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## Morphology of spermathecae of some pentatomids (Hemiptera: Heteroptera: Pentatomidae) from Turkey

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### Abstract

The spermathecal morphology of nine species belonging to the Pentatomidae (Insecta: Heteroptera) were compared by optical and scanning electron microscopy (SEM). Among the examined species [*Rhaphigaster nebulosa* (Poda 1761), *Palomena prasina* (Linnaeus 1761), *Piezodorus lituratus* (Fabricius 1794), *Graphosoma lineatum* (Linnaeus 1758), *Graphosoma semipunctatum* (Fabricius 1775), *Aelia albovittata* (Fieber 1868), *Codophila varia* (Fabricius 1787), *Ancyrosoma leucogrammes* (Gmelin 1790), *Nezara viridula* (Linnaeus 1758)], all spermathecae contained a spermathecal bulb (reservoir), a pumping region, distal and proximal flanges, proximal and distal spermathecal ducts, dilation of spermathecal duct and a genital chamber containing two ring sclerites, but each species had a different spermathecal morphology.

**Key words:** Spermathecal bulb, Flange, Spermathecal duct, Scanning electron microscope, SEM

### Introduction

The insect spermatheca is a female reproductive accessory organ present in all hexapodan orders except Protura and Collembola (Matsuda 1976). The spermatheca plays a significant role in many functions e.g; sperm storage, copulation, fertilization and oviposition (Gaffour-Bensebban 1991, 1994). The spermatheca is located on the dorsal side of the common oviduct (Dallai *et al.* 1975, Palit & Pal 1999, Costa- Leonardo & Patricio, 2005). In the vast majority of insects, spermatozoa are transferred to the oviduct during copulation. Thereafter, spermatozoa are stored in the spermatheca where these remain until they are used for the fertilization of eggs. The period of storage can be different among insects groups, from hours to months and in exceptional cases such as the honey bee, sperm may be stored in the spermatheca for years (Davey 1965, Davey & Webster 1967, Villavaso 1975).

In most Heteroptera, the structures of the spermatheca show a varied and often highly complex diversity and has been found to exhibit many important characters used in taxonomy and phylogeny (Pendergrast 1957). Conversely, in some Heteroptera the spermatheca has been completely lost, while in others the spermatheca has lost its primary function of storing sperm (Dupuis & Carvalho 1955, Dupuis 1970).

The first study of the spermatheca of Hemiptera was carried out by Dufour (1833), who erroneously regarded this organ as a sebaceous gland in which oil may have been produced. Siebold (1837) published the earliest correct description of a spermatheca (as reseptaculum seminis) in Pentatomomorpha. Three fundamental works on the structure of the female genitalia in Hemiptera were published by Dupuis (1955), Pendergrast (1957), and Scudder (1959). Two very important works on the female and male genitalia of Pentatomoidea were published by Kumar (1962) and McDonald (1966). In recent years, morphological studies of Hemiptera spermatheca have been conducted by many investigators (Servadei 1964, Vavrinova 1988, Kim & Lee 1994, Gschwentner & Tadler 2000, Brailovsky & Barrera 2001, Kocorek & Danielczok-Demska 2002, Candan *et al.* 2007, Candan 2008, Pluot-Sigwalt & Lis 2008, Candan *et al.* 2010, 2011, 2012, 2014, Stacconi & Romani 2011). As a result of all these studies, it is safe to state that the structure of the spermatheca in the Heteroptera is complex and diverse, being a source of valuable systematic characters. The morphology of the spermatheca is useful for classification, because they show a great diversity among species and genera. The aim of the present work is to describe the structure of

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