Caswell County Beekeepers Association

2018 Beginning Beekeeping Course

January 10 – March 17, 2018

Housekeeping Announcements

- Changes to the schedule will be posted online on our CCBA website under Bee School (CaswellCountyBeekeepers.org/Bee-School) and e-mailed to students.

- Class hours are from 6:30PM to 8:30PM with a 10 minute break in the middle.

- Please wear your name badge.

- Refreshments are available at the back of the class.

- Restrooms are in the hall just outside the classroom entrance.

- Please turn off cell phones or set to vibrate during class hours. If you must make or take a call, please step in the hallway or go outside.

- Your class fee includes membership to CCBA. CCBA meets the 4th Thursday of the month at 7PM (except November and December). Our first meeting in 2018 is Thursday, January 25, 2018.

- CCBA encourages you to also join the North Carolina State Beekeepers Association (NCSBA). NCSBA has 2 meetings each year and offers 4 levels of certification in beekeeping.

Beginning Beekeeping Course Outline[1] – 2018

Objective: *To provide the knowledge and resources for a person to become a beekeeper.*

Session	Date	Subject	Instructor
1	Jan 10	Introduction to Beekeeping	Robert Neal
		o Review Course Outline o Brief history of honey bees and beekeeping in US o Social order of a honey bee colony o Stages of honey bee development – eggs, larvae, pupae o Makeup of a bee's home – comb, cavity, entrance, propolis, bee space o Colony activity during a year – buildup, foraging, winter bees, clustering o References, books, publications, organizations: NCSBA, CCBA, EAS, etc.	
2	Jan 17	Equipment	Robert Neal
		o Basic hive components - bottom board, hive body, frames, queen excluder, honey super, inner cover and lid o Hive variations – medium, Illinois, deep, shallow, top bar, flow hive o Woodenware – types of wood, quality, joints, construction, painting o Assembly - joining, nailing, gluing, maintaining bee space and critical dimensions, square, flush o Considerations on initial hive components purchase – commonality, manufacturer compatibility, weight, construction, type of materials, costs o Protective gear - veil, coveralls, and gloves o Tools – hive tools (straight, j-hook), frame grips, smoker, spacers, brush, hive straps or staples	
3	Jan 24	About the honey bee	Robert Neal
		o Eight species of honey bees in the genus Apis o Twenty-four races in the species mellifera o External/internal anatomy o Pheromones o Life stages o Worker o Drone o Queen	
4	Jan 31	The colony	Robert Neal
		o Division of labor o Duties of the worker bee o The drone o The queen o Superseding o Swarming o Colony activity during a year – buildup, foraging, winter bees, clustering	

Session	Date	Subject	Instructor
5	Feb 7	Starting a Honey Bee Colony	Scott Oakley
		o Choosing a location – water source, direction of entrance, amount of sunlight, windbreak, accessibility, away from sidewalks/playgrounds /neighbors/public/vandals o Setup site – hive components, install stand, level o Hive type - full size, package, nuc, split, swarm, cutout, trapping. o Feeding (different type feeders) o Inspecting – queen right, drawing comb, sufficient food stores	
6	Feb 14	Bees' enemies, pests, and diseases	[NC Inspector]

		o Mites – varroa, tracheal
		o Diseases:
		  o vectored from mites – acute bee paralysis, deformed wing virus, chronic paralysis virus (K-wing)
		  o Other diseases – nosema, European foulbrood, American foulbrood, chalkbrood, sacbrood
		o Small Hive Beetles
		o Wax Moth
		o Pesticides
		o Other – ants, spiders, mice, hornets, wasps, dragonflies	

7	Feb 21	Food and water for your bees	Phil Barfield
		o Flowering plants and trees (ID, bloom period) o Feed and pollen substitutes (sugar, HFCS, pollen patties/substitutes) o Natural and artificial water sources	
8	Feb 28	Products of the hive	Phil Barfield
		o Bees o Honey o Comb honey o Wax o Pollen o Propolis o Royal jelly o Apitherapy	
9	Mar 7	Managing your bees	Robert Neal
		o Seasonal management – spring/fall o Increasing/decreasing hive space o Inspections –when, what to look for, internal, external o Checking food stores o Feeding o Nectar (honey) flow o Ventilation/moisture control o Culling old comb o Re-queening o Pest prevention/control o Harvesting honey surplus o Robbing	

Session	Date	Subject	Instructor
10	Mar 17	Field Day (4 hours at an apiary in the local area) [1]	Robert Neal
		o Light smoker and inspect a hive (first by an instructor and then by one or more of the students) o Check for disease, check brood pattern and find the queen o Identify a drone o Identify eggs, young larvae, sealed worker brood, sealed drone brood, pollen and honey o Show how to: o Check for Varroa mites o Start a nuc o Show steps necessary in preparation for honey flow - add a queen excluder, add two or more supers, remove entrance reducer o Demonstrate getting a hive ready for winter- include checking a hive for honey stores, feeding by several different methods, removing the queen excluder, providing upward ventilation and adding an entrance reducer	

Notes:

1 Course outline, topics, and schedule are planned but are subject to change.

2 Classes meet on Wednesdays from 6:30PM to 8:30PM.

3 For the field day, each student should bring a veil and any other protective equipment they feel comfortable with while working bees. The smoker and hive tool will be provided. The location and starting time will be given during the class. Please note the Field Day will be on a Saturday. Rain date for the Field Day will be March 24th (also a Saturday).

Directions: Classes will meet in the basement of the Agriculture Services building (126 Court Square) next to the Historic Courthouse in downtown Yanceyville, NC. Please park and enter from the back of the building on the lower level. A Google map can be found on our web site at http://caswellcountybeekeepers.org/directions/.

Course information can be found at http://caswellcountybeekeepers.org/bee-school/. The web page will be kept updated and provide class changes or cancellations in case of emergencies, weather, or instructor availability.

Questions? Please e-mail ccba@caswellcountybeekeepers.org or call Phil Barfield at (336) 459-3276.

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Session 1

Introduction to Beekeeping

Not only has there been an explosion of new beekeepers, but there is also more natural beekeeping information available. A good bit, though not all, has been accumulating on the Internet. While doing some background research for this article (and other searches), I came across some seriously **BAD** information on the net. Some of it was just down right **WRONG** from beginning to end! That provoked me to do a quick survey among beekeepers (hobbyist and commercial), honey bee academics and beekeeping supply purveyors. I asked them to answer a simple question: what books or beekeeping information would you recommend to 1) a beginner and 2) a more experienced beekeeper.

Here is the list of titles (in order of most nominations to least):

Beginner information	More Advanced
The Beekeepers Handbook	*The Wisdom of the Hive*
First Lessons in Beekeeping	*Honeybee Democracy*
The ABC & XYZ of Bee Culture	*The Biology of the Honey Bee*
Honey Bee Biology and Beekeeping	*Honeybee Ecology*
The Hive and the Honey Bee	*The Buzz About Bees*
Backyard Beekeeping	*Bee Culture magazine*
Bee-sentials	*American Bee Journal*
A Book of Bees: And How to Keep Them	
Beekeeping: A Practical Guide	
Hive Management	

Of course you know this, but not everything you read or see on the Internet is correct!
Anyone can post a blog or YouTube video on his/her practices, thoughts, opinions, conclusions, personal views, belief, ideas, etc. And, because we've been somewhat trained to trust what's in print and other media, subconsciously we expect that it MUST be right! Please be careful while searching information in cyberspace. Especially, if you're a new (newer) beekeeper, start with credible information. Build your foundation of beekeeping knowledge from reliable, sound, and peer reviewed material. Don't buy into some fly-by-night, who's only credible experience is website building, and has had only one bee hive (now a dead-out) in his/her life. Yet, people of this ilk have convinced novice beekeepers to follow their nonsensical beekeeping theories, which invariably leads these new beekeepers to lose their colony, become discouraged, and likely give up beekeeping entirely. Thus, our cause loses a potentially great beekeeper.

HISTORY OF BEEKEEPING IN THE UNITED STATES

By Everett Oertel[1]

The honey bee (*Apis mellifera* L.) is not native to the Western Hemisphere. Stingless bees (Meliponids and Trigonids) are native to the West Indies, as well as Central and South America. Wax and small amounts of honey were obtained from stingless bee nests by the early Indians of these areas.

Information available indicates that colonies of honey bees were shipped from England and landed in the Colony of Virginia early in 1622. One or more shipments were made to Massachusetts between 1630 and 1633, others probably between 1633 and 1638. The author was not able to find any records of importing honey bees into other Colonies, but it is reasonable to assume that they were brought by the colonists to New York, Pennsylvania, Carolina, and Georgia.

