

The Buzz about Honeybees

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Name _____

With an animated movie about bees recently arriving in movie theaters and with the latest media reports about the disappearance of honeybees throughout the world, spending some time in this month's Internet Challenge™ to find out more about this unique insect is most sensible. Although tiny in size, the honeybee has a huge impact on our global economy and on our future survival.

Here are some amazing facts about the bee that you might not be aware of: Bees fly approximately fifteen – twenty miles per hour, have five eyes, two sets of wings, and have existed for thirty million years! We discover many remarkable details about this insect. It is time to get started on our online adventure about the *Apis mellifera*, commonly known as the honeybee.

First, what is a honeybee? Get ready to “fly” to three Web sites (listed below.) Go to each site and read its information. After you are done, use all three sites to answer the following questions. Read each site to gather information for your answers.

Web site #1: [Texas A&M University Department of Entomology](http://honeybee.tamu.edu/about/index.html).

<http://honeybee.tamu.edu/about/index.html>

Read the entire page.

Web site #2: [PBS – Nova – The Buzz about Bees](http://www.pbs.org/wgbh/nova/bees/buzz.html).

<http://www.pbs.org/wgbh/nova/bees/buzz.html>

Read the entire page.

Web site #3: [Honeybee](http://www.gpnc.org/honeybee.htm).

<http://www.gpnc.org/honeybee.htm>

Read the entire page.

1. Describe the social structure of bees.
2. Worker bees carry pollen on their hind legs called a pollen basket.
 - a. True
 - b. False
3. How would you explain the differences between a queen bee and a drone?
4. Name four characteristics of a worker bee.
 - a.
 - b.
 - c.
 - d.
5. Summarize the job duties of young worker bees.
6. How do field bees work?

7. Tell how the fuzzy hairs on a bee help with pollination.
8. What is the principal form of communication among honeybees?
- a. through its voice
 - b. through chemicals called pheromones
 - c. through its digestive system
9. *In the United States alone, it is estimated that honeybees accomplish one fourth of the pollination needed for all fruit produced for human consumption.* Choose an antonym for the word “consumption.”
- a. utilization
 - b. intake
 - c. production
10. What is the significance of bee pollination?
11. How would you distinguish between a honeybee’s waggle dance, shake dance and tremble dance?
12. How do guard bees protect the nest?

Good work!

Read on about Colony Collapse Disorder. Go to these two sites to read about it:

[Honeybee](http://www.gpnc.org/honeybee.htm)

<http://www.gpnc.org/honeybee.htm>

Scroll down the page to “[Colony Collapse Disorder.](#)”

[PBS.org – Silence of the Bees](http://www.pbs.org/wnet/nature/bees/)

<http://www.pbs.org/wnet/nature/bees/>

Read the page. After you are done, click and read, “[What is the impact of CCD on US Agriculture?](#)”

13. Define CCD.

Great answers!

Now, we will explore a beehive and go inside it to see amazing photographs. Go to [PBS – Nova – The Buzz about Bees – Anatomy of a Hive.](http://www.pbs.org/wgbh/nova/bees/hive.html)

<http://www.pbs.org/wgbh/nova/bees/hive.html>

Read about the “Anatomy of a Hive,” and then click on each of the ten thumbnail pictures on the left hand side of the screen and read each page. (Start reading “Colony” and end with “Defense.”) Answer these questions.

14. What part does a honeybee’s pollination play in the foods that we eat?

15. With the mystery surrounding CCD, explain why bumblebees might be a good substitute as a pollinator.

Terrific!

Extension Activity – Choose one or all of them!

Go to “Scholastic.com – Student Glossary”
http://content.scholastic.com/content/collateral_resources/pdf/b/bee_glossary.pdf (please click “OK” at the Microsoft popup prompt).

- Activity # 1 a – Create a dictionary slideshow with pictures to illustrate the words. Choose any ten words that you feel are the most important to know. After you are done, share your presentation with your teacher and classmates. Talk about it!

Go to “Scholastic.com – Bee Dance Activity 4”
http://content.scholastic.com/content/collateral_resources/pdf/b/bee_rep4_act4_bee_dance.pdf

- Activity # 1 b - Ask your teacher if you can print out this activity from Scholastic. Complete the top portion of (regarding the dance movement.)

