

## Bat flies (Diptera, Streblidae and Nycteribiidae) in a Cerrado area of Goiás State, Brazil

Gustavo Graciolli<sup>1</sup>, Marlon Zortéa<sup>2</sup> & Luiz Felipe Alves da Cunha Carvalho<sup>1</sup>

<sup>1</sup>Programa de Pós-Graduação em Ecologia e Conservação, Departamento de Biologia, Universidade Federal de Mato Grosso do Sul, 79070-900 Campo Grande-MS, Brazil ggraciolli@yahoo.com.br

<sup>2</sup>Programa de Pós-Graduação em Ecologia e Evolução, Universidade Federal de Goiás, Campus Jataí, Br 364, Km 192, 75801-615 Jataí-GO, Brazil. mzortea@uol.com.br

---

**ABSTRACT.** Bat flies (Diptera, Streblidae and Nycteribiidae) in a Cerrado area of state of Goiás, Brazil. A survey of bat flies was carried out in the Brazilian savanna (Cerrado) in the Goiás state, Brazil. We collected 227 specimens of seventeen species belonging to nine genera of Streblidae and seven specimens of four species of *Basilia* Miranda-Ribeiro, 1903 (Nycteribiidae). Except for *Paratrichobius longicrus* (Miranda-Ribeiro, 1907) (Streblidae), all species are new recorded in Goiás.

**KEYWORDS.** Biodiversity; Hippoboscoidea; host; parasite.

**RESUMO.** Dípteros ectoparasitos de morcegos em uma área de cerrado no estado de Goiás, Brasil. Realizamos um levantamento dos ectoparasitas em uma taxocenose de morcegos em uma área de Cerrado no Brasil central, em Goiás. Nós coletamos 227 espécimes de 17 táxons de nove gêneros de Streblidae e sete indivíduos de quatro espécies de *Basilia* (Nycteribiidae). Excetuando-se *Paratrichobius longicrus* (Miranda-Ribeiro, 1907) (Streblidae), todas demais espécies são novos registros para o estado de Goiás.

**PALAVRAS-CHAVE.** Biodiversidade; Hippoboscoidea; hospedeiro; parasito.

---

Bat flies (Diptera, Streblidae and Nycteribiidae) are one of the most common exclusively bat ectoparasites. In Brazil, 68 species from 20 genera of streblid bat flies and 25 species from two genera of nycteribiid bat flies have been recorded (Graciolli *et al.* 2007, 2008). Presently, 24 species from eight genera of streblid, and four species of *Basilia* (Miranda-Ribeiro, 1907) are found in the Cerrado of the Distrito Federal, and in the states of Mato Grosso do Sul, Minas Gerais, and Tocantins (Graciolli *et al.* 2008). In Goiás state, Pessoa and Guimarães (1936) recorded the occurrence of *Paratrichobius longicrus* (Miranda-Ribeiro, 1907) (Streblidae) on *Artibeus planirostris* (Spix, 1823). Here, we present data of a bat flies inventory conducted in a Cerrado area of the state of Goiás, Central Brazil.

The field work was carried out in a protected area known as a private natural heritage reserve, “Reserva Particular do Patrimônio Natural Pousada das Araras”, municipality of Serranópolis, Southwestern Goiás, Brazil (18° 25' S and 52°00' W), with altitudes varying from 500 to 700 m. The area of the reserve has 175 ha, but the preserved Cerrado fragment spreads throughout the region surrounding the reserve. The climate is classified as typical tropical savanna Aw, according to the classification of Köppen (1948). The climate of the Cerrado is usually divided in two well defined seasons: the dry season, from May to September, and the wet season, from October to April, with an average annual precipitation of 600–2,000 mm (Lima & Silva 2005). The

annual precipitation in Serranópolis is around 1,400 mm, with the dry and cold season from May to August and the rainy season being more intense from December to March (FUNATURA 1999). More information about study area is found in Zortéa & Alho (2008).

