

New records of *Basilia* Miranda-Ribeiro, 1903 (Diptera: Hippoboscoidea: Nycteribiidae) from Colombia

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Abstract. The Nycteribiidae is a group of ectoparasitic and hematophagous flies associated with bats and barely known in Colombia. The revision of previously collected material and additional fieldwork through various regions in Colombia led us to identify various fly species and their associated bats. Particularly, this is the first record of the species *Basilia tiptoni* Guimarães, 1966, for Colombia, collected on the bat *Gardnerycteris keenani* (Handley, 1960) (Mammalia: Chiroptera), from the Antioquia and Sucre departments. Additionally, and as a new geographic and host record, the species *Basilia ferrisi* Schuurmans Stekhoven, Jr., 1931 was found on the bat *Eptesicus brasiliensis* (Desmarest, 1819) from the Sucre department.

Keywords. Hippoboscoidea; Chiroptera.

Resumen. Nuevos registros de *Basilia* Miranda-Ribeiro, 1903 (Diptera: Hippoboscoidea: Nycteribiidae) de Colombia. Los Nycteribiidae son un grupo de moscas ectoparasitas y hematófagas, asociadas a murciélagos y escasamente conocidas en Colombia. La revisión de material previamente recolectado y trabajo de campo adicional en varias regiones de Colombia, permitieron identificar varias especies de moscas y sus murciélagos asociados. Particularmente, este es el primer registro para Colombia de la especie *Basilia tiptoni* Guimarães, 1966, recolectada en el murciélago *Gardnerycteris keenani* (Handley, 1960) (Mammalia: Chiroptera), en los departamentos de Antioquia y Sucre. Además, se encontró al murciélago *Eptesicus brasiliensis* (Desmarest, 1819), procedente del departamento de Sucre, como un nuevo hospedero y nuevo registro geográfico, de *Basilia ferrisi* Schuurmans Stekhoven, Jr., 1931.

Palavras-Chave. Hippoboscoidea; Chiroptera.

INTRODUCTION

The Nycteribiidae Samouelle, 1819, is a group of ectoparasitic and hematophagous flies associated with bats. These flies have a very specific lifecycle which shares with other families within Hippoboscoidea (adenotrophic viviparity); in their life cycle, the larvae develop through their three larval instars inside the female, feeding on "milk" glands. Thereafter, the female abandons the host only to deposit the mature larva on the cave

walls or the soil, nearby the bat, and it pupates almost immediately (Dick & Pospischil, 2015). Morphologically, Nycteribiidae species can be recognized by their spider-like shape; dorsoventrally flattened body; head bent backwards over the thorax at rest; highly reduced compound eyes, either no visible eyes or only rudimentary eye spots (however, eyes are present in the American genera *Basilia* and *Hershkovitzia*); two-segmented antennae without scape; palps with one segment; absent wings and scutellum; reduced, dorsally

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membranous and ventrally sclerotized thorax; halteres present; legs dorsally inserted, with ctenidium between anterior and middle insertions; and abdomen sexually dimorphic: in general, it is more dilated in females, and males with the visible structure of genitalia formed by two anteriorly bent claspers under the abdominal apex (Peterson & Wenzel, 1987; Guimarães & d'Andretta, 1956).

