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**New Record of the Rare  
Emballonurid Bat *Centronycteris  
centralis* Thomas, 1912 in Costa  
Rica, with Notes on  
Feeding Habits**

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The shaggy sac-winged bat, *Centronycteris centralis* (Chiroptera: Emballonuridae), occurs mainly in lowland forests from Veracruz, Mexico, to Peru, although it has been reported from elevations as high at 1450 m in Panama (Simmons and Handley 1998; Hice and Solari 2002). Most captures of the species are of single individuals, and throughout its distribution, this bat is rare and poorly-known (Emmons 1997; Reid 1997; Simmons and Handley 1998). *Centro-*

*nycteris centralis* generally has been assumed to be an aerial insectivore, capturing flying insects on the wing (Starrett and Casebeer 1968; Wilson 1973; Timm et al. 1989; LaVal and Rodríguez 2002). However, direct evidence supporting this trophic role has been lacking. Herein, I report on a specimen of *C. centralis* from seasonally-inundated swamp forest in the Caribbean lowlands of northeastern Costa Rica that provides valuable information on distribution, morphological variation, reproduction, and feeding habits of this species.

The specimen was captured during field work in April and May 2002 at Caño Palma Biological Station (10°36'N, 83°32'W), a ca. 40 ha reserve along the west bank of Caño La Palma, Barra del Tortuguero, Limón Province. The station is about 6.25 km NNE of Tortuguero in a region whose vegetation is generally mapped as Tropical Wet Forest under the Holdridge system of classification (Holdridge 1947; Tosi 1969). The seaward eastern bank of the *caño* (a natural waterway) typically remains above water throughout the year, whereas land on the western bank floods during the rainy season, when much of the reserve is beneath more than a meter of water. Apart from occasional, emergent hardwoods, such as *Pentaclethra*, the natural vegetation is dominated by abundant *Asterogyne*, *Raphia*, *Manicaria*, and other palms. The presence of howler monkey (*Alouatta palliata*), white-faced capuchin (*Cebus capucinus*), spider monkey (*Ateles geoffroyi*), and white-lipped peccary (*Tayassu pecari*) in the reserve and its surroundings testifies to the relative lack of human disturbance of the forest habitats in the immediate area.

Between 18:00 and 19:00 hours local time, on 29 April 2002, an adult female *C. centralis* (USNM 568525) was taken at about 2.5 m in a mist net set just off of a trail in moderately dense understory vegetation. The *C. centralis* was pregnant with a single embryo (crown-rump length, 20 mm). The digestive tract was removed and preserved in 70% ethanol for subsequent analysis of its contents. The same net captured *Artibeus literatus*, *Artibeus watsoni*, *Vampyressa nymphaea*, and *Carollia perspicillata* before midnight.

Other species caught in the net on other nights included *Glossophaga commissarisi* and *Vampyrum spectrum*. *Trachops cirrhosis* and *Ectophylla alba* were taken in other nets in the general vicinity.

*Centronycteris centralis* previously has been documented from only 36 specimens from 31 localities throughout its distribution. In Costa Rica, the species was represented by six specimens from five localities (Simmons and Handley 1998; Albuja 1999; Hice and Solari 2002). An individual was captured previously at Caño Palma and photographed (Simmons and Handley 1998: Fig. 7), but no specimen was preserved. The specimen I report provides the first verifiable record of the species from the northeastern coastline of Costa Rica.

Standard external measurements of the female from Caño Palma are comparable to those recorded for other members of the species (Table 1). Morphology of the cranium and mandible conforms closely to the description of *C. centralis* by Simmons and Handley (1998) and distinguishes it from the only other member of the genus, *C. maximiliani*. In particular, the basisphenoid pits are short, with an incomplete septum between the larger posterior and much smaller anterolateral portions; the postero-medial border of the ectotympanic is smoothly curved; in lateral view of the cranium, the rostrum tapers gradually from forehead to external nares; the nasals are unconstricted laterally; P1 is relatively large (39% the crown length of P4) and the

TABLE 1. External measurements of a sample of female *Centronycteris centralis* (after Simmons and Handley, 1998) and the Caño Palma specimen (USNM 568525). Statistics include mean and observed range, with sample sizes in parentheses.

|                   | <i>Centronycteris centralis</i><br>(n = 5) <sup>a</sup> | USNM<br>568525 |
|-------------------|---|----------------|
| Total length      | 77, 70-93   | 72             |
| Tail length       | 25, 20-40   | 22             |
| Foot length       |   |                |
| (including claws) | 8, 7-9 (n = 9)  | 8              |
| Ear length        | 17, 11-20   | 17             |
| Forearm length    | 45.9, 42.9-48.1 (n = 13)                                | 45.2           |
| Tibia length      | 18.5, 18.1-19.2   | 19.0           |
| Weight (g)        | 5.7, 5.0-6.0 (n = 3)                                    | 6.7            |

<sup>a</sup>Except as noted.

diastema between P1 and P4 correspondingly short (20% the length of P1); the mandible is relatively slim, and the coronoid process rises at a steep angle. However, the posterolateral border of the palate is not as distinctly notched as illustrated by Simmons and Handley (1998: Fig. 4D).

What little is known about the natural history of *C. centralis* was summarized by Simmons and Handley (1998). Reproductive information is too scarce and too scattered geographically to determine any specific patterns with certainty. However, there may be a reproductive peak near the beginning of the rainy season. Pregnant females have been reported previously from March in Ecuador (Albuja 1999), from May in Costa Rica and Nicaragua (LaVal 1977; Greenbaum and Jones 1978), and from September in Peru (Hice and Solari 2002). A lactating female was taken in November in Peru (Hice and Solari 2002). Nonpregnant females have been found during August in Nicaragua (Baker and Jones 1971) and January in Panama (USNM 514956).

Inspection of the stomach contents of the individual from Caño Palma revealed finely chewed bits of chitin and soft tissues from relatively soft-bodied insects. The bulk of the identifiable remains represent plant hoppers (Fulgoroidea, Homoptera). In addition, there are remains of at least two different beetles (Coleoptera)—one of which is probably a leaf-beetle (Chrysomelidae)—and material tentatively identified as orthopteran. No scales or other evidence of lepidopterans are present. This analysis confirms the long-suspected insectivory of *C. centralis* and shows a distinct preference for plant hoppers, at least at this time of year in lowland swamp forest. Plant hoppers tend to rest in groups on branches, although they may fly between trees after dark and are attracted to electric lights (There were no lights near the site where the *C. centralis* was netted at Caño Palma). Many leaf-beetles feed on the surfaces of leaves, and many orthopterans rest on leaves. Both coleopterans and orthopterans tend to be relatively slow fliers. Based on the generalized behavior of these prey, *C. centralis* may feed by gleaning insects from the surfaces of leaves and branches, by tak-

ing slow-flying insects on the wing, or by using a combination of these two strategies. The flight of *C. centralis* was described as slow and “floppy” (Starrett and Casebeer 1968; Baker and Jones 1975) and “fluttering,” and these bats repeatedly fly the same path (Emmons 1997). Such slow, highly-maneuverable (Starrett and Casebeer 1968) flight patterns correspond well with a bat in pursuit of slow-flying insects or moving through heavy vegetation in search of resting prey. Floppy or fluttering flight might cause otherwise stationary and ultrasonically “invisible” insects to move or to become airborne, thereby making them easier to detect and capture.

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