

Introduction

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Notes online

Recommended Reading

The Hive and the Honey Bee

The New Starting Right with Bees

Beekeeping for Dummies

First Lessons in Beekeeping

Housekeeping

Goal - Provide the student with the skills to assemble a hive, install bees and manage the colony successfully.

7 Units

Tentative syllabus

Material can be flexible - class' interests

Unit 2 - January - order bees

Units 4 and 5 - March/April - outdoor lab need protective equipment

Unit 6 – May - Honey extracting

Unit 7 – Late summer – end of season activities, winter preparation

History of Beekeeping

History

Three stages of man's interaction with honeybees

Bee-hunting

Seeking and robbing wild bee colonies. No regard for the survival of the bees

Prehistoric cave wall drawings from Spain

All food is bland at best, bitter at worst. Human selection of cultivars hasn't occurred.

Honey harvest painful and dangerous

Traplining (beelining) - Latin literature - Columella - boil beeswax to attract bees, trap several bees in a hollow reed, release one at a time and follow its path, periodically release another and follow until colony is located.

Bee-having

Maintaining colonies of bees. Bees are killed when the colonies are robbed

Egyptian hieroglyphics - house bee swarms in clay. Smouldering fires in some indicate that they may have discovered that smoke has calming effect.

Skeps made of straw used to house bee swarms. Probably gassed bees with burning sulfur to kill bees at harvest.

Skeps are still a recognized symbol of beekeeping

Bee-keeping

Maintaining colonies of bees. Survival of bees is desired when robbing

1500 - 1850

Consider the state of science in this period. How did they do it? Observation

1568 Nikel Jacob - Germany - Bees can raise a queen from eggs or very small larva

1586 Luis Mendez de Torres - Spain - The queen is the mother of all the bees in the colony

1609 Charles Butler - England - Drones are male bees

1637 Richard Remnant - Workers are female

1792 Francois Huber - Sweden - Created an observation hive utilizing a folding leaf design that could be opened and closed like a book.

- Beeswax is derived from nectar, not pollen
- Pollen is primarily the food for developing brood
- The existence of egg laying workers
- Queens are derived from the same larvae as workers

Huber was blind. He used paid observers and interpreted their data.

1845 Johannes Dzierzon - Drones (male bees) come from unfertilized eggs

Protective clothing

Many ingenious hive creations during the same period.

1851 Rev Lorenzo Lorraine Langstroth- United States - the 'Father of Modern Beekeeping' put it all together. Credited with the discovery of 'beespace'.

Beespace - approximately 3/8", a space small enough that bees will not bridge it with honeycomb yet large enough that they will not glue it closed with propolis.

Langstroth - 1851 - Pondering, as I had so often done before, how I could get rid of the disagreeable necessity of cutting the attachments of the combs from the walls of the hives, and rejecting, for obvious reasons the plan of uprights, close fitting to these walls, the almost self-evident idea of using the same bee space as in the shallow chambers came into my mind, and in a moment the suspended movable frames, kept at suitable distance from each other and the case containing them, came into being. Seeing by intuition, as it were, the end from the beginning, I could scarcely refrain from shouting out my 'Eureka!' in the open streets.

Led directly to the creation of beeswax foundation (Mehring, Germany, 1857) and the centrifugal honey extractor (Hruschka, Austria, 1865).

Conventional beehives today are still often referred to as 'Langstroth' hives.

Beehives don't have to be white!

Honeybees are probably the most studied insect....with good reason. The quality of life hinges on pollination. Over 90 crops in the United States depend on bees, to some extent,

for pollination. It has been estimated that nearly half of our food, both plant and animal, is affected by insect pollination.

Biology

The Players

Drones, workers and queen

They are physiologically different. A product of genetics, how they are fed while developing and cells they develop in. Drones come from unfertilized eggs...they have only one set of chromosomes (haploid). Both workers and queens have two sets of chromosomes. A fertilized egg can become either. The difference is a result of feeding. A larva destined to become a queen is fed a high nutrition, special food appropriately called 'Royal Jelly'.

She develops in a special cell that is larger than those of the workers. The queen cell also extends in a vertical fashion as compared to the horizontal cells of workers.

The stages of development are the same. Complete metamorphosis...egg, larva, pupa, adult

In the larval state the developing bee is fed a highly nutritious diet consisting in large part pollen. During that week the larva will grow several thousand times in weight.

