

Introduction to Woodenware and Equipment



Objectives

- Describe hives through history and the development of the American standard hive.
- Describe the components, configuration, and main features of standard beekeeping woodenware, including frames and foundation.
- Describe beekeeping equipment and protective gear used in hive inspection and maintenance.
- Describe basic beekeeper conduct in the apiary.

Terms

- A related group of honey bees is called a *colony*.
- A *hive* is a man-made container designed to house a colony.

6500 BCE
Prehistoric
Spain



Researchers from the University of Bristol have analyzed pottery from thousands of prehistoric clay vessels and found evidence in what is now Turkey of beeswax use as far back as 7000 BCE.

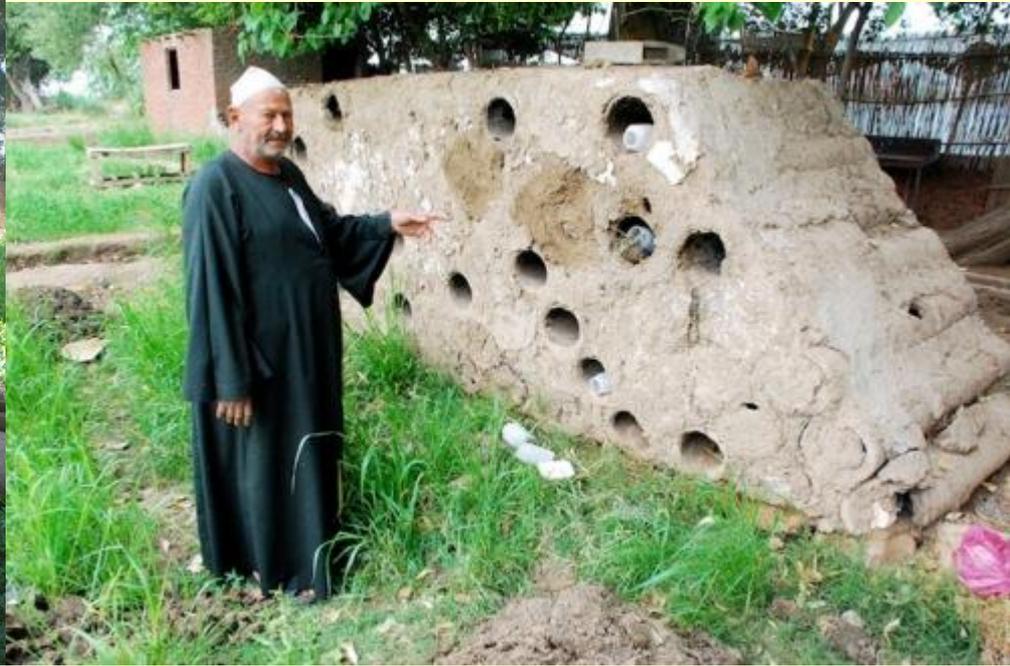
Pre-hive Honey Gathering – not Beekeeping

The start of apiculture – purposeful hives



Hollow Logs

Prehistory to Modern Times



Egyptian
Mud and
Clay
Pottery
Hives



Greek Clay Urn Hives



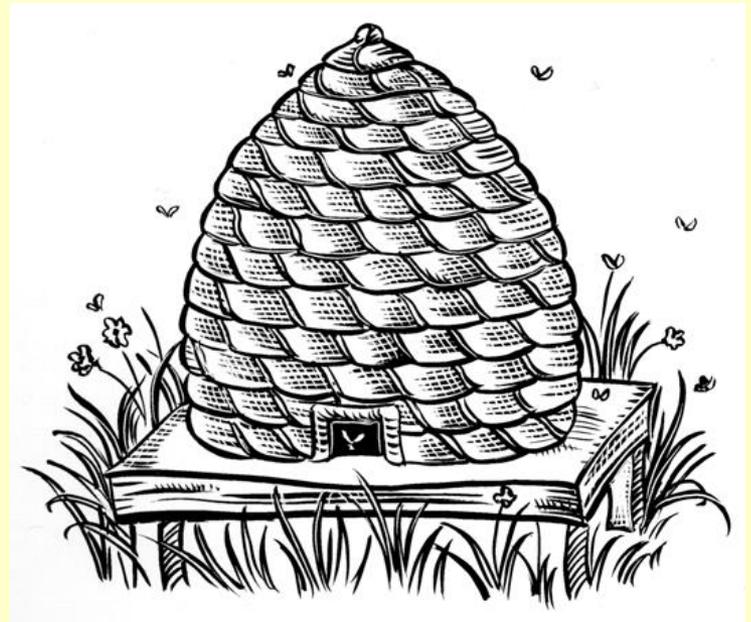
**Priestesses of the Bee:
The Melissae**



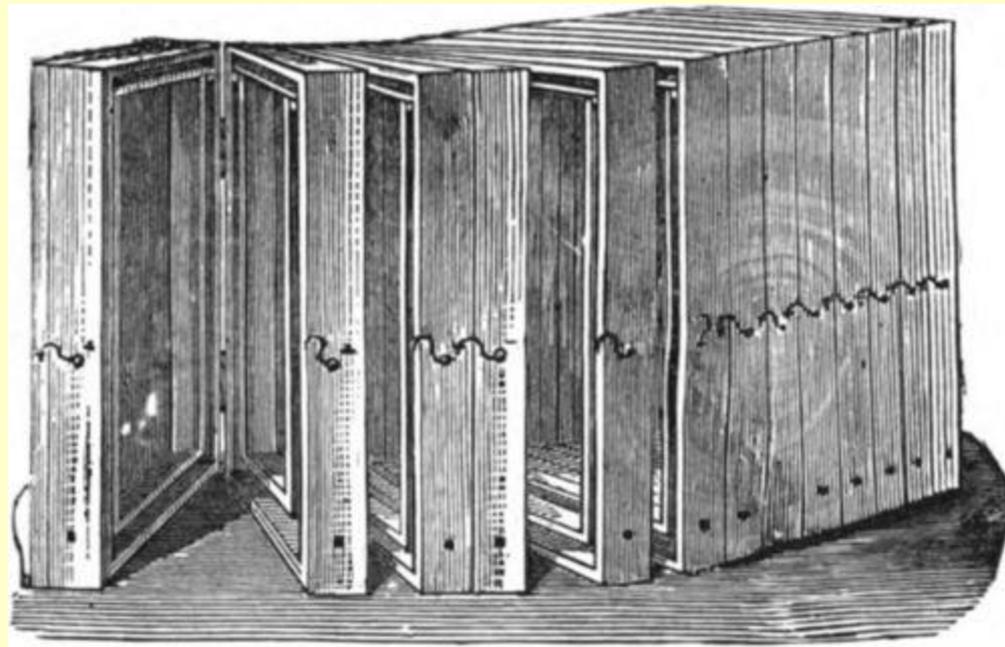
European Medieval Monk using coiled Skeps, which were standard for centuries.