Records indicate that honey bees were present in the following places on the dates shown: Connecticut, 1644; New York (Long Island), 1670; Pennsylvania, 1698; North Carolina, 1730; Georgia, 1743; Alabama (Mobile), 1773; Mississippi (Natchez), 1770; Kentucky, 1780; Ohio, 1788; and Illinois, 1820 (Oertel *1976*). By 1800, honey bees were widely distributed from the Atlantic Ocean to the Mississippi River.

Honey bees may have been taken to Alaska in 1809 and to California in 1830 by the Russians, according to Pellett (*1938*), but no records are available as to whether they survived. In the 1850's, bees were shipped from the Eastern States to California. A few hives were taken over land, but most of the hives were sent by ship to Panama, by land across the Isthmus, and then by ship to California. Probably, the bees reached Oregon and Washington from California in natural swarms or in hives taken there by settlers. There are no dependable records that describe how bees spread westward from the Mississippi River into the Mountain States. It seems likely, however, that bees moved into these areas the same way they did into Oregon and Washington; that is, in natural swarms or in hives carried by the early settlers.

Development of Modern Equipment

For thousands of years, colonies of honey bees were kept in wooden boxes, straw skeps, pottery vessels, and other containers. Honeycomb built in such hives could not be removed and manipulated like the movable combs of today. No doubt the first hives used in the American Colonies were straw skeps (fig. 1). Later the abundance of cheap lumber and lack of trained people to make straw hives caused a fairly rapid shift to box hives made of wood. Log gums, that is, sections of bee trees containing colonies of bees, occasionally were

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Figure 1.—The straw skep was used widely in Europe, but very little in North America.

[1] Retired, formerly apiculturist, U.S. Department of Agriculture.

sawed out and used as hives. A few gums may be in use even now, particularly in wooded, isolated areas (figs. 2 and 3). Some ingenious farmers built wood hives with easily removable tops (caps) so that chunks of honey could be removed without killing the colonies. Affleck (*1841*) showed caps (now called supers) in his illustrations, but he did not give any details such as when they were first used.

In 1852, L. L. Langstroth, a Congregational minister from Pennsylvania, patented a hive with movable frames that is still used today. The principle upon which Langstroth based his hive is the space kept open in the hive to allow bees passage between and around combs. This space is about three-eighths of an inch wide; space that is less than this is sealed with propolis and wax, while space wider is filled with comb. Before this time hives were either Greek bar hives or leaf hives that

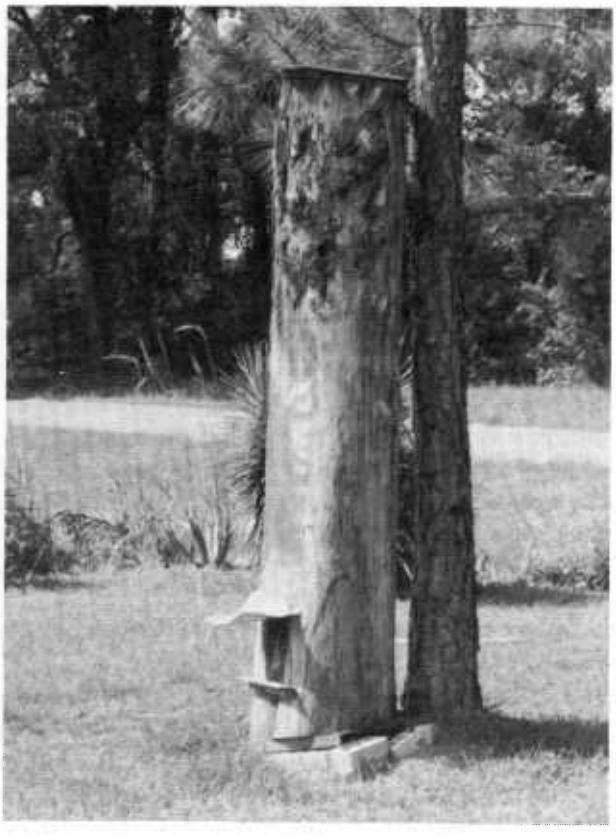

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FIGURE 2.—An unusually tall bee gum.

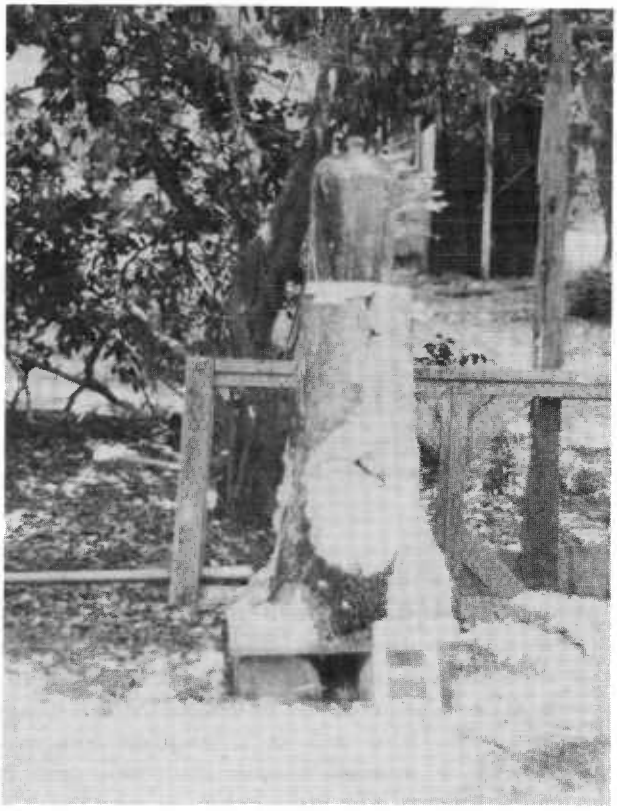

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FIGURE 3.—Bee gum with glass jar on top for honey storage.

allowed the beekeeper to inspect the comb (fig. 4). Langstroth is called "the father of modern beekeeping."

In the period between the importation of honey bees by the early colonist and invention of the movable frame hive by Langstroth, beekeepers had little capability for managing their colonies. They increased their number of colonies each spring by capturing swarms and killed them in the fall by burning sulfur at the entrance of the hive so that the honey and beeswax could be removed. The comb, then, was crushed to squeeze out the honey.

Honey generally was obtained (1) by cutting bee trees and taking what honey was available, (2) by killing colonies and taking the honey within the hive, or (3) by taking whatever honey was stored in a crude super or cap that was placed on the hive during the summer.

Modern methods of beekeeping came very rapidly following Langstroth's patent. Other inventions soon followed that made large-scale, commercial beekeeping possible. Wax-comb foundation,

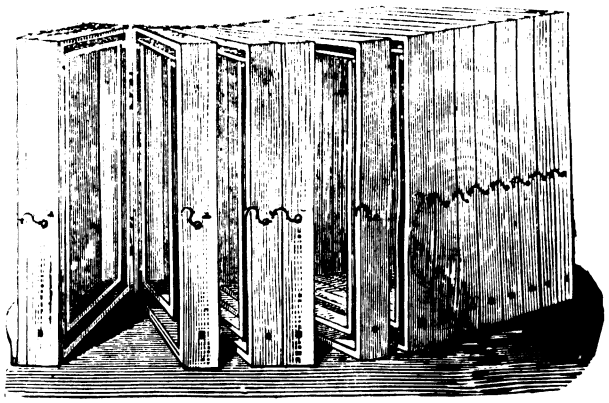

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FIGURE 4.—Book hive with hinged frames used by François Hüber in Switzerland, who published his observations in 1792.

invented in 1857, made possible the consistent production of straight, high-quality combs of predominantly worker cells. Pellett (*1938*) gives a detailed account of the development of wax-comb foundation. The invention of the centrifugal honey extractor in 1865, and its subsequent improvements, made possible large-scale production of extracted honey. The bee smoker, as now used by beekeepers, evolved from a pan used to contain some burning, freely smoking material, the smoke of which could be blown across the open hive to control the bees. The all-important bee veil gradually evolved from pieces of coarse cloth that were wrapped about the head of the beekeeper.

Introduction of Italian Stock

No one knows how many colonies or hives of honey bees were brought to the American Colonies by the first settlers. Nor do we know from what countries they came: England, Holland, France, Spain, or perhaps somewhere else? It is likely that after the early imports all increase was by natural swarming. Since we do not know how many colonies were brought to the east coast, we cannot determine the degree of inbreeding.

