Faculty of Education
Dept. of Biological and
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MORPHOLOGICAL, BIOCHEMICAL AND MOLECULAR PECULIARITIES OF SOME STRAINS OF THE HONEY BEE WORKER, *APIS MELLIFERA* L. (HYMENOPTERA: APIDAE)

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ABSTRACT

The morphology of the antennae of the honey bee *Apis mellifera* Egyptian honey bee *A. m. lamarckii*, Carniolan honey bee *A.m. carnica*, Italian honey bee *A. m. ligustica* were studied. Twelve types of sensilla were observed .The number and distribution of the various types of sensilla were examined. Sensilla trichodea were found most frequently and were present on all the antennal segments. The culminating stage of the defensive behaviour is the 'stinging response', which involves the penetration of the shaft of the sting and the release of venom from the venom sac. The lancets of sting carrying barbs different in numbers and shapes among the workers of three subspecies, 10 barbs in *A. m. lamarckii* and 9 in *A. m. carnica*, and 7 barbs in *A. m . ligustica*.

The ultrastructure of the mandibular gland cells in workers showed that cytoplasm was well developed. Smooth endoplasmic reticulum, many polymorphic mitochondria rich in cristae and with an electron-lucent matrix, and few well developed Golgi complex were seen in the cytoplasm. The nuclear chromatin of the secretory cells of three workers appeared condensed. The glandular cells of the worker of A. *m. ligustica* also contained secretory granules consisting and a

paracrystalline portion were also observed.

The total protein, carbohydrate and lipid content of the workers of the three subspecies of *A. m. lamarckii, A. m. ligustica* and *A. m. carnica*. In head and midgut, the highest mean differences; 0.128 and 0.093 were recorded between *A. m. ligustica* and *A. m. carnica* subspecies. While in the mid-gut this value reached 0.093 between these two subspecies.

The total carbohydrate content of the three subspecies *A. m. lamarckii, A. m. ligustica* and *A. m. carnica,* was also examined in head, sting, haemolymph honey stomach and mid-gut

Protein, isozymes and RAPD-PCR marker systems were conducted to assess the biochemical and molecular characterization of three subspecies of the honey bee worker, *A. mellifera* low polymorphism percentages were recorded in different protein patterns ranging from 18 to 42%. Eighteen, five and four unique bands distinguished the Egyptian, the Italian and the Carniolan subspecies, respectively. The isozyme systems recorded low polymorphism percentages, except that of peroxidase (67%). High levels of polymorphism were observed in RAPD-PCR profiles. 28 unique bands were identified out of 39 polymorphic ones; fourteen in the Egyptian subspecies, six in the Italian subspecies and eight in the Carniolan subspecies. These unique bands were considered as

molecular markers for these subspecies. The dendrogram separated the Egyptian subspecies from the other two subspecies with a highly genetic distance of 0.25. The Italian and Carniolan subspecies were grouped into one main cluster with a genetic distance of 0.01 between them.

Key words: *Apis mellifera* –antennae - sting- mandibular gland- protein - isozymes – RAPD –PCR – polymorphism.

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