

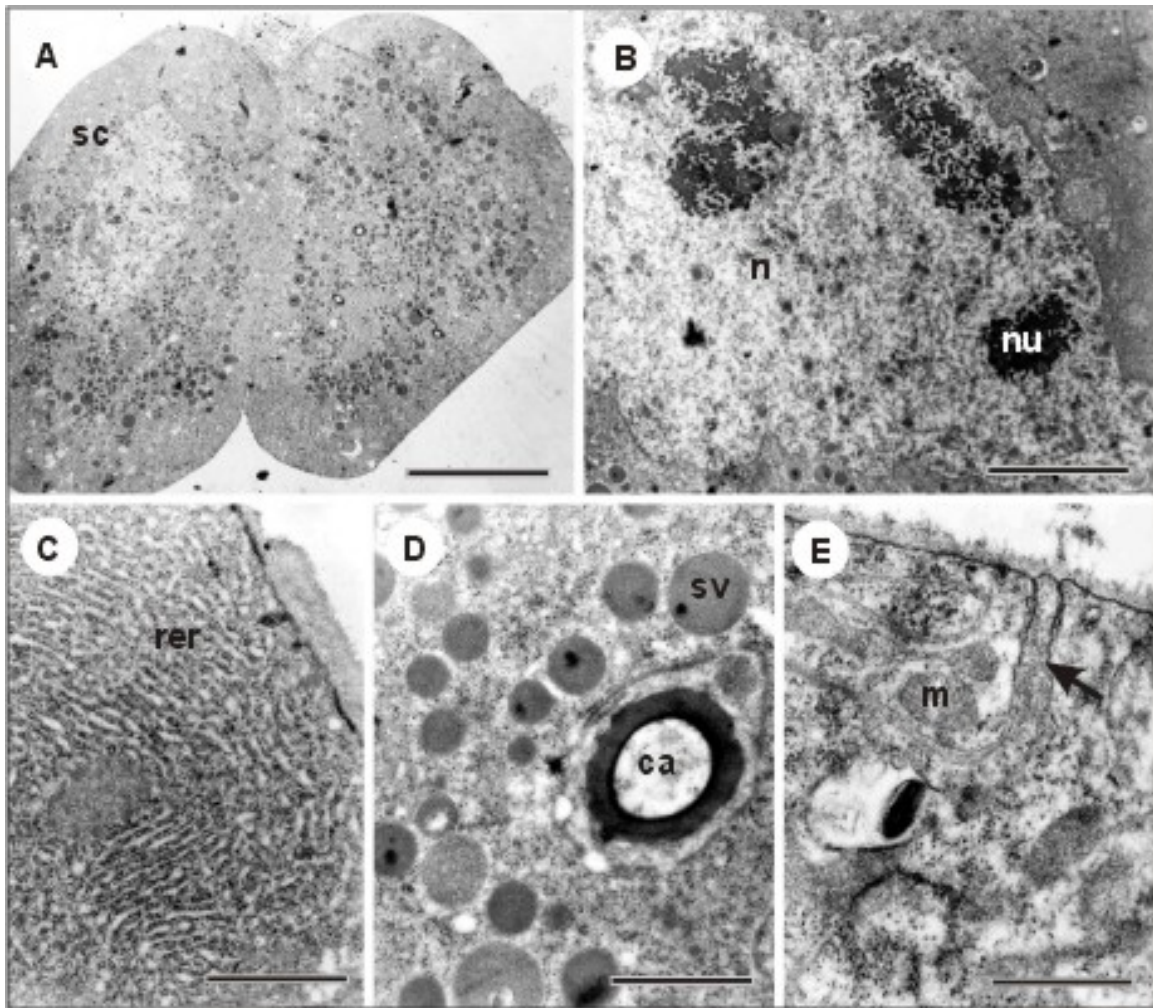
**MORPHOLOGICAL CHARACTERIZATION OF THE HYPOPHARYNGEAL GLANDS' SECRETORY CELLS IN THE PRIMITIVE SOCIAL WASP *Polistes versicolor* (OLIVIER) (HYMENOPTERA: VESPIDAE).** Fábio B. Britto (1), Flávio H. Caetano (1). (1) Universidade Estadual Paulista, Instituto de Biociências de Rio Claro, P.O. Box 199, CEP 13506-900, Rio Claro, SP, Brazil. E-mail: fbbritto@rc.unesp.br

