



# Observing Nature

**Grade:** 2

## Subject Areas:

Life Science, Earth Science, Art, Investigation and Experimentation

**Skills:** exploring, collecting, describing, making connections, observing

**Duration:** 1-2 hours

## Connections:

natural history, microscopes, nature journals, ecology, art, physical education

## Vocabulary

nature  
natural  
nature appreciation  
scale  
patterns  
observations  
ecology  
ecologist  
ecosystem

## Objective:

Students will gain a greater appreciation of nature by viewing natural objects closely while looking for patterns.

## Materials

- a collection of natural things
- magnifying glasses or loupes
- small paper bags
- pictures of highly magnified objects
- digital microscope attached to a computer (optional)
- digital cameras and a printer (optional)
- 2 3 x 5 index cards per student
- a collect of seeds, leaves, and other natural objects
- scissors (one per student)
- glue
- colored markers

## Standards

### Strands: Excellence in Environmental Education Guidelines

**Strand 1 — Questioning and Analysis Skills: B) Designing investigations:** Learners are able to design simple investigations.

#### Strand 2.2—Environmental Processes and Systems

**A) Organisms, populations, and communities:** Learners understand basic similarities and differences among a wide variety of living organisms. They understand the concept of habitat.

**C) Systems and connections:** Learners understand basic ways in which organisms are related to their environments and to other organisms.

#### Strand 2.4—Environment and Society A) Human/environment interactions:

Learners understand that people depend on, change, and are affected by the environment.

### California State Educational Standards:

**Life Sciences 2d:** Students know there is variation among individuals of one kind within a population.

**Investigation and Experimentation: 4f:** Students will use magnifiers or microscopes to observe and draw descriptions of small objects or small features of objects.

**I and E 4g:** Students will follow oral instructions for a scientific investigation.

# Background

## Natural Beauty

There are many definitions for the word nature. According to Gary Snyder, a nature poet, humans attach two different meanings to this word. **Nature** can be viewed as the same thing as **natural**. In this context it takes on the same meaning as the “essence” of something. Nature would include not only a meadow or a mountain, but also a human expression or a machine. This is using the word nature in a very broad context. More often, the word nature means the same thing as “the outside”. In this case, it is viewed as everything natural with the exclusion of those things man-made. In this sense, a building in a city would not be considered nature, however, a park within a city, would. When it comes to getting young students to appreciate nature, the latter meaning is used.

**Nature appreciation** for children or anybody for that matter, encourages an affinity for the natural world. In this case, nature includes humans and their interactions with the environment with a hope of nurturing a sense of wonder. When Richard Louv, wrote the book, *The Last Child in the Woods*, he used the word nature this way: “...in a general way I mean natural wildness: biodiversity, abundance,—related loose parts in a backyard or a rugged mountain range”. Nature in this view is finding little pieces of “wild” in order to reveal their uniqueness or their connectedness to other things.

In this lesson, a closely magnified view of nature is encouraged. When observing things under magnification a whole new scale emerges. As one

contemplates the nature of things, scale becomes important. **Scale** is usually measured according to size. The length of an adult human leg is about one meter. The size of something very small but still visible by the human eye is about 1/10th of one millimeter (mm) or about half the size of the period following this sentence. (1 mm is 1/1000th of a meter.) A human skin cell is about 1/40th of a millimeter or 25 microns. There are 1,000 microns in one millimeter.

In this lesson, students will view a variety of natural objects to discover **patterns**. Some patterns observed may include geometric shapes like spirals, polygons, and circles. Others may be more familiar to children like numbers, letters, smiley faces, logos, or cartoon characters. These types

of associations are called analogies. An **observation** is the act of noting or recording a fact or occurrence. Observations can lead to asking questions and are a critical step in the scientific process. By observing patterns, relationships are developed.