In the 1850's, the superior merits of the Italian race of honey bees became known to a few leaders of American beekeeping and they attempted to import queen bees from Italy. Accounts of these first efforts are confusing, but according to Pellett (*1938*), the first known successful importation of Italian queen bees was made in 1860.

During the last part of the 19th century, some queen bees of other races were brought into this country. They were imported from Egypt, Cyprus, the Holy Land, Syria, Hungary, and Tunisia, according to Pellett (*1938*). None of those races, or selections, was of lasting use in the United States, however. Carniolan and Caucasian queen bees also were imported and still are used to a limited extent. The bee journals and the trade catalogs from about 1870 until after World War I carried advertisements for imported queen bees or their progeny, largely Italian stock. Today, the American version of the Italian race is widely used throughout this country.

Imported Italian queen bees were advertised for sale by L. L. Langstroth and Sons, Oxford Ohio, in 1866, but no prices were given. Those interested were advised to write for a price list. In 1867, Adam Grimm, Jefferson, Wis., advertised imported Italian queen bees for sale at $20 each. He promised to sell medium-sized colonies of bees, with imported queens, in movable comb hives for $30 each in 1868. Others who advertised Italian queen bees for sale in 1867 were C. B. Bigelow, Vermont; A. Gray, Ohio; Ellen S. Tupper, Iowa; William W. Cary, Massachusetts; and K. P. Kidder, Vermont. This last group did not quote prices. Egyptian queen bees were offered for sale by Langstroth and Sons and A. Gray, but no prices were quoted. Charles Dadant, Illinois, offered imported Italian queen bees for sale at $12 each.

The originally introduced dark bees of northern Europe predominated throughout much of the United States and Canada during the 1800's and into the 1900's. Strains present toward the end of that era tended to be irritable and nervous, running readily over the combs and hive. These strains were also subject to European foulbrood disease. Queen bees were shipped from Europe in large numbers from the 1880's to 1922, when a law was passed prohibiting further imports. The purpose of this law was to prevent introduction of the acarine mite, which was causing serious problems in Europe, into the United States.

As queen rearing developed into a large-scale commercial enterprise in the Southern States and Italian queens from Europe were used extensively in the breeding program, a strong, Italian-type bee predominated. Before the end of the 1920's, however, after years of persistent requeening with southern queens, northern beekeepers largely replaced the black bees with a less nervous, Italian-type bee that resisted European foulbrood.

Queen Bee Rearing

As the number of colonies owned and operated by individual beekeepers increased, a market developed for young queen bees. In 1861 Henry Alley, William Carey, and E. L. Pratt, all of Massachusetts, began producing queens for sale. These early producers used narrow strips of comb containing eggs and larvae which they fastened to the top bars or partial combs. When these materials were added to swarm boxes that were queenless, queen cells formed. The queen cells were distributed individually to queenless colonies for mating.

G. M. Doolittle, Onondaga, N.Y., in 1889 developed a comprehensive system for rearing queen bees that is the basis of bee production today. His system, essentially, was making wax cups and placing worker bee larvae into them from which the queen-rearing bees formed the queen cells. This same system, or some modification of it, is used today by all commercial queen rearers.

Since 1886 queen bees have been sent in the mail, which has benefited both buyers and sellers (Pellet *1938*). Losses in transit have been reported from time to time, but on the whole, shipment by mail has been satisfactory. Post offices will accept either single queen cages or several cages stapled together. About a million queen bees are sent in the mail annually. Most of these bees are mailed to places in the United States and Canada, but some are sent to other countries.

Recent developments include the crossing of selected inbred lines to produce hybrid bees, and as of 1977, the direct sale of artificially inseminated queens. This step marks the beginning of a new era in bee breeding, in that male and female lines can now be controlled in a commercial breeding program.

Commercial Beekeeping

From the beginning of beekeeping in the 1600's until the early 1800's, we assume that honey was largely an article of local trade. Many farmers and villagers kept a few colonies of bees in box hives to supply their own needs and those of some friends, relatives, and neighbors (fig. 5). According to Pellett (*1938*), Moses Quinby of New York State was the first commercial beekeeper in the United States as his sole means of livelihood was producing and selling honey. Quinby (*1864*) described the

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FIGURE 5.—Box hive used widely in the United States before movable frame hives became available.

box hives that he built so that combs of honey could be removed without first killing the colonies. Quinby writes of his financial returns as: "In particularly favorable seasons, hives will yield a profit of one or two hundred percent—in others, they hardly make a return for trouble." Quinby, after experimenting with a few movable comb hives, gradually replaced his box hives with the movable comb-type and advised others to do likewise.

Other beekeepers in Quinby's neighborhood used his methods and began to produce honey on a commercial scale. As the use of movable comb hives, comb foundation, and improved honey extractors became more widespread, commercial beekeeping spread into other States. Poor roads and the use of horse-drawn vehicles restricted the size of the area in which a beekeeper could operate and the number of colonies that could be managed profitably. After World War I, however, with better highways and increased use of motor vehicles and more efficient methods of colony management and honey handling, commercial beekeepers throughout the United States were able to expand the size of their businesses. By 1957 Anderson (*1969*) estimated that 1,200 professional beekeepers operated 1,440,000 colonies in the United States. By that time, hobbyists had a few

colonies, the part-time beekeepers kept from 25 to 300 colonies, and the commercial beekeeper had up to several thousand colonies. Some U.S. beekeepers have owned as many as 30,000 colonies.

Comb or Section

The term "section" used here describes the honey produced in small wooden frames or sections. The production of section honey is, to coin a phrase, "the fanciest product of the beekeeper's art." Probably, section honey was first produced in the 1820's. Moses Quinby produced section honey in the 1830's and 1840's and did not claim that the method originated with him. Honey was produced by cutting large holes in the top of a box hive, setting a shallow cap on the hive, and filling the cap with wooden sections that might have small comb starters fastened to them. A cover was placed over the hive. The sections, which were of various sizes, might contain up to 4 pounds of honey when filled. Some beekeepers inverted glass containers over the holes in the box hive, and if they were lucky had honey stored in them.

The crude method of section honey production was gradually abandoned as more and more beekeepers began to use movable comb hives. The large homemade section boxes were replaced with smaller, factory-made ones. Supers especially fitted to hold the sections were developed. Manufacturers sold 45 million to 55 million sections annually in the years just before World War I. Between about 1875 and 1915, approximately one-third of the honey produced in New England, New York, Pennsylvania, the Midwest, and a few Western States was in the form of section honey. Generally, the nectar flow in the Southern States was not suitable for section honey production.

Increase in Production of Extracted Honey

The amount of section honey produced declined rapidly after World War I. The product was fragile and difficult to ship; shelf life was short and combs were likely to leak or granulate. Production of section honey required a heavy nectar flow of several weeks' duration, and a great deal of hand labor for cleaning, weighing, and grading. In addition, beekeepers were unable to provide the intensive colony management needed in outyards miles from their homes. The Pure Food Law of 1906 gave buyers more confidence in the purity of extracted honey, thereby increasing demand for it. During the sugar-short period of World War I, the demand for honey increased and, as the price was high, production of extracted honey increased rapidly.

Large amounts of liquid honey were shipped in wooden barrels in the last part of the 19th century. Then 60-pound metal cans came into general use. Today, most bulk honey is sold in steel drums.

Development of Honey-Packing Plants

As commercial honey producers increased the size of their operations, they found it difficult to pack and sell the crop on the retail market and specialized honey-packing plants developed in the 1920's. Packing plants now are very sophisticated in packing liquid or smoothly crystallized honey.

Beeswax

Beeswax was an article of commerce soon after it became available in the Colonies. It was widely used in candles at home and abroad. The wax was melted, poured into molds, and then transported to market. North Carolina in 1740 and Tennessee in 1785 permitted taxes to be paid in beeswax because of the shortage of money (Oertel *1976*). Information is not available about how much beeswax was produced or used in the Colonies in the 1600's and the first part of the 1700's. Beeswax was an article of export in the 18th century, particularly from the ports of Philadelphia, Charleston, Pensacola, and Mobile. In 1767, a total of 35 barrels of beeswax were exported from Philadelphia and 14,500 pounds from Charleston in 1790. Beeswax was listed in articles exported from the British Continental Colonies in 1770:[2] Value 6,426 pounds sterling; 128,500 pounds weight; 62,800 pounds to Great Britain; 50,500 pounds to Southern Europe; 10,000 pounds to Ireland; and the rest to the West Indies and Africa. Honey was not mentioned.

