

Ages:

8 & up

# All You Ever Wanted to Know About Hornets and Yellowjackets

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**Main idea:** The yellowjackets and hornets are social insects living together in a colony starting from a single queen in the spring.

**Objective:** Learn about the life history of these insects through the season and, by examining an abandoned nest, determine how many might have lived in the colony. What does this mean to you?

## **Materials:**

an abandoned aerial hornet or yellowjacket nest (best collected during the winter)

a serrated bread knife (for adult use only)

note paper

pencils for gathering data

ruler and/or tape for measuring nest size

**Motivator:** You are the detective. You will be able to discover the secret of the nest and to tell others about the colony.

**Questions (See Background for help with answers):**

- q How many hornets or yellowjackets do you think lived in this hive?
- q What is the hive made of?
- q Can you tell us what the life cycle of a hornet or yellowjacket is?
- q What are the steps in the life cycle, starting with the egg?
- q Is the nest thicker or thinner on top?
- q Why do you think it was built this way?
- q How many openings are there for the hornets or yellowjackets to go in or out of the nest?

**Activity:**

- q Cut the nest in half vertically with the serrated knife. Examine the overall structure. (Notice that it is thicker on top.) Write down how many layers of comb there are and notice that the layers closer to the top are usually larger, and they get smaller as one moves down towards the nest opening.

q Take out the comb keeping the two halves of each layer in the same place so you can see which ones are larger. While looking at the comb, ask the following: Do you see different size cells? (Two different width cells should be obvious.) Are some of the cells still capped?

q Open one up gently and remove the contents using your pencil point to push it out, or tweezers to grasp gently and pull out. What is it?

q Have the group divide up with each group having one comb to work with. Have the students count the number of cells of each size group and write down that number:

§ small cells\_\_\_\_\_

§ large cells\_\_\_\_\_

q If the wasps use each worker cell three times during the season, and the Queen and Drone cells only once, how many wasps might have been in this colony if they all survived?

q In other words, multiply the number of small cells you counted by 3, and then add to that the number of large cells to find the total number of wasps possible if all had lived and were present at the same time.

## **Background:**

The aerial hornets and yellowjackets that occur in the northeastern United States are annual nesters, that means, that they start a new nest each year.

The nest is started by a mated queen that has overwintered successfully. She begins by gathering “wood” and chewing it up into small particles, mixing it with saliva, then placing it in the spot she has chosen for a nest.

At first she “glues” this material to the structure that will hold the nest, often an overhanging roof or other solid piece of wood in a protected location. This forms the petiole of the nest. Then she begins to draw out the “paper mache” that she makes into a protective envelope and a group of six-sided cells -- usually five or six in the group.

When these are partially completed, she lays an egg in each one and continues working on the cells and the envelope of the nest. Meanwhile, the eggs incubate and the larvae hatch in approximately five days. The envelope will protect the nest from weather, and will surround the comb and help the insects to regulate both the temperature and moisture in the nest.

When the first group of larvae hatch they are hungry. Being legless creatures they depend on the queen to feed them. The queen goes out in search of insects such as caterpillars or flies, which she captures, chews up, and then regurgitates to her larvae to feed them. This is a full time job when the larvae are actively growing (about 2 weeks).

When the larvae are full grown, they spin a cap of silk over the cell they are in, and in this location they undergo pupation, a resting stage in which the larva changes greatly, develops legs and wings, antennae, and gradually transforms to an adult.

After about 14 days, the adult is fully formed and ready to emerge from its pupal cocoon. It chews a hole in the cocoon cover, and pulls itself out. After a few hours its body is hardened off, its wings expanded, and it is ready to take on the life of a worker.

The workers from this point on will take over the duties of the upkeep and expansion of the hive, leaving the queen to lay eggs for the rest of the colony. Workers keep building cells and feeding other larvae as they develop. In the life of the colony the worker cells may be used a maximum of three times for brood during the growing season.

As fall approaches, the queen continues to lay eggs, some in larger cells the workers have built. These eggs will develop into a brood of new queens and males (drones) which will fly out on warm days, form mating pairs, and then the queens will seek protected places to spend the winter. The larger brood cells are used only once in the life of a colony. Although a few queens may return to the original nest, most find tufts of grass or decaying portions of trees to hibernate in and wait for spring. The old queen, workers and drones die in the fall.

## **Vocabulary:**

**yellowjacket:** A small, yellow marked social wasps that commonly nest in the ground or in the air.

**hornet:** Any of the larger social wasps.

**wasp:** Any of a number of social or solitary winged hymenopterous (bee family) insects that usually have a slender smooth body with the abdomen attached by a narrow stalk.

**comb (honeycomb):** A group of six-sided cells built by wasps in their nest to contain brood and stores of food.

**cell:** An individual six-sided structure that together with others makes up the comb.

**annual:** Yearly, each year

**petiole:** The stem, the first part of a wasp nest that is quite strong and attaches the hive to a branch or other structure.

**regurgitate:** To throw or pour back out, the casting up of incompletely digested food (as by some birds and insects in feeding the young).

**pupation:** The intermediate stage of a metamorphic insect. For example, when butterfly larvae (caterpillars) form cocoons, they enter the pupal stage of their development.

## Extensions:

- q Measure and record the size of the nest: length, width and circumference at widest part.
  
- q Make a drawing of the nest.
  
- q Explore how the wasp makes the paper covering of the nest.
  
- q Make a paper mache nest that is hollow inside and as long and wide as your head. (Use a balloon as the basis for the nest, then when finished, pop the balloon. When dry, cut your “nest” in half with a serrated knife, cut holes in the appropriate places for eyes and a hole to breathe from - make this into a mask - decorate any way you wish. (Materials needed: Strips of newspaper, balloons, flour and water paste or other paper mache paste, elastic to make a band for the mask to hold it on when finished.)
  
- q This is a good time to ask questions about:
  - o What would you do if you saw a wasp or hornet starting to make a nest near your front door under the roof?
  
  - o Would you remove the nest now, when there are only a few workers in it, or would you wait longer? Why?

q Since these insects use a sting as a defense they are often disliked by people. Some people are afraid of them, and some may be allergic to the venom in the stings. If you were responsible for the school grounds, you would want to keep the hornets and yellowjackets away from the playgrounds. You would want to control them before the nests got large, and the chances of someone getting stung increased. With older groups, you could even begin to introduce Integrated Pest Management concepts here.