

Ectoparasites of bats (Chiroptera, Furipteridae), with a description of a new species of *Synthesiostrebla* Townsend (Diptera, Streblidae) from Brazil

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ABSTRACT. Ectoparasites of bats (Chiroptera, Furipteridae), with a description of a new species of *Synthesiostrebla* Townsend (Diptera, Streblidae) from Brazil. Records of ectoparasites from furipterid bats are restricted to bat flies (Streblidae). Only three streblid species were known before this work: *Trichobius pallidus* (Curran, 1934), *Strebla wiedemanni* Kolenati, 1856, and *Synthesiostrebla amorphochili* Townsend, 1913. A second species of *Synthesiostrebla* is described here, increasing the geographical distribution of the genus to east of the Andes. *Synthesiostrebla cisandina* **sp. nov.** was found on *Furipterus horrens* (Cuvier, 1828) in southeastern Brazil. Anterior parts of the body, wing, tergite 7, epiproct and male genitalia are illustrated, and a key to females for species of *Synthesiostrebla* is provided.

KEYWORDS. Bat flies; Brazil; cis-andean; Furipteridae; taxonomy.

RESUMO. Ectoparasitos de morcegos (Chiroptera, Furipteridae), com a descrição de uma nova espécie de *Synthesiostrebla* Townsend (Diptera, Streblidae) do Brasil. Os poucos dados sobre ectoparasitismo em morcegos furipterídeos são restritos a moscas (Streblidae). Somente três espécies de estreblídeos eram conhecidas antes desse trabalho: *Trichobius pallidus* (Curran, 1934), *Strebla wiedemanni* Kolenati, 1856, and *Synthesiostrebla amorphochili* Townsend, 1913. Outra espécie de *Synthesiostrebla* é descrita aqui aumentando a distribuição geográfica do gênero para o lado leste dos Andes. *Synthesiostrebla cisandina* **sp. nov.** foi encontrada sobre *Furipterus horrens* (Cuvier, 1828) no sudeste do Brasil. Região anterior do corpo, asa, tergito 7, epiprocto e genitália masculina são ilustrados e uma chave de identificação para fêmeas também é apresentada.

PALAVRAS-CHAVE. Moscas ectoparasitas de morcegos; Brasil; cis-andina; Furipteridae; taxonomia.

Townsend (1913) erected *Synthesiostrebla* (Diptera, Streblidae) as a monotypic genus, describing a new species, *Synthesiostrebla amorphochili*, based on a female specimen collected on *Amorphochilus schnablii* (Chiroptera, Furipteridae) from Piura (5°12'S, 80°38'W), Peru. The species was later re-described by Jobling (1947), who used another female specimen that was collected on the same host species from Tambo Valley, east Chucarapi (17°10'S, 71°44'W), Arequipa, Peru. For almost 100 years since original description, *Synthesiostrebla* was considered a monotypic genus, with a geographical distribution restricted to the west side of the Andes, mirroring its host's distributional range (Fig. 1).

The few records of ectoparasites of furipterid bats are restricted to Streblidae. In addition to *Synthesiostrebla*, Wenzel *et al.* (1966) noted an undescribed species of *Trichobius pallidus* group on *A. schnablii* from Peru, and Guerrero (1994) recorded *Trichobius pallidus* (Curran, 1934) on *F. horrens* from Guyana and Venezuela. Graciolli *et al.* (2008) recorded *T. pallidus* and *Strebla wiedemanni* Kolenati, 1856, an accidental record, on *F. horrens* in Brazil.

