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A Note on Sexual Dimorphism in Nesophontes Edithae (Mammalia: Insectivora), an Extinct Island-Shrew from Puerto Rico

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A Note on Dimorphism in *Nesophontes edithae* (Mammalia: Insectivora), an Extinct Island-shrew from Puerto Rico.

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The island-shrew, *Nesophontes edithae* Anthony 1916, is the only Puerto Rican representative of the monogeneric family Nesophontidae. Currently considered to comprise eleven species, *Nesophontes* appears in the late Quaternary faunas of Cuba, the Isle of Pines, Ile de Gonave, Hispaniola, Puerto Rico, Vieques, St. John, St. Thomas, Grand Cayman and Cayman Brac (MacPhee et al., in press).

Nesophontes edithae is the largest species, with a head-body length of perhaps 160-190 mm and a body mass of 180-200 g in life (based on an allometric comparison of the skull with that of the extant *Solenodon paradoxus*). In an early description, Anthony (1925) noted: *The series of crania is divisible into two groups, on the basis of size only, and the most logical way to account for this is by assuming sexual dimorphism.*

Presuming the larger morph to be male, Anthony noted a male-female dimorphic ratio of 1.2 in the lengths of a series of 20 femora from Cueva Clara, near the town of Barahona, Morovis municipality, Puerto Rico, although no such extreme sexual dimorphism is evident in any extant insectivore. The putative existence of sexual dimorphism in this genus is important, because several nominal species of *Nesophontes* are distinguished on the basis of size—the most recent example being two undescribed species reported from cave deposits on Grand Cayman and Cayman Brac, respectively (Morgan, 1994).

The detection of sexual dimorphism in fossil species is not a trivial problem (Plavcan, 1994), and alternative explanations for widely disparate size classes of extinct insular mammals abound (c.f. Biknevicius et al., 1993). When dimorphism is extreme and the size distribution 'tails' of the two subgroups do not overlap excessively, the simple expedient of splitting the total group at the mean or median and recalculating subgroup means may be sufficient to resolve the distributions (Godfrey et al., 1993). When distribution tails of the two subgroups overlap to form an apparently unimodal distribution, Finite Measure Analysis (FMA) is more appropriate (Plavcan, 1994).

A sample of 69 well preserved *N. edithae* femora collected by H. E. Anthony from Cueva Clara and now in the Department of Vertebrate Paleontology, American Museum of Natural History (AMNH) were measured for this study. The specimens fell into a continuous series which does not conform to the Gaussian distribution expected of a single population (Shapiro-Wilk's W = 0.9393, p = 0.0036). Splitting the group at the mean (Plavcan, 1994) yielded two sub-groups that were distributed normally ('small' subgroup, W = 0.9616, p = 0.3329; 'large' subgroup, W = 0.9495, p = 0.1418; Table 1, Fig. 1). The size ratio of the means of the two subgroups was 1: .15. FMA demonstrates that the maximum dimorphism that could be contained within these unimodal subgroups is 1: 1.04.

TABLE 1. Greatest length of femur (mm) data for *Nesophontes edithae* from Cueva Clara, Barahona, Puerto Rico.

	All specimens	'small' subgroup	'large' subgroup
N	69	34	35
Mean	24.72	23.011	26.38
St. Dev.	1.969	0.597	1.400
Maximum	28.9	24.4	28.9
Minimum	21.35	21.35	24.7

In their analysis of specimens collected from the Barahona caves by James Bee in 1957, Choate and Birney (1968) recognized that dental and postcranial measurements of *N. edithae* from Cueva del Perro, located only a few hundred meters from Cueva Clara, were intermediate between Anthony's large and small subgroups. These authors rejected sexual dimorphism, and suggested that the specimens represented an allochronic series.

