

Ultrastructure of the mandibular glands of eusocial bees: a comparative study.

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The mandibular glands are paired structures localized in the head of the bees, opening in the base of the mandibles. The secretory cells of these glands belong to the class III of Noirot and Quennedey [1]. In *Apis mellifera* the secretory cells cover all the reservoir and in workers are related with the production of alarm pheromones and in queens with sexual pheromones, besides other functions. In *Melipona bicolor*, one of the rare species of bees that presents natural polygyny, the worker's and the queen's mandibular glands are formed by a group of secretory cells separated from the reservoir, such cells produce pheromones which seem to have participation in the interactions between workers and queens during the provision and oviposition processes (POP). In *Scaptotrigona postica*, the gland presents a bifid reservoir, being just one of the branches totally covered by secretory cells, being the secretion in workers used as trail pheromone. In queens its function is still unknown. The aim of this investigation is to compare the gland ultrastructure among these three species, whose social organization presents some particularities: *A. mellifera* only accepts the presence of one queen for colony, be the queen virgin or fecundated; *M. bicolor* accepts more than one physogastric queen and *S. postica* accepts virgin queens. The glands of these species were fixed and prepared for transmission electronic microscopic analyses by routine procedures. According to the results, the mandibular glands of all species are constituted by secretory cells of the class III of Noirot and Quennedey [1]. Each cell connects to the reservoir through a canalicule (Fig. 1B,C), which presents a portion surrounded by the secretory cell and, other that, continues extracellularly with other canalicule, which opens and realizing the secretion in the reservoir's lumen. In all these species, the secretion is of lipidic nature, although its composition may vary. In this way, the cytoplasm of the secretory cells has indicators of its involvement with the lipidic synthesis, as very well developed smooth endoplasmatic reticulum (Fig. 1A,D), lipidic droplets (Fig. 1D) and myelinic bodies (Fig. 1B). In *M. bicolor*, the characteristic feature of the mitochondria (Fig. 1A) suggests that these organelles also may participate in secretion production. The great amount of myelinic bodies in the cytoplasm of the secretory cells may be related with hydrocarbon production.

Reference

[1] Noirot and Quennedey, *Annls. Soc. Ent. Fr.* 27 (1991) 123-128.

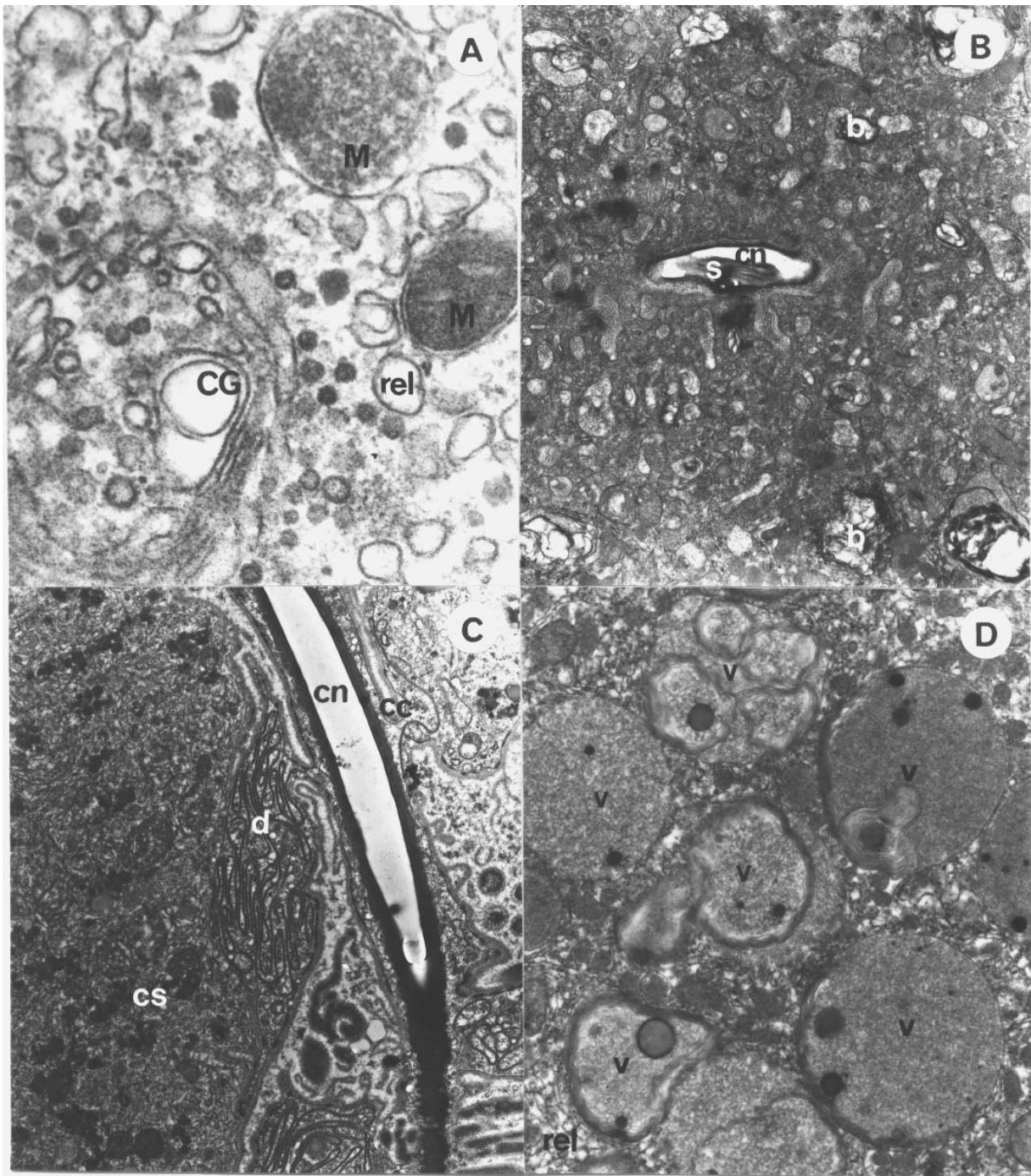


Figure 1. Transmission electron microscopy of mandibular glands. A. Cytoplasm of secretory cell (x29,000). B. Cross section of canalicule into secretory cell (x21,000). C. Contact between secretory cell and canalicule cell (x9,500). D. Vesicle with secretion in the cytoplasm of secretory cell (x21,000). b = myelinic body, cc = canalicule cell, cs = secretory cell, CG = Golgi complex, cn = canalicule, d = secretory cell plamic membrane fold, m = mitochondria, rel = smooth endoplasmic reticulum, s = secretion, v = vesicle.