All About Honey Bees

A Free Educational E-Book
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This E-Book is designed to help you learn about Honey Bees and why they are essential to our lives.

Honey Bees are absolutely essential for the production of agricultural crops as they pollinate 1/3rd of what we eat – 50 different agricultural crops valued at more then $20 billion. Much of the feed consumed by livestock is pollinated by Honey bees. In addition, they produce honey and beeswax valued at more then $150 million. The average per capita consumption of honey is more then 1.2 pounds.

You do not have to like Honey Bees but neither do you need to feel frightened by them. Honey bees only sting when they feel you represent a threat them or if you accidentally step on one in your bare feet.

If you see one flying around you and you feel afraid, grit your teeth and calmly walk away from her. The Honey Bee will not feel threatened by you and she will happily fly on to continue her mission of gathering nectar and pollen as food supplies for her hive.

Honey Bees are essential to our well being as one third of what we eat is pollinated by Honey Bees, such as almonds, apples, avocados, blueberries, cantaloupes, cherries, cranberries, cucumbers, sunflowers, watermelon and many other crops. All rely on honey bees for pollination. Gardeners know they are not going to do well if there aren't any Honey Bees flying about.

The largest managed pollination event in the world is in Californian almond orchards, where nearly half (about one million hives) of the US Honey Bees are trucked to the almond orchards each spring. New York's apple crop requires about 30,000 hives; Maine's blueberry crop uses about 50,000 hives each year.

A number of factors are causing a serious decline in the Honey Bee population in the US. Pesticide misuse, unprofitability of beekeeping for honey, the rapid transfer of pests and diseases to new areas of the globe, urban/suburban development, changing crop patterns, clearcut logging, clearing of hedgerows and other wild areas, loss of nectar corridors for migratory pollinators, and the human paranoia of stinging insects especially the 'African Killer Bee' hype in the press.

Who Lives Inside The Beehive ?

As you can see from the above drawing there are three occupants that live inside a beehive, each with a specific job to do.

The Drone

"The Drone" is the male bee and is considerably larger then the Queen or Worker Bees. Some people think he sounds like a World War II Bomber Aircraft when he flies by as his flying buzzing sound is quite loud. The Drone lives only to seek out and mate with a virgin Queen on her maiden flight. The act of mating actually leads to his death as his sexual organ is ripped out of his body by the Queen and stored within her abdomen for later use.

Those Drones not fortunate enough to fulfill their life's mission will die in the fall when the Worker Bees force all the drones out of the hive to starve and die at the onset of colder fall/winter weather. The Drones perform no function within the hive hence they are not required for the survival of the hive throughout the winter. It is rather pitiful to stand by the entrance to a beehive and watch the Worker bees drag the Drones out.

The Queen will create new Drones as spring arrives. An inspection inside a hive will reveal that Drone cells are easy to spot as they have a much larger and more prominent cap over the cells within which they develop.

Most women can easily identify with the Worker Bee (a sterile female) and the Queen as these two Honey Bees do all the work inside the beehive. The Drones just stop by to feed and/or to rest up for awhile and then they are off once again looking for a Virgin Queen. As they say, "What else is new" :-)

The Queen

As you can see from the drawing on the previous page the Queen Bee has a much longer abdomen then either the Drone or the Worker Bee.

After mating during her maiden flight she returns to her hive to spend the rest of her life (with one exception having to do with swarming which will be covered later) inside the hive. All of her bodily needs are met by Worker Bee attendants.

	The Queen Bee is in the center of the photo and she is surrounded by her Attendants. These are the Worker Bees that are facing in towards her. They feed her and take care of all her other needs. She inspects each cell before she will lay an egg in it to make sure it is clean and suitable.

For the rest of her life she will now spend most of the year, except for the cold winter months, laying eggs. When the hive is building up its work force in early spring to go out and gather nectar and pollen, she will lay 1000 plus eggs a day.

A Queen Bee will normally live for three to four years, Some beekeepers replace their Queens every year in the hope of maintaining maximum honey production.

The Queen bee is essential for the hive to continue its existence. Should her egg production begin to fail the Worker bees will begin preparations to raise a new Queen to replace her. The original Queen is aware of this and as the new Queen gets close to emerging from her cell she will attempt to approach the rival's cell to sting her to death, but is prevented from doing so by the Worker Bees. It is at this time that the Old Queen can be heard making a protesting “piping sound”.

While the Queen bee has a stinger, it lacks the barbs on it like the Worker Bees have on their stingers. As a result the Queen can sting multiple times without its stinger getting caught and ultimately ripped out of her body.