Go to “Thinkquest - Bees: An Inside Look.”
<http://library.thinkquest.org/19579/>

- Activity # 2 – Design a timeline of the history of bees either with pencil/pen/art tools or with appropriate computer software. After you are done, share your creation with your teacher and classmates. Talk about it!

Go to “Bees Online.”
<http://www.bees-online.com/Beesite.htm>

- Activity # 3a –Explore this site to learn about the anatomy of a bee! Click “Bee Anatomy,” “Honey Bee under Belly,” and “Bee Wasp ID Chart.”

Pretend that you are a science teacher for elementary students (example: 5th grade). Your

lesson for the day is the anatomy of a honeybee. What type of lesson plan would you prepare? Would you include any images? What kind of activity would you have your students create that would reinforce their understanding of the honeybee’s anatomy? After you are done, share your final product with your teacher and classmates. Talk about it!

- Activity # 3b – Discover the health benefits of honey in this site! We have seen how bees make honey – consider the health benefits. Why should we eat it and use it?

Create a poster advertising honey and its multiple health benefits. Use either pencil/pen/art tools or with appropriate computer software. After you are done, show your poster to your teacher and classmates. Talk about it!

- Activity # 3c – This site also contains some fun educational games in the “Bee Games” section. For example, try the interactive “Bee Hive Crossword Puzzle” and see how you do. Then, check out “Find the Queen Bee” and “Bee Trivia Quiz.” Note: Do not download anything to your computer! Just play the interactive games.

Go to “PBS – Nova – Silence of the Bees”
<http://www.pbs.org/wnet/nature/bees/help.html>

- Activity # 4 - How can we help bees? Is CCD just a local problem or is it the beginning of a global problem? Why would funding honeybee research be important? How can we educate the public about this?

With a classmate, review this site (and others in this activity) to get ideas. Then, draft a persuasive letter to your school newspaper (or community newspaper) about the need for honeybee research. After you are done, share your letter with your teacher and classmates. As a further extension activity, have a debate with your classmates and discuss CCD and our part in helping honeybees. Talk about it!

Congratulations! You have done an tremendous job in completing this month’s Internet Challenge™.

Answers to September's Internet Challenge™

1. Honeybees are social insects. In the wild, they create elaborate nests called hives containing up to 20,000 individuals during the summer months. Domestic hives may have over 80,000 bees. They work together in a highly structured social order. Each bee belongs to one of three specialized groups called castes. The different castes are queens, drones, and workers.

2. (a) True

3. There is only one queen in a hive and her main purpose in life is to make more bees. She can lay over 1,500 eggs per day and will live two to eight years. She is larger (up to 20mm) and has a longer abdomen than the workers or drones. She has chewing mouthparts. Her stinger is curved with no barbs on it and she can use it many times. In one day, a queen can lay her weight in eggs. She will lay one egg per minute, day and night, for a total of 1,500 eggs over a 24-hour period and 200,000 eggs in a year. Should she stop her frantic egg-laying pace, her workers will move a recently laid egg into a queen cell to produce her replacement. Male bees in the hives, called drones, have no stinger. They live about eight weeks. Only a few hundred, at most, are ever present in the hive. Their sole function is to mate with a new queen, if one is produced in a given year. A drone's eyes are noticeably bigger than those of the other castes are. This helps them to spot the queens when they are on their nuptial flight. Any drones left at the end of the season are non-essential and will be driven out of the hive to die.

4. (Students can give any four of these answers.) Worker bees do all the different tasks needed to maintain and operate the hive. They make up the vast majority of the hive's occupants and they are all sterile females. Workers born early in the season will live about six weeks while those born in the fall will live until the following spring.

Workers are about 12 mm long and highly specialized for what they do, with a structure called a pollen basket on each hind leg, an extra stomach for storing and transporting nectar or honey and four pairs of special glands that secrete beeswax on the underside of their abdomen. They have a straight, barbed stinger, which they use only once. It rips out of their abdomen after use, which kills the bee.

5. Young worker bees are house bees and work in the hive doing comb construction, brood rearing, tending the queen and drones, cleaning, temperature regulation, and defending the hive.

