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A taxonomic revision of genus *Labrundinia* Fittkau, 1962 (Diptera: Chironomidae: Tanypodinae)

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Abstract

The species of the genus *Labrundinia* (Diptera: Chironomidae: Tanypodinae: Pentaneurini) are revised, described and figured. Keys to known adult males, pupae and larvae are provided. Fourteen previously known species are redescribed, and 25 species from Neotropical region are diagnosed and described as new to science. These species treated are *L. amandae* sp. n., *L. amazonica* sp. n., *L. becki* Beck et Beck, *L. carolae* sp. n., *L. costaricae* sp. n., *L. fera* Roback, *L. fiorelinii* sp. n., *L. fittkai* sp. n., *L. fosteri* Roback, *L. hirsuta* Roback, *L. gregi* sp. n., *L. jasoni* sp. n., *L. johannseni* Beck et Beck, *L. kogilamae* sp. n., *L. longipalpis* Goetghebuer, *L. mayaca* sp. n., *L. meta* Roback, *L. multidentata* sp. n., *L. nathani* sp. n., *L. neopilosella* Beck et Beck, *L. nicaraguensis* sp. n., *L. opela* Roback, *L. panamensis* sp. n., *L. parabecki* Roback, *L. parafittkai* sp. n., *L. parareniformis* sp. n., *L. paravirescens* sp. n., *L. paulae* sp. n., *L. pilosella* Loew, *L. reniformis* sp. n., *L. robacki* sp. n., *L. semicurvata* sp. n., *L. setosa* sp. n., *L. separata* Edwards, *L. sofiae* sp. n., *L. tenata* Roback, *L. trilocida* sp. n., *L. unicolor* sp. n., *L. virescens* Beck et Beck. A diagnosis of the genus is presented and morphological differences to closely related genera are discussed.

Key words: Pentaneurini, non-biting midges, *Labrundinia*, generic diagnosis, new species, keys, taxonomy, immature stages.

Introduction

Species of the genus *Labrundinia* are small dipterans with immatures living in a variety of unpolluted freshwater habitats (Silva *et al.* 2011). The genus belongs to the tribe Pentaneurini and was erected by Fittkau in 1962, based on the Palaearctic *Tanypus longipalpis* Goetghebuer, 1921. Since then, new species have been added to the genus, mostly resulting from research activities by Elisabeth C. Beck, William M. Beck and Selwyn S. Roback, in the 1960's and 1970's. Until the present study, there were few *Labrundinia* species known to science. The Catalogue of Neotropical and Mexican Chironomidae (Spies & Reiss 1996) lists 10 species and the later World Catalogue of Chironomidae (Ashe & O'Connor 2009) lists 15 valid species. Recently, *Labrundinia maculata* Roback was considered to be a junior synonym of *Labrundinia longipalpis* (Goetghebuer) (Silva *et al.* 2011), which decreases the number of valid species in the genus from 15 to 14.

Labrundinia is known from the Neotropical, Nearctic and western Palaearctic regions, although most species have been found in the Neotropics. The immatures live in a variety of aquatic systems, from small streams and ponds to lakes and bays, where the larvae usually live associated with aquatic macrophytes or marginal vegetation in slow flowing streams or rivers. *Labrundinia* species often have been reported as predators and have been recorded in many ecological studies (Trivinho-Strixino & Strixino 1993, Aburaya & Callil 2007, Maltchik *et al.* 2012). A study of the chironomid fauna associated with aquatic macrophytes, in a small reservoir in southeast Brazil, reported *Labrundinia* larvae in high abundances associated with *Salvinia auriculata* rather than *Myriophyllum aquaticum*, which may indicate that larvae of *Labrundinia* have specific habitat preferences (Dornfeld & Fonseca-Gessner 2005).

Phylogenetic relations among known *Labrundinia* species based on partial DNA sequences of the nuclear protein-coding gene CAD and morphological characters suggest that the genus is monophyletic and biogeographical analyses favour a *Labrundinia* ancestor with initial diversification in the Neotropical region (Silva *et al.* in preparation). Silva *et al.* (2013) analysed the applicability of DNA-barcodes for species delimitation and the life stage association of *Labrundinia*. The phylogenetic analyses produced monophyletic groups and barcode clusters which were almost entirely congruent with groups based on morphological features. The only exception was for specimens identified morphologically as *Labrundinia tenata*, which were divided into two well-defined and divergent barcode clusters.

Recent collecting in Brazil revealed numerous new species of *Labrundinia*, which supplemented by undescribed species from Zoologische Staatssammlung München entomology collection, yielded 25 new species. The main aim of this study is to revise and describe unknown and previously known species in the genus *Labrundinia* and to present morphological identification keys to adult males, pupae and larvae.

Taxonomic remarks

Larvae of *Labrundinia* can typically be distinguished by features on the cephalic capsule such as maculation and lateroventral and posteroventral groups of spines, whereas the shape of the thoracic horn and the length of the genital sacs are the main diagnostic characters for the pupae. Regarding the adult males, their morphology-based identification is often difficult, especially for non-experts, and often demands time-consuming genitalic dissections. In descriptions of imaginal stages, abdominal coloration pattern and body size have been largely used as diagnostic features, despite the fact that these characters have been reported to be intraspecifically variable in some genera, particularly in aquatic insects from temperate regions (Kobayashi & Hayashi 2001). The expression of some morphological characters can be affected by environmental conditions, producing a variety of phenotypes. For example, body size is influenced by thermal conditions in *Chironomus plumosus* (Reist & Fischer 1987) and by salinity in *Procladius culiciformis* (Vodopich & Cowell 1984). Thus, while body size is used as a taxonomic character in these taxa, it may not accurately distinguish species. Although abdominal coloration and body size exhibit extensive variation within *Labrundinia*, these features appear to be reliable and sufficient to distinguish most species. Moreover, these characters frequently are the only available features for separation of adults in morphologically similar species. Thus, although future examination of more specimens might increase the intraspecific variation observed for several *Labrundinia* species, we believe that the above described diagnostic characters will remain valid after more immatures are associated and DNA barcodes of additional species are released.

Distribution

The genus *Labrundinia* seems to be primarily a new world genus. There are at least six species in North America. Except for *L. pilosella* they are mostly distributed in eastern or southeastern USA (Roback 1987a). *Labrundinia separata* is the only southern South American species described to date, while *L. longipalpis* has a Holarctic distribution. In this paper, we described 21 new species from Brazil, a number that appears to be incipient, since there are still numerous undescribed morphotypes from this region (Ospina-Torres 1992, Wiedenbrug 2000, Trivinho-Strixino 2011). Moreover, we recorded four species from Central America and six from Colombia; *L. tenata* originally described from Colombia, also occurs in Brazil. Although Roback (1987a) described five morphotypes from Colombia based on larval stages, none of the adults here redescribed from this area could be associated with this material with certainty. Since it is common to find more than one *Labrundinia* species at the same locality, we are reluctant to associate the adults of the new species with the larvae previously described from the same region.

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