

Sphaeronycteris toxophyllum (Chiroptera: Phyllostomidae)

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Abstract: *Sphaeronycteris toxophyllum* Peters, 1882, is a rare bat known as the visored bat because it has a unique outgrowth on the face. This typical hornlike growth is sexually dimorphic, larger on males than on females, and also better developed in adults than in juveniles. This bat is endemic to tropical South America and present in Venezuela, Peru, Colombia, Bolivia, Brazil, and Ecuador. It is present from the Amazon Basin to mountainous regions up to 3,000 m in elevation and has been captured in secondary rain forest, cloud forest, deciduous forest, and open areas. The International Union for Conservation of Nature and Natural Resources conservation status is Lower Risk/Least Concern. DOI: 10.1644/814.1.

Key words: bat, frugivore, rare species, South America, stenodermatine, visored bat

Published 6 June 2008 by the American Society of Mammalogists
Synonymies completed 25 September 2007

www.mammalogy.org



Sphaeronycteris Peters, 1882

Sphaeronycteris Peters, 1882:988. Type species *Sphaeronycteris toxophyllum*.

CONTEXT AND CONTENT. Order Chiroptera, suborder Microchiroptera, family Phyllostomidae, subfamily Stenodermatinae, tribe Sternodermatini, subtribe Stenodermatina (Wetterer et al. 2000). *Sphaeronycteris* is monotypic (Simmons 2005; Wetterer et al. 2000).

Sphaeronycteris toxophyllum Peters, 1882 Visored Bat

Sphaeronycteris toxophyllum Peters, 1882:989. Type locality “tropischen America;” restricted to “the neighbourhood of Mérida, SW Venezuela, alt. 1600 to 3000 m” (Husson 1958:119) based on Thomas (1898:318), who cited Mérida as the type locality; also restricted to “Pebas, Loreto, Perú,” (Cabrera 1958:92), following Rehn (1901).

CONTEXT AND CONTENT. Context as for genus. *S. toxophyllum* is monotypic (Koopman 1993; Simmons 2005).

DIAGNOSIS

Sphaeronycteris toxophyllum (Fig. 1) has a unique outgrowth on the face (the visor) with an attached inverted-U-shaped nose leaf. Among related taxa, *Centurio senex* lacks a nose leaf and the face is covered by intricate

dermal outgrowths (Emmons and Feer 1997; Husson 1958; Lee and Dominguez 2000; Nowak 1994; Wetterer et al. 2000), whereas *Ametrida centurio* and *Pygoderma bilabiatum* (Lee and Dominguez 2000) lack facial outgrowths but have unattached nose leaves. In *S. toxophyllum* the fleshy central rib of the nose leaf extends proximally but does not reach the tip. In contrast, the rib extends to the tip of the spear in *A. centurio* and *P. bilabiatum*. This character does not apply to *C. senex* because it lacks a nose leaf (Wetterer et al. 2000).



Fig. 1.—An adult female *Sphaeronycteris toxophyllum* collected from Reserva Nacional de Vida Silvestre Manuripi, Pando, Bolivia, 11°58'S, 68°48'W. Photograph by Lizette Siles.

Sphaeronycteris toxophyllum and *A. centurio* differ cranially from *C. senex* in having a longer rostrum and an upper dental arcade that is not semicircular (Fig. 2; Jones and Carter 1976; Miller 1907). *S. toxophyllum* differs from *A. centurio* in having a distinct postorbital constriction behind the postorbital process narrower than the interorbital constriction, a larger interorbital constriction (6.0–6.5 mm versus 3.3–4.1 mm in *A. centurio*), a zygomatic arch markedly curved upward in the middle, a relatively larger foramen magnum (4.4–5.0 mm versus 3.4–3.5 mm), and in height of coronoid (3.8–4.2 mm versus 3.1–3.5 mm—Husson 1958).

GENERAL CHARACTERS

Sphaeronycteris toxophyllum is a medium-size bat; length of head–body is 52–63 mm (Emmons and Feer 1997; Nowak 1994) and length of forearm is 36.5–42.0 mm (Emmons and Feer 1997; Husson 1958). Some authors mention that females are larger than males (Emmons and Feer 1997), but others consider that they are about the same size (V. C. Tavares and N. B. Simmons, in litt.).