Bee Supply Manufacturers

No doubt, before the invention of the movable comb hive, beekeepers made their own box hives. Movable comb hives and frames must be cut to exact measurements, so machine methods grad-

[2] Taken from *Historical Statistics of the United States*, 2 parts, 1975, Bureau of the Census, U.S. Department of Commerce.

ually took over from manufacture by hand. As metal honey extractors came into general use, companies began to offer them for sale. C. P. Dadant began to sell bee hives and frames to his neighbors in 1863 and comb foundation in 1878.[3] By 1884, Dadant and Sons had sold 60,000 pounds of comb foundation throughout the United States.[3] In 1867, C. B. Bigelow of Vermont advertised that he sold the Langstroth bee hive (fig. 6). In 1868, J. Tomlinson, Wisconsin, had honey boxes and frames for sale. In the same year, the National Bee-Hive Company, Illinois, sold bee hives, frames, honey boxes, and honey extractors.

A. I. Root and Moses Quinby started to sell bee supplies in 1869. In 1870, Henry Alley, Massachusetts, sold the Langstroth hive, and A. V. Conklin, Ohio, sold the Diamond bee hive. Later on in the 1870's, Alley offered the Bay State hive for sale, claiming that this was the "best hive in use." Edward Kretchmer, Iowa, began to manufacture and sell supplies in 1874. The W. T. Falconer Co., New York State, started its bee supply business in 1880. At about this same time, P. L. Viallon, Louisiana, began to manufacture and sell bee hives.

Today's beekeeper, who is used to large colonies of bees, would be amused or puzzled if he could see the small hives used in the American Colonies, and even in the States until about 1900 to 1920. The small hives meant small colonies of bees, small crops of surplus honey, and many swarms. Several old books the author consulted stated that a beekeeper should be well pleased if a colony contained 10,000 to 25,000 bees. Even Moses Quinby, a leading beekeeper in the mid-1880's, stated that a 12- by 12- by 14-inch hive (excluding the cap or super) was large enough for use in New York State and an even smaller hive probably would be adequate in warm climates. Quinby thought that 25 pounds of honey was sufficient to last a colony from October 1 to the following April. Charles Dadant, on the other hand, advocated large hives and strong colonies of bees. Over the years, other beekeepers became convinced that a colony must have a large population at the beginning of the nectar flow, an accepted practice today.

[3] Personal communication from Dadant & Sons, Inc., Hamilton, Ill.

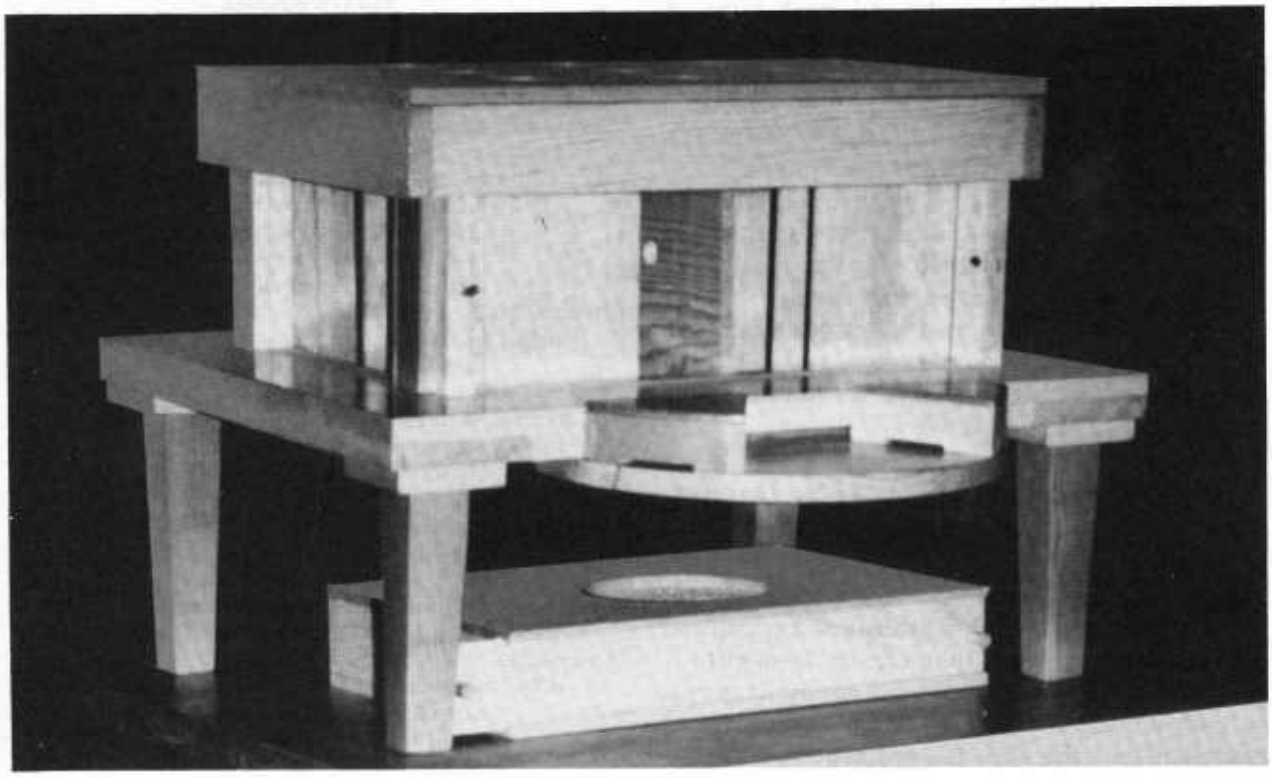

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FIGURE 6.—Model of Langstroth's original movable-frame hive, with the front removed to show the frames.

Twentieth Century

During the 20th century, the dimensions of bee hives and frames became more standardized, thus eliminating the various sizes that were so confusing 100 or more years ago. The 10-frame movable comb hive is now used throughout the world wherever beekeeping is seriously practiced. Most beekeepers use full-depth standard hive bodies for brood chambers; some also use them for honey supers, while others use shallow or half-depth bodies. Development of strong colonies for major nectar flows rests upon such fundamentals as hive room, adequate stores, and high-quality queen bees. Commercial and part-time beekeepers control swarming in their colonies, but beginners still have difficulties. Drugs (antibiotics) are now available for the control of foulbrood and nosema disease. Artificial insemination of queen bees, that is, controlled mating, is being used commercially to a limited extent.

The rental of colonies for the pollination of certain crops has increased markedly in this century, although management of colonies for such purposes needs to be improved.

The wax moth (*Galleria mellonella*) has been a serious pest of stored combs and weak hives. A limited survey by Williams (*1976*) showed that in recent years annual losses caused by the wax worm ranged from $48,000 in Louisiana to $1,016,000 in Florida. Such early writers as Affleck (*1841*), Langstroth (*1862*), and Miner (*1859*), gave much space to the damage caused by this pest and how it might be controlled. A number of patents were issued in the 1840's and 1850's for various devices that were supposed to keep wax moths from entering bee hives. None was effective. Chemicals have been used with some success, and the feasibility of using biological control methods is being studied.

Research Sponsored by U.S. Department of Agriculture

A full description of apicultural research, as conducted by the U.S. Department of Agriculture, needs much more space than can be devoted to it here. Consequently, only a brief outline is given. In 1860 William Bruckisch, a German immigrant, suggested that the U.S. Government should conduct investigations in beekeeping, and money was set aside to start such research in 1885. Those who have had responsibility for guiding this program are listed below:

N. W. McLain—1885–87, discontinued because of lack of funds.

Frank Benton—1891–1907, work suspended in 1896–1897; no funds. Spent much of his time locating and shipping stock from Europe.

E. F. Phillips—1905–06, acting; 1907–24

J. I. Hambleton—1924–58

C. L. Farrar—1958–61

F. E. Todd—1961–65

S. E. McGregor—1965–69

M. D. Levin—1969–75

E. C. Martin—1975–79

The following did some of their research while employed in the USDA's Division of Bee Culture. Their names were well known in the earlier part of this century.

James A. Nelson—author of *The Embryology of the Honey Bee.* 1915.

R. E. Snodgrass—author of *Anatomy and Physiology of the Honeybee.* 1925.

G. F. White—basic bulletins on bee disease, 1906–20.

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The Colony and Its Organization

Honey bees are social insects, which means that they live together in large, well-organized family groups. Social insects are highly evolved insects that engage in a variety of complex tasks not practiced by the multitude of solitary insects. Communication, complex nest construction, environmental control, defense, and division of the labor are just some of the behaviors that honey bees have developed to exist successfully in social colonies. These fascinating behaviors make social insects in general, and honey bees in particular, among the most fascinating creatures on earth.