Skeps were in use for so long that
they have become symbolic of
beekeeping

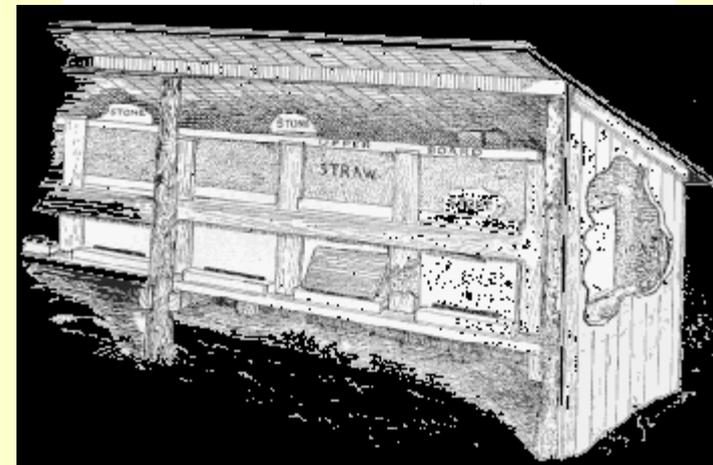
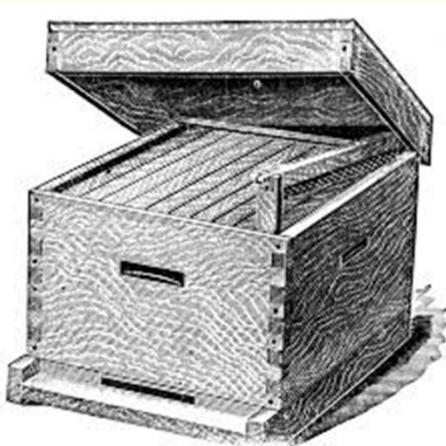
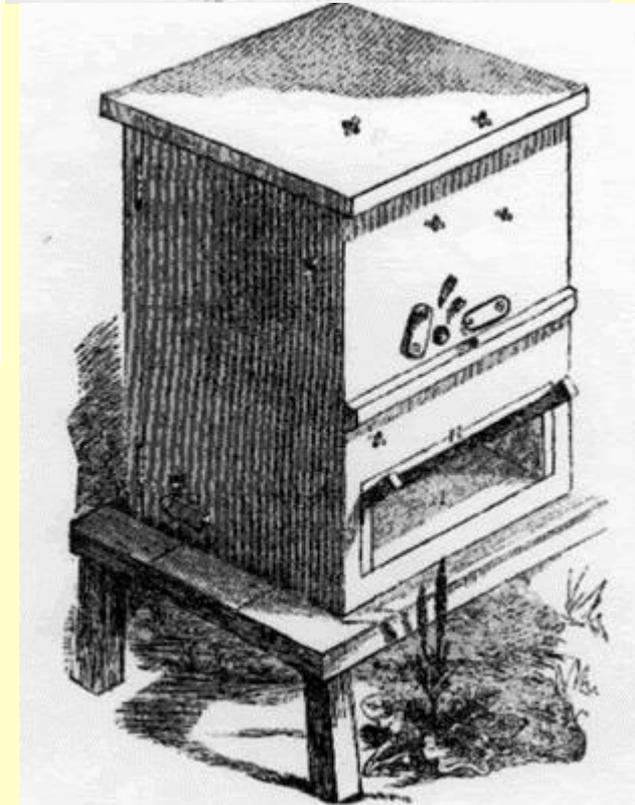
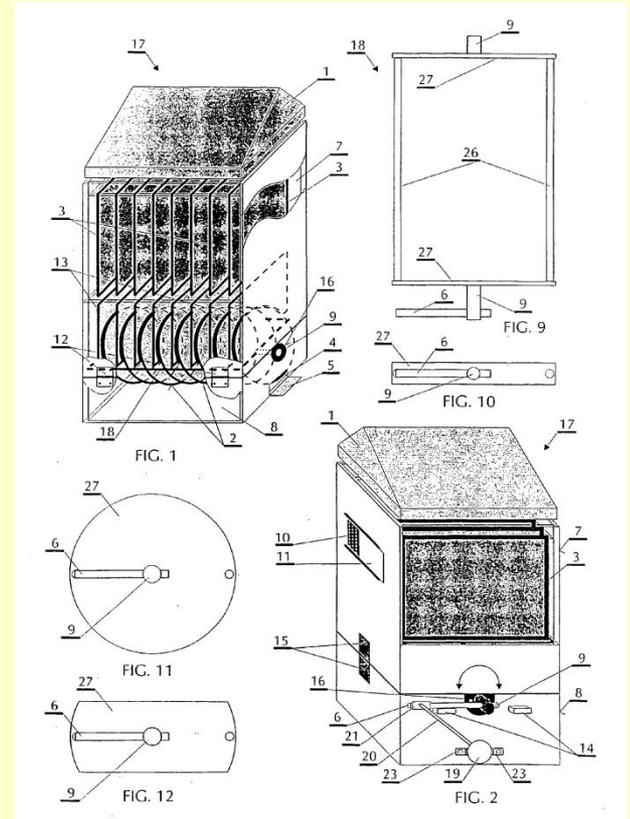
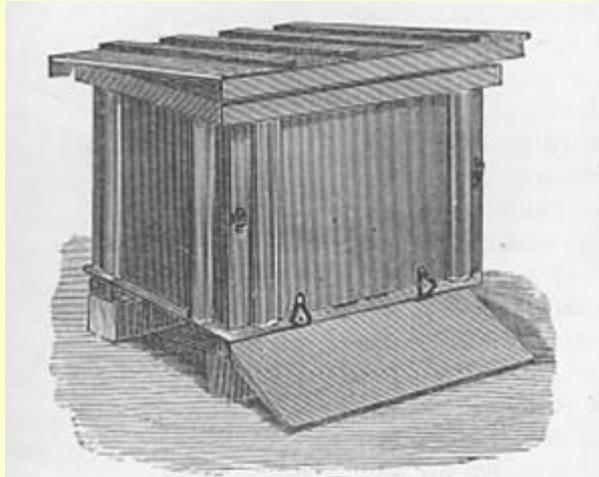
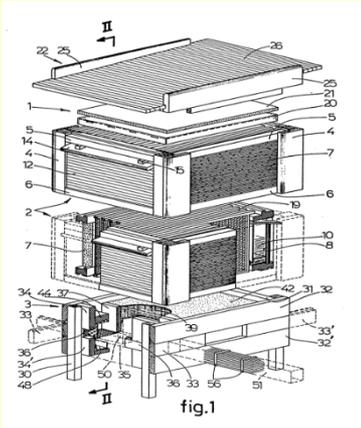
But you cannot use a skep
- they are illegal in all 50
states. (We will talk about
why in a minute.)



Francois Huber invented the Leaf Hive in 1789 in Switzerland. The leaf hive had solid frames attached in the back with hinges, making a box-like hive. The leaf hive was examined by turning the frames like pages in a book.



1800 -1850s America – Lots of designs; no real standards



The era of modern woodenware

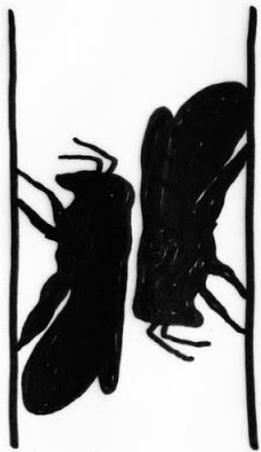
- Although there are other kinds of hives (Topbar, Warre, Rose, National, etc) the standard hive I will discuss today is the Langstroth hive, named after the father of American beekeeping, who standardized it in the 1850s.

