Beekeeping Made Easy

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Welcome to the rich and rewarding world of beekeeping. Within these pages you will find all the information that you will need to start your own beehive and active colony.

Whether you want an apiary for fun or for profit, there is a way to do it - and an *efficient way,* at that. It doesn't matter whether you live in a town, city, or near a farm - there is always a way to raise bee colonies without posing danger to *anyone* whether it be yourself, your family or your neighbors. Let's get started!

History of Bees

Bees are one of nature's most prolific pollinators. It is estimated that a single bee, at the peak of its performance, can visit literally thousands of wild and cultivated flowers across an area spanning hundreds of miles. Bees are known for enhancing crop production as well as producing one of nature's finest food products: honey.

Bees don't just produce honey, though - they also produce royal jelly (an energy-rich substance naturally produced by bees which is added to food supplements to enhance physical performance and maintain wellness).

Beeswax, another natural product of the bee, is used in personal care products such as lotions and shampoos and is also used in the arts & crafts such, especially in candle making.

Based on the theory of evolution, all bees essentially came from prehistoric wasps. If we were to trace the genealogy of the

bee, we would eventually find the *Crabronidae* family of prehistoric wasps.

These wasps are predatory insects and feed on other insects. Like sharks, prehistoric bees did not change much up to the modern time - a testament to the fact that their biological engineering is near perfect and did not require much change throughout these millions of years of existence.

Modern bees belong to the scientific family *Apidae.* The *Apis* genus (the most widespread in beekeeping) is further divided into three subdivisions: open-nesting species, single-comb species and the cavity-nesting species. *Apis mellifera,* the most commonly used species for beekeeping, belongs to the third subdivision.

Why are bees so efficient in pollinating flowers and plants? Here are our top five reasons:

1. The bee's entire body is covered with fine hair. This hair acts a bit like a velcro tape, latching on to the tiny pollen particles found in flowers.

2. The bee's body is elongated and segmented at strategic points. This allows a bee to "dig deep" into a flower to reach more nectar and pollen.

3. An average colony requires a *lot* of pollen and nectar to thrive. A worker bee spends her entire life making honey and rearing bee larvae. Foraging bees can travel more than fifty miles per flight in search of flowers.

4. Bees tend to collect pollen and nectar from one species of flower *at a time.*

5. Bees don't just let the pollen stock to their body hairs; they have *pollen baskets* on their hind legs. Pollen is placed in these organic baskets to keep the food safe until the bee reaches home.

History of Beekeeping

According to recorded history, the first bee colonies (that were then placed in wooden hives) were brought to the United States from England.

These hives were transported to the English colony of Virginia in the year 1622. I n terms of modern beekeeping, the arrival of these beehives signaled the beginning of beekeeping in the US.

The craft had already been introduced - it was up to the pioneers of that time to adapt the method to what the land had to offer.

After the colony of Virginia, more beehives were sent to Massachusetts. This happened between the years 1629 and 1634. From there, it was believed that apiculture was then transmitted to places like Pennsylvania and New York.

Apiculture is a not really a modern invention, because even ancient cultures around the world raised bees. People used organic skeps made from straw and hives made from clay. The colonies in America made use of skeps as well.

Skeps are dome-shaped hives with a few openings to allow bees to enter and exit. When it was time to harvest, the beekeeper had no choice but to destroy the skep which also effectively destroyed the hive inside.

Compared to the standards of apiculture today, keeping bees in straw skeps was destructive and in many ways counter-

productive because it necessitated the creation of a new hive and the installation of another active colony (not to mention the introduction of a new queen bee).

It was in the year 1852 when a man named L.L. Langstroth devised a simple wooden hive made from planks and frames.

This invention was called the Langstroth hive and is considered the *standard* when it comes to beekeeping. Little has changed in the design of Langstroth hives today, because L.L. Langstroth's system was so efficient. Every part of the wooden hive served a purpose and performed its function very well. Langstroth's invention of the Langstroth hive was enough to earn him the name, "the father of modern beekeeping".

Prior to the invention of the Langstroth hive, people in the colonies generally obtained honey through the following methods:

1. They placed caps on top of beehives, so that bees could create wax cells and store honey on the artificial cap. When it was time to harvest, the cap was simply removed and the wax was squeezed to extract the honey.

2. Using pre-modern hives like straw skeps, people were able to keep wild swarms that were captured easily from trees in the forest. When it was time to harvest the honey produced by these wild swarms, sulfur was burned near the entrance of the straw skeps. Burning sulfur killed the bees. The straw skep was sliced open and the wax was again squeezed for honey.

3. Trees were also cut down to obtain the honey from hives that were established in the trunks of trees. Whole colonies of bees were killed so that people could get the wax and the honey.

With the arrival of Langstroth's invention, modern approaches to beekeeping appeared in the horizon. *Finally,* there was a way to raise bees efficiently.

With the use of simple tools like tin smokers, beekeepers were able to observe the behavior of their bees and monitor the hives for signs of problems and disease. Modern beekeeping was born when the modern hive was invented.

One of the most important innovations in beekeeping at that time was rearing queen bees.

It was in the year 1861 when Messrs. Alley, Carrey and Pratt began selling locally-raised and bred queen bees. These three intuitive beekeepers made use of the bees' natural instinct when it comes to queen bees. Wild swarms that were kept in separate nucleus boxes/hives were sometimes queen-less.

Without a queen, a colony becomes restless and unhappy. So what they did was they took narrow strips of wax that contained eggs.

These narrow strips of wax were then installed in queen-less swarm boxes. Once the swarm detects the presence of the eggs, queen cells will form. Queen cells are special cells that produce queen bees, rather than worker bees.

When a colony decides to "swarm", usually more than half of the entire colony leaves. In their wake will be numerous queen cells, which in theory will ensure that a queen will be released into what was left of the previous colony.

In modern beekeeping, the formation of queen cells in a healthy colony is a sign that something is amiss, and that the colony may be planning to swarm.

D. Doolittle was the first beekeeper to formalize his method of raising queen bees. His method, later known as the Doolittle method, is also considered one of apiculture's standard approaches of raising queen bees.

What was different from Doolittle's method was that he made use of plastic cups that contained potential queen bees. This way, a person who was using the method could produce numerous queen bees easily (breeders are especially adept with this method because they sell queen bees to local beekeepers).

Since the late 1800s, the local mail system was used to deliver queen bees to beekeepers. Queen bees can also be mailed along with a large bee colony. They come in wooden boxes, with the queen bee housed in a special box that is *separate* from the larger box of worker bees and male drones.

Though some deaths occur from time to time, mail-order queen bees and colonies are a good choice. Just make sure that you claim your bees once the post office calls you to prevent any mortalities.

If you acquire you first colony this way, note that it is normal to find dead bees in the main box. If dozens or hundreds of bees are dead, something is definitely wrong and you should contact the breeder about what happened. It is likely that the breeder will send you a fresh colony to work with after your call.

Bee Species

To date, there is an estimated twenty thousand known species of bees around the globe, each species with its own special set of traits that may or may not make it ideal for beekeeping.

Essentially, there are two types of bees when it comes to their behavior. There are social bees (honey bees are social bees, meaning that workers, drones and the queen bee live together in one large colony) and non-social/solitary bees (some bee species do *not* like living a colony).

A good example of a solitary or non-social bee would be the *Mason bee.* The *Osmia rufa* species is known for creating holes in porous material and laying eggs in the resulting cavity.

A true wandering bee, the Mason bee is often accused of causing collapsing structures because of their egg-laying habits. There is simply no truth in this. If a house collapses, it's because of structural weakness and *not* because a member of the *Osmia rufa* species has laid eggs in the mortar.

Our main focus in this book is the *honey bee,* which is a very social insect.

Honey bees exhibit one of the most well-organized social behaviors in the animal kingdom. Often touted as the proponents of the perfect society, honey bees work together tirelessly within the colony to ensure the colony's growth and expansion.

During winter, honey bees survive the scarcity of food and the large dip in environmental temperature because honey bee colonies *store food* through the spring and fall, ensuring that no bee will starve during winter. To keep warm, honeybees are known to huddle together, protecting the queen and keeping each other warm throughout the cold months.

While it is true that honey bees are related to wasps, it is not possible for the two to successfully produce offspring. This is the mark that the two insects come from very distinct genetic lines - the inability to create hybrid offspring.

Common Types of Bees

There are *four* common types of bees known for producing honey and wax, two of which are not readily domesticated because of their absconding behavior. These species are: apis florea, apis dorsata, apis cerana and apis mellifera.

1. **Apis florea** - *Apis florea* is known as the tiny honey bee or the dwarf honey bee because of its size (compared to other honey bees). It is considered the *smallest* honey bee species in existence. This species creates single comb hives and have largely eluded the grasp of local beekeepers around the world because of its sensitivity to disturbances.

This type of honey bee creates hives suspended from trees or sometimes in cave formations. To prevent ants and other insects from taking honey and disrupting colony life, worker bees usually place propolis (plant glue) on the ends of the hive itself, to trap invading insects.

When there is more than enough food for the colony, *Apis florea* colonies tend to swarm to further expand their numbers. Such swarms are called "reproductive swarms" and are considered a positive sign.

Due to the size and consumption habits of *Apis florea,* it is fairly common to find only a few hundred grams of usable honey in a single hive, compared to the many liters of honey you can usually harvest from a domesticated colony.