A honey bee colony typically consists of three kinds of adult bees: workers, drones, and a queen (Figure 1). Several thousand worker bees cooperate in nest building, food collection, and brood rearing. Each worker has a definite task to perform, related to its adult age. But surviving and reproducing take the combined efforts of the entire colony. Individual bees (workers, drones, and queens) cannot survive without the support of the colony.

In addition to thousands of worker adults, a colony normally has a single queen and several hundred drones during late spring and summer. The social structure of the colony is maintained by the presence of the queen and workers and depends on an effective system of communication. The distribution of chemical pheromones among members and communicative "dances" are responsible for controlling the activities necessary for colony survival. Labor activities among worker bees depend primarily on the age of the bee but vary with the needs of the colony. Reproduction and colony strength depend on the queen, the quantity of food stores, and the size of the worker force. As the size of the colony increases up to a maximum of about 60,000 workers, so does the efficiency of the colony.

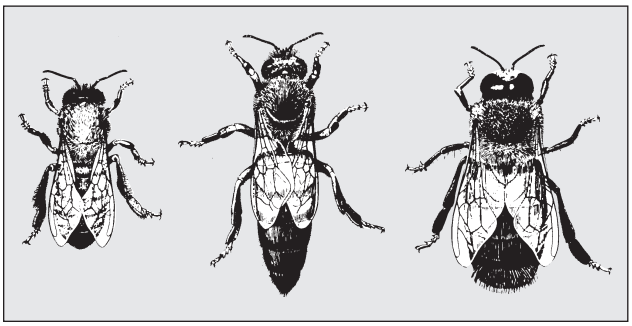


Figure 1. Three types of honey bees normally found in a honey bee colony: worker, queen, and drone. (Courtesy of the U.S. Department of Agriculture)

Queen

Each colony has only one queen, except during and a varying period following swarming preparations or supersedure. Because she is the only sexually developed female, her primary function is reproduction. She produces both fertilized and unfertilized eggs. Queens lay the greatest number of eggs in the spring and early summer. During peak production, queens may lay up to 1,500 eggs per day. They gradually cease laying eggs in early October and produce few or no eggs until early next spring (January). One queen may produce up to 250,000 eggs per year and possibly more than a million in her lifetime.

A queen is easily distinguished from other members of the colony. Her body is normally much longer than either the drone's or worker's, especially during the egg-laying period when her abdomen is greatly elongated. Her wings cover only about two-thirds of the abdomen, whereas the wings of both workers and drones nearly reach the tip of the abdomen when folded. A queen's thorax is slightly larger than that of a worker, and she has neither pollen baskets nor functional wax glands. Her stinger is curved and longer than that of the worker, but it has fewer and shorter barbs. The queen can live for several years—sometimes for as long as 5, but average productive life span is 2 to 3 years.

The second major function of a queen is producing pheromones that serve as a social "glue" unifying and helping to give individual identity to a bee colony (Figure 2, next page). One major pheromone—termed queen substance—is produced by her mandibular glands, but others are also important. The characteristics of the colony depend largely on the egg-laying and chemical production capabilities of the queen. Her genetic makeup—along with that of the drones she has mated with—contributes significantly to the quality, size, temperament, and productivity of the colony.

About one week after emerging from a queen cell, the queen leaves the hive to mate with several

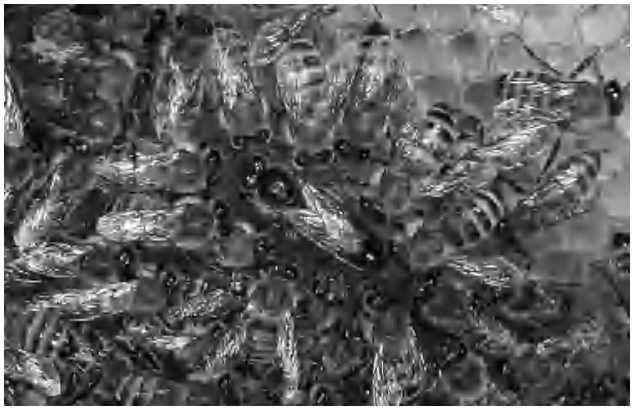


Figure 2. Queen surrounded by attendant workers. Although unique in shape and size, the queen is recognized by works and drones, not by the way she looks, but by her "chemical signature" or pheromone called queen substance.

drones in flight. Because she must fly some distance from her colony to mate (nature's way of avoiding inbreeding), she first circles the hive to orient herself to its location. She leaves the hive by herself and is gone approximately 13 minutes. The queen mates, usually in the afternoon, with seven to fifteen drones at an altitude above 20 feet. Drones are able to find and recognize the queen by her chemical odor (pheromone). If bad weather delays the queen's mating flight for more than 20 days, she loses the ability to mate and will only be able to lay unfertilized eggs, which result in drones.

After mating, the queen returns to the hive and begins laying eggs in about 48 hours. She releases several sperm from the spermatheca each time she lays an egg destined to become either a worker or queen. If her egg is laid in a larger drone-sized cell, she normally does not release sperm, and the resulting individual becomes a drone. The queen is constantly attended and fed royal jelly by the colony's worker bees. The number of eggs the queen lays depends on the amount of food she receives and the size of the worker force capable of preparing beeswax cells for her eggs and caring for the larva that will hatch from the eggs in 3 days. When the queen substance secreted by the queen is no longer adequate, the workers prepare to replace (supersede) her. The old queen and her new daughter may both be present in the hive for some time following supersedure.

New (virgin) queens develop from fertilized eggs or from young worker larvae not more than 3 days old. New queens are raised under three different circumstances: emergency, supersedure, or swarming. When an old queen is accidentally killed, lost, or removed, the worker bees select younger worker larvae to produce emergency queens. These queens are raised in worker cells modified to hang vertically on the comb surface (Figure 3). When an older queen begins to fail (decreased production of queen substance), the colony prepares to raise a new queen. Queens produced as a result of supersedure are usually better than emergency queens since they receive larger quantities of food (royal jelly) during development. Like emergency queen cells, supersedure queen cells typically are raised on the comb surface. In comparison, queen cells produced in preparation for swarming are found along the bottom margins of the frames or in gaps in the beeswax combs within the brood area.

Drones

Drones (male bees) are the largest bees in the colony. They are generally present only during late spring and summer. The drone's head is much larger than that of either the queen or worker, and its compound eyes meet at the top of its head. Drones have no stinger, pollen baskets, or wax glands. Their main function is to fertilize the virgin queen during her mating flight, but only a small number of drones perform this function. Drones become sexually mature about a week after emerging and die instantly upon mating. Although drones perform no useful work for the hive, their presence is believed to be important for normal colony functioning.

Figure 3. Emergency queen cell built by workers by modifying an existing worker cell to accommodate the larger size of the queen. (Courtesy Maryann Frazier)

While drones normally rely on workers for food, they can feed themselves within the hive after they are 4 days old. Since drones eat three times as much food as workers, an excessive number of drones may place an added stress on the colony's food supply. Drones stay in the hive until they are about 8 days old, after which they begin to take orientation flights. Flight from the hive normally occurs between noon and 4:00 P.M. Drones have never been observed taking food from flowers.

When cold weather begins in the fall and pollen/nectar resources become scarce, drones usually are forced out into the cold and left to starve. Queenless colonies, however, allow them to stay in the hive indefinitely.

Workers

Workers are the smallest bodied adults and constitute the majority of bees occupying the colony. They are sexually undeveloped females and under normal hive conditions do not lay eggs. Workers have specialized structures, such as brood food glands, scent glands, wax glands, and pollen baskets, which allow them to perform all the labors of the hive. They clean and polish the cells, feed the brood, care for the queen, remove debris, handle incoming nectar, build beeswax combs, guard the entrance, and air-condition and ventilate the hive during their initial few weeks as adults. Later as field bees they forage for nectar, pollen, water, and propolis (plant sap).

The life span of the worker during summer is about 6 weeks. Workers reared in the fall may live as long as 6 months, allowing the colony to survive the winter and assisting in the rearing of new generations in the spring before they die.

