

HONEYBEES: A Resource Guide for Teachers

Meets North Carolina Standard Course of Study

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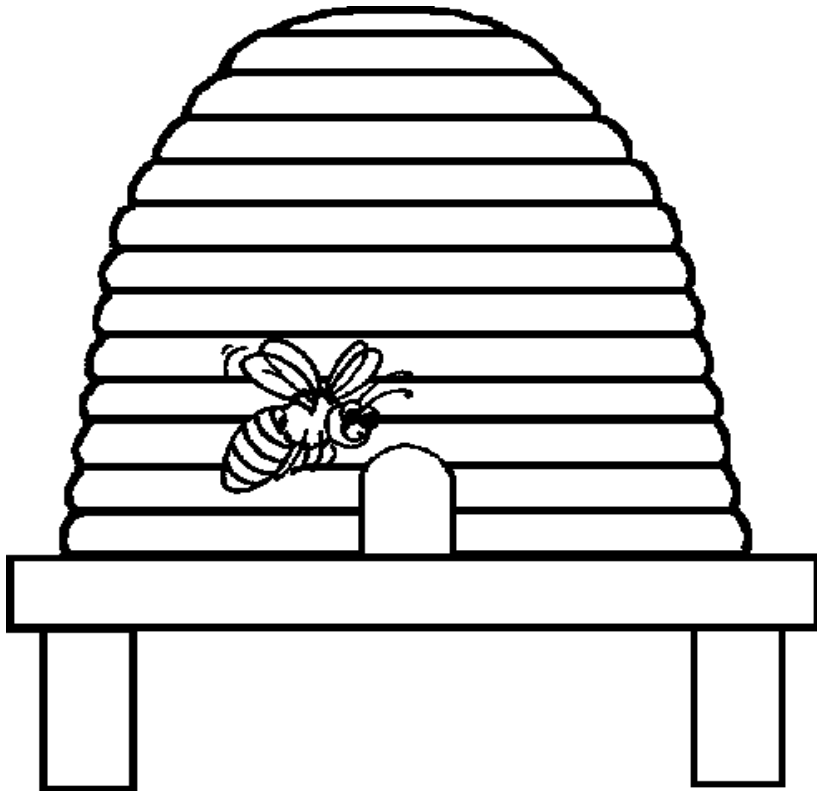
Without Bees, We'd See Less Fruit

Bees are some of the most fascinating animals in the world. They work very hard to pollinate apples and all of our other fruits. Every time you eat an apple, a strawberry, or drink a glass of orange juice, just think — before you got these fruits, honeybees were probably there!

The Order of the Hive

Honeybees are very orderly individuals. Each of the three types of bees: the queen, the drones, and the workers, have an appointed task in the hive. A colony of honeybees lives inside a hive. There may be up to 60,000 bees per hive!

Although we sometimes think of bees as simply living in a “hive”, the hive is really like a big city with many “sections of the town”. A colony of bees is made up of a large family of bees living in one beehive. (Insert pictures of hives and colonies; use these illustrations to show the difference between what a hive looks like in real life and the “myth” of the honeybee hive in children’s literature, like *Berenstein Bears*, *Winnie the Pooh*)



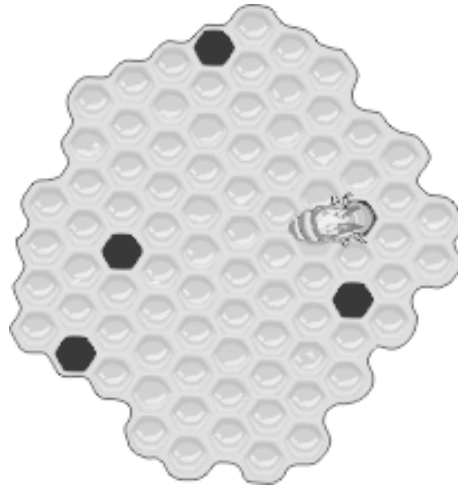


The Life of the Queen

Can you imagine what life would be like for a queen in a palace? In much the same way, honeybees live in the palace of the hive. Hive life revolves around the queen bee; her subjects are the drones and worker bees.

Like a beauty show contestant, the queen bee has to win her crown. As soon as she hatches from her cell, she battles other potential queens in the colony. This is one of the few times the queen will use her stinger. Like any contestant winner, the queen bee fights to win her stately position.

Did you know that you can tell right away which bee cells are “queen cells”? A queen cell looks kind of like a peanut. Usually, queen cells can be found in the lower part of the comb. Another easy way to spot a queen cell is to look for the cells in a hive that are hanging vertically. The other cells in a hive fit inside the comb horizontally.



