PYGMY ROUND-EARED BAT
Lophostoma brasiliense W.Peters, 1867

TAXONOMY: Class Mammalia; Subclass Theria; Infraclass Metatheria; Order Chiroptera; Suborder Microchiroptera; Superfamily Noctilionoidea; Family Phyllostomidae, Subfamily Phyllostominae, Tribe Phyllostomini (López-Gonzalez 2005, Myers et al 2006, Hoffman et al 2008). There are six species in the genus *Lophostoma,* d´Orbigny 1836, two of which are present in Paraguay. The origin of the generic name *Lophostoma* is Greek meaning "crest mouth" possibly in reference to the row of bony tubercles present on the lower lip (Palmer 1904). The species name *brasiliense* refers to the origin of the type specimen as Brazil. The species is monotypic.

The date of description is often cited as 1866, but the pages on which the species was described were actually published in 1867 (Gardner 2007). The type specimen is an adult female deposited in the British Museum of Natural History (BMNH 49.11.7.14) with type locality Bahía, Brazil (Carter & Dolan 1978).

This species was formerly considered to belong to the genus *Tonatia* (Gray 1827) but numerous authors had noted that some of the species included were highly divergent from others. Lee et al (2002) performed a revision and molecular review of the phylogenetics of the genus and concluded that it should be split into two distinct genera, with the majority of species, including this one relocated in *Lophostoma.* The genus *Lophostoma* is neuter and necessitates the species name ending *brasiliense.* If returned to *Tonatia* (feminine) the species name should be altered to *brasiliensis.* Synonyms adapted from Gardner (2007):
Lophostoma brasiliense W.Peters 1867:674. Type locality "Baía" (=Salvador), Bahía.
Lophostoma venezuelae W. Robinson & Lyon 1901:154. Type locality "Macuto, Venezuela".
[*Tonatia*] *brasiliense* Trouessart 1904:111. Name combination.
[*Tonatia*]*venezuelae* Miller 1907:129. Name combination.
Tonatia nicaraguae Goodwin 1942:205 Type locality "Kanawa Creek, near Cukra, north of Bluefields, Nicaragua".
Tonatia minuta Goodwin 1942:209 Type locality "Boca Curaray, Ecuador" (=Boca del Río Curaray, Loreto, Peru).
Tonatia brasiliensis Handley 1976:16 Name correction and correct gender.
[*Lophostoma*]*brasiliense* Lee, Hoofer and Van den Bussche 2002:55 First modern use of current name combination.

ENGLISH COMMON NAMES: Pygmy Round-eared Bat (Wilson & Cole 2000, Gardner 2007), Lesser Round-eared Bat (Goodwin & Greenhall 1961), Little Round-eared Bat (Goodwin & Greenhall 1961).

SPANISH COMMON NAMES: Murciélago de orejas redondas pigmeo (Aguirre 2007), Murciélago orejón menor (Ascorra et al 1991).

GUARANÍ COMMON NAMES: No known names.

DESCRIPTION: The smallest of the Paraguayan *Lophostoma/Tonatia* group with long, rounded ears and a short tail. Pelage long and smooth, but not dense, warm brown in colour (Prout´s brown - Goodwin 1942), but becoming somewhat darker around the face (Mummy brown - Goodwin 1942) and with a creamy base to the fur. Venter slightly paler than dorsum and with pale buffy wash. Muzzle sparsely-furred, appearing almost naked and rows of small rounded tubercles on the chin forming a U-shape. Eyes small. Nose leaf large and prominent, lanceolate in shape and relatively broad. Ears large with rounded tips, with hair on the upper edge and connected by a band of skin across the forehead, colour blackish with pinkish bases. Thumb furred and second phalanx with a longer claw than the first. Uropatagium longer than the legs, and short tail (approximately half the uropatagial length) is completely enclosed within it, except for the tip which protrudes slightly from the dorsal side. Wing and tail membranes

blackish. Feet robust. Measurements important for specific identification. (Goodwin 1942, Goodwin 1961, Emmons 1999).