	Here we see a new Queen Bee just beginning to emerge from her cell. An egg destined to be a Queen is fed more liberally then a larvae that will become a Worker Bee. It takes 16 days to transform from the original egg to the adult stage you see in this photo.

The Worker Bee

The Queen Bee, the Drone and the Worker Bee all start out as an egg deposited in a cell by the Queen Bee. Like the Queen the Worker Bee is a female but is not fed the enriched food that makes a Queen Bee. It also takes her less time to make the transition from the egg to the pupae to her emergence from the cell as an adult bee. She is also sterile.

The Worker Bee is the Bee that you see flying around, alighting on flowers to gather nectar and pollen, or sitting at the edge of a puddle of water to sip up and bring back to her hive. She is a sterile female. The Worker Bee in only able to produce an egg to create a Drone Bee. She cannot reproduce another Worker or Queen Bee.

She is also the Bee that will sting you if she feels that you are threatening her or represent a danger to the survival of her hive. If you see and/or hear her flying around you she is just checking you out and if you simply slowly move away she will most likely fly away to go about her business.

When she does sting, her stinger has barbs much like those on a fishhook. This results in her stinger staying stuck in your skin. If she tries to pull away or you brush her off with your hand, her stinger will stay in your skin and gets ripped out of her body thus causing her death.

If you do get stung, use your finger nail or a credit card to remove the stinger and its poison sack by scraping over the stinger and its sack in only one direction. As the stinger works its way deeper into your skin the poison sack keeps pulsating to push more venom into your body. The sooner you remove it the less its effect, swelling, etc.

When the Worker Bee first emerges from her cell as an adult she starts her life of work as a “house bee” inside the hive. Her duties may include caring for the Queen as an attendant, feeding the new developing larvae, capping their cells, cleaning out cells for the Queen to lay her eggs in, collecting nectar from incoming field bees and storing it in cells and a myriad of other in house chores.

She may then make the transition to a Guard Bee. If you watch the entrance to a hive you will see some bees just standing guard at the entrance to keep out other bees who do not belong to the hive. These other bees could be scouting about to find a weak hive to rob of its honey or it could be a yellow jacket intent on robbing or killing the Honey Bees inside the hive. The Guard Bees check all the incoming bees for their particular unique hive odor. If the strange bee does not leave they will attack and attempt sting it to death.

I have watched a very large Hornet attempting to enter a hive attracted to the strong smell of honey coming from inside. It was attacked many times by a number of Guard Bees. Each time the Hornet shook them off and renewed its attempt to enter the hive. Finally after being continually attacked by the Guard Bees it gave up and flew away.

During the first day or two as an emerging Worker Field Bee she will fly around just outside the hive mapping its precise location so she will know which way to fly when she returns from her nectar and pollen gathering field flights. A Field Bee will make foraging flights outward from her hive for up to a two mile radius of operation.

When it returns to the hive from a field trip the Worker Field Bee will go inside the hive and pass her nectar via its proboscis (a long tube like appendage she can extend and use to suck up nectar from inside flowering plants, shrubs and trees) to the proboscis of an inside Worker Bee, who will carry it to a cell.

When that cell is filled up with the nectar the inside bee will cap it to be used for food storage for the oncoming winter months when it is too cold to fly outside.

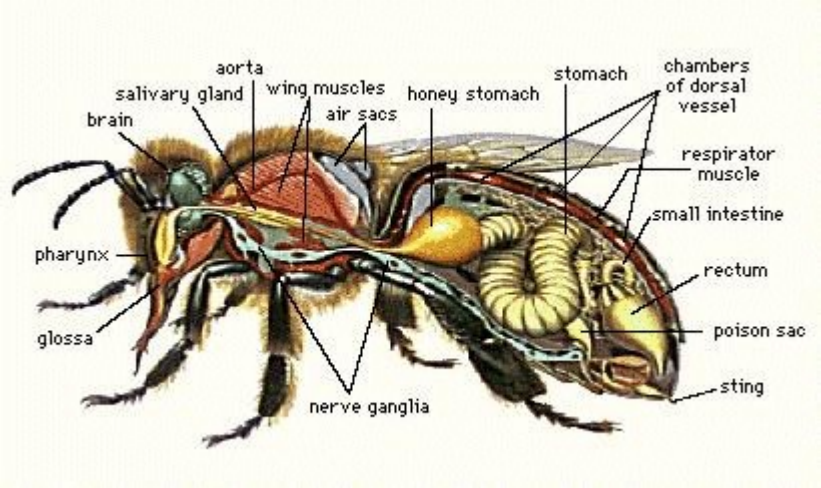
As the Worker bee flies around gathering nectar from inside a blossom, grains of pollen become lodged on its body hairs. A large clump usually accumulates on its rear legs as you can see in this photo. Since Honey Bees only work the same kind of flower on a trip, grains of pollen get carried to other flowers and some falls off and pollinates that plant.