Did you know that the queen bee is fed only “Royal Jelly”? Royal jelly, a milky-white, colored substance, is jelly-like in nature; that’s how it got its name. “Nurse bees” secrete this nourishing food from their glands, and feed it to their queen. The diet of royal jelly makes the queen bee bigger than any of the other bees in the hive! She also lives much longer than the other bees: a queen may live up to 5 or 6 years whereas worker bees and drones never live more than 6 months.

This royal jelly is so full of nutrients, humans found a way to make it into a food supplement that human beings like you and me could take. If you go to a health food store, look for royal jelly in a bottle. Many people believe that this “human version” of royal jelly really does give them energy!

The queen is the most important member of the hive because she is the one that keeps the hive going. With the help of approximately 18 male bees (drones), the queen bee will mate one time in her life over several days. The sperm from the drone will then be planted inside a pouch in her body. She uses the stored sperm to fertilize the eggs. Keeping the queen and her eggs safe will determine the entire survival of the hive!





The Easter Bunny Isn't the only One Whose Job It Is To Work With Eggs!

Whether a honeybee will become a queen, a drone, or a worker, depends on whether the queen fertilizes an egg. Since she's the only bee in the colony who has fully developed ovaries, the queen is the only bee that can fertilize the egg. Queens and workers come from fertilized eggs and drones come from unfertilized eggs.

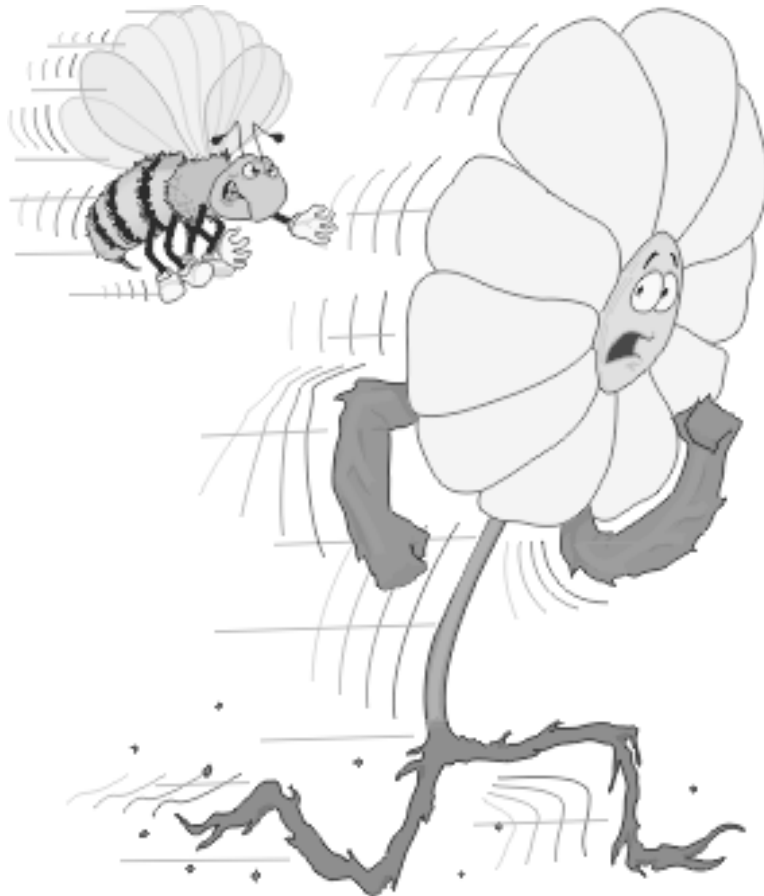




What's in a Name?

Where Does the Honeybee get her Name?

The honeybee's Latin name, *Apis mellifera L.*, stands for "Honey Maker". A bee that's just rolled in a flower full of pollen surely a sight to see! If you get a chance, look at a picture of this yourself and you will see why somebody a very long time ago, gave her this name. Buzzy's namesake goes back to a time before the oldest book in the world — the Bible — was even written. (Now that's exciting!)