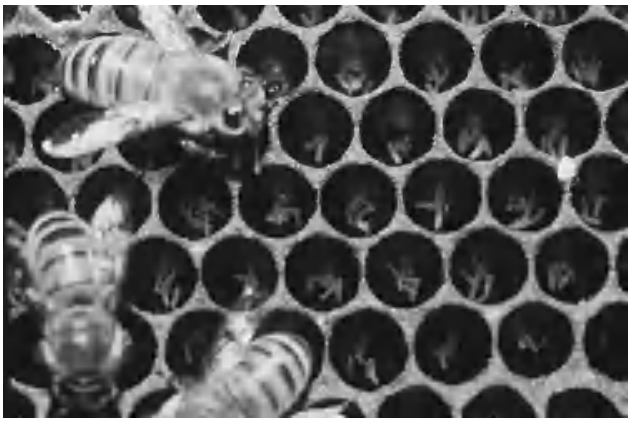


Figure 4. Eggs laid by workers (laying workers) in a queenless colony. (Courtesy Scott Camazine)

Laying Workers

When a colony becomes queenless, the ovaries of several workers develop and workers begin to lay unfertilized eggs. Normally, development of the workers' ovaries is inhibited by the presence of brood and the queen and her chemicals. The presence of laying workers in a colony usually means the colony has been queenless for several weeks. However, laying workers also may be found in normal "queenright" colonies during the swarming season and when the colony is headed by a poor queen. Colonies with laying workers are recognized easily: there may be anywhere from five to fifteen eggs per cell (Figure 4) and small-bodied drones are reared in worker-sized cells. In addition, laying workers scatter their eggs more randomly over the brood combs, and eggs can be found on the sides of the cell instead of at the base, where they are placed by a queen. Some of these eggs do not hatch, and many of the drone larvae that do hatch do not survive to maturity in the smaller cells.

Bee Development

All three types of adult honey bees pass through three developmental stages before emerging as adults: egg, larva, and pupa. The three stages are collectively labeled brood. While the developmental stages are similar, they do differ in duration (see Table 1). Unfertilized eggs become drones, while fertilized eggs become either workers or queens. Nutrition plays an important part in caste development of female bees; larvae destined to become workers receive less royal jelly and more a mixture of honey and pollen compared to the copious amounts of royal jelly that a queen larva receives.

Table 1. Developmental stages of the three castes of bees.

DEVELOPMENTAL STAGE	DURATION OF STAGES		
	QUEEN	WORKER	DRONE
	Days		
Egg	3	3	3
Larval stage	5 ½	6	6 ½
Pupal stage	7 ½	12	14 ½
Total developmental time	16	21	24

Brood

EGGS

Honey bee eggs are normally laid one per cell by the queen. Each egg is attached to the cell bottom and looks like a tiny grain of rice (Figure 5). When first laid, the egg stands straight up on end. However, during the 3-day development period the egg begins to bend over. On the third day, the egg develops into a tiny grub and the larval stage begins.

LARVAE

Healthy larvae are pearly white in color with a glistening appearance. They are curled in a "C" shape on the bottom of the cell (Figure 6). Worker, queen, and drone cells are capped after larvae are approximately 6, 5½, and 6½ days old, respectively. During the larval stage, they are fed by adult worker (nurse) bees while still inside their beeswax cells. The period just after the cell is capped is called the prepupal stage. During this stage the larva is still grub-like in appearance but stretches itself out lengthwise in the cell and spins a thin silken cocoon. Larvae remain pearly white, plump, and glistening during the prepupal stage.

PUPAE

Within the individual cells capped with a beeswax cover constructed by adult worker bees, the prepupae begin to change from their larval form to adult bees (Figure 7). Healthy pupae remain white and glistening during the initial stages of development, even though their bodies begin to take on adult forms. Compound eyes are the first feature that begin to take on color; changing from white to brownish-purple. Soon after this, the rest of the body begins to take on the color of an adult bee. New workers, queens, and drones emerge approximately 12, 7½, and 14½ days, respectively, after their cells are capped.

Figure 5. Cells with fertilized eggs laid by the queen. (Courtesy Maryann Frazier)

BROOD PATTERNS

Healthy brood patterns are easily recognized when looking at capped brood. Frames of healthy capped worker brood normally have a solid pattern with few cells missed by the queen in her egg laying. Cappings are medium brown in color, convex, and without punctures (Figure 8). Because of developmental time, the ratio should be four times as many pupae as eggs and twice as many as larvae; drone brood is usually in patches around the margins of brood nest.

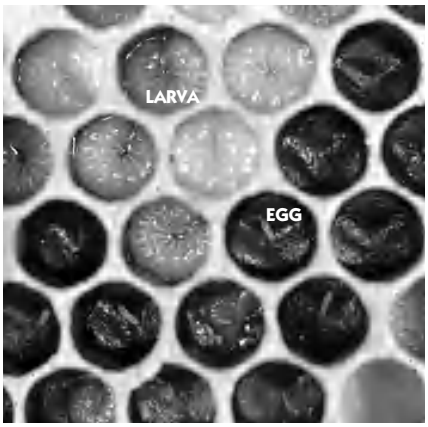


Figure 6. Cells with healthy worker larvae. (Courtesy Dewey Caron)

Figure 7. Honey bee pupae changing from the larval to adult form. (Courtesy Scott Camazine)

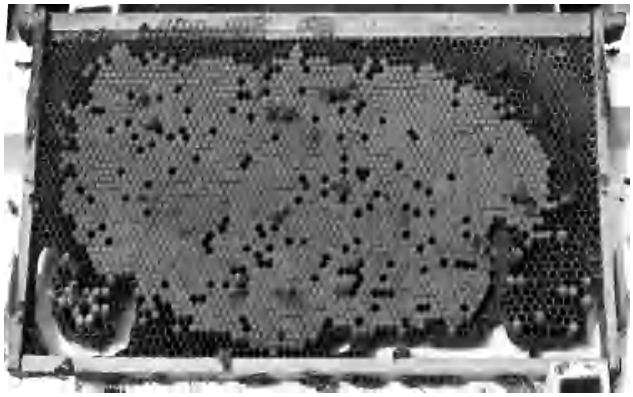


Figure 8. Comb of sealed worker brood with drone cells in the lower corners. (Courtesy Maryann Frazier)

Beehive Components

The modern bee hive is like a highly efficient multistoried factory with each "story" having a specific function. These "stories" work together to provide a home for bees and a honey factory for the beekeeper.

A. Hive Cover - Telescoping cover "telescopes" over the sides of the top super to protect the hive. Galvanized covering.

B. Inner Cover - Creates a dead air space for insulation from heat and cold.

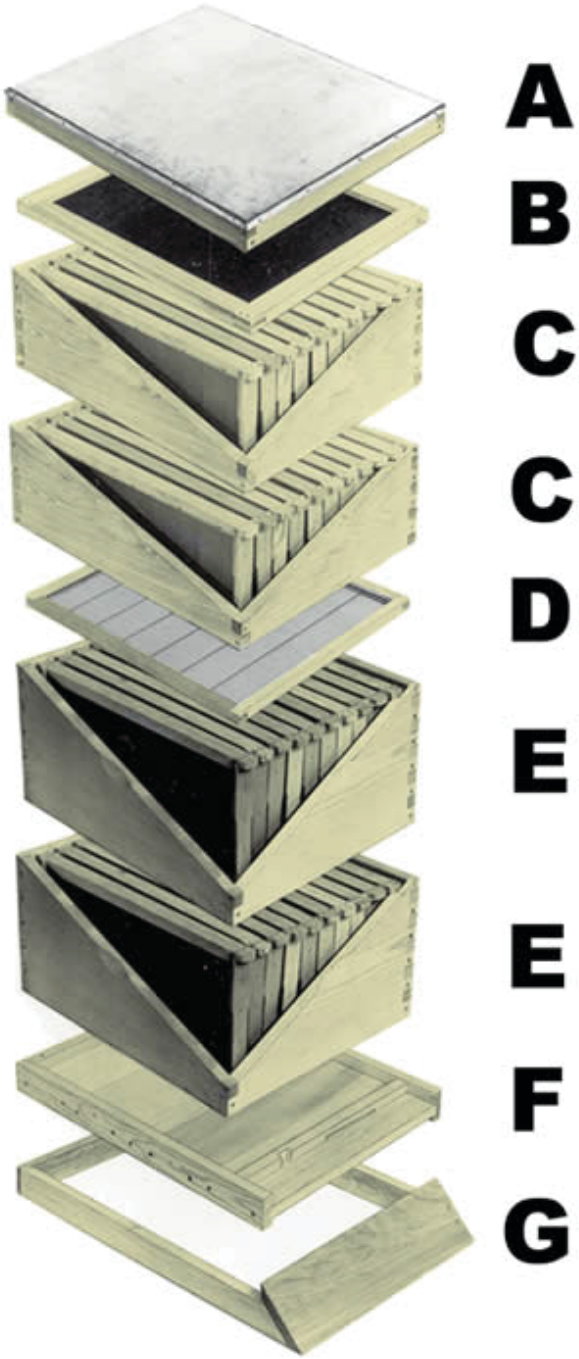
C. Shallow Supers - Consist of Super, Frames and Beeswax Foundation for "surplus" honey storage. Bees store their extra honey in the frames for the beekeeper to remove. 6-5/8' or , 5-11/16'' supers, or even hive bodies may be used.

