

Animal Behavior

OBJECTIVES

Students observe the animals in the terrariums and draw conclusions about their typical behavior.

The students

- ▶ continue to observe and record the behavior of the animals in their terrariums
- ▶ draw conclusions about when anoles change color
- ▶ observe anoles eating crickets and discuss anoles as secondary consumers

SCHEDULE

Session I About 40 minutes, with continuing observation sessions every other day for 10–12 days

Session II About 40 minutes, after completing the final observation session and Activity 8

VOCABULARY

camouflage
secondary consumer

MATERIALS

For each student

- 1 Activity Sheet 7, Parts A, B, and C

For each team of four

- 2 magnifiers
- 1 terrarium

For the class

- 1 chart, Colorful Anoles
- 2 spray bottles
- 1 roll tape, masking
water, spring*

*provided by the teacher

PREPARATION

Session I

- 1 Make a copy of Activity Sheet 7, Part A, for each student. Each student will also need a fresh copy of Activity Sheet 7, Part A, for each observation session.
- 2 Use masking tape to hang the Colorful Anoles chart where all the students can see it.
- 3 If necessary, refill the spray bottles with spring water.

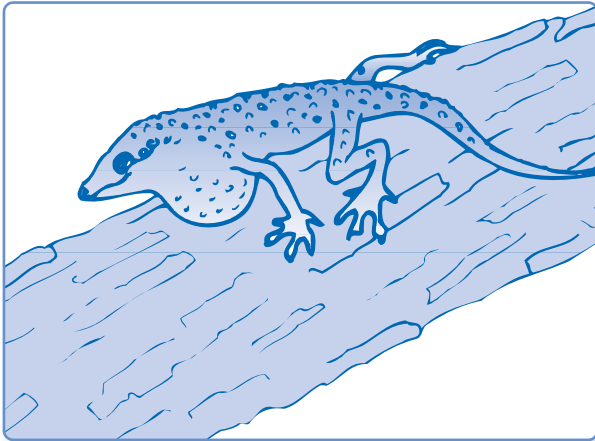
Session II

Make a copy of Activity Sheet 7, Parts B and C, for each student.

BACKGROUND INFORMATION

Both green anoles and true chameleons are known for their ability to change color. Many people think these lizards change color in response to their surroundings, but research has shown that the color changes actually occur in response to temperature, light intensity, and the emotional state of the lizard. Anoles are usually green when in bright light or when warm. They are more likely to be brown when they are cool, or at night. A male that has won a fight with another male will be a lighter color than the losing male.

Anoles are also known for the dewlaps, or distinctive throat fans, of the males. This fan is a fold of skin under the throat that has a filament of cartilage in it. To frighten an enemy or a rival male, males use the cartilage to pull the fan down and out into a semicircular shape, as shown in Figure 7-1. At the same time, the skin on the fan changes to a bright yellow, orange, or red, causing a dramatic change in appearance.



▲ Figure 7-1. An anole displaying its dewlap.

Like many reptiles, anoles periodically shed their skin. This usually takes place over the course of a day. First, the outer layer of skin turns slightly milky, then it splits open down the back. The anoles pull off this dead skin with their mouths, eating it as it comes off.

Anoles catch prey by lunging at insects and trapping them in their mouths. If the insect is too large to swallow whole, they hold the insect in place and suck its insides out, leaving a hollow shell. They do not need to eat every day, and the amount that they eat will vary with the temperature and the time of year. (They eat less in winter and when they are cold.)

While animals that eat plants are called **primary consumers**, animals that eat primary consumers are called **secondary consumers**, to denote that these animals are one step further removed from the plants that are the original producers of the food.

▼ Activity Sheet 7, Part A

Animal Behavior

Date _____ Temperature in terrarium Answers will vary.

Crickets

- Write the number of crickets you see
 - in the grass Varies.
 - on the twigs Varies.
 - on the bare soil Varies.
 - under the leaves Varies.
 - other (describe) Varies.
- Have you seen the crickets eat anything? What? Answers will vary.
- Have you seen the crickets drink anything? How? Answers will vary.
- How many crickets have you placed in your terrarium, total? Varies.
- How many crickets are in your terrarium today? Varies.

