

# Impact and status of honey bees

## The Social Hierarchy of *A. mellifera*



Roy Beckford, PhD

UF/IFAS Lee County Extension Director  
Agriculture/Natural Resources Agent

# How Honey Bees Live



- Bees live in groups called hives
- Different groups of bees live in hives
- These groups differ according to their function
- 3 groups of bees live in the colony – Worker, Queen, and Drone

# How Honey Bees Live

- Honeybees are social insects with a marked division of labor among the various bees in the hive.
- A colony contains;
- 1 queen,
- 500 to 1,000 drones
- 30,000 to 60,000 workers.

# Groups of Bees



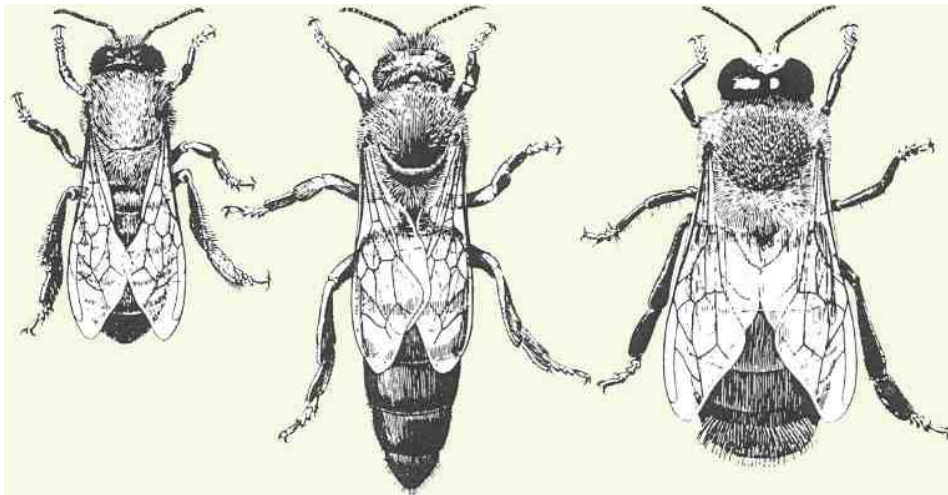
Worker Bee



Queen Bee



Drone Bee



# The Queen Bee

These are the mother bees

Queen bees are...

- The mother of all the bees in the hive
- The only fertile female bees



Queen bee

# The Queen Bee

- The largest bee and matriarch of the colony.
- She has a large abdomen that extends past her wing tips.
- She controls the hive by secreting queen substance, a pheromone that works to stimulate behaviors in the hive.
- Nurtured on a special diet of royal jelly, the queen is the only sexually developed female in the hive.
- Her major task is laying eggs to produce bees and keep the hive vital.

# The Queen Bee

- A few weeks after hatching, the queen mates with drones in flight.
- During this 'mating flight,' the queen receives millions of sperm cells that last her entire life span.
- A productive queen will lay up to 2,000 eggs in a single day.

# The Mating Enigma

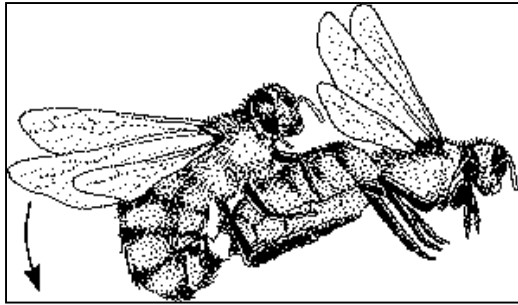
- **HONEYBEES** always mate on the wing, usually well away from the nest and often high enough off the ground to be out of sight.
- Research has shown that during fine weather, at definite times of the day, drone bees leave the nest and fly to certain areas where they congregate on the wing to await queen bees. When a queen flies into the area, many drones will chase her and a number of them will mate with her



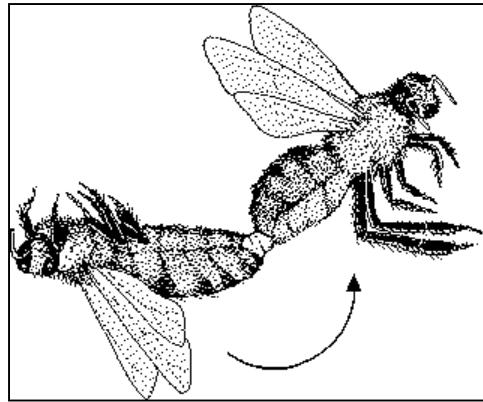
# Congregation Areas

- Many drone congregation areas appear in the same place year after year. One at Selbourne in Hampshire, UK was first described in 1789 and still exists today.
- Drones in congregation areas tend to fly at certain heights and within certain boundaries. Other insects entering the area such as butterflies and even small birds are avidly chased by drones.

