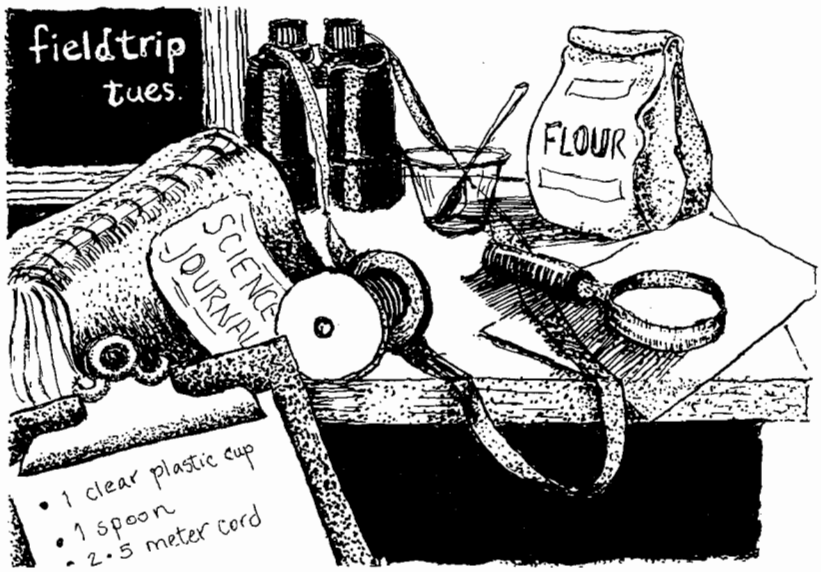
1.2 Preparing for Field Work



Action Synopsis

Students become familiar with what animals and animal signs to look for outdoors, then practice field research skills and methods.

Session 1		**40 minutes**
1. Show and discuss pictures of animals and animal signs.		*familiarizing*
2. Plan and practice field techniques (setting up a study plot, finding animals and animal signs, capturing and observing small animals).		*demonstrating methods*

Session 2		**40 minutes**
1. Practice observation and notetaking skills.		*observing & recording*
2. Prepare a journal page for recording observations and ideas.		*documenting*
3. Discuss how to behave like scientists while doing field work.		*setting standards*

Desired Outcomes

Throughout the lesson, check that students:

✓ Are familiar with some of the animals and animal signs they might see outdoors.

✓ Know how to gather evidence of what animals eat.

✓ Know how to set up a study plot and where to look for animals within the plot.

✓ Are able to use humane techniques for capturing and observing small animals.

✓ Have sharper observation skills, and understand the difference between an observation and an idea.

✓ Are ready to behave like scientists outdoors.

What You'll Need

Session 1

For the class:

- ❑ overhead transparencies of animals and animal signs (see "Getting Ready")
- ❑ set of field equipment:
  - pointed metal or wooden stake, about 60 cm long
  - 2.5 meter cord tied to a metal ring that fits over the stake
  - clear plastic cup
  - plastic spoon
  - cotton swab
  - index card
  - small eraser or piece of chalk

Session 2

For each student:

- ❑ hand lens
- ❑ item to observe (see "Getting Ready")

Vocabulary

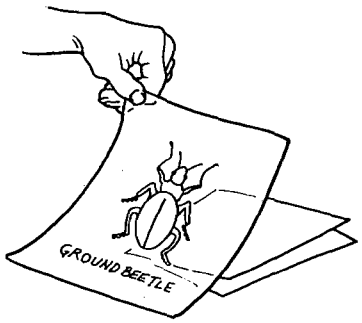
FIELD - Scientists' name for the outdoors.

STUDY PLOT - A small piece of land used for observations.

Getting Ready

Session 1

- Make overhead transparencies using pictures from the *Who Eats What* guide (pages 355–382). First find the habitat description that most closely resembles your study site. Then choose pictures of a few signs of animals from pages 360–364, and several animal pictures from pages 367–381. Animals students are most likely to see include squirrels, sow bugs, millipedes, beetles, and spiders. You might want to enlarge the pictures on a copier so that you have just one image per overhead.



Session 2

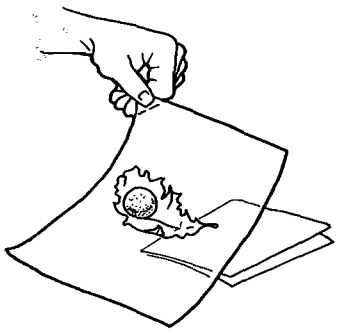
- Gather enough objects so that each student (or every two students) has something to use to practice observation skills. Small stones, dead leaves, pine cones, twigs, or pieces of fruit are appropriate materials. Using items that are similar to one another will allow you to extend the activity by mixing them and challenging students to find the object they observed.

