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The Natural Inquirer Monograph Series



The Morel of the Story





The *Natural Inquirer*

Monograph Series

The Morel of the Story: Comparing Scientific Research With Local Mushroom Hunters' Knowledge of Morel Mushrooms

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Cradle of Forestry in America Interpretive Association

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The Morel of the Story:

Comparing Scientific Research
With Local Mushroom Hunters'
Knowledge of Morel Mushrooms



Join us in being green!

The following Educator Resources are now available exclusively on the *Natural Inquirer* Web site, <http://www.naturalinquirer.org>. Click on the "The Morel of the Story" cover or go to "Educator Resources" to access these resources:

- Note to Educators
- Lesson Plan for "The Morel of the Story"
- Possible Answers to Questions in the Reflection Sections



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WHO ARE SCIENTISTS?



Scientists are people who collect and evaluate information about a wide range of topics. Some scientists study the natural environment.

To be a successful scientist,
you must:

Be curious:

Are you interested
in learning?



Be enthusiastic:

Are you excited about an
environmental topic?



Be careful:

Are you accurate in
everything that
you do?



Question everything:

Do you think about
what you read
and observe?



Be open-minded:

Are you willing to listen
to new ideas?



Welcome to the *Natural Inquirer* Monographs!



Scientists report their research in a variety of special books. These books enable scientists to share information with one another. A monograph is a book about research that focuses on a single science project.

This monograph of a *Natural Inquirer* article was created to give scientists the opportunity to share their research with you and other middle school students. The monograph presents scientific research conducted by scientists in the Forest Service, U.S. Department of Agriculture (USDA). If you want to learn more about the Forest Service, you can read about it on the inside back cover of this monograph, or you can visit the *Natural Inquirer* Web site at <http://www.naturalinquirer.org>.

All of the research in this *Natural Inquirer* monograph is concerned with the natural environment, such as trees, forests, animals, insects, outdoor activities, and water. First, you will “meet the scientists” who conducted the research. Then you will read about one of the many interesting aspects of science and about the natural environment. You will also read about a specific research project. The research article is written in the format that scientists use when they publish research in scientific journals. Then YOU

become the scientist as you go through the FACTivity associated with the article. Don’t forget to look at the glossary and the special sections highlighted in the article. These sections give you extra information that is educational and interesting.

At the end of each section of the article, you will find a few questions to help you think about what you have read. These questions will help you think like a scientist. They will help you think about how research is conducted. Your teacher may use these questions in a class discussion, or you may discuss these questions in a small group.

Each *Natural Inquirer* monograph will help you explore the exciting world of science and prepare you to become a young scientist. You will learn about the scientific process, how to conduct scientific research, and how to share your own research with others.

Visit <http://www.naturalinquirer.org> for more information, articles, and resources.



Editorial Review Board

Watersmeet School

Watersmeet, Michigan

Mrs. Nan Powell's Class

The most important thing I learned was not to eat wild mushrooms no matter where you find them.

Never eat a wild mushroom unless with a mushroom hunter.

What happens to mushrooms in the winter?

How long do you have to study to be a morel mushroom hunter?

Add more pictures so we can picture what it looks like in real life.

I like that you included where it is (on a map).

More captions and pictures of mushrooms.

The most important thing I learned is the mushroom population may be decreasing.



What Is Mushroom Hunting?

Mushroom hunting is just one of the terms used to describe searching for wild mushrooms. Other terms include mushrooming, mushroom picking, and mushroom **foraging**. In the wild, mushrooms grow only in particular places at certain times of the year. Some mushrooms, for example, are found only near particular tree **species**. Mushrooms are hunted throughout Europe, Asia, and North America.

Glossary words are in **bold** and are defined on page 18.

Becoming a successful mushroom hunter is difficult. In many countries, mushroom-hunting skills are passed down from parents to children. Learning to positively identify **edible** mushrooms is important, because many mushroom species are deadly. Deadly mushrooms can look almost exactly like edible mushrooms. A microscope is sometimes needed to distinguish edible mushrooms from deadly ones.



Warning! Never eat a mushroom found growing outdoors unless you are with an experienced mushroom hunter. Remember that experienced mushroom hunters have taken years to learn mushroom identification. Never give a wild mushroom to anyone else. When you see a mushroom growing outdoors, observe it, but leave it alone.

Most mushroom hunters gather (or pick) the mushrooms they find to cook and eat. Mushrooms may also be hunted but are not gathered. Finding a particular mushroom species is a special skill that takes years of practice. Mushroom hunters not only know much about mushrooms;

they also know a lot about mushroom **habitat**. Mushrooms are found in fields, forests, yards, and even near the ocean. The next time you see mushrooms growing outdoors, stop and observe them. But remember, don't touch them!

The Morel of the Story:

Comparing Scientific Research With Local Mushroom Hunters' Knowledge of Morel Mushrooms

MEET THE SCIENTISTS!

Dr. Marla Emery, Geographer ►

My favorite experience was interviewing a man who grew up gathering plants in the forests. He had a lot of experience. He helped me understand many things about how local communities use and benefit from forests.

As we were driving around one day, he stopped his truck. He took me to a place where service berries and huckleberries grow close to each other. "This is one of my favorite flavors," he said. He showed me how to pick some of each and pop them into my mouth at the same time. He was right. It's a delicious combination. He reminded me, however, that some wild berries can be deadly. Wild berries should not be eaten unless you are with someone who knows which berries are safe to eat.