Bats were captured monthly from August 2000 through July 2001 (except February), in the darkest nights. We carried out 4–6 capture samples per month, depending on weather conditions. In total, we performed 60 days of capture, resulting in about 240 h of sampling effort. The bats were collected in mist nets of 6, 9, and 12 m in length by 2.8 m in height, set in trails, clearings, edge of rivers and creeks, and in the interior of vegetation. Each month, three different places were sampled in the reserve. The mist nets were opened at sunset, generally half an hour before dark, and stayed open for 4 h. The bats were previously identified in the field but some specimens were collected for taxonomic identification in the laboratory. The collected bats were deposited at Chiroptera Collection of “Universidade Federal de Goiás, Campus Jataí” (CCUFG).

During each bat inspection, the presence or absence of ectoparasites was recorded. When present, the parasites were individually placed in labeled eppendorf vials containing 70% ethanol. The bat flies were removed of body's host with fine tweezers. The bat flies are deposited in the Zoological Collection of “Universidade Federal do Mato Grosso do Sul”.

A total of 227 specimens of 17 species in nine genera of

Streblidae and seven specimens of four species of *Basilia* Miranda-Ribeiro, 1903 (Nycteribiidae) were collected. Except for *Paratrachobius longicrus*, all species are new records for Goiás state.

In the examined material is presented the number of specimens of each sex, host and data collection. Remarks on the species were made when deemed appropriate.

#### Nycteribiidae

##### ***Basilia anceps* Guimarães & D'Andretta, 1956**

Material examined (2 males and 1 female). 1 male and 1 female, ex. *Myotis* sp. (released), 27/III/2001. 1 male, ex. *Myotis* sp. (released), IV/2001.

Remarks. In Brazil, *B. anceps* had been recorded in Distrito Federal on *Myotis nigricans* (Schinz, 1821) and *Myotis riparius* Handley, 1960 (Graciolli *et al.* 2008).

##### ***Basilia hughscotii* Guimarães, 1946**

Examined material. 1 female, ex. *Myotis* sp. (released), IV/2001.

Remarks. *Basilia hughscotti* had already been recorded in Cerrado in Minas Gerais and Distrito Federal (Graciolli *et al.*, 2008).

##### ***Basilia tiptoni* Guimarães, 1966**

Examined material. 1 male, ex. *Mimon crenulatum* (E. Geoffroy, 1803) (released), XI/2000.

##### ***Basilia* sp.**

Examined material. 1 male and 1 female, ex. *Myotis* sp. (released), 27/III/2001.

Remarks. Species very similar *B. quadrosae* Graciolli & Moura, 2004 and *B. ortizi* Machado-Allison, 1964. Probably these specimens belong to an undescribed species.

#### Streblidae

##### ***Anastrebla modestini* Wenzel, 1966**

Examined material (3 males and 1 female). 1 male, ex. *Anoura geoffroyi* Gray, 1818 (released), 30/X/2000. 1 male, ex. *A. geoffroyi* (released), 25/XII/2000. 1 female, ex. *Anoura caudifer* (E. Geoffroy, 1818) (released), I/2001. 1 male, ex. *A. geoffroyi* (released), 23/IV/2001.

##### ***Aspidoptera phyllostomatis* (Perty, 1899)**

Examined material (17 males and 10 females). 1 male and 1 female, ex. *Artibeus planirostris* (released), 29/IX/2000. 5 males and 3 females, ex. *A. planirostris* (released), 25/XII/2000. 4 males and 2 females, ex. *A. planirostris* (CCUFG 428), 27/I/2001. 5 males and 3 females, ex. *A. planirostris* (released), 23/III/2001. 2 males, ex. *A. planirostris* (released), 23/IV/2001.

Remarks. *Aspidoptera phyllostomatis* is a specific parasite of species of the genus *Artibeus* Leach, 1821 (Wenzel *et al.* 1966; Wenzel 1976).