Action Narrative

Session 1

Let's look at some pictures of animal signs we might see on our study site.

Show and discuss the animal signs overheads you've made, pointing out that looking on or among plants provides many clues about animals. Also emphasize that finding animals and animal signs takes careful observation and patience.



One way to find animal signs is to think like Sherlock Holmes. When he walked onto the scene of a crime he looked for things that were out of place or different from usual. On the study site, green leaves and fresh twigs on the ground could mean that squirrels or insects are feeding overhead. Dirt and leaves scraped aside might indicate that an animal is burying or looking for food there. Leaves with holes or edges eaten away could mean that a caterpillar or other insects are eating the leaf. A white coating of droppings on leaves might be the result of a bird that flew over or perched above them. Keeping your eyes open for things that don't appear quite right is a good way to tune into animal activity outdoors.

Now let's look at some pictures of animals we might see at our study site. By thinking about the answers to three questions, we can figure out some information about what an animal eats:

1) Where is the animal located?

2) What sort of body (mouth, eyes, legs, and shape) does the animal have?

3) How does the animal behave?

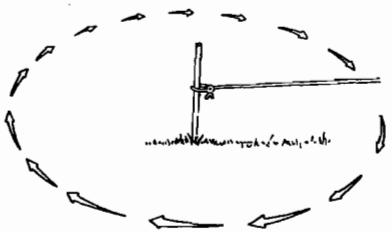
If you show a picture of an earthworm, students might suggest that it is found in the soil near the surface, so there is a good chance it eats something that is in or on top of the soil. It doesn't seem to have eyes or legs. It does have a mouth opening, but no teeth or pincers, so it probably doesn't eat other animals. It stretches and contracts. This helps it get food in the soil, and to avoid becoming food for another animal by retreating quickly from the surface. Have students take this kind of reasoning as far as they can for each animal picture you show.

Scientists always make a plan of action before they start an investigation. What are some things we should plan before we go outside?

Students might mention that they need to decide what they should do, what equipment they'll need, what notes they should take, and how to split up the space and tasks. Give them as much responsibility for deciding how to run the study as possible, trying to strike a balance between encouraging them to develop their own plans and teaching them the field methods described below.

We're going to use some of the same methods ecologists use when they do studies like ours in the FIELD, their name for the outdoors. We'll work in small groups. Each group will have a set of field equipment to make a STUDY PLOT, a small piece of land used for observations.

Show students the field equipment. Ask a volunteer to hold the stake upright on the floor. Slip the ring and cord over the stake and have another student hold the end of the cord so that it is fully stretched.



When you're outside, another team member will walk behind the person holding the cord to sprinkle a flour border in his or her footsteps.

Have the cord holder walk the circumference of the circle, acting like a human drawing compass, while a student follows pretending to sprinkle flour.

The area within your flour circle will be your study plot. Where will you look for animals and animal signs within your plot?

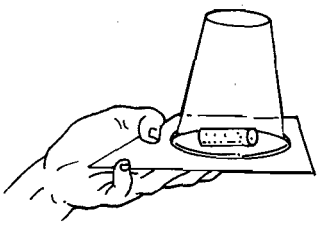
Students might suggest looking under leaves, sticks, rocks, and logs; on leaves, twigs, and trunks; in moist spots, crevices, and topsoil.

In order not to trample any plants, animals, or animal homes, remember to step lightly, touch gently, and move gracefully within your plot. Imagine yourselves "stalking" nature, acting like Native Americans did while hunting, being both aware and respectful.

Have a few students demonstrate stalking around the classroom.

Ecologists often capture small animals for closer observation. How would it feel to be an ant captured by a giant? How would you want to be treated?

Demonstrate three ways that a small animal can be gently captured, using a pencil eraser or a small piece of chalk to represent the animal:



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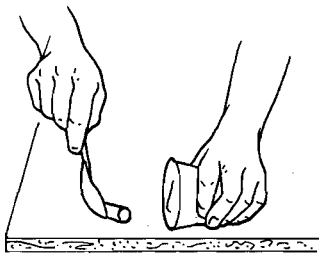

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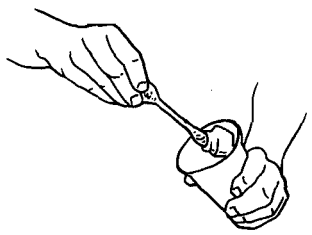


3

1) Put the open end of the cup over the object, then slide an index card beneath it. Once sealed, turn the cup right side up and keep the card on top.

