



## FIRST RECORD OF THE PARASITE BAT FLY *Basilina mimoni* THEODOR & PETERSON, 1964 (DIPTERA: NYCTERIBIIDAE) IN COLOMBIA

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**Abstract:** The ectoparasites of bats belonging to the family Nycteribiidae (Insecta, Diptera) are highly specialized and little is known about this family in the New World. Only two genera of the family Nycteribiidae are catalogued in Colombia, *Basilina*, with seven species, and *Herskovitzia*, with only one species. This is the first report of *Basilina mimoni* in Colombia. Two females and one male were collected from the bat *Gardnerycteris keenani* (Chiroptera, Phyllostomidae). These records broaden the distribution range of this parasite species in Latin America and increase to nine the number of species in the family Nycteribiidae in Colombia.

**Keywords:** Chiroptera; ectoparasite; *Gardnerycteris*; South America.

The family Nycteribiidae Samuella, 1819 (Insecta, Diptera) are highly specialized parasitic flies (Graciolli 2010). This family has been adapted morphological and biologically to its life as obligatory ectoparasites of bats, as they have strong legs and claws, as well as a flattened body, especially in the thorax (Dick & Patterson 2006).

In this family, there are three degrees of host-parasite specificity, according to Vanin & Vernier (2009): (1) specificity to one host species, such as *Basilina corynorhini* Ferris, 1916 (Diptera, Nycteribiidae) and *Corynorhinus townsendii* Cooper, 1837 (Diptera, Nycteribiidae) (Frank *et al.* 2014); (2) specificity to a host genus or family, such as *Basilina juquiensis* Guimaraes, 1946 (Diptera, Nycteribiidae) - genus *Myotis* Kaup, 1829 (Chiroptera) (Graciolli & Carvalho 2001); and (3) lack of specificity, such as *Basilina carteri*

Scott, 1936 (Diptera, Nycteribiidae) parasitizing more than two host genus (Frank *et al.* 2014). The host specificity is mainly determined by ecological factors and geographical isolation (Dick & Patterson 2006, Dick & Pospischil 2015). Despite the high specificity in the host-parasite interaction between bats and flies, some authors consider that this is probably not the result of a strict coevolution (Graciolli & Carvalho 2012). However, another study based on phylogenetic analyses of 15 bat host species parasitized by nine Nycteribiidae taxa found a significant signal of phylogenetic congruence (putative host-parasite coevolution) (Ramasindrazana *et al.* 2017).

The species distribution within this family is poorly known in Colombia (Graciolli *et al.* 2016). This may due to difficulties in the species identifications of the genus *Basilina* Miranda-

Ribeiro, 1903, consequently compromising the understanding of the interactions between *Basilina* species with their specific host bat species (Graciolli *et al.* 2007). Seven species of the genus *Basilina* occur in Colombia, *B. anceps* Guimarães & D'Andretta, 1956; *B. astochia* Peterson & Maa, 1970; *B. bequaerti* Guimarães & D'Andretta, 1956; *B. constricta* Guimarães & D'Andretta, 1956; *B. dubia* Guimarães & D'Andretta, 1956; *B. ferrisi* Schuurmans-Stekhoven, Jr., 1931; and *B. wenzeli* Guimarães & D'Andretta, 1956 (Diptera, Nycteribiidae). *Basilina mimoni* has not been previously recorded in Colombia, it is originally registered in Peru and Brazil in the states of Distrito Federal, Pará, and Maranhão, with all records in the striped-hairy-nosed bat *Gardnerycteris crenulatum* Geoffroy, 1803 (Chiroptera, Phyllostomidae) (Graciolli 2001, Graciolli *et al.* 2007, Frank *et al.* 2014, Figueiredo *et al.* 2015). In this study, we report for the first time the presence of *B. mimoni* in the Peri-Caribbean Arid Belt Biogeographical Province, Colombian Caribbean in Northern Colombia.