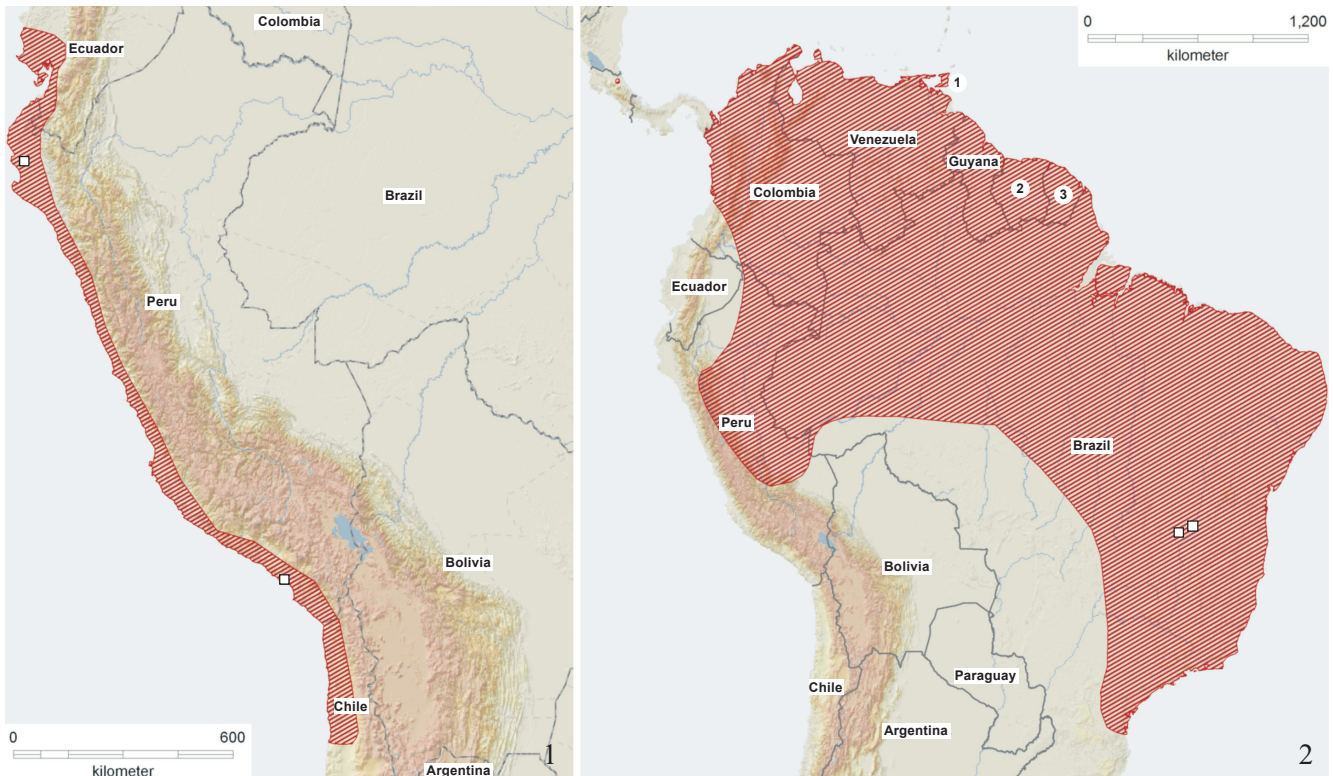
Furipteridae comprises two monotypic genera of bats, *Amorphochilus* Peters, 1877 and *Furipterus* Bonaparte, 1837

(Simmons 2005). *Amorphochilus schnablii* Peters, 1877 is distributed west of the Andes in Ecuador, Peru, and Chile (Barquez & Diaz 2008), while *Furipterus horrens* (Cuvier, 1828) has a broader distribution, found in Costa Rica, Trinidad, and in northern South America, including Peru and east into large portions of Brazil (Miller *et al.* 2008) (Fig. 1).

Here, we describe a new species of *Synthesiostrebla* collected on *F. horrens* from Minas Gerais, Southeastern Brazil, establishing a disjunct distribution of the two species known from the genus.

MATERIAL AND METHODS

Morphological terminology follows Wenzel & Peterson (1987). Measurements were made with the aid of Leica (LAS Leica™ software). Body length was measured from the anterior margin of the palpi to the apex of the abdomen. Specimen images were made on microscopy M205 with camera DF420C and processed by Leica (LAS Leica™) software. Type material has been deposited at Museu de Zoologia da Universidade de São Paulo, São Paulo, Brazil (MZSP).



Figs. 1–2. Geographical distribution of the hosts (Chiroptera: Furipteridae) (shared area) and their parasites species of *Synthesiostrebła* (Diptera: Streblidae), indicating restricted localities where the last ones were recorded: 1. *Amorphochilus schnablii* Peters and *Synthesiostrebła amorphochili* Townsend – modified of Barquez & Diaz (2008). 2. *Furipterus horrens* (Cuvier) and *Synthesiostrebła cisandina* sp. nov.; 1, Trinidad; 2, Suriname; 3, French Guiana – modified of Miller *et al.* (2008).