2) Coax the animal into the cup using the spoon.

3) Put the cotton swab in the path of the animal so it will crawl up it, then put the swab and animal in the cup.

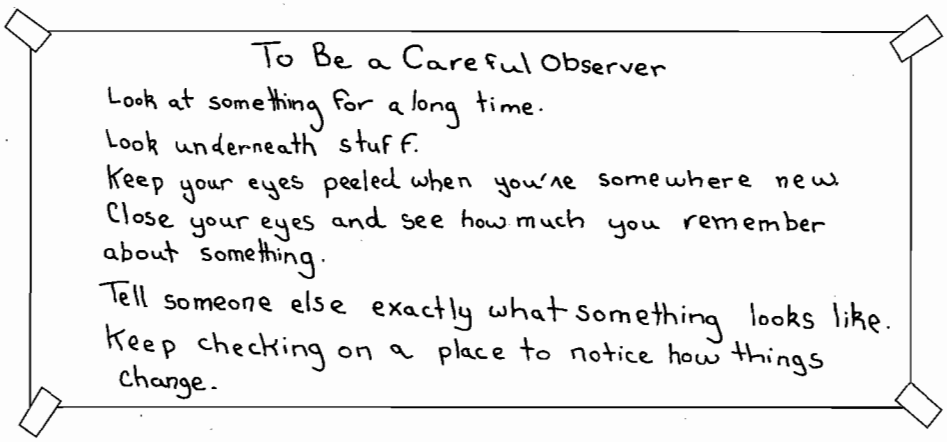
Demonstrate how to use the hand lens through the top, side, or bottom of the cup for closer viewing.

After you observe a small animal, it is important to return it back where you found it. Be sure not to touch animals with your bare hands — for your own safety and for the creature's protection.

Session 2

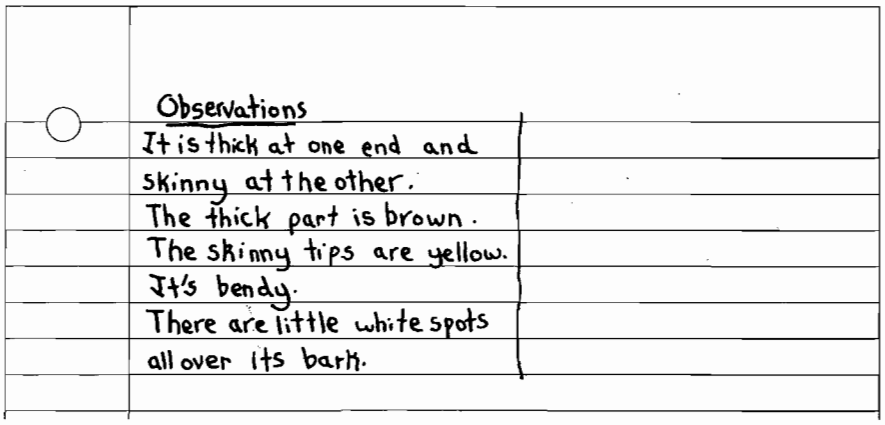
Scientists have to be careful observers. What does a good observer do?

As students list characteristics of good observers, encourage them to talk about times when they have watched something carefully or noticed something that nobody else did. Key qualities of observers include: looking closely and carefully, listening intently, noticing key features, watching something over time, being patient and aware, and practicing these skills often. You might want to record students' ideas on a poster to hang in the classroom, and encourage them to continue to add to or revise the list.



Let's practice observation and recording skills using your science journal. On the left side of a page write "Observations." When I give you something to observe, look closely at it. Then, when you're ready, jot down some words that describe it.

Give each student or pair of students an object to observe (e.g., a twig, leaf, rock). Make your own observations of an object along with the students.



After five or ten minutes, show students a hand lens and demonstrate how to use it. The best approach is to hold the hand lens up to your eye, resting your thumb on your cheek, then bring the object up to the lens, or move your head to the object, rather than moving the lens away from your eye toward the object. Give each student a lens so that they can practice this technique.