## Studying Ecology

While observing natural objects under magnification, students will build analogies or make comparisons to the things that are more familiar to them. For example, bark under magnification might remind someone of their favorite cereal or a close up view of a feather might remind one of a paint brush. Close observation is one of the first steps to understanding and

## Local Connection

### The Hidden World of Fungi

The mild wet winters along the Pacific Northwest produce favorable conditions for a variety of fungi. Different groups of fungi include yeast, mushrooms, molds and rust. Fungi are nature's recyclers. They are not plants and therefore do not use sunlight as food. Instead, like animals, fungi need to consume to get their energy requirements.

On the forest floor one might see a host of different mushrooms. A mushroom is the temporary fruiting body of a much larger underground organism called mycelium. An umbrella shaped mushroom typically has a fleshy cap with gills underneath. The spores are held within the gills until the right conditions exist for their release. Spores can be spread by wind, rain and animals. The fleshy cap sits upon a stem called a stipe.

Below ground the mycelium is made of tiny thread-like structures called hyphae. Mycelia (plural) secrete the enzymes necessary to break down organic matter. Many trees as well as other plants have mutualistic partnerships with mycelium. The fungus gets food from the tree and the tree is better able to absorb water and essential minerals from the so called mycorrhizal fungus.

learning the science of ecology. The word **ecology** originates from the Greek word “oikos” meaning house. The suffix “ology” means to study. So the literal translation is, the study of a house or a household. The study of ecology has only recently become a diverse field of study, and is a very critical one, especially with the onset of rapid alteration of the landscape happening today.

The Earth and all living things are extraordinarily complex and nearly impossible to study all at once.

**Ecologist** attempt to study the interrelationships of organisms and their environment which is no easy task. They, therefore, limit their study to a particular **ecosystem** where the interrelationship between living things and physical things are studied.

---

## Changing Things Up

---

Plants and animals have adapted to their surroundings over time through a process called natural selection. Natural selection allows us to understand that all life originated from a primordial beginning. For instance, all the different body plans we see today in animals, can be traced back to about 500 million years ago. If one studies animals, many reoccurring patterns or themes appear, like symmetry. When something has symmetry two sides appear the same along one axis. Humans and butterflies have symmetry. Another pattern one can see while studying animals is the fact that many have a distinct head and tail region. One end absorbs food, while the other gets rid of waste. This body plan also allows an animal to travel in a forward motion and better sense the world around them.

Other patterns and cycles seen in nature include seasonal fluctuations. Animals are often born in the spring

to take advantage of more food in the summer months. In most places, flowers bloom in the spring and go to seed in the fall. Trees lose their leaves in preparation for the cold of winter and some animals go underground or migrate to warmer areas at this time. Natural cycles include the circular pattern of birth, life, and death; or the process of decay and renewal. Young children, however, may not be able to make these broader connections to the natural world.

By taking the time to study objects up close, hopefully one can begin to interpret the world around them and find relationships. Interpretation is the process of making meaning out of something. It is another important component of the scientific process. By finding patterns in nature, children can find a sense of wonder in the natural world and begin to make connections to the different scale of things.

# Activity 1: The Private Eye (an exploration of natural things)

## Preparation

Find a natural area near the school where kids can collect things and take pictures. Possible objects include rocks, bones, moss, tree bark, flowers, mushrooms, dead insects, spider webs, shells, leaves, and sticks. If there is not a good source of things near the school or if the weather is too lousy to go outside, find another source and collect things ahead of time. It is important to include a variety of things for this activity.

## Procedure

1. Discuss with the students the concept of nature or natural things. Begin by asking some questions.
  2. Show a picture of something greatly magnified and ask the students to guess what it is. This works best by showing the class a common thing, like a leaf, and then magnifying it on a computer screen for all to see. It may be that they instantly say something like, "I see veins" or "the veins look like a river". Use this opportunity to excite the kids about a hidden world that exists if you know how to find it. Explain to them that secrets are revealed when we see things up close and magnified. In this activity, they are encouraged to look for patterns. Make it clear, that they are searching for the patterns in nature. This means that they should find natural objects that remind them of something else. Give them or show them a few examples of this. An option is to place several things on a tray and take it away quickly to see how many things they observed in just a few moments.
  3. Before you begin taking them on a nature walk, take the time to explain to the students the meaning of the word ecology. Write it on the board and

## Materials

- a collection of natural things
- magnifying glasses or loupes
- small paper bags
- pictures of highly magnified objects
- digital microscope attached to a computer (optional)
- digital cameras and a printer (optional)

explain what an ecologist does. Explain that they will be observing natural things up close using loupes or magnifying glasses and that close observation is the first step to becoming an ecologist. This may be a good time to bring up Dora the Explorer. It might be fun to have them pretend they are explorers.