Anoles

- Locate your anole in the terrarium. Where is it?
 - in the grass Varies.
 - on the bare soil Varies.
 - on the twigs Varies.
 - under the leaves Varies.
 - other (describe) Varies.
- What is it doing? Answers will vary.
- Is it hard to see? Why? Answers will vary.
- Have you seen it eat anything? What? Answers will vary.
- Have you seen it drink anything? How? Answers will vary.

Earthworms

- Locate the earthworms in your terrarium, if possible. Can you see the earthworms or their tunnels? Where are they? Answers will vary.

▼ Activity Sheet 7, Part B

Animal Behavior

Crickets

- Look back over your cricket observations and write a summary of cricket behavior. Answers will vary. Possible answer: Crickets crawl around, feel with their antennae, climb on twigs and grass, and like to hide under things. They eat grass and oatmeal flakes, and sometimes pick these up and carry them around.

Anoles

- Look back over your anole observations and write a summary of anole behavior. Answers will vary. Possible answer: They sit still a lot, in the warmth of the lamp. Sometimes they move quickly, pouncing on and eating crickets. They drink droplets of water and like to climb up on twigs. Occasionally, they will flatten themselves against twigs as camouflage.
- Are there times when the green anoles are usually green? When? green more often in warmer temperatures
- Are there times when the anoles are usually brown? When? brown more often in cooler temperatures

▼ Activity Sheet 7, Part C

Animal Behavior

4. How do anoles make themselves difficult to see?
They align themselves with whatever is there—when on a twig, they may put their legs out to blend in with the shape of the twig.

Anoles in the Food Chain

1. What do anoles eat? crickets
2. Did you see an anole eat a cricket? Answers will vary.
3. How do they do it? They lunge at the cricket and snap it up in their mouths.
4. Are anoles producers? No. Green plants are producers.
5. Are anoles primary consumers? No, they don't eat plants.
6. What do we call anoles in the food chain? Secondary consumers

Guiding the Activity

Session I

- 1 Tell students that for the next several weeks they will be studying the behavior of the animals in their terrariums. Distribute a copy of **Activity Sheet 7, Part A**, to each student.
- 2 Arrange students into their terrarium teams. Give each team two magnifiers. Explain that they will be keeping track of the air temperature in their terrariums. Help them to read the thermometers in their terrariums.

Additional Information

Read through the activity sheet with the students to help them understand what they will be looking for.

Guiding the Activity

Distribute the spray bottles to two of the teams, and instruct them to pass the spray bottles to another team when they have finished using them. Have students mist the sides of the terrariums, the grass plants, and the dead leaves covering the soil side of the terrariums. Since anoles get their water from water droplets, misting the terrariums will make it more likely that the students will actually see the anoles drink.

Tell the students to observe their terrarium habitats and record the required data on Part A of their activity sheets.

3 Help students summarize their observations by asking, **Where were the crickets in your terrariums? What were they doing?**

Ask, **Where were the earthworms in your terrariums? What were they doing?**

4 Ask, **Where were the anoles in your terrariums and what were they doing?**

Ask, **What color were your anoles?**

If any of the students saw the anoles change color, have them describe this to the class and ask, **Why do you think the anole changed color?**

Additional Information

As you circulate, reinforce their observations and direct them toward observing behaviors they may have missed.

The crickets are likely to have been hiding under leaves, crawling along the soil, climbing on the twigs, or eating bits of grass or oatmeal.

Students should be able to see underground tunnels made by the earthworms, if not the earthworms themselves.

The anoles prefer to be up off the soil on the twigs or sides of the terrarium. Students may have seen them climbing, drinking from water droplets, or catching and eating crickets. They may have also seen them shed and eat their skins.

Some of the anoles are likely to be brown and some green. If students have not yet realized that the anoles can change color, let them simply discuss why they think different anoles are different colors at this point, and save the discussion of color-changing until they have observed this themselves.