Fur is long and tricolored; dorsum is cinnamon brown to dark brown with grayish tone and individual hairs in the middle of the back are whitish; anterior part is lighter than posterior, because length of the color bands in the hairs is variable (Husson 1958). The venter is brownish white to grayish; a white spot on the shoulder near the wing and neck is present and a 2nd white spot occurs below the ear; the typical hornlike growth from the posterior spear is sexually dimorphic, larger on males than on females, and also better developed in adults than in juveniles (Emmons and Feer 1997; Husson 1958; Nowak 1994; Wetterer et al. 2000). The outgrowth has 2 parts, 1 is directly posteriorly and attached to the spear leaving only a free border around the edge, and connecting the spear with the 2nd outgrowth (“the visor”). In females, the visor is small and located over the center of each eye; in males it is 4 times larger in size and has its origin from the lateral corner of the eyes (Wetterer et al. 2000). The face is short and broad with a wide, monkeylike, and smiling mouth; eyes are large, bulging, and metallic golden brown; ears are triangular with a yellow base and brown tip; the tragus is yellow, narrow, and with 2 lateral projections. Adjacent to the nose leaf are 3 well-developed vibrissal papillae in a column that form elongate fleshy cylinders that protrude from the face and are not connected with each other. Muzzle is naked; chin is smooth or with an incomplete row of very small papillae; a fold of skin around the neck is characteristic of this species; small in females, in males it operates as a mask and can be pulled up over the face when the bat is roosting; the proximal three-fourths of the forearm is covered with drab hairs; the wings are dark drab; uropatagium is short, V-shaped and hairy; calcar is shorter than foot and tibia (Albuja and Mena 1991; Emmons and



Fig. 2.—Dorsal, ventral, and lateral views of skull and lateral view of mandible of male subadult *Sphaeronycteris toxophyllum* from Iquitos, Maynas Province, Loreto Department, Perú, 3°45.17'S, 73°14.65'W (Colección Mamíferos Lillo, Universidad Nacional de Tucumán, Tucumán, Argentina, CML 7345). Greatest length of skull is 16.9 mm. Photograph by R. M. Barquez.

Feer 1997; Husson 1958; Linares 1998; Nowak 1994; Snow et al. 1980; Wetterer et al. 2000).

Sphaeronycteris toxophyllum has a rostrum that is less than half of the length of the braincase; the nasal and maxilla are upturned and largely oriented vertically on the same plane as the palatal process and the nasal aperture is located at the base of the cranium, giving the skull a distinctly apelike appearance; the anterior margin of the orbit is extended to form a conspicuous plate; the palatal emargination is V-shaped, shallow, and extending to approximately the middle of M2; the coronoid processes are relatively long; dental features are similar to those of *Ametrida*, but upper incisors are larger and the inner cups of upper molars less developed but in the same position (Anderson 1997; Husson 1958; Koopman 1994; Lee and Dominguez 2000; Owen 1988; Nowak 1994; Wetterer et al. 2000).

Ranges of external measurements (in mm) of 2 males from Peru (Angulo and Díaz 2004) and 2 males and 2 females from Bolivia (Anderson 1997) are: total length, 58–85; length of hind foot, 11–17; length of ear, 14–17; length of forearm, 37–41.5; length of tibia (1 female and 1 male from Bolivia), 14–16; 3rd finger formula: carpal length including wrist, phalanx 1, phalanx 2 (1 female and 1 male from Bolivia): 42–15–22, 41–14–21. Average and range of length of forearm are 38.36 (36.5–40.5) for 1 male and 4 females from Venezuela (Husson 1958).

Ranges of wing measurements (in mm) of 3 males, 5 females, and 1 undetermined sex from Mérida, Venezuela are: digit III, metacarpal, 37–41; digit IV, metacarpal, 37–40; digit V, metacarpal, 37.5–41; phalanx I, digit III, 13–15; phalanx I, digit IV, 10–11; phalanx I, digit V, 10.5–11.5; phalanx II, digit III, 20–23; phalanx II, digit IV, 15–18; phalanx II, digit V, 10.5–12 (Husson 1958).

