

Fifth In A Series – Beekeeping Instructor's Guide & Essentials

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We had four sessions on teaching beekeeping that ended in April. This session deals with the Bee Nest or Hive and how to visit the hive as a teacher with students. Here are the topics we will cover:

The Bee Nest or Hive.

- Parts of a natural hive.
- Parts of a beekeeper's hive.
- Bee stings and protection.
- The Smoker, how it works and how to use it.

Class activity –

- Look at a natural hive from a bee tree.
- Comparison with a wasp nest (without wasps).
- Assemble beehive.
- Economics of wood+wax vs plastic frames.

Typical Course Structure

As a reminder of how we will ap-

proach these sessions, I am repeating the Typical Course Structure which appeared in the first of the series:

Most classroom teachers are required to prepare lesson plans for each teaching experience. A lesson plan includes many things for modern teachers, and I have chosen to leave aside the educational aspects of a lesson plan (like measuring a student's knowledge or attitude toward a particular subject before and after the lesson, or measuring the success of the unit taught, and other components of education theory). For our use, I focus on four components I want to include in my class structure, much of it offered somewhat informally:

1. What is to be taught (stated in a lesson plan or planning notes)
2. Pre-teaching the subject using traditional classroom sessions as well as high tech research options
3. A field or hands on session in the orchard, apiary or honey house
4. A follow up laboratory session to examine what has been collected.

The Beehive Pre-teaching

Parts of a natural hive.

Non beekeepers have preconceived ideas of what habitats bees live in. Thanks to Walt Disney animation, bees are often shown to live in hornet-like nests hanging in trees. This is a case of species confusion, as to what is a bee, a wasp, or a hornet. Bees are vegetarians, while wasps, yellowjackets and hornets are carnivores.

Collect as many photos and drawings as you can of honey bees, *Apis mellifera* L. in natural settings. Of course, for folks in ecosystems filled with large trees, it is easy to find bee nests in large trees in forests and parks. But bees also live in the sides of buildings, unfilled walls of out buildings, water meters, and other human made items. There are other

sites bees used in other climates. In the deserts the bees live in rock outcroppings formed from erosion and animal burrowing. They are located near a natural source of water. In warm climates they may be found in less protected areas, such as under a limb of a large tree, and live very successfully there.

Use a drawing or photo of a cross section of a natural nest. Review with the students the following aspects of the nest: The construction from the top down, the use of propolis at the entrance and to coat the inside of the nest, the size of the opening of the nest, the location of honey, brood, drone production and queen cells (especially for swarming).

Parts of a beekeeper's hive.

Using drawings and photos, show the students the makeup of a standard Langstroth hive (unless you are in an area exclusively of top bar and/or Warre hives). If you live in a country other than the U.S. use the standard hive designs of your area. Show the construction of the comb, the attachment to the frames, their use of foundation or starter strips, the use of propolis to reduce the size of entrances and to keep the frames from moving in the wind, the size and position of the opening of the nest, and the location of the honey, brood, drone production and queen cells (especially for swarming).

Introduce L.L. Langstroth, the person associated with the development of modern beekeeping by developing a movable frame that recognized the need to respect the bee space, the room needed by two bees to work on parallel combs with room enough to pass, yet providing the most efficient use of the cavity of the nest.

Look at beekeeping using Langstroth equipment. Three standard frames, the standard, the medium (also called the Illinois or Western frame in different parts of the country). and the shallow frame. Review the various hive configurations beekeepers use in their hives. Look at the use of five, eight and ten frame equipment and using deep and medium frames, as well as combinations of the two.

Look at honey extraction using movable frame combs. See how the strength and durability of the comb is an essential part of the success of



Arizona wild hive.

this hive design. Note how the frames may be moved to other hives to boost colony strength and to make new colonies or nuclei.

Bee stings and protection.

Find drawings or photos of the sting structure of the worker honey bee. Point out the barbed shaft of the sting, the venom sac, and the muscles that keep the sting pumping venom after it detaches from the bee and into the flesh of the sting recipient. Discuss how the loss of some bees due to defensive stinging is cost effective for a social organism, and how this deters further predation by various predators, from birds, toads and mammals (including humans, bears, skunks). Note how this is less effective on hard bodied animals like other insects, and how predation by dragonflies and spiders occurs at a low level.

