Exploring locomotor patterns among Hispaniola's extinct rodents

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Hispaniola once had over ten endemic rodents, but today only one remains, *Plagiodontia aedium*, a largely arboreal species weighing ca. 1000g, which genomic analyses place in Echimyidae. Extinct taxa were morphologically diverse and ranged in mass from ca. 400g (*Brotomys voratus*) to nearly 5000g (*P. ipnaeum*). Isotopic work suggests dietary niche differentiation, but beyond this, little is known about the functional morphology and ecology of extinct species. This lack of data impedes our understanding of how species divided niche space and the factors that may have affected extinction risk. Locomotor pattern is a vital aspect of ecological niche. We performed locomotor reconstructions for four extinct Hispaniolan species (*Br. voratus, Hexolobodon phenax, P. ipnaeum, Rhizoplagiodontia lemkei*) as well as four extinct Cuban species (*Boromys torrei, Boromys offella, Geocapromys columbianus, Macrocapromys acevedo*). The modern comparative sample included extant Caribbean species, *P. aedium, Geocapromys brownii, Capromys pilorides, Mesocapromys nanus, Mesocapromys auritus, Mesocapromys angelcabrerai, Mesocapromys melanurus, Mysateles prehensilis, Geocapromys ingrahami* and 73 South American mainland taxa engaging in a variety of locomotor patterns including terrestrial, cursorial, arboreal, scansorial, fossorial, semiaquatic, and saxicolous (living on and among rocks). We collected 21 linear measures on the humerus, femur, and tibia and calculated 13 functionally relevant indices. Species averages were used for extinct taxa as complete skeletons were not available. *R. lemkei* had a femur available and *M. acevedo* had a femur and humerus available so these taxa were analyzed using a partitioned dataset. Principal component analysis was used to explore variation in indices among locomotor groups. In a PCA including indices from all bones, PC1 separated terrestrial, cursorial, and saxicolous species from arboreal, scansorial, fossorial, and semiaquatic species. Loadings indicate PC1 is associated

with relative width of the humeral epicondyle (a proxy for attachment area for forearm flexors) and femoral trochanter height (a proxy for gluteal muscle attachment area). There was substantial overlap on PC2 among all taxa. PC3 separated fossorial species from all other groups; loadings indicate an association with hindlimb robusticity and length of the humeral deltoid tuberosity. All Caribbean taxa clustered within the space occupied by arboreal, scansorial, and semiaquatic species. This includes the extant terrestrial/saxicolous G. brownii, potentially indicating an "arboreal stamp" remains on postcranial anatomy despite moving into new ecological niches. When only echimyids are included in the analysis, extinct and extant Caribbean taxa fall within their own morphospace. This may indicate that Caribbean taxa have locomotor niches unrepresented by their mainland relatives.