Ranges of cranial measurements (in mm) of 10 specimens from Venezuela (4 males, 5 females, and 1 undetermined sex—Husson 1958), 1 specimen from Peru (1 male—Angulo and Díaz 2004), and 4 specimens from Bolivia (2 males and 2 females—Anderson 1997) are: greatest length of skull, 15.7–16.9; condylobasal length, 13.8–14.9; lambdoidal breadth, 10.4–10.6; breadth of braincase, 8.9–9.6; depth of skull, 8.2–9.1; zygomatic breadth, 11.8–12.7; interorbital breadth, 6.0–6.5; postorbital constriction, 5.3–5.8; mastoid breadth, 8.9–10.5; length of palatal, 3.6–4.4; length of maxillary tooththrow, 4.2–4.6; breadth across molars, 7.1 (1 specimen from Peru); breadth across canines, 4.2–4.8; dental span, 7.5–8.0; width of molar, 1.7–2.0; length of mandible, 8.7–9.6; length of tooththrow of mandible, 4.4. Additional measurements are available in Albuja and Mena (1991) and Emmons and Feer (1997).

DISTRIBUTION

Sphaeronycteris toxophyllum is endemic to tropical South America (Fig. 3; Emmons and Feer 1997; Hershkovitz 1949;

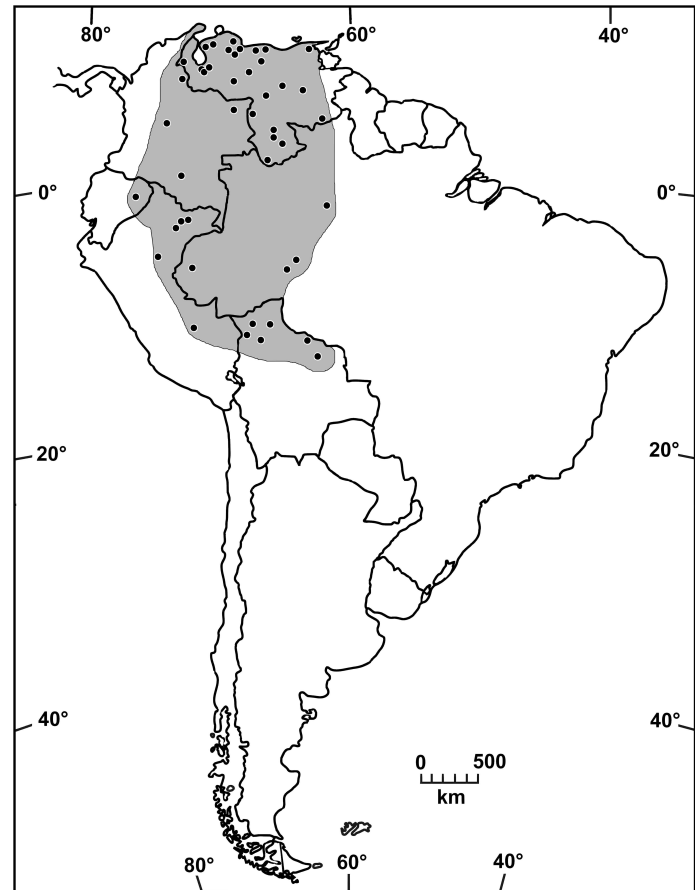


Fig. 3.—Geographic distribution of *Sphaeronycteris toxophyllum* (modified from Emmons and Feer 1997). Points indicate localities where specimens of *S. toxophyllum* were collected.