Buzzy the Worker Bee

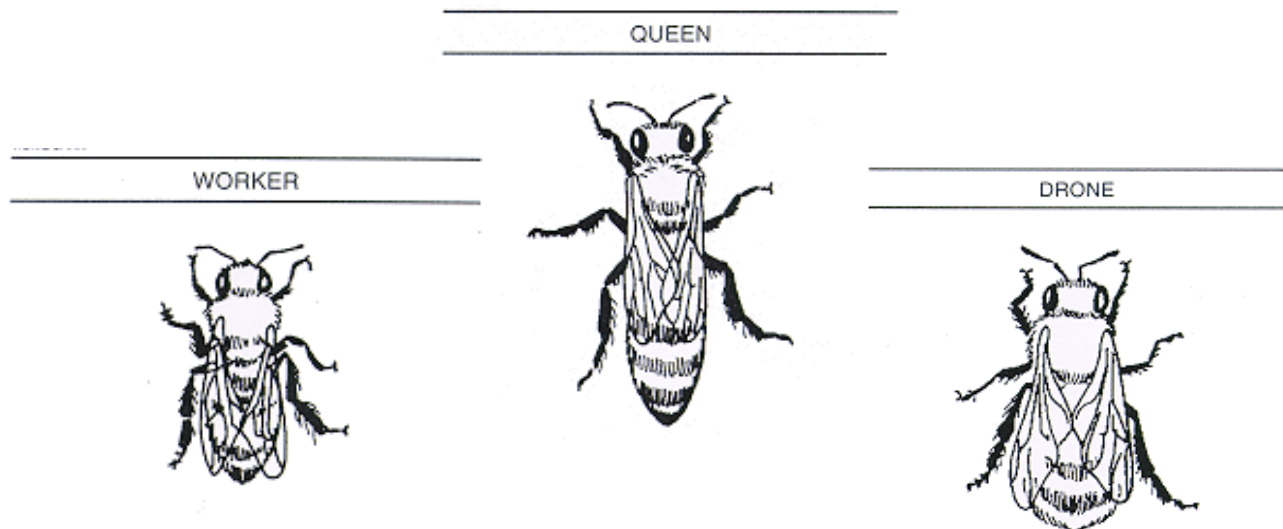
Buzzy is a worker bee, and like most of the bees she shares the colony with, she is working to perform all the work of the hive. “Worker bee” is a good description for what Buzzy does. She works all the time she is alive — without stopping! It is estimated that in only one day, Buzzy will make a dozen (or more!) Trips from the hive, and visit several *thousand* flowers! Can you imagine what it would be like to pick a thousand flowers everyday?!

Buzzy, though female, normally does not lay eggs. That is the queen’s job. But sometimes, a hive will get into trouble because a queen dies and there’s no one there to lay eggs. The female worker bees will take the lead in such a case, and lay unfertilized drone eggs. A new queen will emerge from the eggs that the old queen laid before she died.

Being a substitute queen though, is not something Buzzy normally does. This happens only if there is no queen in the hive, and no queen cells that will hatch a queen. *Remember, worker bees do not have reproductive organs and cannot fertilize eggs. If they could fertilize eggs, who would be queen?

There are usually several hundred drones that live with the queen and worker bees. However, like Buzzy, the worker bee, Mother Nature has given the drones just one task too: give the queen some sperm. After the mating process the drones die.

As the nights turn colder and Old Man Winter is knocking at the door, the drones still in the hive are ushered out of the hive by the worker bees. It is a sad thing, but the hive will not have enough food if the drones stay. In the world of bees — it’s women and children first.





Some Strange Things To Think About In The World Of Beedom:

Because Mother Nature set things up the way she did, there are some facts that are confusing, but nonetheless, facts:

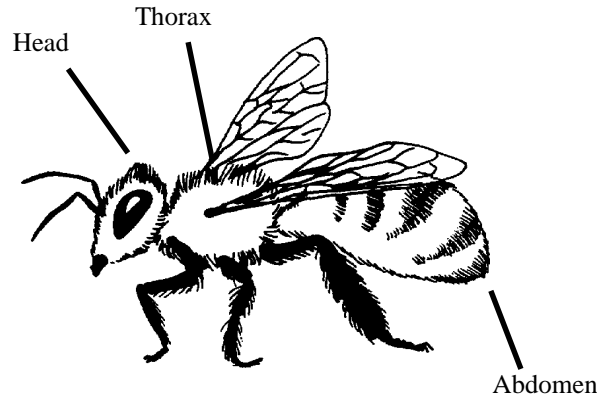
- The drone comes from an unfertilized egg.
- The drone is a male bee but doesn't have a father; he does have a grandfather though!
- The queen and worker bees are produced from fertilized eggs.
- The worker is an undeveloped female.
- There are some 500 to 60,000 worker bees in one colony.
- The queen is a female fully developed because the larva was fed an excessive amount of royal jelly by the worker bees.
- The queen can lay both fertilized and unfertilized eggs.
- The queen bee, mother to all the bees, can lay several thousand eggs in one day.
- In the winter, there is no work in the field, so the queen lays very few eggs; in the spring, flowers are in bloom and the queen starts laying. When a hive swarms, the old queen goes with the swarm and a new queen stays in the old hive.
- It takes only 16 days to rear a fertile egg to adult queen stage; this time is called metamorphosis.
- The worker bee take 21 days to get through metamorphosis and become an adult bee.
- The drone egg takes 24 days from the time it is laid to reach maturity.
- In the larval stages, the queen is fed royal jelly, and comes out into adulthood a fully developed female.
- The queen mates with the drones in the air, then goes back to the hive immediately to lay eggs.





