SENSORY BIOLOGY of INSECTS

ENTOMOLOGY 497B

Instructor: T.C. Baker

COURSE GOALS: The goal of this course is to give students an understanding of insect sensory systems that contribute to the behaviors that we see insects performing for their survival and reproduction. Students will gain knowledge about the sensory mechanisms underlying mate-finding and courtship, host-finding and oviposition, and feeding/recruitment. Emphasis will be placed on understanding the neuroethology of insect orientation, communication, learning, and in particular cases, the evolutionary pressures that may have shaped these behaviors and their underlying sensory systems. Selected systems will be studied with regard to what is known about signal acquisition, signal processing, and signal classification for chemical, visual, mechanoreceptive/auditory, and thermosensory stimuli.

TEXT USED: None

ENTRY LEVEL:

Prerequisite: Introductory Biology

COURSE FORMAT:

1. Three one-hour lectures each week. Credit 3 Units.
2. Two midterm exams (each worth 30% of grade in course) and one final exam (worth 40% of grade in course).

TOPICAL OUTLINE:

1. Neuroethology Overview
2. Receptors vs. Sensations
3. Controlled Flight and Orientation; Dispersal, Migration, Homing
4. Insect Chemoreception; Direct vs. Indirect Behavioral Responses
   a. Signal acquisition
   b. Signal processing
   c. Signal classification
   d. Examples: Mate-finding
   e. Examples: Host-finding
   f. Examples: Feeding

3 Insect Vision and Response
   a. Signal acquisition
   b. Signal processing
   c. Signal classification
   d. Examples: Mate-finding
   e. Examples: Host-finding

4. Insect Mechanoreception/Audition and Response
   a. Signal acquisition
   b. Signal processing
   c. Signal classification
   d. Examples: Mate-finding
   e. Examples: Host-finding
5. Insect Thermoreception
   a. Signal acquisition
   b. Signal processing and classification
6. Internal Factors Modulating Behavior (Hormones, Rhythms, Prior Performance)
7. Communication for Survival
   a. Defensive Behavior: (Chemical, Visual, and Mechano-Auditory)
8. Communication for Reproduction
   a. Mate-finding and courtship: selection pressures and evolutionary shifts
   b. Host-finding for oviposition: selection pressures and evolutionary shifts
   c. Host-finding for feeding: recruitment to food
9. Biomimetics and Bioinspiration: Applied Uses of Insect Communication Systems