

# NATURE DETECTIVES

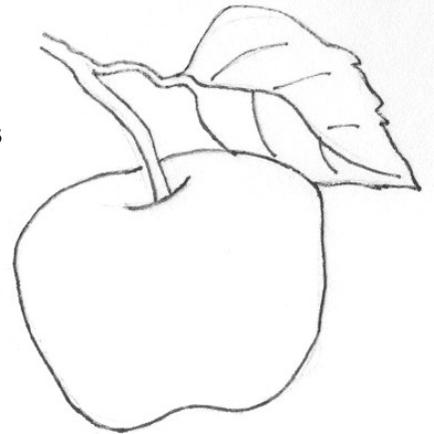
Fall  
2009



BEE ON APPLE BLOSSOM

## Bee Thankful

Honeybees are busy bees because they are the only insects that make food people eat – honey. As pollen carriers, they also help guarantee we have other things to eat. As they buzz from flower to flower, they move pollen from one plant to another plant, ensuring that there will be fertile seeds to sprout and grow into next season's foods like apples, peaches, melons and sunflowers. Thankfully, because of bees, we have pumpkins and cranberries and lots of other crops.

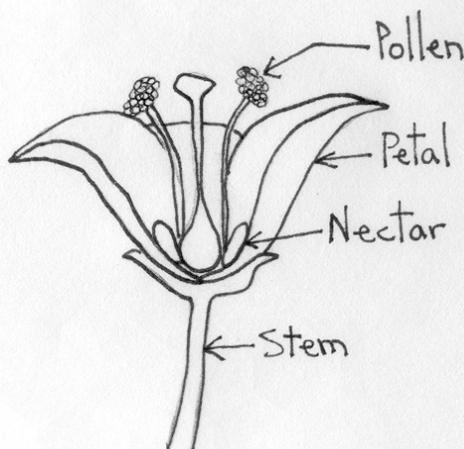


When colonists first settled in North America, they didn't know there were already around 4,000 kinds of native bees here to pollinate their food plants so they brought their honeybees with them. The settlers needed their bees so they would have beeswax for candles and honey to eat, too.

## Honeybees to See

Boulder County's Agricultural Heritage Museum at Lohr/McIntosh Farm has working beehives on the farm. Soon they will be setting up a whole display with vintage and antique beekeeping equipment donated by long-time beekeeper, Tom Theobald.

## Bee Specialties



Bees can see ultraviolet colors, which human eyes cannot see. Ultraviolet colors on flowers act like direction arrows guiding bees to the nectar and pollen inside the flowers. Flowers are much more colorful to a bee's eyes than to ours. Except for red flowers, that is – bees can't see red.

Bees smell nectar with their antennae and with the pads on their feet. Good-smelling nectar makes good honey.

(What if we humans had smell sensors on our feet? Think about it. Yuck!)



## Why Bees Make Honey



Bee activity starts winding down with fall's cooler temperatures, but for honeybees it doesn't stop. They are the only kind of bee or wasp that keeps a colony of workers with the queen through the fall and winter.

The number of workers clustered together to stay warm in cold weather is small compared to the thousands in a hive during the honey-making season when flowers are blooming. The nectar and pollen they gathered and stored as honey and "bee bread" will allow these workers and the queen to survive until warm weather brings spring flowers and a new honey-making season. Energetic bees make more than enough honey to feed themselves through most winters. The honey is stored in wax cells made by the worker bees, and it is this extra honey that beekeepers harvest for human food.



QUEEN



DRONE



WORKER

### Busy Bee Life

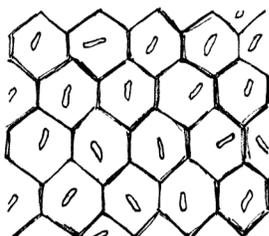
It takes the whole life's work of 12 honeybees to make one single teaspoon of honey. A bee's life starts as an egg laid by the hive's one queen bee. Each year, the first eggs are laid in late winter. The workers build different size brood cells in the hive depending on whether an egg will become a new queen, a female worker bee (all worker bees are girls) or a male drone. Worker bees construct the cells from wax that oozes out of glands on their body. The thin sheets of wax are formed into the six-sided cells that make up the whole inside of a beehive.

### ACTUAL SIZES

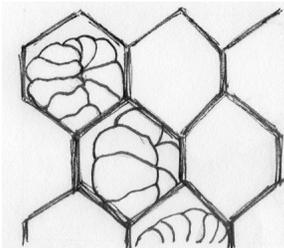
In three days, the eggs hatch into worm-like larvae. The nursery worker bees feed the larvae "bee milk," which is made in glands in their heads. After six days, the larvae are fed "bee bread," a mixture of pollen and honey. Larvae that will become queen bees keep getting the more nutritious "bee milk," which is often called "royal jelly." In the brood cell each larva becomes a pupa inside a cocoon. The pupa goes through big changes and emerges as an adult bee.

When worker bees emerge, their first job is housekeeping. Soon, they become nursery workers, then wax-making bees and queen-tending bees. Next they become guard bees. Stationed near the hive's entrance, they will give their lives to protect the hive from predators such as bears. The oldest worker bees in a hive are the nectar-and-pollen-gathering forager bees.

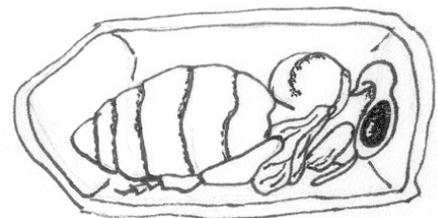
All the queen does is lay eggs, but she can lay as many as a 2000 a day. The only job drones have is to mate with queens, and drones are pushed out of the hive in the fall.