What Kind of Scientists Did This Research?

- **geographer:**

This scientist studies Earth's natural environment and human society.



► **Dr. Elizabeth Barron,**
Geographer

My favorite experience is hiking and looking at plants and trees. I never thought much about mushrooms until I started the morel (mò **rel**) mushroom project. At the time, I did not know much about morel mushrooms and, especially, did not know how to find them in the forest.

To prepare for the project, I spent several months reading about morel mushrooms. I learned how important they are to local people and local culture in Maryland. Maryland is located in the United States Mid-Atlantic region. After reading about mushrooms, I was anxious to see my first morel mushroom. I went to Maryland to do **preliminary** fieldwork for the project.



On my first interview, the man I was talking with offered to take me out to look for morel mushrooms. We found eight that afternoon. I'll never forget the feeling of seeing a morel for the first time, growing right out of the soil. It was a total thrill, and, as they say, the rest is history! In this photo, I am holding morel mushrooms.

Thinking About Science

Think about one thing you have learned from your own observation and experience. Let's say you have observed that 2-year old children usually cry when they do not get their way. Do you think your own knowledge is less or more accurate than scientific knowledge on the same topic? How does your own learning compare with scientific learning?

In this study, the scientists were interested in comparing what local people have learned from experience with what scientific research has shown. In this case, the topic was the places and times to find wild morel mushrooms. Wild morel mushrooms are hunted and harvested for their flavor. Some people have hunted morel mushrooms since they were young. The scientists in this study wanted to compare what these people have learned with what scientific studies have shown about where and when morel mushrooms can be found.



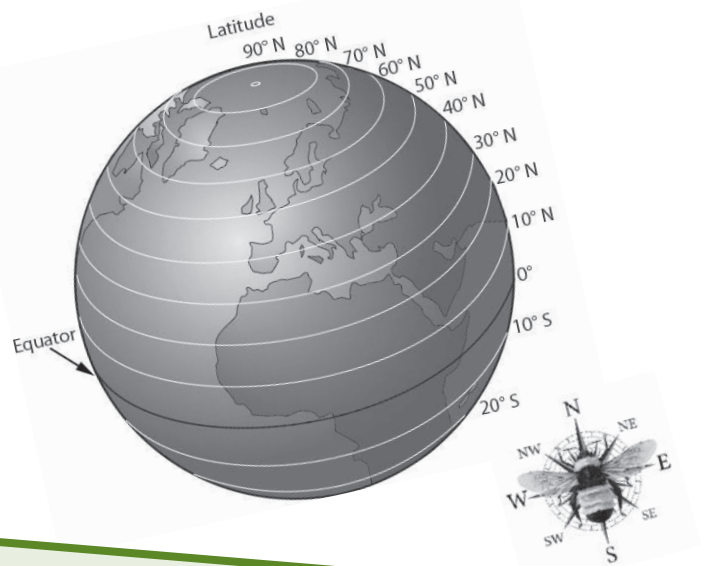
Thinking About the Environment

Mushroom hunting is a favorite pastime of many people. Mushrooms are hunted in the wild and often are gathered to be eaten. Mushroom hunting is a **specialized** skill that takes years to learn. Wild mushroom species are difficult to identify, and many wild mushrooms are poisonous. No one, therefore, should eat a mushroom found in the wild unless he or she is with an experienced person who can positively identify the **species** as safe to eat. Some poisonous mushrooms look a lot like edible mushrooms. This resemblance between some safe and poisonous mushrooms is why mushroom hunting is a skill that takes years to learn. Mushroom hunters often say, "When in doubt, throw it out."



In this research, the mushroom being hunted is called a morel. Morels are found throughout the Northern Hemisphere (figure 1). Morel mushrooms are part of an underground fungus. The part of a mushroom that you can see is the fruiting body. The fruiting body of morels is seen in the spring. Morels are often found near certain trees, such as elm, ash, and apple trees. Morel hunters look forward to hunting in their favorite places each spring.

Figure 1. The Northern Hemisphere is the area of Earth north of the equator. Illustration by Samantha Bond.



Are Wild Mushrooms Safe To Eat?

Never eat a mushroom that you find outside, whether it is growing in your yard, in a forest, or anywhere else. The only exception to this rule is if you are with an experienced adult mushroom hunter who has identified a mushroom as safe to eat. Never give a wild mushroom to someone else to eat. Some mushrooms can make humans very sick, and some can even be **fatal**.



Introduction

Morel mushrooms are found across the Northern Hemisphere (see figure 1). Because morels are found in so many places, they can look different and are found in many different habitats (figures 2a-2c). Not much scientific research has been done on morels growing in the Mid-Atlantic region. In the Mid-Atlantic region, therefore, morel **ecology** is still a mystery. To learn more about morel mushrooms, the scientists reviewed research about these mushrooms from the Pacific Northwest region (figure 3). Morels grow, among other places,

Figure 2a



Figure 2b



Figures 2a-2c. Many species of morel mushrooms are found in Earth's Northern Hemisphere. These species include the yellow morel (a), the half-free morel (b), and the black morel (c).

Photos by Chris Evans, Illinois Wildlife Action Plan and courtesy of <http://www.bugwood.org> (2a and 2b) and Joseph O'Brien, Forest Service and courtesy of <http://www.bugwood.org> (2c).

