







- b. "What does that pattern remind you of? Where else have you seen similar patterns?"
- c. "What are some possible explanations for one of the patterns you observed?"
- d. "Do you expect that the patterns you saw might be different during a different season or in a different location? Why or why not?"

## Cause and Effect

- a. "Were there any interesting or unique markings you noticed while doing your species account? What are some possible explanations for them?"
- b. "When we study an organism, we can notice where it is located, what it is doing, its shape or growth pattern, or any evidence of interactions with other species or the environment. This is all valuable information, and each category can be thought of as a mystery to explain. Look back at your notes and discuss these questions:"
  - "Where is the organism located? What are some possible causes of this?"
  - "Did you find any evidence that the [observed organism] may be affected by living or nonliving things in the environment?"
  - "How do you think the [observed organism] might affect the living or nonliving things in the environment?"
  - "How might the interactions we observed be affected by the time of day, year, weather, or location?"
  - "Did you see any interactions between the [observed organism] and the environment? What effect might they have had on each other?"

## Structure and Function

- a. "What were some of the structures you noticed while studying this species? Describe them in detail."
- b. "Pick a structure and think about how it might function or work to help this organism survive in this environment. Connect your explanation with a specific description of the structure and how it works in this environment. For example, don't just say 'Its fur helps it hide.' Say, 'The brown spots on the fur look like they might help it blend in to the dead grass or the hillside.'"

## Systems and System Models

- a. "How do the [observed organism] and the [other thing or organism in area] affect each other?"
- b. "What connections between the [observed organism] and other parts of the ecosystem did we observe? How many others can you think of?"

## Energy and Matter

*Note:* These questions are appropriate for students fifth grade and above.

- a. "Let's construct a partial food chain based on your observations. What did you see eating what? Now expand your food chain to a web based on what you have seen in this area, your prior knowledge, and your best guesses about other relationships between animals."
- b. "Now trace the cycling of matter through the parts of the food chain you just described. Use arrows to show how matter cycles through different parts of this ecosystem."

## FOLLOW-UP ACTIVITIES

### Conducting Further Research

Encourage students to supplement their personal observations with research. Have other scientists seen the same patterns or behaviors that your students observed? Offer resources such as field guides, research papers, or contact information for local scientists so that students can answer their questions and extend their studies. The chapter Teaching Science and Inquiry: A Deeper Dive, following the activities, includes ideas for how students can engage in future research.

### Looking at Others' Field Notes

Grinnell and his colleagues at the Museum of Vertebrate Zoology in Berkeley, California, made detailed species accounts across the western United States to gather distribution and natural history data. The types of information they collected for each species can provide a framework for what students pay attention to whenever they encounter a new species. Students could study these examples of species accounts and use them to guide the observations they make the next time they take notes.