What Buzzy Looks Like: a Quick ‘n Dirty Bee Anatomy

What do you think of when your teacher says the word “insect”? If you’ve ever seen a giant bug in a scary movie, there’s a good chance you would’ve seen what I think of when I hear the word “insect”. It sounds like kind of a dorky name, doesn’t it? But insects are real, as you will see — and their bodies are highly “specialized”, (which means their bodies allow them to carry out many different types of jobs). Buzzy is an insect, but she’s anything but dorky!



Main Body Parts of Honeybee: Head, Thorax, Abdomen

At adulthood, honeybees have a head that carries compound eyes & simple eyes; an antennae (or feelers); and feeding mouth parts — just like some other “common” insects you probably know: ant, cricket, and grasshopper.

Buzzy, the worker bee, has a slender neck that ties her main trunk — the thorax — and head together. The other main part of Buzzy’s body is the abdomen, which looks pretty much like an ant’s rear end. Buzzy’s entire body is covered by fine hairs which protect her and help Buzzy gather nectar and make honey.

Now it is really not fair to compare Buzzy’s head, thorax and abdomen, to the humps on an ant, but describing an insect’s main body parts is very much different than say, describing our own human body parts. The abdomen is certainly a good example of the difference between our body and an insect’s, because this is a thing we both have. But Man Alive! Did Mother Nature surely make our abdomen’s different!

If you have ever seen your mom or dad doing sit-ups, or watch an exercise show on TV where they are doing crunches, you will see grown-ups trying to strengthen their abdomens (abdominal muscles) into shape. Since we humans use our abdomens very little these days, it is very hard to keep this body part in shape. Now, Buzzy doesn’t have to worry about such nonsense because her abdomen is, again, specialized. (Or in this case, Buzzy doesn’t have what we usually call “a stomach”, that gets flabby)! Buzzy’s abdomen — among other things — contains wax glands, which we’ll talk about more in a minute. It is here that beeswax is made, and used by people for making wax candles, varnish, glue, and many other things!





Mouth: Like a Straw

Buzzy's mouth lets her bite, suck, or lap somewhat like what we humans can do. Only her mouth is very different from ours: all the work her mouth does to get food is done through a long and hairy tongue. Buzzy's mouth is more like a tube than anything. It has to manage its liquid diet — nectar, honey and water — by lapping back and forth inside the flower, and sucking the juice out, like a straw.

Wings: Highly Specialized Vehicles that let the Bee Fly Fast!

Buzzy has two pairs of thin-veined wings, and her front pair of wings is a lot bigger than her back pair. Buzzy's wings are very strong and can carry food, twice as heavy as itself! Not only can this small worker bee carry food, she also uses her wings to transport water back to the hive, and plant resin to help build up the nest!

Indeed, these wings are just as special as any fairy's wings! Remember Tinkerbell in Peter Pan? She would come to John, Wendy and Michael's window and stay there, her wings fluttering all the time while she looked for her friend, Peter Pan. Well, Buzzy bee has this same ability to fly in one place, up and down, besides just flying forward — just like Tinkerbell!

In another scene in Peter Pan, Tinkerbell has to use her wings and race to save Peter from the wicked Captain Hook. Buzzy's wings are built for speed, too; she can fly very fast, very quickly! You see, honeybees need to have speed when they swarm, early in spring. They also need to be able to protect the hive from predators (enemies). When Buzzy needs to fly fast, her fan wings spread out and hook onto the flying wings. This doubles the surface area of each wing, and lets Buzzy carry a full load of nectar — while flying at speeds of up to fourteen miles per hour!

Honey Stomach: Ability of Honeybee to Carry Food Back to Hive

Now I am trying to tell you about some pretty amazing bee parts, without going into all of them a whole lot. And one of the most amazing bee features that Buzzy has is two stomachs! This is a pretty cool honeybee feature, if you think about it...in fact, and I bet a whole lot of humans would like to have this feature, don't you? Like, remember being asked at Shoney's if you saved room for dessert? Well, Buzzy doesn't have to worry about "saving room" with two stomachs!

The "honey stomach" is used to carry nectar and water. Can you believe that this "honey stomach" lets Buzzy "hand over" what she's stored to one of her sisters? This stored honey is to be used later. If Buzzy has been in the field eating with her true stomach, that honey is used right then for fuel!





Wax Glands: Highly Specialized for Making Wax

Four pair of wax glands are hidden under Buzzy's abdomen. These glands make wax to use for the honeycomb in the hive. This beeswax that Buzzy can make is secreted only at pretty high temperatures and comes after she has "gorged" on a whole lot of honey, nectar, or sugar syrup! You can see this wax coming out under the last four segments of Buzzy's abdomen; it looks like small, oval, irregular flakes. These glands are most developed when Buzzy is 10-18 days old.

Pollen Baskets

Buzzy has more specialized parts on her body, just like her abdomen, stinger, and stomach. The "pollen baskets" on her hind legs are really hairy cavities where Buzzy stashes most of the pollen she is collecting. As she "works" the flowers and fruit blossoms, Buzzy will get pollen all over her fuzzy body. She packs the pollen into her pollen baskets on her back legs and carries it back to the hive.

