# BRAZILIAN BIG-EYED BAT
## *Chiroderma doriae* O. Thomas, 1891

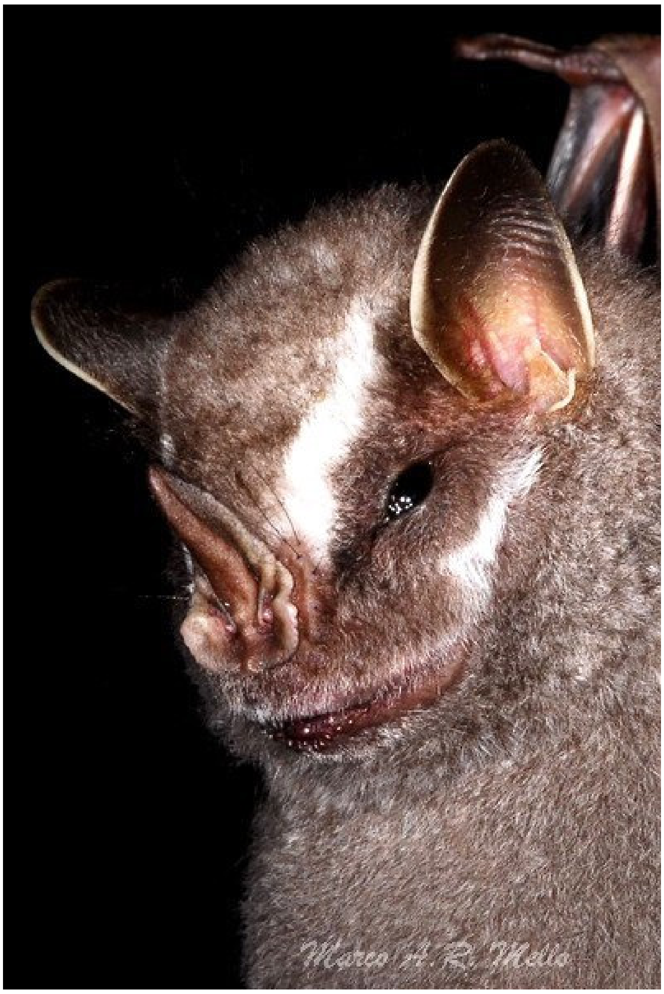

***FIGURE 1*** - Adult (©Marco Mello www.casadosmorcegos.org).

**TAXONOMY:** Class Mammalia; Subclass Theria; Infraclass Metatheria; Order Chiroptera; Suborder Microchiroptera; Superfamily Noctilionoidea; Family Phyllostomidae, Subfamily Stenodermatinae, Tribe Stenodermatini (López-Gonzalez 2005). There are five species in this genus, one of which occurs in Paraguay. The generic name *Chiroderma* is Greek meaning "hand skin" (Palmer 1904). The species name *doriae* is in honour of Marquis G Doria "a naturalist whose intimate knowledge and magnificent collection of Chiroptera are always at the service of other workers in the same field." (Thomas 1891).

The holotype was misidentified by Dobson (1878) as *Chiroderma villosum* on account of its poorly marked facial stripes.

A Quaternary fossil from Minas Gerais, Brazil reported by Lund (1840) as *Phyllostoma dorsale* was later confirmed by Winge (1893) to belong to this species (Czaplewski & Cartrelle 1998).

Owen (1988) found little phenetic coherence for the genus *Chiroderma* despite some diagnostic characters. The genus was found to be less morphologically homogeneous than any other Stenodermatine genus except *Vampyressa*. *C. doriae* was allied with bats of the genus *Vampyressa* in the majority of the analysis, more so than with its congeners (Owen 1988).

Baker et al (1994) resolved the relationships within this genus using cytochrome-*b* sequences and concluded that the large size of this species had evolved independently from that of the other large member of the genus *C.improvisum*. The species was considered to be most closely related to *C.trinitatum*, diverging from each other 1.6 mya and that this clade diverged from the *C.villosum-improvisum* clade about 2.6 mya. Allopatric speciation is the most model that best explains the patterns of distribution in this genus.

