



## The Lone Anole

### HOW TO USE THIS RESOURCE

The following activity uses the image “The Lone Anole” to begin a discussion about which structures or behaviors in an organism could be considered adaptations and elicit student thinking about variation within populations. The “Procedure” section provides questions and discussion prompts, as well as suggestions for how to implement this activity in your classroom. The image, as used in this activity, can serve as an anchoring phenomenon for a set of lessons exploring adaptations and natural selection.

### KEY CONCEPTS

- Variations in one or more traits may provide members of a population a survival and/or reproductive advantage over other individuals.
- Adaptations are traits that are common in a population or species because individuals with the trait have an advantage in survival and/or reproduction in a particular environment compared to individuals without the trait. Adaptations arise through the process of natural selection.
- The anole’s dewlap is an example of an adaptation.

### STUDENT LEARNING TARGETS

- Describe structures and behaviors of the pictured anole that may be adaptations to its environment and how variations in these traits may affect survival and/or reproduction.
- Describe evidence they would need to collect to support or refute a claim that a particular structure or behavior is adaptive in a particular environment.

### NGSS PERFORMANCE EXPECTATIONS

HS-LS4-4: <https://nextgenscience.org/pe/hs-ls4-4-biological-evolution-unity-and-diversity>

HS-LS4-5: <https://nextgenscience.org/pe/hs-ls4-5-biological-evolution-unity-and-diversity>

### KEY TERMS

adaptation, behavior, reproduction, species, structure, survival

### TIME REQUIREMENTS

- One 50-minute class period

### BACKGROUND

Anole lizards are a highly diverse group, with nearly 400 known species, of which around 150 are found in the Caribbean. The image used in this activity is that of a male Plymouth anole on the island of Montserrat in the West Indies displaying its bright yellow dewlap, the flap of skin attached to its throat. Male anoles usually keep their dewlaps hidden unless they are challenged by another male or need to impress a female. The dewlap of each anole species has a characteristic color and shape. Along with the species-specific head bobbing behavior, the timing of the dewlap display serves as a way to communicate with members of the same species and as a threat to ward off predators.

**PROCEDURE**

1. Divide students into groups of two or three.
2. Ask each group of students to examine the image in their handouts and note structures or features of the anole in the photo. You may prefer to print the pictures in black and white, if you can project in color, and have students directly annotate specific features.
  - Ask students to identify structures or features of the anole that they would consider to be adaptations.
  - Students may identify the following: color or spots; toe size and length; body size and shape, tail length and width; eye position; dewlap color, size, etc.
  - Have them identify as many possible structures as they can in a specific time period, but note that they should not write why these structures may be considered adaptations.
  - Have students share the structures they've identified between groups (so, in larger groups of 4-6) to look for shared trends in their thinking.
  - It may be helpful to poll the class for structures they identified and list these.
3. Ask each group to select three of the structures they identified and hypothesize on what survival and/or reproductive advantages they might confer to a population of anoles.
  - Students may not recognize the anole's dewlap as an adaptation since it doesn't contribute to camouflage. Allow them to question the role of the dewlap without correcting them or telling them how it is used.
  - As a class, have students share the traits they have selected as adaptations and their hypotheses for what survival/reproductive advantages these traits confer. Once a group shares their trait/hypothesis, record these as a class list. If another group has identified a similar trait/hypothesis, put a checkmark or plus sign next to it, to show class consensus. If you don't have an interactive whiteboard or a way of annotating a slide or document for the class to see, tape a large picture of the anole on a whiteboard or chalkboard and annotate it as groups share out.
  - Once groups have shared, there may be categories of traits they have identified, such as adaptations that are used to avoid predation, find prey or reproduce.
4. Students should then read the caption associated with the image and answer the following question: "How does the anole use its dewlap?" It may also be helpful to show the gif of an anole displaying its dewlap.
5. Have students summarize their answer to the question within their groups and then ask them to consider the following claim: "The anole's dewlap is an adaptation."
  - Ask students to describe at least two kinds of evidence that they would need to collect in order to support or refute this claim. This evidence could be either observational or experimental. It may be helpful to have students divide a white board, piece of chart paper, etc., in half and record each kind of evidence in the appropriate half, leaving space for answering the next prompt.
  - Ask students to explain how their proposed evidence would either support or refute the claim above. Students may note that an adaptation can function in both survival (communication, warding off predators) and reproduction (male-male competition, female choice, etc.). Students should discuss in their groups and record their answers on their white boards, chart paper, etc.
  - If you wish to extend this discussion, you could display a picture of a peacock's feathers (<http://www.hhmi.org/biointeractive/dad-feathers>) to discuss the idea that some adaptations involve a tradeoff between survival and reproduction.
6. Have students extend their thinking through the following prompts:
  - What would happen if an individual male anole was born with a dewlap and/or head-bobbing behavior that was different from those of its species? Consider whether this would decrease or increase the anole's chances of survival and/or reproduction.

- Students are more likely to indicate that variations in a given trait would decrease survival or reproduction than they are to say that variations can increase fitness. Any reasonable answer would be acceptable if students can support their claim. This may be a place to record student questions that you can revisit as you proceed through a unit on evolution.
  - Another anole species was introduced to the island that has a different dewlap color or head-bobbing behavior. Predict how individuals of these two species might interact.
    - Students may predict that the two anole species will compete for resources, eventually driving one species extinct. Another possible answer is that the two species may end up occupying different niches and co-exist in the same island. It may be helpful to ask students to consider both short-term and long-term consequences of direct competition.
7. Have students share their predictions with one another. Have students record their predictions in their handouts or jot them down on Post-it notes (use different colors for each prompt) and then display them on a board for the class to see.
  8. Follow this activity with other related anole resources associated with the *Origin of Species: Lizards in an Evolutionary Tree* short film. As you do, you may revisit student predictions above so that students are given an opportunity to revise, add additional evidence to, or elaborate on their predictions.

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