Student answers will vary. Record their suggestions on the Colorful Anoles chart, making notes on the temperature in the terrarium, the time of day, and the behavior of the anole at the time.

Guiding the Activity

Explain to students that the class will be collecting information on this chart to try to discover when and why anoles change color.

Tell the students that they will be discussing the crickets and the earthworms more in upcoming sessions and activities.

Collect the magnifiers and return them to the kit. Return the terrariums to their location in the classroom, and keep the spray bottles nearby. Collect and save the activity sheets for future reference.

- 5** Every other day for the next 10–12 days distribute a fresh copy of **Activity Sheet 7, Part A**, to each student. Have them observe their terrariums and complete their activity sheets. Collect and save the activity sheets at the end of each observation session. Students will need to look at them again during Session II.

Help the students add observations and ideas to the Colorful Anole chart during the ongoing observation period as well.

Session II

- 6** Begin Session II after having completed Activity 8.

Distribute a copy of **Activity Sheet 7, Parts B and C**, to each student. Also distribute to each student all of his or her copies of **Activity Sheet 7, Part A**. Allow time for students to answer questions on Parts B and C of Activity Sheet 7.

Discuss students' answers to Activity Sheet 7, Parts B and C, by asking, **Now that we have observed them for awhile, what can we say about the behavior of crickets?**

Repeat this process, asking about first earthworm, then anole, behavior.

Additional Information

Students will need to refer to their copies of Activity Sheet 7, Part A.

As students offer answers, write them on the board and ask if other students agree or disagree with the observation.

Focus first on everything except the anoles' color-changing behavior.

Guiding the Activity

7 Ask, **Who can suggest an idea about when anoles are usually green? Brown?**

Tell students that research has shown that the color changes actually occur in response to temperature, light intensity, and the emotional state of the lizard. Challenge students to see if this information helps them make sense of their observations.

8 Write *camouflage* on the board. Say that when something is **camouflaged**, it blends in with its surroundings.

Ask, **Why would it be good for an anole to blend in with its surroundings sometimes?**

Ask, **How do anoles camouflage themselves?**

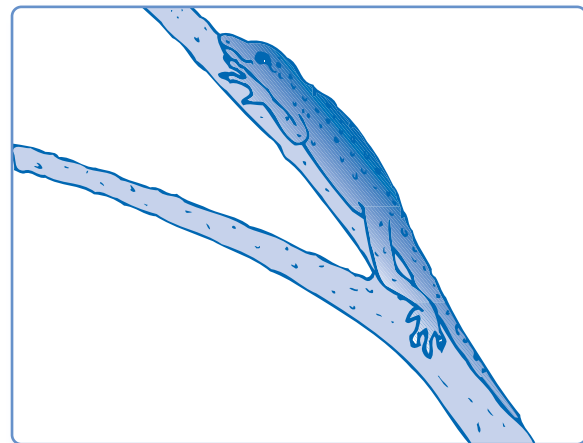
Additional Information

Again, list students' suggestions on the board and invite other students to agree or disagree. During this process, you may want to refer to the comments written on the Colorful Anoles chart, to make sure all the observations of the students are included in the discussion.

Have students check to see how the anoles' color related to the temperatures they recorded. Below 18° C (65° F), for example, the anoles are usually brown.

Certain other animals may want to catch and eat any anole they see. But if an anole is camouflaged, those animals may not even be able to see it!

Anoles often flatten their legs and body to twigs, making themselves look like a piece of wood (see Figure 7-2).



▲ *Figure 7-2. An anole flattening itself to a twig.*

Guiding the Activity

9

Ask, **Has anyone observed the anoles eating? What did they eat? How do they catch their food?**

Write *producers* on the board and ask, **Are anoles producers?**

Remind students that a **producer** is a green plant that can produce food from sunlight, carbon dioxide, and water.

Write *primary consumers* on the board and ask, **Are anoles primary consumers?**

Tell students that a **primary consumer** is an animal that eats green plants.