Recent work has yielded radiocarbon evidence relevant to this issue. The fossil bed in Cueva del Perro is a discrete layer of owl-pellet-derived bone at a depth of 10-20 cm in the sediment floor. Bird-bone collagen from this deposit was dated at 5410 ± 80 radiocarbon years before present (rcyrbp), whereas analysis of a *Pluerodonte* gastropod from 30 cm depth in the fossiliferous sediments of Cueva Clara yielded an age of

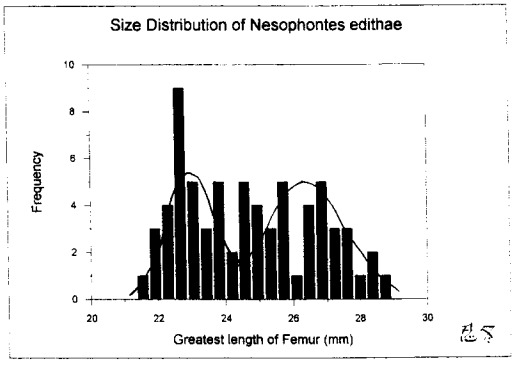

FIG. 1. Size distribution of *Nesophontes edithae*. (normal distributions of the two subgroups shown as curves).

>34,650 rcyrbp. Although Anthony did not discriminate between the stratigraphic dispositions of his Cueva Clara fossils, the preponderance of evidence supports Choate and Birney's (1968) view that Anthony combined specimens of two different ages from Cueva Clara and suggests that *N. edithae* exhibited considerable body-mass plasticity in late Quaternary time. Sexual dimorphism within heterochronous samples, if it existed, did not exceed a ratio of 1: 1.04. The determination of allochronic collections of Cuban, Hispaniolan, and Cayman *Nesophontes* species on the basis of size should therefore be treated with great caution.

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First Record of a Reproductive *Lasiurus borealis minor* (Miller) from Puerto Rico (Chiroptera)

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Lasiurus borealis minor (= *L. minor*) is a rare species in Puerto Rico, with one record (an adult male) from 1962 at Moca, on the north-western part of the island (Starrett and Rolle, 1963), three females captured over a period of nine years of mist-netting at El Verde, on the north-eastern mountains of the island, and two males from Susua Forest on the south-west. None of these bats were in reproductive condition, and all were captured between May and July (Willig and Gannon, 1996; Gannon pers. comm.). I hereby report the capture of a lactating female at the main campus of the University of Puerto Rico, in the heart of the San Juan Metropolitan area.

On 4 June, 1997 a university employee at UPR-Río Piedras collected a *L. borealis* that had crashed into a building in broad daylight, after being attacked by a bird. The bat, a lactating female carrying three pups, had a forearm length (FA) of 42 mm and a body mass of 7.76 g. Ear length and hind foot were, 9.5 mm and 6.5 mm respectively. The litter consisted of two males (body mass 3.65 g and 3.77 g; FA 27.5 mm and 29 mm) and a female (4.24 g; FA 30 mm) for a combined body mass of 11.66 g, about 33% higher than the mother's body mass. The three pups had a cinnamon red dorsum and greyish venter. The four bats are deposited in my collection at the Inter American University, Bayamón Campus.

Nine fecal pellets were obtained while holding the bats. Examination of the feces revealed that the adult bat had been feeding almost exclusively on moths. Two of the pellets contained some remains from Isoptera, whereas all nine contained many moth scales. On the single instance where Silva-Taboada (1979) was able to examine feces from this species in Cuba, he reported an almost exclusive occurrence of Coleoptera, whereas a single stomach examined by Willig and Gannon (1996) contained "many flying male formicids".

Willig and Gannon (1996) indicate that this migratory species is uncommon at El Verde. The occurrence of *L. borealis* in urban areas is not rare at other latitudes (Shump and Shump, 1982), and its apparent rarity in Puerto Rico (Woods, 1996) may be an artifact of the species' roosting and foraging ecology, combined with the relatively low capture activity on the island. This report provides evidence that *L. borealis* reproduces in Puerto Rico.

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