Fossil Shrews from Honduras and Their Significance for Late Glacial Evolution in Body Size (Mammalia: Soricidae: Cryptotis)

Published in: Fieldiana: Geology (New Series) 51

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Abstract

Our study of mammalian remains excavated in the 1940s from McGrew Cave, north of Copán, Honduras, yielded an assemblage of 29 taxa that probably accumulated predominantly as the result of predation by owls. Among the taxa present are three species of small-eared shrews, genus Cryptotis. One species, Cryptotis merriami, is relatively rare among the fossil remains. The other two shrews, Cryptotis goodwini and Cryptotis orophila, are abundant and exhibit morphometrical variation distinguishing them from modern populations. Fossils of C. goodwini are distinctly and consistently smaller than modern members of the species. To quantify the size differences, we derived common measures of body size for fossil C. goodwini using regression models based on modern samples of shrews in the Cryptotis mexicana-group. Estimated mean length of head and body for the fossil sample is 72–79 mm, and estimated mean mass is 7.6–9.6 g. These numbers indicate that the fossil sample averaged 6–14% smaller in head and body length and 39–52% less in mass than the modern sample, and that increases of 6–17% in head and body length and 65–108% in mass occurred to achieve the mean body size of the modern sample. Conservative estimates of fresh (wet) food intake based on mass indicate that such a size increase would require a 37–58% increase in daily food consumption. In contrast to C. goodwini, fossil C. orophila from the cave are not different in mean body size from modern samples. The fossil sample does, however, show slightly greater variation in size than is currently present throughout the modern geographical distribution of the taxon. Moreover, variation in some other dental and mandibular characters is more constrained, exhibiting a more direct relationship to overall size. Our study of these species indicates that North American shrews have not all been static in size through time, as suggested by some previous work with fossil soricids.

Lack of stratigraphic control within the site and our failure to obtain reliable radiometric dates on remains restrict our opportunities to place the site in a firm temporal context. However, the morphometrical differences we document for fossil C. orophila and C. goodwini show them to be distinct from modern populations of these shrews. Some other species of fossil mammals from McGrew Cave exhibit distinct size changes of the magnitudes experienced by many northern North American and some Mexican mammals during the transition from late glacial to Holocene environmental conditions, and it is likely that at least some of the remains from the cave are late Pleistocene in age. One curious factor is that, whereas most mainland mammals that exhibit large-scale size shifts in during the late glacial/postglacial transition experienced dwarfing, C. goodwini increased in size. The lack of clinal variation in modern C. goodwini supports the hypothesis that size evolution can result from local selection rather than from cline translocation. Models of size change in mammals indicate that increased size, such as that observed for C. goodwini, are a likely consequence of increased availability of resources and, thereby, a relaxation of selection, during critical times of the year.