The species is monotypic (Gardner 2007). Synonyms adapted from Gardner (2007) and Oprea & Wilson (2008):

[*Phyllostoma*] *dorsale* Lund 1842a:134. Nomen nudum.
[*Phyllostoma*] *dorsale* Lund 1842b:200. Nomen nudum.
*Chiroderma villosum* Dobson 1878:534. Not *Chiroderma villosum* W.Peters, 1860.
Ch[*iroderma*]. *doriae* O.Thomas 1891:881. Type locality "Minas Geraes", Brazil.

**ENGLISH COMMON NAMES:** Brazilian Big-eyed Bat (Wilson & Cole 2000).

**SPANISH COMMON NAMES:** Murciélaguito frutero de ojos grandes (Emmons 1999).

**GUARANÍ COMMON NAMES:** No known names.

**DESCRIPTION:** This is a medium-sized Stenodermatine bat with two bold white facial stripes from the posterior base of the ears to the nose leaf. The rostrum is shorter than the larger bats of the genus *Artibeus*. Dorsally the fur ranges from greyish-brown to dark brown or reddish-brown, and the ventral fur is sometimes slightly darker or greyer. Occasionally there is a yellowish tinge to the posterior of the dorsum and the area of the plagiopatagium. Juveniles usually show a distinctly greyish colouration to the venter and a grey-brown tinge to the dorsal pelage. A longitudinal medial dorsal white line runs the length of the body to between the shoulders, not reaching the head. Parts of the forearm, legs and feet are covered by fur. The uropatagium is densely covered with thick brownish fur with paler tips. Wing membrane attaches to the metatarsus. The ears are short, longer than they are wide and somewhat rounded with slightly pointed tips. The internal margin is convex and the external margin has a strong medial concavity. Ears have a pinkish-yellow colouration internally around the ear canal and thin yellow rims. The yellowish tragus is pointed. Eyes large. (Oprea & Wilson 2008).

**CRANIAL CHARACTERISTICS:** Anterior zygomatic arch robust, thought to be an adaptation for a diet of fig seed allowing for the attachment of a large masseter muscle (Nogueria et al 2005). Mandible with angular processes short but enlarged (Miller 1907).

Though *Chiroderma* have been sometimes been stated to lack nasal bones (Miller 1907), fetal analysis shows that they bones are present during development, becoming displaced laterally and subsequently fusing with the frontals and maxillae rather than fusing with each other along their midline (Straney 1984).

Taddei (1979) found no significant differences between sexes in the cranial characteristics that he measured.

Taddei (1979) gives the following mean and range measurements for 15 males and 15 females from São Paulo, Brazil: *Greatest Length of Skull* male 27.96mm (27.3–28.7mm), female 28.15mm (27.5–28.7mm); *Condylobasal Length* male 26.12mm (25.5–26.8mm), female 26.29mm (25.6–26.7mm); *Condylocanine Length* male 25.25mm (24.6–25.8mm), female 25.41mm (24.9–26.1mm); *Basal Length* 22.9mm (22.3–23.6mm), female 23.10mm (22.7–23.8mm); *Palate Length* male 14.99mm (14.3–15.8mm) (15.12, 14.6–15.5); *Mandibular Length* male 19.75mm (19.3–20.2mm), female 19.8mm (19.4–20.3mm); *Width Across Canines* male 6.41mm (6.2–6.6), female 6.47mm (6.1–6.8mm); *Width Across Molars* male 12.99mm (12.5–13.2mm), female 13.01mm (12.2–13.6mm); *Interorbital Constriction* male 7.17mm (6.5–7.8mm), female 7.23mm (7–7.5mm); *Postorbital Width* male 6.3mm (5.9–6.7mm), female 6.3mm (6.1–6.6mm); *Zygomatic Width* male 17.64mm (17.2–18.5mm), female 17.81mm (16.9–18.4mm); *Width of Braincase* male 11.95mm (11.6–12.3mm), female 12.12mm (11.5–12.6mm); *Mastoid Width* male 13.83mm (13.6–14.3mm), female 13.95mm (13.6–14.3mm); *Palate Width* male 7.39mm (7.1–7.9mm), female 7.49mm (6.9–8.1mm); *Height of Braincase* 10.3mm (9.9–10.5mm), female 10.33mm (10–10.7mm); *Occipital Height* 7.29mm (6.9–7.6mm), female 7.38mm (7-7.7mm).

