



PETER'S SAC-WINGED BAT

Peropteryx macrotis (Wagner, 1843)



FIGURE 1 - Adult (©Marco Mello www.casadosmorcegos.org).

TAXONOMY: Class Mammalia; Subclass Theria; Infraclass Metatheria; Order Chiroptera; Superfamily Vespertilionoidea; Family Emballonuridae; Subfamily Emballonurinae; Tribe Diclidurini (Hooper et al 2003, López-Gonzalez 2005, Myers et al 2006, Lim et al 2008). There are four species in the genus *Peropteryx*, Peters 1867, though Lim (2008) suggested that this species may actually be a composite of two cryptic but allopatric species.

Peropteryx is derived from two Latin roots meaning "pouch wing", presumably in reference to the positioning of the sac (Palmer 1904), *macrotis* means "big-eared". It is frequently misspelled as *Pteropteryx* (López-Gonzalez 2005). Czaplewski & Cartelle (1998) describe Quaternary fossils of this species from Minas Gerais, Brazil.

Gardner (2007) recognised two subspecies, that present in most of the Central and South American range, including Paraguay is *P.m.macrotis* (Desmarest 1804) (Type Locality Mato Grosso, Brazil). Yee (2000) included *P.trinitatis* (Sanborn 1937), confined to the island of Trinidad as a subspecies of

P. macrotis, but here it is treated as a distinct species following Gardner (2007). Synonyms adapted from Yee (2000), López-Gonzalez (2005) and Gardner (2007).

Vespertilio caninus Schinz 1821:179. Type locality "Östküste von Brasilien". Restricted to Timicui on the Rio Belmonte, above Bôca d'Obu" Bahía, Brazil by Ávila-Pires (1965). Preoccupied.

Proboscidea canina Gray 1838:499. Name combination.

Emballonura canina Temminck 1841:298. Name combination.

Emballonura macrotis Wagner 1843:367. Type Locality "Matto Grosso". Restricted Cuiabá, Matto Grosso, Brazil by Carter & Dolan (1978).

Emballonura brunnea Gervais 1856:66. Type locality "Province de Bahía", Brazil.

Peropteryx canina W.Peters 1867:472. Name combination.

Peropteryx macrotis W.Peters 1867:472. First use of current name.

Saccopteryx canina Dobson 1878:373. Name combination.

[*Saccopteryx* (*Peropteryx*)] *canina* Trouessart 1897:138. Name combination.

Pteropteryx macrotis López-González 2005:13. Incorrect spelling.

ENGLISH COMMON NAMES: Peters' Sac-winged Bat (Yee 2000), Lesser Doglike Bat (Wilson & Cole 2000, Yee 2000, IUCN 2007, Gardner 2007), Neotropical Sac-winged Bat (Goodwin & Greenhall 1961).

SPANISH COMMON NAMES: Murciélago de bolsa alar perruno (Emmons 1999), Murciélago menor cara de perro (Aguirre et al 2007).

GUARANÍ COMMON NAMES: No known names.

DESCRIPTION: A small bat with a naked, pointed rostrum and chin - considered "dog-like" by some observers. There is a small tuft of hair on the crown which stops abruptly next to the bare face and a thin beard of stiff hairs on the chin. Though variation in pelage colour has been noted across the range from brown to grey or red, with similarly-coloured or slightly paler venter (Yee 2000), all Paraguayan specimens known have been dark brown above and slightly paler below (López-Gonzalez 2005). Pelage is moderately long (6-9mm) and sparse, though shorter than in others members of the family. Wing membranes black and with characteristic shape of family, terminating at an attachment point on each ankle. Ears long and rounded at the tip, separated at the base. Inner part of the ear is lined with deep parallel crests, and the anterior border of the ear is thickly folded. Caudal membrane is long, the calcaneous being at least twice the length of the foot. The membrane is covered with lines of fine, short hairs, being rough to the touch on the underside, and softer and furrer on the dorsal side. Tail approximately one-third of body length, perforating the uropatagium on the dorsal side at its tip - characteristic of the family. Fur of the dorsal surface continues along the length of the tail.

CRANIAL CHARACTERISTICS: Well-developed post-orbital processes, relatively narrow and blunt. Adults with incomplete premaxillaries, retaining only the nasal portion and not fused either to the maxillaries or to each other. Sagittal crest present. Snout rises relatively abruptly towards brain case. Basisphenoid processes not divided. (López-Gonzalez 2005).