6. Older workers are field bees. They forage outside the hive to gather nectar, pollen, water and certain sticky plant resins used in hive construction.

7. As the field bees forage for nectar, pollen sticks to the fuzzy hairs, which cover their bodies. Some of this pollen rubs off on the next flower they visit, fertilizing the flower, and resulting in better fruit production.

8. (b) It is through chemicals called pheromones.

9. (c) production

10. Bees are important because they pollinate approximately 130 agricultural crops in the US including fruit, fiber, nut, and vegetable crops. Bee pollination adds approximately 14 billion dollars annually to improved crop yield and quality.

11. A bee performs the waggle dance when she wants to inform other bees of a nectar source she has found. The longer she waggles - typically bees make between one and 100 waggle runs per dance - the farther the flower patch lies from the hive, with every 75 milliseconds she prolongs the dance adding roughly another 330 feet to the distance. She shows how rich the source is by how long and/or how vigorously she dances. She indicates the direction of the source by the angle her waggle walk deviates

from an imaginary straight line drawn from the dance floor to the sun at its current position. Finally, the dancer shares the odor of the flowers in question with the other bees, who sample it with their antennae. A worker does the "shake" dance when nectar sources are so rich that they call for more foragers. A worker arriving back from a foraging run will move throughout the hive and shake her abdomen back and forth before a non-foraging worker for one to two seconds before moving onto more non-foragers at the rate of between one and 20 bees per minute. The "tremble" dance is when foragers have brought so much nectar back to the hive that more bees are needed to process the nectar into honey. Walking slowly around the nest, the dancer quivers her legs, causing her body to tremble forward and backward and from side to side. Lasting sometimes more than an hour, the tremble dance stimulates additional bees to begin processing nectar.

12. Besides using their stingers, bees rely, primarily, on their protective nest. Guard bees patrolling the single, tight entrance quickly attack intruders, and when necessary, will join a massive counterattack synchronized by the release of alarm pheromones. For internal threats, bees have a bevy of defenses as well. When first building the hive, they varnish the interior walls with floral herbicides and fungicides. They bear a colony-specific odor that helps them distinguish between colony members and intruders. The honey they produce has biocidal properties that inhibit the microbial spoilage of this precious resource. "Undertaker" bees are diligent about removing the carcasses of their dead bees.

13. Colony Collapse Disorder (or CCD) refers to a mysterious malady that affects domestic honeybees and causes them to leave the hive and not return, leading ultimately to death of the colony. First noticed in late 2006 in North America, CCD has been the focus of much research to try to determine what is causing it. Pathogens, parasites, environmental toxins, and even cell phone transmissions have been the subject of investigation. A factor that may be uniquely associated with CCD is a virus known as Israeli Acute Paralysis Virus (IAPV). While unproven yet that IAPV is the sole cause of CCD, but it is found in nearly all hives affected by CCD. A possible scenario is that various stress factors trigger CCD in bees infected with IAPV. Research is currently underway to test this hypothesis.

14. The role honeybees play in our diet goes beyond honey production. They pollinate about one-third of all crop species in the U.S. Honeybees pollinate about 100 flowering food crops including apples, nuts, broccoli, avocados, soybeans, asparagus, celery, squash and cucumbers, citrus fruit, peaches, kiwi, cherries, blueberries, cranberries, strawberries, cantaloupe, melons, as well as animal-feed crops, such as the clover that's fed to dairy cows. Essentially all flowering plants need bees to survive.

15. With the threat of CCD looming, researchers are starting to study how other pollinators like the larger bumblebees could step in for honeybees. "The Dutch have figured out how to use bumblebees," says Pettis. Bumblebees share many similarities with honeybees. Both are social nesters, although the bumblebees' society is not as highly ordered as that of honeybees. In addition, bumblebees make a new nest each spring by solitary queens, who hibernate through the winter. Honeybees remain in the old nest. Perhaps the biggest consideration is an economic one. Bumblebees last just two months and cost \$ 200 per colony, whereas honeybees can last several months in the summer with colony rentals running only \$ 100 to \$ 140. As a result, only high-value crops such as tomatoes have access to bumblebee pollination. The use of bumblebees is a step in the right direction, but is not a final solution.

Extension Activities – students own answers.