Introduction to Honey Bees and Beekeeping
What aren’t Honey Bees

NOT A BEE!

- Bald-faced Hornet
- Dolichovespula maculata

NOT A BEE!

- European Hornet
- Vespa crabro

NOT A BEE!

- German Yellowjacket
- Vespula germanica

NOT A BEE!

- European Paper Wasp
- Polistes dominula

0.5 inch
1.25 cm

Honey Bee
- Apis mellifera

Bumble Bee
- Bombus impatiens
Not Honey Bee Nests

Bald Face Hornet

Wasp (yellow jacket)
The Honey Bee

Apis mellifera

Anatomy and Biology
Compound Eye

Thousands of individual lenses (3000 – 9000)

Hairs tell wind direction, flight speed, collect pollen

Excellent motion detection – high flicker threshold
- move slowly!
Comparison of light wavelengths visible to humans and bees

- Don’t see red, no photoreceptor for it
- Can see ultraviolet light (needed to find nectar)
- Detects polarized light (navigation)
Nectar guide = UV-absorbing area of a flower
Antennae

- majority of bees' sensory organs are located in the antennae
- 170 odor receptors (chemoreceptors), O₂, CO₂, moisture
- locates pollen-rich flowers and hive pheromones
- used for communication by touching
Mandibles (jaws)

- eat pollen for food;
- cut and shape wax;
- feed larvae and queen;
- clean the hive;
- groom themselves;
- fighting.
Thorax

- Point of Attachment for
  - Six Legs
  - Two Pairs of Wings
- Wings held together by hooks
Removing Bee Stingers

Use your hive tool

http://www.dave-cushman.net/bee/beestings.html
Worker, Drone, & Queen
The Population of a Colony Depends on:

- the egg laying ability of the queen,
- the space available in the hive,
- the incoming food supply.
Complete Metamorphosis

1) Queen lays egg in brood cell
2) Worker feeds hatched larva
3) Larva reaches full growth
4) Worker caps cell
5) Larva spins cocoon and becomes pupa
6) Adult bee leaves cell

Egg → Larvae → Pupa → Adult

https://forum.teksyndicate.com/t/bee-syndicate-s1-e3-8-17-2015-how-brood-you-do/86119
# Honey Bee Development

<table>
<thead>
<tr>
<th></th>
<th>Larvae hatches</th>
<th>Larva</th>
<th>Cell capped</th>
<th>Pupa</th>
<th>Adult emerges from cell</th>
<th>Start of Fertility</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Queen</strong></td>
<td>3</td>
<td>5 ½</td>
<td>7 ½ - 8</td>
<td>8</td>
<td>16</td>
<td>Approx. 23</td>
</tr>
<tr>
<td><strong>Worker</strong></td>
<td>3</td>
<td>6</td>
<td>9</td>
<td>12</td>
<td>21</td>
<td>n/a</td>
</tr>
<tr>
<td><strong>Drone</strong></td>
<td>3</td>
<td>6 ½</td>
<td>10</td>
<td>14 ½</td>
<td>24</td>
<td>Approx. 38</td>
</tr>
</tbody>
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Larvae & Capped Brood
Queen Facts

• She is larger than the other bees in the hive and has a slim torpedo shape.

• Her role in the hive is to produce eggs and to release pheromone signals within the hive.

• Under normal conditions a hive will have only one queen.

• Uses her stinger only to kill other queens.

• A queen has the longest life span in the colony living 2 – 5 years versus months.

• She lays up to 1500+ eggs per day at the height of the brood season.

• Workers will replace her if they sense something wrong
Queen Cells (peanut shaped)

- young queen larva in royal jelly day 4 - 8
- capped larva day 8
- new queen emerging from cell day 16
- pupa day 9 - 15
Queen Laying Eggs
Drones (males)

• Larger than the worker and is more barrel shaped than the queen;

• Develop from unfertilized eggs;

• Don’t forage for food, don’t help with the building of comb, can’t defend the hive (have no stinger);

• Fed and cared for by the workers;

• Mate with virgin queen. Die after mating;

• Many drones mate with queen during her mating flight (10 - 20);

• When cold weather approaches or food is scarce; worker bees force the drones out of the hive.
Worker Bees

- Female but typically not able to reproduce

- A colony will have 20,000 - 60,000 workers

- Live for 4-6 weeks in summer, 4-5 months in winter

- Under certain conditions can lay eggs but, because they are not mated, the eggs can only develop into drones.
Worker Bees

- Are all female from fertilized eggs
- Collect & store food and water for the colony
- Tend to the queen
- Build wax comb
- Do the housework (clean cells)
- Feed larvae
- Maintain the interior temperatures of the hive
- Guard the hive against intruders
Workers as New Adults

- Tasks increase with age;
- Emerge & clean other cells for new eggs,
- Learn to move around colony, beg for food;
- Eat pollen to develop hypopharyngeal glands for production of royal jelly;
- As hypopharyngeal glands mature becomes nurse
  - feeds older larvae pollen & honey;
  - at 6 days old can feed royal jelly to youngest larvae.
5 - 15 days after emerging:

