



Coxal combs in the Cydnidae *sensu lato* and three other related “cydnoid” families – Parastrachiidae, Thaumastellidae, Thyreocoridae (Hemiptera: Heteroptera): functional, taxonomic, and phylogenetic significance

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Abstract

Coxal combs are described for 26 species of 21 genera, representing all currently recognized subfamilies and their tribes within the Cydnidae *sensu lato* (i.e., Amnestinae; Amaurocorinae; Garsauriinae; Cephaloctrineinae: Cephaloctrineini and Scaptocorini; Cydninae: Cydnini and Geotomini *s. lato*; Sehirinae: Sehirini *s. lato*). In addition, *Thyreocoris scarabaeoides* Linnaeus, 1758, and *Strombosoma impictum* Amyot et Serville, 1843 (Thyreocoridae); *Thaumastella aradooides* Horváth, 1896 (Thaumastellidae); and *Parastrachia japonensis* (Scott, 1880), *P. nagaensis* Distant, 1908, *Dismegistus binotatus* (Westwood, 1837), and *D. fimbriatus* (Thunberg, 1783) (currently placed within Parastrachiidae), have also been studied. 22 species were investigated using SEM techniques for the first time. Three basic types of setae, making up the coxal comb, were recognized during the study, i.e., stout setae, gutter-like setae, and scale-like setae. Two main types of the coxal combs are described, i.e., (1) the coxal comb composed of an irregular row of long, apically sharpened, stout setae (Cydnidae: Cephaloctrineinae: Scaptocorini; and Parastrachiidae), and (2) the coxal comb composed of a regularly aligned row of gutter-like or scale-like setae (all other subfamilies and tribes of the Cydnidae *s. lato*, Thaumastellidae, and Thyreocoridae). Functional, taxonomic, and phylogenetic significance of the coxal combs is also briefly discussed.

Key words: Hemiptera, Heteroptera, Cydnidae *s. lato*, Parastrachiidae, Thaumastellidae, Thyreocoridae, coxal combs, morphology, SEM, phylogeny, classification

Introduction

The occurrence of the coxal combs (an array of stout setae, usually more or less flattened, present on the distal margin of coxae, addressed to the surface of the trochanters), unknown elsewhere in the Heteroptera, was always regarded as one of the most important characters defining the family Cydnidae within the superfamily Pentatomoidea, regardless of its subfamilial composition (e.g., Froeschner 1960; Dolling 1981; Gapud 1991; Lis 1994; Schuh and Slater 1995; Schaefer 2003; Grazia *et al.* 2008).

Such an array of setae was also found in Thyreocoridae, including Corimelaeninae (e.g., McAtee and Malloch 1933; Schuh and Slater 1995; Grazia *et al.* 2008), and Thaumastellidae (e.g., Dolling 1981; Jacobs 1986, 1989; Schuh and Slater 1995; Grazia *et al.* 2008).

A similar structure composed of an irregularly placed setae was documented also for Parastrachiidae (e.g., Dolling 1981; Schaefer *et al.* 1988, 1991; Sweet and Schaefer 2002; Schuh and Slater 1995; Grazia *et al.* 2008), but usually, it was not considered as homologous to “true” coxal combs. Admittedly Schuh and Slater (1995), in their key to subfamilies of the broadly conceived Cydnidae, treated such a structure as a type of coxal combs, but only Grazia *et al.* (2008) regarded the coxae with all kind of armature, i.e., with “fringes of setae, bristles or scales” as an apomorphic state within Pentatomoidea.

In addition, the Cyrtocoridae were documented as having coxal combs (Schaefer *et al.* 1988), but then (Packauskas and Schaefer 1998; Schaefer *et al.* 1998) it was proven to be untrue for both their adult and larval stages.