There are 3 widths for Langstroth hives, one 8 frames wide and one 10 frames wide, and a special one 5 frames wide. The 10 frame has been the standard of the commercial beekeeping industry, while the 8 frame has recently become popular for hobbyists, due to less weight.

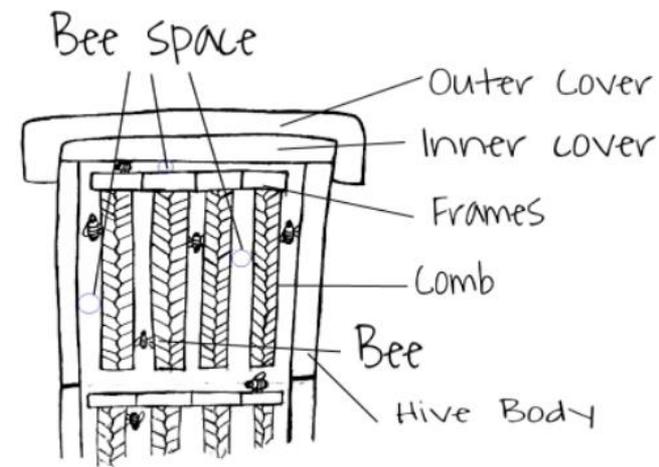
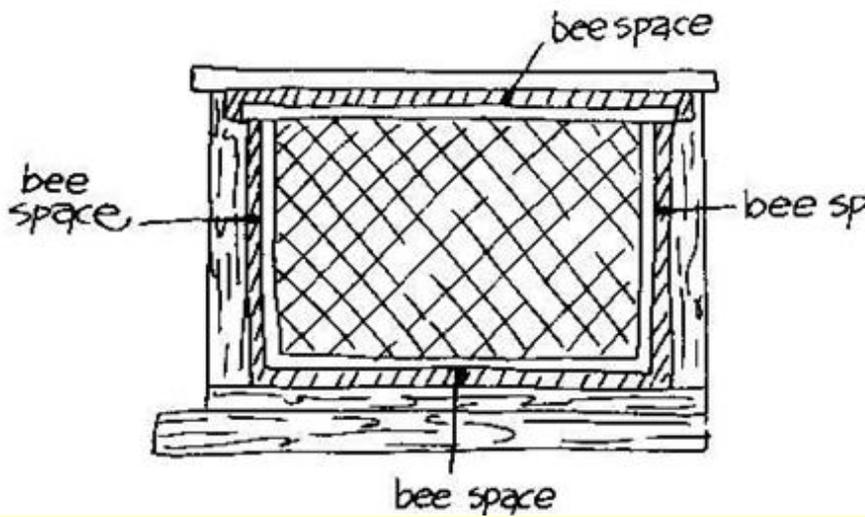




Rev. Lorenzo Lorraine Langstroth
Often called the “Father of American Beekeeping”
for **two reasons...**



3/8"



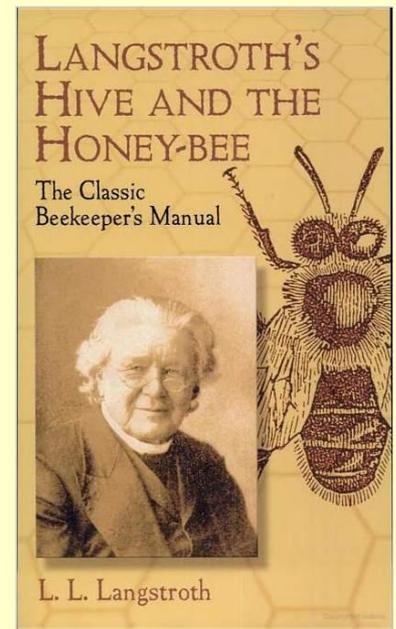
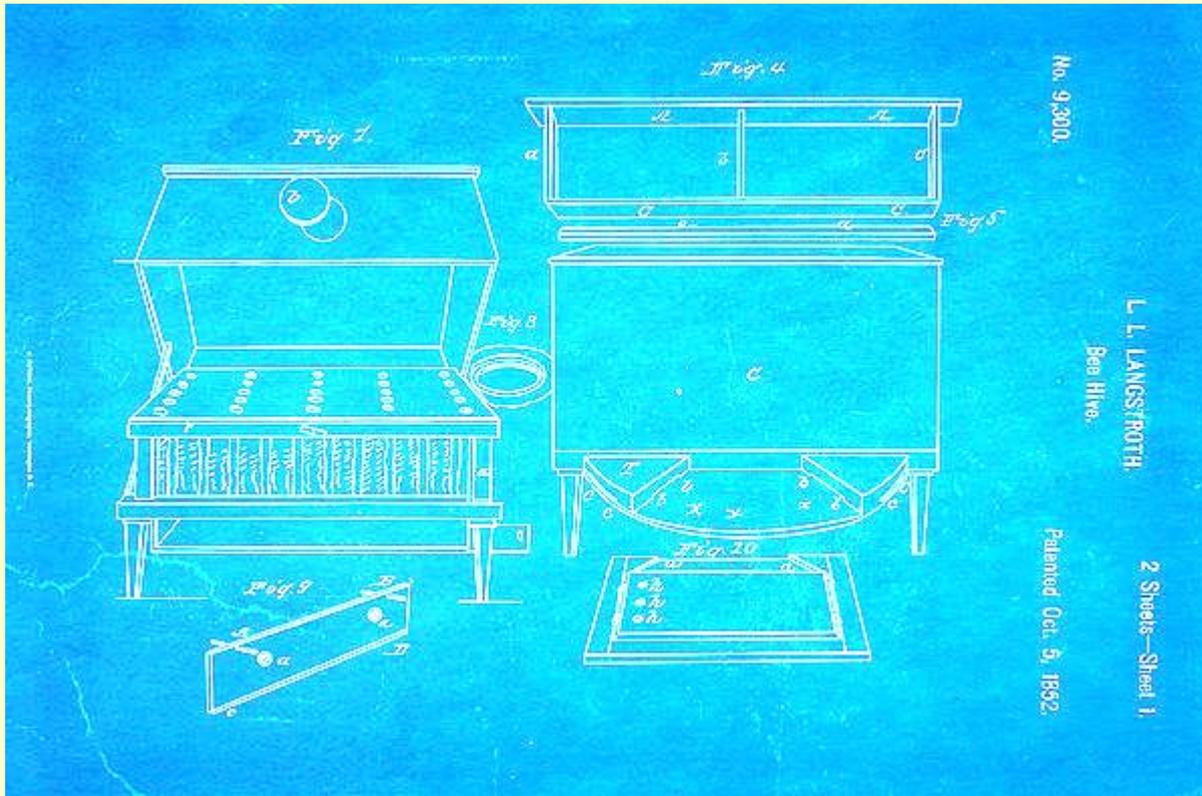
Bee Space

In 1851 Langstroth determined that “bee space” was a critical concept in understanding the bee’s production of wax comb.

He documented that *bees build excess comb* in a space larger than 3/8 inch. *Bees will fill any space* less than 1/4 inch with propolis.