Once disturbed, *Apis florea* colonies tend to abscond or completely abandon their hives. People from places like India and Thailand have used this absconding behavior to their advantage; because once the bees abscond their hive, the harvester is free to collect the wax and honey from the single-comb hive.

Wild populations of this species can be found in the following regions: Oman, Sri Lanka, India, Pakistan and Iran. It cannot survive altitudes exceeding 1,500 meters so this species cannot be found in temperate mountain ranges. *Apis florea* colonies generally do not like human settlements. They are usually found in forests and can also be found in lush, farming zones.

2. **Apis dorsata -** *Apis dorsat,a* or the rock bee, behaves similarly to the dwarf honey bee when it comes to absconding the hive. Like the dwarf honey bee, these bees tend to abandon their hives if something disturbs it.

Domesticated honey bees fare well even with excessive disturbance (just make sure that you smoke them adequately before opening the Langstroth hive) while species like *Apis dorsata* consider such things as unacceptable - unacceptable enough for the whole colony to leave their honey and hive.

This species usually establishes colonies in dense forests. The single-comb hive of this species is often suspended from a stable support (like the hives created by the dwarf honey bee). Hives can often be found five meters off the ground, which makes the colony relatively safe from larger honey-loving predators.

Rock bees are *massive* compared to other bees, which also makes them a formidable foe. This is the reason why worker bees from this species do not bother to make glue or propolis traps.

It is common for a rock bee colony to devote one third or more of its total colony population to defending the hive from insect and mammalian invaders.

The term “bee tree” was coined to describe tall trees with as many as twenty individual hives of the species attached. In

countries like Thailand, older and taller trees can hold as many as one hundred individual rock bee hives.

3. **Apis cerana -** also known as the oriental honey bee, *Apis cerana* is notable for its range as well as its significant contribution to agriculture.

It is a very active pollinator and covers a wider area compared to the the dwarf honey bee and the rock bee/giant honey bee. A hardy insect, *Apis cerana* can be found in tropical regions, sub-tropical zones and even in temperate countries.

The range of this species includes the following countries: USSR, Philippines, Thailand, India, Indonesia, Japan, China and Korea. Due to the wildly different climates of its range, the size of the bees vary.

Other traits and factors that are dependent on the bee's geographic location include: population or size of the bee colony, size of the hive or nest, swarming behavior, and absconding behavior.

Yes, this species also absconds its hive. It appears that members of the species that thrive in temperate zones have a tendency to store excess honey which is in contast to their tropical and subtropical counterparts (probably because of the change in seasons).

Unlike the dwarf and giant honey bees, *Apis cerana* can be domesticated and raised in man-made hives. In fact, rural villages in the tropics and sub-tropics still raise this species in movable-frame hives (a bit similar to Langstroth hives) or straw skeps.

Another notable difference is the way that this species creates its hives. Unlike the two species that we have discussed earlier, *Apis cerana* creates *parallel comb hives* and not *single comb hives.* This design gives worker bees much more space

to operate and also helps the worker bees ventilate the entire structure.

4. **Apis mellifera -** *Apis mellifera* or the European honey bee is the most common bee species used by beekeepers and breeders in the U.S. and some parts of Western Europe. This species is also present in Asia (so essentially, *Apis mellifera* also thrives in subtropical, tropical and temperate regions like the oriental honeybee).

This species, like the oriental honeybee, is a cavity-dwelling species that likes to create parallel combs in secure spaces such as caves and tree trunks.

A minimum cavity size of 10 liters is usually needed before a wild swarm can create a viable hive. Truly social creatures, one can get the gist of social bee behavior by simply observing what this species does.

In *Apis mellifera* society, there is consistent division of labor among members of the colony and also a well-maintained social hierarchy.

The average population of a colony is 15,000 bees, though sometimes this can go up to 60,000 members if the conditions are ideal for population expansion. If not, the bee population will not rise as an instinctual response to resource scarcity.

The Anatomy of a Bee

The honeybee has three main body parts: its head, its midsection or thorax, and its abdomen or abdominal cavity. The following are individual parts of a bee's anatomy, including the function(s) of each part:

1. **Compound eyes -** bees have compound eyes, which allows them to have a wider field of vision (which is perfect when they are searching for wild flower patches/beds).

In addition to giving bees a wide field of vision, bees are also able to derive directional information from the ultraviolet rays of the sun. This allows bees to find their way back to their hives and also helps bees mark which locations are likely to have food sources the next time they pass by.

2. **Simple eyes -** in addition to having a pair of compound eyes, bees also have three individual simple eyes or *ocelli*. These primitive eyes are used primarily to measure the amount of light present in a particular area, which helps the bee navigate unfamiliar terrain.

3. **Antenna -** to detect scents of potential food sources (and predators), bees use their pair of antenna. The antenna has two main functions when a bee is out searching for pollen and nectar.

First, they tell the bee if a potential food source is present. And second, *where* the food source can be found. That's right - bees also derive directional information from the *scents* that their antennas pick up from the air.

4. **Mandibles -** the mandibles or jaws of the bee has several functions:

- Cut and shape beeswax to produce strong, uniform cells in the hive.

- Help the bee consume pollen and honey.

- Help the bee collect water for various uses inside the hive and for self-hydration.

- Mandibles are also used to feed the young bee larvae that reside in open honeycomb cells. Worker bees are also responsible for feeding the queen bee, which barely has time to groom and feed herself because her main function is to lay eggs across the hive structure ceaselessly.

- A bee's mandibles are also used for grooming and removing parasites that may have attached themselves to the bee's body.

- When invaders are present, mandibles are also used to attack fellow insects, bees from other colonies, and larger animals.

5. **Proboscis -** a bee's proboscis is used mainly for drinking water and collecting nectar, which is then stored in the bee's body until it reaches the hive, where it deposits the nectar in cells.

Worker bees add water to the nectar and fan the fresh deposits of nectar to jump-start the curing process. Food exchange is also possible between individual drones or worker bees through the use of the proboscis.

6. **Thorax -** the thorax of a bee contains its efficient wings and all of its legs. Muscles that make flight and movement possible are also located in the thoracic section of the bee.

7. **Abdomen -** the abdomen or abdominal cavity is where the bee's reproductive organ is located. Queen bees and worker

bees are both *female* but only queen bees are capable of laying fertilized eggs.

Drones are the male members of bee society and has the *sole function* of mating with the queen. Worker bees are female, but are sterile.

Once the queen bee is finished mating, it is fairly common to see female worker bees driving out the male drones from the hive. When a new queen bee is introduced to a queen-less colony, it takes a "nuptial flight" to encourage male drones to approach and mate.

8. **Forewings -** bees have two types of wings: forewings and hindwings. The forewings are much larger than the hindwings and are used for flight. In the hive, you can see worker bees furiously fanning nectar-filled cells with their forewings to help regulate the curing nectar's temperature.

During the hottest days of the month, you will most likely see worker bees near the entrance of your Langstroth hive, furiously buzzing and flapping their wings.

This behavior (which is often seen as humorous by many first-time beekeepers) is actually a way for the worker bees to cool down the hive when it becomes too hot inside. Since ventilation is often poor inside a healthy hive, ventilation has to be improved to prevent nectar spoilage and larval death.

9. **Hindwings -** the bee's thinner hindwings are attached to the larger forewings by means of hooks called *hamuli.* The two pairs of wings are hooked to each other to ensure synchronized movement during flight. Like the forewings, the hindwings are also used by the bee to keep the hive cool during the hotter months of the year.

10. **Legs -** primarily used for movement, the legs are also used by the bee to create the hexagonal cells in the hive and collect pollen from flowers and propolis from trees. Propolis is a sticky substance produced by trees and is used by bees to stratify the hive structure and to trap other insects (such as ants, wasps, etc.).

11. **Sting -** the sting of the bee is located at the tip of its abdominal section. It has barbs at the end, which ensures that the sting *will stay in place* after the bee has done its work. When a bee stings, it usually takes flight once again, leaving the sting to perform its function.

A bee's sting/stinger has a small sac attached to it. This sac contains the bee's venom. The stinger will continue pumping poison into its victim's skin long after the bee has left. It is normal for a bee to leave a significant portion of its digestive tract along with the stinger and the poison sac.

This tendency of bees to sacrifice their lives in protection of their colony earned them the name "nature's kamikaze fighters". Bees die soon after leaving their stingers in the victim's skin.

The Life Cycle of the Honeybee

During the hottest months of the year, a honeybee colony's population can reach up to 50,000 - 60,000 easily.

If there is plenty of food for all the bees, the queen bee goes into overdrive, laying as many as 2,000 eggs per day. The worker bees are also hard at work, creating more cells for the newly fertilized eggs of the queen bee.

During this time, the male drone population of the hive also booms. Hundreds can be found in a hive during such time (drones are cared for by worker bees; they cannot really fend for themselves).

As we have mentioned earlier, in bee society, both the queen bee and the worker bees are female and only the drones are male. Queen bees and worker bees are both hatched from fertilized eggs. Both these members of bee society have thirty-two chromosomes in total.

So how come the queen bee can lay fertilized eggs and the female worker bees cannot? The difference is *how* the larvae was cared for. You see, when a colony requires a queen bee, the worker bees create what is called a *queen cell.*

Queen cells are very different from other larval cells. It is oval-shaped and protruding, compared to the flat, hexagonal cells that were meant for male drones or female workers.

When the larva is ready to come out, worker bees give the queen larva richer food. Royal jelly is given in copious amounts to the queen larva. This diet of royal jelly produces the majestic queen bee.