4. Give every student a brown paper bag and explain to them what they are allowed to pick up. Avoid broken glass, poison oak and other hazards. It is important to set some clear guidelines. You may want to break the students up into two groups. Have them bring their items back to the classroom and observe them up using a loupe or magnifying glass. This can also be done outside. An option is for them to write or draw about their exploration in a nature journal.

- *What do you think of when I say the word "nature"?*
- *Where can we see nature? What kinds of things have you observed in nature?*
- *Can we observe nature at home? At school?*
- *Do you think humans can see every natural thing around them?*
- *What kinds of things can we not see?*
- *What tools do we have that allow us to see the secret world of tiny things?*
- *What do we mean by magnification?*

*"It is a wholesome and necessary thing for us to turn again to the earth and in the contemplation of her beauties to know of wonder and humility."*

*—Rachel Carson*

## Activity 2: Peek-a-boo Patterns

### Preparation

After the students have had time to explore their collected objects during Activity 1, have them pick a pattern seen in something else (an analogy). For instance, an insect may have chewed through a leaf to make it look like the letter “s” (objects can be collected for them ahead of time as well.) Using photographs or drawings of natural objects are further options. The selected pattern will be hidden behind a window on a peek-a-boo card. When they open up the window the pattern they have selected will be revealed.

### Procedure

1. Have at least two index cards for each student. Have them paste their selected object with the “pattern” onto it to the bottom card. Using a pencil, have them lay the top card on top and mark the spot. Next, they need to carefully cut the necessary shape out except about a one inch segment (they make a window). They need to

make a clear fold at the one inch margin so they can open and close the window. Once they have cut the window out of the top card, have them glue it in place. The top card can be decorated and labeled however they want. This exercise takes some imagination and some students may need some help.

2. After most students are done

### Materials

- 2 3 x 5 index cards per student
- a collection of seeds, leaves, and other natural objects
- scissors (one per student)
- glue
- colored markers

making a card, have them share it with others. Each student who wants to participate should stand up and tell the class what pattern they see in their object. Have them take turns and share their experiences.

## Extensions

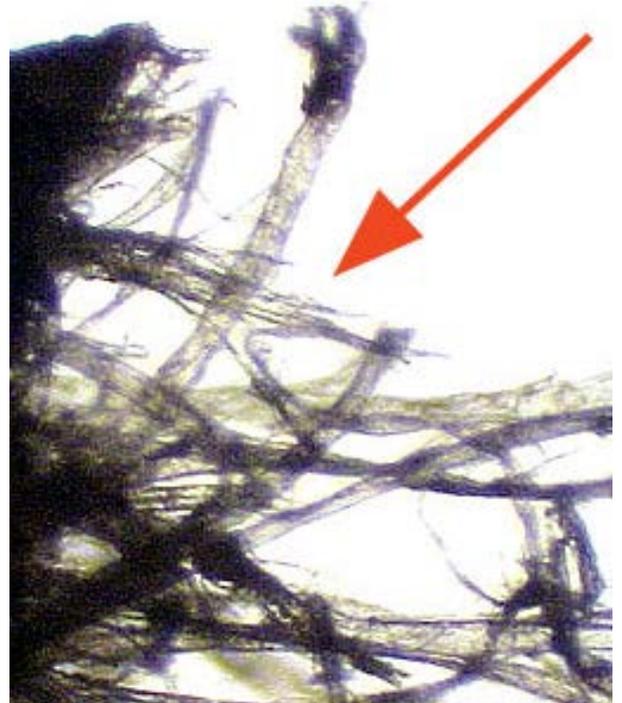
- Have students find patterns in music by playing various rhythms and/or songs.
- Begin a nature journal.
- Find patterns using picture books including subjects like astronomy, geology, weather, forests, and animals.
- Compare natural areas of California to natural areas in other parts of the world.
- Use magnification to introduce rocks, fossils or soils to the class.
- Introduce students to geometric patterns or tanagrams after looking at patterns in nature.
- Use the topic of invisibility to discuss concepts we cannot see like gravity and magnetism.