Have them record any additional observations of their object they make using the hand lens.

Now, on the top of the right side of the page write "Comments and Questions." As scientists make observations they get ideas and generate questions about what something is, how it works, what it is related to, how it survives, and so forth. Take a few minutes to note some comments and questions about your object.

You might want to share a few examples of ideas you have about the object you've been observing to get students started. Comments can be musings about what made the object look like it does (*Something ate a hole in it*), personal reactions to it (*This rock is pretty*), conjectures (*The twig probably came from a big tree because it is long and thick*), etc. Questions can arise from something puzzling (*Do those white spots have a purpose?*), a desire to know the item's origin (*What kind of tree did this come from?*), general queries (*Do plants have feelings?*), etc.

	Observations	Comments and questions
	It is thick at one end and skinny at the other.	An animal chewed off the tip.
	The thick part is brown.	Why is the bark red?
	The skinny tips are yellow.	
	It's bendy.	
	There are little white spots all over its bark.	

When students are done writing, have them share some of their observations, comments, and questions with a partner, or share them aloud as a class.

If you have used items that are only slightly different from one another, a fun additional activity is to mix them all together and challenge students to find the one they observed.

Conclude the activity with questions such as:

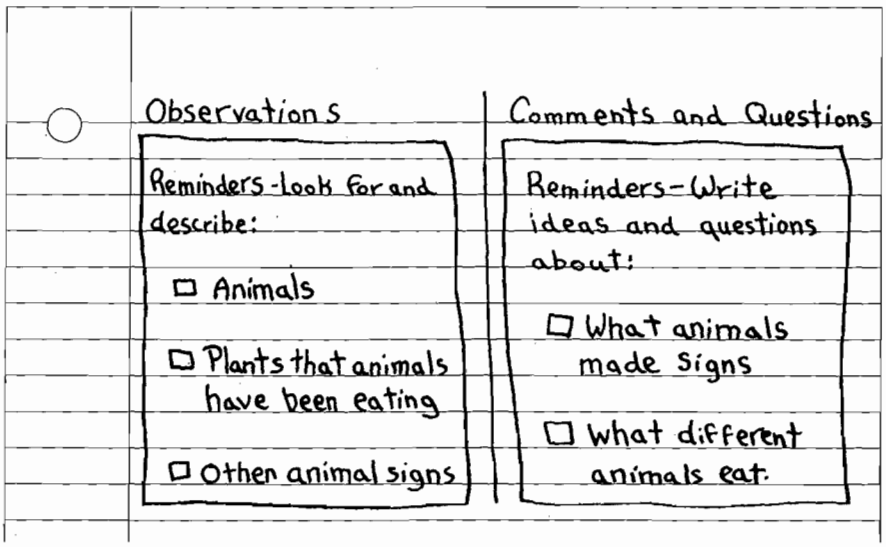
How many new things did you notice after you used the hand lens?
Point out that scientists use tools like lenses to improve and extend their observations.

What happened the longer you looked at the object?
It is amazing how much it is possible to see in one small item just by taking the time to look carefully. This is a particularly useful way to learn to identify plants and animals.

What is the difference between an observation and a comment or idea?
An observation is a statement of fact that anyone who looks at the same item will probably agree with. A comment or idea is more personal, a hunch or an opinion that not everyone would share. Ideas and questions can lead to investigations.

You'll need a place to record notes while we're outside. Scientists always prepare a data sheet to remind them what information to record. Prepare a page in your journals for your notes by drawing a line down the center of an empty page. Write "Observations" on the left half, and "Comments and Questions" on the right side. What kinds of notes will you put in each of these sections?

Students are likely to respond that in the "Observations" section they'll record whatever they see that gives them clues about what animals live on the site and what they eat: animals, plants that animals have been eating, and other signs of animals. In the "Comments and Questions" section they'll write ideas about what they think an animal they saw might eat, what animal might have made a sign they see, as well as questions relating to animals and their food. They might want to note some of these points in their journals to remind them what to record in each section when they're outside.



What other information would be useful to record?

Encourage students to make additional sections for notes they think are important to take, such as: the date, notes about weather conditions, a list of non-living things, an overall description of the site, etc.

One last thing we need to talk about is how scientists behave while doing outdoor research. What are your ideas?

