



Insect Discovery

KNOW YOUR ROACHES: *RECOGNIZING INDIVIDUALS*

Lesson Plan – Insect Science Educational Supplements

Grade level: 1-3

Academic Standards:

NextGen Science

Standards: Individuals of the same kind of animal are recognizable as similar but can also vary in many ways (LS3.B)

Designs can be conveyed through drawing. These are useful in communicating ideas (ETS1.B)

Common Core: With guidance, gather information to answer a question (W.1.8)

Time: 60 minutes

Logistics: Pairs or small groups of students will be given a Madagascar hissing cockroach

Materials:

- Madagascar hissing cockroaches
- Paint or nail polish
- Drawing materials
- Plastic containers
- Measurement tools

Background: Often students understand they are different from one another but do not recognize individuality in other species. This activity will demonstrate natural variation within a single species, Madagascar hissing cockroaches. It will also give students a chance to get to know these fascinating insects. Students will learn to make scientific observations and gather information to answer questions.

Preparation: Obtain a terrarium of Madagascar hissing cockroaches. These animals are very easy to rear in the classroom. If you do not have access to Madagascar roaches, contact the Insect Discovery program to see if we have roaches available to lend your class (or even donate!) Try to have enough individuals for students to work in pairs or small groups. If you do not already have these animals in the classroom, see the back page of this lesson plan for How to Care for your Roaches.

Activity:

1.) *Setting the stage* Remove one cockroach from its terrarium and ask the students if they know what kind of animal it is. Often they can recognize it as a roach. When holding the cockroach, always keep it close and low over the table, be ready to catch it with your other hand if it is about to fall on its head. Emphasize that this animal is harmless and furthermore, friendly. They cannot bite or injury you. Maintain an environment of respect for the organism. Invite students to touch the roach and make general observations.

2.) *Introduction* Obtain a cockroach of the opposite sex. Tell students which one is a boy and which is a girl. In this species, males are recognized by the big bumps on their thorax. Let the students know which is a boy and which is a girl, then let them figure out what differences they can observe between the two roaches. Bring both the cockroaches around the classroom and allow students to observe.

3.) *Exploration* Supply small group or pairs of students with their own cockroach in a plastic container. Tell them that besides noting whether they are a boy or a girl ask if they can make further observations about why each one is a unique individual. Ask them to identify features that make their animal different from every other cockroach in the room, ex. size, color. Provide

them with some tools to aid them in this process, like paper and pencils to record their observations in drawings and rulers to measure their roach's size. One option is to lead this activity as a technical drawing experience. Encourage each group of students to really get to know their roach, giving it a name. Then the students can write the first one or two letters of the name on a small sticker or piece of tape and attach it to the roach's underside or belly. (They may need some help with this if their roach is wiggly.)

4.) *Know your roach* Have all the groups place their individual roach into one large container. Give the roaches a minute to calm down, then walk around the class to each group and have the students try to identify their roach. Check to see if they were correct by looking at the sticker.

5.) *Optional Roach Racing!* Be prepared with a large plastic container with a start and finish line. Students will have to identify their roach after a competitive roach race. This will test the depth and scope of their previous observations. Place all the roaches at the starting line in the race container. Place a dark cloth at the other end of the raceway, to give the roaches something attractive to run towards. Inspire them to move by shining a bright light. Note: It is unlikely they will travel in a straight line. At the end ask the students to identify which group won.

Assessment

Reflect

Ask students what makes them special, how are they different from other people. Ask if this also applies to cockroaches. Do other species show similar variation like humans do?

Supplementary information

Male versus female cockroaches Male cockroaches have dorsal bumps on the thorax whereas females do not. Additionally, males have “fuzzier” antennae although this feature is harder to see. Full-grown females are usually bigger than males. Differences in coloration, however, reflect individuality, not gender.

Aren't all roaches pests NO! There are more than 4000 species of cockroaches (Order: Blattodea) and only a few will come in our houses and bug us. They are not known to carry human diseases. Most cockroach species live in the tropics. Termites are a sub-group of cockroaches that live in colonies and tend to eat wood. It's a drag when the wood they eat is your house, but again, most termite species are not pests. Generally, cockroaches and termites are decomposers, helping the planet by recycling dead plants and helping create soil.

