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## Morphological diversity of the labial sensilla of phytophagous and predatory Pentatomidae (Hemiptera: Heteroptera), with reference to their possible functions

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### Abstract

Sensory structure on the labial surface of five genera of Pentatomidae (Hemiptera: Heteroptera) belonging to two subfamilies *i.e.* Asopinae and Pentatominae have been studied using Scanning Electron Microscopy. Three representatives of the subfamily Pentatominae (phytophagous)—*Dolycoris indicus* (Stal), *Plautia crossota* (Dallas) and *Piezodorus hybneri* (Gmelin) and two of Asopinae (predatory)—*Perillus bioculatus* (Fabricius) and *Eocanthecona furcellata* (Wolff) were studied to morphologically characterize and compare the sensory structures present on the labium. Six types of labial sensilla were found on their labial tip and surface. The labial sensilla identified were sensilla peg (SP), basiconica (SB), campaniformia (SCa), chaetica (SCh), styloconica (SStc) and trichodea (ST). Their possible functions were discussed relating to morphology and location. A new form of sensilla basiconica was also observed in *D. indicus*. Sensilla styloconica were restricted only to the predatory pentatomid bugs. Cuticular projections (Cpr) on the sensorial region of the studied pentatomids were also observed along with labial cuticular pores.

**Key words:** Labial sensilla, Pentatomidae, phytophagous, predatory, scanning electron microscope

### Introduction

Insects use their sensory organs extensively during every step in host probing, acceptance and feeding. In Hemiptera, the mouthparts consisting of a short, conical labrum and a longer segmented labium, bisected by a labial groove within which lie the mandibular and maxillary stylets. Generally, the labial tip is bilobed with symmetrically distributed sensilla grouped into sensory fields (Foster *et al.* 1983; Backus 1985), but in some taxa of Heteroptera a tripartite labial tip was also observed (Cobben 1978; Brożek & Zettel 2014). Feeding on plant and prey requires specialization of mouth parts, digestive tract, enzyme complexes, and biochemical pathways (Cohen 1990; Terra & Ferreira 1994). The antennae and maxillary palps of adult insects are important sensory receptors implicated in various behaviors during adult life. These sensilla perform specific functions to adapt to their habitat (Chapman 1982). Nevertheless, in heteropterans sensilla also occur on two sensory fields of the lateral lobes of labium. The labial sensilla provide a direct link between the insect and the host, enabling them to monitor the chemicals from the external surface of the hosts. The labial sensilla in most of the hemipterans perform both chemosensory and mechanosensory functions while exploring the host surface. The Heteroptera and the Auchenorrhyncha shows a similar labial sensory structure with great variability and diversity than the Sternorrhyncha (Backus 1988).

The Pentatomidae, generally called stinkbugs is one of the largest families within the Heteroptera with about 5,000 known species occurring worldwide (<https://www.ndsu.edu/ndsu/rider/Pentatomoidea/>). Members of this family show diverse feeding habits *i.e.* phytophagy, zoophagy and omnivory (Boyd *et al.* 2002). Generally, they are highly specialized plant-feeder however contains very few, non-phytophagous taxa. Predatory stink bugs prefer