Therefore, a space between 3/8 inch and 1/4 inch is acceptable bee space. A Langstroth hive has a 3/8-inch space separating each frame and the frames from all other hive parts.

Movable Frames

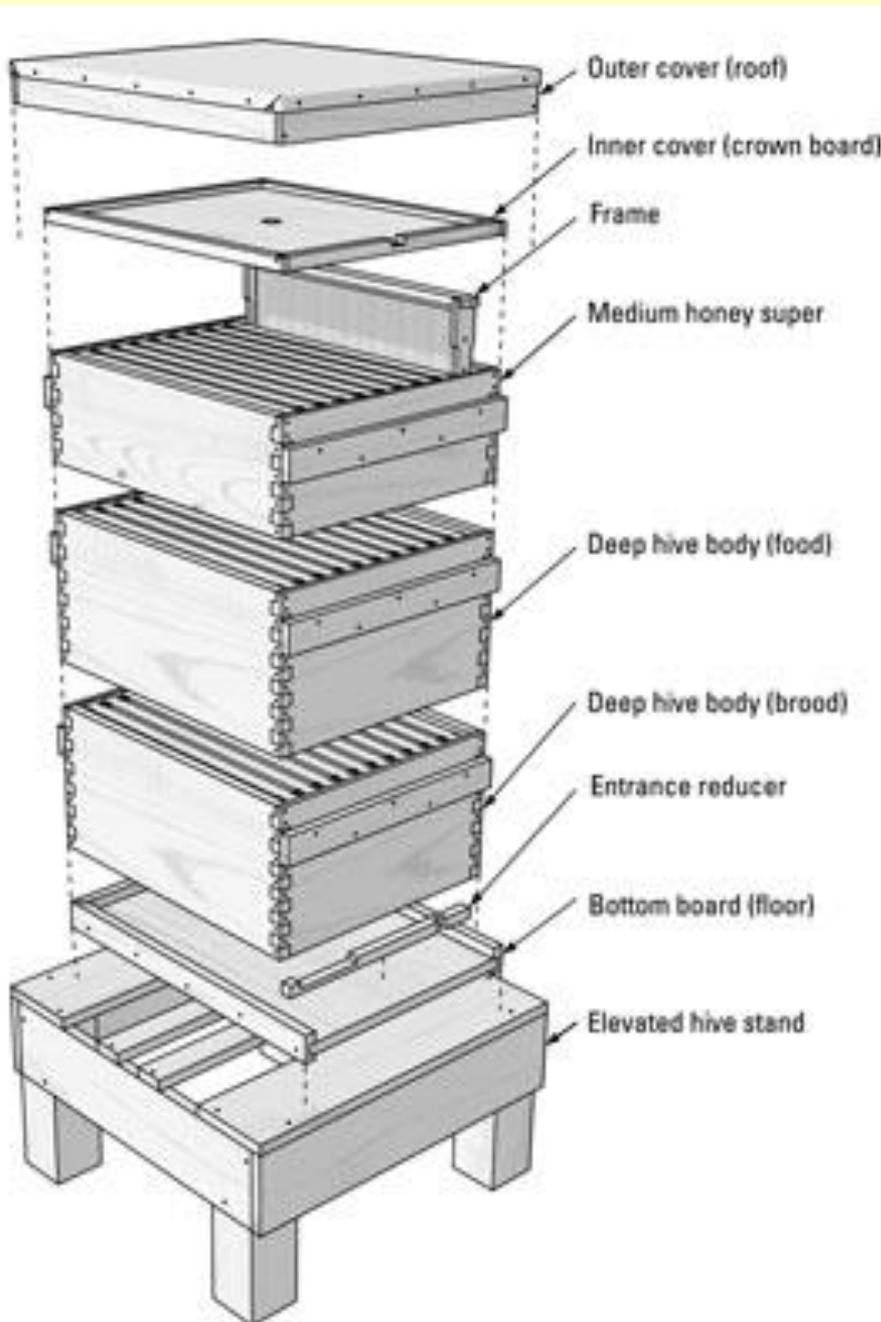


Langstroth wrote "Hive and the Honey-Bee" in 1853. It is still in print today after 40 editions.

On October 5, 1852 Langstroth received a patent for his hive. Before Langstroth invented his movable frame hive, most bees were kept in fixed-frame boxes. These hives had many problems and limitations such as not being able to detect disease within them.

Movable Frames.....

- Encourage rapid inspection without angering the bees.
- Weak colonies can be strengthened with brood or eggs and larva for requeening.
- Strong colonies can increase in size.
- Queens are more quickly found.
- Diseases, pests and parasites can be quickly determined and remedied.
- Stores or brood can be rearranged or reconfigured for different seasons.
- Allows honey extraction without destroying the comb. Honey comb requires 7 or more pounds of honey for every pound of beeswax. Individual frames can be harvested.
- Beside increased honey production, the bees no longer have to be killed to remove the honey.
- Inspection by removable frames is required in the United States. (This is why you can't use skeps.)

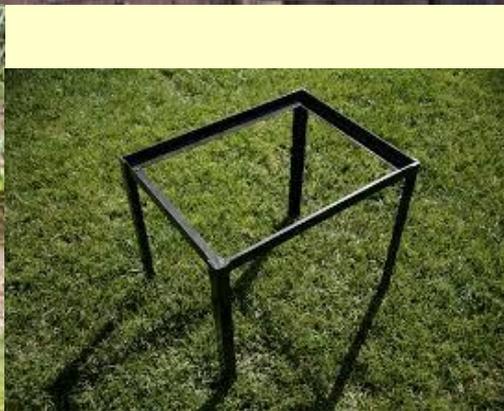


What are the components of the standard hive?

From the bottom up, a complete standard hive includes: a bottom board, boxes for the brood chamber with frames and foundation, boxes for the honey supers and frames with foundation, an inner cover, and a telescoping cover with metal top. The number of boxes varies throughout the year as the bee population changes and nectar flows start and finish.

What is the purpose of each component?

- HIVE STANDS keep hives off the ground, away from water, ground rot, and small mammals. Many use concrete blocks or other types of hive stands. Some use only single stands while others put 2-6 hives on the same stand.
- Multi-hive stands may transmit vibrations from the hive being worked to others down the line and cause the bees in those hives to become defensive.
- Also multi-hive stands can encourage drifting and robbing.



- **Bottom Board:** The brood box must have something to sit on. It sits on the bottom board. A bottom board is *a little bit longer* than a brood box. The extension to the front of the bottom board is the **landing board area** for bees just about to enter the hive to land on.
- Many bottom boards now come as screened bottoms to allow mites and other debris to fall through and give the colony added ventilation. There are advantages and disadvantages to both solid and screened bottom boards.
- *The bottom board is usually the first piece of equipment to rot out.* For longer life, it should set above the ground on a hive stand.



Along with the bottom board is an **entrance reducer**. These are used to help weak hives defend themselves from robbing bees and may be used in the fall and winter to keep rodents out. Rodents seek a dry place to build a nest during those seasons. Some beekeepers leave the size of the bottom entrance reduced year round, as they observe the small openings in natural tree cavities.



