



## Comparative morphology of the male terminalia of the subtribe *Rhinotorina* (Diptera, Heleomyzidae, Rhinotorini)

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### Abstract

The Rhinotorini (Diptera, Heleomyzidae) are currently divided into three subtribes, which were considered as monophyletic groups. Rhinotorina, the main focus of this study includes *Rhinotora* Schiner, *Apophoneura* Malloch, *Neorhinotora* Lopes, and *Rhinotoroides* Lopes. This study is aimed to provide a hypothesis of homology among the structures of the male terminalia of the four genera of Rhinotorina, as well as to reassess the diagnostic features proposed by D. McAlpine for the subtribe, and to furnish new information about the morphology of these structures, particularly of the hypopygium. Species of the four genera of Rhinotorina were studied, as well as species of other subtribes of Rhinotorini. The putative synapomorphies for the Rhinotorina stated by D. McAlpine are considered here to be consistent, being observed in the four genera included in the present study. The hypopygium in Rhinotorina, in contrast, is very variable, and the study of its structures has added only one diagnostic feature to Rhinotorina: the presence of a ventral plate on the hypandrium. The degree of variation is not equivalent among the structures of the hypopygium: the surstyli are the most variable structures in *Neorhinotora*, and are very useful to diagnose species, and the shape of the epandrium, bacilliform sclerites, cerci, phallus, ejaculatory apodeme, phallapodeme, and hypandrium are very conservative in this genus. In *Rhinotora*, on the other hand, whereas the cerci, surstyli, phallus, phallapodeme, and postgonites vary widely among the species, the shapes of the bacilliform sclerites and the ejaculatory apodeme are relatively constant. The comparisons made among the male terminalia of Rhinotorina suggest that this set of structures is a promising source of informative characters for future phylogenetic studies of Rhinotorini and Heleomyzidae.

**Key words:** Heteromyzidae, Acalyptratae, male genitalia, protandrium, *Cairnsimyia*, *Anastomyza*

### Introduction

Rhinotorini are rarely collected acalyptrate flies (*Eremoneura*, *Cyclorrhapha*, *Schizophora*), whose adults have been found on exudations on tree trunks (D. McAlpine 1985) and attracted by decomposing fruit (Guimarães & Papavero 1966; J. McAlpine 1987).

This group was first treated as Rhinotorinae, within the Ropalomeridae (Williston 1896), but it was later treated by several authors as a separate family, Rhinotoridae (*e.g.*, Hendel 1916; Brues & Melander 1932; Wheeler 1954; Steyskal 1957; Hennig 1958; 1971; 1973; D. McAlpine 1958; J. McAlpine 1987, 1989; Foote 1965; Guimarães & Papavero 1966; Papavero 1967; Griffiths 1972). In recent decades, however, this group has been primarily considered as a tribe of Heleomyzidae (D. McAlpine 1968, 1985; Sinclair & McAlpine 1995; Almeida & Ale-Rocha 2008) or Heteromyzidae (Heleomyzidae plus Sphaeroceridae; D. McAlpine 2007).

In addition to the changes in taxonomic status of these flies, there have been disagreements concerning the inclusion or exclusion of the genera *Anastomyza* Malloch, *Apophoneura* Malloch, and *Tapeigaster* Macquart. According to D. McAlpine (1968), Rhinotorini only comprise the genera *Cairnsimyia* Malloch, *Neorhinotora* Lopes, *Rhinotora* Schiner, and *Rhinotoroides* Lopes. Later on, D. McAlpine (1985) added the genera *Anastomyza*, *Apophoneura*, and *Zentula* McAlpine to the tribe. Following the description of *Zinza* by Sinclair & McAlpine (1995), the tribe is presently comprised of eight genera and 41 named species.