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Morphological features of the eggs of Pentatomidae (Hemiptera: Heteroptera)*

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Abstract

Eggs of 14 species within two subfamilies (Edessinae and Pentatominae, tribes Carpocorini, Nezarini, Pentatomini, Procleticini, and one unplaced species) of neotropical pentatomids were studied with scanning electron microscopy, and their external morphology was characterized in detail (chorion surface, operculum, and aero-micropylar processes). Eggs of these species have similar characteristics to those already described for other pentatomids. Most of them are barrel-shaped, except in *Edessa meditabunda* (with spherical eggs) and *Odmalea basalis* (whose eggs have flattened lateral faces). A "T"-shaped *ruptor ovis* is present in all studied species; eclosion line at the operculum rim may be visible or not. Average size of eggs (length x width) ranges from 0.9 ± 0.12 x 0.9 ± 0.05 mm (*Euschistus picticornis*) to 2.1 ± 0.12 x 1.7 ± 0.10 mm (*Chinavia erythrocnemis*); the number of the aero-micropylar processes ranges from 10 (*C. musiva*) to 86 (*C. obstinata*). Chorion surface has a variable aspect: eggs of *Euschistus* spp., *Loxa deducta*, and *Pallantia macunaima* have the spinose chorion type; *C. erythrocnemis*, *C. longicorialis*, *C. obstinata*, *C. pengue*, and *Grazia tincta* have a reticulate chorion; *C. musiva*, *O. basalis*, and *E. meditabunda* have a granulated chorion; and *Thyanta humilis* has a salebrose chorion type. All the species with described eggs in the Edessinae share the same diagnostic features. In Pentatominae, we did not identify shared characters among the species at subfamily or tribe level. Chorion sculpture pattern and aero-micropylar processes shape, as well as number, are diagnostic features at genus level; however, a few species could be identified in the egg stage.

Key words: Aero-micropylar processes; chorion sculpture; immature stages; stink bugs

Introduction

The immature stages of Heteroptera have provided important characters for classification and phylogeny construction (Southwood 1956; Cobben 1968; Schuh 1979; Hasan & Kitching 1993; Wheeler *et al.* 1993; Henry 1997; Grazia *et al.* 2008). Among Heteroptera, pentatomids are considered the best studied group concerning the earlier stages of development (Yonke 1991). A preliminary list reveals 140 of almost 5,000 known species of Pentatomidae have eggs and/or nymphs described (Table 1). The egg is considered the less studied stage (Bundy & McPherson 2000); yet more species have the egg described in this family than in any other heteropteran family (Southwood 1956; Hinton 1981).

Eggs of Pentatomidae can be easily recognized by their characteristic shape and variable degree of chorion ornamentation (Heidemann 1911; Esselbaugh 1946; Yonke 1991). Several studies have recognized important characters for genera and species identification (Esselbaugh 1946; Hinton 1981; Lambdin & Lu 1984; Saini 1984; Javahery 1994; Bundy & McPherson 2000; Candan *et al.* 2001).

The eggs, always oviposited in clusters, are barrel-shaped and cylindrical or spherical (Esselbaugh 1946; Southwood 1956; Hinton 1981). Chorion surface may present very striking sculpture patterns: smooth, granulated, reticulated, spinose, and salebrose (Heidemann 1911; Esselbaugh 1946; Southwood 1956; Javahery 1994; Bundy & McPherson 2000; Wolf & Reid 2001). An operculum (or pseudoperculum, see discussion in Wolf & Reid 2001), which corresponds to the portion of the anterior pole that is lifted during hatching, seems to be always present and is surrounded by a ring of aero-micropylar processes (Heidemann 1911; Esselbaugh 1946; Southwood 1956; Brailovsky *et al.* 1992; Wolf & Reid 2001). These processes participate in the gas exchange and in the fertilization of the egg, and may show variable morphology (Southwood 1956; Cobben 1968; Hinton 1981; Javahery 1994). The *ruptor ovis* (or egg-burster), a sclerotized "T"-shaped structure that allows the rupture of the chorion during hatching, is also present in pentatomids (Heidemann 1911; Southwood 1956; Javahery 1994).

The detailed study of these structures, using scanning electron microscopy, has allowed the revision of terminology and recognition of patterns within the family (Lambdin & Lu 1984; Candan & Suludere 1999a, b, 2006; Suludere *et al.* 1999; Bundy & McPherson 2000; Candan *et al.* 2001, 2005; Wolf & Reid 2001, 2003, 2004; Wolf *et al.* 2002).