The family is widely distributed around the world, and divided in the subfamilies Archinycteribiinae, Cyclopodiinae and Nycteribiinae. The latter is reported in America with the genera *Hershkovitzia* Guimarães & d'Andretta, 1956 and *Basilina* Miranda-Ribeiro, 1903. The genus *Hershkovitzia* has five recorded species, and only one species is present in Colombia: *H. primitiva* Guimarães & d'Andretta, 1956. Which is also present in Costa Rica (Graciolli et al., 2007). The genus *Basilina* has 53 species (Graciolli et al., 2007; Graciolli & Dick, 2009), and there are eight species registered from Colombia: *Basilina anceps* Guimarães & d'Andretta, 1956 (Caquetá); *B. astochia* Peterson & Maa, 1970 (Santander); *B. bequaerti* Guimarães & d'Andretta, 1956 (Tolima); *B. constricta* Guimarães & d'Andretta, 1956 (Bolívar); *B. dubia* Guimarães & d'Andretta, 1956 (Putumayo); *B. ferrisi* Schuurmans Stekhoven, 1931 (Antioquia, Bolívar, Caldas, Chocó, Meta, Santander); *B. ferrisi* Theodor & Peterson, 1964 (Córdoba); and *B. wenzeli* Guimarães & d'Andretta, 1956 (Cundinamarca) (Graciolli et al., 2016; Pastrana-Montiel et al., 2019; Raigosa Álvarez et al., 2020). Local inventories of bats along the country and the careful harvesting of their associated parasites (i.e., Tarquino-Carbonell et al., 2015; Raigosa Álvarez et al., 2020) have allowed to discover a high diversity of bat flies and even new associations. The purpose of this study was to contribute to the diversity knowledge of the Diptera parasites associated with bats in Colombia.

MATERIAL AND METHODS

As part of several mammal surveys, bat netting was done in different locations from departments Antioquia and Sucre (see details below); mist nets of 12 × 2.5 m were used to capture the chiropterans, and nets were left opened between 17:30 and 22:00 hours. The bats were manipulated with gloves and most of them were identified in the field through the Muñoz (1995) and Gardner's (2008) keys. After that, all the detected ectoparasitic flies were captured with soft tweezers from the bats' surface and stored in 96% ethanol vials. These fly specimens were deposited in the Colección Entomológica Universidad de Antioquia (CEUA). Catalogued fly records will be available as a GEUA dataset through SiB Colombia (Wolff et al., 2023: <https://doi.org/10.15472/tyebaw>). Equally, some bat individuals were collected and deposited in the Colección Teriológica de la Universidad de Antioquia (CTUA); catalogued bat records will be available as datasets through the SiB-Colombia (Solari, 2021: <https://doi.org/10.15472/hkwiav>).

The taxonomic identification of flies was made through available literature and keys including original

descriptions (e.g., Guimarães & d'Andretta, 1956; Wenzel & Tipton, 1966; Guimarães, 1972; Graciolli & Carvalho, 2001; Graciolli, 2004). The photographs were taken with a Tucsen Mlchrome 20 digital camera, IMX183CQJ-J mounted on a Zeiss Stemi 2000-C stereoscope (magnification 6.5×-50×).

Finally, an occurrence map for *Basilina* species was constructed in ArcMap, including the herein presented records, the museum specimens (some type localities) listed in the Catalogue of Diptera of Colombia (Graciolli et al., 2016) and the recently recorded species *B. ferrisi* (Pastrana-Montiel et al., 2019). For most of those records the original listed localities were georeferenced and completed or corrected, this was necessary as some of the specific localities lack full details (e.g., municipalities) or were assigned to another department not consigned in the original labels, but the specific localities allowed us to find and solve those inconsistencies (Fig. 2). These two incorrect department assignments occurred in *Basilina ferrisi* (one from Norte de Santander, and the other from Córdoba; Table 1).

Examined material

***Basilina tiptoni*:** Colombia, **Sucre**, San Onofre, Berrugas, Reserva Natural Sanguaré, 1.5 m, 9.706°N, -75.6793417°W, 1M, 3F, 19/IX/2012, CEUA70725, host: *Gardnerycteris keenani*, Leg. J.A. Cogollo & D. Gómez. (same location) 1M, 1F, 23/II/2012, CEUA64236, host: *Gardnerycteris keenani*, Leg. C. Calderón & J.M. Martínez.
Antioquia, Maceo, Santa Bárbara, 450 m, 6.5441111°N, -74.6402222°W, 1M, 1F, 24/V/2008, CEUA70796, host: *Gardnerycteris keenani*, Leg. S. Solari.