Measurements of populations in Brazil suggest that females are consistently larger than males in 4 cranial measurements (greatest skull length, condylobasal length, width across upper molars, width across upper canines). Willig (1983) gave the following measurements for the sexes in north-eastern Brazil (male n=15 female n=7): *Greatest Skull Length* male 13.8mm (+/- 0.3mm) female 14mm (+/- 0.2mm); *Condylobasal Length* male 12.7mm (+/- 0.3mm) female 13mm (+/- 0.4mm); *Transverse Zygomatic Width* male 8.2mm (+/- 0.2mm) female 8.3mm (+/- 0.2mm); *Mastoid Width* male 7.3mm (+/- 0.1mm) female 7.3mm (+/- 0.3mm); *Width of Brain Case* male 6.5mm (+/- 0.2mm) female 6.5mm (+/- 0.2mm); *Width Across Upper Molars* male 6mm (+/- 0.2mm) female 6.5mm (+/- 0.4mm); *Width Across Upper Canines* male 3.5mm (+/- 0.1mm) female 3.7mm (+/- 0.2mm).

Goodwin & Greenhall (1961) give the following measurements for three females from Tobago: *Greatest Skull Length* 14.7mm, 14.8mm, 15mm; *Transverse Zygomatic Width* 7.9mm, 8.3mm, 8.4mm.

Two females from Paraguay had the following cranial measurements *Greatest Skull Length* 15.2mm; *Condylobasal Length* 13.7mm; *Transverse Zygomatic Width* 8.4-8.8mm; *Mastoid Width* 7.7-7.9mm; *Interorbital Constriction* 2.8-2.9mm; *Width Across Upper Canines* 3.4mm; *Width Across Upper Molars* 6.2-6.3mm. (López-Gonzalez 2005). A female from Paraguay had the following dimensions (Myers & Wetzel 1983): *Greatest*

Skull Length 14.2mm; *Condylbasal Length* 13.4mm; *Transverse Zygomatic Width* 8.6mm; *Interorbital Constriction* 2.9mm; *Mastoid Width* 7.7mm; *Width Across Upper Canines* 3.4mm; *Width Across Upper Molars* 6.2mm.

DENTAL CHARACTERISTICS: I1/3 C1/1 P 2/2 M 3/3 = 32. Upper and lower incisors are small, lower incisors being trifold.

Goodwin & Greenhall (1961) give the following *Upper Tooth Row* measurements for three females from Tobago: 5.8mm, 5.8mm, 6mm.

Two females from Paraguay had the following measurements *Upper Tooth Row* 5.6mm; *Lower Tooth Row* 5.9mm. (López-Gonzalez 2005). A female from Paraguay had the following dimensions (Myers & Wetzel 1983): *Upper Tooth Row* 5.6mm.

GENETIC CHARACTERISTICS: $2n=26$ FN=48. (Yee 2000). Autosomes composed of eleven pairs of metacentric or submetacentric elements with a single pair of subteleocentric elements. X-chromosome a medium-sized near acrocentric, Y-chromosome about half the size is a near acrocentric. (Baker et al 1981).

EXTERNAL MEASUREMENTS: A small bat with tail approximately one-third of head and body length. Though no precise information exists for Paraguay, measurements of populations in Brazil suggest that females are consistently larger than males in 5 external measurements (total length, length of tragus, forearm length, length of third digit, length of fifth digit).

Willig (1983) gave the following external measurements for the sexes in north-eastern Brazil (male $n=15$ female $n=7$): **HB** male 61.3mm (+/- 2mm), female 64.1mm (+/- 3.8mm); **TA** male 14.2mm (+/- 1.6mm), female 14.1mm (+/- 2.1mm); **FT** male 6.6mm (+/- 0.5mm), female 6.6mm (+/- 0.8mm); **FA** male 42mm (+/- 0.9mm), female 43.6mm (+/- 1.1mm); **EA** male 14.2mm (+/- 0.6mm), female 14.4mm (+/- 1mm); *Length of Tragus* male 6.1mm (+/- 0.5mm), female 6.7mm (+/- 0.5mm); *Length of First Digit* male 7.5mm (+/- 0.7mm), female 7.1mm (+/- 1.1mm); *Length of Third Digit* male 64.7mm (+/- 2.4mm), female 68mm (+/- 4.1mm); *Length of Fifth Digit* male 44.4mm (+/- 1.4mm), female 46.9mm (+/- 1.9mm); **WT** male 4.2g (+/- 0.6g), female 4.6g (+/- 0.9g).