Field Bees only live about three or four weeks during the nectar gathering season as they literally work themselves to death. Their wings soon fray and wear away and they are no longer able to fly.

Most of the Worker Bees born during the fall will live inside the hive throughout the cold winter. They will only emerge during those nice sunny days we often get in the winter. They will then fly a short distance from the hive to rid themselves of accumulated body waste. If you live near a hive you may well notice small yellowish streaks on your car or truck, which will wash off in the snow or rain. Some times a few will fly too far, get chilled and be unable to fly to return to the hive. Honey Bees only fly out from the hive to work when it is about 57 degrees or higher.

In the winter the bees in a hive clump together in a large ball like configuration, constantly shivering to create heat with the temperature around the Queen in the center of the cluster being maintained at about 94.1 to 98.0 °F (34.5 - 36.7 °C).

Anatomy of a Honey Bee



Note that the 'Honey stomach' is separate from the bee's food stomach. If you recall I earlier told you how a Field Bee returns to the hive and transfers the nectar it has collected to an inside Worker bee who then places the nectar into a cell.

The Field Bee actually regurgitates the contents of the 'honey stomach' and it is transferred over via its proboscis (the long appendage above just to the right of the 'glossa' label) to the proboscis of the Worker Bee. If you could get your ear close enough you would actually hear a slurping sucking sound.

Take note of where the stinger is located. Looking further up into the body you will see the poison sack to which the stinger is attached. If you will recall I told you earlier that the stinger remains stuck to your skin when you get stung because of the sharp fish hook like barbs that hold the it in place. As the Worker Bee pulls away, or is frantically brushed off, the stinger with its poison sack remains stuck in your skin and the sack pulsates as it continues to move more venom down the stinger into your body.

You do not want to try to rub the stinger off as that will only help push more venom into you. Using a fingernail or a credit card scrape across the stinger in one direction only until it is pulled out of your skin.

You will not see any blood vessels in the above anatomical drawing as the bee's blood is circulated throughout the body cavity in the spaces between its organs.

Swarms

This is a photo of an unusually large swarm in a tree, weighing about 26 pounds. The Queen is in the center of the swarm. Scouts are coming and going with reports about good spots for new home.

Nobody knows how it all works but the swarm somehow reaches a decision to fly off to one of these locations and start their new hive.

Before they left their original hive they engorged with honey to bring along as a food supply to enable them get their new home off to a good start.

Honey Bees will normally swarm and leave their hive to establish a new home elsewhere for two reasons. If their hive becomes overpopulated and runs out of adequate space to store more honey or they feel the need to establish another hive as a way of propagating their own species.

In both cases they will not leave until they they have created a new Queen bee to leave behind as the old Queen is the one that leaves with about half of the colony as a swarm.

Before they leave the Workers, who will be swarming, engorge themselves with honey as a food supply. Once engorged they are too full to engage in stinging anything. In fact, you could stick your whole hand into the middle of the swarm pictured above and not get stung.

Beekeepers do their best to keep ahead of the Workers bringing in nectar during the honey flow season by making sure they always have an empty super (the boxes that you see stacked up to make a beekeepers beehive) on top of the hive in an attempt to keep them from swarming. A hive that has about half of its Workers leaving in a swarm is not a hive that is going to produce any surplus honey for the beekeeper to remove at the end of the flowering season.

In addition a hive weakened late in the season by half its work force having left is not in the best of shape to be able to make it through the oncoming winter.

You need not be fearful of a swarm of bees as they are not aggressive and will not stay very long where you see them. As you have read above they will soon leave for their new home. Sometimes they may remain overnight but that is not a common occurrence.

Natural Honey Bee Comb

This is what honey bee comb looks like in its natural state hanging from a pine tree. Honey Bees cannot survive the cold winter in this exposed state. They need to be inside a hollow tree, a bee beekeepers hive, a cavity in a cliff or even inside the walls of your home, to protect themselves from the cold wet and windy winter weather found in most parts of the US.

Exposed combs like this are found in year round warmer climates such as in parts of Africa and Asia.