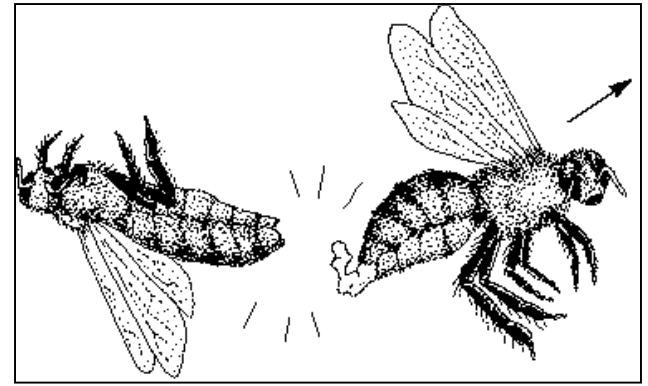
# Queen and Drone mating Sequence



**1.** The drone mounts the queen, inserts his endophallus, and ejaculates his semen.

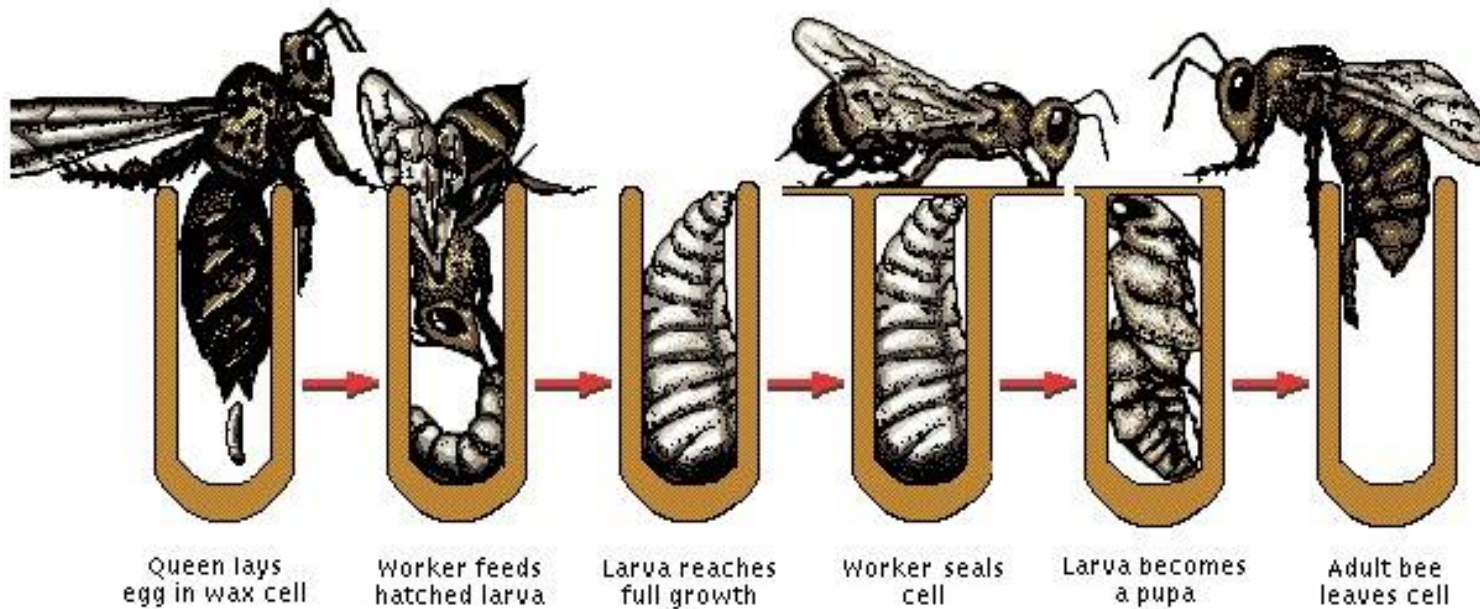


**2.** During ejaculation, the male falls back and his endophallus is ripped out of his body and remains attached to the queen.



**3.** Drones mounting later remove the previous drone's endophallus and lose their own through similar matings. The emasculated drones die very quickly with their abdomens burst in this fashion.

# The Queen Bee



The reproduction process, from egg to adult

# Drone Bees

These are the male bees.