CRANIAL CHARACTERISTICS: Skull with short, broad rostrum that rises abruptly towards the brain case. Brain case rounded with a narrow sagittal crest and interorbital constriction. Palate short ending abruptly at a line across the molars. (Goodwin 1942, López-González 2005).

Measurements taken from the only Paraguayan specimen (a female) from López-González (2005): *Greatest Skull Length* 20.3mm; *Condylobasal Length* 18.3mm; *Transverse Zygomatic Width* 9.8mm; *Mastoid Width* 9.7mm; *Interorbital Constriction* 3.4mm; *Width Across Upper Molars* 6.9mm; *Width Across Upper Canines* 4.2mm.

Genoways & Williams (1984) give the following measurements for specimens from Surinam (males n=2, females n=1): *Greatest Skull Length* males 19.6-20.2mm, female 19.5mm; *Condylobasal Length* males 16.6mm, female 16.3mm; *Transverse Zygomatic Width* males 9.1-9.2mm, female 9.3mm; *Mastoid Width* males 8.8-9mm, female 8.9mm; *Interorbital Constriction* males 3-3.2mm, female 3mm; *Width of Braincase* males 7.9-8mm, female 7.8mm; *Width Across Upper Molars* males 6.1-6.3mm, female 6.4mm.

Lemke et al (1982) give the following measurements for a female (FMNH 121251) from Colombia: *Greatest Skull Length* 20mm; *Transverse Zygomatic Width* 9.6mm; *Interorbital Constriction* 3.4mm; *Depth of Braincase* 9mm; *Width Across Upper Canines* 3.9mm; *Width Across Upper Molars* 6.2mm.

Goodwin & Greenhall (1961) give the following measurements for one male, one female and one juvenile from Trinidad: *Greatest Skull Length* male 20mm, female 19.5mm, juvenile 18mm; *Transverse Zygomatic Width* male 8.2mm, female 9.2mm, juvenile 6.5+mm; *Interorbital Constriction* male 3.1mm, female 3.1mm, juvenile 3.2mm.

Willig (1983) gives the following mean measurements for males (n=2) and females (n=6) from the caatinga of northeast Brazil: *Greatest Skull Length* male 19.95mm, female 20.45mm; *Condylobasal Length* male 17.4mm, female 17.86mm; *Transverse Zygomatic Width* male 9.95mm, female 10.30mm; *Postorbital Constriction* male 3.25mm, female 3.23mm; *Width of Braincase* male 8.25mm, female 8.42mm; *Width Across Upper Molars* male 6.45mm, female 6.62mm.

DENTAL CHARACTERISTICS: I2/1 C 1/1 P2/3 M3/3 = 32. One pair of lower incisors only.

Measurements taken from the only Paraguayan specimen (a female) from López-González (2005): *Length of Upper Tooth Row* 7.2mm; *Length of Lower Tooth Row* 7.9mm.

Genoways & Williams (1984) give the following measurements for specimens from Surinam (males n=2, females n=1): *Length of Upper Tooth Row* males 6.6-7mm, female 6.7mm.

Lemke et al (1982) give the following measurements for a female (FMNH 121251) from Colombia: *Length of Upper Tooth Row* 6.9mm; *Length of Lower Tooth Row* 7.9mm.

Goodwin & Greenhall (1961) note the following measurement for one male, one female and one juvenile from Trinidad: *Length of Upper Tooth Row* male 6.9mm, female 7.1mm, juvenile 6.5mm.

Willig (1983) gives the following mean measurements for males (n=2) and females (n=6) from the caatinga of northeast Brazil: *Length of Upper Tooth Row* male 8.10mm, female 8.18mm.

GENETIC CHARACTERISTICS: 2n=30. FN=56. The X-chromosome is submetacentric, the Y-chromosome acrocentric. (Baker & Hsu 1970, Baker 1973).