D. Queen Excluder - Keeps the queen bee in the brood chambers as she is too large to pass through the excluder. Prevents her from laying eggs and raising brood in honey supers placed above the excluder.

E. Hive Bodies - Consists of Body, Frames and Beeswax Foundation. "Brood Chambers" are the bees' living quarters. Queen lays eggs in these chambers and brood is raised. Honey is also stored for the bees' food.

F. Bottom Board - Forms the floor of the hive. Shown with wooden entrance reducer in place to keep mice and some cold out during winter.

G. Hive Stand - Supports the hive off the ground to keep hive bottom dry and insulate hive



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Session 1 - Introduction

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MAAREC MID-ATLANTIC APICULTURE RESEARCH AND EXTENSION CONSORTIUM

Seasonal Cycles of Activities in Colonies

A colony of honey bees comprises a cluster of several to 60,000 workers (sexually immature females), a queen (a sexually developed female), and, depending on the colony population and season of year, a few to several hundred drones (sexually developed males). A colony normally has only one queen, whose sole function is egg laying. The bees cluster loosely over several wax combs, the cells of which are used to store honey (carbohydrate food) and pollen (protein food) and to rear young bees to replace old adults.

The activities of a colony vary with the seasons. The period from September to December might be considered the beginning of a new year for a colony of honey bees. The condition of the colony at this time of year greatly affects its prosperity for the next year.

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In the fall a reduction in the amounts of nectar and pollen coming into the hive causes reduced brood rearing and diminishing population. Depending on the age and egg-laying condition of the queen, the proportion of old bees in the colony decreases. The young bees survive the winter, while the old ones gradually die. Propolis collected from the buds of trees is used to seal all cracks in the hive and reduce the size of the entrance to keep out cold air.

When nectar in the field becomes scarce, the workers drag the drones out of the hive and do not let them return, causing them to starve to death. Eliminating drones reduces the consumption of winter honey stores. When the temperature drops to 57° F, the bees begin to form a tight cluster. Within this cluster the brood (consisting of eggs, larvae, and pupae) is kept warm-about 93° F – with heat generated by the bees. The egg laying of the queen bee tapers off and may stop completely during October or November, even if pollen is stored in the combs. During cold winters, the colony is put to its severest test of endurance. Under subtropical, tropical, and mild winter conditions, egg laying and brood rearing usually never stop.

As temperatures drop, the bees draw closer together to conserve heat. The outer layer of bees is tightly compressed, insulating the bees within the cluster. As the temperature rises and falls, the cluster expands and contracts. The bees within the cluster have access to the food stores. During warm periods, the cluster shifts its position to cover new areas of comb containing honey. An extremely prolonged cold spell can prohibit cluster movement, and the bees may starve to death only inches away from honey.

The queen stays within the cluster and moves with it as it shifts position. Colonies that are well supplied with honey and pollen in the fall will begin to stimulatively feed the queen, and she begins egg laying during late December or early January-even in northern areas of the United States. This new brood aids in replacing the bees that have died during the winter. The extent of early brood rearing is determined by pollen stores gathered during the previous fall. In colonies with a lack of pollen, brood rearing is delayed until fresh pollen is collected from spring flowers, and these colonies usually emerge from winter with reduced populations. The colony population during the winter usually decreases because old bees continue to die; however, colonies with plenty of young bees produced during the fall and an ample supply of pollen and honey for winter usually have a strong population in the spring.

Spring Activity

During early spring, the lengthening days and new sources of pollen and nectar stimulate brood rearing. The bees also gather water to regulate temperature and to liquefy thick or granulated honey in the preparation of brood food. Drones will be absent or scarce at this time of the year.

Later in the spring, the population of the colony expands rapidly and the proportion of young bees increases. As the population increases, the field-worker force also increases. Field bees may collect nectar and pollen in greater amounts than are needed to maintain brood rearing, and surpluses of honey or pollen may accumulate).

As the days lengthen and the temperature continues to increase, the cluster expands further and drones are produced. With an increase in brood rearing and the accompanymg increase in adult bees, the nest area of the colony becomes crowded. More bees are evident at the entrance of the nest. A telltale sign of overcrowding is to see the bees crawl out and hang in a cluster around the en trance on a warm afternoon.

Combined with crowded conditions, the queen also increases drone egg laying in preparing for the natural division of the colony by swarming. In addition to rearing workers and drones, the bees also prepare to rear a new queen. A few larvae that would normally develop into worker bees are fed a special gland food called royal jelly, their cells are reconstructed to accommodate the larger queen, and her rate of development is speeded up. The number of queen cells produced varies with races and strains of bees as well as individual colonies.

Regardless of its crowded condition, the colony will try to expand by building new combs if food and room are available. These new combs are generally used for the storage of honey, whereas the older combs are used for pollen storage and brood rearing.

Swarming

When the first virgin queen is almost ready to emerge, and before the main nectar flow, the colony will swarm during the warmer hours of the day. The old queen and about half of the bees will rush en masse out the entrance. After flying around in the air for several minutes, they will cluster on the limb of a tree or similar object. This cluster usually remains for an hour or so, depending on the time taken to find a new home by scouting bees. When a location is found, the cluster breaks up and flies to it. On reaching the new location, combs are quickly constructed, brood rearing starts, and nectar and pollen are gathered. Swarming generally occurs in the Central, Southern, and Western States from March to June, although it can occur at almost any time from April to October.

After the swarm departs, the remaining bees in the parent colony continue their field work of collecting nectar, pollen, propolis, and water. They also care for the eggs, larvae, and food, guard the entrance, and build combs. Emerging drones are nurtured so that there will be a male population for mating the virgin queen. When she emerges from her cell, she eats honey, grooms herself for a short time, and then proceeds to look for rival queens within the colony. Mortal combat eliminates all queens except one. When the survivor is about a week old, she flies out to mate with one or more drones in the air. The drones die after mating, but the mated queen returns to the nest as the new queen mother. Nurse bees care for her, whereas prior to mating she was ignored. Within 3 or 4 days the mated queen begins egg laying.

During hot summer days, the colony temperature must be held down to about 93° F. The bees do this by gathering water and spreading it on the interior of the nest, thereby causing it to evaporate within the cluster by its exposure to air circulation.

During the early summer, the colony reaches its peak population and concentrates on the collection of nectar and pollen and the storage of honey for the coming winter. After reproduction, all colony activity is geared toward winter survival. Summer is the time for storage of surplus food supplies. The daylight period is then longest, permitting maximum foraging, although rain or drought may reduce flight and the supply of nectar and pollen available in flowers. It is during the summer that stores are accumulated for winter. If enough honey is stored, then the beekeeper can remove a portion and still leave ample for colony survival.

Caswell County Beekeepers Association

Promoting beekeeping in Caswell County, NC

Welcome

The **Caswell County Beekeepers Association** meets every ***fourth Thursday of the month*** at 7:00PM (except November and December) in the basement of the Agriculture Building next to the Historic Courthouse in downtown Yanceyville, NC. The public is invited to join us for socializing and the meeting.

We discuss a variety of aspects of beekeeping in Caswell County, North Carolina including:

- Colony management
- Beekeeping equipment
- Beekeeping and honey bee problems and their solutions
- Honey and other beekeeping products.

We are a local chapter of the North Carolina State Beekeepers Association.

Caswell County Beekeepers Association

Promoting beekeeping in Caswell County, NC

Events

December 16, 2017 – **Introduction to Beekeeping**

The Caswell County Beekeepers Association will hold a talk on Saturday afternoon, Dec 16, from **2PM to 4PM** about honey bees and what it takes to get into beekeeping. The talk is free and open to all. Please join us in the basement of the Agriculture Building next to the Historic Courthouse in downtown Yanceyville. Click on Directions for a map.

January 10 to March 17, 2018 – **9-week Beginning Beekeeping Course**

See Bee School for more information on topic, schedule, field day, cost, and registration.

March 1-3, 2018 – **NCSBA Spring Conference**

Session 1 - Introduction

NCSBA North Carolina State Beekeepers Association

Who We Are

The NCSBA is a volunteer led organization comprised of more than four thousand active members, almost all of which are hobbyist beekeepers that are also members of a network of local beekeeping associations. These local associations are chartered by the NCSBA and serve to help their members learn and enjoy the practice of keeping bees.