Figure 2c





Figure 3. The Pacific Northwest region of the United States.

in national parks of the Mid-Atlantic region (figure 4). Some park managers were worried that the morel **population** might be declining in these national parks. If the morel population is declining, the managers might need to limit the number of mushrooms that local hunters could gather each year. Little research had been done on morel populations in this region. The park managers, therefore, asked the scientists to study morels in the Mid-Atlantic region's national parks.

The scientists decided to ask questions of morel hunters living in the Mid-Atlantic region. The scientists believed that local

mushroom hunters had a lot of knowledge about morels. The scientists wanted to compare the mushroom hunters' knowledge with the knowledge produced by scientists in the Pacific Northwest region. By combining research findings with local morel hunters' knowledge, the scientists hoped to better understand the morel population in Mid-Atlantic national parks.



<http://www.naturalinquirer.org>
Cartographer: Lindsay Gnan 2013

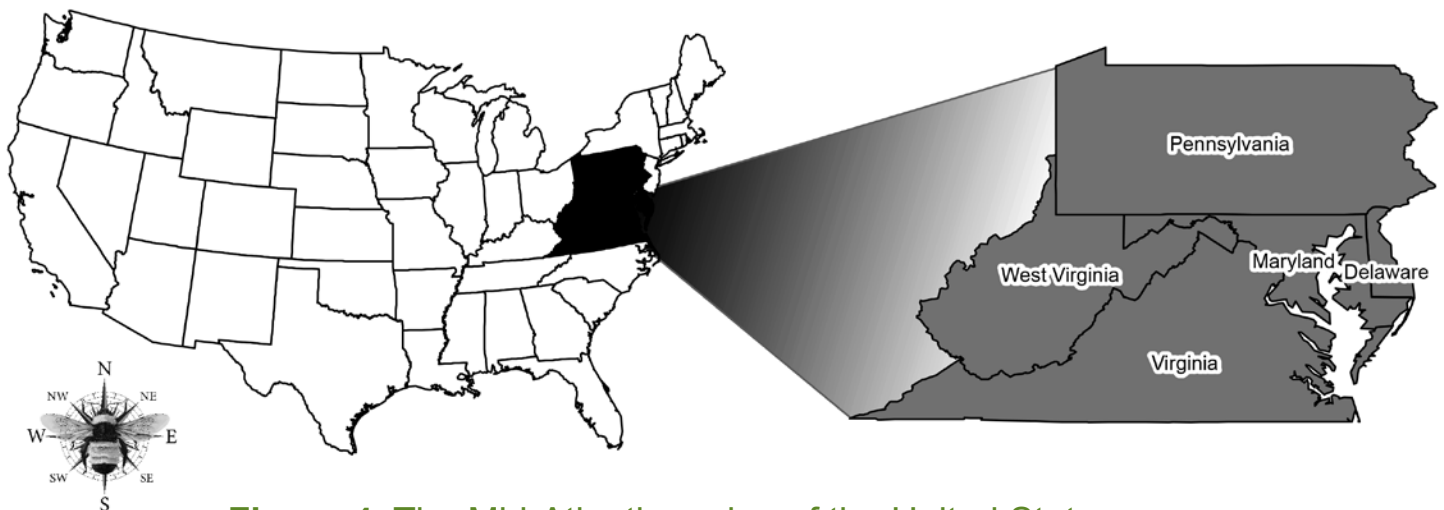


Figure 4. The Mid-Atlantic region of the United States.

<http://www.naturalinquirer.org>
Cartographer: Lindsay Gnan 2013

How Do Morel Mushrooms Get Their Nutrients?

Morels get their nutrients in two ways. Morels are **decomposers**. These mushrooms use **biochemical** processes to break down the cells of dead and decaying organisms. Morels also produce **filaments** that form around the ends of certain tree roots (figure 5). This relationship is called **symbiotic**, because the morels and the tree share resources. The morels receive carbon in the form of sugars and other organic substances from the tree. The tree benefits because the morels help it take in minerals and other substances from soil.