##### ***Exastinion clovisi* (Pessôa & Guimarães, 1937)**

Examined material (7 males and 7 females). 1 male and 1 female, ex. *Anoura geoffroyi* (released), 05/IX/2000. 1 female, ex. *A. geoffroyi* (released), 28/IX/2000. 4 males and 3 females, ex. *A. geoffroyi* (released), 30/X/2000. 1 male, ex. *A. geoffroyi* (released), 25/XII/2000. 1 male and 1 female, ex. *A. geoffroyi* (released), 27/I/2001. 1 female, ex. *Anoura caudifer* (released), I/2001.

##### ***Mastoptera minuta* complex (Wenzel, 1966)**

Examined material. 2 females, ex. *Lophostoma brasiliense* Peters, 1866 (released), VII/2000.

##### ***Megistopoda aranea* (Coquillett, 1899)**

Examined material (44 males and 26 females). 1 male, ex. *Artibeus planirostris*, 29/IX/2000 (released). 1 female, ex. *A. planirostris*, IX/2000 (released). 4 males and 4 females, ex. *A. planirostris*, XI/2000 (released). 11 males and 2 females, ex. *A. planirostris*, 25/XII/2000 (released). 15 males and 11 females, ex. *A. planirostris*, 27/I/2001 (CCUFG 428). 13 males and 6 females, ex. *A. planirostris*, 23/III/2001 (released). 2 females, ex. *A. planirostris*, 23/IV/2001 (released).

##### ***Megistopoda proxima* (Séguy, 1926)**

Examined material (14 males and 9 females). 3 males and 1 female, ex. *Sturnira lilium* (E. Geoffroy, 1810), 05/IX/2000 (CCUFG 63). 1 female, ex. *S. lilium* (released), 30/X/2000. 1 male and 1 female, ex. *S. lilium* (released), 25/XII/2000. 1 male, ex. *S. lilium* (released), 23/III/2001. 9 males and 6 females, ex. *S. lilium* (released), 23/IV/2001.

##### ***Paratrachobius longicrus* (Miranda-Ribeiro, 1907)**

Examined material (4 males and 2 females). 2 males, ex. *Platyrrhinus lineatus* (E. Geoffroy, 1810) (released), 05/IX/2000. 1 female, ex. *P. lineatus*, XI/2000. 1 male and 1 female, ex. *P. lineatus* (released), 23/IV/2001. 1 male, ex. *P. lineatus* (released), V/2001.

Remarks. *Paratrachobius longicrus* is a complex of species that parasites bats of the genera *Artibeus* and *Platyrrhinus* Saussure, 1860 (Wenzel *et al.* 1966). Pessôa & Guimarães (1936) recorded *P. longicrus* on *Artibeus planirostris* in Goiás. In others cerrado areas, *P. longicrus* were only recorded on *P. lineatus* in Mato Grosso do Sul (Graciolli *et al.* 2006) and Minas Gerais (Komeno & Linhares 1999). Probably, the specimens that parasitize *P. lineatus* belong to a different species that the specimens found on *A. planirostris* or *A. lituratus* (Olfers, 1818).

##### ***Strebla curvata* Wenzel, 1976**

Examined material. 1 male, ex. *Glossophaga soricina* (Pallas, 1766) (released), V/2001.

##### ***Strebla wiedemanni* Kolenati, 1856**

Examined material. 1 male, ex. *Desmodus rotundus* (E. Geoffroy, 1810) (CCUFG 53), 04/IX/2000. 1 male, ex. *D. rotundus*, 30/X/2000 (released). 1 male, ex. *D. rotundus* (CCUFG 247), XI/2000.

