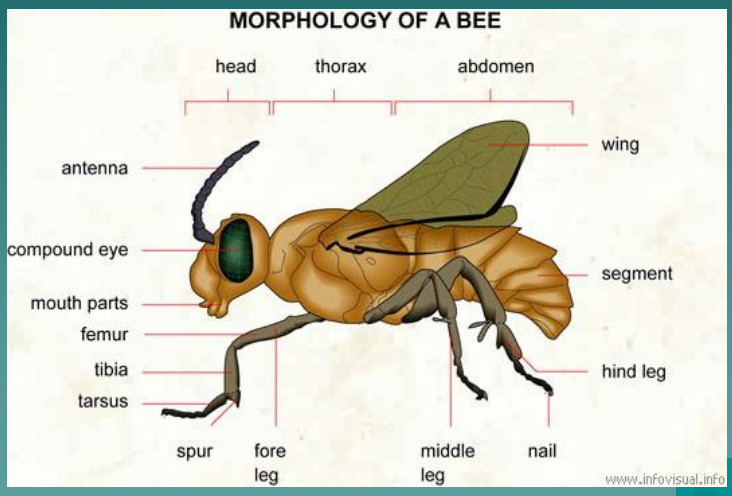
Bee Behavior

Summary of an article by
Stephen Taber III from
Beekeeping in the United States

Bees



Sense Organs: Vision

- Each compound eye is spherical in shape and comprised of some 6,300 cone-shaped facets or eyes.
- Bees can easily distinguish high contrast shapes and patterns, but can detect light intensity only 1/20 as well as humans.
- The sensitivity to ultra-violet and polarized light enables the honeybee to observe the sun under cloudy conditions.
- Its spherical-shaped eyes allow the honeybee to measure angles accurately between the relative positions of the sun, the food source and the nest.

Sense Organs: Odor

- The honeybee's olfactory sense is estimated to be 40 times better than man's and plays a critical role in locating food sources.
- Some 5,000 - 6,000 olfactory detectors are on each antenna.

Sense Organs: Taste

- Taste is detected through the mouthparts and forelegs.
- Bees have a limited range of taste and many substances detected by humans are tasteless to bees.
- Within the narrow range of substances they can taste, bees display high sensitivity. Sugar solutions as low as 2% can be detected although for foraging purposes, bees are not interested unless the sugar concentration is 30% or more.

Sense Organs: Sense of Time

- Bees are known to be time sensitive.
- Communication inside the nest expressing the location of a site relative to the sun has been observed over time, even when the sun's position progressed below the horizon.
- Awareness of time is important in determining the time of nectar secretion and the commencement of foraging.

Definition of “Pheromone”

- A pheromone is a substance secreted by an animal that causes a specific reaction by another individual of the same species.

General Observations about Bees

- Certain bee behavior activities are inherited.
- Individuals within the colony communicate with each other but not with bees of another colony.
- There is no known governmental hierarchy giving orders for work to be done.
- A definite effect on the colony is observed when the queen disappears.

General Observations about Bees

- There is evidence that the worker bees from 10 to 15 days old, who have largely completed their nursing and household duties but have not begun to forage, control the "governmental" structure. Just what controls them has not been determined.

Division of Labor

- Scout bees: Locate and communicate availability of domiciles.
- Forager bees: Get food.
- Queen bee: Reproduce, keep the hive together.
- Worker bees:
  - Nursing
  - Cleaning: remove debris from hive (genetically controlled)
  - Defense: through stinging intruders
  - Drone: mating

Queen Pheromones

- Several pheromones:
  - Recognition of queen and reduction of egg laying by workers.
  - Mating attractant.
  - In combination with worker bees, scent gland holds swarming bees together.

Worker Pheromones

- Several pheromones:
  - Fanning attractant
  - Swarm attraction and stabilization.
  - Colony alarm.
  - Alarm communications.

Use of Pheromones

- When bees first enter a new domicile, some bees stand near the entrance and fan.
- At the same time, they turn the abdominal tip downward to expose a small, wet, white material on top of the end of the abdomen.
- This seems to affect the other bees, for within several minutes all will have entered the new hive.
- When bees find a new source of food, they also mark it with the same chemical.

Other Methods of Bee Communication

- Dance:
  - Very precise
  - Tells other bees direction and how far to fly
  - Communicates kind of flower or plant (by releasing the perfume of the flower through nectar regurgitation or from nectar aroma on body hairs.)
  - Considered a language

Age Levels and Work Habits

- Bee's age determines its daily activity.
- In response to special needs of the colony, bees are capable of altering the division of labor according to age.
- In general, young bees feed larvae, build comb, and ripen nectar into honey in a rather definite sequence.
- After about 3 weeks, they become field bees.
- If many field bees are killed by pesticides, young bees go to the field at a younger age to get necessary chores accomplished.

Foraging Behavior

- Individual bees usually confine their foraging area in a series of trips to the field to a relatively small area such as a single fruit tree.
- Honey bees distribute themselves well over the area within flight range.
- Honey bees flying 2 1/2 miles in all directions from a single hive have access to 12,500 acres.

Grow-Slow Potion: Pheromone keeps bee youngsters youthful

Summary of an article by
Susan Milius in
Science News, Dec. 4, 2004, p.355

More Pheromones

- Worker bees spend their first few weeks as young adults tending the colony's brood.
- They then shift jobs to foraging for food outside the colony.
- Foragers pass along a pheromone that slows their younger sisters' career change.

More Pheromones

- That pheromone is possibly conveyed to the teens during mouth-to-mouth food transfer.

Effect of Pheromone

- Should the colony run low on mature foragers, the supply of grow-slow pheromone dwindles.
- Young bees mature rapidly to fill in the ranks.
- When foragers abound, an abundance of the pheromone slows the replacement process.

Questions?