Koopman 1982; Nowak 1994; Sanborn 1941). Originally known only from Venezuela (Thomas 1898) and Peru (Rehn 1901), its known range has been extended to Colombia (Sanborn 1941), Bolivia (Koopman 1976), Brazil (Peracchi 1986; Piccinini 1974), and Ecuador (Albuja and Mena 1991). In Venezuela, this species is found throughout the country, from sea level to 2,240 m elevation (Fernandez B. 1982; Handley 1976; Husson 1958; Linares 1998; Pirlot 1967; Thomas 1898). In Peru, it is known from the northeastern and southeastern portions of the Peruvian Amazon Basin (Angulo and Díaz 2004; Cabrera 1958; Ceballos Bendejú 1968; Pacheco et al. 1993; Rehn 1901; Solari et al. 1998; Tuttle 1970). In Ecuador, it is known from a single specimen at Parque Nacional Yasuní (Albuja and Mena 1991). In Colombia, it is found in the eastern and Andean regions in Amazonas, Caqueta, Vaupés, Vichada, Guainía, Cundinamarca (Bogotá), Magdalena, and Norte de Santander departments from sea level to 2,600 m (Alberico et al. 2000; Allen 1900; Cuervo Diaz et al. 1986; Muñoz Arango 2001; Sanborn 1941; databases Colección de Mamíferos, Instituto de Ciencias Naturales, Universidad Nacional de Colombia and Colecciones Biológicas, Instituto von Humboldt, Co-

lombia). In Bolivia, it is known from Beni, La Paz, Pando, and Santa Cruz departments (Anderson 1993, 1997; Anderson et al. 1982; Anderson and Webster 1983; Koopman 1976; Webster and Fugler 1984). In the maps of INFONATURA (2004) the distribution of the species in Bolivia is extended to the far south of the country, including areas where the species has not been recorded. In Brazil, it is known only from the states of Amazonas (Pedro do Gavião; Humaitá; and Santo Antônio, Rio Madeira) and Acre (Cruzeiro do Sul—Peracchi 1986; database American Museum of Natural History, New York). Previously, this species was included in Brazil but the location was incorrectly listed as Pará instead of Amazonas (Peracchi 1986; Piccinini 1974).

FOSSIL RECORD

In Venezuela, this species is known from the Quaternary (Linares 1998).

FORM AND FUNCTION

Dental formula is $i\ 2/2$, $c\ 1/1$, $p\ 2/2$, $m\ 2-3/3$, total 30–32; the main cusp of the 1st upper incisors is well developed and in the center of the tooth; inner upper incisors are elongate, more than twice the length of the greatly reduced outer incisors (Anderson 1997; Fernandez B. 1982; Lee and Dominguez 2000; Owen 1991; Wetterer et al. 2000). M3 is frequently absent from 1 side of the dentition (Wetterer et al. 2000); although small, m3 is present at least on 1 side (Lee and Dominguez 2000). The W-shaped ectoloph pattern is difficult to observe in the molar cusps (Griffiths 1985).

On the tongue, each medial circumvallate papilla with the papillary body is fused with the vallum anterolaterally and posteromedially, and the incomplete fossae appear as paired slits on each side of the papillary body. In most phyllostomids, 2 or more small horny papillae occur posterior to the main papilla, but in *S. toxophyllum* these are absent (Wetterer et al. 2000).

The presence of a much larger visorlike structure in males than in females suggests that sexual selection may have played a role in its evolution (Wetterer et al. 2000). The hair structure has no medulla, as is typical in bats and is similar to those of *C. senex*, *A. centurio*, and *P. bilabiatum* (Benedict 1957).

ONTOGENY AND REPRODUCTION

Reproduction occurs twice annually, at the beginning and at the end of the rainy season (Linares 1998). In Bolivia, 1 pregnant female was taken in October (Anderson and Webster 1983), 1 female captured in September had 1 embryo (Anderson 1997), and 1 was lactating by late October (L. Siles, in litt.). In Ecuador, 1 pregnant female

(crown–rump length of fetus = 26 mm) was collected in April (Albuja and Mena 1991). In Peru, 3 pregnant and 1 lactating females were found in October (A. Bravo, in litt.).

ECOLOGY

Sphaeronycteris toxophyllum has been taken from the Amazon Basin to mountainous regions up to 3,000 m elevation (Angulo and Díaz 2004; Husson 1958; Linares 1998). The species has been captured in secondary rain forest, cloud forest, deciduous forest, and open areas such as gardens, plantations, and pastures (Emmons and Feer 1997; Nowak 1994). In Venezuela, it is found in both deciduous and evergreen forests of open to dense structure of varying heights and complexity, and from low-lying warm and humid areas to cold montane areas at elevations up to 2,240 m (Eisenberg 1989; Linares 1998). In Peru, it has been recorded in urban areas, near bodies of water (Angulo and Díaz 2004), at streams in bamboo forest (Solari et al. 1998), and visiting tapir watering holes (A. Bravo, in litt.). Also, a specimen of *S. toxophyllum* was collected along with 10 other species of bats at a tapir watering hole in virgin evergreen forest, from Caño Majagua, near San Juan, Venezuela (Tuttle 1974). In Ecuador, the only known specimen was collected in primary forest along with 12 other species of chiropterans (Albuja and Mena 1991); however, in Bolivia, it has been captured in highland Amazonian forests (L. Siles, in litt.).