##### ***Trichobioides perspicillatus* (Pessôa & Galvão, 1937)**

Examined material. 1 male, ex. *Phyllostomus discolor* Wagner (released),

Table I. Number of species of Streblidae and Nycteribiidae found by Brazilian states (source: Dias *et al.* 2009; Gracioli *et al.* 2007, 2008; Rios *et al.* 2008)

STATE	NUMBER OF SPECIES		TOTAL
	Streblidae	Nycteribiidae	
Distrito Federal	37	03	40
Paraná	31	08	39
São Paulo	25	14	39
Pará	28	03	31
Maranhão	22	01	23
Santa Catarina	15	08	23
Minas Gerais	18	04	22
Goiás	17	04	21
Rio Grande do Sul	13	04	17
Roraima	14	02	16
Rondônia	13	00	13
Amazonas	08	03	11
Rio de Janeiro	08	02	10
Mato Grosso	05	03	08
Mato Grosso do Sul	06	01	07
Bahia	04	00	04
Pernambuco	03	01	04
Ceará	02	01	03
Espírito Santo	02	00	02
Tocantins	01	00	01

1843, 30/X/2000. 1 male and 1 female, ex. *P. discolor* (released), 23/III/2001.

#### *Trichobius affinis* Wenzel, 1976

Examined material. 1 female, ex. *Lophostoma brasiliense*, VI/2001. 1 male, ex. *L. brasiliense*, VII/2001.

#### *Trichobius costalimai* Guimarães, 1938

Examined material (8 males and 2 females). 3 males and 1 female, ex. *Phyllostomus discolor* (released), 30/X/2000. 5 males and 1 female, ex. *P. discolor* (released), 23/III/2001.

#### *Trichobius dugesii* Townsend, 1891

Examined material (6 males and 2 females). 2 males, ex. *Glossophaga soricina*, 05/IX/2000 (released). 1 female, ex. *G. soricina* (released), 28/IX/2000. 1 male, ex. *G. soricina* (released), 27/I/2001. 1 female, ex. *G. soricina* (released), 23/III/2001. 3 males, ex. *G. soricina* (released), V/2001.

#### *Trichobius joblingi* Wenzel, 1966

Examined material (11 males and 4 females). 2 males and 2 females, ex. *Carollia perspicillata* (L., 1758) (released), 30/X/2000. 1 male, ex. *C. perspicillata* (released), V/2001. 1 male and 1 female, ex. *C. perspicillata* (released), IX/2000. 7 males and 1 females, ex. *C. perspicillata* (released), VII/2001.

#### *Trichobius parasiticus* Gervais, 1844

Examined material. 1 male and 1 female, ex. *Desmodus rotundus* (CCUFG 53), 04/IX/2000. 1 female, ex. *D. rotundus* (CCUFG 83), 28/IX/2000.

#### *Trichobius tiptoni* Wenzel, 1976

Examined material (3 males and 3 females). 1 male, ex. *Anoura caudifer*

(released), 01/X/2000. 1 male and 1 female, ex. *Anoura geoffroyi* (released), 30/X/2000. 1 female, ex. *A. caudifer* (released), 23/III/2001. 1 male and 1 female, ex. *A. caudifer* (released), V/2001.

#### *Trichobius uniformis* Curran, 1935

Examined material. 1 female, ex. *Glossophaga soricina* (released), V/2001. 1 male, ex. *G. soricina* (released), VII/2001.

The following captured species of host did not harbour bat flies: *Mesophylla macconnelli* Thomas, 1901, *Glyphonycteris* aff. *behni* (Peters, 1865), *Mimon bennettii* (Gray, 1838), *Molossops temminckii* (Burmeister, 1854) (Molossidae), *Eptesicus diminutus* (Osgood, 1915), and *Lasiurus ega* (Gervais, 1856) (Vespertilionidae).

It is important to mention that ectoparasites were seen on the following bats species, but they were not collected: *Artibeus cinereus* (Gervais, 1856), *A. lituratus*, *Chrotopterus auritus* (Peters, 1856), *Platyrrhinus helleri* (Peters, 1866).

Including our results, the number of species of bat flies in Goiás state increased to four *Basilina* and 17 for Streblidae species. Although our work is the first inventory carried out in this state, the number of recorded species is surpassed only by the Distrito Federal, and Paraná, São Paulo, Pará, Santa Catarina, and Minas Gerais states (Table 1), but those areas have a higher number of inventories of bat flies (Gracioli *et al.* 2008). New inventories are necessary to help understanding the host-parasite relationship in the Cerrado biome, and the number of records of bat flies will probably increase in the state.