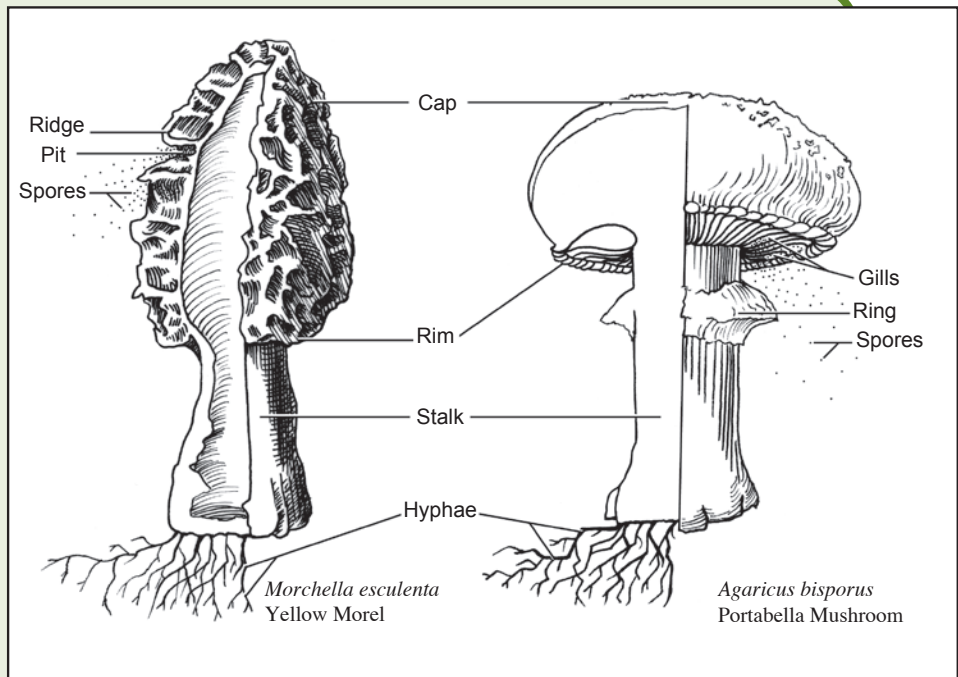


Figure 5. The parts of a mushroom. Notice the filaments, called hyphae, at the bottom of the mushroom stalk. Illustration by Stephanie Pfeiffer.

Reflection Section



Why might morel research done in the Pacific Northwest not apply directly to morels in the Mid-Atlantic region?

Do you think local morel hunters would be a good source of information about the population of morel mushrooms? Why or why not?

Methods

The scientists were interested in learning from people who hunt morels in the Mid-Atlantic region's national parks. The scientists asked questions of 41 morel hunters. These individuals ranged in age from 18 to more than 65 years of age. These hunters had spent between 9 years to more than 30 years hunting morels. The scientists

audiotaped their interviews, which totaled almost 40 hours across all individuals. The scientists **transcribed** the audiofiles into a computer program, resulting in 1,034 pages of questions and answers. The scientists also went into the forest with some of these hunters, learning from them as they watched them hunt morels.



Number Crunches

What was the average length of an interview in minutes?
What was the average length of a transcribed interview in number of pages?

The scientists used a computer program to place all the answers into categories. The scientists then compared research findings

from the Pacific Northwest with the morel hunters' knowledge.

Reflection Section



Why do you think the scientists audiotaped and transcribed the interviews they conducted with the morel hunters?

Why did the scientists compare research findings from the Pacific Northwest with the answers given by the morel hunters in the Mid-Atlantic region of the United States?

Findings

Mid-Atlantic morel hunters identified five to six types of morels. Morels can look different, depending on what species they are and where they are found. The scientists

compared research findings from the Pacific Northwest with the Mid-Atlantic morel hunters' knowledge (figure 6).

Figure 6. The scientists compared the knowledge gained through research in the Pacific Northwest with local knowledge gained over generations of morel hunting in the Mid-Atlantic region.

| Pacific Northwest Research Findings | Mid-Atlantic Morel Hunters' Knowledge |
|--|---|
| Types of Trees With Morels Found Nearby | |
| Elm, ash, tulip poplar, apple, oak, white pine, coniferous trees in the Pacific Northwest | Elm, ash, tulip poplar, apple, and white pine |
| Disturbances | |
| Flooding (negatively affects morel fruiting) Soil disturbance, fire, trees killed by insects (promote morel fruiting) | Logging, blow-downs , flooding (all negatively affect morel fruiting) |
| Weather | |
| Following snowmelt | Following snowmelt |
| Environmental Threats: Development | |
| Habitat destruction from logging and development (negatively affects morel fruiting) | Habitat destruction from development (negatively affects morel fruiting) |
| Environmental Threats: Fungicides , insect sprays | |
| No research available | Insect spray used to kill gypsy moths (negatively affects morel fruiting) |
| Environmental Threats: Harvesting Many Morels | |
| No impact reported from harvesting many morels | Some hunters believe harvesting many morels is causing morel population decline |
| Climate Change | |
| No research available | Earlier morel hunting season has been observed over the past several years |

Reflection Section



Look at figure 6. What do you notice about the comparison between Pacific Northwest research and Mid-Atlantic local knowledge?

Based on the findings in figure 6, what conclusions can you draw about the impact of harvesting many Mid-Atlantic morels on the population of morels?



Discussion

The scientists concluded that **insufficient** evidence exists to determine whether morel populations are declining in the Mid-Atlantic region. The similarity of morel hunters' knowledge with that of the research findings

was an important finding. The morel hunters' knowledge can therefore be combined with research findings to increase understanding of morels.

Did you know?

A colony of honey mushrooms (*Armillaria solidipes*) in Oregon's Malheur National Forest is estimated to be at least 2,400 years old. This colony spans about 2,200 acres (8.9 km²) and is thought to be one of Earth's largest living organisms. This fungus lives underground and is visible only in the fall when the honey mushrooms appear. Although many fungi are beneficial to trees, this fungus causes the death of many of the trees with which it is **associated**.



Photo by Gil Wojciech and courtesy of <http://www.bugwood.org>.

The scientists suggested that scientific studies on morel biology and ecology should be done in the Mid-Atlantic region to help answer the question of morel

population decline. In particular, the scientists suggested that morel populations should be monitored over a period of years in **collaboration** with local morel hunters.

Reflection Section



Based on this research, should national park managers limit the number of morels that can be harvested in Mid-Atlantic parks? Why or why not?

Do you think morel hunters' knowledge should be considered along with research findings about morels? Why or why not?