Hive Boxes: Boxes come in 3 different widths and 3 depths. All are $19 \frac{3}{4}$ inches long.

Widths --

Ten Frame boxes are $16 \frac{1}{4}$ inches wide. Eight Frame boxes are $13 \frac{3}{4}$ inches wide.

Five frame Nuc boxes are $9 \frac{1}{2}$ inches wide.

Depths provide the box names --

Deeps are $9 \frac{5}{8}$ inches high, *Mediums* are $6 \frac{5}{8}$ inches high and *Shallows* are $5 \frac{11}{16}$ high.

Boxes also take on one of two names depending on their function:

1. Brood box/Hive body: The brood chamber is the area the bees live in. This is where the queen will lay eggs and the brood will be reared. These boxes are generally deeps or mediums.

2. Honey super. Honey supers are extra boxes the beekeeper uses to give the honeybees extra room above the brood chamber to put up extra stores of honey during the season. (Super means 'above' in Latin.) At the end of the season or "flow" the beekeeper can take some of the honey depending on how much is left in the brood. Boxes used as honey supers are usually **shallows** or **mediums**. Why?

A matter of depth



Deep or Hive
Body

[10-frame]

>60 lb when
filled with
honey



Medium or
Illinois Super

[10-frame]

>40 lb when
filled with
honey



Shallow Super

[10-frame]

>35 lb when
filled with
honey

- **The Inner Cover** prevents bees from gluing down the top cover to the box. If an inner cover was not used the beekeeper would have to pry the top cover from the hive, possibly damaging it and alerting the bees to your presence, causing defensive behavior.
- There are two sides inner covers with some having different depths. Perhaps the quickest way to start a fight among beekeepers is to ask which side goes up or down for the winter.

- **Inner Cover (or crown board)**
- An oval hole is traditionally cut in the middle to fit a Porter Bee Escape as well as to vent moisture.
- Some beekeepers cut a channel in the cover to provide a top entrance to the hive and to let moisture escape.
- Ventilated inner covers can be used in hot weather to help the hive cool.

Top cover: There are three designs for top covers.

§- A **Migratory cover** only has front / back pieces. This allows hives to be stacked close together during transportation hence the “Migratory” name. They don’t have metal tops.

§§- A **Telescoping cover** has a rim around all sides and front/back of the top box and uses an inner cover. Usually this top is covered with a galvanized or aluminum metal sheet which is pressed to fit over the wood.

§§§- A **Garden cover** is normally copper covered and peaked vs flat. They are more decorative and are heavier.

No matter which type of cover is used ventilation may be required in either summer humidity or winter clustering.

A **Queen Excluder** can be used to keep the queen from laying eggs in honey frames. Either metal or plastic. You do not absolutely need a queen excluder unless you are producing comb honey. When a queen lays eggs in comb and raises brood, the comb (not the honey) will turn dark and be unfit to eat.

Some beekeepers use a half excluder placed sideways over the brood nest. Since the queen usually stays on the inside frames, this keeps her in place most of the time while allowing workers to travel up the outside walls faster to store nectar. If the queen does go up, frames with eggs can be moved downward during inspections.

Variants of the standard hive



Langstroth Hive

Outer Cover
with Inner Cover
hidden underneath

Medium
Super for
Honey

2nd Deep
Super for
Brood

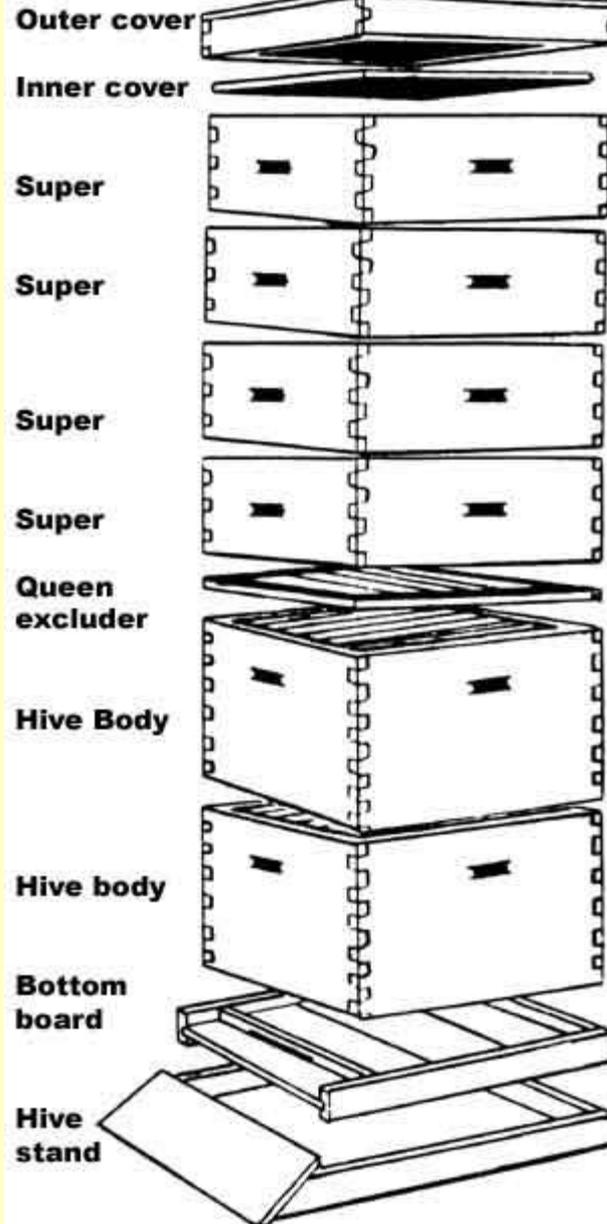
1st Deep
Super for
Brood

Queen
Excluder

Slatted
Rack

Screened Bottom Board

BeverlyBees.com



What is a nuc?

A nuc is a nucleus hive, a miniature fully functioning hive with only three to five frames. The reduced size helps the small colony defend itself while growing bigger. A nuc contains a laying queen, adult bees, open and capped brood, and honey and pollen stores, just like a larger sized hive.

Nuc with migratory cover compared to an 8-frame hive.