RESULTS AND DISCUSSION

Synthesiostrebła Townsend, 1913

Townsend, 1913: 99. Type species: *Synthesiostrebła amorphochili*, by original designation.

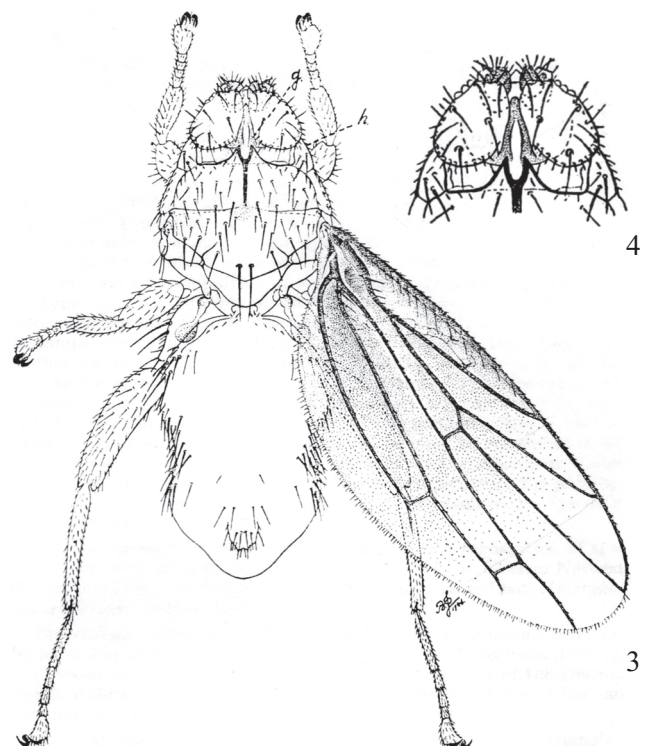
Bequaert, 1942: 85 (key). Jobling, 1947: 39 (redescription). Wenzel *et al.*, 1966: (key).

Diagnosis (modified from Jobling (1947)). Occipital lobes broadly rounded. Mediovertex with elliptical sclerite. Middle of anterior margin of prescutum with 2 closely placed, sharp teeth which fit into grooves on the posterior part of the head (Figs. 3–5); proespisternum 1 strong (Figs. 4–5), with flat projections which fit under posteroventral margin of head. Scutellum broadly triangular, with four setae, two long and discal and two short, each near the lateral margins (Fig. 3). Mesosternum narrower than mesonotum. Leg 3 as long as body (Fig. 3). Tibiae 1 with a row of eight strong setae on the antero-dorsal surface. R vein curved. R_{2+3} up to C. r-m near fork of Rs (Figs. 3, 6).

Synthesiostrebła cisandina sp. nov.

(Figs. 2, 5–9)

Description. Body length (on slide). Holotype female 1.735 mm; male 1.599 mm



Figs. 3–4. *Synthesiostrebła amorphochili*: 3, habitus, dorsal view – after Jobling (1947); 4, head and anterior part of thorax, dorsal view – after Jobling (1949). Abbreviations: G: occipital lobe; h: proespisternum 1.

Head. Laterovortex short, lobed, and with seven setae (Fig. 5). Occipital lobes with 18 sparse setae (Fig. 5).

Thorax. Teeth in the anterior margin of prescutum each with an apical seta (Fig. 5). Five to six spiniform setae near the anterior margin of prescutum. Each side of prescutum with 18 to 21 setae. Longitudinal suture united with transverse suture. Scutum with 24 discal setae and about 10 antescutellar setae (Fig. 6). Two episternal setae. Legs, femur 1 with a row of six strong setae on dorsal surface. Basitarsus 3 as long as following two tarsomeres combined. Wing, R with two setae; $M_4+Cu_1(Cu_1)$ with two long setae (Fig. 7).

Abdomen. Lateral connexivum with long setae. Female. Tergite 7 transverse and united to epiproct, with two pairs of lateral setae of similar length (Fig. 8). Epiproct with four long setae and one pair of discal setae (Fig. 8). Sternite 2 with 19 discal setae and 11 along the posterior margin. Sternite 7 divided in two semicircles, each with 12–13 setae. Male. Sternite 2 with 14 discal setae and eight along the posterior margin. Sternite 5 subtriangular with 27 discal setae and 12 along the posterior margin, some of which are as long or longer than sternite 5. Syntergosternite 7+8 with three setae on each side. Gonopods curved with two gonopophyseal setae of similar length (Fig. 9).