Glossary

association (ə sō sē āt): A connection or relationship between things or people.

biochemical (bī ō ke mi kəl): Characterized by, produced by, or involving chemical reactions in living organisms.

blow-down (blō daŭn): Tree that has been felled by high winds.

collaboration (kə la bə rā shən): The act of working jointly with others.

coniferous (kā nə fər us): A type of tree having (pine) cones.

ecology (i kā lə jē): The study of the interactions of living things with each other and with the nonliving environment.

edible (e də bəl): Safe to be eaten.

decomposer (dē kəm pō zər): Organism that digests parts of dead organisms and the wastes from living organisms.

fatal (fā təl): Causing death.

filament (fi lə mənt): A single thread or a thin flexible threadlike object.

forage (fər ij): Search for food.

fungicide (fən jə sīd): An agent that destroys fungi or inhibits their growth.

habitat (ha bə tat): The place or environment where a plant or animal naturally or normally lives and grows.

insufficient (in(t) sə fi shənt): Not sufficient; not enough.

mycelium (mī sē lē əm): The mass of interwoven filaments (called hyphae) that forms the vegetative portion of a fungus and is often submerged in another body.

organic (ør ga nik): Of, relating to, or derived from living organisms.

population (pā pyə lā shən): The total number of individuals of the same type occupying an area.

preliminary (pri li mə ner ē): Something that comes first in order to prepare for or introduce the main part of something else.

specialized (spe shə līzd): Designed, trained, or fitted for one particular purpose or occupation.

species (spē sēs): A class of individuals having common attributes and designated by a common name.

symbiotic (sim bī ōt ik): The living together in close union of two dissimilar organisms.

transcribe (tran(t) skrib): To make a copy of (dictated or recorded matter) in longhand or on a machine (as a computer).



If you are a trained Project Learning Tree educator, you may use “The Fallen Log” or “People of the Forest.”

FACTivity



Time Needed

40 minutes

Materials

- Blank sheet of paper
- Pencil
- “The Morel of the Story” article, including this FACTivity
- A mushroom or two to three species of mushrooms with stalk (if possible) from a grocery store (shiitake mushrooms if available)



In this FACTivity, you will examine the parts of a mushroom. Although different mushroom species may look different, they have similar parts. Think about what a mushroom looks like. Based on your knowledge of what a mushroom looks like, what is one question you want to answer about mushrooms? You will

answer your question by examining a real mushroom, comparing it to the mushroom photos in this FACTivity, and doing additional research about mushrooms on the Internet or in the Media Center. Write your question on a piece of paper or in the space below. Be sure to use proper grammar, punctuation, and spelling.

Method

You will work independently. First, examine your mushroom. You may use a plastic knife to cut your mushroom into two halves lengthwise, including the stalk. Draw your mushroom on the sheet of paper. Using the diagram on page 13, identify the parts of your mushroom. Write the parts on your drawing, with a line from each part-name to the part.

Now, examine the mushroom photos on pages 20-21. Compare your mushroom drawing with the photographs. Now take some time to research your question in books, on the Internet, or in the Media Center. Based on your comparison and your research, write the answer to your question on your paper.

Now, using your mushroom drawing as a guide, identify the parts of mushrooms in the photographs. Compare the mushrooms. What are two similarities between all mushroom species? What are two differences between some mushroom species?



Figure (a). Photo by Norman D. Davis and courtesy of <http://www.bugwood.org>.



Figure (b). Photo by Norman D. Davis and courtesy of <http://www.bugwood.org>.

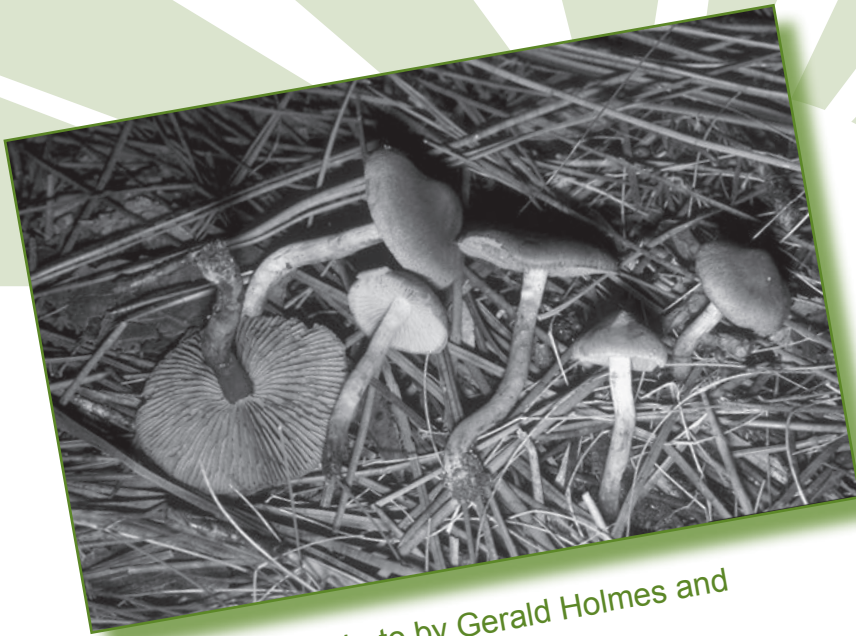


Figure (c). Photo by Gerald Holmes and courtesy of <http://www.bugwood.org>.



Figure (d). Photo by Norman D. Davis and courtesy of <http://www.bugwood.org>.



Figure (e). Photo by Babs McDonald.



Figure (f). Photo by Chris Evans, Illinois Wildlife Action Plan, and courtesy of <http://www.bugwood.org>.

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FACTivity



Oral History-Making!