A word about painting

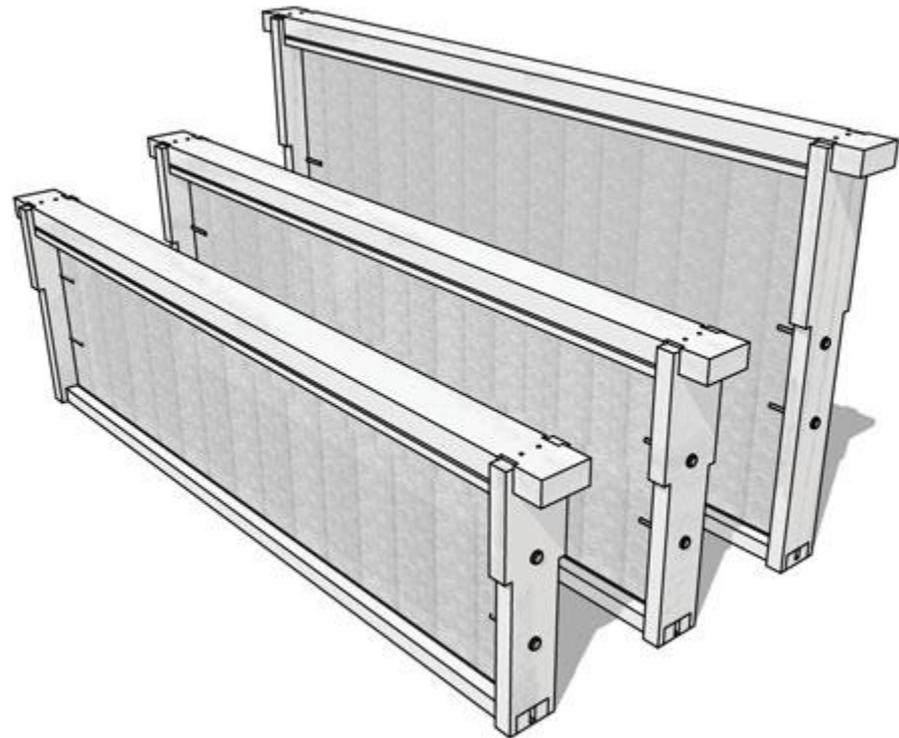
- Most bee equipment is built from white pine or cypress. Cypress is known for its long life and is more expensive. Beekeepers paint **the exterior surfaces** of all equipment so that it is protected from the weather. Bee hives do not need to be painted, but it protects your investment.
- People traditionally paint hives white to keep them cooler in the summer by reflecting the sun's heat. Others paint them to blend into the landscape or use whatever is on sale. Some use linseed oil rather than paint, which is highly effective protection. (Caution: highly flammable)
- Different colors can help bees identify their own hives by sight. Bees have a tendency to drift to other hives that are not their own if they are in a straight row.



Frames and Sizes

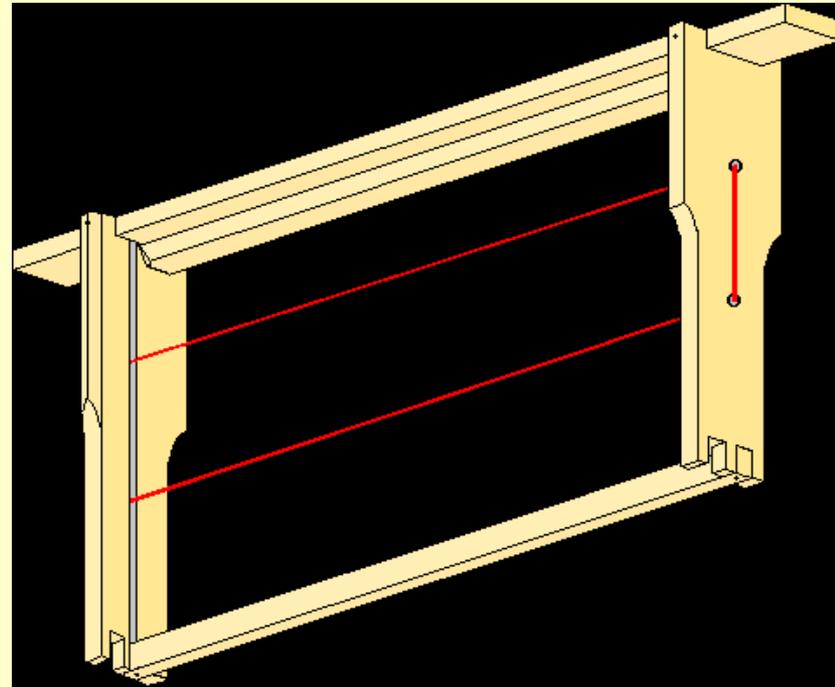
- 8 or 10 frame Langstroth hives can have deep or medium-sized or shallow frames . Traditionally, deep frames are used for the colony brood space, while medium or shallow frames are used to collect honey.

Recently, many beekeepers have started standardizing on all medium equipment to cut down on keeping multiple sizes, and for weight considerations.



Frames have a standard, too.

- A 'standard' frame is actually a Hoffman frame, named after the inventor of the side lug shape that keeps the frames spaced correctly for bee space. But few beekeepers know to call it a Hoffman frame.

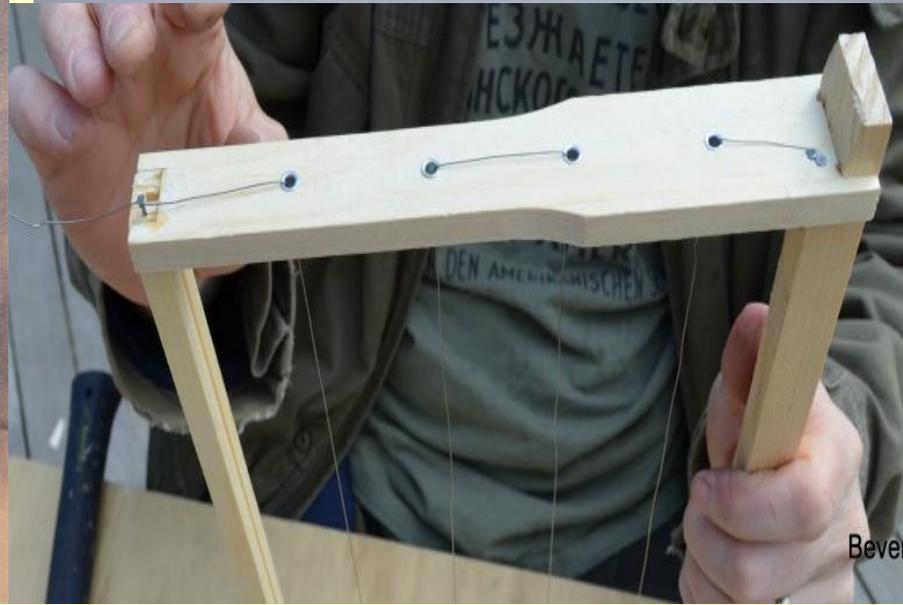
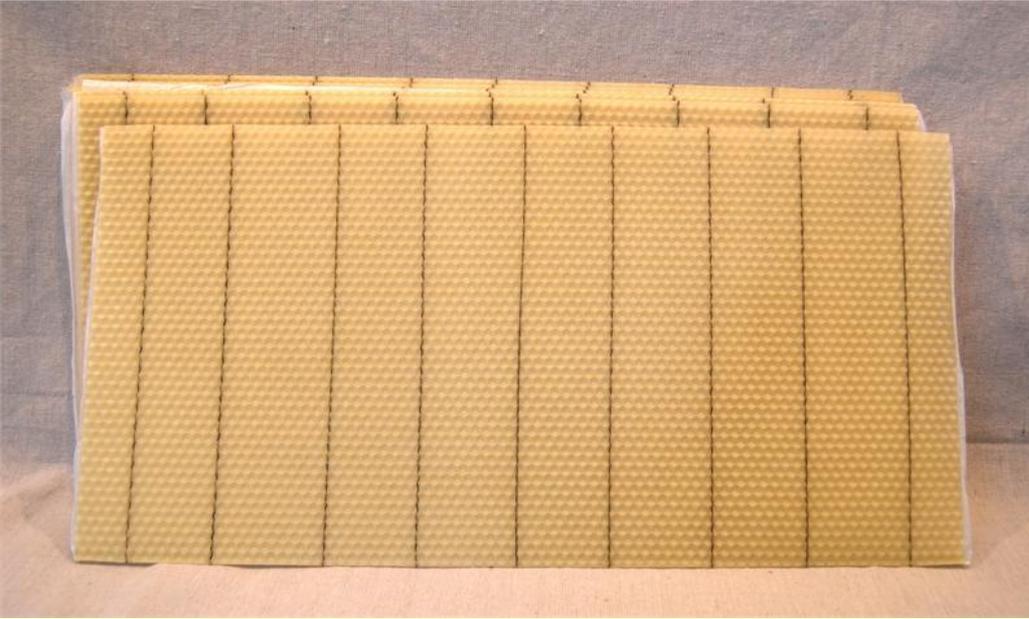