Swanepoel & Genoways (1979) give the following measurements for two males and two females from Brazil: *Greatest Length of Skull* male 28.1-28.8mm, female 28-29mm,; *Condylobasal Length* male 25.8-26.3mm, female 25.9-26.4mm; *Zygomatic Width* male 17.6-17.9mm, female 17.8-18.1mm; *Postorbital Constriction* male 6.2–6.4mm, female 6.1-6.3mm; *Width of Braincase* male 12mm, female 11.2-12.5mm; *Width Across Molars* male 13-13.4mm, female 13.5-13.6mm.

Dias et al (2002) give the following mean and range measurements for 2 males and 3 females from São Paulo, Brazil: *Greatest Length of Skull* male 29.1mm (28.8-29.4mm), female 28.73mm (28.4-29.1mm); *Condylobasal Length* male 27.15mm (27-27.3mm), female 26.97mm (26.8-27.1mm); *Basal Length* male 24.75mm (24.7-24.8mm), female 24.3mm (24.1-24.5mm); *Palate Length* male 15.9mm (15.7-16.1mm), female 15.57mm (15.3-15.7mm); *Width Across Molars* male 13mm (12.8-13.2mm), female 12.77mm (12.3-13.1mm); *Mandibular Length* male 20.4mm (20.3-20.5mm), female 20.37mm (20.2-20.6mm); *Width Across Canines* male 6.35mm (6.3-6.4mm), female 6.43mm (6.2-6.6mm); *Postorbital Constriction* male 6.6mm, female 6.2mm (6-6.5mm); *Zygomatic Width* male 18.25mm (17.8-18.7mm), female 17.57mm (17.2-18mm); *Width of Braincase* male 12.15mm (12-12.3mm), female 11.93mm (11.5-12.2mm); *Mastoid Length* male 13.8mm, female 13.5mm (13.4-13.6mm).

Scabello et al (2009) gave the following measurements for a female (MBML 2826) from Espirito Santo, Brazil: *Greatest Length of Skull* 28mm; *Condylobasal Length* 25.25mm; *Basal Length* 21.9mm;

*Condylocanine Length* 24.9mm; *Mandibular Length* 18mm; *Postorbital Width* 6mm; *Zygomatic Width* 17.2mm; *Cingular-Canine External Breadth* 6.25mm; *Width Across Molars* 12.95mm; *Width of Braincase* 11.5mm; *Mastoid Width* 13.5mm.

Miklauskas et al (2006) give the following measurements for a male from Sergipe, Brazil (ALP 6445): *Greatest Length of Skull* 27.4mm; *Condylo-incisor Length* 25.82mm; *Basal Length* 23.69mm; *Condylocanine Length* 24.98mm; *Mandible Length* 18.96mm; *Postorbital Constriction* 5.94mm; *Zygomatic Width* 17.06mm; *Width Across Canines* 5.84mm; *Width Across Molars* 12.72mm; *Width of Braincase* 11.62mm; *Mastoid Width* 13.26mm.