Goodwin & Greenhall (1961) give the following **FA** measurements for three females from Tobago: 46mm, 46.2mm, 47.2mm

Two females from Paraguay measured (López-Gonzalez 2005): **FA** 43-44.6mm; *Length of Third Digit* 38.2-40mm. A female from Paraguay had the following dimensions (Myers & Wetzel 1983): **FA** 43mm, *Length of Third Metacarpal* 39.1mm.

SIMILAR SPECIES: This is the only member of the family in Paraguay and the characteristics of the family are sufficient to identify the species - notably the outward-opening sac on the upper edge of the antibrachial membrane (more obvious in males) and the fact that the tip of the tail emerges from the central part of the uropatagium. This species shows no white on the wings.

Two other members of the family that share some or all of these characteristics are considered of hypothetical occurrence in Paraguay. *Rhynchonycteris naso* (Figure 2) can be identified by exaggerated trunk-like nose, tufts of white hairs on the forearms and the lack of glandular sacs on the forearm in both sexes. The calcaneus is also proportionately longer being 3x the length of the foot compared to twice the length of the foot in this species. *Saccopteryx bilineatus* (Figure 3-4) is most obviously separated from *P. macrotis* by two conspicuous longitudinal white stripes along the dorsal surface.

An extremely similar species, *P. kappleri* occurs in Bolivia as far south as northern Departamento Santa Cruz and is of possible though unlikely occurrence Paraguay. That species can be distinguished by measurements only, having a total length >62mm, forearm length >45mm and the greatest length of the skull >16mm - all these measurements are smaller than the given figures in *P. macrotis*.

DISTRIBUTION: The nominate subspecies, *P. m. macrotis*, is widely distributed from south-eastern Mexico south through South America where it occurs east of the Andes to northern Paraguay and southeastern Brazil. It has only rarely been collected above 1000m which may be its upper elevational limit and would explain its absence from the Andes (Yee 2000). *P. m. phaea* (GM Allen 1911) is found only on Grenada in the Lesser Antilles (Baker & Genoways 1978).

In Bolivia there are records from Pando, northern Beni and eastern Santa Cruz departments, though the species is also potentially present in northern Departamento La Paz (Aguirre et al 2007). In Brazil



the species is widely distributed, having been recorded in the following states: Alagoas, Amazonas, Amapá, Bahia, Distrito Federal, Espirito Santo, Goiás, Maranhão, Minas Gerais, Mato Grosso, Pará, Pernambuco Paraná, Rio de Janeiro, Rio Grande do Norte and São Paulo (dos Reis et al 2007).

In Paraguay the species has been collected in two localities only, both near the banks of the Rio Paraguay, these being Cantero Italo and Cantero 54, near San Lázaro in Departamento Concepción and at Fuerte Olimpo, Departamento Alto Paraguay where it was found at 200m (López-Gonzalez 2005). Two Concepción specimens are in the UMMZ, two in the AMNH and 31 in the Collection of the Servicio Forestal del Paraguay. The single Fuerte Olimpo specimen is in the AMNH. (Myers, Stallings et al 1983).

HABITAT: Generally associated with humid and subhumid gallery forest, though will also forage over nearby savanna, plantations and dry forests (Emmons 1999). Paraguayan specimens were found roosting in caves in rocky areas (López-Gonzalez 2005) and it has been hypothesised that the absence of suitable roosting areas may limit their distribution (Emmons 1999).

Yee (2000) lists tropical deciduous forest, evergreen forest and semi-arid thorn scrub among the habitats utilised. Willig (1985) found the species to be uncommon in the caatinga of northeast Brazil and absent from edaphic cerrado habitats.

ALIMENTATION: An aerial insectivore (Willig 1985).

Foraging Behaviour and Diet Emmons (1999) states that this species feeds principally on small Coleopterans and flies (Diptera). In areas close to human habitation they may forage over roads and around lights (Yee 2000). The species feeds on the wing (Goodwin & Greenhall 1961).

REPRODUCTIVE BIOLOGY: Little known. Data available from across the range that seasonal polyestry occurs, at least in some areas, though monoestrous reproduction would seem to be the norm (Kruttsch 2000).

Seasonality No data available from Paraguay.

Brazil Willig (1985) reported pregnant females in the Caatinga of northeast Brazil during January, September and October and lactating females in January. One female captured in October showed no signs of reproductive activity.

Guyana A juvenile collected in the Karisparu savanna during August was reported by Shapley et al (2005).

Panama On May 27 Bloedel (1955) collected four individuals from a colony of 20 bats in a cave, all of which proved to be females with nursing young.

Peru Tuttle (1970) notes pregnant females in August with foetal CR lengths of 6, 11 and 13mm. Carter et al (1981) collected a single female in August that was non-reproductive.