Drones...

- Are the product of an unfertilized egg, so they have only one pair of chromosomes
- Their only job is to fertilize the queen
- Wings are chewed off and kicked from the nest by worker bees



# Worker Bees

- Most of the eggs laid by the queen are placed in worker cells.
- These eggs are fertilized and develop into female worker bees that are most common in a hive.
- Worker bees have wings that are approximately the length of the abdomen, and the workers are smaller than the drone bees.



# Worker Bees

These are the busy bees.

Worker bees...

- Clean the hives
- Care for the young
- Forage for food and water
- Heat, cool and defend the hive



Carrying pollen

# Worker Bees

- Once hatched, these worker bees do a sequence of jobs.
- These tasks separated into;
- Hive jobs for the younger bees; cleaning the hive, feeding and caring for the larvae, making wax, guarding and cooling the hive.
- Older "field" bees do nectar and pollen collection.

# The Hive

- The house the bees live in is a series of six-sided cells made of beeswax.
- The wax is secreted from glands of 2-3 week old worker bees. Beeswax is almost pure white when secreted. It is then chewed and formed into the cells.





# The Hive

- No one has been able to force bees to produce wax nor can it be made synthetically.
- A colony of 50,000 honeybees should be able to produce one-half pound of wax a day in ideal conditions.



# Honey Production

- Worker bees visit flowers to get food.
- Plants produce nectar, a sugar filled liquid that bees drink from the flower and carry back to the hive.
- Honey is made from the nectar from particular flowers mixed with an acid secretion and then deposited in the hive to 'brew'.



# Honey Production

- The moisture is evaporated from the nectar until it is at 18-20% water, then it is capped with wax and left to ripen.



# Honey Production

- It can take 75,000 loads of nectar to product 1 pound of honey, and bees may travel as far as 55,000 miles and visit more than two million flowers to gather enough nectar to make just a pound of honey.
- An active hive can produce 300 pounds of honey a year.

# Honey Production

- No one has yet been able to produce synthetic honey.
- Honeybees are the only insects that produce a food consumed by humans.



Some people do try

# Honey Production

## DOCTOR FUN

18 May 2000



Breakfast at the Honeypot Ant Diner

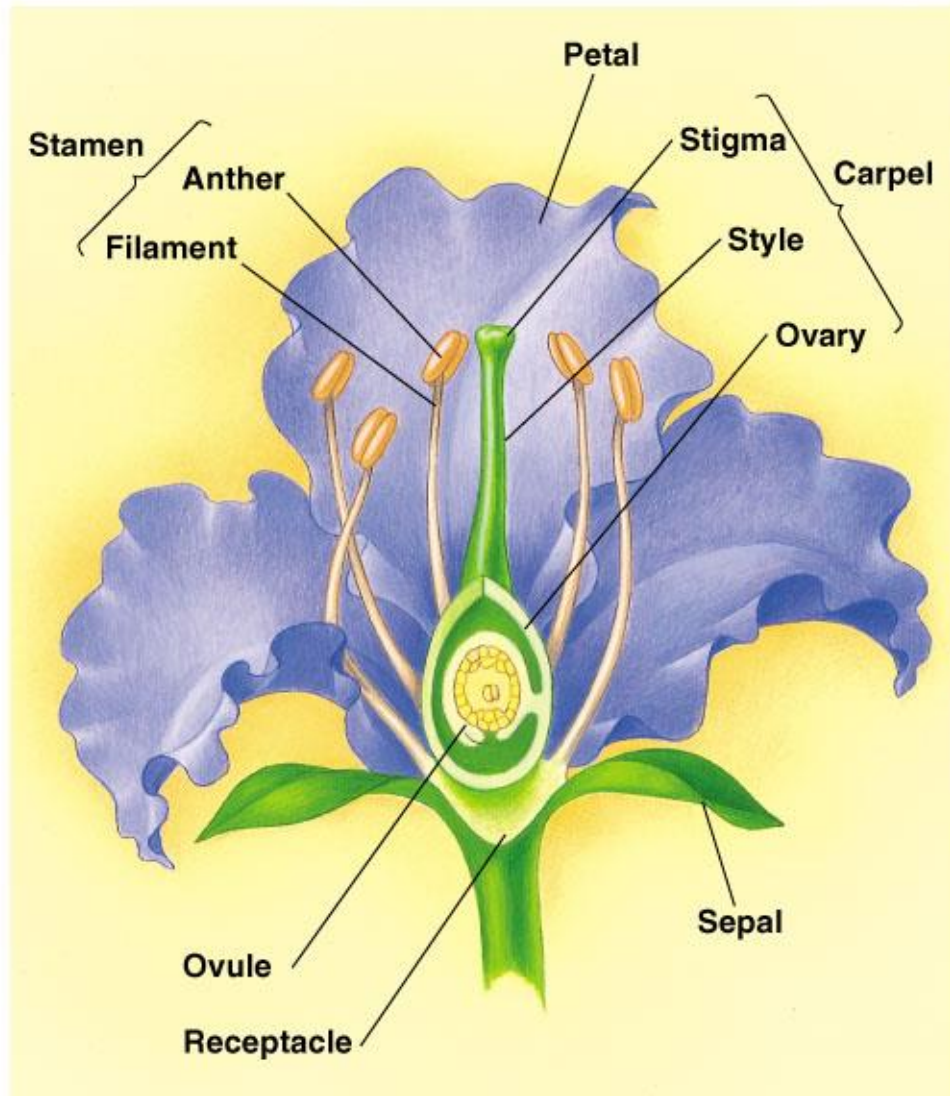
Copyright © 2000 David Farley, d-farley@metablab.unc.edu  
<http://metablab.unc.edu/Dave/drfun.html>