**DENTAL CHARACTERISTICS:** I2/2 C 1/1 P2/2 M2/2 = 28 (Taddei 1979). Upper incisors slender and "spike-like" (Oprea & Wilson 2008). Lower incisors less crowded. Anterior premolar small and not in contact with posterior premolar, and each with the diameter of the crown less than that of its respective canine. (Miller 1907). Anterior lower premolar with its distinctive anterior cusp (Oprea & Wilson 2008). Upper molars with cusps protocone, base of which in M2 is thickened, so as to encroach on the crushing area of the crown and the surface of which is marked with coarse wrinkles. Outer cusps with cingula obsolete. Lower molars with outer cusps also thickened, particularly in case of hypoconid. Inner cusps of m1 virtually absent, but those of m2 thickened and with a supplemental cusp between the metaconid and entoconid. (Miller 1907). Molars fewer but proportionately larger than those of other Stenodermatines (Nogueira et al 2005).

Taddei (1979) gives the following mean and range measurements for 15 males and 15 females from São Paulo, Brazil: *Upper Tooth Row* male 10.15mm (9.9–10.4mm), female 10.25mm (10.1–10.5mm); *Lower Tooth Row* male 11.24mm (10.9–11.5mm), female 11.36mm (11–11.6mm). Dias et al (2002) give the following mean and range measurements for 2 males and 3 females from São Paulo, Brazil: *Upper Tooth Row* male 10.75mm (10.7–10.8mm), female 10.6mm (10.3–10.9mm); *Lower Tooth Row* male 11.55mm (11.5–11.6mm), female 11.33mm (11.1–11.5mm).

Scabello et al (2009) gave the following measurements for a female (MBML 2826) from Espirito Santo, Brazil: *Upper Tooth Row* 10.2mm; *Lower Tooth Row* 10.9mm. Swanepoel & Genoways (1979) give the following measurements for two males and two females from Brazil: *Upper Tooth Row* male 10–10.2mm), female 10.2–10.3mm. Miklauskas et al (2006) give the following measurements for a male from Sergipe, Brazil (ALP 6445): *Upper Tooth Row* 9.66mm; *Lower Tooth Row* 10.80mm.

**GENETIC CHARACTERISTICS** 2n=26. FN=48 (Eisenberg & Redford 1999).

**EXTERNAL MEASUREMENTS:** This is the second largest member of the genus (Oprea & Wilson 2008). Taddei (1979) found significant differences between sexes in the lengths of the 3rd and 4th metacarpals, with that of the female larger in each case.

Taddei (1979) gives the following mean and range measurements for 15 males and 21 females from São Paulo, Brazil: **TL** male 74.8mm (69–78.5mm), female 75.45mm (70–80); **HF** male 10.77mm (10–11.5mm), female 10.98mm 10–12mm); *Length of Calcar* male 6.9mm (6–7.5mm), female 7.17mm (6–8mm); **EA** 20.17mm (19–21.5mm), female 20.36mm (19–21.5mm); **FA** male 52.03mm (49.5–53.5mm), female 53.02mm (51–55.5mm); **WT** 30.18g (27.13–33.02mm); *Length of Tragus* 7.27mm (7–7.5mm), female 7.33mm (7–7.5mm); *Length of Thumb* male 7.93mm (7.5–8.5), female 8.05mm (7.5–8.5mm); *Length of 3rd Metacarpal* male 49.13mm (47–50.5mm), female 50.38mm (48–52.5mm); *Length of 1st Phalanx III* male 20.45mm (19.5–21.5mm), female 20.53mm (19–21.5mm); *Length of 2nd Phalanx III* male 28.57mm (26.5–29.5mm), female 28.9mm (27–31); *Length of 3rd Phalanx III* male 15.2mm (14–16.5mm), female 15.67mm (14.5–17mm); *Length of 4th Metacarpal* male 48.33mm (45.5–50mm), female 49.69mm (47–52mm); *Length of 1st Phalanx IV* male 16.77mm (16–17.5mm), female 16.9mm (16–18mm); *Length of 2nd Phalanx IV* male 16.43mm (15–18mm), female 16.95mm (16–18.5mm); *Length of 5th Metacarpal* male 49.8mm (47–51.5mm), female 50.78mm (48.5–53.5mm); *Length of 1st Phalanx V* male 12.97mm (12–14mm), female 13mm (12–13.5mm); *Length of 2nd Phalanx V* male 13.57mm (13–14mm), female 13.88mm (13–15mm); *Length of Tibia* male 19.3mm (18.5–20.5mm), female 19.5mm (18–21.5mm).