## References

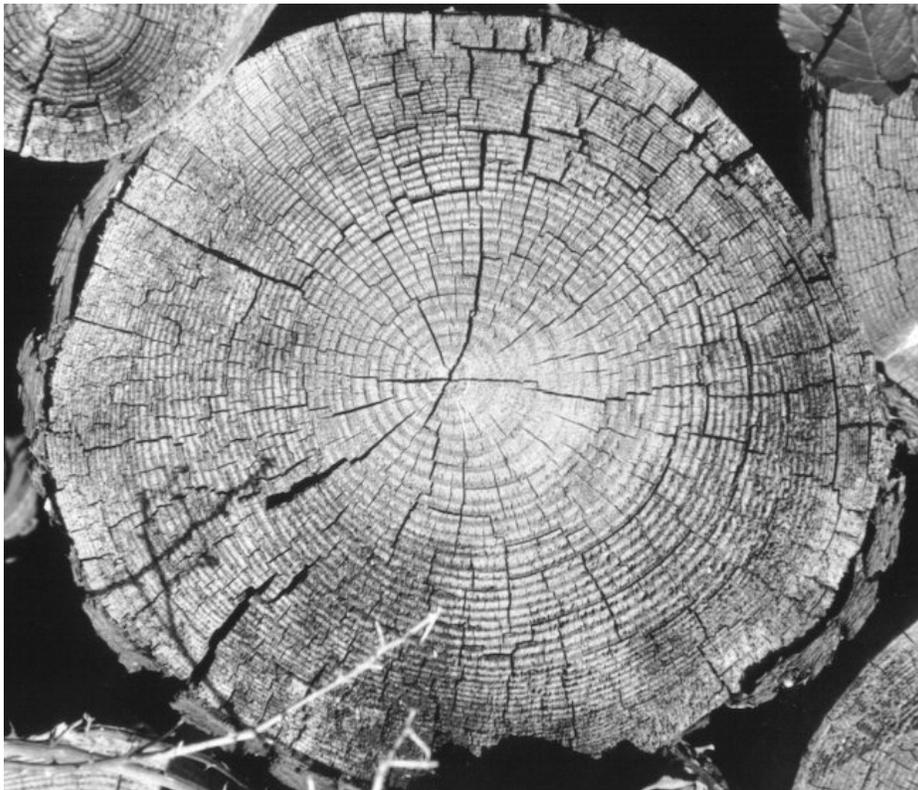
- Patterns in Nature Lesson, Teacher's Net Lesson #3245 <http://teachers.net/lessons/posts/3245.html>  
Ecology, <http://www.eco-pros.com/ecology.htm>  
Kids Do Ecology, <http://kids.nceas.ucsb.edu/ecology/ecoindex.html>, 2010  
Louv, Richard, Last Child in the Woods, Saving our Children from Nature-Deficit Disorder, Algonquin Books of Chapel Hill, pgs. 1-10, 2005  
Photos of Patterns in Nature: [http://atschool.eduweb.co.uk/sirrobohitch.suffolk/patterns\\_nature/](http://atschool.eduweb.co.uk/sirrobohitch.suffolk/patterns_nature/), 2010  
Ruef, Kerry, The Private Eye, Looking/Thinking by Analogy, The Private Eye Project, 2003  
The role of mushrooms in nature, <http://www.agroforestry.net/overstory/overstory86.html>, 2011  
What is a mushroom? <http://americanmushrooms.com/basics.htm>, 2011



© W.P. Armstrong 2001



<http://waynesword.palomar.edu/traug99.htm>



<http://atschool.eduweb.co.uk>