Essentially, all worker bees have the potential to become queen bees. It's just that they were not given the same diet as the queen bee, which is why they are sterile. Worker bees have ovaries too, but these ovaries are considered rudimentary compared to the fully developed ovaries of the queen bee.

There is a phenomenon in apiculture called "the laying worker". What does this mean? Well, in rare situations some worker bees begin *laying eggs.* Do these eggs hatch?

Yes. But the worker bee's eggs only produce *male drones.* In contrast with a worker bee and the queen bee, the male drone only has sixteen chromosomes.

And yes - male drones do *not* have fathers because they can be produced from eggs that have not been fertilized by another male drones. Queen bees and worker bees are produced from the union of egg and sperm.

If a colony is overpopulated with male drones, a colony will not thrive because male drones do not do anything. Drones do not collect pollen and nectar; they are also incapable of rearing young bee larvae.

Male drones are only important when the queen bee requires sperm to lay thousands of eggs per day during the population boom, which can happen once or twice per year. After mating, a male drone naturally dies.

In temperate zones, it is common for female worker bees to kill or drive out male drones during the autumn season, just before the coldest months of the year.

This is done to conserve the resources inside the hive (pollen and honey). Since male drones do not produce anything, they have to be removed from the hive during this time so the rest of the colony will be able to survive.

Beekeepers have to be vigilant when it comes to this phenomenon. A common method of removing egg-laying worker bees is by isolating the frames where the egg-laying bees are located and gently shaking the bees in a sack. The

sack is then placed 20 to 30 meters away from the hive and opened.

Foraging bees will be able to find their way to the hive. Egg-laying workers, or those worker bees that tend only to the internal workings of the colony, will not be able to find their way back to the hive because they have not performed the necessary directional imprinting done by foraging workers.

At a Glance: The Workings of Bee Society

1st day - The queen bee inspects a cell's measurement to determine whether the cell was meant for a male drone or a female worker. Once it has determined this important detail, an egg is laid vertically in the cell.

The egg may or may not touch the wall of the cell (this makes it hard for beginning beekeepers to spot cells filled with eggs; try using a magnifying glass to spot the eggs. Bee eggs look like tiny grains of rice).

2nd day - The egg begins to slowly lean toward the cell wall, at 45 degrees.

3rd day - Eventually, the egg reaches the cell *floor* and is completely vertical. At this phase, the egg finally hatches. The larva emerges. The cell at this point in time is still open.

4th day to 8th day - Female workers diligently feed the newly hatched larvae with brood food. The larvae expand and grow at a phenomenal speed; molting occurs at 24-hour intervals.

A larva grows so quickly that it eventually fills the entire cell cavity. When this finally happens, it is time to seal the cell.

Worker bees seal the cell with porous wax to initiate the next phase in the development of the larva.

8th day to 21st day - The larva begins to excrete waste at this point in time. Then the larva begins to extend its head and body, in preparation for creating a cocoon for its pupal stage.

The larva spins a cocoon around itself. This usually happens after the fifth molting. During this time, the ivory white larva also begins to change color. At 21 days, the pupa molts for the last time before breaking out of the sealed cell.

Activities of the Worker Bees

The life of the worker bee revolves around the hundreds of tasks involved in stabilizing and maintaining a live colony of honeybees.

1st day to 3rd day - Worker bees clean functional cells (the cells have to be sterile before a queen can lay an egg) and watches over incubating larvae.

4th day to 6th day - Rapidly expanding larvae are fed rich brood food nearly 24 hours a day. Food for older larvae is composed of pollen and honey.

7th day to 12th day - Younger larvae are given brood food; this is also a round-the-clock task.

13th day to 18th day - Worker bees perform the important task of processing and curing newly collected nectar to honey.

Water is naturally evaporated by the continuous flapping of the worker bees' wings. During this time, worker bees also produce

wax for the hive structure and also store pollen by packing collected pollen into the cells.

19th day to 21st day - Some worker bees begin to guard the entrance and exit points of the hive.

Invading insects are killed and carried away to keep the hive clean and free from disease and parasites. Worker bees that are tasked to forage for nectar and pollen begin their orientation flights (directional imprinting).

When you buy your first hive and colony, you will notice some bees near the entrance of the hive, circling around and going back to entrance, repeatedly.

This is the orientation flight. The bees are imprinting signs and landmarks in their surroundings that would help them remember where the hive is.

Progressively, the distance covered by the bees during the orientation flights will increase until they have completely mastered how to find their way back to the hive.

Important note: Worker bees do not have fixed roles in bee society. Older bees can still perform brood-rearing duties and younger worker bees can act as guards if need be.

A worker bee that does not have fully-developed wax glands cannot help with hive-creation. In such cases, a worker bee can instead help by ventilating the hive and curing honey. The sting glands also take at least 18 days to fully emerge and become functional.

A Drone's Life

1st day to 12th day - Male drones are hatched, fed, incubated and break open sealed cells to emerge as mature male drones. Male drones are kept in the hive except for cleansing and sometimes, the rare orientation flights on ideal days.

12th day to 14th day - Male drones become sexually mature and are ready to mate. Drones in the colony begin to congregate.

Such masses of male drones are called *drone assemblies*. If there is a new queen in the hive that is ready to take her nuptial flight, the queen bee will release chemicals called pheromones that will attract the drone assembly.

Autumn - Worker bees kill drones or drive them out of the hive. The sole purpose of having male drones in the colony is for the queen bee to be able to mate and produce fertilized eggs. Once a drone successfully mates, the drone dies from the process.

If drones are still around after two seasons, that means the drones will no longer serve any useful functions the rest of the year. That being said, the colony no longer requires their presence, so they are expelled or exterminated by the colony.

The Queen Honeybee

1st day - Emerges from the sealed cell and begins looking for any other queen cells in the hive. Other queen cells are destroyed and the larvae are killed. This is done to prevent the bees from swarming or splitting the colony in half.

3rd day to 5th day - The queen bee performs orientation flights and leaves the hive for the first time.

1st week to 5th week - The virgin queen bee engages in nuptial flights or mating flights to mate with members of a

drone assembly. Once the sperm has been successfully deposited, the male drone dies.

After mating with drones, a new queen bee will start laying eggs regularly after the 2nd or 4th day. The queen continually produces another type of pheromone.

This time the pheromone announces to the entire hive that a live, breathing queen bee is present and is laying eggs. This pheromone actually *prevents* worker bees from engaging in queen bee-rearing behavior, such as creating queen bee cells.

When a queen bee dies, the pheromone is no longer produced, which makes the honeybees restless and unhappy. The queen has died! That means they have to create another queen (and they can do that easily, by using a fertilized egg laid by the former queen bee).

There are times when an ailing queen bee is replaced by a new queen bee that has been reared by the colony. A queen bee can serve her purpose for up to five years; after this period, it is very possible that the colony will decide to replace the old queen.

When a young queen bee emerges, she has to *fight* the old queen bee to the death. Once the old queen bee has been defeated, the new queen bee can take her rightful place as the center or nucleus of the honeybee colony.

Bees During Winter

Wintertime is the most inactive season for honeybees; they try to preserve heat and energy by clustering together, which creates an amplified heating effect for the entire hive.

Queen bees do not lay eggs (or very few eggs) during the wintertime (for obvious reasons) and simply stays at the middle of the winter honeybee cluster to keep warm.

Worker bees continue to tend to the needs of the queen bee. At this point in the year, the hive is exclusively female because the male drones have already been driven out of the hive or killed during autumn.

Just before spring rolls in, it would be a good idea to mark your queen bee so she will be easier to spot later on. In temperate zones, plants like ivy are the last to succumb to the cold.

If you live in an area with lots of ivy, expect some foraging workers braving the winter cold (during not-so-cold days) to increase the stores of food for the rest of the winter.

A little trivia about winter clustering: a honeybee cluster can be "tight" or "loose" depending on the temperature *outside* the hive. If the temperature outside is a constant 68 degrees Fahrenheit, the winter cluster is loose (and food consumption is increased a little).

During the coldest weeks of winter, food consumption drops as well as the activity of the colony. The winter cluster is tightest during the coldest weeks. When the weather is tolerable, honeybees will take advantage and will perform what is called "cleansing flights".

Here is a quick reference for winter time:

- **50 degrees F to 110 degrees F** - The colony is active and normal duties are undertaken (foraging of the workers, egg-laying of the queen, etc.)

- **95 degrees F** - Brood nesting still possible.

- **57 degrees F** - All activity in the colony is reduced or limited. Winter clustering commences at this temperature (57 degrees F = 14 degrees C).

- **50 degrees F -** At this temperature, honeybees are no longer able to fly outside the hive. Winter clustering is tight.

- **45 degrees F** - Many species of honeybees become completely immobile at 45 degrees Fahrenheit.

Bees in Spring

Spring means renewed life for many creatures, including honeybees. As the days become warmer and warmer, the queen bee resumes her egg-laying duties once again.

The winter cluster slowly breaks away and the spring duties of the worker bees commence. Stores of food (honey and pollen) are consumed in preparation for the work ahead.

Since they were not able to leave the hive during the wintertime, worker bees take to the skies (these are called "cleansing flights") and collect moisture and any available pollen from flowers that have bloomed early in spring.

During spring, the population of the colony decreases significantly as the older worker bees die a natural death. There are no male drones yet.