This cartoon is made available on the Internet for personal viewing only. Opinions expressed herein are solely those of the author.

# Pollen and Pollination

- Along with Nectar, bees collect the pollen from flowers and take it back to the hive where it is stored until it is used to feed the bees in the hive.
- As the bee moves from flower to flower getting food, the plant benefits in being able to produce fruits, with seeds that can grow into new plants.

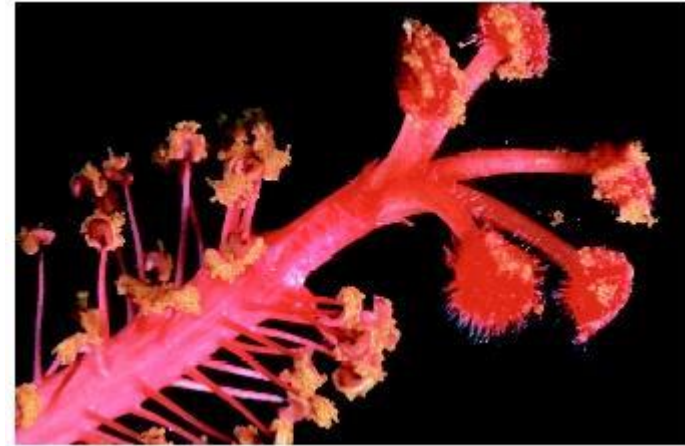
# The Flower





# Pollen and Pollination

- Some pollen can be blown by the wind from flower to flower.
- Windborne pollen in the air is what causes allergies in people who are sensitive.
- The pollen of apples, pears, peaches, alfalfa, almonds, avocados, cantaloupe, cucumber, cotton, watermelon and many other plants, needs to be carried by insects, and honeybees do this job the best!



# Propolis

- One of the last jobs a worker bee may have is in collecting propolis or 'bee glue' for the hive.
- It is gathered from the buds of trees such as poplar and from the wounds or cracks in the bark of conifers.
- The plants produce this resin to waterproof the area and to protect it from attack from bacteria, molds, yeasts, fungi, insects and pests.



# Propolis

- Propolis has long been used in folk medicine but is now also used in orthodox medicine.
- Propolis in oil solution is recommended for children and people who don't tolerate alcohol.
- For children it is used in the treatment of soft mouth tissue, gum lesions, diminishing pain locally and healing of wounds that result from tooth extraction.
- Adults use propolis for vascular treatment, asthma, gastric and duodenal ulcers, gastritis and various mouth and throat inflammations.
- Other uses - burns, different types of eczema, warts and hemorrhoids and also for stimulating tissue regeneration.

# New Hives



- When a hive becomes crowded, it raises a new Queen
- Then half the hive leaves with the old Queen just before the new queen emerges from her cell
- This mass of bees with the old queen seeking a new home is called a **swarm**

# Africanized bees – A brief look

- In 1956, a subspecies from the savannahs of Africa, *A. m. scutellata*, was introduced to Brazil in an attempt to increase honey production.
- The descendants of these African honey bees rapidly spread northward and southward from Brazil, hybridizing with and displacing previously introduced European honey bees.

# Spread of Africanized honey bees by year, by county

(updated July 2006)



First found in southern Texas in 1990, Africanized honey bees are now found in much of the South.

