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## **Review of the brachypterous, micropterous, and apterous Braconidae of the cyclostome lineage (Hymenoptera: Ichneumonoidea) from the Palearctic Region**

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## Abstract

The Palearctic species of Braconidae with brachypterous, micropterous, or apterous modification are discussed. The following new species are described: *Chremylus planispinus* Belokobylskij (France, Algeria), *Chremylus algecirasus* Belokobylskij (Spain), *Pambolus erogolus* Belokobylskij (Mongolia), *Pambolus ovchinnikovi* Belokobylskij (Kyrgyzstan), *Hormius stauropolicus* Belokobylskij (Russia (North Caucasus)), *Bracon (Habrobracon) barbieri* Belokobylskij (Algeria), and *Panerema kamtshatica* Belokobylskij (Russia (Kamchatka)). The following species are re-described: *Heterospilus hemipterus* (Thomson) (male and female), *Chremylus pomonellae* (Atanasov) (male, female and macropterous form), *Hormius minialatus* Tobias (female), and *Aleiodes (Chelonorhogas) hemipterus* Marshall (male and female). *Lituania brachyptera* Jakimavicius, 1968 is a new synonym of *Eurybolus hemipterus* Thomson, 1892. *Chremylus pomonellae* (Atanasov), new combination, is transferred from *Rhyssalus*. *Aleiodes hemipterus* is placed in the subgenus *Chelonorhogas* Enderlein. *Asobara subalata* (Zaykov & Fischer) is returned from *Phaenocarpa* Foerster. New distribution records are reported for *Ecphylus (Sactopus) caudatus* Ruschka, *H. hemipterus*, *Rhaconotus hispanicus* Belokobylskij, *Pambolus tricolor* (Ruthe), *Hormius minialatus* Tobias, *A. (C.) hemipterus*, and *Pseudopezomachus kasparyani* Tobias. A key for identifying all Palearctic flightless cyclostome braconid species, and the genera in which they are placed, is provided. A discussion about the diversity, morphological characters, and natural history of wing size reduction, and possible reasons for flightlessness, is provided.

**Key words:** descriptions, distribution, identification, key, new species, new records, parasitoid, taxonomy

## Introduction

Reduction in wing size (together with venation) resulting in brachyptery, microptery, and aptery occurs in several hymenopteran groups (Reid 1941; Brothers 1975; Rasnitsyn 1980; Hölldobler & Wilson 1990). A loss of flight after wing size reduction in these hymenopterans leads to replacement of the ecological niche; for parasitoids it restricts the availability of potentially suitable hosts. Morphological transformation of the mesosoma sometimes accompanies wing size reduction. Notably, the mesothorax is reduced to varying degrees, and the prothorax and propodeum are correspondingly enlarged due to the main locomotor function changing from wings to legs. Further, sutures and depressions of the mesosoma are reduced and sometimes absent; in some cases deep constrictions develop between metasomal segments (Reid 1941).

Most species of Braconidae are macropterous and have 4–7 cells enclosed by veins (van Achterberg 1993; Wharton *et al.* 1997). However, 85 species are listed as exhibiting brachyptery or aptery in Yu *et al.* (2005). Addi-