Stinger: How it works & why Bee stings can be Deadly

A part that everybody knows on Buzzy's abdomen is the stinger! Many other insects in nature have a place where a stinger would go. But instead of a stinger, they will have something which can pierce another plant or insect (to deposit or lay eggs). When a bee stings an animal or a person, the stinger parts of the bee's internal organs are pulled out and the bee dies. The sting hurts because inside the bee a gland makes poison, and this poison really hurts when you are stung.

A few people are deathly allergic to a bee sting, and this is why it is important to find out from a doctor if you might be allergic to bee stings. But in all fairness to Buzzy, it is good to know she will not sting unless she feels that her home is being threatened, (or she is mashed).

Note on Yellowjacket Wasps: Have Stinger, will Travel

Another stinging insect often confused with the honeybee, is the yellowjacket wasp. Of 7 different kinds of this insect, 2 are obnoxious, and cause many stinging insect problems in late summer to early fall. They are foraging insects too, like the honeybee. But unlike the honeybee, they do not pollinate food crops. Since they look a lot like a honeybee in color, many grown-ups do not know they are not honeybees. The yellowjackets are very aggressive, and have given honeybees a bad name because they resemble them. They can be harmful to people because they can bite and sting many times. It is for this reason that we need to be able to identify the difference between the normally harmless honeybee, a beneficial friend — and the aggressive yellowjacket wasp. Honeybees die when they sting but yellow jackets don't.





A Day in the Life:

Busy Buzzy Wears Many Hats!

In a way, Buzzy gets to be queen of the hive for about three days. Right after she emerges from her cell, (an egg, not a prisoner, silly!) she gets the luxury of grooming herself and feasting on honey.

House Bee

After the feast, Buzzy's first job in the hive is to work as a "house bee". This means she will clean "house", keep the house the right temperature, and build honeycomb. When the hive starts to become too cold, Buzzy knows how to handle it: she will eat honey to make heat for the hive from her own body. When it's hot outside, she knows how to take care of the hive just as well. Buzzy fans her wings to keep the hive cool during those lazy, hazy, crazy days of summer. While being a house bee and doing all of these important tasks, Buzzy will continue to guard the hive against enemies like skunks.

Nurse Bee

After Buzzy has been a "house bee" for a while, she will take on the job of "nurse bee". "Beeing" a nurse bee requires a lot more effort than the effort human nurses have to do for their babies, or sick patients. Just to give you an idea, the nurse bees feed the larvae, or "bee grubs", practically every 2 minutes.

And again, although honey and pollen are the primary foods of the hive, the "royal jelly", has to be made by the nurse bees. We have a sense of this in our world, when a new mother has a new baby to take care of. She has to eat foods that are healthy for her, if she nurses her baby. The new mother's body produces milk for the infant. Nurse bees too, have to take care of the brood to the best of their ability. Instead of milk, their bodies manufacture royal jelly for the brood.

We can imagine our human nursing mothers are probably told to eat more fruits and vegetables by our human doctors, don't you think? Well if a nurse bee went to her doctor, she would be told instead to, "Eat more honey and pollen so you can make good royal jelly!" The nurse bees gorge on these foods too — just as they gorge when the house bees yell, "We need some more wax down here to make honeycomb, Buzzy!"

Field Bee

After Buzzy has taken care of the house and brood (about 21 days), chances are, she'll don her graduation cap, and fly out into the field. Out of the hive, she's going to keep busy gathering lots of nectar from an incredible amount and variety (kind) of plants. Buzzy will carry this nectar back to the hive where it's going to be made into honey by the house bees; also, this honey is going to be fed to the nurse bees to make royal jelly for rearing the brood.





Other things that a “field bee” does is bring water, pollen and propolis, (called “bee glue”, for short) to the hive. Bee glue is used to hold the honeycomb together, patch holes and cracks in the honeycomb, and to make the inside smooth.

The Bottom Line: All Worker Bee Jobs Revolve Around Making Honey

By looking at the working order of the hive, we see that all of the different jobs that Buzzy, the worker bee does, have one thing in common: making honey. Out in the field, Buzzy will gather several hundred pounds of nectar in a season! Bee scientists, or apiculturists, say that a good average amount of honey that a hive will make is around 50 pounds each season, but there are places in the United States where a hive will produce (or make) as much as 200 to 300 pounds each season!

50 to 300 pounds of honey per hive is truly amazing, if you stop and think about it. After all, this is just extra honey, leftover from feeding the young in the hive in during one season! Just think, this production could weigh as much as a football player after he’s eaten chili and nachos all those years his Mama was raising him up to play football!

