Honey Bee Colony Life History

An understanding of bee biology and life history under natural conditions is necessary to manage them effectively

Understanding honey bees

- Honey bees are not domesticated animals
- Honey bees are not miniature people (anthropomorphism)
- Honey bees cannot get mad at you
- Honey bees cannot like you
- Honey bees respond to stimuli in predictable ways

Types of adult honey bees and how to recognize them

There are three kinds of bees in a honey bee colony

One queen

Thousands of workers

Hundreds of drones

The number of workers and drones changes with the season

Lifespan & population

	Ave. Lifespan	# Per Hive
Queen	2 years	1
Worker	5-6 weeks - summer	15 to 50,000
Drone	90 day max. or until mate	Hundreds in summer - none winter

Duties in the hive

- Kill sisters
- Take a mating flight
- Lay 1,500 eggs/day
- Secrete queen pheromone

Duties in the hive

- Make comb
- Tend larvae
- Tend queen
- Clean hive
- Gather nectar, pollen, propolis, water
- Evaporate nectar

- Defend hive
- Temperature regulation

Drones enjoy the good life

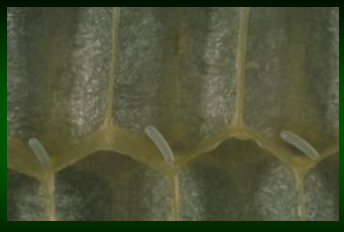
- Cruise for Queens

There is a catch!!!

Honey bees develop by complete metamorphosis

Days in the development of honey bees

	Egg	Larvae	Pupa	Total
Queen	3	5.5	7	16
Worker	3	6	12	21
Drone	3	6.5	14.5	24

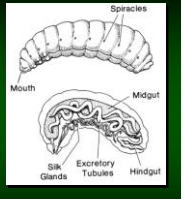


Eggs are laid singly on the base of the cell
Egg stage last for 3 days

Larvae feed and grow until they fill their cell

Eggs and larve

- Bee larvae are essentially feeding machines
- They are legless, blind
- They receive ± 1,300 visits per day from adults
- Developing bees grow by shedding their skin (6 molts)
- Workers increase their weight 900 times during the larval stage



Larvae are fed hundreds of times each day

After 6 days of feeding, larvae stretch out to pupate

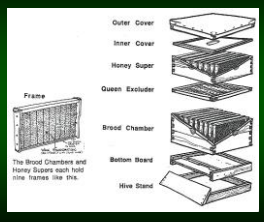
Pupae

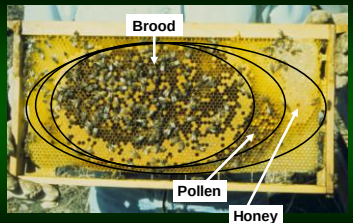
After 12 days of pupation, young bees emerge

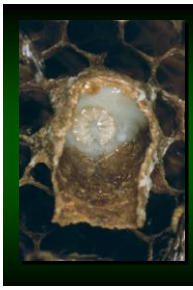
Emerging adult

Newly emerged promptly begin cleaning cells

The hive







Royal jelly – a nutrient dense food fed to larvae that are destined to become queens

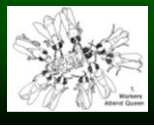
Queen cells

Swarm cells – numerous, located at edges of comb

Supersedure cells – only a few, located in the center of the brood nest

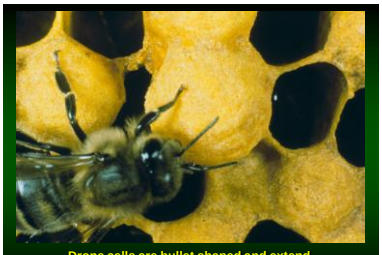
Queens have no hair on their thorax, their wings do not cover their abdomen and their abdomen is pointed

- Queens are surrounded by a circle of attendant bees
- Queen substance suppresses worker ovary development and inhibits queen rearing
- Queen substance is spread in the colony by bee to bee contact
- It has a half-life of 15 minutes



Egg laying sequence repeated > 1000X per day

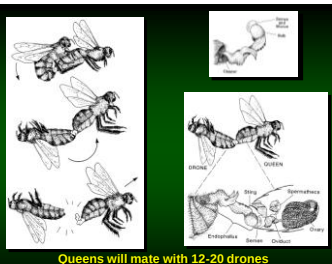
Queen inspects cell with her antennae, measures cell diameter with forelegs, then backs in and lays egg



Drone cells are bullet shaped and extend beyond the surface of worker cells

Drones have rounded abdomens and greatly enlarged compound eyes

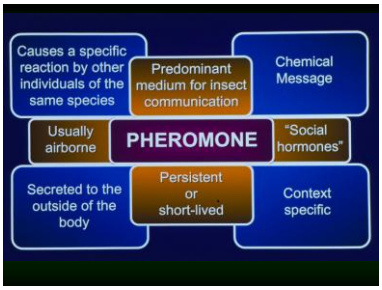
Drone emerging from brood cell after 24 days