EXTERNAL MEASUREMENTS: There is apparently no significant sexual dimorphism. Measurements taken from the only Paraguayan specimen (a female) from López-González (2005): **TL** 61mm; **TA** 8mm; **FT** 9mm; **FA** 40.2mm; **EA** 24mm; *Length of Third Digit* 34.3mm; **WT** 13.8g.

Additional measurements provided by Eisenberg (1989) for specimens from Venezuela: **TL** male 63.25mm (+/-2.31mm), female 60.60mm (+/-3.21mm); **HB** male 52.38mm (+/-3.16mm), female 51mm (+/-4.18mm); **TA** male 10.88mm (+/-2.59mm), female 9.60mm (+/-3.36mm); **FT** male 11.88mm (+/-0.83mm), female 11.80mm (+/-0.84mm); **FA** male 34.63mm (+/-0.91mm), female 35.34mm (+/-1.69mm); **EA** male 24.75mm (+/-1.91mm), female 24.40mm (+/-0.89mm); **WT** male 9.94g (+/-0.53g), female 10.75g.

Genoways & Williams (1984) give the following forearm measurements for specimens from Surinam (males n=2, females n=1): **FA** male 35.5mm, female 34.5mm.

Lemke et al (1982) give the following measurements for a female (FMNH 121251) from Colombia: **TL** 100mm; **TA** 5mm; **FT** 12mm; **FA** 37mm; **EA** 23mm; *Tragus* 9mm; *Calcar* 13mm; *Noseleaf* 8mm; **WT** 10g.

Goodwin & Greenhall (1961) give the following measurements for one male, one female and one juvenile from Trinidad: **FA** male 35.5mm, female 35.6mm, juvenile 34mm; **WT** male 9.9g, female 9.6g.

Willig (1983) gives the following mean measurements for males (n=2) and females (n=6) from the caatinga of northeast Brazil: **TL** male 75mm, female 69.80mm; **TA** male 11mm, female 9.20mm; **FT** male 10mm, female 9.80mm; **EA** male 22mm, female 23mm.

SIMILAR SPECIES: This is a small Phyllostominae (long ears, nose leaf well-developed with horseshoe shape enclosing the nostrils) with a short tail and round-tipped ears. Bats in the genus *Lophostoma* are extremely similar to *Tonatia bidens* and can be most easily separated on account of the naked or sparsely-furred muzzle, the band of skin connecting the ears and the fact that they roll their ears when handled. Both *Tonatia* and *Lophostoma* are unique amongst small Phyllostomids in having only one pair of lower incisors, the character being shared only by the much larger *Chrotopterus auritus.*

This species can be distinguished from the other Paraguayan member of the genus *L.silvicolum* principally by its smaller size, having a forearm <45mm as opposed to >50mm, being about half the weight (*silvicolum* generally not less than 25g, *brasiliense* usually not more than 15g). and with an ear length that is invariably <27mm in *brasiliense* compared to >30mm in *silvicolum*. Note also that *L.silvicolum* frequently has a white throat patch of variable size which is not present in this species. The tragus of this species is comparatively much smaller than that of *L.silvicolum* and lacks the three tooth-like projections near the base on the outer edge, instead having a single, pointed tooth-like projection near the base on the inner border (Genoways & Williams 1980).

The only other member of the subfamily that even approaches this species in size is the Long-legged Bat *Macrophyllum macrophyllum,* but that species can be easily separated on account of its over-sized feet, long tail and longitudinal rows of dermal denticles on the ventral side of the uropatagium.

DISTRIBUTION: Widespread occurring from southern Veracruz in Mexico south through Central America to South America east of the Andes.

In Bolivia the species has been recorded in Departamentos Beni, Cochabamba and La Paz (Aguirre 2007). In Brazil it occurs south coastally to Espirito Santo, but inland the southern limits of the range are much further north. The species has been recorded in the following Brazilian states: Amazonas, Amapá, Bahía, Espirito Santo, Goiás, Minas Gerais, Mato Grosso, Mato Grosso do Sul, Pará, Pernambuco, Roraima and Tocantins (dos Reis et al 2007).