Early spring signals the need for the hive to collect more nectar and more pollen to create balance in the colony. Since many honeybees have already died, the stores of food have to be replenished and the colony has to be repopulated with active workers (and drones, if need be).

The presence of any or all the following factors can delay the population boom of a honeybee colony after winter:

- *Diseases*

- *Parasitic invasion*
- *Physical destruction of the hive*
- *Weather changes*
- *Temperature changes*
- *Humidity changes*
- *Scarcity of resources/ foraging material*
- *Too few worker bees*

In temperate regions, honeybee colonies need to gather enough number and force to benefit from the increase of foraging materials, such as oil seed. Increased hive activity usually occurs in the month of April.

As spring rolls forward to the hotter months of summer, male drones are produced - usually in preparation for swarming behavior. In a more natural setting, swarming behavior isn't all that bad. It's actually a way for the honeybees to survive.

Once there is a population boom, a single hive cannot fully support more 60,000 individual bees. The capacity of the hive has to be observed.

Now, how do the bees finally decide to swarm? The story goes like this: the queen bee produces a pheromone that keeps the colony together and also acts as a chemical messenger that prevents the formation of new queen cells. Now, this pheromone is sent out through physical transmission (e.g. grooming habits, etc.).

If the population is in an ideal range, the strength of the queen's pheromone ensures that the colony will not swarm or attempt to produce a new queen bee. If the opposite is true,

worker bees begin to form queen cells in preparation for swarming.

The old queen bee is not left behind, nor is she killed in the process of swarming. You seen, when a colony decides to swarm, it leaves behind *half or less* (50% to 90%) of its population in the old hive. The old queen also swarms and still serves as the nucleus or center of the entire swarm.

In the wild, you will see wild swarms congregating around a single point - their queen. Now, when a colony swarms, they leave behind one or more queen cells. This way, the rest of the population can raise another queen bee - a virgin queen bee that will once again take a nuptial flight to mate with drone assemblies.

When a queen dies in a colony, this is when "egg-laying workers" usually emerge.

Since the strength of the queen bee's pheromone is no longer regulating the worker bees' reproductive systems, there is a chance for some (not all) of the worker bees to start laying drone-producing eggs.

You can easily spots cells that were filled by egg-laying worker bees.

Queen bees lay fertilized eggs in a clustered pattern. There is regularity in the way she lays eggs, so it is fairly common to see a large section of a frame to be completely filled with eggs. The opposite is true for the egg-laying worker bee.

Instead of laying in a clustered patter, the egg-laying worker bee lays eggs in a haphazard fashion; there is no pattern and everything is irregular. Remember this one difference in egg-laying patterns and *you will be able to spot* rogue workers in your own colony.

Part 2: Beginning Beekeeping

Keeping Bees in Your Backyard

Since many of us live in modern cities and towns, some think that beekeeping is impractical or impossible to accomplish. This is simply not true. Many modern beekeepers install hives in their backyards.

Some people even keep Langstroth hives on top of buildings! That's how flexible apiculture is. As long as the beekeeper is conscientious with the care and maintenance of the hive and the colony, everything is likely to work out well for both the bee and the beekeeper.

Contrary to common belief, domesticated honeybees do not need large patches of flowers nearby to collect pollen and nectar. Remember: these insects can travel many miles *at a time* to forage for the materials they need to keep their colonies strong and healthy.

One of the biggest concerns of people who want to start a hive in their backyard are *bee stings.* Of course, your neighbors would also be *very concerned* of such things if they learn that you are setting up a hive next door.

But it does not have to be this way. You can take the steps to make sure that everyone is safe and *assured* that your new hobby (or business) of raising bees will not cause any problems.

Installing a Fence

If you live in the suburbs with neighbors in close proximity to your own backyard, you have to install a new fence. The new fence should be at least six feet high to make sure that your bees will be flying *above* people's heads and not lower. You can also install a fence that is higher than six feet.

A tall fence will reduce the chances of your bees colliding with both adults and children. A fence also hides your Langstroth hive from plain view of people. If your neighbors do not see your hive at all, they will eventually forget about it.

In addition to hiding your hive from plain sight, a tall fence will also protect your hive from strong winds that can damage or even tip over your hive completely.

Sufficient Water

Bees need enough water to thrive in a city or town setting. In the wild, honeybees create their hives in close proximity to natural water sources such as streams, ponds and rivers.

To ensure that your bees will get enough water, you have to install water sources near your hive. Here are some easy tips:

1. You can use shallow water pans with pebbles added to the bottom of the pans. Fill the pans with some water but do not allow the pebbles to become completely submerged.

Bees do not hover when they take a drink (and they need a lot of water); they *perch.* Bees need something to perch on when they lower their proboscis into the water; otherwise, they might drown.

2. Water jars or feeders can also be used to provide enough water to your colony. These special inverted jars can be purchased from agricultural or livestock supply stores in your locality. Fill the jars with water and change water every week.

3. If you have the time and resources for it, you can also create a small, perpetually flowin' pond near your hive to provide a constant source of water to your bees.

Important: If your bees do not have enough water, they will seek out sources from beyond the borders of your backyard. If you have a neighbor with an adult swimming pool or a kiddie pool, your neighbors might complain that your bees are taking a drink in their pool/s everyday!

8 Easy Ways to Win Your Neighbors' Hearts

Whether we like it or not, our neighbors are there to stay and pass judgment on your beekeeping activities. There is no need to create friction between your family and your neighbors simply because you started beekeeping. Here are eight easy ways to win them over:

1. If you plan to keep bees in your backyard (assuming that you are in a suburban location), do limit your number of hives to one or two. Any more can cause a ruckus with your neighbors, as multiple hives often scare people into thinking that it is no longer safe to go outside because of the all the bees nearby.

2. Place your hive/s *away* from areas that your neighbors commonly use, such as their driveway, etc.

Keep your hives hidden as much as possible - remember, the less your neighbors remember that you have beehives, the better.

3. Using paint can be an inexpensive way to make your hives inconspicuous. Light green or light brown are ideal colors because these colors allow the hives to match perfectly with the home, outdoor furniture or even your garden.

4. Installing ample water sources *in your backyard* will also reduce or completely eliminate the need for your bees to seek other sources of hydration, such as your neighbor's kiddie pool.

5. You can invite people over to see just how gentle honeybees really are - and you can show them that you are perfectly capable of handling them.

6. Tell your neighbors that honeybees are not interested in staying near their hive - in fact, they are more interested in flower beds three miles from home.

7. After your first harvest, don't forget to give your neighbors a jar of freshly extracted honey!

Working With Your Bees

Working with honeybees for the first time is an exciting time for every beginning beekeeper. Nothing compares to the first time that you don your beekeeping suit and use your smoker to mellow down your honeybees.

There is an ideal time to visit your bees:

1. When many of the bees are out collecting pollen and nectar (usually early morning).

2. During strong nectar flows of nearby flower patches.

3. When the hive is not under stress from the weather or perhaps from invading insects like other bees and even wasps. If they are on the offensive, bees are less cooperative.

4. Check the temperature before visiting your beehive. Is the temperature higher than 95 degrees Fahrenheit? If so, the bees might not be that relaxed.

Honeybees & Stinging

Honeybees have been equipped by nature with *stings.* These insects don't bite or scratch, but they can pack a powerful, venomous punch with their stings.

Unlike other insects, the sting of the honeybee comes with its own "automatic" venom sac that continues pumping bee venom long after the honeybee has left and died.

This being the case, you should always be careful around your bees because if you approach them the wrong way, you *can* get stung. Here are some ways that you can avoid getting stung by your honeybees:

- Never forget to wear your netted veil when visiting your bee yard. Also, your smoker is the second most effective tool against stings and agitated worker bees. You do *not* want to open a hive full of angry bees without using your tin smoker first.

- Your movement is also of paramount importance when it comes to handling honeybees. Honeybees don't like sudden or harsh movements.

  So whatever you may feel about raising the cover of the Langstroth hive, keep it to yourself and *don't* let your emotions translate to unsteady movement. Slow and calm is the best way to go when dealing with bees. Do this and you will be able to avoid 99% of all the stings associated with beekeeping.

- Never crush your bees, even if they are crawling about your body. Wear a beekeeper's suit when visiting your bee yard (that includes the veil, which protects your face).

  Since you're wearing a long-sleeved suit, there's no reason why the bees shouldn't be allowed to explore your arms and hands. If you swat or crush them, you are likely to set off an alarm that will alert all the battle-ready worker bees in the colony.

- Whenever you are moving or inspecting frames, always hold the wooden frames firmly with *both hands.* Make sure that

you have a firm grip *before* lifting the frame from the hive. If you drop the frame (and of course, the bees in the frame), you will have a very angry swarm of bees to deal with.

- During the most active months of the year, it is very common for honeybees to collect lots of propolis (the strong, glue-like substance collected from plants) and use this substance to glue together parts of your hive.

  This is a common practice and is simply the honeybees' way to strengthen the entire hive structure. However, since you have to inspect the frames regularly, this will not do. *But* no matter what, do not attempt to snap apart two frames stuck with propolis.

  Such a movement will probably cause noise and far too much vibration, which can easily agitate your bees. Use an appropriate tool (a blunt knife or an old butter knife) to manually remove the propolis from the frames.

- Here's another "best practice" for you: never leave containers full of sugar or syrup open. Honeybees love anything that's sweet, so the presence of such foodstuffs can actually ignite a feeding frenzy.

  You do not want this to happen when you are doing your routine inspections, because you want the bee's level of activity to *decrease* rather than increase. Open syrup containers can also attract foraging bees from *other hives* which can cause robbing behavior.