Throughout North Carolina, the beekeepers of the NCSBA can be seen promoting the honey bee to the public at beekeeping schools, county fairs, festivals, and special events. You may have seen some of us presenting at a public event such as Bug Fest in Raleigh, Bee Friendly Day in Tarboro, National Honey Bee Day at Waynesboro State park in Goldsboro, at our Honey Bee Exhibit at the North Carolina Zoo in Asheboro, or at the North Carolina State Fair in Raleigh where we promote the goodness of NC honey with our annual honey sales program.

Join Online Now

Master Beekeeper Program

With our master beekeeper program, we have helped thousands of people become certified beekeepers and learn the very interesting practice of beekeeping. Our local chapters participate in this program by offering bee schools on an annual basis where individuals can learn and become certified beekeepers. Learn more…

Test Your Knowledge!

There are four levels in the program. The first three levels require a passing score on the written exam. Try the sample quizzes below to get an idea of what is expected. The questions in each quiz are taken from actual exams. There is no obligation and you will receive the results once you complete the quiz. Good luck!

Updated 12/1/2016

Certified Level	Journeyman Level	Master Level

Games!!!

Certified Game – Definitions	Journeyman Game – Definitions	Master Game

Session 1 - Introduction

NCSBA North Carolina State Beekeepers Association

Statewide Conferences

The NCSBA holds state-wide conferences twice a year, in the Spring and Summer. In odd-numbered years, the Spring Conference is held jointly with the South Carolina Beekeepers Association, alternating locale between states.

2018 NCSBA Spring Conference – March 1st – 3rd, New Bern, NC

being hosted at the
New Bern Riverfront Convention Center
203 South Front Street
New Bern NC 28560

Highlights of Past Meetings

- 2017 Summer Meeting, July 13,14, and 15th – Winston-Salem , NC
- 2017 NCSBA/SCBA Spring Meeting, Mar 3-4, Rock Hill, SC
- 2016 NCSBA Summer Meeting, July 7-9, Hickory, NC
- 2016 NCSBA Spring Meeting, Feb 25-27, New Bern, NC
- 2015 NCSBA Summer Meeting, July 9-11, Lake Junaluska, NC
- 2015 NCSBA/SCBA Spring Meeting, Feb 5-7, Monroe, NC
- 2014 NCSBA Summer Meeting, July 10-12, Wilkesboro, NC
- 2014 NCSBA Spring Meeting, March 6-8, Wilmington, NC
- 2013 NCSBA Summer Meeting, July 11-13, Pinehurst/Southern Pines, NC
- 2013 NCSBA/SCBA Spring Meeting, March 1-2, Rock Hill, SC
- 2012 NCSBA Summer Meeting, July 12-14, Lumberton, NC
- 2012 NCSBA Spring Meeting, March 9-10, Morganton, NC
- 2011 NCSBA Summer Meeting, July 7-9, Elon, NC
- 2011 NCSBA/SCBA Spring Meeting, March 4-5, Dallas, NC
- 2010 NCSBA Summer Meeting, July 8-10, China Grove, NC
- 2010 NCSBA Spring Meeting, March 5-6, Lumberton, NC
- 2009 NCSBA Summer Meeting, July 9-11, Wilkesboro, NC
- 2009 NCSBA/SCBA Spring Meeting, March 6-7, Rock Hill, SC
- 2008 NCSBA Summer Meeting, July 10-12, Pinehurst, NC
- 2008 NCSBA Spring Meeting, March 7-8, Burlington, NC
- 2007 NCSBA Summer Meeting, July 12-14, Kinston, NC
- 2007 NCSBA/SCBA Spring Meeting, March 2-3, Monroe, NC
- 2006 NCSBA Summer Meeting, July 13-15, High Point, NC
- 2006 NCSBA Spring Meeting, March 17-18, Clemmons, NC

NCSBA North Carolina State Beekeepers Association

Website Links

NOTICE: Selecting any of these links will open a new window which is not part of the NCSBA site.

BEEKEEPING AND RELATED LINKS IN NORTH CAROLINA:

Center for Honeybee Research in Asheville, NC
The Wolfpack's Beeyard (NCSU Entomology Apiculture)
NC Dept of Agriculture Apiary Services Program
NC Africanized Honey Bee Resources
NC Honey Bee Research Consortium
Bee-Linked: Linking pollinators and farmers in NC

NATIONAL AND INTERNATIONAL ASSOCIATIONS:

American Beekeeping Federation (ABF)
Eastern Apicultural Society (EAS)
International Bee Research Association (IBRA)
Mid-Atlantic Apiculture Research and Extension Consortium (MAAREC)
American Honey Producers Association (AHPA)

U. S. HONEYBEE RESEARCH LABS:

Bee Research Laboratory – Beltsville, Maryland
Carl Hayden Bee Research Center – Tucson, Arizona
Honey Bee Breeding, Genetics & Physiology Lab – Baton Rouge, Louisiana
Kika de la Garza Subtropical Agricultural Research Center – Weslaco, Texas
Pollinating Insects Research Unit – Logan, Utah

BEEKEEPING COMMUNITIES & FORUMS:

Beekeeping Forums – An international beekeeping community
Bee Source – Beekeeping forums, downloadable plans
Beemaster – International beekeeping forums
VSHBreeders – Forum focused on breeding VSH queens

NATURAL & SUSTAINABLE BEEKEEPING:

The Bee Space – Smart, Simple & Sustainable beekeeping blog
Organic Beekeeping – Yahoo! group with 5,000+ members focused on natural

beekeeping
Bush Farm Bees – Michael Bush's blog on natural beekeeping

MAGAZINES & PUBLICATIONS:

American Bee Journal
Bee Culture
Beekeepers Quarterly – magazine from Great Britain

HONEY

National Honey Board – One ingredient. The way nature intended.
Eating Well Honey Recipes
Southern Living Honey Recipes
Martha Stewart Honey Recipes
Bon Appétit Honey Recipes
USDA Annual Honey Report – Includes number of colonies producing honey, yield per colony, honey production, average price, price by color class and value; honey stocks by state and U.S from 1996 to present

HIVE MANAGEMENT

Hive Tracks – Web-based hive management software (Located in Western NC)
BeeTight – Web-based & Mobile App hive management software
MyBeeHives – Web-based hive management software

Serving Beekeepers Since 1977

Brushy Mountain Bee Farm

The lush rolling hills of North Carolina are home to the Brushy Mountain Bee Farm. Lying in an isothermal belt, the Bee Farm is surrounded by orchards of apples and peaches, with small vineyards close by. This rich land with varied wild and cultivated plants is a perfect spot for honeybees.

Brushy Mountain Bee Farm was established by Steve and Sandy Forrest and opened for business in 1977. It began as a part time business with the office and wood shop in the home of Steve and Sandy. In 1980 it grew into a full time business that spread into an old barn that was on the property and a small two-room house. A year later a 200 year old log cabin was moved from an adjacent property and attached to the two room house to form the retail and storage facility for the business. The first warehouse was built in 1983 for storage and shipping and the offices were moved into the log cabin. As the business grew more buildings were added and today it occupies over 30,000 square feet under roof with a woodshop, metal shop, sewing room, and warehouse space.

Brushy Mountain continues to expand and provide products from coast to coast and beyond. Since 1998 we have had our catalog on-line and an e-commerce site for the convenience of our customers.

Each year we seek ways to make the products we make better, and to increase our knowledge to provide the best information to our beekeeping customers. Beekeeping has become more challenging in today's world but we are constantly seeking new remedies, innovative products and ideas to keep you successful with your bees. Our knowledgeable and courteous staff is available to provide you with the latest information. The future of the Bee Farm is invested in supplying the best quality, best service, and best support in the beekeeping industry.

Dadant & Sons has produced quality beekeeping supplies since 1863.

Welcome to the world of beekeeping where Dadant & Sons, Inc. is America's oldest & largest manufacturer of **beekeeping supplies**! Beekeeping is a fascinating hobby and proves to be a challenging business as well. There are many aspects to beekeeping, ranging from raising the bees and producing honey to using the products from the hive for crafts, cooking and for your health. We have helped the beekeeper for many generations and it is our goal to continue providing helpful information to all beekeepers, from small to large. We have included a brief company **History**, a **Learning Center** for the beginners, a **News** section to keep everyone up-to-date on industry developments and helpful **Links** to connect you to associations and websites of interest. You can also visit the **Shop** where you can check out our secure online catalog.

We also offer the **American Bee Journal**, "The Beekeeper's Companion Since 1861". Our monthly magazine dedicated to beekeeper's that is distributed worldwide. Dadant & Sons, Inc. produces a wide range of beautifully handcrafted, **100% beeswax candles** and paraffin candles handcrafted in the U.S.A.

Thank you for coming to our website, where we provide "Everything for the Beekeeper".

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