Known only from a single record at a single locality in Paraguay which extended the species known inland range south by over 1000km (López-González et al 1998). A female was taken at Estancia La Victoria, Departamento Presidente Hayes (23º 29.04'S, 58º 34.79'W) on 29 July 1995 about 50m from the Rio Siete Puntas.

HABITAT: The only Paraguayan specimen was caught 50m from a river in a mist-net placed at 4.5m high in palm savanna dominated by the palm *Copernicia australis.* (López-González et al 1998). Elsewhere the species is strongly associated with moist areas and streamside habitats and can range into deciduous forest (Eisenberg & Redford 1999) or more open secondary vegetation and savannah forest (Genoways & Williams 1984). Of 51 specimens captured in Venezuela 34% were captured over or near streams, 48% in moist areas and just 18% in dry situations (Handley 1976). Willig (1985) found the species to be uncommon in the caatinga of northeast Brazil and absent from cerrado.

ALIMENTATION: Diet probably consists of fruit and insects (Gardner 1977). Members of this genus are perch hunters that detect prey by emitting sounds whilst hanging from a branch and flying out to capture it once it is located (Emmons 1999). Considered a foliage-gleaning insectivore by Willig (1985).

REPRODUCTIVE BIOLOGY:

Seasonality No information available for Paraguay.

Bolivia Wilson & Salazar (1989) collected a female pregnant with a 25mm embryon during September in the Estación Biologica Beni.
Brazil A female pregnant with a 34mm long foetus was taken on 22 August (Graciolli & Bernard 2002). Willig (1985) notes pregnant females from the caatinga of northeast Brazil in March, August, September, October and December and a reproductively inactive female in January.
Costa Rica Pregnant females were taken in February and April (Graciolli & Bernard 2002).
Surinam A pregnant female with a 13mm long foetus was taken on 13 September 1979 (Genoways & Williams 1984).
GENERAL BEHAVIOUR: ***Activity Levels*** The species is usually caught in mist nests shortly after dusk.

Roosts In Trinidad the species has been found roosting in arboreal termite nests of the species *Microcerotermes arboreus* (Goodwin & Greenhall 1961). Kalko et al (2006) found a roost in Peru in a large termite nest 60-70cm high x 60-70cm wide. The entrance was 6cm in diameter and the cavity 28cm deep. Emmons (1999) suggested that the ability to fold the ears may be an adaptation to such specialised roost sites. In Surinam the species has been found roosting with the following species that occur in Paraguay: *Glossophaga soricina* and *Eptesicus brasiliensis* (Genoways & Williams 1984).

Parasites Presley (2005) found 12 parasites on 1 specimen of this bat in Paraguay it having a monoxenous association with a spinturnicid (*Mastoptera minuta*) and a single *Parichoronyssus sclerus*. Dick & Gettinger (2005) note that the taxonomy of *Mastoptera* is confused and that these individuals may belong to an as yet undescribed species. Herrin & Tipton (1975) reported the spinturnicid mite *Periglischrus tonatii* from Venezuela.
VOCALISATIONS: No information.
HUMAN IMPACT: None. The species has only recently been confirmed as present in Paraguay and the only record is from an area with low human population.
CONSERVATION STATUS: Globally considered to be of Least Concern by the IUCN on account of its wide geographic range and unspecialised habitat requirements. See http://www.iucnredlist.org/details/21984 for the latest assessment of the species. Considered stable in Paraguay by López-Gonzalez (2005) though the species is currently known from a single specimen in an unprotected area. As far is as currently known the Paraguay record represents the southern limits of the species range and the scarcity of specimens suggests that it is at best uncommon. Following extensive sampling in Paraguay, Willig et al (2000) found this species to account for 0.42% of all bats caught in the Central Paraguay region (n=3989). The species might best be considered Data Deficient in Paraguay.
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FIGURES 1-6 - Skull (©Philip Myers/Animal Diversity Web http://animaldiversity.ummz.umich.edu).