- Generally, seasoned beekeepers wear light-colored clothing because dark-colored clothing seems to agitate honeybees more often.

Parts of a Langstroth Hive

Your first investment as a budding beekeeper is the modern Langstroth hive. Nowadays you can certainly buy or order blueprints for this hive or you can buy a ready-made model. It doesn't matter how you acquire the Langstroth hive, as long as it is well-built and was made from strong wooden material. The parts of a Langstroth hive include:

- *Hive stand*
- *Bottom board*
- *Slatted rack*
- *Lower deep or brood chamber*
- *Upper deep or food chamber*
- *Queen excluder*
- *Shallow honey super*
- *Inner cover*
- *Outer cover*

Since your hive/s will be exposed to the elements for a long time, it would be best if you can apply a few coats of paint to the outer surface of the hive.

You can use polyurethane (use the outdoor grade variant), oil-based paints, etc. You can paint the outside of the hive all you want *but* do not paint the following:

- Feeder (the one located at the top of the hive)
- Cover (the whole cover should not be painted or stained)
- Hive bodies
- Frames

If you paint the wooden parts of the Langstroth hive that will house the bees, the bees may swarm since they don't like the smell of paint. And you wouldn't want any of those chemicals to mix with the honey, would you?

Now, when you want to move your hive, you have to make sure that each of the sections of the entire hive is strapped down securely.

While it is true that bees use lots of propolis to secure each of the sections, you cannot rely entirely on the natural glue. If you have to transport the hive on your pick up truck, use ratchet straps or hive staples to secure everything *before* driving because the hive might come apart during the actual drive.

Understanding the Langstroth Hive

There are three main types of hives used around the world: the straw or basket hive (skep), the top bar hive (used in countries like United Kingdom) and the Langstroth hive (popular in the United States).

We are going to focus on the Langstroth hive because it is the easiest to acquire in the US and you wouldn't have to construct a top bar hive on your own.

So how do the parts of the Langstroth hive come together? The base is where the entire hive structure sits. Many hive makers use cypress for the base, which is a very suitable wood because it resists weathering and rotting better than other types of wood.

The hive stand is a very important part of the entire hive structure because it separates the entire hive body from the moist ground and also helps in ventilating the various parts of the hive.

The hive stand also helps foraging bees by elevating the entrance points and exit points. Non-elevated hives often have entrance and exit points blocked by growing grass; this slows down the activity of foraging bees.

Now, your hive will come with an entrance reducer - this wooden cleat is used in the cooler months of the year to help preserve the warmth inside the hive. Note that for the warmer months of the year, the entrance reducer should only be used for colonies that have been newly installed in the hive.

The main part of the Langstroth hive is called the deep hive body. This is where all the action takes place, because this large section is where all ten waxed frames are installed.

Again, manufacturers make use of cypress, but some makers use pine as well. The deep hive body has two separate regions: the lower deep and the upper deep.

The lower deep is used for curing and storing honey. The upper deep, which is also called the brood chamber, is used by the queen to lay eggs. Nurse bees also abound in the upper deep, since they are tasked with caring for bee larvae.

The queen excluder on the other hand, is a screen that prevents the queen bee from entering the honey supers.

It was designed in such a way that the queen bee will not be able to pass through (but the foraging workers will be able to, thanks to the size difference of worker bees and the queen bee).

The queen excluder should only be used during active honey production. Otherwise, it should not be used. This component of the Langstroth hive was designed to preserve the purity of the honey and to prevent the honey from being mixed with brood and pollen.

When it's time to install your bees, you have the choice of using wooden frames with *wax foundation* or wooden frames with *plastic foundation.* Does the foundation of the wooden frame have bearing on the speed at which honeybees can create actual cells in the frames? Yes.

Honeybees really do prefer working with wooden frames with a *wax foundation.* They work so much faster if they have a wax foundation, as opposed to a plastic foundation. Some beekeepers will argue that in the long-term, frames with plastic are a better investment because the material will not rot.

That may be true, but the fact still remains that honeybees are usually very slow to accept plastic foundations. To avoid this conundrum, it would be much simpler if you just purchased foundation made from beeswax from your local beekeeping supply. It doesn't take much effort to assemble everything and your bees would be that much happier with your preference.

Know Your Beekeeping Tools

Every trade or hobby has its own set of special tools to make the work easier. The following are beekeeping's most useful tools; acquire each tool as you see fit (no need to buy all of them all at once):

1. **Smoker** - the smoker is *must-have* for every beekeeper (yes, you have to buy one immediately. Don't buy a hive and a colony without one!). Essentially, a smoker is a closed kettle with a tall body and an air inlet to let oxygen in.

   You place burning wood chips inside and you use the bellows to create smoke. The smoke leaves the chamber of the smoker through the spout. The smoker is used to calm down the honeybees before inspection or harvesting.

   Two to three puffs of smoke is often enough for a regular colony. Never lift the outer cover of the Langstroth hive without using your smoker first. Do not *over-smoke* your bees, because that might reduce their overall activity level for 2-3 days.

When smoking the bees, give the smoker two large puffs with the bellows and allow the available wind to carry the smoke within the body of the hive.

A smoker is usually 7 inches in height, though some larger varieties are also available (the larger ones can be as tall as 10 inches). The spout or nose of the smoker is characteristically bent to allow the beekeeper to smoke the hive easily without lifting the outer cover fully.

Smokers are available in copper and stainless steel varieties. Many beekeepers prefer the stainless steel variety as it resists weathering and rust better than smokers made from other metals or alloys.

An alternative to the smoker is a plastic spray bottle filled with diluted liquid smoke. Liquid smoke is sold in sachets and is mixed with water. The solution is then sprayed on the bees. It has been said that this approach has also been effective in reducing the excitability of honeybees prior to inspection.

2. **Hive tool -** the hive tool is another essential tool in the beekeeper's arsenal. The hive tool has two parts: the wedge/blade and the handle. The wedge allows the beekeeper to remove stuck woodwork and noiselessly remove propolis from various sections of the Langstroth hive.

   Hive tools are often fitted with brightly-colored, plastic-coated handles so it would be easier for the beekeeper to spot the tool amidst all the other tools. The bright colors also help the beekeeper locate the hive tool after it has been placed on the grass.

   Some hive tools have chiseled ends that allows the beekeeper to carefully pry apart stuck frames. Hive tools are relatively cheap -- the price difference is dependent on the

metal used for the wedge/blade and the manufacturer. You can buy a decent hive tool for less than $20 per piece.

Again, manufacturers produce hive tools using different metals. But if you want something that will last for a long time, we highly recommend that you purchase a hive tool with a stainless steel wedge. This way, you can easily polish your hive tool after using it and it will last longer.

Every beekeeper needs weather-resistant tools because more often than not, you will drop these tools on the moist grass when you're working on your bees.

3. **Uncapping fork -** the uncapping fork is used during honey extraction to remove the wax caps from the honey supers. Honeybees cap the cells full of stored honey and these caps must be removed prior to extract.

   The uncapping fork resembles a flat, wide fork with numerous metal points. The fork is simply inserted into the topmost layer of the hexagonal cells and carefully lifted to remove the caps.

   This tool can also be used if the beekeeper wants the honeybees to transfer the cured honey to the frames in the upper section of the hive body. There are three popular types of uncapping forks: the flat fork, the bent fork and the Swedish uncapping fork.

   The flat fork is the simplest variant and is used primarily during honey extraction. The bent fork is used to open brood cells to check for varroa mite infestation. The bent tines of this tool allows the beekeeper to open individual cells without disturbing the others.

   The third type, the Swedish uncapping fork, is equipped with an additional blade (or scraper) which allows the beekeeper to remove burr combs from the wooden frames.

Burr combs are simply random bits of honeycomb that worker bees create on the edges of the frames. These are removed so the frames will not be stuck together.

4. **Hive stand -** though Langstroth hives have stands of their own, you may want to invest in an elevated stand that will further raise the entire hive structure at least 30 centimeters of the ground.

   Hive stands also protect the bottom section of the Langstroth hive from rotting and also helps discourage animals like skunks and other smaller mammals from disturbing your hive(s).

5. **Brush -** any soft-bristled brush can be used to gently brush away bees during routine inspections of the hive. Since you can't pick up handfuls of bees just to get to the frames, a soft-bristled brush is the most convenient choice.

Wearing Bee-Tight Clothing

Bee-tight clothing can be purchased from brick-and-mortar beekeeping stores and of course, online. Many beekeepers prefer the blouse-type "bee suit" that comes with a medium-sized, netted veil. You can wear a pair of jeans and a pair of boots to complete your suit.

Now, some people might ask: what about the hands? What should we wear to protect our hands? Well, there are actually two main views on this matter:

View #1 states that you should wear latex gloves so your hands will be more dexterous and careful during the handling of the frames and the bees.

View #2 states that thick gloves should be used to fully protect your hands from stings.

It's up to you whether you want to wear thick gloves or latex gloves when handling your bees. Just make sure that whatever you decide to wear will *not* affect your hand's ability to carefully maneuver in between the frames and bees. And don't forget your soft-bristled brush when inspecting your hive, okay?

Getting Your Bees for the First Time

The most practical way to obtain your honeybees is by ordering them from local breeders/beekeepers. In the United States, there are beekeeping organizations or clubs that you can contact if you are interested in buying your very first colony.