- Transfer nectar from field bees to comb;
  - Honey stomach mixes enzyme into nectar
  - Converts sucrose into glucose & fructose

Passive evaporation removes water from honey

Ripe honey (18% water) is capped with wax
Worker Wax Production

- 12 - 17 days after emerging
- Wax sheets from glands under abdomen
  - worked in mouth 109°
- Comb building
- Cap honey & brood
Worker Bees Guarding Behavior

- Guarding begins day 18
- Guard all entrances/holes in hive
- Guards smell every bee entering hive
- Challenge bees that don’t smell right
  - sometime welcome strangers
  - other times will attack / kill strangers
Worker Bee Foraging Behavior

- 21 days after emerging
- Nectar – weak sugary liquid (carbohydrate energy)
- Pollen – male portion of plant reproduction (protein)
  Eaten from emergence to day 10. Little as adult. Needed to raise brood, build muscles & glands.
- Water – needed for drinking and cooling
- Propolis – resin from woody plants
Bee Dance Language

In the field:
- Nest
- Sun
- Food patch
- Flight path
- Orientation during wagging & sound
- Reference direction

On the comb:
- Round dance (Short distance)
- Waggle dance (Long distance)

Recruits and dancer participate in trophallaxis.

Short distance
Long distance
Frame of Brood
Swarming

- Natural method of colony reproduction;
- May – June strong nectar flow;
- Colony gets crowded;
- Queen pheromone gets diluted (old queen);
- Workers start to make queen cells;
- Old queen leaves with ½ the workers.
Parts of a Beehive

Langstroth Hive

- Outer Cover with Inner Cover hidden underneath
- Medium Super for Honey
- 2nd Deep Super for Brood
- 1st Deep Super for Brood
- Queen Excluder
- Slatted Rack
- Screened Bottom Board
Bottom Boards – one per hive

Screened

Solid
Supers (boxes) – for brood and honey

Medium
Brood = three per hive
6 5/8 in. deep
up to 50 lbs. each

Deep
Brood = two per hive
9 5/8 in. deep
up to 80 lbs. each
Supers

All mediums

Honey supers

Brood supers
April – June

Colony needs to build comb

Bees draw comb from center frames outward

By Waugsberg https://commons.wikimedia.org/w/index.php?curid=4146647
Beehive Cover
• Smoldering fire.
• Burns most organic materials, i.e. pine needles, wood pellets, cotton rags, straw.
• Smoke interrupts bee pheromone communication.
• Bees fill stomach with honey.
Hive Tool

Metal tool for prying apart hive boxes and frames, lifting frames, scraping away wax and propolis.
Protective Clothing

• Coverall or jacket
  – Veil attached or not
  – Some times necessary
    • Poor weather
    • Night
    • Aggressive bees
    • Summer dearth
  – Hot
  – Many types
    • Cotton
    • Nylon – Very Hot
Gloves

- Leather gloves
  - Sometimes necessary
    - Poor weather
    - Nasty bees
  - Hot
  - Poor dexterity
  - Spread disease
  - Mash bees
  - Keep venom smell

- Nitrile gloves
  - Maintain dexterity
  - Provide some protection to stings
  - Reduce disease spread
Setting Up a New Colony of Honey Bees
How Beekeepers Get Bees

- **Out of State Packages**
  - 3 lb package of bees
  - Order Early

- **Nucs - Local producers**
  - NJ Beekeepers Association news
    - List of certified apiaries – Apiarist
    - Order early – January, February

- **Swarms**
  - NJBA web site
  - Natural swarms great comb builders
Installing a Package

- Components
  - 3 lbs of bees
  - 1 queen in cage
  - 1 feeder can
- Late in day
- Rainy day
  - Less drifting
- Spray with sugar syrup (water)
  - Get wings sticky
  - Less drifting

http://www.brightonbee.club/order-bee-packages

M. Haberland
Installing a Package

Gently brush off bees hanging on queen cage into the hive.

Types of queen cages
Installing the Queen

Push cage into wax comb or wedge between two frames using a pin or tape…

…or use a rubber band to secure the queen cage onto foundation. If you have comb, you can push the queen cage into the wax to secure it.

• The candy should be level or angled down.

• Make sure worker have access to the screen to meet queen.
Holding the package right-side-up, tap the package on the ground, then pour bees into the hive by gently rocking the package back and forth.
Add telescoping cover and entrance reducer.
Examples of Sugar Syrup Feeders

Hive top feeder

External feeders

Division Board feeder

Boardman feeder

Installing a Nuc

- A *nuc* (pronounced “nuke”) is short for “nucleus hive” and is a small but fully functional working colony in a small hive, typically with five frames.
Frames in a nuc
Installing a Nuc

- Transfer after 1-2 days.
- Gently move frames into your hive in same order as in the nuc.
- Shake bees out of box.
- Place inner & outer covers.
Honey Frame
Honey extraction

Remove the wax capping

Extracting the honey
Honey extraction

Filter after extracting to remove wax
Questions?

Extreme Farmstand

Pick Your Own HONEY