Courtship Colonies generally consist of a single male with several females, leading to the assumption that the breeding system follows a harem-style structure (Willig 1983). Scent emitted from the wing sac of males may play a role in courtship (Goodwin & Greenhall 1961).

Pregnancy A single young is usually produced after a gestation of 4 to 4.5 months. (Yee 2000).

GENERAL BEHAVIOUR:

Activity Levels Typically this species becomes active before dark.

Flight Pattern It flies with rapid, butterfly-like wing beats and retracing the same flight trajectory over and over.

Roosts Roosting Sac-wings are often found in well-lit areas and as might be expected of bats that roost in exposed locations, they are alert in the daytime (Nowak 1991). Roosts are found in rocky areas, hollow trees and caves in small groups of 1 to 10 individuals, typically constituting a single male and several females. In Tobago the species was found roosting in well-lit limestone and coral caves overlooking the ocean (Goodwin & Greenhall 1961). Occasionally as many as 80 individuals may form a roost, and large caves may contain several roosts (dos Reis 2007). Willig (1983) found that distances between individuals in roosts in north-east Brazil was between 15 and 60cm.

Tuttle (1970) notes approximately 25 individuals roosting under a root ledge over a small stream in mature forest in Peru. Arita (1996) noted that roost sites used by this species in Mexico were typically short, simple caves. Mares et al (1981) found groups of 10 roosting in large openings in rock piles and culverts in the Brazilian caatinga.

Roosting individuals may cling to a vertical surface, adopting a characteristic head-down posture with arms and legs spread into a cross-shape, or else suspend themselves from a horizontal surface. The wings are folded to a 45° angle when roosting. When disturbed they shake rhythmically.

Known Paraguayan specimens were collected at the entrance to limestone caves near rocky crevices, where they shared their refuges with *Desmodus rotundus* and *Glossophaga soricina* (Myers & Wetzel 1983, López-Gonzalez 2005). In Panama Bloedel (1955) recorded the species roosting in groups of 20 in caves with *Carollia perspicillata* and *Saccopteryx bilineata*. Graham (1988) notes that of eight roosts in Peru 12.5% were shared with *Phyllostomus hastatus*, *Myotis nigricans* and *Glossophaga soricina* respectively, and 25% with *Carollia perspicillata*.

Grooming Behaviour Carter et al (1981) collected a single female in August that showed no signs of moult.

Mortality Recorded as falling prey to owls and to the predatory bat *Chrotopterus auritus* in other parts of their range (Yee 2000). Pine & Ruschi (1976) mention the species as falling prey to Barn Owls *Tyto alba* in Epirito Santo, Brazil.

Parasites Human bed bugs have been found engorged with blood at the base of the posterior surface of the tail in Colombia. Nematodes have been found internally in Tobago. (Yee 2000).

VOCALISATIONS: No information.

HUMAN IMPACT: Human impact likely negligible, though the species may suffer from the fact that it sometimes shares roosts with the Vampire Bat *Desmodus rotundus*, and any persecution of that species at the roost would undoubtedly affect other species present.

CONSERVATION STATUS: Globally considered to be of Least Concern by the IUCN, see <http://www.iucnredlist.org/search/details.php/16709/all> for the latest assessment of the species. Considered stable in Paraguay (López-Gonzalez 2005), but no population data is available and no studies of the threats to this species have ever been performed. Emmons (1999) states that the availability of suitable roosting places may be a limiting factor on the distribution of the species. The small number of bats of this species using any given roost, plus the apparent harem-based social structure, means that a large number of roosts must be available for a viable population to exist. On current knowledge the species appears to have a limited distribution in Paraguay where it apparently reaches the southern limits of its wide geographical range. It is said to be uncommon over much of its South American range (Emmons 1999), though Yee (2000) noted that in some areas it "occurs abundantly". Its known Paraguayan range encompasses some of the most isolated and least densely-populated areas in the country, and other populations will likely be discovered with further field work. However, a general fear of bats, added to the fact that this species sometimes shares its roosts with the Vampire Bat *Desmodus rotundus* means that it may suffer from persecution wherever it comes into contact with humans.

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FIGURE 2 - *Rhynchonycteris naso* (©Marco Mello www.casadosmorcegos.org).

FIGURE 3 - *Saccopteryx bilineata* (©Marco Mello www.casadosmorcegos.org).



FIGURE 4 - *Saccopteryx bilineata* showing typical head down resting position of Emballonuridae, Venezuela (©Jonathan Newman).