Scabello et al (2009) gave the following measurements for a female (MBML 2826) from Espirito Santo, Brazil: **TL** 73mm; **FA** 53.5mm. Swanepoel & Genoways (1979) give **FA** of 53.7mm for a single female (BMNH 9.11.19.15) from Brazil. Dias et al (2002) give the following mean and range measurements for **FA** of 2 males and 3 females from São Paulo, Brazil: male 53.4mm (53.1-53.7mm), female 51.3mm (50.6-52mm). Miklauskas et al (2006) give the following measurements for a male from Sergipe, Brazil (ALP 6445): **TL** 72.2mm **FA** 50.2mm.

Taddei (1973) gives the following measurements of external characters for a neonate from São Paulo and the proportions to its mother's measurements (in parentheses): **TL** 48mm (64%); **EA** 14mm (65%); *Tragus Length* 4.5mm (60%); **FA** 25mm (46.2%); *Thumb* 7mm (87.5%); *Length of 3rd Metacarpal* 20mm (39.2%); *Length of 1st Phalanx III* 8mm (39%); *Length of 2nd phalanx III* 10m (35%); *Length of 3rd phalanx III* 5mm (31.2%); *Length of 4th Metacarpal* 20mm (39.6%); *Length of 1st Phalanx IV* 7mm (41%); *Length of 2nd Phalanx IV* 7mm (43.7%); *Length of 5th Metacarpal* 21mm (41.1%); *Length of 1st Phalanx V* 6mm (48%); *Length of 2nd Phalanx V* 5.5mm (39.2%); *Length of Tibia* 10.5mm (55.2%); **HF** 10mm (91.6%); WT 8.13g (25.2%).

**SIMILAR SPECIES:** Several species of Stenodermatinae have bold pale head stripes and they are the only subfamily of Phyllostomid that possess them. However only two of those striped species also possess a longitudinal white mid-vertebral stripe; *Chiroderma doriae* and the marginally smaller *Platyrrhinus lineatus*. Though there is some overlap in size between the largest *P.lineatus* and the smallest *C.doriae*, as a general rule *P.lineatus* has the forearm <50mm and *C.doriae* > 50mm.

Externally *Platyrrhinus lineatus* may be distinguished by the fact that the white vertebral line extends to the crown, it stops between the shoulders in *C.doriae*. Additionally note that the uropatagium is somewhat furred in *C.doriae* and largely naked in *P.lineatus*, and that the ear colour differs considerably, being largely yellow in many specimens of *P.lineatus* (including the borders), and with yellow colouration mainly restricted to the area of the ear canal and only thinly on the borders in *C.doriae*. The calcaneum is long in *C.doriae*, approximately 75% of the length of the foot, but less than half the length of the foot in *P.lineatus*.

**DISTRIBUTION:** The distribution approximately coincides with the extent of the Atlantic Forest region of Brazil and Paraguay (Oprea & Wilson 2008). Marinho-Filho (1996) considered the species to be endemic to southeastern Brazil, but it has since proved to be more widespread and even locally present in the Pantanal (Bordignon 2005) and Cerrado biomes (Gregorin 1998).

In Brazil the species has been recorded from the following states: Distrito Federal (Coimbra et al 1982), Espírito Santo (Scabello et al 2009), Mato Grosso do Sul (Bordignon 2005), Minas Gerais (Thomas 1891), Paraná (Miretzki 2003), Pernambuco (Silva & Guerra 2000, Souza et al 2004), Rio de Janeiro (Marinho-Filho 1996), Santa Catarina (Sipinski & Reis 1995), São Paulo (Marinho-Filho 1996), Sergipe (Miklauskas et al 2006)

The first Paraguayan specimen was documented by López-Gonzalez et al (1998) from Estancia Sombrero, Departamento Cordillera: (TTU 75275) and this remains the only known locality for the species in Paraguay. The record extended the known distribution at that time by almost 1000km to the west and 200km to the south. Three Paraguayan specimens exist (TTU 64800, 64831 and TTU 75275) all from the same locality.