The time to go from egg to adult differs. Note the time it takes a queen to emerge.

Three body parts - head, thorax and abdomen

6 legs

2 pair of 'married' wings - from Order *Hymenoptera*

1 pair of antennae - primary sensory elements - odor acuity - 10X to 100X to wax and floral scents.

At base of antennae is Johnston's organ - sensitivity to bending - speed detection

On top of head, above compound eyes are three small simple eyes - *ocelli*

Ocelli detect the position of the sun (triangulation) and are crucial to navigation.

Drone - no stinger, worker - barbed stinger, queen - unbarbed stinger

Drone - While he may appear clumsy landing at the hive entrance, don't be fooled. His large eyes help him spot a flying queen. He must be a skilled and powerful flyer if he is to beat the competition. He mates one time and dies. He has no useful duties within the colony.....a veritable *n'er do well*. In the Fall of the year the workers may evict him from the hive and he will starve.

Worker - The female worker does it all. Her jobs typically vary with age.

0 - 10 days

Clean cells

Feed larvae ('nurse bees')

11 - 20 days Wax secreting glands on underside of abdomen are active

new comb construction

comb repair

capping cells

'dock worker'
21 - 35 days
guard
forage
scout

Foraging workers collect either pollen, nectar, propolis or water. A worker usually does only one and often spends her foraging life collecting from a single type of bloom. Pollen and propolis are carried in specialized 'baskets' on the worker's rear legs. Pollen is carried by the foraging worker into the hive and 'kicked' out into an appropriate cell. Nectar and water are carried in the stomach of the bee. At the hive the forager regurgitates the nectar, which is swallowed by an in-house worker who then stores the nectar in an appropriate cell.

Queen

Her longer abdomen makes her appear more wasplike.

Her stinger is unbarbed and usually only used against rivals.

After emerging the queen will take up to several mating flights. During those flights she will mate with one to twenty drones. She stores sperm from these matings and use it for the remainder of her life. She may store several million sperm.

At the height of egg laying season she may lay up to 2000 eggs per day.

Queens are produced in two ways. If something happens to the colony's queen the workers will try to make a replacement using larvae that was originally intended to become workers. This is called 'supercedure'. Because these larvae are chosen under emergency conditions, they may be older than is desirable. Emergency supercedure often fails or produces inferior queens.

A second method of producing queens is done in preparation of swarming. Swarming will be discussed shortly. This is a more controlled means to make a new queen. The eggs are initially destined to become queens. The larvae are fed Royal Jelly right from the beginning of their development. The result is often a higher quality queen.

A newly emerging queen quickly travels throughout the hive and kill any rivals. If she finds any unopened queen cells she will sting the potential rivals through the side of the cell. If another queen has already emerged, the two will fight to the death of one.

Commercial queen production emulates the swarm impulse style of queen production.

Who Can Keep Bees?

Physical

For someone who is allergic a single bee sting can be fatal. About one person in one hundred is actually allergic to bee stings. Pain and swelling at the sting site are normal. Shortness of breath, heart palpitations and dizziness aren't. If in doubt, consult your doctor.

A full super may weigh 50 to 75lbs. If you are unable to lift it, you will need to have someone to help.

Location

There are very few limits on where one can keep bees.

Avoid conflicts with people. Don't place your hives near heavily traveled areas (sidewalks, footpaths, or roads). If they are close to property lines, plant a shrub line or build a fence to alter the bees' flight path. Avoid areas that are mowed regularly. Bees can become a nuisance at swimming pools, bird baths or pet water bowls. Make sure that your bees have a safe, fresh water supply.

Equipment

Hive Components

Bottom board

- Conventional

- Screened or IPM

Standard (Langstroth) Hive Body

- 10 Frame

- 8 Frame

Frames

- Plastic foundation

- Beeswax foundation

Queen excluder

- Wood/metal

- Plastic

Supers

Feeders

- Hive top

Entrance or 'Boardman'
Inner cover
Bee escape
Telescoping cover
Conventional
Plastic
Entrance reducer

Tools

Smoker
Hive tool
Bee brush
Frame 'grabber' (optional)
Frame 'hanger' (optional)

Protective Clothing

Veil
 'Alexander'
 Better quality
Gloves
Velcro straps (optional)
Cloth long sleeve shirt
Long slacks
Cotton socks
Closed toed/tie shoes