Getting in touch with beekeeping organizations is also a good way to reach out and learn from more experienced beekeepers in your area. It's not unusual for beekeepers to create instant rapport with each other since they all share a common passion for honeybees.

Many breeders can be found in the southern part of the country, but don't be mistaken - there are breeders in the north as well. Purchased colonies are usually delivered through the United States Postal System (USPS). This method of delivery is cost-effective and has been used for many decades now.

Bee packages are small; usually no bigger than a common shoe box. A separate box is used to house the queen bee, which is installed separately in the new hive. A regular package of bees can contain as many as eleven thousand individual bees.

5 Tips for Finding A Good Bee Breeder

1. **Stick with seasoned breeders -** since this is your first time buying a colony of bees, you really are better off with a seasoned breeder who has been breeding bees for many years, as opposed to sourcing your colony from a breeder on his first year.

2. **The health of the bees matter** - in the game of beekeeping, the health of the bees is everything. If you get bees with diseases and parasites, don't expect a trouble-free year.

This is the reason why there are apiary inspectors in every state - and you *must* insist in seeing the latest apiary inspection of the bees before buying a colony (that is, if you can pay the breeder a visit). If not, a strong reference from a local bee club would suffice.

3. **Is the apiary inspected regularly?** - apiaries that are well maintained have nothing to hide from its customers. So there is no reason why an apiary owner would refuse a regular inspection from the state's apiary board.

Ask the breeder if inspection is done in the apiary at least once a year. If the breeder is unable to answer or answers in the negative, don't buy bees from him.

Look for another breeder who knows the value of regular inspections. Such a move will discourage other breeders from engaging in similar practices.

4. **Replacement policy -** every reputable bee breeder knows that there is a mortality rate whenever bees are shipped via USPS. This being the case, a good breeder would be more than willing to replace bees that have died during shipping. Ask the breeder about his replacement policy before placing an order.

5. **Watch out for fancy claims -** it's normal for breeders to add hype to their sales pitch when talking to customers. But

there is a fine line between emphasizing the good points about honeybees and telling them completely false information.

If you hear a breeder bragging that his honeybees are sterling hybrids that can resist varroa mites and just about any other disease known to bees, simply walk away. That breeder is already using fallacious information to get sales.

Collecting Honey

Collecting the honey after considerable work in the bee yard is one of life's greatest pleasures. But before you go about collecting the honey, here are some pointers to remember:

- Honey is one of the stickiest substances around, so make sure that you have some water ready so you can wash your hands during honey extraction, to keep everything clean and free from sticky honey.

- When you bring in the supers for extraction, some loose bees will try to fly into light bulbs and other sources of light. Opening a small exit will often do the trick. But aside from this special case, keep all doors and windows locked. Otherwise, the sweet smell of honey might drive your bees (and other bees from the surrounding area) to a feeding frenzy.

- Be careful when handling frames with loose bee. Always wear hand protection (like latex gloves).

- Make sure that you have an adequate number of jars and other plastic containers for the honey harvest.

- Don't throw away the caps of the honeycombs. Instead, place these on top of a jar that has been covered tightly with cheesecloth. Allow the honey to naturally drip into the jar. If not, you may lose as much as ten percent of the total honey harvest.

How is Honey Harvested?

There is a basic four-step process involved during harvesting:

1. The hive is first treated with *Bee Away!* or a similar product to temporarily drive away the bees. Frames full of capped honey are removed from the site and transported to an extraction room.

2. Wax cappings are removed.

3. If an automatic extractor is present, then one or two frames are placed inside the extractor at a time. The movement of the extractor forces the honey to leave the wax cells.

4. Honey settles at the bottom of the extractor and is collected.

Part 3: Hive Management & Troubleshooting

Inspecting the Hive

The big day is finally here: it's time to inspect your hive! But don't just open the outer cover of your Langstroth hive and peek - there's a proper way inspecting a honeybee colony.

First off, *wear the appropriate bee-tight suit* before visiting your bees. Your safety is always the number one priority, so make sure that every part of your body has adequate protection before you venture to your bee yard. Wear a veil to protect your hair, face and neck and a pair of boots to protect your legs.

If you're ready, *let's start inspecting*! Follow these guidelines during inspection:

1. Proper smoking of the bees - Before opening the outer cover of the hive, use your smoker to give the hive a few puffs of smoke. Use dried wood as kindling for the smoker. Choose wood that burns easily and produces smoke with at least a tolerable smell.

If you were ever a Boy Scout, you would know how to build fire from scratch: you start with a little kindling, then you start building a larger pile with more material as the fire grows. T he same principle applies when you are lighting up your smoker.

To make things easier, always keep some waterproof matches or a lighter in your toolbox so you can easily relight your smoker during inspections.

The fire in your smoker *will go out* at one point, so make sure you're ready to relight it. Having a "live" smoker is important throughout your stay in your bee yard.

Avoid over-smoking the bees. Also, try to observe how your bees react to your puffs of smoke. Some bees are actually

more agitated if you give them too much smoke (a common error of many beginners and even seasoned beekeepers).

2. Check for congestion - Pull out one frame at a time during the inspection. Check to see if there are queen cells or supersedure cells present. If there are, the hive might be too crowded for your bees. Swarming is imminent if the hive is overcrowded.

You can ease congestion by performing hive reversal or by adding additional supers to the hive. Note that installing additional supers does not prevent swarming 100% of the time, but it's worth a try.

3. Position yourself properly during inspections - Your Langstroth hive has two sides, a front and a back. The front section of the Langstroth hive is where the entrance and exit points are. *Don't* position yourself in the front.

If you do, you will notice returning bees behind you, hovering as if they were waiting for you to move so they can get back to the hive. Your best choice is standing on the *side* of the hive so you won't disturb foraging bees leaving and returning to the hive.

4. A little smoke does a lot - When you open the hive for the first time, press the bellows on your smoker to introduce a little smoke. Bees don't need lots of smoke to calm down (though some race and species of bees do). Be very observant of your honeybees. Each colony has its own personality, so you would do well by remembering your colony's own preferences.

5. Watch out for the first wave of honeybees - Even after smoking the hive once or twice, there will still be some bees meeting you after you remove the inner cover of the hive.

Some may even fly about you to observe what you are doing. Ignore the welcoming committee. Simply use the smoker to

subdue any over-excited honeybees rising from the main body of the hive. Since you are protected by your bee-tight suit, you won't have to worry about stings at this point.

Important Note: It is common for worker bees to use propolis and burr comb to attach the inner cover to the rest of the hive structure. Do *not* snap away the inner cover as this will most likely disturb your bees.

Instead, use your hive tool to remove the visible propolis. You can also cut through the burr combs. Use the notched edge of the hive tool to lift the inner cover.

You can also use a notched flat screw driver as an improvised tool to lift the inner cover and separate other parts of the woodwork (especially if the woodwork is stuck with propolis).

6. Don't leave the hive open too long - After selecting a frame for inspection, be sure to put back the inner cover of the hive. This will make the bees feel more secure (and it also shields you from other curious honeybees who wish to find out who is causing the disturbance in the first place).

What to Look For During Inspections

Since this is your very first hive, here are some things to look for:

1. Check to see if your bees are already drawing out and creating uniform, hexagonal cells in the frames. If you used frames with a wax foundation, your honeybees should be hard at work, creating cells for brood and food. New cells are characteristically white or light yellow in color. As the wax hardens and ages, it may adopt a darker tone of yellow.

2. Count the number of frames that have been drawn out with honeycomb or are already being drawn out. There are ten or sometimes nine frames in total for a Langstroth hive.

Many beekeepers prefer adding new supers when seven or eight frames have already been occupied and drawn out by the hardworking honeybees.

Adding supers is necessary to keep your honeybees healthy and happy. The outermost frames are almost always used by the honeybees to store extra stores of food.

Your honeybees need extra stores of food, in addition to the fresh stores they have at the very center of the lower deep. During harvesting, you should not take *all* of the frames with honey. Otherwise, the colony will not have enough honey for itself.

3. In addition to storing nectar and pollen, another sign that your colony is doing well is egg-laying. Instinctively, your queen bee will be laying eggs in the upper deep of the hive body. Carefully extract one of the frames in the upper deep and hold a magnifying glass close to the comb.

-Newly laid eggs resemble small fragments of rice grains or crystallized sugar. These can be harder to spot in newly drawn out comb, since new comb tends to be white or very light yellow in color.

-Young larvae resemble, small, pearly grubs. Healthy larvae are curled up contentedly in their cells, awaiting more food from the nurse bees.

-Cells with brownish caps are larvae that are preparing to pupate or are already in the pupal stage.
If you are having trouble spotting the queen bee (even if you have already spotted newly laid eggs), don't worry. The presence of well-clustered eggs is a sign that you have a live, breathing queen bee busily laying eggs everyday.

An exception to this would be the presence of egg-laying workers (refer to an earlier section of the book regarding the difference between the egg-laying pattern of a worker bee and a genuine queen bee).

4. The next thing that you should check is the presence of capped honey. Capped honey is usually white in color. Alongside capped honey, you will probably see cells with yellow or brown stuff in them. These cells are filled with fresh nectar, curing honey and pollen.

Capped honey is often found in the topmost layer of a frame (in an arch-like pattern). Brood are often placed at the very center of a frame in a cluster-like pattern.

Moving Your Langstroth Hive... The Right Way

Moving a hive is important because some beginning beekeepers may decide to buy a "complete package": a Langstroth hive that already has an established colony of honeybees. Whatever the case may be, you should know that honeybees are very particular about the *location* of their hive.