**HABITAT:** Closely associated with the Atlantic Forest region of Brazil and Paraguay, and considered an Atlantic Forest endemic species (Marinho-Filho 1996), though it is not strictly confined to that habitat. It is likely that the strict ecological requirements of this species (in terms of specialised diet) is most often fulfilled by Atlantic forest but that they are able to tolerate other habitats within their area of distribution provided that these requirements are fulfilled.

Bordingnon (2005) documented a specimen from semideciduous forest at about 550m altitude in the Urucum Mountains of Mato Grosso do Sul, within the Pantanal biome. Scabello et al (2009) document a specimen captured in an area of Atlantic Forest described as floresta ombrofila densa and Floresta estacional semidecidual, fragmented by monocultures of coffee and *Eucalyptus*. It was captured in the lowest pocket of a mist net set over a dry brook. Miklauskas et al (2006) took a specimen in Sergipe in an area of sandy soil with a covering of grasses and cacti at 200-300m altititude. The surrounding area was heavily modified with islands of Atlantic Forest, capueira and open areas associated with human activity.

Esberard et al (1996) record the species from an urban park that harboured several examples of *Ficus tomentella* amongst the 2300 trees in its 50ha area. This perhaps indicates some flexibility to colonize or at least forage in urban areas if its particular food resource is available.

A female collected on October 20, 1995 at Estancia Sombrero, Departamento Cordillera was caught in a mist net set across a creek at its opening into a pond. Vegetation was secondary interior Atlantic forest, surrounded by cultivated grasslands and natural wetlands, all grazed by cattle. (López-Gonzalez et al 1998).

**ALIMENTATION:** Gardner (1977) noted that up until that point nothing was known of the diet of this species, but suggested that the species probably subsists "primarily on fruits".

***Foraging Behaviour and Diet*** Taddei (1973) first reported the specialisation of this species for feeding only on figs (*Ficus enormis* and *Ficus* sp.), though this was frequently overlooked by subsequent authors. He also reported a single specimen as carrying a fruit of *Chlorophora tinctoria*, another Moraceae. Sipinski & Reis (1995) reported feeding on *Ficus organensis* in Santa Catarina and they captured 13 of their 15 specimens in autumn when the fig was in fruit. Esbérard (1998) captured this species near a fruiting *F.tomentella*. Faria (1996) reported the bat from Reserva Santa Genebra in Sao Paulo where four species of *Ficus* are known to occur and phenological studies have demonstrated that the *Ficus* community present provides a year-round supply of food for vertebrate frugivores (Figueiredo 1996).

Esbérard et al. (1996a) reported 32 feeding instances in Rio de Janeiro State, including the following records: one carrying a mature fig, one with pollen on its head, and three fecal samples containing seeds of *Ficus* sp., *Piper* sp., and fruit pulp. Nogueira & Peracchi (2002) noted that though *Piper* and floral resources may prove to be important items in the diet of *C. doriae*, the evidence did not support Esbérard et al´s (1996) conclusion that the presence of these additional items in the diet meant that the species is not a fig specialist. Olmos & Boulhosa (2000) caught a specimen at a *Mabea fistulifera* (Euphorbiaceae) tree with a small amount of pollen on it.

