INTRANIDAL WORKER REACTIONS TO VOLATILE COMPOUNDS IDENTIFIED FROM CEPHALIC SECRETIONS IN THE STINGLESS BEE, *Scaptotrigona postica* (HYMENOPTERA, MELIPONINAE)

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**Abstract**—From pentane extracts of worker heads of the stingless bee (*Scaptotrigona postica*), 70 volatile compounds were identified by combined gas chromatographic–mass spectroscopic analyses. A bioassay was developed to evaluate intranidal reactions of workers to synthetic volatiles. Thirty-six of the cephalic volatiles were tested. Thirteen types of behavioral reactions were recorded in a semiquantitative manner. The test was run in the brood nest where mainly young nurse bees are present and also in the storage area of the nest with old foragers traffic. The results obtained were compared and discussed in order to understand the chemical communication system of this species. Especially in the dark interior of the nest, which in nature is found in hollow tree cavities, chemical messages obviously play a particularly important role in the communication systems of the bees.

**Key Words**—Cephalic volatiles, stingless bee workers, intranidal reactions, *Scaptotrigona postica*, Meliponinae, Apidae, Hymenoptera.

**INTRODUCTION**

The enormous behavioral diversity in the more than 300 species of stingless bees (Hymenoptera: Apidae, Meliponinae) seems to depend on elaborate com-

We hypothesize that in stingless bees an expressive chemical communication system is essential for their highly evolved social organization. Nothing is known about pheromones involved in reproduction (Sakagami, 1982; Wille, 1983) and only little about chemocommunication in the dark interior of nest cavities (Keeping et al., 1982). Therefore, we developed a bioassay to be employed within the nest.

Recently we reported a considerable age- and function-dependent variation in the numerous cephalic volatiles found in workers of Scaptotrigona postica (Francke et al., 1983); the list of identified compounds is completed here. In order to decode the information transmitted by volatiles, we only tested in this first study worker reactions to single synthetic compounds. The objective was to clarify whether all identified constituents of the cephalic volatiles would release a specific behavioral response. The expected results will enable us to design biotests with various mixtures of volatiles.

METHODS AND MATERIALS

Bees. Free flying Scaptotrigona postica4 (Latreille) colonies of normal size, as found in natural nests, were kept in indoor observation hives in the bee laboratory of the Department of Genetics on the Ribeirão Preto Campus, Sao Paulo State, Brazil.

The nest boxes constructed for the bioassay (Figure 1) are subdivided into a brood nest and a storage part, connected only by two narrow tunnels to avoid rapid odor exchange. The nest entrance leads to the storage area. The brood nest consists of horizontal combs built from bottom to top. New vertical cells are added on the edge of the combs. Following the provisioning of a completed cell with larval food by the nurse bees, and ovipositioning by the queen, the cell is sealed. The brood nest is normally surrounded by several thin layers of cerumen. The uppermost part of this involucrum was always removed in order

4 According to the subdivision of the Scaptotrigona postica superspecies as proposed by Moura (1942), our bees belong to Sc. depilis.