Teacher's Corner

http://www.cnr.berkeley.edu/citybugs/teachercorner/insectSmells.htm

The Good, The Bad, and The Smelly

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SUBJECTS ADDRESSED:

Insects' use of pheromones
Beneficial insects versus insect pests

GRADE LEVELS:

Upper elementary

LESSON PURPOSE OR GOAL:

Discuss the various ways insects use pheromones to communicate and compare them to human pheromones;
Make in-field observations of insects, gather specimens, discuss whether they are helpful or harmful to the plant community, and the role pheromones play in the insects' communication with each other.

LESSON DESCRIPTION:

Discuss how animals use pheromones every day
Play pheromone game
Discuss ethics regarding live insect handling
Insect scavenger hunt in the schoolyard garden
Examine and discuss collected insect specimens

APPROX. CLASS TIME NEEDED

Pheromone discussion: 5 minutes
Pheromone game: 15 minutes
Ethics in handling live insects: 5 minutes
Scavenger hunt: 20 minutes
Examination of specimens: 15 minutes

RELATED RESOURCES:

“Introduction to Insect Biology and Diversity,” Daly, Howell V., et al.

MATERIALS:

Even number of small containers with lids, one for every student (film canisters ideal)
One cotton ball taped into the bottom of each container

Various scents so that there are only two containers having the exact same scent; for example, rubbing alcohol, perfume, cooking extracts (lemon, almond, strawberry, etc.), vinegar, mouthwash, etc.
Pen for labeling the bottom of each container
Piece of paper
Cup or bowl
Collection equipment, such as clear jars with lids, magnifying glasses
Insect identification guide for juveniles

PREPARATION:

INTRODUCTION ACTIVITY:

Begin by writing the word “pheromone” on the board and asking the students to say the word aloud. Explain that this is another word for “scent.” Write “sent,” “scent,” and “cent” on the board and ask the students which one of these homonyms describes that which one smells. Ask the students to define what a homonym is. Then ask for volunteers to use each word (“sent,” “scent,” and “cent”) in a sentence.
Ask the students if they've ever seen an insect with a nose. Explain that insects don't have noses like we do, but they are able to do what we think of as smelling, or odor detection. An insect may smell with its antennae, its feet, or even its behind (such as when a female is laying an egg on a particular plant). Other animals make scents, too. Ask the students if they've ever smelled a skunk's scent before. Ask the students why they think skunks smell that way; is it a good smell or a bad smell? Explain that skunks use that smell to protect themselves from danger; that is how they repel enemies. Explain that “repel” means to push away, and the opposite of “repel” is “attract.” Ask the students if they think a skunk's smell repels or attracts humans (repels). Then discuss with students how animals use scents to attract others. Site humans as an example, specifically when humans use cologne or perfume to attract a mate. Ask the students if humans are animals (yes). Next ask they students if they've ever been to a gas station and smelled gasoline fumes; does this smell repel or attract us (repel)? Some vapors (the droplets of a scent that go into the air) are toxic and dangerous to smell; they can make a person really sick. Gasoline is one of them. Scientists know scents can be dangerous, so they are careful when they smell something. They smell it in a special way called wafting. They wave their hand over a chemical to bring the vapors to their nose rather than bringing their nose to the vapors. Demonstrate wafting and have the students practice wafting before handing out the scented containers.

PROCEDURE:

Prior to class, tape a cotton ball into each canister. Make a unique mark on the bottom of each container (numbers are fine; just make sure you scent them randomly). Dampen the cotton ball of two containers with the same scent and write on a sheet of paper the mark to which that scent corresponds. Refer to the list to confirm matches and provide help to the students when needed. When confirming a potential match, ask the students if they found the smell repelling or attracting.

Explain the pheromone game: “We're going to play a game where we pretend we're insects. Everyone will get one canister. Inside is a scent. Just like scientists, you're going to waft the vapor to your nose. Don't stick your nose in the container, don't try to remove the cotton ball, and don't tip the container upside down. There is one, and only one, other person in the room who has a container with the same scent as you. Your job as insects is

to find that container by wafting the other people's scents to your nose. When you think you've found a match, raise your hand, and we'll tell you if you are correct. Once you've found the person with your matching scent, stay with that person."
Next, discuss the ethics of handling live insects. Ask the students to recall the benefits insects have to humans. Remind them that insects are delicate and should be handled carefully. Insects are animals, just like us, and should be treated with respect. Just because an insect is relatively big does not mean it is harmful to us. In fact, it is usually the smaller, seemingly less scary insects that cause the most harm to humans, such as mosquitoes that spread malaria and fleas that spread typhus, both potentially deadly diseases to humans.

Demonstrate removal of an insect one may find in one's house. Set a piece of paper near the pretend insect and place a glass over the paper. Slowly, gently move the paper closer to the insect to encourage it to walk onto the paper while at the same time moving the glass to keep the insect covered. Scoop hand under paper with glass on top and walk the insect outside where it can continue on with its insect duties, such as pollination.

Then explain that we're going to go on an insect scavenger hunt outside in the garden. Ask the students where they would look for insects in the garden. Good places to look are in flowers, under leaves (Q. Why would an insect be underneath a leaf instead of on top? A. To hide from predators.), in the dirt, under the bark of a tree, etc. Tell the students to search for insects outside, but don't touch or disturb the insects. Have them observe what the insect is doing while they raise their hand to have an adult come and collect the insect in a clear jar. Organize the children in their pairs and move to the outside garden. You may choose to pass out hand-held magnifying glasses now or just before the discussion. Collect what the students identify as an insect even if it is not. The critter can be used later in the discussion to reiterate the definition of an insect. After the insect is collected, make sure it is place out of direct sunlight. There should be plenty of oxygen in the jar until its release.

After all the insects are collected, gather to examine and discuss each specimen. Discuss whether the insect feeds on plants, other insects, or has a role in pollination. Touch upon insects' means of communication by citing examples of ants who leave scent trails to mark a food source so other ants of their colony can find it. Bees do the waggle dance to communicate to other bees of the hive a nectar and pollen source. Remember that even insects that feed on plants are important as decomposers. Release all insects back into the garden in which it was found.

ASSESSMENT:

Assessment can be achieved by querying the students during the pheromone game if they find a particular scent repelling or attracting. The scavenger hunt will confirm whether the students understand the definition of an insect.

EXTENSION ACTIVITIES:

The Camouflage Game: Although insects frequently communicate with members of their own species, sometimes they avoid even being noticed. Share pictures with students of insects known to be good at the art of camouflage, such as stick insects, leaf bugs, and certain moths. To play the game, send a few students out of the room. Pass out small pieces of paper and coloring utensils to the remaining students. Have them camouflage the paper to blend in with something in the room, such as a desk or cabinet. Affix the camouflaged paper to the item the students attempted to match. Bring the few students in from outside and see if they can find the camouflaged pieces of paper. End by discussing

other ways insects use coloring to communicate, such as a warning to potential predators that they are poisonous and should not be attacked. This technique is employed by the monarch butterfly, while other butterflies mimic the same warning colors as the monarch even though they are not poisonous.