Nogueira & Peracchi (2002) offered the first evidence that *Chiroderma* bats are in fact seed predators of *Ficus* rather than dispersers, and that the species may become locally abundant when figs are fruiting. Working in the Rio de Janeiro Botanical Garden and adjacent Tijuca National Park, they captured 100 specimens of *Chiroderma*, 86% of which were *C.doriae*. Within the study area at least five adult individuals of *Ficus tomentella* and two of *Ficus cyclophylla* were present and captured frugivorous bats defecated seeds of at least three other species of native *Ficus*. Of the 100 specimens of *Chiroderma* 54 were captured under fruiting figs (49 were *C.doriae*) and 39 in association with other resources (eg. trails, flowering trees, bodies of water) but where *Ficus* feeding was indirectly recorded (eg by figs carried into the nets and fig-seeds present in fecal samples). Only seven were obtained on nights when the authors found no evidence of *Ficus* fructification. Netting sessions close to *Caryocar* flowering trees at the Botanical Garden of Rio de Janeiro resulted in 12 specimens of *C. doriae* none of which had pollen loads on their pelage or wing membranes, as was detected in specimens of *Artibeus* captured in the same nets, suggesting that their presence close to the tree was not due to the flowering, and in fact may have been associated with distress calls of the netted bats.

Nogueira & Peracchi (2003) described the feeding behaviour of the species in detail. They noted that 45 of the 46 fecal samples obtained from this species contained seed-coat fragments attached to pulp indicating seed predation, with undamaged seeds present in just 6 fecal samples. In the samples with undamaged seeds a mean of 4.8 (+/-5.2) undamaged seeds were present, suggesting that any accidental dispersal role that they play is limited.

Additionally they performed short-duration captive observations on 5 individuals of this species whilst feeding on *Ficus tomentella*. Bats offered figs would bite into the fruit and manipulate them with their thumbs as they ate. Figs presented had a mean mass of 7g (+/-0.5) and the mean time for consumption was 31.5 minutes (+/-13.3). They spent a mean of 31.4s (+/-16.2) masticating pulp and 74.2s (+/-19.2) masticating seeds. The first defecation after beginning consumption occurred after a mean of 14 minutes (+/-5.58). Initially a masticated ball of the fibrous skin of the fig and parasitised seeds was ejected from the mouth. Upon reaching the pulp, each bite taken was slowly chewed and the fig seeds were amassed in the cheek. Following a varying number of bites (mean 5, +/-2.6, n=30) the accumulated seed mass was then masticated with a conspicuous crunching sound. A compact, fibrous pellet of seed coat fragments was then ejected from the mouth, indicating that the seed content had been ingested. This complex manipulation of seeds within the mouth is quite remarkable, with the bat distinguishing between damaged and undamaged seeds and able to selectively move the seeds despite their gelatinous coat.

Wendeln *et al.* (2000) argued that, by feeding on a combination of *Ficus* species, even bats that do not digest seeds could obtain a complete set of nutrients. Considering that seed predation results in additional protein and energy intake (Morrison 1980), it is reasonable to conclude that a fig-only diet is possible for *C. doriae*. Handling time for feeding is considerably longer than in other fig feeding bats, but the increased nutrient gain in consuming seeds means that less figs need be consumed per night and hence there is less risk of predation whilst foraging (Nogueira & Peracchi 2003).

Nogueira et al (2005) demonstrated that morphological adaptations relative to granivory have evolved in *Chiroderma*. They found that *Chiroderma* could be discriminated from other sampled frugivorous bats based on the increased development of masseter-related variables (height of the anterior zygomatic arch, masseter moment arm, and masseter volume), which, in conjunction with other morphological characteristics (dentition and gape angle) corroborates the evolution of durophagy in this group.

***Diet in Captivity*** Taddei (1980) was unsuccessful in trying to raise these species in captivity using fruits that were readily consumed by other bat species, and was able to obtain positive results only when whole figs were fed to them.

**REPRODUCTIVE BIOLOGY:** Data is limited but seems to indicate some seasonality in reproduction Oprea & Wilson (2008).

***Seasonality*** No data available for Paraguay.

*Brazil* Sipinski & Reis (1995) reported a lactating female in April and 2 of 4 males in reproductive condition during May in Santa Catarina, Brazil. Taddei (1973) recorded reproductive males monthly from March to June and in November in São Paulo. Pregnant females were taken in January, February, June, July, August, September, and November and non-pregnant females in May and August. Esbérard et al (1996) found lactating females in Rio de Janeiro in January, and pregnant females in August and October.

