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**Molecular genetics study on honey bee's (*Apis mellifera*)  
memory activity and learning behavior**

**A Thesis Submitted by**

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# ABSTRACT

There are variations in behavior and performance of honey bees individuals that may be attributed to many conditions in and out honey bees hives. Moreover, the genomic diversity between individuals may play a critical role in these variations. The present study investigated behavioral variation between forager bees under controlled conditions between training and test trials. In addition, the correlation between these attributes and genetic polymorphism in some genes related to learning and memory was studied. Moreover, molecular investigations were established to document the genetic basis of inter-individual variation in learning and memory. Through the statistical analysis of the behavioral experiments (Flower patches and Y maze), two groups of high and low-performance honey bees individuals were subjected to molecular investigations. In addition, results indicated individual bees had different learning abilities and different memory retrieving.

Prior to the molecular analysis, four genes were picked up from memory-related genes list retrieved from the GenBank. Investigated genes were; actin-related protein 1 (Arp1), serine/threonine-protein kinase mang-po s/t-pk-mp, and two microRNA: miR-210 and miR-932. PCR, sequencing, and bioinformatics tools were used to analyze these 4 genes' sequences which were obtained from the genomic DNA of bees under investigation. Intriguingly, results revealed that Arp1, s/t-pk-mp, and miR 210 genes alignments exhibited the number of polymorphism that expected to be correlated to variation in learning behavior and memory activity, while miR-932 did not show any genetic polymorphism.

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