



CALIFORNIA STATE SCIENCE FAIR 2010 PROJECT SUMMARY

Name(s) Jeongmin Shin	Project Number S2411
Project Title Ontogeny of Honey Bee Orientation Flights	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The orientation flights that honey bees undertake before foraging is crucial for navigation as the knowledge base of the environment is established during these flights. To examine the ontogeny of orientation flights in detail, the flight experiences were examined in correlation to the honey bees' maturity and whether the areas explored through these flights were omni-directional, regardless of the hive orientation.</p> <p>Methods/Materials The experiment was conducted in East Lansing, Michigan (42°40.7' N and 84°28.7' W) during the summer, from July 10th to July 31st, 2009. Located in the fields of the Bee Biology Building of Michigan State University, three beehives were set up in similar locations but oriented in different directions. To each colony, 3000 bees were paint-marked on their thoraces and introduced. On the day of orientation tests, bees that were painted on their thoraces were recovered from each colony by an insect vacuum, cooled on ice, and marked with paint on the abdomen to distinguish among the eight location points per age group. For each age group in one hive, 25 bees were released from each different location points. We then observed the return rate of the honey bees an hour after the release.</p> <p>Results Examining the data presented through the return rate, the development of orientation flight experiences in honey bees is presented clearly. The older aged bees have higher return rates than those of younger bees in the same distance, confirming the first hypothesis. However, an interesting pattern noted is that the disparity of homing rates in orientation flight decreased as honey bees matured, suggesting that the orientation flight experiences increase predominantly when the honey bees are young. The data regarding the orientation of the flight entrance also confirms the second hypothesis as the direction does not influence any of the areas explored by the honey bees.</p> <p>Conclusions/Discussion The study establishes two important components of orientation flights; the orientation flights are concentrated when the bees are younger and the area explored through these flights are omni-directional, regardless of the hive orientation. Utilizing the results, a theory was established that is believed to connect the two main causes of the Colony Collapse Disorder (CCD), the recent bee disappearing phenomenon. The theory will be presented in detail during the presentation.</p>	
Summary Statement The project investigates the development of the orientation flight experience in relevance to honey bees' maturity and reaches new results that may offer insights to the recent CCD (colony collapse disorder).	
Help Received Used lab equipment at Michigan State University under the supervision of Dr. Huang; Participant in High School Honors Science Program (HSHSP)	