's Rule using Second Phalanges

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This study investigated the prevalence of relationships between equid body size and climate by comparing the El Golfo and Rancho La Brea horse second phalanges. Bergmann's rule, which states that fauna adapted to warmer climates are generally smaller in size than those adapted to colder climates, was tested. During the Rancholabrean land mammal age, there were glacial and interglacial periods from which the Rancho La Brea specimens originated; during the early Irvingtonian in El Golfo, the climate was subtropical. I hypothesized that equids from El Golfo would be smaller in size than those at Rancho La Brea because, according to Bergmann's rule, body size decreases as a phenotypic response to the environmental stress of temperature fluctuations. Past classifications of equid species were based on cranial characters in fossil horse remains leading to the characterization of over 50 species of Equus in the Americas alone – making horse nomenclature complicated and poorly defined. This study measured six morphometric parameters on the second phalanx: Maximal Length, Anterior Length, Minimal Breadth, Proximal Maximal Breadth, Proximal Maximal Depth, and Distal Articular Maximal Breadth, and compared 80 Rancholabrean specimens to 37 from El Golfo. The Welch’s and unpaired t tests showed that the Irvingtonian El Golfo specimens were significantly smaller than the Rancholabrean specimens ($p<0.01$ for 5/6 parameters). This supports Bergmann’s rule as an accurate ecogeographical model for these populations, and implies that environmental pressure plays a greater role in faunal body size than genotype. This will provide a new dimension for equid nomenclatural reorganization.

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Fourth Award of $500