Time Needed

- 10 minutes for introduction
- 20 minutes out of class
- One class period

Materials

- Pencil
- Paper
- Recording device (optional)

The scientists in this study engaged in a form of oral history gathering by collecting information from morel hunters. In this FACTivity, you will do your own oral history gathering.

The question you will answer in this FACTivity is: What is a family tradition from your family or a friend's family? The procedure you will use to answer this question is listed in four steps.

1. Your teacher will introduce the idea of a family tradition. A tradition is something that has been done on a regular and periodic basis. An example might be that a family takes an outdoor picnic on the Saturday closest to Earth Day every year. Another tradition may be that every Sunday evening after dinner, a family plays Monopoly together.

2. You will select a parent, uncle, aunt, or an adult from another family to interview. Using your recording device or a pencil and paper to take notes, ask the adult to describe a family tradition.

3. In class, you and your classmates will take turns reporting on a family tradition. You and your classmates will each have 3 minutes to describe the tradition.



4. Following all presentations, your teacher will lead a class discussion about family traditions. How were the reported traditions alike and how were they different? What are three characteristics of family traditions,

based on the reports from you and your classmates? What are the similarities and differences between the family traditions shared in class and the tradition of mushroom hunting?

Web Resources

What Is a Mushroom? What Are the Parts of a Mushroom?

<http://www.uhaul.com/supergraphics/states/michigan/fungus/definitions.html>

Life Cycle of a Morel Mushroom

http://www.youtube.com/watch?v=6JurrfK_wQI

Mind-Boggling Facts About Mushrooms

<http://www.ars.usda.gov/is/kids/farm/story4/mushroomfacts.htm>

Mushroom Education Packet

<http://www.americanmushroom.org/workbook.pdf>

The Morel of the Story

Antonym and Synonym Challenge

For each word pair, identify whether the pair are antonyms or synonyms by writing an “A” or “S” beside the pair.

_____ {
Edible
Poisonous

_____ {
Collaboration
Noncooperation

_____ {
Local
Neighborhood

_____ {
Start
Complete

_____ {
Prior
Preliminary

_____ {
Decline
Decay

_____ {
Experienced
Specialized

_____ {
Forget
Recall

_____ {
Inorganic
Organic

_____ {
Perception
Observation

_____ {
Category
Classification

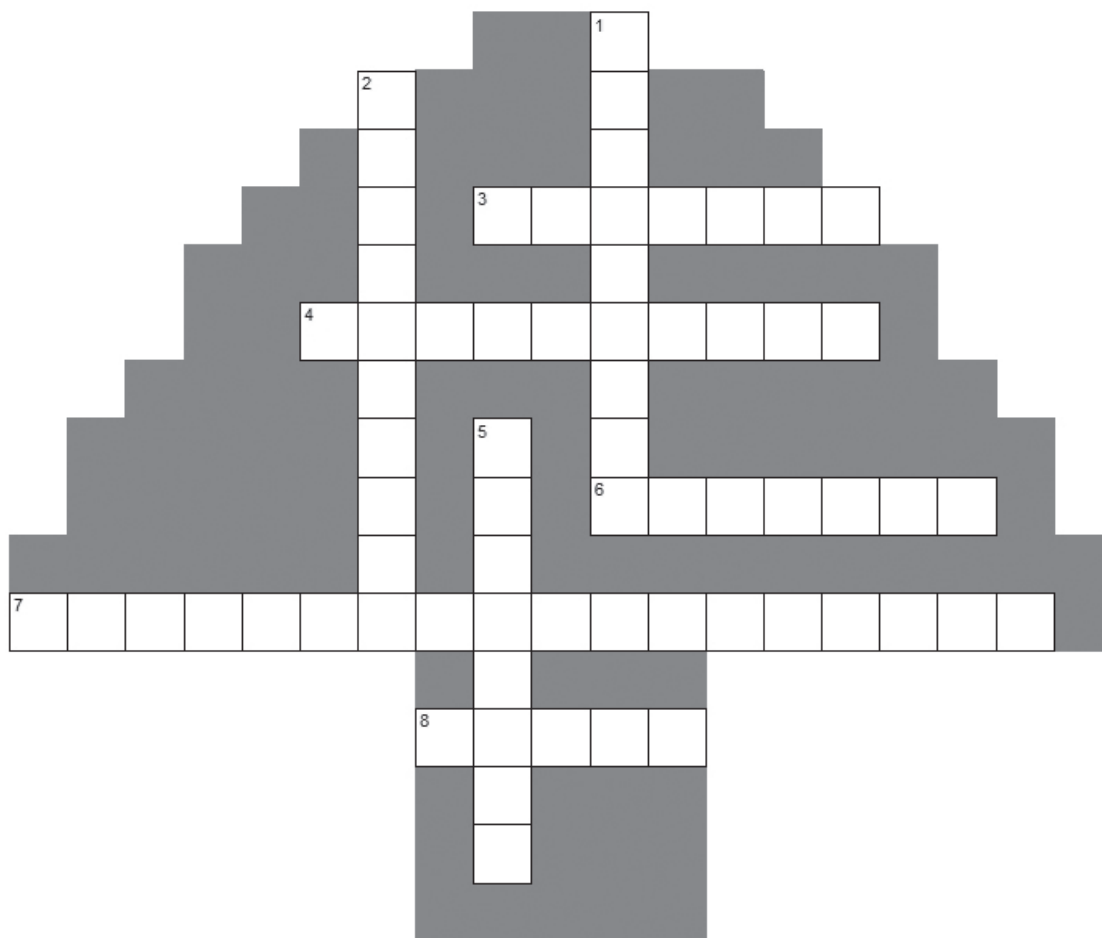
_____ {
Wild
Domestic

_____ {
Construction
Destruction

_____ {
Doubt
Disbelief

The Morel of the Story

Crossword Puzzle



Across

- 3. Of, relating to, or derived from living organisms.
- 4. To make a copy of (dictated or recorded matter) in longhand or on a machine (as a typewriter).
- 6. The study of the interactions of living things with each other and with the nonliving environment.
- 7. The area of Earth north of the Equator.
- 8. A type of mushroom hunted for its good taste.