After students have shared their thoughts, add anything they haven't mentioned, such as:

- Outdoors is a place for work, like the classroom, so use time wisely.
- Handle living things and equipment with care.
- Don't damage plants by ripping leaves or bark off trees, etc.
- Stay inside the boundaries of the study area.
- Never put any leaves, berries, mushrooms, etc. in your mouth.

- Don't run, throw things, or chase animals.
- Work quietly so as not to scare away wildlife.
- Don't touch or collect any sort of dead animal, whether it's a bird, mammal, insect, worm, or whatever.
- Don't touch or pick mushrooms.
- Don't touch or collect animal droppings.
- Don't touch human artifacts that are a health hazard (e.g., needles, vials, band-aids, broken glass).
- Don't put anything, including your hands, in your mouth.
- Wash your hands as soon as you come indoors.

If exploring the outdoors is new to your students, talk through any anxieties or fears they have. Help them think of ways to get comfortable with being outdoors, so their emotions don't lead to behaviors that will distract them and others from their tasks.

Ongoing Assessment

Student Reflections

Have students send a C-Mail message or record thoughts in their journals. Optional journal writing prompts include:

Animals I'd like to see and learn more about are...

Times when I've been a good observer are...

Teacher Reflections

- ❑ Do students have ideas of where and how to look for animals and clues about what they eat?
- ❑ Are they prepared to set up study plots, use observation equipment, and take notes while outdoors?

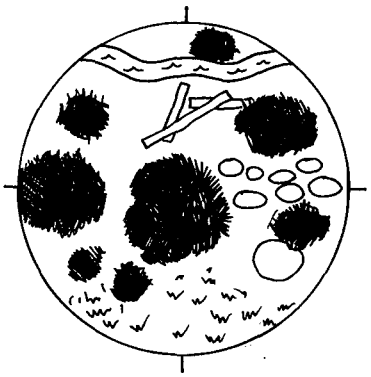
Extensions

Mapmaking Preparation. Making a map of the study site is an optional part of the next lesson. A map of the site's natural features provides a compelling visual nucleus for students' reports, and is a common component of professional field ecologists' reports. Students will need some practice in map making techniques, however, before going outdoors.

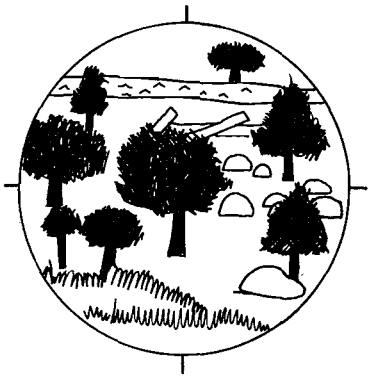
Bring to class, and ask students to collect, examples of site maps, such as from nature center, zoo, and museum brochures. Also try to borrow a survey map of some local land from a realtor or the town or county planning department. Talk about how the scale and purpose of these maps differ from road and continent maps.

Place the map samples at stations that students can visit to observe the different techniques the map makers used. Discuss what they notice about the maps, such as how plants, paths, roads, and other features are represented, and whether or not symbols and a key are used.

You might want to enlist the help of the art teacher in providing instruction and practice drawing maps, perhaps by mapping the classroom. Precise scale is not so important for the study site map as is simply getting the prominent features of the plots drawn in a way that is easy for the viewer to interpret. The maps shown below use combinations of symbols and pictures from two viewpoints: a bird's eye view in which the artist imagines s/he is hovering over the plot looking down on what is there, and a ground level view in which the artist stands at one edge of the plot.



Bird's Eye View



Ground Level View

Before going outside, students might want to make a key of symbols for common objects such as dead logs, pine trees, other trees, shrubs, small plants, and rocks. They can refine and add to these symbols once they are outside.

Finally, help students make a map template by drawing a circle on a piece of unlined paper to represent their study plot This is best done with a compass (or a string tied to a pencil), or by tracing a circular object. Ask them to imagine the circle as a clock face and make short lines at 12, 3, 6, and 9 o'clock. At the top of the circle (12 o'clock), have them write a large N for north. When they are outside students can use flour to mark these same lines on their plot circle, to use as guides for placing features on their map.

More Observation Practice. Take the class outdoors. Set boundaries. Then give students about ten minutes to find a plant or non-living object and write a description of it. Have them exchange their descriptions with a partner, and try to find the object their partner has described. When they have found it (either on their own or with their partner's help), have them add as many new written details as they can to the original description. Once back indoors, discuss why it was easy or difficult to find the objects and how the activity helped them sharpen their observation and recording skills.