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

- Worker
- Queen
- Drone

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

<table>
<thead>
<tr>
<th></th>
<th>Ave. Lifespan</th>
<th># Per Hive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Queen</td>
<td>2 years</td>
<td>1</td>
</tr>
<tr>
<td>Worker</td>
<td>5-6 weeks - summer</td>
<td>15 to 50,000</td>
</tr>
<tr>
<td>Drone</td>
<td>90 day max. or until mate</td>
<td>Hundreds in summer - none winter</td>
</tr>
</tbody>
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Duties in the hive

Worker

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

Drones enjoy the good life

- Cruise for Queens

There is a catch!!!

Duties in the hive

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

Honey bees develop by complete metamorphosis.
Eggs are laid singly on the base of the cell. Egg stage lasts for 3 days.

<table>
<thead>
<tr>
<th></th>
<th>Egg</th>
<th>Larvae</th>
<th>Pupa</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Queen</td>
<td>3</td>
<td>5.5</td>
<td>7</td>
<td>16</td>
</tr>
<tr>
<td>Worker</td>
<td>3</td>
<td>6</td>
<td>12</td>
<td>21</td>
</tr>
<tr>
<td>Drone</td>
<td>3</td>
<td>6.5</td>
<td>14.5</td>
<td>24</td>
</tr>
</tbody>
</table>

Bee larvae are essentially feeding machines:
- They are legless, blind.
- They receive about 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.

After 12 days of pupation, young bees emerge.
Emerging adult

Newly emerged promptly begin cleaning cells

The hive

Brood
Pollen
Honey

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

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

Queen cells

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

Queens are surrounded by a circle of attendant workers

Queen substance suppresses worker ovaries, 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 = 95°F
  - Brood absent = 55°F

Colony Defense
- Guard bee behavior
- Defense of aggression
- Alarm pheromone
  - Respond to
    - Vibration
    - Odor
    - Movement
    - Dark colors
- Sting removal
- Masking alarm pheromone
Food transmission
- Trophallaxis
- Begging and offering behaviors
- Life-long pattern

Fanning
- Cooling or to ripen nectar

Scent fanning

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 swelling 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.

Preventing swarming is a critical beekeeping skill.
Honey bee swarms are not defensive.

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 95 F.