Write *secondary consumers* on the board. Tell students that **secondary consumers** are animals that eat primary consumers. Ask, **Can we call anoles secondary consumers?**

Ask students to help you create a food chain diagram for the anoles, the crickets, and the grass.

Additional Information

In the terrariums, the anoles ate crickets. They catch them by lunging at them and trapping them in their mouths. Sometimes they hold a cricket half-in and half-out of their mouths, slowly swallowing it.

No, only green plants are producers.

No, primary consumers eat plants and anoles do not eat plants—they eat crickets.

Yes, anoles eat crickets that eat plants.

grass → cricket → anole

REINFORCEMENT

Have students do research and design experiments to better understand aspects of cricket and anole behavior. For example, they may want to add various items to a terrarium to see if the crickets and anoles climb on them, or vary the temperature or light in a terrarium to see if this affects the color of the anole in it.

SCIENCE JOURNALS

Have students place their completed activity sheets in their science journals.

CLEANUP

Once again, collect all copies of Activity Sheet 7, Part A, and save them for use in Activity 9. You may choose to leave the Colorful Anoles chart up for the remainder of the activities.

SCIENCE AT HOME

Have students observe behavior of household pets and describe their predictable behaviors, including favorite resting locations, response to student coming home, behavior when hungry, and so on. Challenge students to decide if their pets are primary consumers or secondary consumers.

Connections

Science Extension

- ▶ Students can test the mistaken belief that anoles change color to match their surroundings by placing them on sheets of construction paper of different colors, including green and brown. Provided that the room temperature is between 70°–85°F, probably all of the teams' anoles will turn bright green when handled and placed on paper of any color. Explain that bright green is an anole's natural color when it is active or when it feels uncomfortable or frightened. Let each team leave its anole undisturbed on the paper (any color) for awhile to see whether it changes to brown. Explain that brown is an anole's natural color when it is calm, comfortable, and at rest. Ask students to review the Colorful Anoles chart and try to find specific examples of these relationships between color and activity/comfort level.
- ▶ Students will undoubtedly be curious about whether their team's anole is a male or a female. Tell them that females are usually smaller and narrower than males and have a more pointed head. The most telling feature, though, is the flap of loose skin that hangs down below the throat. When faced with another male anole, a male will dilate this skin into a fan, revealing bright red skin between the scales on the flap. A female may also display a fan, but it is smaller and duller in color than a male's fan. The best way to tell whether an anole is a male or female is to place a small mirror in the terrarium. A male will usually display his fan in response to his reflection.
- ▶ Students may have noticed two crickets fighting in a terrarium. Explain that adult male crickets fight to determine which one is the "top" cricket in the area and to establish and defend individual territories. Give students an opportunity to observe cricket territoriality by setting up a larger

terrarium containing three or four male crickets and several protected nooks, such as rocks, dead leaves, or small branches. Before placing the crickets in the terrarium, put a tiny dot of different color paint on each cricket's head or back so students can tell the crickets apart. When the crickets are placed in the terrarium, students may see them fighting initially, but in time each cricket will probably establish its own territory and stay in it most of the time.

Science Challenge

- ▶ The American chameleon's natural pattern of bright green when active and brown when at rest (see the first Science Extension connection) has protective value. Ask students to think about an anole's surroundings in nature and to suggest how these skin colors would help an anole survive. (An active green anole moving around in a tree or bush would look like green leaves stirring in a breeze, and a resting anole would look like a brownish branch or twig—making the anole more difficult to see in both cases.)
- ▶ Encourage students to research other examples of camouflage in nature. Many science textbooks and library books contain dramatic photographs of camouflage in various types of animals. Also suggest that students find out what mimicry is and find pictures of examples.

Science and Social Studies

Ask students to investigate human uses of camouflage—for example, by the military, by hunters in early societies, and by wildlife photographers today. What is (or was) the purpose of the camouflage in each of these cases? Why are hunters today advised to wear brightly colored clothing rather than camouflage?