

STUDIES ON THE FUNCTION OF THE MEMBRACID PRONOTUM (HOMOPTERA) II. HISTOLOGY

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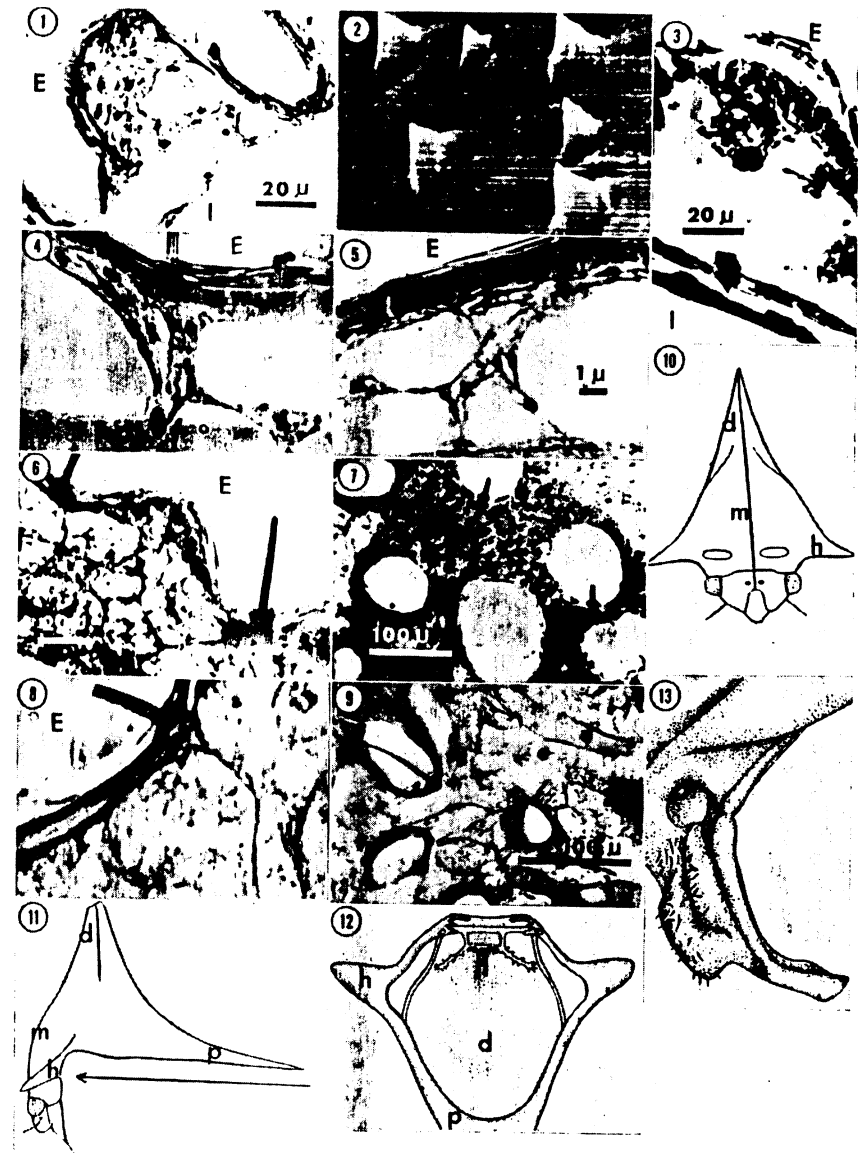
ABSTRACT—The membracid pronotum historically has been considered an ornamental and protective structure with no physiological function. This paper demonstrates the pronotum of *Umbonia crassicornis* to be a complex cellular structure permeated with trachea suggesting a high metabolic rate. Two types of cells which may be secretory in function are present. Nerves in association with trichoid sensilla offer further evidence that the pronotum may have a sensory function.

Membracidae are characterized by an enlarged pronotum, which takes many bizarre forms. Poulton (1903) and Funkhouser (1951) discussed crypsis, mimicry, aposematic display and shape as possible functions of the pronotum, but these contentions lack experimental verification. Funkhouser (1951) stated that even the hairs and punctations (pits) on the pronotum were not functional since he found no evidence of nervous, tracheal or glandular connections. He concluded that pronotal structures were not involved in any physiological processes and were "merely hollow extensions of the chitinized wall." In contrast Wood and Morris (in press) demonstrated the general occurrence of trichoid sensilla and pits on the membracid pronotum, which implied a sensory function for the pronotum. These conflicting statements led me to reexamine the histology of the pronotum and demonstrate its cellular nature.

METHODS

The pronotum with head attached was removed from live *Umbonia crassicornis* (Amyot and Serville) and fixed in a modified Carnoy's fixative (Salt-house, 1958). Tetrahydrofuran was used for dehydration, the pronotum was then double embedded with paraloidin and paraffin. Paraffin infiltration was done under vacuum. Serial longitudinal, horizontal, and cross sections were made and stained with Delafield's hematoxylin and eosin Y. The Ramon y Cajal's

Fig. 1-13, illustrations and photomicrographs of the pronotum of *Umbonia crassicornis* Amyot and Serville. Symbols: E = exterior cuticle, I = interior cuticle, d = dorsal horn, m = metopidium, h = humeral horn, p = posterior process, c.s. = cross section, l.s. = longitudinal section. 1, relationship between (c.s.) cuticular layers and pits. 2, scanning electron micrograph of conical projections on interior cuticular surface. 3, secretory cells (c.s.) below exterior and interior cuticle. 4, trichoid sensilla with elongate cells (c.s.) at base of hair. 5, squamous epithelial cells (c.s.) lining exterior cuticle. 6, two adjacent pits



(c.s.) demonstrating secretory cells below exterior cuticle. The relationship between trichoid sensilla and the nerve at base of hair is also shown. 7, dorsal horn (l.s.) with exterior cuticle removed. 8, nerve along pit (c.s.) with a peripheral fiber to interior cuticular surface. 9, humeral horn (c.s.) demonstrating trachea. The arrow indicates view of Fig. 12. 12, a posterior-ventral view of metopidial surface showing the transverse and lateral ridges. 13, frontal view of eye fossa showing position of exterior opening to transverse and lateral ridges.