A specimen was found in a cavity in the ground (Husson 1958); and in Peru 2 specimens were reported in a *Ficus* (Angulo and Díaz 2004). The species is nocturnal, and has been found singly or in pairs (Linares 1998).

This species feeds on fruit juice (Linares 1998) and is a strict frugivore (Ferrarezzi and Gimenez 1996; Wetterer et al. 2000). The stomach contents of 1 specimen showed a yellowish material similar to fruit pulp (Fernandez B. 1982).

Sphaeronycteris toxophyllum has only 1 reported ectoparasite, *Aspidoptera falcate*, a fly belonging to the family Streblidae (Guerrero 1995).

GENETICS

Sphaeronycteris toxophyllum has a chromosome complement of $2n = 28$, $FN = 52$. The X chromosome is a subtelocentric, the Y chromosome is a submetacentric (Baker 1973), and there is a small pair of metacentric chromosomes (Myers 1981).

CONSERVATION

The conservation status of *S. toxophyllum*, according to the International Union for Conservation of Nature and

Natural Resources Species Survival Commission (Hutson et al. 2001), is Lower Risk/Least Concern; no status is mentioned in Convention on International Trade in Endangered Species of Wild Fauna and Flora, whereas in INFONATURA (2004) this species is considered as G4 (Apparently Secure: uncommon but not rare; some cause for long-term concern due to declines or other factors).

REMARKS

Sphaeronycteris toxophyllum is related to *A. centurio*, *C. senex*, and *P. bilabiatum*, a group of species known as the mainland short-face bats, and the Antilles genera *Ardops*, *Ariteus*, *Phyllops*, and *Stenoderma* (Lim 1993; Wetterer et al. 2000). *S. toxophyllum* is a sister taxon of *C. senex* (Wetterer et al. 2000) or *A. centurio* (Baker et al. 2003; Jones et al. 2002; Owen 1988, 1991). In a phenetic study of morphology (Owen 1988), indicates that these latter 3 taxa form a loose group; but cladistic analyses based on morphological, chromosomal, and molecular characters show a closer relationship among the 3 taxa (Lim 1993; Wetterer et al. 2000).

Sphaero- combining the Late Latin *sphaer-*, *sphaero-*, and the Greek *sphair-*, *sphairo-*, *sphaira*, means ball or consisting of spherical elements; *nycteris* is a New Latin noun meaning bat. *Toxo* is from the Greek *toxon*—bow, arrow, or arched or shaped like an arrow or bow; whereas *phyllum* is a New Latin noun derived from the Greek *phyllon* meaning leaf. *Toxophyllum* thus refers to the prominent arched nasal leaf of this species.

ACKNOWLEDGMENTS

We thank L. Siles for the photograph of *S. toxophyllum*; R. M. Barquez for skull photographs and help with the map; and museum curators Yaneth Muñoz-Saba (Colección de Mamíferos, Instituto de Ciencias Naturales, Universidad Nacional de Colombia), E. Castillo (Colecciones Biológicas, Instituto de Investigación de Recursos Biológicos Alexander von Humboldt), and M. S. Hafner (Louisiana State University Museum of Natural Science, Louisiana). For the contribution of unpublished data and literature, we thank L. Aguirre, L. Siles, M. Pinto, M. Nogueira, A. Peracchi, A. Bezerra, A. Bravo, D. Flores, M. Tuttle, C. Bloch, and J. Ochoa.

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Associate editors of this account were PAMELA OWEN and ERIC RICKART. P. M. VELAZCO reviewed the synonymy. Editors were MEREDITH HAMILTON and VIRGINIA HAYSEN.