Foundation is just that...

a starting point for bees to draw wax

- Foundation is imprinted with hexagons to help the bees maintain an even pattern.
- The size of the hexagons can vary from 4.9mm to a 'standard' 5.4mm for worker cells. Drone pattern foundation at 6.4 mm is also available.
- Wax foundation vary in thickness from 'thin surplus' to 'medium brood'.

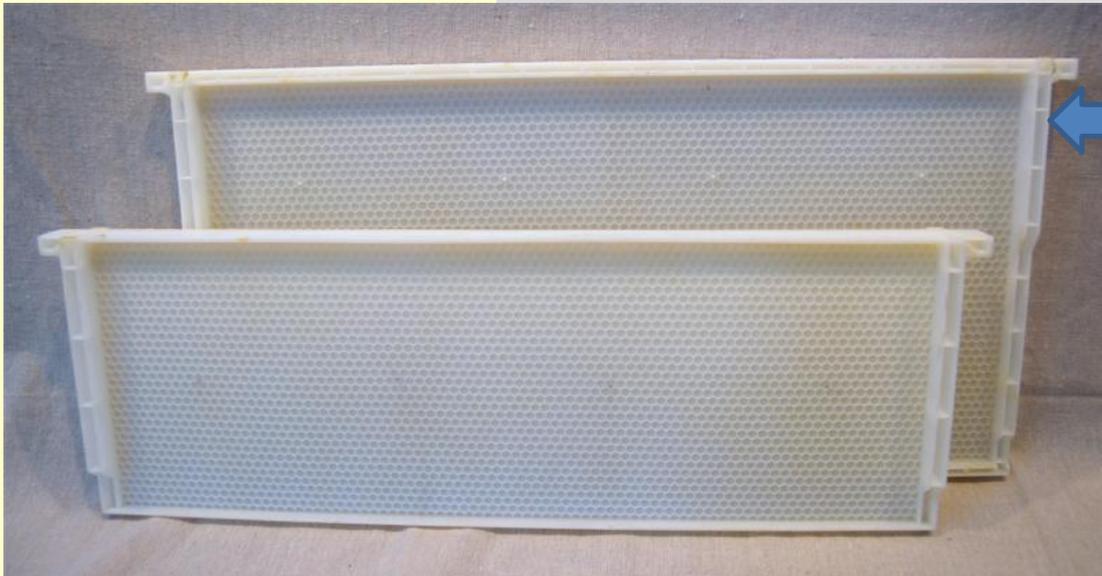
Wax foundation can be plain or wired.



Crimp wired foundation is usually more important to be used in wax honey frames that will be extracted. The wires hold the wax in place and keep it from deforming or 'blowing out' of the frame during the force of extractor rotation.

Cross-wiring can also be used to keep wax in place both in extraction and in hot weather.

I recommend using plastic foundation for beginners. Plastic foundation fits in wood frames. The plastic is usually coated with a thin layer of wax. It comes in natural and black. It is easier to see eggs on black foundation



They have an all plastic frame/foundation combination which I don't recommend because they have areas for SHB and other pests to hide.

Frames have several foundation insertion methods

- Some capture crimp wired foundation hooks behind a nailed on piece of wood called a wedge.
- Some have a slotted top into which foundation drops.
- Some are grooved for plastic foundation
- Bottom rails can be slotted for wax or grooved to accept plastic foundation

No matter what kind of insertion system is used, frames must be strongly nailed *and* glued together so they don't separate when being pried out of propolized hive boxes.

Nails should be sent horizontally through the side/top rail connection to strengthen the frame joints.

Foundationless – let the bees draw it to their specs.



Feeders

- There are many styles and types available
- Many options on types of feed
 - 1 to 1 sugar to water
 - 2 to 1 sugar to water
 - Fondant
 - Granulated sugar
 - Purchased premixed syrup
 - Additives
 - Bee healthy
 - Essential oils



Check your water!

- Check the pH of your syrup. Honey average pH is 3.9 (range 3.4-6.1) My water tested at 8.4!
- Use pool water test strips, add acid (cider vinegar and/or lemon juice) to lower pH.



Pollen (Patties and Dry Substitute)



Cut patties into strips and put a drop or two of food grade wintergreen essential oil on top to repel SHB.



Pollen Patties

- Cut into strips, 1-1.5 inch
- Add a drop or two of food grade wintergreen essential oil (repels SHB)



Make a dry pollen feeder



- Body: 12 inches of PVC **drain** pipe.
- Drain pipe adapter (glued)
- Drain pipe cap (don't glue)
- 2 eye bolts w/nuts
- Chain (carabiner clip)
- The pvc over hanging chain prevents raccoons from wrapping around limb
- The baffle stops squirrels
- Cotton soaked with oil stops ants
- ½ in screen stops birds from using as a nest.

Basic Tools

- **Smoker:** A smoker is useful in beekeeping. Its purpose is to mask alarm scents and to move the bees. It is important to not oversmoke them. A smoker is designed to produce a cool cloud of smoke which can be directed. All it takes is a puff or two. There are many fuels for smokers; pine needles, grass or leaves can all be used.
- **Smoker lighter:** From matches to piezoelectric propane torch, something has to light the smoker.
- **Hive tool:** Allows you to pry boxes apart and assist in freeing frames to be removed from the hive. This is a handy item for scraping and removing burr comb. Hive tools come in many sizes and shapes. You have to decide which one(s) are best for you.
- **Bee brush:** To gently brush bees off comb when removing honey or during inspections or splitting.
- **Frame rest:** Keeps 1-3 frames outside the hive body during inspections.
- **A wagon, wheel barrow, cart, or handtruck:** Useful for carrying bee equipment from your garage or truck to your bees.
- **Bucket, bag or box for your tools.**
- **Frame grip:** Helps to pull frames straight up and hold on to them one-handed.