If you move an established hive 10 yards away, foraging bees will confusedly hover over the *exact spot* where their hive was formerly located. If you place a wooden box in place of their hive, returning bees will attempt to enter that wooden box, thinking that it is their own hive.

In the wild, this honing skill is a *very useful* because honeybees are able to remember an *exact point* in a very wide area. They *need* to imprint the exact location of their hive because they fly for *miles* everyday looking for fresh nectar and pollen.
So what do you have to do if you want to move a hive?

If you are moving a hive to another location that is *less than two miles* from the original location of the hive, there is a big

chance that foraging bees will return to the *original* location of their hive.

If the move is more than two miles, the foraging bees will perform orientation flights to imprint the new location of their hive. If the move is less than 2 miles, it would be best if you transport the hive to a location that is farther away so that you will not lose your foraging bees after the move.

Leave the colony at the distant location for at least seven days before proceeding to transport them once again to their real, intended location.

Here are some general recommendations when moving a hive from one location to another:

1. Night is by far the *best time* to move a hive because all the worker bees are inside during night time.

2. If it's not too hot, you can use regular tape to close all exits and entrances to the hive. Do not do this if the weather is hot - the hive structure will overheat and the bees will have to work double time to cool down the hive.

3. During warm days, substitute a fine wire screen for the adhesive tape. Simply cut the fine wire screen to small V-shaped pieces so you can insert the small screens into the small gaps between the woodwork.

This way, you are blocking entrance and exit to the hive structure but you are still allowing air exchange between the hive and the immediate environment.

4. Before placing the hive in its new location, make sure that you place an additional hive stand (or really, anything that can elevate the hive) for the incoming Langstroth hive.

Elevated stands are very effective in preserving the bottom section of hives because it prevents the wood from absorbing the moisture from the ground.

5. *Always* secure the entire hive structure with straps or even staples before moving it.

Crating is also an option that you can try when moving your hive to a distant location. Any technique that can secure your hive but does not limit air flow into the hive can be explored.

Note: The bottom boards of Langstroth hives *are not fixed.* These should be stapled separately.

6. After securing the hive itself, do not forget to secure the hive *to the vehicle.* Nothing beats a good old truck or a pick-up with an open carrier when transporting a hive.

Ratchet straps and strong cords are a good choice. Check the tension of the straps/cords before driving off. Also, it is important to secure the base of the hive to make sure that the hive will not fall sideways when the ride becomes bumpy.

7. A long drive is enough to cause honeybee mortality in some cases, so it would be best if you can drive at a consistent speed. Defensive driving is best. Make sure that the trip is smooth, too. Sudden braking is not recommended.

8. Upon placing the hive in its new location, remove staples, straps, tape and any screen wire that may have been used to secure the hive prior to the transfer.

It is common for a transported hive to have a low level of activity. The honeybees literally need a bit of fresh air flow before they can fly out again. You can perform a routine check on them the next day (don't forget your suit and your smoker!)

9. During the inspection, *the first thing that you should ascertain* is whether or not the queen bee is alive. If not, you can simply order a new queen from a reputable breeder. Don't worry -- young queens are a good thing for healthy, strong colonies.

Special Report: Swarming & Absconding

Swarming behavior usually takes place in between April to June (so watch out for possible signs of swarming during these months).

In the past, swarming was considered a good thing because beekeepers were able to naturally increase the number of colonies by capturing swarms. However, in more recent times, swarming is considered a nuisance because it instantly reduces honey production.

Reasons for Swarming

Why would a colony decide to swarm? Here are just *some* of the identified causes of swarming:

1. Overpopulation or congestion in the hive.

2. There is an imbalance between old worker bees and young worker bees.

3. The hive is often overheated and the bees are unable to adequately ventilate the hive. This is usually caused by placing Langstroth hives in places where there is absolutely no shade around.

4. The hive structure is no longer serving at full capacity due to the over-abundance of defective cells. Signs of defective cells include: far too many cells filled with male drones, irregularly shaped cells, thick cells and damaged cells.

When the queen bee is no longer capable of laying the usual number of eggs she normally lays, the hive may be considered unsuitable and the colony may decide to swarm.

5. The queen bee is unable to lay eggs because many of the new cells have already been filled with cured nectar (honey) or pollen.

6. Weather is inclement and inhospitable. The weather does not permit bees to exit the hive, as evidenced by workers "hanging out" near the entrance and exits of the hive.

7. The queen is no longer capable of laying eggs. The queen may be sick or dying. Instead of creating a new queen by creating queen cells, the colony may decide to simply leave the old hive and establish a new colony elsewhere.

8. The queen bee is no longer producing the necessary amount of pheromones to keep the colony together.

9. Genetics and the bee's race also play a part in swarming behavior (and even absconding behavior).

10. The presence of idle nursing bees (workers) may also signal an internal problem, which may result in swarming.

In some instances, a colony may decide to *abscond* instead of swarm. Absconding is very different from swarming because 100% of the colony's population is involved in absconding. Some reasons why bees would abscond their hive include:

1. The bees are starving due to lack of foraging material.

2. The hive is infested by Varroa mites.

3. An adult wax moth has infiltrated the Langstroth hive and is causing irreparable damage to the hive.

4. The Langstroth hive is newly painted and is emitting undesirable fumes.

5. The hive is poorly ventilated.

6. The beekeeper or perhaps animals from surrounding area may be excessively disturbing the colony. Bears and skunks are notorious for disturbing hives.

Swarm Preparation

Regular inspection is needed to spot possible swarming preparation or swarming behavior. It is recommended that you inspect your hives at least once (or more) per week. The following are some clues that a colony may be preparing to leave your hive:

1. There is a visible increase in the population of female worker bees in the colony.

2. Drones are suddenly being reared in large numbers.

3. Hive expansion is no longer taking place even if cells are full to capacity with pollen, larvae and honey.

4. Queen cells or queen cups are seen near the bottom sides of a frame.

5. The queen bee has already laid eggs in the queen cups.

6. Normal egg production of the queen bee begins to slow down; the number of brood being reared by nursing bees has decreased.

7. The queen bee appears restless and is not doing what she usually does (grooming, receiving food from workers, laying eggs in clustered patterns, etc.).

8. There are open queen cells that contain multiple larvae. The larvae may or may not differ in age.

9. Field bees or foraging bees are no longer as active as they used to be. It is possible to see some of these field bees hovering near the hive.

10. Swarm cells or queen cups are being sealed by workers.

11. Finally, when everything has been done, the preparation ends and the swarm is finally cast.

A swarm is considered imminent if you see any of the following signs:

1. The queen cells are no longer empty and have been sealed completely by the workers.

2. Some wax has been removed from the tips of the queen cells. When the wax is removed, a live cocoon can be seen protruding from within the queen cell. T his exposed part is called the "bald tip".

3. The bees are no longer collecting food compared to your other hives of similar age and size.

4. When there is a clustering of bees near the entrance of the Langstroth hive. The clustering will take place whether or not the hive is too hot for the bees.

Clipped Queen Bees

Some beekeepers think that clipping the wings of the queen bee can actually *prevent* a whole colony of honeybees from swarming.

This is simply not true. When you clip off the wings of a queen bee, two things can happen: first, the queen be may not be able to leave the hive at all *or* it will attempt to leave the hive and fall to the ground.

When the queen bee is flightless, the colony will still swarm away. After a time, it will cluster on a tree or vertical surface near the queen bee, or it may cluster on the ground where the queen bee is. Give the swarm a little more time and it will return to the old hive. A colony cannot survive without a queen bee.

The colony will raise a new, virgin queen bee and will proceed to swarm when the new queen bee is ready. Clipping does not prevent swarming.

What it does is simply *delay* the swarming. Some adherents of this method say that you can *prevent* a swarm if you put back the flightless queen bee and *remove* several frames from the hive, thereby reducing congestion.

The surplus frames can then be placed in a new hive (it doesn't have to be a Langstroth hive; you can use a top-bar hive if it's the only thing available). It is likely that the excess frames that you removed from the old hive have queen cells attached to them.

So what do you do with these queen cells? Do you remove them during the transfer of the frames? No. Allow the split colony to raise new queen bees from the queen cells.

Once the new queens emerge, they will have to fight each other. Once a new queen bee emerges, she will take her

nuptial/mating flight and begin laying eggs once mating has been successful.

Preventive Measures

Of course, every beekeeper wants to keep his hives intact. Swarming is no longer considered an efficient, natural way to reproduce colonies. Here are some steps that you can take to prevent bees from swarming:

- Congestion is often the main reason why bees decide to swarm. You can easily ease the congestion in a colony by adding more room (frames) to the hive.

  By adding brooding and storage frames, the queen bee will be able to resume her egg-laying duties and the workers will resume collecting nectar and pollen.

- Temporarily separate the queen from the rest of the colony until all the issues in the hive has been resolved. This can be done by placing the queen in a special super/frame at the topmost section of the hive that will not allow the queen to fly out.

- Reverse the hive to ease congestion brought about by winter clustering.

Hive Reversal

The most common cause of congestion in hives is winter clustering. During wintertime, the queen bee usually moves *upward* to the upper frames of a Langstroth hive.

The workers bees follow their queen and cluster together in the upper sections of the hive. This produces instant congestion. This type of clustering is fine during the winter months, but for early spring, it is not (and this is when bees usually prepare to swarm).