Down

- 1. An agent that destroys fungi or inhibits their growth.
- 2. A type of scientist who studies Earth's natural environment and human society.
- 5. The fruiting body of a fungus.



Create Your Own Mushroom Dictionary!

Create your own words, based on reading “The Morel of the Story.” Write the word, identify its part of speech, write its definition, and write an example sentence that uses the word. Be sure to use proper grammar and punctuation in your sentence. Use the graphic organizer to create up to 3 words. Combine your words into a mushroom dictionary for your class. An example is given in the first row.

| Word | Part of Speech | Pronunciation (Underline accented syllable) | Definition | Example Sentence |
|--------|----------------|---|------------------------|----------------------------------|
| Mushdo | Verb | <u>Mush</u> -do | To hunt for mushrooms. | I like to mushdo on the weekend. |
| | | | | |
| | | | | |
| | | | | |

To help you with the four parts of speech you are mostly likely to use, here is part of a poem written by David B. Tower and Benjamin F. Tweed:

A **noun**’s the name of anything,
As in school or garden, toy, or king.

Adjectives tell the kind of noun,
As in great, small, pretty, white, or brown.

Verbs tell of something being done,
To read, write, count, sing, jump, or run.

How things are done the **adverbs** tell,
As in slowly, quickly, badly, well.

Note that **abstract nouns** are things that exist but cannot be seen, like freedom and intelligence.

Other verbs include words like be, am, are, is, was, and were.

Activity adapted from http://www.wordcentral.com/byod/byod_index.php.



WINTER 2014

NATURE-ORIENTED PARENTING®

A guide for caregivers to teach children about the natural world

A Companion to the *Natural Inquirer*

...Be natural



Even the Robinsons Started Somewhere...

Surely the Swiss Family Robinson didn't shipwreck with a survival expert who knew exactly what berries and foliage to eat. They were forced to take chances and adopt a trial and error attitude towards eating and surviving. That's not to say that we should pop any old berry or mushroom into our mouths when we're hungry. Today, however, it's easy to learn what is edible and what is not, thanks to identification books, videos, and local naturalists and experts in the field.

Sometimes we simply don't have time to sit and read an ID book on a subject. The alternative is to participate in one of the numerous programs and demonstrations that are available at local nature and wildlife centers and museums around the country. Foraging for wild foods and survival skills basics may be learned by devoting several days or only a few hours on the weekend. You could learn a skill that might someday save your life!

In my opinion, the best way to learn the skills and basics of surviving in the wild is to work with an expert. There's nothing to compare with being in the field and being shown, firsthand, how to find the plants or animals that will sustain you if you're lost in the woods.

In the end, the Robinson family was forced into their life of simplicity and foraging, but luckily, we usually don't have to worry about a shipwreck. Our chance to learn what nature has to offer is as simple checking out your local nature center or museum for the next family program! *Adam DeWitte, Cradle of Forestry in America Interpretive Association Director of Education*

The Nature-Oriented Newsletter is designed for cutting out of the journal and taking home to share with parents or other caregivers. Please encourage students to cut along the dotted line, then take the page home to share with family or caregivers.

Wildlands Spotlight: Fungus Among Us

They grow in the strangest places, these mushrooms. All colors, all shapes and configurations, and most of which appear as if a Smurf will be exiting the stalk at any moment. With names like "Turkey-Tail," "Black Jelly Oyster," and "Bladder Cup," it's no wonder that most humans tend to stay away from formally looking for and cultivating mushrooms as a source of food. And with good reason, as some mushrooms can be extremely dangerous, causing serious sickness and possible death.

Mushrooms are *fungi*, a group of organisms that have more in common with molds and yeast than any flowering plant that you're likely to see in your garden. The part of the mushroom that you see above ground, typically called the *cap*, is actually the flowering part of the fungus that holds the reproductive properties, called *spores*. Most mushrooms that we see around the shady areas of our home have a round cap that can be slimy, rough and gritty, or smooth, which may flatten and shrink over time as the mushroom ages. Lastly, the mushroom may or may not have a *stalk*, similar to a regular flowering plant, which is used to help spread the spores as far as possible.

Now that you know what they look like, how do they grow? And why do they seem to pop up in the most unlikely places? The truth is that no one really knows exactly what mix of chemistry and luck produces a batch of mushrooms around your house, only that they will typically expand rapidly with the continuous absorption of water. Some mushrooms might grow overnight and disappear the next day, where others will expand, or "mushroom" to full size, release spores, and deflate in a matter of hours.