Acknowledgements. GG thanks the Conselho Nacional de Pesquisas e Desenvolvimento Científico e Tecnológico (CNPq) for grant (Proc. #304459/2008-9).

#### REFERENCES

- Dias, P. A.; C. L. C. dos Santos; F. S. Rodrigues; L. C. Rosa; K. S. Lobato & J. M. M. Rebelo. 2009. Espécies de moscas ectoparasitas (Diptera, Hippoboscoidea) de morcegos (Mammalia, Chiroptera) no estado do Maranhão. *Revista Brasileira de Entomologia* 53: 128–133.
- FUNATURA. 1999. *Plano de manejo Reserva Natural Pousada das Araras*. Brasília, FUNATURA, 215 p.
- Gracioli, G.; A. G. Autino & G. L. Claps. 2007. Catalogue of American Nycteribiidae (Diptera, Hippoboscoidea). *Revista Brasileira de Entomologia* 51: 142–159.
- Gracioli, G.; A. A. Azevedo; M. Árzua; D. Battesti & P. M. Linardi. 2008. Artrópodos Ectoparasitos de Morcegos no Brasil, p. 123–138. In: S. M. Pacheco; R. V. Marques & C. E. L. Esbérard. (Org.). *Morcegos no Brasil: biologia, sistemática, ecologia e conservação*. 1ª ed., Porto Alegre, Armazém Digital, 504 p.
- Gracioli, G.; N. C. Cáceres & M. R. Bornschein. 2006. Novos registros de moscas ectoparasitas (Diptera, Streblidae e Nycteribiidae) de morcegos (Mammalia, Chiroptera) em áreas de transição cerrado-floresta estacional no Mato Grosso do Sul, Brasil. *Biota Neotropica* 6: <http://www.biotaneotropica.org.br/v6n2/pt/abstract?short-communication+bn03206022006> (accessed 13 October 2009).
- Komeno, C. A. & A. X. Linhares. 1999. Batflies parasitic on some phyllostomid bats in Southeastern Brazil: parasitism rates and host-parasite relationships. *Memórias do Instituto Oswaldo Cruz* 94: 151–156.
- Köppen, W. 1948. *Climatologia*. México, Fundo de Cultura Econômica, 478 p.
- Lima, J. E. F. W. & E. M. Silva. 2005. Estimativa da produção hídrica superficial do Cerrado brasileiro, p. 61–72. In: Scariot A.; J. C. Sousa-Silva & J. M. Felfili (Orgs.). *Cerrado: Ecologia, Biodiversidade e Conservação*. Brasília, Ministério do Meio Ambiente, 439 p.

- Pessôa, S. B. & L. R. Guimarães. 1936. Notas sobre Streblidae (Diptera), com a descrição de um novo genero e duas novas especies. **Anais da Faculdade de Medicina da Universidade de São Paulo** 12: 255–267.
- Rios, G. F. P.; R. J. Sá-Neto & G. Gracioli. 2008. Fauna de dípteros parasitas de morcegos em uma área de Caatinga do nordeste do Brasil. **Chiroptera Neotropical** 14: 339–345.
- Wenzel, R. L. 1976. The streblid batflies of Venezuela (Diptera: Streblidae). **Brigham Young of University Sciences Bulletin, Biological Series** 20: 1–177.
- Wenzel, R. L.; V. J. Tipton & A. Kiewlicz. 1966. The streblid batflies of Panama (Diptera: Calyptera: Streblidae), p. 405–675. *In*: R. L. Wenzel & V. J. Tipton (eds.). **Ectoparasites of Panama**. Chicago, Field Museum of Natural History, xii+861 p.
- Zortéa, M. & C. J. R. Alho. 2008. Bat diversity of a Cerrado habitat in Central Brazil. **Biodiversity Conservation** 17: 791–805.