EGGS



LARVAE

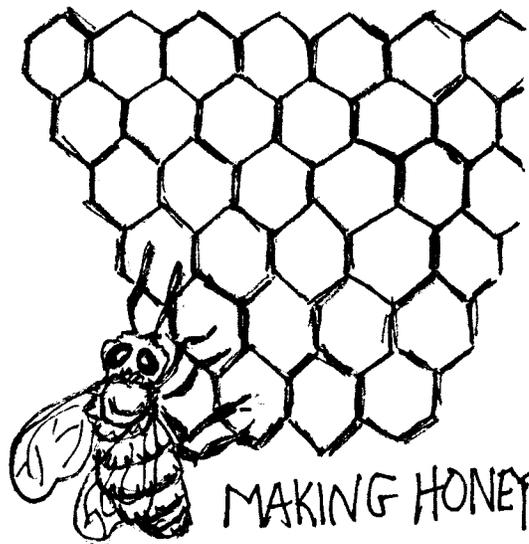


PUPA

## Making Honey

It takes a bee puke to make honey. It starts with forager bees returning with flower nectar in their special honey stomachs. They bring the nectar back up so a hive bee can suck it into her mouth with her tongue. While inside the bee's body, chemicals (enzymes) that are made by the bee's body are added to the nectar.

The hive bee will hold the enzyme/nectar mix in her mouth, opening and closing her mouth to let water evaporate from the mix. Then the hive bee puts the mix into a honey cell. She repeats this many times until the cell is full. She will fan her wings to evaporate more water from the mix in the cell. In a few days, when the consistency is just right, she caps that honey cell with wax.



Honey stored in capped wax cells (called honeycombs) can keep for thousands of years. Honeycombs have been found in ancient tombs with perfectly edible honey inside.

## Bee Cool or Warm

To maintain the honey and make sure the hive stays comfortable, worker bees at the entrance fan their wings to bring cool air into the hive on hot days. If the hive is really hot, instead of nectar, forager bees gather water to spread on the wax cells. Evaporating water droplets act like air-conditioning in the hive. To increase their own body heat, bees can shiver their wing muscles to warm the hive in winter.

## Making a Bee Line

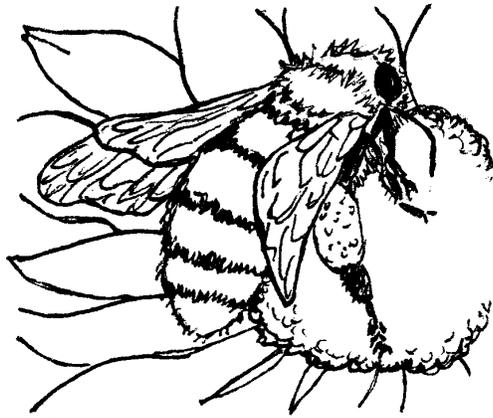
Bees fly straight from their hive at top speeds of 15-20 miles per hour to get to a nectar source. When they come back with a full load of nectar or pollen or water, they only fly about 12 miles per hour. Bees bring back pollen in special hairs on their back legs called pollen baskets.

## Bees vs. Yellow Jackets

How do you tell honeybees from the more sting-ready wasps, especially yellow jackets? Honeybees are hairy, but yellow jackets have smooth, hairless bodies.

In Colorado yellow jackets are thought to cause almost all of the stings (90%) that people blame on "bees." Yellow jackets are the pests that fly around food and garbage cans. When they bother your picnic you want them to just buzz off.





POLLEN COLLECTS ON LEG

## Befriending Bees

Remember that pesticides kill the native bees and honeybees that are needed to pollinate the foods we eat so think before you spray bug killer around your home.

Some native bees visit only a single kind of flower; planting a variety of native plants helps protect the local bees that depend on them. See if you can find some foraging bees. Can you find any honeybees with full pollen baskets?

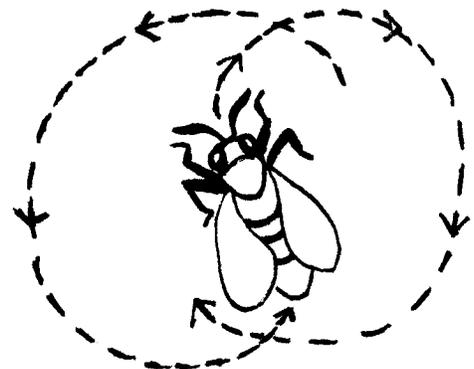


For more details on bees and wasps in Colorado go to <http://www.ext.colostate.edu/pubs/insect/05525.html>

The Great Sunflower Project is a study of bees in the entire US and Canada. If you'd like to count bees in your yard for the project next summer, go to [www.greatsunflower.org](http://www.greatsunflower.org) to get on their list for the 2010 growing season. You don't have to be a bee expert for this fun citizen science project.

## Honey Bee Dancing

When forager bees get back to the hive they tell other foragers where they found good nectar. They do this by dancing inside the hive. They've developed a special dance code that the other bees "read" in the dark of the hive by feeling the forager with their antennae as she dances. A circle dance tells of flowers near the hive. Straight lines across the circle show the direction from the sun. Body waggles show specific distances. More waggles in the dance mean the flowers are farther away, maybe as far as five miles. Bees adjust their dance to account for the sun's movement as they dance inside the hive even though they can't see the sun.



CIRCLE DANCE



With a friend, make up your own bee dance and see if you can de-code each other's meaning.