***Basilina ferrisi*:** Colombia, **Sucre**, San Onofre, Berrugas, Reserva Natural Sanguaré, 1.5 m, 9.706°N, -75.6793417°W, 2M, 6F, CEUA64325, host: *Myotis riparius*, C. Calderón-Acevedo & D. Gómez. (same location) 2F, 1M, 01/III/2012, CEUA64246, host: *Myotis riparius*, Leg. C. Calderón & J.M. Martínez. (same location) 1F, CEUA70742, *Eptesicus brasiliensis*, Leg. J. Cogollo-Arias, D. Gómez & L. Vargas. (same location) 1M, 2F, CEUA70794, host: *Myotis* cf. *riparius*, Leg. J. Cogollo-Arias.

RESULTS AND DISCUSSION

A total of 23 specimens were examined, which belonged to the genus *Basilina*. The herein identified species were: *Basilina tiptoni* Guimarães, 1966 (Fig. 1A, B), which constitutes a new record for the country from the departments of Antioquia and Sucre associated with the bat *Gardnerycteris keenani* (Handley, 1960); and *Basilina ferrisi* (Fig. 1C, D) associated with *Myotis riparius* Handley, 1960 and *Eptesicus brasiliensis* (Desmarest, 1819); this is the first report of *E. brasiliensis* as host for *B. ferrisi* as well as the first record of the latter for the Sucre department. This increases to nine the number of species from the genus *Basilina* registered in Colombia (i.e., Graciolli et al., 2016; Table 1).

Basilia tiptoni belongs to the *ferruginea* species group due to morphological characteristics of the female: two abdominal tergites and the second one with

two differentiated lobes (Gracioli, 2010). This species was described based on female and male specimens collected in Panama (Bocas del Toro), in a host reported as