Find a clear summary of how been venom works, and how it is quite different from other social insect venoms. This means that a beekeeper may have little reaction to honey bee venom, but become quite sick after being stung by yellowjacket wasps or hornets.

Look at some of the hats, veils and bee suits beekeepers wear to protect themselves from bee stings. Discuss how some beekeepers use little protection once they are familiar with bee behavior.

The Smoker, how it works and how to use it.

Look at the design of a typical bee smoker, with a bellows and fire chamber. Explain how these work, and the need to start from the bottom of the fire pot chamber to have long-lasting smoke. Look for other methods humans have used against bees. Discuss the behavior changes of using smoke: confusion of the chemical communication systems of bees and the engorgement of their honey stomach. Look at alternate methods of calming bees without smoke, including wet towels, moveable frame covers, fine water or scented water mist, and the advantages/disadvantages of each.

Class activity – In the laboratory or elsewhere

Look at a natural hive from a bee tree.

Obtain a natural bee colony

Propolis on bee.



abandoned by the bees (where they died naturally). With a large tree, this may require the help of a good carpenter or handyman. It may require a visit to the place where the natural nest is being stored so it is not destroyed. The ideal arrangement is a tree section that can be cut or split so the combs are exposed like leaves in a book, as much as the bees may have cooperated to let that happen.

Carefully remove the combs from the outside of the nest. Have students draw a cross section of the hive, showing the attachment of the comb to the top and sides of the wood chamber. Look for communication holes that allow bees to move from one side of the comb to the other without walking a long distance around the comb. Identify the worker cells, the drone cells, and any queen cells. Look for the darkened comb where brood has been produced.

Comparison with a wasp nest (without wasps).

Obtain a hornet or yellowjacket nest that has been depopulated

by short term insecticides, or wait to capture such a nest after cold weather has killed the inhabitants, and before predators or the weather had destroyed it. Using a sharp knife or razor blade, cut the outer layers away from the nest along a midline the students select. As in the honey bee chamber, note the attachment of the combs to the interior of the nest and locate the areas of young wasp production. Look for any remaining wasp larvae and pupae. Count the number of cells in the nest and predict the number of wasps that lived there. Handle these nests carefully if they have been killed by insecticides. Use lightweight, disposable gloves, and watch for new emergence of wasps from the brood that was sealed when the adult wasps were killed.

Assemble beehive.

Bee supply manufacturers offer starter kits for beekeepers. Look at these kits for purchase or decide to purchase your own starter kit to personal specifications. Following standard safety rules (eye protection)

Bee tree top of combs.



glue and nail the frames, hive bodies, covers, and bottom board together. I would not recommend using an air compressor for student groups for safety reasons. Insert the foundation, or use plastic frames. Paint or stain the hive to reflect you class's personality.

Economics of wood+wax vs plastic frames.

Compare the cost of purchase, labor and efficiency of use of plastic frames compared to wood and wax. Discuss the issues of labor savings versus the problems of disposal of old plastic combs compared to the disposal of wood and wax combs. **BC**

References

Book

Caron, Dewey M., *The Bee Nest*, Honey Bee Biology and Beekeeping, Wicwas Press, Kalamazoo, MI
Seeley, Thomas, *Honey Bee Democracy*

Vocabulary

Bee nest, nest volume, bee space, comb, honeycomb, brood comb, hive site selection, propolis, bottom board, brood chamber, honey super, inner cover, outer cover, frames, foundation, plastic honey comb, chewed wood nest, vegetarian, carnivore, smoker, fire pot, bellows, natural bee nest, L.L. Langstroth, nest site characteristics

Check out the new website www.honeybeespeak.com. This offers a matching service for folks who speak about bees and beekeeping, and the groups who seek their services. You may sign up both as a speaker and as a person who will receive notices of speaker activity.

January is time for the Serious Sideline Symposium, held as part of the American Beekeeping Federation Convention in Hershey, PA. The SSS is held on Thursday and Friday of the convention. If you are a small scale, sideline, or semi-commercial beekeeper, come and join us for the two-day event.

Two new Wicwas Press titles are *Beekeeping Equipment Essentials*, by Ed Simon, who has written for *Bee Culture*, and *Bee-sentials: A Field Guide*, by the author of this article. Go the PayPal bookstore at www.wicwas.com for further information.

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