The exocrine glands are structures very important in insects' life. They have important roles in the production of digestive enzymes, pheromones and defense substances like venoms and repellents [1,2,3]. One of these glands, known as hypopharyngeal, is exclusive of the Hymenoptera order and has been well studied in social bees, like *Apis mellifera*. In this insect the hypopharyngeal glands (HGL) produce the royal jelly that is used to feed the brood [3]. However, in the most primitives Hymenopterans the HGL have just few studies [4]. The aims of this study were to determine the morphological aspects of the HGL's secretory cells in the primitive social paper wasp *Polistes versicolor*. The genus *Polistes* is considered the "key genus" for understanding the evolution of social insects, mainly because of the absence of morphological differences between castes and, also, because of its wide distribution along the different climate areas of the world [5]. To process the *P. versicolor*'s HGL, the specimens were captured in their nests and anesthetized with gradual degree of the temperature up to 4°C. Then, their glands were removed with the aid of tweezers, microscissors and stereomicroscope. The glands were transferred to the fixative glutaraldehyde 2,5% in sodium-cacodilate buffer 0,1M (pH 7,2), where they were kept for 2 hours. After this procedure the glands were washed twice with sodium-cacodilate buffer, for 15 minutes, and transferred to Osmium Tetroxide 1% in the same buffer, for 2 hours. The glands were, once more, washed twice in sodium-cacodilate buffer and, then, transferred for a solution of ethanol 10%, during 15 minutes. After that, the glands were contrasted with Uranil Acetate, for 4 hours. The material was dehydrated with acetone and embedded in Epon resin, being, later, sectioned in Sorval MT-2 ultra-microtome. The ultrathin sections were contrasted with Uranil-Acetate (45 minutes) and Lead-Citrate (10 minutes) and, then, analyzed in the Philips CM100 TEM. The *P. versicolor*'s HGL are constituted by unicellular secretory unities (Fig. 1A), being different from the *A. mellifera* glands, that present multi-cellular secretory unities, besides the differential anatomy [3]. However, it was observed that the general aspects of each secretory cell in both species are similar [3]. The studied specimens of *P. versicolor* presented high developed nuclei with some nucleoli and large amount of euchromatin (Fig. 1B). The rough endoplasmic reticulum is well developed (Fig. 1C), showing the high level of protein synthesis, that could be proved by the large number of secretory vesicles stored in the cytoplasm (Fig. 1A and 1D). The plasmatic membrane presented deep invaginations in all its extension and, near them, there were mitochondria (Fig. 1E). Like in bees, it was not observed the Golgi apparatus, being suggested that the final constitution of the secretion is reached in the rough endoplasmic reticulum. The general morphologic pattern of the secretory cells in ants is also similar to that found in social bees and *P. versicolor*, in spite of the presence of few Golgi apparatus in some species [6]. However, the differential anatomy of this gland in the different species indicates that its function might not be the same. In *A. mellifera*, for example, just the workers have HGL, since its secretion is produced to feed the brood and this activity is exclusive of this caste. In males and queens, the HGL are atrophied [3]. In *P. versicolor* the division of tasks occurs according to the needs of the colony, so the individual specialization is not observed. Besides it, the HGL have been found well developed in all individuals of the colony, independent of their cast, sex or activity performed. The males presented glands with the same characteristics of the females, being also found a large amount of secretory vesicles. Thus, in this wasp, the HGL might not be related with some social activity and its function might be important in the individual aspect, like in the production of some digestive enzyme, for example. This enzyme could be used by the imago, during the activity of macerating the prey, since *P. versicolor* is a predatory species.

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**Figure 1.** (A) General aspect of the hypopharyngeal glands' secretory cells (sc) (bar = 16 $\mu$ m). (B) Detail of the nucleus (n) and nucleolus (nu) (bar = 6 $\mu$ m). (C) High developed rough endoplasmic reticulum (rer) (bar = 1,7 $\mu$ m). (D) Secretory vesicles (sv) stored in the cytoplasm near the canaliculus (bar = 0,12 $\mu$ m). (E) Peripheral region of the secretory cell showing the deep invaginations of the plasmic membrane (arrow) and some mitochondria (m) around (bar = 0,75 $\mu$ m).