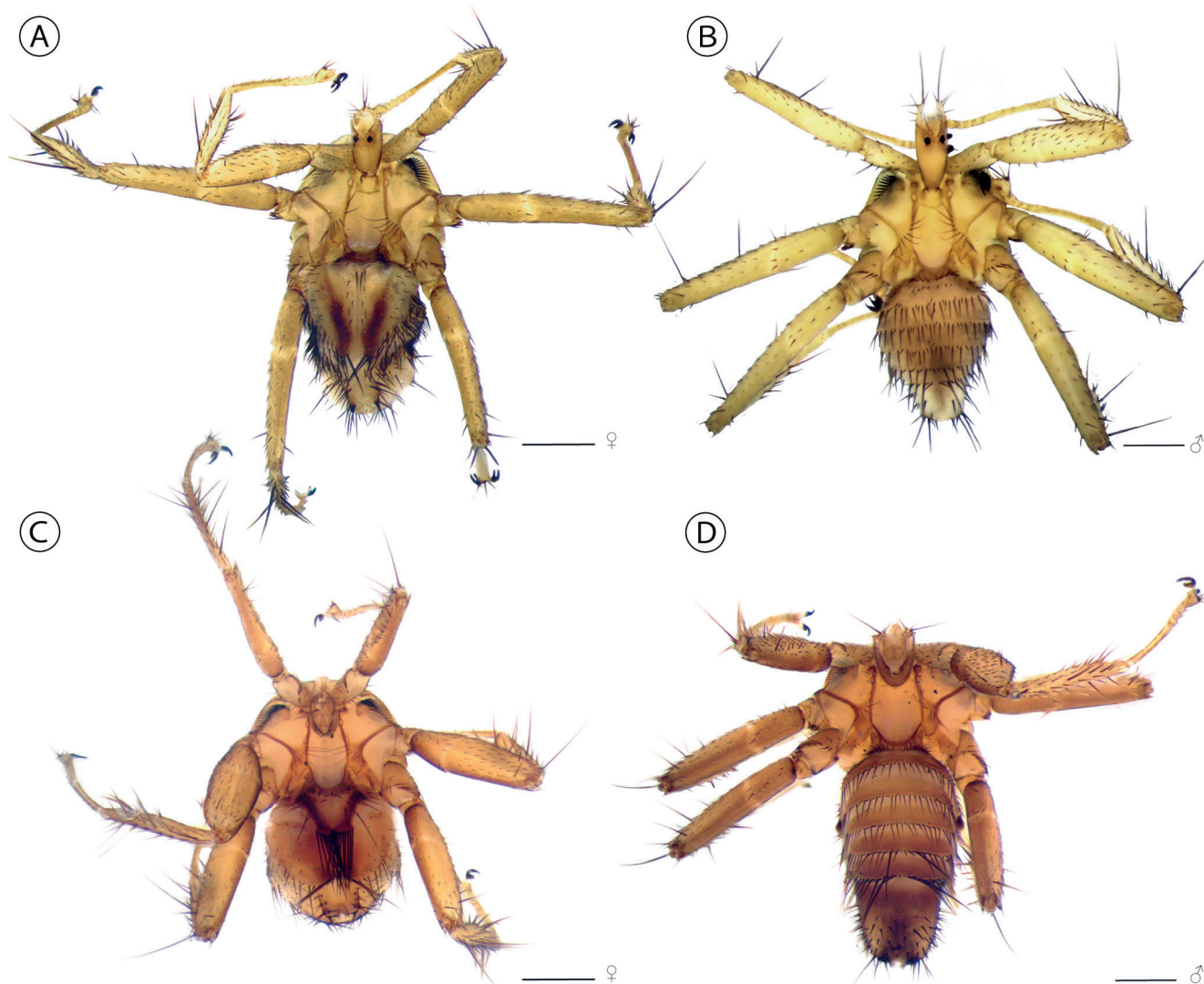


Figure 1. Habitus *Basilia tiptoni* (A) female, (B) male; and *Basilia ferrisi* (C) female, (D) male. Scale bar: 1 mm.

Table 1. Species of *Basilia* genus (Nycteribiidae) recorded in Colombia and distribution. The added geographic information is included in brackets.

Species	Distribution localities	coordinates
<i>B. anceps</i> Guimarães & d'Andretta, 1956	Caquetá: [Solano,] La Tagua, Tres Troncos, Río Caquetá	−0.058041; −74.649981
<i>B. astochia</i> Peterson & Maa, 1970	Santander: [Mogostes,] El Hoyo de Pájaros (near San Gil)	6.488441; −73.039946
<i>B. bequaerti</i> Guimarães & d'Andretta, 1956	Tolima: Espinal[, Guayabal]	4.161877; −74.908862
<i>B. constricta</i> Guimarães & d'Andretta, 1956	Bolívar: Catival, [San Basilio de Palenque,] upper Río San Jorge	10.05650; −75.218833
<i>B. dubia</i> Guimarães & d'Andretta, 1956	Putumayo: Puerto Asís	0.50200; −76.4989
<i>B. ferrisi</i> Schuurmans-Stekhoven, Jr., 1931	Antioquia: Urabá, [La Arenera,] Río Currulao, 20 km to Turbo highway	8.018500; −76.612333
	Bolívar: Catival, [arriba] Río San Jorge	10.054765; −75.224940
	Bolívar: [Turbaco, Frontera de] Las Campanas	10.39732; −75.38314
	[Córdoba: Montería, San Isidro,] Socorré, near to Río Sinú	8.597993; −75.934374
	Chocó: [Itsmina,] Andagoya, Río San Juan	5.108789; −76.696895
	Meta: [Puerto Gaitán,] Carimangua	4.577445; −71.338341
	[Norte de] Santander: [Cúcuta, San José de] Cúcuta	7.894143; −72.576192
	Sucre: San Onofre, Berrugas, Reserva Natural Sanguaré	9.706000; −75.679342
<i>B. ferrisi</i> Theodor & Peterson, 1964	Córdoba: Tierralta, vereda el Volador	8.288333; −75.997222
* <i>B. tiptoni</i> Guimarães, 1966	Antioquia: Maceo, vereda las Brisas, Santa Bárbara	6.544111; −74.640222
	Sucre: San Onofre, Berrugas, Reserva Natural Sanguaré	9.706000; −75.679342
<i>B. wenzeli</i> Guimarães & d'Andretta, 1956	Cundinamarca, Bogotá, Boquerón, San Francisco	4.463476; −74.076708

* new report to the country.