Lifespan: Worker Bee

Any given day in the life of Buzzy, the worker bee, is extraordinary, because of all the tasks this busy little bee has to do. We would think that because of all this work, Buzzy would live a long, long time in order to get things done! But in reality, Buzzy’s lifespan can be as little as five to six weeks, which is less than the queen’s. The queen’s average lifespan is four to six months (but she can live as long as 4 to 5 years).

Buzzy can, of course, live longer than six weeks- maybe six to eight months provided she overwinters in the hive, like the queen. No matter how long Buzzy lives, at the end of her life she will have flown about 500 miles, and her wings will be pretty ragged, like old paper.

Summary: All the Jobs A Worker Bee Does

After all, Mother Nature intended Buzzy to accomplish a lot in her short lifetime: clean out brood cells, clean the hive, feed older and younger larvae, build honeycomb, feed the queen and the drones, maintain an even temperature in the brood nest, guard the entrance to the hive, while scouting and foraging for nectar and pollen sources, and gathering propolis and water too! And Buzzy, the busy worker bee is able to do all these things and do them very well!

By the time Buzzy dies, she will have made a great contribution to the future of her bee family in the hive (species). Life may have been busy, but at least there was always plenty of honey to go around! Winnie the Pooh seems to agree...although he may not exactly have wanted to work as hard as Buzzy. Have you ever seen him complain about too much honey?

Other Activities Bees Do: Dances & Swarming





Earlier we saw Buzzy’s need to fly fast and her specialized wings. But bees also use their wings in another very special way. Honeybees do dances to “talk” (communicate) to each other. There are several kinds of dances:

For example, the “round dance” begins with a few quick, short steps, then leads into running in narrow circles, and changing directions — vertically on the side of the comb! The honeybee that starts the dance is telling the others in the hive that she has found food, and the dance is a motion for them to follow her to the foodsource.

The “wag-tail” dance is done on the brood comb, and is another dance telling the honeybees where food is. This dance has something to do with the way the sun lines up, because it is always related to the direction of the sun from where the line is that the honeybee is dancing. In this dance, the little bee is very specific about where the foodsource is because she dances either downward or upward, giving the others an idea whether the foodsource is to the left or right of the sun.

Swarming: A Reproductive Act (as Explained to a Young Child)

Swarming takes place each season, when the bees come out of hibernation. It is something the bees do when they outgrow their hive. They swarm to increase the number of colonies in their hive and avoid overpopulation, kind of like when you are on a hiking trip and split up into two groups so you can hike better if there’s one too many people in your group. The swarm usually has a huge group though: 10,000 to 30,000 worker bees!

If you have ever seen a swarm of bees, you know that it is a sight to see! The bees are all hanging together, usually on a bush or tree limb. Bees like to do this in early warm spring weather, and you will see them do this usually in April or May, mid-morning to late-afternoon.

Swarming bees may look a little scary, all hung together like a big bunch of grapes, but unless they are disturbed — they are really very gentle. They do not have any brood (forming baby bees) to protect, or honey (food) to defend. *Note: If you ever see a swarm of bees, stay away and don’t disturb them. They will not sting you unless you interrupt them during the 24 to 36 hours it will take for the scout bees (another worker “job”), to make a decision about where the hive will make a new home.

After swarming, the bees settle into their new home. As soon as they arrive, the work begins. Wax comb must be built by the workers, and the queen gets busy laying eggs. This new bee “nursery” is where all activity is centered around the “babies” of the hive — or from Buzzy’s standpoint, the “new brood”.

An average hive has 25,000 older worker bees: that’s about how many people live in an average-sized city! Add to this, another 25,000 bees that are young workers in the hive that are “rearing brood” and housekeeping. Can you imagine a beehive having about the same amount of bees as there are people in Asheville, North Carolina?





Pollination: The Most Important Activity the Honeybee Does

Honeybees help produce the world's food sources. The process of pollination is a mystery to most people. Without this simple act, many of our food crops would disappear from the earth.

Pollination: What it is

Q: What is pollination?

A: The transfer of pollen from the anther (male part) to the stigma (female part) of the flower.

Pollination is like a “contract” between the Bee and the Flower. A contract in the world of humans means that each “party” (person or company) has an agreement to trade special jobs with the other. In the world of bees and plants, this contract is that the plant is going to give food to the bee, and in return, the plant is going to be able to set seeds and reproduce (have babies).

As the honeybee makes her way into the flower to get nectar to make honey, she accidentally rubs pollen all over her body and onto the plant's stigma. If you know what a dandelion is, you may remember that the dandelion is a very yellow flower but you may not have noticed that the flower would leave a streak if you didn't take it somewhere (like inside your house or on top of your mother's just-washed car). But if you get the chance, you'll find that the dandelion lets off a bunch of sticky, wet stuff. And this is what the little bee makes her honey from.