Hive reversal is one of the most effective ways to reduce congestion brought about by winter clustering. Here's how you can do it:

1. You need another bottom board if you want to reverse your hive. Elevate the hive and place the new bottom board, effectively making the old bottom board the second board.

2. Install another hive body *on top* of the old hive body.

Ideally, this will force the queen bee to move up once again since she is effectively "on the bottom" of the hive. If this doesn't work, remove one brooding frame and replace it with an empty frame.

Other Strategies for Preventing Swarming Behavior

Colony splitting involves the division of the colony population into half. The old queen is taken to a new hive along with half of the colony and half of the population in the old hive is allowed to raise their new queen.

The old queen plus half of the population should be installed in a distant hive. This technique works most of the time, but honey production will still be reduced in the process.

Additional supering can also be installed to the hive so that the bees have additional space to store pollen and honey.

Here are some additional tips (minor interventions, but just as important as the approaches mentioned earlier) for swarm prevention:

- **Replace your queen bee every two years -** Colonies with young queens are less prone to swarm. Colonies with queen bees that are 3 years old or older are twice or thrice as likely

to exhibit swarming behavior than colonies with young queen bees.

- **Avoid supersedure completely -** Supersedure happens when a queen bee is no longer laying as many eggs as before *or* when the queen bee is not producing enough pheromone.

  In such cases, the colony often produces supersedure cells or additional queen cells.

  When the new virgin queen bee emerges, a fight will ensue. When the old queen bee is killed or driven out by the new queen bee, the risk for swarming doubles.

Winter Management

Ideally, a winter-hardy colony should be composed of at least 30,000 workers and a queen bee no older than 2 years. It is fairly common for some colonies to be cut down to just ten thousand or fifteen thousand during the winter.

Preserve the surviving colonies and breed them. This ensures that as you grow the number of hives in your bee yard, you also grow the resilient, healthier strains of honeybees. Mortality during winter is simply nature's way of weeding out weaker colonies.

Honeybees have three main enemies during wintertime: other insects (including other bees), inclement weather and temperatures, and of course, *starvation.* They should be protected from all three if they are to survive the challenging time that is winter.

Here are some guidelines for the winter management of colonies:

1. If you think the food stores of the colony is running low, you can use emergency foodstuff like light syrup to make sure your colony doesn't die.

However, hive-top feeders filled with sugary syrup also attracts unwanted attention from common enemies such as robbing bees from other hives and wasps. Watch out for the presence of these critters.

Entrance points and exit points should also be reduced to regulate the inflow and outflow of insects in the hive. If you see evidence of robbing behavior, there is little that you can do (though robbing behavior is more common during spring and summer).

One technique to stave off robbing behavior is by covering the hive completely with a wide fabric to block intruding insects. Robbing behavior starts and ends on its own; you will just have to trust that your colony's defenders (its worker bees with mature stingers) are doing their best to defend the hive.

2. Another potential problem during winter is *mice* and wax moths. Since the colony is in a winter cluster, they are not that active (especially if the temperature has dropped considerably the past few days) and the hive becomes that much more open for pillaging.

If you have mice trouble at home, you can bet that your backyard hive will be the next target. Remove the entrance reducer and install a *mouse guard.* Mouse guards were specifically made to withstand attacks by mice and also provides excellent protection against invading moths.

3. Hives are also at risk from *people* - like other beekeepers. This problem is most common in bee yards that are not fenced off properly and are not visited regularly (at least, not regularly *enough*).

Whole frames can be stolen. If you think this is a very big possibility, it might be a good idea to transport your hive to a safer location. Follow the guidelines in the earlier section of this book regarding the proper transportation of hives.

Spring Management

Avoid opening your hives during early spring, unless the temperature has risen above 14 degrees C. Otherwise, your bees and the brood may become chilled and may die from the sudden flux in temperature inside the hive structure. If the temperature is less than 14 degrees C., it is not a suitable day to open the hive for inspection.

A clear sign that it is fine to open the hive for inspection is when you see foraging bees collecting winter stores from plants like the flowering currant.

You can also observe what kind of activity is taking place at the entrance and exit points of the Langstroth hive. If you see numerous bees taking off (presumably for cleansing flights), then that is another sign that you can open the hive.

Regular foraging means the colony is slowly returning to its former level of activity and the queen bee has probably resumed laying eggs in the upper deep of the hive body.

Now, if you have more than one hive in your bee yard, it is necessary to check to see *if all of the hives* have made it through winter. There are some cases when the winter had been too much for a colony, and severe or complete mortality of the colony transpires.

If one colony has fared well, it does not mean that all of the colonies enjoyed the same luck. If you think one hive succumbed to the winter cold, a quick inspection of the suspect hive is in order.

If a whole colony has died, you *must* remove the dead bees from the hive immediately. If this is not possible, seal all possible entrances with tape to prevent other bees and insects from robbing the poor hive.

If the weather is good for inspecting the hive, here is a quick checklist for early spring inspection:

- Check the bees for signs of dysentery. Bees with erratic flight patterns may have dysentery. Consult with your vet to confirm this.

- Look for the queen bee. Is she still in the hive? Is she laying eggs? If so, your queen bee has survived winter and is resuming her regular egg-laying duties. If you see supersedure cells or queen cells on the corners of your hive's frames, the queen bee has died during winter.

  The queen-less colony must be united with what is called a "queen-right" colony. If there is evidence of egg-laying workers, the egg-laying workers must be separated from the colony as these bees are capable of killing queen bees.

- Is there congestion in the hive? If congestion is apparent, perform hive reversal to prevent swarming.

- Are there enough stores of food to help the colony grow to a robust size during the early spring nectar flow? If not, proceed with supplemental feeding with sugar syrup.

Making Supplemental Sugar Syrup

Supplemental sugar syrup is usually given during the late autumn and during the early spring to help honeybees prepare for the change in seasons. Early spring means renewal of nectar and pollen sources, but it also usually translates to reduced colony size and little or no extra food left for the whole colony.

Thin sugar syrup is used during autumn, while thick sugar syrup is used during the early spring. The recipe for the two are as follows:

1. Thick sugar syrup - add two pounds of white sugar to one pint of pure water.

2. Thin sugar syrup - add one pound of white sugar to one pint of pure water.

In more recent times, a third type of sugar syrup, the *medium sugar syrup,* has been proclaimed as adequate for both autumn and early spring supplemental feeding. To make medium sugar syrup, simply mix a kilo of white sugar to a liter of pure water.

The sugar syrup can be placed in the hive top feeder *or* it can be placed *inside* the hive body. To do this, pour the syrup in a large Ziplock bag and use a blade to make a tiny cut at the very center of the plastic. Replace the feeder or bag at least once a week.

Common Diseases

In the world of beekeeping, nothing is more serious than finding your hive racked with disease. The following are common diseases that affect the brood or the *young* of the honeybee:

1. **Sacbrood -** sacbrood is one of the most common diseases affecting the honeybee brood. This problem is present in almost 30% of all cases of brood disease. Sacbrood usually occurs when there is far more larvae than adult bees. Signs include yellow to brown larvae.

This disease is capable of killing off large numbers of brood through transmission. The virus that causes this disease becomes less virulent after some weeks. It is considered a

transitory condition that does not require the disposal of the hive.

2. **Chalkbrood -** Chalkbrood is caused by fungi and causes larvae to become hard and mummy-like. Spore formation is common. Frames can be disposed off or sterilized using agents like acetic acid. This problem usually occurs in hives that have insufficient ventilation.

3. **American foul brood -** This disease is caused by bacteria and results in perforated larval cappings and diseased larvae. The "toothpick test" is often used to detect the presence of American foul brood.

A toothpick is used to punch through what appears to be a diseased, capped cell. If a slimy substance with a rope-like quality is produced, presence of AFB is confirmed. Once confirmed, there is no other choice but to burn the hive and the frames. *Do not reuse any of the components of the hive!*

4. **European foul brood** – Also caused by a bacteria, this disease kills off larvae by interfering with digestion and absorption of nutrients.

Brown scaling is common with larvae infected with the EFB. The toothpick test is not used to detect European foul brood. Unlike AFB, this disease can be treated with antibiotics.

5. **Stone brood –** This is another disease that causes what appears to be the mummification of larvae. It is caused by the pathogen *A. flavus.*

Watch Out for Bee Pests

Like other animals, bees are sometimes afflicted with pests. The following are common pests associated with apiaries:

1. **Varroa -** Varroas are a type of mites that attach to honeybees during foraging flights. Originating from Asian apiaries, this pest has made it way to virtually *every country* in the world.

Agricultural experts have identified the varroa mite as a bee pest since the early eighties and beekeepers are still working hard today to prevent these pests from gaining an upper hand.

Varroa mites feed off "hemolymph" or what is considered the blood of bees. Too many varroa mites can weaken a honeybee colony to the point that it becomes more vulnerable to viral, bacterial and fungal diseases.

2. **Tracheal mites** - This pest attacks the honeybee's respiratory system. The condition is known as the *ascarine disease.* Signs that may point to the existence of tracheal mites include weak and erratic honeybees and bees with wings that are positioned at unusual angles.

If the problem becomes widespread, it is common for bees to abscond or completely abandon their hive, in the attempt to escape the pathogen. Menthol balls can be used to ward off this parasite.

3. **Wax moths -** Wax moth infestations can cause the complete destruction of the hive. Weak colonies are susceptible to such attacks, as well as unprotected hives during the wintertime.

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