Lonchorhina or *Tonatia*, and two preserved males, one with a label that recorded the host as “like *Tonatia*”, and another one collected from *Gardnerycteris keenani* (recorded as *Mimon crenulatum*; Guimarães, 1966); the species has been recorded in Brazil, Costa Rica, Panama and Venezuela (Graciolli et al., 2007). The *Mimon crenulatum* bat species was recently included in the genus *Gardnerycteris* (Hurtado & Pacheco, 2014) and thereafter divided in the species *G. keenani* and *G. crenulatum* with specific geographic distributions (i.e., Hurtado & D’Elia, 2018). Therefore, according to the host distribution, the *B. tiptoni* records from Graciolli et al. (2007) probably comes from *G. keenani* for Colombia, Costa Rica, and Panama, and from *G. crenulatum* for Venezuela and Brazil. Thus, this species would have also a second degree of specificity like it was proposed for *B. ferrisi* (i.e., Pastrana-Montiel et al., 2019), because it keeps associated with two bat species in a solely genus (*Gardnerycteris*). This is a high specificity degree and each fly species distribution is associated with the distribution of their hosts (*G. keenani* and *G. crenulatum*).

Basilia ferrisi is in the *speiseri* species group because females have two abdominal tergites and the second one has a slightly rounded posterior margin (Graciolli, 2010). This species is distributed in Brazil, Costa Rica, Colombia, Guyana, Panama, Peru, and Venezuela (Graciolli et al., 2007, 2016; Raigosa Álvarez et al., 2020) and the herein presented record, extend its geographic distribution to the Sucre department. *Basilia ferrisi* has been registered in a wide host diversity from the Phyllostomidae, Vespertilionidae, and Molossidae families (Graciolli et al.,

2007), and here we add the vespertilionid bat *Eptesicus brasiliensis*.

CONCLUSIONS

This report increases the number of *Basilia* species for Colombia, by adding two geographic records (from the same specific host) of *Basilia tiptoni*. Also, a new host (*Eptesicus brasiliensis*) and geographic record (from Sucre department) are added for *B. ferrisi*. These records update the distribution information (Fig. 2) and the knowledge of natural history for Nycteribiidae species in the country.

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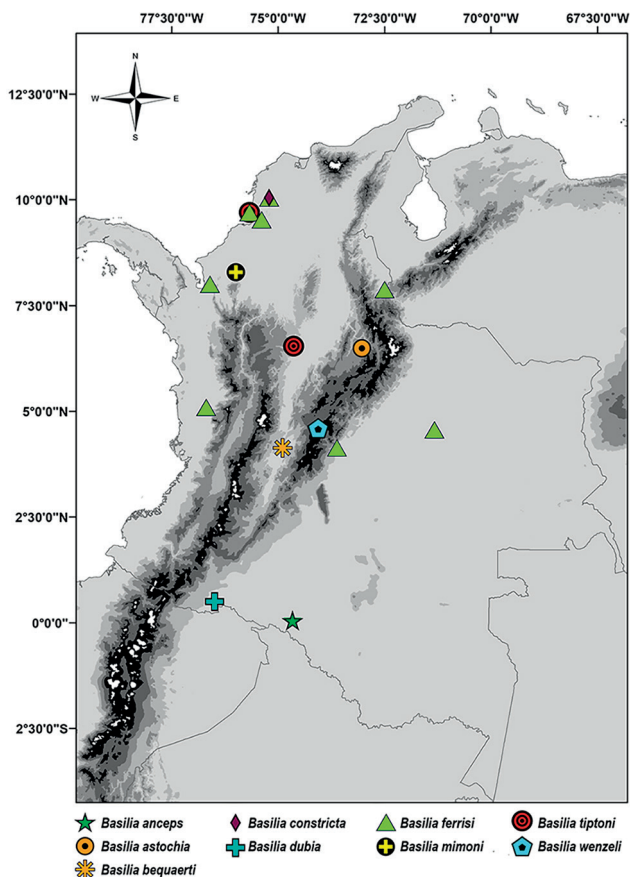


Figure 2. Recorded localities in Colombia for *Basilia* species.

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