Fruits and Vegetables are Pollinated by Bees Everywhere

This pollination “partnership” between the Bee and the Flower(or plant), is how we get all of the fruits and vegetables that we have come to know at the supermarket. Apples, often called “The King of Fruit” are certainly well-known across the world, but there are many fruits and vegetables that we've never even seen that depend on this “pollination contract”.

What Kinds of Flowers do Honeybees Like?

Answer: Anything that is in bloom. When the bee comes out of hibernation, the first flowering plant it sees is the forsythia bush. This bright-yellow, springtime bush is a good source of pollen for the bees. The other early source for pollen is clover, and then come the fruit flowers: peach, followed by apricot and apple.

Pollination: How it Works

Most importantly, bees forage for pollen by staying with one kind of flower at a time, instead of mixing up all those thousand different varieties (kinds) we talked about earlier. This is kind of like if you picked two kinds of flowers that looked like daisies: say Black-Eyed Susan's (yellow with a black button-center) and Shasta Daisies (white with a yellow-button center). If you made the mistake of sticking the two kinds of flowers together — come next year — you would have one ugly flower! This would be because the pollen got mixed up.





But if you pollinated your flowers the way the honeybee did, you'd have your Black-Eyed Susans together in one vase, and your Shasta Daisies together in another separate vase.

Only in this way can fruits, vegetables, and flowers cross-pollinate with their own kind and not get mixed-up into becoming something unlike themselves!

Pollination: How Important is it to Us?

Bees are a big, big part of today's agriculture. In fact, they make up about 80 percent of the insect pollinators for our crops, worldwide. This is kind of like your favorite chocolate pie with two scoops of ice cream on top. The ice cream would be the part of crops other insects were able to pollinate. The chocolate part of the pie would stand for the plants the honeybee pollinated. Now I don't know about you, but if I had a chocolate pie in front of me with a couple scoops of ice cream, I wouldn't be happy for very long if I just got some ice cream with no chocolate, would you?

Can you imagine what it would be like if we didn't have honeybees? Well for starters, we wouldn't have any of about fifty different commercially-grown crops we have today. Just some of the plants the honeybee visits are (fruits): apples, tangerines, plums, watermelons, peaches, pears, cantaloupes; (vegetables): eggplants, onions, asparagus, turnips; (spices): caraway, coriander, cinnamon; (legumes): red clover, vetch, clover; (herbs) chives, dill, fennel; (decorative flowering plants): lavender, sunflower, monarda (bee balm); (nuts): almonds, coconuts; (oilseed crops): flax, cotton, soybeans, safflower.

Not included in this list are ornamental plants, range plants, medicinals (plants used for medicine), and the many types of forest trees which are visited by the busy honeybee. In fact, there are many things that would surprise us entirely that fall under the plant category which require (or benefit from) pollination: tea, cocoa, even some cut-flower seeds!

Fruits and berries, not mentioned up above, would fall by the wayside too; just like the dinosaurs they would become extinct!

The other little thing those lists up there didn't tell you, is that legumes (podlike fruit used for fodder and fertilizer) need to have the bees too — in order to make fertilizer for our farm soils! What would we do if our cows wouldn't come home to eat because our grasses weren't good enough? Chances are pretty good that *they* wouldn't be lining up at the local salad bar, and *we* wouldn't be eating steak with our salads!

So, we can even say that honeybees are not only good for the necessary pollination of fruits and vegetables; they are equally important in getting dairy products like milk and butter to our tables, (and don't forget the beef)!

Without honeybees, we would lose ten to forty billion dollars in un-pollinated crops each year. To give you an idea of how much money this really is — in only one year, the honeybee makes (for us), more dollars than there are people across our entire 50 states of America!





And though many people may not eat honey like Winnie the Pooh, they still probably use many products everyday that are the products of honeybees. Candles and cosmetics, for instance, rely on honeybees, because they are made from wax. About 4 million colonies in the United States each year, produce \$100 million dollars from the sale of honey and beeswax alone. So, we need not take for granted the importance of this busy little insect, called “man’s most useful insect”.

Where We’re At: Managed Hives

Because bees can no longer survive in nature without man’s help, it is critical that we have managed hives.

enemies of Honeybees: Mammals, Parasites, Diseases, Pesticides

Honeybee mammal enemies are skunk, toads, and birds, which love to eat bees. Since the drone bees do not have stingers, and the queen is busy laying eggs, it is up to Buzzy and her sister worker bees to protect the hive!

Other bee pests are called parasites, and these are varroa and tracheal mites. It doesn’t matter if you cannot remember the names of these important honeybee pests. Just think of these parasites as little bugs (or insects) that attack bees — sort of like how a tick jumps on a dog.

Between the two, they have wiped out almost all of our wild honeybee’s in only a very short amount of time. To give you an idea of how short an amount of time this has been, if you are eight years old, the mites began to attack bees about the time you were born! Today, apiculturists and entomologists — scientists who study bees — think about 90% of our wild bee populations (hives) are gone. These pests also cause us to lose about one-half of our bee colonies that are kept by beekeepers.

