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A revision of *Boreantrops* Kits & Marshall (Diptera: Sphaeroceridae: Archiborborinae)

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Abstract

Boreantrops Kits & Marshall is a recently described genus of flies in the family Sphaeroceridae. Species occur from Brazil and Bolivia north to northern Mexico, mostly in humid montane environments. Two species were included in the genus when originally described, *B. calceatus* (Duda) and *B. mexicanus* (Steyskal). Here we revise the genus to include 32 species, including the following 30 **new species**: *B. albipes*, *B. alytothrix*, *B. apterus*, *B. auranticeps*, *B. avignis*, *B. boliviensis*, *B. challabamba*, *B. costaricensis*, *B. cryptopygium*, *B. durango*, *B. emarginatus*, *B. friburguensis*, *B. guatemalensis*, *B. hispidus*, *B. hondurensis*, *B. inbio*, *B. longiphallus*, *B. masneri*, *B. machinator*, *B. oaxacensis*, *B. peruvianus*, *B. pollex*, *B. punctipennis*, *B. subemarginatus*, *B. subfoveolatus*, *B. suchixtepecensis*, *B. talamanca*, *B. wayqecha*, *B. zacapa*, *B. zamora*. A key is provided for all known species.

Key words: taxonomy, new species, Neotropics, Central America, South America

Introduction

The Archiborborinae is a diverse clade of Neotropical flies. The group, raised to subfamily level by Kits & Marshall (2011), was poorly known until recently. This paper, revising the genus *Boreantrops* Kits & Marshall, completes a series of papers (Kits & Marshall 2011, Kits & Marshall 2013) revising all genera of the subfamily, which now includes 117 described species (92 of those newly described in this series of papers). The true diversity is certainly higher; we have seen nine species in collections represented by only females and thus left undescribed, and there are several areas of the Neotropics (particularly Colombia and northern Peru) that probably host a diverse fauna of archiborborines but have not yet been adequately sampled.

Boreantrops includes the most northerly members of the Archiborborinae; the type species, *B. mexicanus* (Steyskal) was described from near Ciudad Victoria, Tamaulipas, and three species are known from similar latitudes in Durango and Sinaloa. The genus occurs from these localities south through montane Mexico and Central America into the Venezuelan coastal range and the Andes south to Bolivia. It also occurs in southeastern Brazil, and one species has been recorded in the Amazonian lowlands of Peru. The genus is absent from southern South America where other archiborborine genera (*Antrops* Enderlein, *Coloantrops* Kits & Marshall, *Fruillaria* Richards, and *Maculantrops* Kits & Marshall) occur. What little is known of the biology of archiborborines is reviewed in Kits & Marshall (2013).

Boreantrops was described for a distinctive group of archiborborines characterized by reduced sclerotization of the abdominal tergites. Phylogenetic analyses (Kits et al. 2013) delineated the genus as a monophyletic group, probably the sister group to most archiborborines other than the genus *Poecilantrops*. Only two species, *B. mexicanus* and *B. calceatus* (Duda), were included in *Boreantrops* at the time of description, but additional species described here bring the number of described species in the genus to 32. Most species in the genus can be divided into two species groups, with a single additional species representing its own group. *Boreantrops mexicanus* and 18 other species comprise the *B. mexicanus* species group, characterized by a sculptured mesoscutum and males with tab-like structures extending ventrally from the hypandrial arms. The latter character is often visible on undissected specimens (Fig. 24); the tabs project into the posterior part of the genital cavity just anterior to the surstyli. The *B. emarginatus* group includes *B. calceatus* and 11 other species, characterized by the convergence or fusion of the sides of the epandrium between the cerci and anus. *Boreantrops cryptopygium* **sp. nov.** does not belong to either of these groups and represents its own species group; it has entirely sclerotized abdominal tergites 1–4 and in males the hypopygium is retracted within the abdomen when at rest.

Material and methods

This revision is based on approximately 1500 specimens of *Boreantrops*. Most specimens were originally stored in alcohol and critical-point dried for mounting. Genitalia were prepared by removing the entire abdomen or its apical portion and macerating it in hot KOH for several minutes, then neutralizing in glacial acetic acid for 10 minutes before transfer to glycerin for examination and storage. All removed parts are stored under the specimen in plastic genitalia vials.

DEBU); **Cochabamba**: Río Vinto, 80 km E Cochabamba, 2300 m, mixed alder litter, 3 Feb 1999, R. Anderson (1 ♂, DEBU); Sehuencas, 16 km N Monte Puncu, 2219 m, chaco, bait trap (squid carrion), 18 Nov 1993, Parrillo & Rojas (4 ♂, 3 ♀, FMNH); Serranía de Siberia, Chua Khocha, 2360 m, cloud forest, window trap, 26 Aug–6 Sep 1990, P. Parrillo (2 ♂, 2 ♀, FMNH); along Hwy. 7, 1651 m, road cut into forest, bait trap (squid carrion), 19 Nov 1993, Parrillo & Rojas (12 ♂, 7 ♀, FMNH); **Santa Cruz**: Yungas de la Mairana, 2300 m, Yungas, litter, 29 Jan 1999, R. Anderson (1 ♀, DEBU).

Distribution. Across the Bolivian yungas (Fig. 132). Elevations from 1400–2550 m.

Etymology. The species name is from the Greek *kryptos* (hidden) + *pygium* (buttocks), referring to the retracted hypopygium of the males.

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References

- Cumming, J.M. & Wood, D.M. (2009) Adult morphology and terminology. In: Brown, B.V. et al. (Eds.), *Manual of Central American Diptera: Vol. 1*. NRC Research Press, Ottawa, Ontario, Canada, pp. 9–50.
- Duda, O. (1921) *Fiebrigella* und *Archiborborus*, zwei neue südamerikanische Borboriden-Gattungen (Dipteren). *Tijdschrift voor Entomologie*, 64, 119–146.
- Kits, J.H. & Marshall, S.A. (2011) A revision of *Frutillaria* Richards and *Penola* Richards (Diptera: Sphaeroceridae: Archiborborinae). *Zootaxa*, 2863, 1–34.
- Kits, J.H. & Marshall, S.A. (2013) Generic classification of the Archiborborinae (Diptera: Sphaeroceridae), with a revision of *Antrops* Enderlein, *Coloantrops* gen. nov., *Maculantrops* gen. nov., *Photoantrops* gen. nov., and *Poecilantrops* gen. nov. *Zootaxa*, 3704 (1), 1–113.
<http://dx.doi.org/10.11646/zootaxa.3704.1.1>
- Kits, J.H., Marshall, S.A. & Skevington, J.H. (2013) Phylogeny of the Archiborborinae (Diptera: Sphaeroceridae) based on combined morphological and molecular analysis. *PLOS One*, 8, e51190.
<http://dx.doi.org/10.1371/journal.pone.0051190>
- Richards, O.W. (1961) Diptera (Sphaeroceridae) from South Chile. *Proceedings of the Royal Entomological Society of London, Series B*, 30, 57–68.
<http://dx.doi.org/10.1111/j.1365-3113.1961.tb00163.x>
- Roháček, J., Marshall, S.A., Norrbom, A.L., Buck, M., Quiros, D.I. & Smith, I. (2001) *World catalogue of Sphaeroceridae (Diptera)*. Slezské zemské muzeum, Opava, Czech Republic, 414 pp.
- Steyskal, G.C. (1973) A new species of the genus *Archiborborus* Duda from Mexico (Diptera: Sphaeroceridae). *Journal of the Kansas Entomological Society*, 46, 154–157.