During the activities of the project of Universidad de Córdoba, Colombia, "Characterization of the mammals of the Córdoba department, Colombia", four expeditions were carried out in April and October 2016, November 2017 and March 2019 in the extensive livestock production systems "El Danubio" in the Tierralta municipality, Córdoba department (08°17'17.8" N, 75°59'50.1" W). The study area has an altitude of 51 m with a relative humidity of 80%, where the climate is generally warm. The average temperature of the area is 27°C, with average annual rainfall of 1,759 mm.

The bats were captured (except in April 2016) using mist nets (6 x 2.5 m) in a fragment of dry tropical forest of 4,179 km<sup>2</sup> within the livestock matrix between 18:00 and 23:00 h. Bat flies were removed from the hosts using a brush impregnated with ethanol. Specimens collected were conserved in 70% ethanol and identified following the taxonomic keys and descriptions of Guimarães & D'Andretta (1956), Theodor & Peterson (1964), Graciolli & Carvalho (2001) and Miller & Tschapka (2001).

Herein we report the findings of two females and one male of *B. mimoni* (Figure 1a-c), associated with two females and one male of the bat *Gardnerycteris keenani* Handley, 1960 (Chiroptera, Phyllostomidae) (Figure 2). After the collection of

ectoparasites, a female bat was euthanized and taxidermized following the procedures of the American Society of Mammalogists (Sikes *et al.* 2016), and deposited in the Zoological collection of the University of Córdoba (CZUC-M-0330; Resolution N° 00914 August 04, 2017, Ministerio de Ambiente y Desarrollo Sostenible, Colombia). The other bats were released in the study area. The species *G. keenani* was differentiated from the congeneric species *G. crenulatum* using the characters proposed by Hurtado & D'Elia (2018), which are a broad and yellowish dorsal stripe, shorter and dense dorsal fur, the presence of large hairs on the tip and short ones on the base of the noseleaf, lower sagittal crest of the braincase, broader basioccipital breadth at cochlear level and deeper basisphenoid pits.

Guimarães (1972) suggested that *B. mimoni* has its distribution associated with the bat species *Mimon crenulatum* E. Geoffroy St.-Hilaire, 1803 (Chiroptera, Phyllostomidae), recently separated from the genus *Mimon* Gray, 1847 and included in the genus *Gardnerycteris* Hurtado & Pacheco, 2014. This genus groups the species *G. crenulatum*, *G. keenani* and *G. koepckeae* Gardner & Patton, 1972, which are distributed from Guatemala to northeastern Bolivia (Hurtado & Pacheco 2014, Hurtado & D'Elia 2018). Thus, this bat fly may be included in the second degree of specificity, as it has been recorded in different species of the same host genus (*Gardnerycteris*).

This record increases the number of ectoparasite flies of the family Nycteribiidae for *G. keenani*, which previously recorded the presence of *Basilina tiptoni* Guimarães, 1966 in Panama when it was considered a subspecies, *G. crenulatum keenani* (Guimarães 1972, Franz *et al.* 2014, Hurtado & Pacheco 2014, Hurtado & D'Elia 2018). The present note therefore increases the number of species of the genus *Basilina* registered in Colombia to eight; and considering all Nycteribiidae species, it increases to nine (Graciolli *et al.* 2016). This record adds Colombia in the distribution range of this species in the Latin American countries (Graciolli *et al.* 2007, Frank *et al.* 2014, Graciolli *et al.* 2016). In addition, it contributes to the scarce information on bat flies of the family Nycteribiidae in Colombia, with only four references available (Guimarães & D'Andretta 1956, Peterson & Maa 1970, Graciolli



**Figure 1.** Ectoparasite *Basilia mimoni* (Diptera, Nycteribiidae) recorded in the Tierralta municipality, Córdoba department, Colombia: a) female dorsal view; b) female ventral view; c) male ventral view.



**Figure 2.** Bat host *Gardnerya keenani* (Chiroptera: Phyllostomidae) recorded in the Tierralta municipality, Córdoba department, Colombia.

*et al.* 2007, Graciolli *et al.* 2016), improving the understanding of the patterns of distribution and ecology of ectoparasites and hosts.

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