Holotype. 1 female (MZSP), Brazil, Minas Gerais, Itacarambi (44°05'W, 15°05'S) on *Furipterus horrens*, 09/XII/1997; A.A. Azevedo leg.

Paratype. 1 male (MZSP), Brazil, Minas Gerais, Cavernas do Peruaçu National Park (44°27'W, 15°48'S) on *F. horrens*, 10/XII/1997; A.A. Azevedo leg.

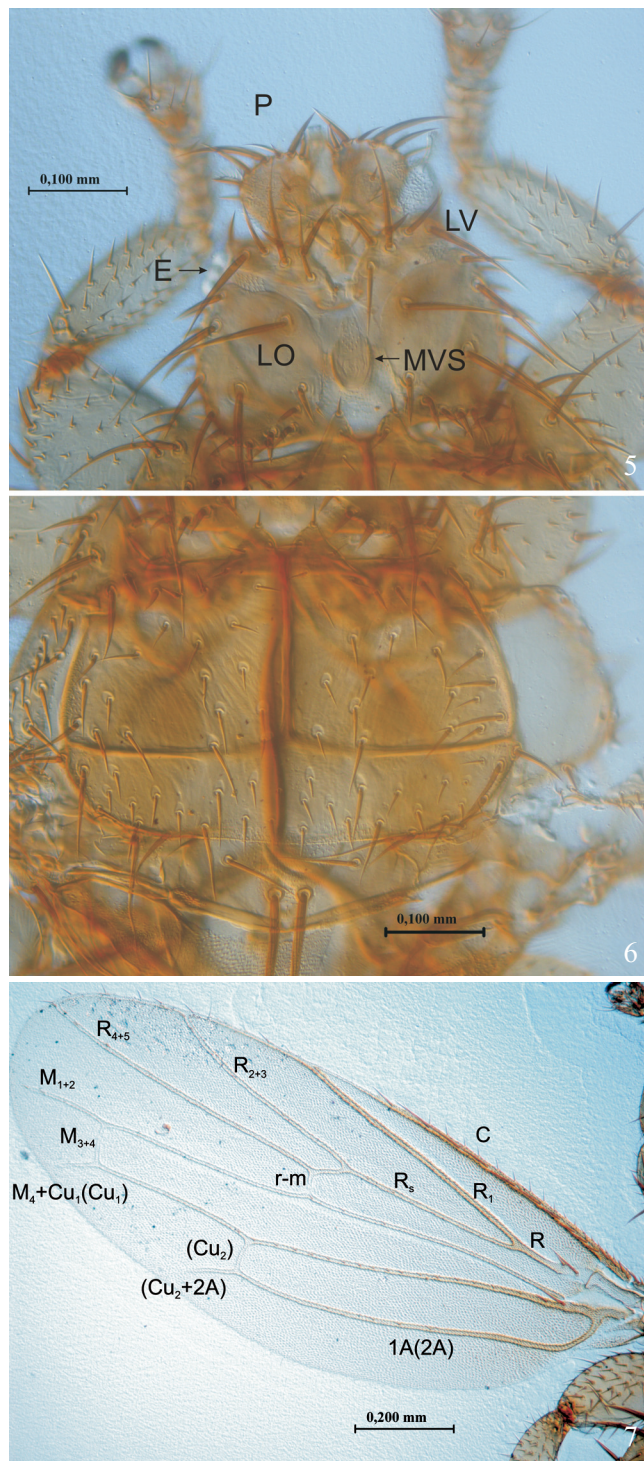
Etymology. The name “*cisandina*” is a reference to “*cisandean*”, signifying that this is the first distributional record of *Synthesiostrebla* from opposite sides of the Andes.

The taxonomic key below can be used to identify only females of *Synthesiostrebla*, because the male of *S. amorphochili* is unknown.