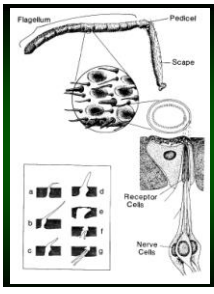


Queens will mate with 12-20 drones
Drones die when they mate

Drones are evicted from the colony in the fall and when resources become scarce

Workers perform all the task required to sustain the colony





Honey bees live in a world where odors and chemical messages are abundant

Pheromones you should know about to successfully manage bees

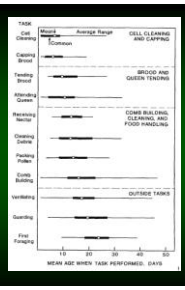
- Queen substance
- Alarm pheromone
- Nasanov pheromone

Who is in charge?

- No central authority
- How does an individual bee know what to do, when and where an activity is appropriate?
- If bees are simply little robots with computer-like brains, why do bees in a colony behave in so many different ways in a given moment?

Age-related division of labor

From the moment of emergence, workers begin laboring in the nest



Worker bee behavior

- Nest defense
  - Bees are not aggressive
  - Bees are only defensive in vicinity of nest
- Nest homeostasis
  - Brood present = 95ºF
  - Brood absent = 55ºF

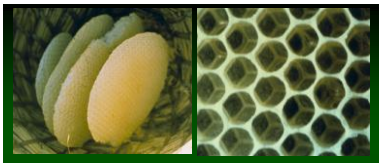
Colony Defense

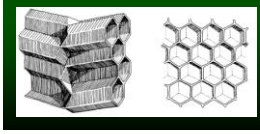
- Guard bee behavior
- Defense ot aggression
- Alarm pheromone
- Respond to
  - Vibration
  - Odor
  - Movement
  - Dark colors

Food transmission

- Trophallaxis
- Begging and offering behaviors
- Life-long pattern

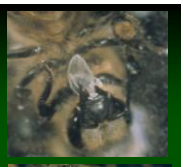
Caring for brood





Comb building

Wax secretion and manipulation



Fanning

Cooling or to ripen nectar

Scent fanning

Fanning to cool hive or to ripen nectar

Scent fanning from Nasanov gland –orientation pheromone

Ripening nectar – invertase and moisture removal

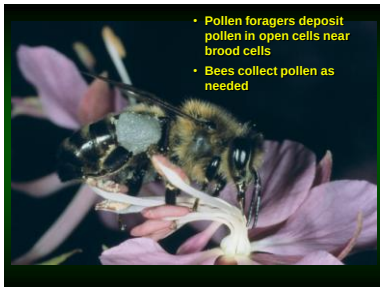
Life expectancy

- **Workers** –Summer 6 weeks, winter 5 months
- **Drones** – Summer 21-28 days, winter – XXX
- **Queens** – 1-3 years, up to 8 years documented

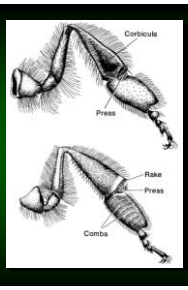
Four things bees collect

- Nectar
- Pollen
- Propolis
- Water

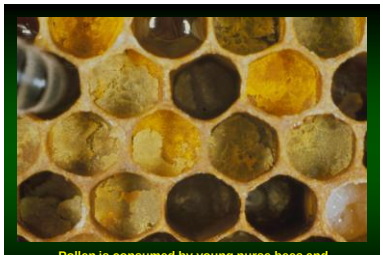
- Nectar foragers transfer nectar to receiver bees
- Bees hoard honey for adverse times



- Pollen foragers deposit pollen in open cells near brood cells
- Bees collect pollen as needed



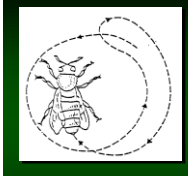
Pollen is transported back to the hive in the bees corbicula or pollen basket



Pollen is consumed by young nurse bees and stimulates their brood feeding glands

Bees collect propolis to seal cracks, reduce entrances and to inhibit microbial growth in their nest

Bees collect water to dilute honey and to cool their hive



Bees communicate the location of resources by dancing

Swarming

- Mostly in May and June
- Wild colonies almost all swarm 1X or more per year
- Prime and after swarms
- Pre swarming behavior
- Swarm behavior
- Probability of survival

- Colonies reproduce by swarming
- Nest in 20 – 100 liter cavities
- Prime swarm and after swarms
- Mid-April to mid- June

Survive winter as a social unit

- Adaptations to cold winter, short flowering season, and a swarming mode of reproduction
  - Nest in protected cavities
  - Hoard honey for adverse times
  - Initiate brood rearing mid-winter
  - Cluster and shiver to maintain heat
    - Brood absent – 18 C. or 55 F.
    - Brood present – 35 C. or 93-95 F.