Worker Bees manufacture the wax to make comb between the scales on the bottom of their abdomen. The hexagonical shape of each individual cell gives the walls of the cell incredible strength.

Beeswax is made from this comb when it is emptied of honey and melted. It is not only used in the manufacture of candles but it is also a major product used extensively in the cosmetics industry. Leather workers will rub the edges of a hand tooled belt to give it that nice sheen look and to help it slip easily through belt loops. It also was frequently used to rub on the bottom slides of bureau drawers to make them slip in and out easier. In medieval times it was widely used as a seal on documents.

I was recently given an attractive slim jar full of honey. The stopper was sealed to the jar with bees wax giving it a rich and elegant appearance.

This is a photo of what honey comb looks like inside the wall of a house. In this instance the bees came in a hole from the outside and made their bee hive between the two studs underneath a window. This shows the plaster board broken away after the bees had been disposed of.

If you have bees in a wall or ceiling it is best not to try and remove them and their hive by yourself. In addition, do not simply kill the bees and leave the hive inside the wall as it will begin to melt and seep through in the hot weather as there will be no bees inside it circulating the air with their wings. Call an exterminator/carpenter

Honey

The Worker Bee spends all spring, summer and early fall gathering nectar to bring back to the hive and have it transform into honey to store for food during the flowerless winter months. The beekeeper steals the surplus making certain there are adequate stores left to keep the hive alive during the oncoming winter.

If the miracle of the Honey Bee's pollination of the fruit and nuts we eat were not enough, it is the other gift she gives us that has amazed humankind throughout the world. The gift is honey. Honey is embraced by nearly every culture and religion. In the course of her lifetime the Worker Bee will produce 1/12th of a teaspoon honey.

Honey Bees do not really 'make honey'. The honey we eat is created by being slightly changed by the action of enzymes while it is in the honey stomach and it is honey at the time it is transferred into the cells in the bee hive.

Because it literally sucks the moisture out of them, bacteria cannot live in honey. Years ago, it was put on open wounds to promote healing, a practice increasingly beginning to be recognized for its value by the world of medicine today.

When a jar of honey sits around for awhile it may slowly solidify or crystallize starting at the bottom of the container. The honey is still good and fit to eat. All you need to do is to heat the jar slowly and lightly in hot water. The honey will return to its liquid state and be fine to use.

Honey has woven itself into our rituals. “Honey” as in honeymoon has become synonymous with new beginnings and the promise of renewal. In many traditions, brides would make beauty treatments using honey. The versatile qualities of honey can be put to use for facials, lip balms and even shampoos.

Some types of honey, flavors and suggested uses

LIGHT HONEY	FLAVOR CHARACTERISTICS	SUGGESTED USES
Alfalfa	Mild flavor; beeswax aroma	Perfect in desserts such as tarts and cookies
Basswood	Green ripening fruit taste; lingering flavor	Whip into butter for a sweet topping for bagels
Clover	Sweet flowery flavor	Sweeten fresh brewed tea and other beverages
Fire Weed	Delicate and sweet with subtle tea-like notes	Drizzle on cheese and crackers elegant floral aftertaste
Sage	Sweet, clover-like flavor	Heat slightly, pour onto pancakes or French Toast
Sour Wood	Sweet, spicy anise aroma	Stir into fresh fruit salad

Pollination

This Worker Bee has been quite busy and has accumulated large clumps of pollen on its rear legs. While they are out foraging the Workers limit themselves to visit the same type of flower on each daily flight. And that is why the pollination process works. While foraging for nectar, bees inadvertently transfer pollen from the male to the female components of flowers. At the same time she is also picking up more pollen as her legs brush the anthers of the flower. The anthers are on the stamens and are covered with that plants grains of pollen.

Not all pollen is the same yellow color you see here. Different plants can produce other colors. If you know your plants, then you can figure out which plants a bee is visiting that day.

Pollen is brought into the hive and mixed with nectar to serve as food for the baby bees.

Some people believe pollen is beneficial to the human body and will eat a spoon a day or sprinkle it on their cereal. It is marketed in health food stores and on the internet.

Honey Bees are very much a part of the modern American agricultural picture. It is estimated that there are 2.9 million colonies in the US today, owned by beekeepers with five or more colonies. Over two million of these colonies are on the road each year to pollinate crops and to produce honey and beeswax. This represents a major change in US agriculture since the first colonies of honey bees were rented for pollination of apples in New Jersey in 1909, and since the first migratory beekeeping for the purpose of honey production began in this country in the latter part of the 1800s.

Each year, bees pollinate 95 crops worth an estimated $15 billion in the US alone.