Additional Tools

- Journal and pen
- Small folding table
- First aid, including Benadryl
- Frame channel scraper
- Markers
- Cinnamon
- Flashlight
- Magnifying glass
- Cardboard box or bucket for debris

More Tools

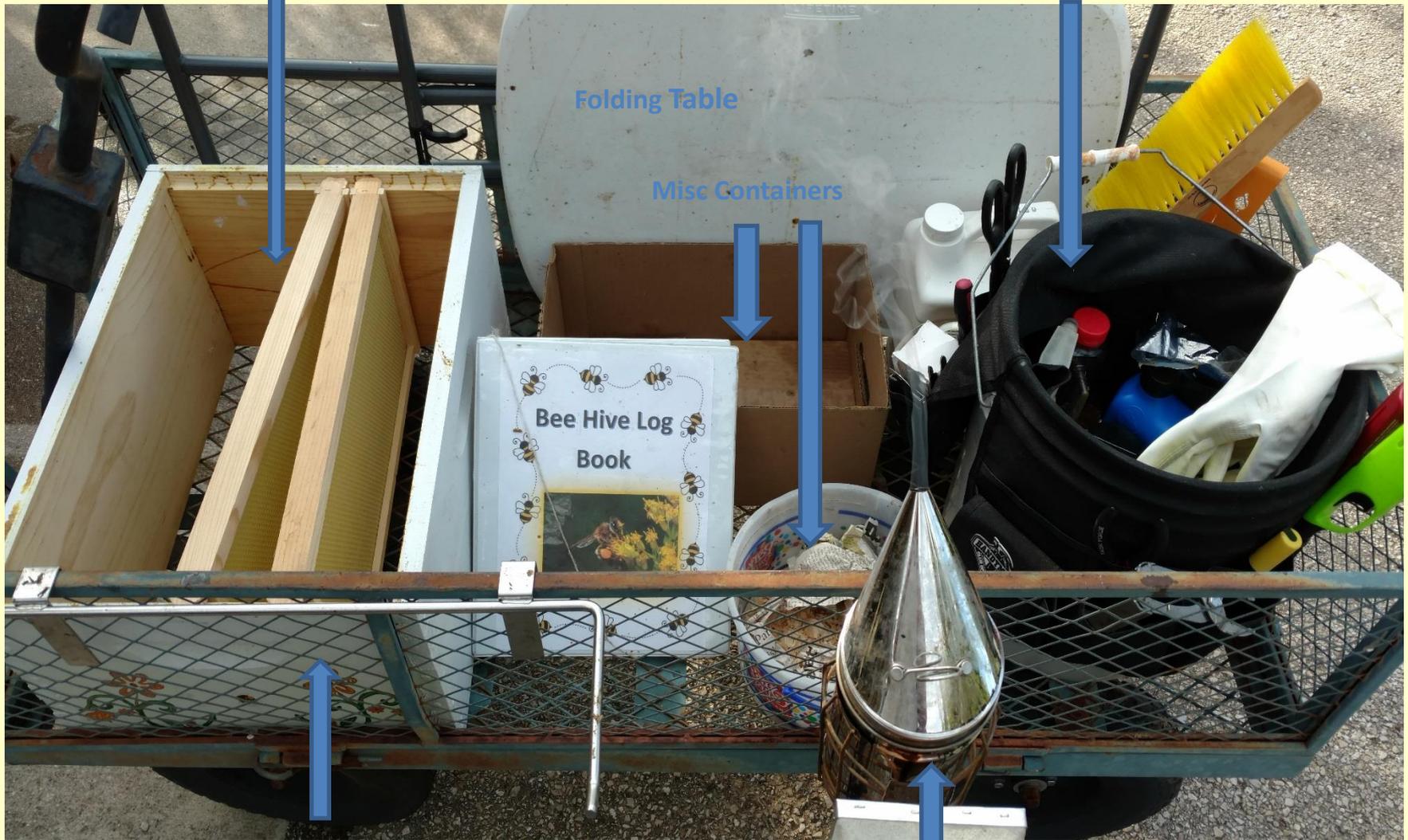
- Queen catcher and marking system
- Swifter sheets
- Beetle Blasters and oil mix
- Roach Motels
- Box knife
- Scissors
- Sharp pointed tweezers
- Water bottle to stay hydrated
- Lots of other stuff in the bucket!

My Bee Wagon



Hive Equipment

Tool Bucket



Folding Table

Misc Containers

Frame holder

Smoker

Extracting Equipment

Uncapping knife and/or Scratcher - A knife for slicing or prying off the cappings from combs of honey.

Uncapping tank - A container for receiving the cappings. Wet cappings fall onto a screen, and honey drips through to the bottom of the tank and out a spigot.

Extractor - A drum containing a rotating wire basket. Uncapped combs are placed in the basket and the basket is turned by hand or by motor. Honey is flung out of the combs onto the sides of the tank and drains through a spigot.

Strainer - A mesh of coarse screen or cloth directly under the extractor spigot. This filters out large debris such as wax and dead bees.

Storage/bottling tank - A large tank with a spigot, or "honey gate," at the bottom. As honey settles in the tank, air bubbles and small debris rise to the top and can be skimmed off, allowing honey that is bottled from the honey gate to be clean.

Protective clothing: There are a variety of full bee suits and jackets -- with and without round and spacesuit veils and with or without ventilated fabrics. A loose fitting shirt that can be zipped or buttoned up tight is an alternative.

Avoid dark colors. Bees see dark colors as defense threats and will be more likely to pay attention to you. For pants a new beekeeper should find something light in color - tan or white. Pant legs can be folded up at the ankle and the tops of the sock pulled up to hold the pant legs in place. It also prevents bees from crawling up pant legs. Wear white socks, not dark ones. Bees will get on dark socks and sting through them. You can also use duck tape to seal your pant legs to your boots.

Shoes: Many beekeepers wear high top work boots or rubber boots when working bees for the support they provide and to keep bees from their ankles.

Gloves protect the hands from stings. Some people just beginning select the least expensive -- a canvas garden glove. But bees will sting through light canvas. They provide some protection but not enough. Good bee gloves will have sleeves sewn on them to keep bees from crawling up your cuffs.

Bee gloves come in cow and goat leather and in rubber versions. You can use petroleum jelly to soften the leather.

The rubber coated ones are good for honey harvesting as honey can be washed off.

Some beekeepers wear white nitrile or dishwashing gloves as they are inexpensive and give good sensitivity.



Bee veils protect the head from bee stings. Bees will defend the hive against anything that disturbs it. They are attracted to the eyes and nose. They also become entangled in hair. Veil choices include square, round, and jackets with attached veils. If you can afford it, we recommend a jacket or suit with an attached bee veil. This type of suit will provide the maximum of protection from stings. Some beekeepers prefer just a standalone tie-on veil. *The screening material on most veils is made of dark mesh because it is easier to see through than white mesh.*



WEAR A VEIL WHILE BEEKEEPING!



Basic Beeyard Conduct

- Avoid strong scents, lotions, and perfumes
- Avoid dark and tight clothing
- Avoid banana-type odors
- Use deliberate motions during hive inspections and avoid vibrations and banging or bumping
- Use proper technique for opening a hive; knowing the time of day; time of year; weather
- Know how to approach a hive; look and listen
- Know how to pull and manipulate frames

Basic Beeyard Conduct

- Know how to inspect the bottom of frames
- Use the cover to keep the boxes off the ground
- Cross stack the inspected boxes to minimize crushing bees.
- Use a turning motion to restack boxes.
- Keep time in hive to a minimum to avoid setting back their work; know when to retreat.
- **Always have a clear idea of what you want to achieve before opening a hive**

**Can't remember all the
woodenware nomenclature
and choices?**

Grab a catalog (or online) from any
bee supply...

Dadant

Mann Lake

Brushy Mountain

Beeline

etc.