***Development*** Taddei (1973) captured a female in January that have birth to a female an hour after capture. Oprea & Wilson (2008) translate the description of the neonate as follows: "pointed and curved teeth; dorsal region densely covered by grayish brown fur, with conspicuous dorsal white stripe formed by fur with white tips, from the shoulders to the uropatagium; white facial stripes conspicuous in the adults nonexistent in the neonate; dorsal fur short and extended laterally, covering about two-thirds of the forearm to the propatagium and plagiopatagium, bordering the body on the plagiopatagium, above the thigh and leg and all of the uropatagium, including feet; propatagium, plagiopatagium, and uropatagium with short and rarefied hair growing laterally to the body."

**GENERAL BEHAVIOUR:** Little known, this bat has only recently been captured in any numbers and behavioural and ecological data is scarce.

***Activity Levels*** The species is active all through the night, but Esbérard & Bergallo (2005) collected 66.6% of their specimens after midnight, and all specimens were caught between 8.50pm and 4.20am. The species is generally considered rare and Esbérard (2009) calculated capture rates (number of captures / net hours x 103) of 0.008 and 0.017 in Rio de Janeiro, Brazil.

Scabello et al (2009) captured a specimen at 2.53am in Espírito Santo, Brazil, and Miklauskas et al (2006) took a specimen 9pm in Sergipe.

***Parasites*** Pressley (2005) lists the Spincturnicid *Periglischrus iheringi.* for three Paraguayan specimens.

***Physiology*** The basal metabolic rate for 2 specimens of *C. doriae* (body mass 19.9 g) was 31.1 ml $O_2$/h (Cruz-Neto et al. 2001).

**VOCALISATIONS:** No information.

**HUMAN IMPACT:** None in Paraguay where the species has been recorded from only a single locality.

**CONSERVATION STATUS:** Globally considered to be Least Concern by the IUCN, see http://www.iucnredlist.org/apps/redlist/details/4664/0 for the latest assessment of the species. Though it has been consistently recognised as a threatened species on regional Brazilian red lists, this stems largely from the limited number of records and an inferred association with the diminishing Atlantic Forest region. The species has since been downgraded in light of new distributional information (Oprea & Wilson 2008).

SEAM (2006) considers the species endangered in Paraguay. Though it may potentially occur throughout the Atlantic Forest region of eastern Paraguay it apparently does so at low density and recent records in Brazil from the Pantanal and Cerrado biomes suggest that the species may be more widespread than previously thought. The species might best be considered Data Deficient in Paraguay pending more information.

Nogueira & Peracchi (2002) highlight the importance of assessing the availability of food plants in reaching a conservation assessment for this species. Though they have been shown to tolerate considerable human disturbance of habitat at least in some areas of their range (Esbérard et al 1996), the presence of sufficient *Ficus* plants would seem to be a limiting factor on their distribution.

Fruiting periods in *Ficus* are very short (1-2 weeks) and unpredictable (Morrison 1978) and the presence of fig trees in a given area does not necessarily mean the availability of fruit. As a result though temporary local home range may be quite small, the year round range needed to sustain a viable population may be much larger (Nogueira & Peracchi 2002). Additionally the life cycles of many *Ficus* sp. are complex and involve inter and intraspecific asynchrony in flowering patterns and species specific relationships with certain pollinator fig-wasps. McKey (1989) notes that if a fig population in a particular area is reduced below a minimum critical size, temporal gaps between flowering trees may lead to the local extinction of the fig-wasps and hence of the fig population itself.

In Brazil several fig species are classified as threatened (Carauta 1989) and human intervention through the cultivation of seedlings in conservation units may be vital to avoid their local extinction (Mello-Filho et al. 2000). SEAM (2010) apparently does not recognise any species of *Ficus* to be of conservation concern in Paraguay, but this perhaps does not reflect the reality given the situation in Brazil.

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