FINE STRUCTURE OF SELECTED MOUTHPART SENSORY ORGANS OF GYPSY MOTH LARVAE

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ABSTRACT

Gypsy moth larvae, *Lymantria dispar* (L.), are major pest defoliators in most of the United States and destroy millions of acres of trees annually. They are highly polyphagous and display a wide host plant preference, feeding on the foliage of hundreds of plants, such as oak, maple, and sweet gum. Lepidopteran larvae, such as the gypsy moth, depend largely on their gustatory and olfactory sensory organs (sensilla) to find food sources. Feeding behavior is controlled by input from the mouthpart gustatory sensilla. The majority of these larvae possess four types of bilateral gustatory sensilla. One type, the lateral and medial styloconic sensilla, is thought to play a decisive role in host plant selection behavior. These sensilla are in continuous contact with plant sap during feeding and are capable of detecting different phytochemicals. These sensilla were examined using both scanning and transmission electron microscopy. Ultrastructural examination of the styloconic sensilla of fifth instar larvae revealed that each sensillum is comprised of a small cone inserted into a tall style. Each sensillum is ≈ 70 um in length and 30 um in width and consists of a single sensory peg inserted into the socket of a large style. Each peg bears a slightly subapical terminal pore averaging 317 nm in lateral and 179 nm in medial sensilla and houses five bipolar neurons. The proximal dendritic segment of each neuron gives rise to an unbranched distal dendritic segment. Four of these dendrites terminate near the tip of the sensillum below the pore and bear ultrastructural features consistent with contact chemosensilla. The fifth distal dendrite terminates near the base of the peg and bears ultrastructural features consistent with mechanosensilla. Thus, each sensillum bears a bimodal chemo-mechanosensory function. The distal dendrites lie within the dendritic channel and are enclosed by a dendritic sheath. The intermediate and outer sheath cells enclose a large sensillar sinus, whereas the smaller ciliary sinus is enclosed by the inner cell. The neurons are ensheathed successively by the inner, intermediate, and outer sheath cells. The results of this morphological research allow us to more easily characterize the neurophysiological responses of gustatory receptor neurons housed within these sensilla, which is research currently ongoing in the laboratory. It also allows us to further our understanding about the processing of gustatory information by these taste organs.

This research was supported by NIH grant 1R15DC007609-01 awarded to V.D.C. S.