Key to the species *Synthesiostrebla* (females)

1. Body length: 1.0 to 1.4 mm. Occipital lobes greatly developed, covering the laterovortex (Figs. 3–4). Teeth on the anterior margin of prescutum without apical setae. Basitarsus 3 as long as following four tarsomeres combined (Fig. 3). Wing, R with four to five setae; $M_4+Cu_1(Cu_1)$ with three long setae (Fig. 3). Epiproct with two pair of discal setae (Fig. 3) *Synthesiostrebla amorphochili* Townsend
- 1'. Body length: 1.735 mm. Occipital lobes not covering the laterovortex (Fig. 5). Teeth on the anterior margin of prescutum each with an apical seta (Figs. 5–6). Basitarsus 3 as long as following two tarsomeres combined. Wing, R with two setae; $M_4+Cu_1(Cu_1)$ with two long setae (Fig. 7). Epiproct with one pair of discal setae (Fig. 8) *Synthesiostrebla cisandina* sp. nov.

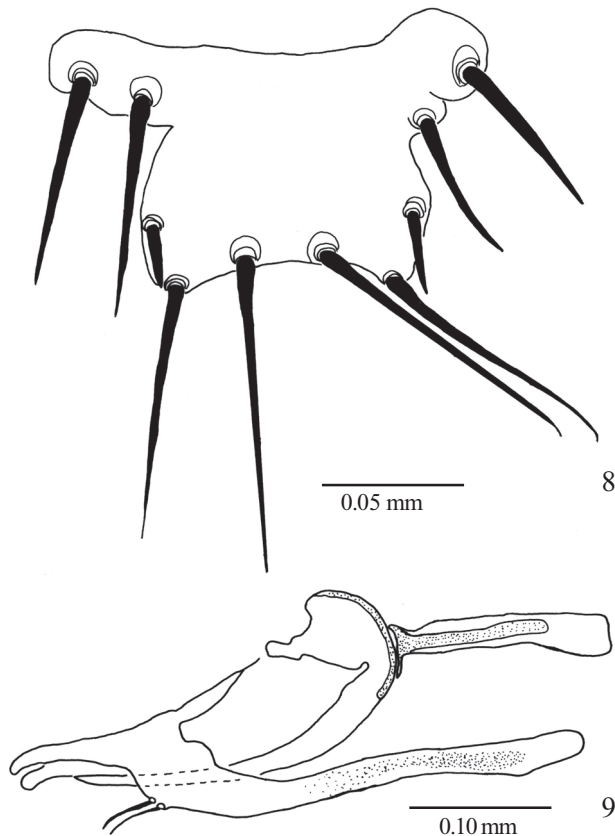
The degree of occipital lobe development, presence of mesonotal teeth and strong proespisternum 1 in *Synthesiostrebla* are characteristics unique among the streblid bat flies. Wenzel *et al.* (1966) aligned (albeit doubtfully), *Synthesio-*



Figs. 5–7. *Synthesiostrebla cisandina* sp. nov.: 5, head, dorsal view; 6, mesonotum; 7, wing. Abbreviations: E: eye; LO: occipital lobe; LV: laterovortex; MVS: mediovertex sclerite; P: maxillary palp.

strebla near to *Trichobius pallidus* within the Trichobiinae.

A female of *T. pallidus* was also collected on the same bat individual that hosted the male paratype of *S. cisandina*. This record re-confirms the relation between this bat fly species and *F. horrens*, as have been related previously (Guerrero, 1994; Gracioli *et al.* 2008).



Figs. 8–9. *Synthesiostrebla cisandina* sp. nov.: 8, tergite 7 and epiproct; 9, male genitalia.

Graciolli & Dick (2009) pointed out that when a bat fly species occurs exclusively on a host species that is threatened or endangered of extinction, it also should receive at least the same heightened status as the host. As *Synthesiostrebla amorphochili* parasites a bat species considered endangered by IUCN (Barquez & Diaz 2008), we consider this bat fly to be endangered as well. However, the same consideration cannot be affirmed for *S. cisandina*.

Parasitological indices are not yet available for *Synthesiostrebla*. Only two specimens of each species are known in the literature. The distribution of these bat flies species likely corresponds to the distribution of their respective host species. Alternatively, *S. cisandina* may be considered rare in nature. Although its host, *F. horrens*, has a wide distribution, it is known to be rare locally (Miller *et al.* 2008). More information is needed to understand these host-parasite relationships.

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