Varroa mites kill bees by attaching themselves to the honeybee’s body and using specialized mouth parts to suck all the bodily fluids out of the bee. If that isn’t bad enough, these parasitic varroa mites will attach themselves to one bee, travel into the hive with that one bee, lay eggs, then kill uninfected bees! Once the bees begin to get sick and die, there are fewer “nurse” bees to take care of the remaining bees in the hive. As the varroa parasites keep producing more eggs, more mites kill more bees right inside the hive.

Tracheal mites, the other type of parasite, are also a severe problem to bees in North Carolina, as well as the entire Southeast. In North Carolina we have lost over 90% of our wild bees. These mites kill the bees by getting into their windpipes, or tracheal tubes, and suffocating them to death. Since the population of tracheal mites is highest in the early spring, bee populations have not yet made the new brood; thus overwintering colonies are at their weakest. If these mites can work their way into a hive, they can destroy a colony very quickly. These tracheal mites are about twice the size of a human hair. That means that if your best friend let you take one hair from her head, and you wrapped it around your thumb to get a closer look, you’d see about half the tracheal mite’s tiny body!





There are several diseases that honeybees get which can kill them too, so a beekeeper really has to watch his or her hive very carefully! Some of these diseases are caused by bacteria, which live on (or in) other organisms. You cannot see bacteria because they are so small. Only with the help of a microscope can you see them.

Most bacteria are about one cubic micrometer in volume — we can't even compare these to the size of a human hair! We are not too concerned with them here, but mention them to show how complicated beekeeping really is. The worst of these bacterial diseases is called “Foul-brood”, and the two kinds are American and European foulbrood.

There are also what are called “fungal diseases” in the great world of beekeeping: chalkbrood is the main one that beekeeper's really have to watch out for in the hive. Fungal diseases are caused by organisms which make their living by eating on living things (called “the host”).

Examples of damage caused by fungi which use human beings as their living host include, athlete's foot, ringworm, and many skin disorders that “show up” without our ever knowing what caused them until we go to see the doctor. Like bacteria, fungi are so small, you cannot see them.

The last disease group which is a major concern of beekeepers is called a “Protozoan” disease. This means that the spore (Protozoa) gets into the gut of the bee and causes some horrible things to happen. Apiarists cut dead bees open to make sure that this is what is causing their bees to die when this disease gets in a hive. They look at the bee's abdomen under a microscope; like these other things — fungi, bacteria, parasites — spores are much too small to see with only the human eye.

Crop Protectants: Friend to Fruit, Enemy to Bee

Another enemy to bees is crop protectants (pesticides, if used during bloom). Crop protectants must be sprayed in commercial orchards to help protect fruit against its enemies: bad bugs(insects), fruit pests, and fruit diseases caused by wet weather and bad spores (like germs when we get sick).

In modern agriculture, we have to use crop protectants to preserve the quality of our fruit. Food crops are constantly under attack from insects, plant diseases, and weeds. Growers protect their crops from the most damaging of these invaders by using crop protection products known as herbicides, insecticides, and fungicides. If we didn't use them, no one would buy the fruit: it would not look good, and most of it would not be very good. For example, without crop protectants, apple growers can lose over 60% of their crop. Cotton growers can lose up to 50% . If this were the case, there would be no one to grow crops because no one could afford to feed his family!

Although crop protectants have in the past, been thought of as very bad for the fruit grower to use, today, we think of them as medicine. Did you know, for example, that there is a good





chance that your family uses some of these same chemical crop protectants around your home to protect your pets and garden from insects and disease? When handled safely, crop protectants are a very valuable and necessary tool we use to grow good fruit. However, if used improperly they will kill honey bees.

One of the safest things that a grower does is never to use crop protectants during bloom, because he or she knows that protecting our honeybees is very important.

BeeFact: Bees starve before they will freeze

Did you know that no matter how cold it gets, bees hardly ever freeze? Instead, what can commonly kill them is starvation. This all has to do with how the worker bees can regulate the temperature of the hive, using their own body heat. But in order to be able to do this, honeybees have to be able to eat. In a continuous cold snap, the entire colony may starve with plenty of honey in the hive: the bees are not able to leave their “cluster” to get into their stores of honey. But even at 40 degrees below zero F, the busy little bees won’t freeze...as long as they can get to their life’s blood, honey!

*Note: A cluster is a big ball that bees make, to keep warm when it turns cold outside. There are usually thousands of bees in a cluster!

BeeFact: Can’t have it all: some blossoms are poisonous to bees!

Although there are a good many springtime blossoms that come from “ornamental” trees, these are poisonous to bees. (Ornamental trees are trees that scientists breed just to look pretty, like Bradford Pear trees.) Other plants in nature, like the Rhododendren, and Mountain Laurel can be toxic to bees too.





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