HOW TO LOVE AND CARE FOR YOUR ROACHES

The **Madagascar hissing cockroach** (*Gromphadorhina portentosa*), also known as **Hissing roach** or simply **Hisser**, is one of the largest species of cockroach, reaching 4-5 inches at maturity. They are originally from the island of Madagascar off the African coast, where they can be found in rotting logs. Unlike most cockroaches, they are wingless (though this is also true of some other wood-dwelling roaches). Females carry the egg case internally, and release the young nymphs only after the eggs have hatched. As in some other wood roaches, the parents and offspring will commonly remain in close physical contact for extended periods of time. In captivity, these insect can live 2 to 5 years.

Their nickname, "hissing cockroach", is due to their ability to force air through the breathing pores (spiracles) on their abdomen. The Madagascar hissing cockroach is believed to be the only insect that can hiss in this exact manner, as most insects that make a "hissing" sound do so by rubbing together various body parts. This hiss is used in several contexts: the disturbance hiss and fighting and courtship hisses. All cockroaches from the fourth instar (fourth molting cycle) and older are capable of the disturbance hiss. Females only make the disturbance hiss. Males make all sorts of hisses, including the fighting hiss when challenged by other males. This results in one of the males eventually backing down and the fight being over. The loser male usually sits and sulks outside the bark nest.

LOVING YOUR ROACHES:

Be sure to name all your roaches, as you can tell them apart if you try. When they are full grown, you can tell the sexes apart because males have two big bumps on the thorax (big flat shield protecting the head) while females are relatively smooth. Females also don't hiss as much as males. Don't worry – they can't bite or sting or do anything fiesty except hiss!

To pick them up, the best method is to lift up the piece of wood and gently scoop them into your hand. They may get a bit hissy at first, but will calm down quickly. Always use both hands and keep your hands over a table when holding a roach, as they like to explore and will walk right off the edge of your hand. If they fall all the way to a hard floor, they can get hurt.

You can also stroke the roaches on their backs. It's not clear whether they like it or not, but it helps them get used to being handled. It is probably not a good idea to kiss them. You should also wash your hands after handling your roaches. A few people have a mild skin allergy to the roaches and get red itchy bumps. If this happens to you, you can still enjoy the roaches, just use gloves when holding them.

HOUSING:

Your cockroaches will be happy in a plastic or glass terrarium. Give them some sort of shelter like a paper towel roll or a piece of bark or wood. You don't really need to clean out the cage until a lot of poop has accumulated (maybe in 6 months.)

Always close the cage lid securely. The roaches are very strong and can lift lids of cages. If you forget and a roach escapes, don't panic. It won't have gone far. Look for your roach in nearby books or papers – that's where they like to hide.

FOOD and WATER:

Your roaches like all sort of fruits and vegetables as well as rat chow pellets (available at most pet stores). Once a week, give them a slice of orange or banana or something similar to enjoy. You should keep several of the rat chow pellets in the food bowl to make sure they get a balanced diet. Take out the old fruit as it gets moldy.

You can provide them with water several ways. They need a moist environment, so be sure to spray water in the cage from a mist bottle once or twice a day. They will sometimes drink by licking the side of the cage. You can even get them to drink from your hand! However, the misting water is not really enough. Either provide them water using "Cricket Quencher" yellow jello (available at most pet stores) or place a tube of water in the cage with a cotton ball plug. It is also a good idea to pour about a cup of water straight onto the bedding material about twice a week (but try not to water the rat chow pellets!)

BABIES:

These roaches will not lay eggs outside of their bodies. A pregnant female will produce a long yellow egg case and then take it back into her body. The eggs hatch internally and, after a while, the female will give birth to about 50 babies. If this should happen, do NOT release the babies (or adults) outside. They are not a native species and will probably all just die unhappily, but may also upset some native organisms as well. If you don't want to keep the babies, please contact Kathleen Walker (telephone 626-2088 or email krwalker@ag.arizona.edu) for help with babies or any other roach problem or questions.