Today we estimate the annual value of increased agricultural production attributable to honey bee pollination at $14.6 billion versus $9.3 billion in 1987. The value comes in the form of both increased yields and superior quality of the crop.

Propolis

Notice the black lump of resin on this Worker Bee's back leg.

Propolis is a wax-like resinous substance collected by honeybees from tree buds or other botanical sources and used as cement to seal cracks or open spaces in the hive. Its color varies from green to brown to reddish, the color being dependent on its botanical source. Honeybees will use propolis to cement the removable frames inside a beehive to the box (called a super).

Traditionally, beekeepers assumed that bees sealed the cracks and joints of the beehive with propolis to protect the colony from the elements (like rain) and prevent drafts during the wintertime. More recent research suggests that bees not only survive, but thrive with increased ventilation during the winter in most temperate regions of the world. Propolis is now thought to:

1. Reinforce the structural stability of the hive
2. Reduce vibration
3. Make the hive more defensible by sealing alternate entrances
4. And bees may also use it to prevent diseases and parasites in the hive.

Honey Bees normally carry waste (dead larva, etc.) out of and away from the hive. However if, for example, a mouse chews its way into the hive for a winter nest and dies, the bees won't be able to move it out through the hive entrance. They have instead been known to seal the carcass in propolis, effectively mummifying the mouse.

Propolis is marketed by health food stores for its claimed beneficial effect on human health.

Old beekeepers recommend a piece of propolis kept in the mouth as a remedy for a sore throat.

Propolis is used by music instrument makers to better show the wood grain.

Propolis can also be used to treat canker sores.

Perhaps you may be interested in beekeeping ?

Any man, woman, or young person can keep Honey bees, in the country or even in the heart of a big city !

It can be a lifetime hobby that is healthy for your soul and a very relaxing change from most people's average work day. It's a great hobby to continue on into retirement. Many hobbyist beekeepers give their honey as gifts and also sell some for extra money and to help have their beekeeping pay for itself. It will keep you learning the rest of your life. The bees are fascinating to observe in and out of the hive.

You may ask, " Where do I start ?". You have already started by beginning to learn about Honey Bees in this electronic book. I began beekeeping by just reading one book and then getting the equipment and what was needed and learning from there. However, it is best to do a combination of reading, watching a video, going to a Bee School and talking with other beekeepers.

Visit my web site at http://www.bees-online.com to learn much more on the subject. From there you can e-mail me with any questions you may have on the subject. I also offer a comprehensive selection of beekeeping books as well as a set of six beekeeping videos on DVDs.

You will also learn how to find out if there any beekeeping associations near to where you live. Many of these organizations run their own Beekeeping School every year in the winter/early spring.

However every beekeeper has their own way of doing things. They say if you ask fifty beekeepers a question you will get fifty different answers :-) In time you too will develop your own techniques. BUT, always remember, the Honey bees always know what they are doing is the right way :-) !

Did you know that Henry Fonda, the late movie star of Ulee's Gold fame (a movie about a beekeeper) was a hobbyist beekeeper ?

The Good Life

Waldo McBurney, 104, takes a break from tending his bee hives in Quinter, Kan. McBurney, a beekeeper, was honored recently as America's oldest worker for 2006. AP photo

Only recently I read about this gentlemen who is 104.

After graduating from college in 1927, he worked a quarter century at various jobs: as a vocational-agricultural teacher, county extension agent and at the local co-op. He started a business cleaning seeds for planting in the 1950s and ran it until he was 91.

He took a decades-long hobby of beekeeping and went into the honey business, which he still has.

In Conclusion

I sincerely hope that you have found this e-book entertaining and informative. I have done my best to keep this relatively short and amply illustrated. I know I have enjoyed putting it together using material from a variety of sources, my web site, Wikipedia, the National Honey Board and a medley of other resources.

Please feel free to make copies of this and forward them along to your relatives and or friends or anyone you think may have an interest in Honey Bees and possibly beekeeping.

I also hope that this can be used as a learning tool in schools as well.

Please do visit my web site at:

http://www.bees-online.com

and/or its companion site at:

http://www.healthybenefitsofhoney.com

When possible, please buy honey from a beekeeper in your local area. Not only will this help support a local enterprise but also the proliferation of Honey Bees. Many people feel that the tiny bits of pollen in their local honey (that you cannot really see) help immunize them from the effects of hay fever and allergies that are stirred up local pollen in the air.

A photo of the underside of a Honey Bee

Thanks again for taking the time to read this e-book !

The End