One thing is certain—whether it's a "death cap," "velvet-footed pax," or "saltshaker earthstar," mushrooms are to be given their due respect and left for the experts to identify. Simply touching some mushrooms can lead to sickness if the spores or outside coating get into your digestive system. Keep your distance, take a photo, and admire the beauty and uniqueness that can be found in the most unlikely of places! *Adam DeWitte, Cradle of Forestry in America Interpretive Association Director of Education*



I'll Have a Number Five, With a Side of Acorns

The next time your family is clamoring for a junk food snack in the afternoon, tell them to go take a hike—literally! The natural world is full of delicious (and nutritious) edibles that will satisfy any snack craving. Of course, many of us are familiar with the images of rows and rows of corn or fruit trees spreading through fields across the country under picture-postcard blue skies, but have you ever checked to see what's growing in the grocery store of your own backyard? From wild blueberries to edible acorns, the great outdoors are simply teeming with tasty delights.

Of course, caution should always be exercised when choosing from nature's delicacies. Many nuts, berries, and other forest items that look tasty can also be very poisonous. The possibility of eating a poisonous plant is why it is imperative that you first acquire a reliable resource to help you determine what is safe for your family to eat. Countless books and Web sites are available on the subject, and many offer regional information as to what you can find specifically in your area. You can also find cookbooks and recipe Web sites offering up creative ideas for preparing your personally collected forest food. One great example is *Edible Wild Plants: From Dirt To Plate* by John Kallas, Ph.D., which is a part of *The Wild Food Adventure Series* (<http://www.wildfoodadventures.com>).

Imagine that instead of your family spending another perfectly beautiful autumn day inside eating junk food, you could be out exploring and learning about the edible bounty that the natural environments in your region have to offer. The experience could continue when you got home with everyone pitching in to make acorn muffins, stinging nettle lasagna (really!), or wild blueberry crepes. Sure, it might be strange to eat something that you didn't find in a store, but the unique outdoor experience your family will share is certainly worth it.

Ashleigh Boice, Cradle of Forestry in America
Interpretive Association Intern

Dandelion Fritter Recipe

(paraphrased as well as directly quoted from
<http://www.learningherbs.com>)

- All you need to gather for dandelion fritters is just the yellow tops. Pick them midday when they are fresh and open. Be careful to avoid areas that may have been sprayed with pesticide or weed killer (such as concrete or very urban areas). Make sure to cook the fritters right after collecting the dandelions.
- Bring your basket of flowers inside, find a bowl, and mix together one egg and one cup of milk. Stir in a cup of flour, and your fritter batter is ready to go. (If you like your fritters sweet, you can add a little maple syrup or honey.)
- Now, prepare a skillet on the stove with gently warmed olive oil—keep it over medium heat.
- Rinse the dandelion tops gently to remove any dirt or other natural nondandelion bits from the flower (keep an eye out for the errant ant or beetle).
- Take one of the flowers and hold it by the greens at the base of the flower petals. Dip the petals into the batter and twirl until the flower is covered.
- Drop it into the skillet, flower side down. Continue dipping and dropping flowers, checking the first ones every once in a while to see if they are brown. When they've lightly browned, flip them over and brown them on the other side.
- When they're brown on both sides remove them from the skillet and place them on a paper towel on a plate to drain the excess oil.
- For a sweet treat, drizzle them with maple syrup, honey, jam, or powdered sugar. For savory fritters, try dipping in mustard or adding some savory herbs to the batter.

Ashleigh Boice, Cradle of Forestry in America
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"What is a weed? A plant
whose virtues have not yet
been discovered."

—Ralph Waldo Emerson

Cradle of Forestry In America
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Which National Science Education Standards Can Be Addressed Using This Monograph?

| National Science Education Standard | Location in Article |
|--|---|
| Abilities Necessary To Do Scientific Inquiry | Meet the Scientists: Reading about a research topic to learn about subject matter; Thinking About Science: Observation is necessary in science; Introduction: Conducting research on morels in different regions, scientists gaining knowledge on morels from interviewing local people; Introduction Reflection Section: Analyzing why previous research done on morels may not apply to this study; Methods: Conducting surveys, recording data; Number Crunches: Math is important in science; Findings: Analyzing data and drawing conclusions from results. |
| Understanding About Scientific Inquiry | Thinking About Science: Observation; Thinking About the Environment: Mushroom hunting is a specialized skill that requires scientific knowledge of species; Introduction: Conducting research; Introduction Reflection Section: Considering whether local hunters are a good source of information; Methods: Understanding how the data was collected via interviews; Methods Reflection Section: Understanding why scientists recorded interviews; Figure 7: Using a comparison chart to analyze data; Discussion: Insufficient results led scientists to suggest more research should be conducted. |
| Regulation and Behavior | Mushroom hunting sidebar: Mushrooms are found in certain habitats; Introduction sidebar: How morel mushrooms get their nutrients; Figure 7: Various disturbances and factors can affect morel fruiting. |
| Populations and Ecosystems | Thinking About the Environment: Morels are often found near certain trees; Introduction: Morel populations are found across the Northern Hemisphere; Discussion Sidebar: Colony of honey mushrooms in Malheur National Forest. |
| Populations, Resources, and Environments | Thinking About the Environment: Morels are often found near certain trees; Introduction: Morel populations are found across the Northern Hemisphere in different environments; Findings: Morels can look different depending on their environment, various factors in the environmental can affect morel fruiting. |
| Risks and Benefits | Monograph introduction: Risks of eating wild mushrooms; Thinking About the Environment: Wild mushroom species are difficult to identify and many are poisonous, risk of eating wild mushrooms without properly identifying them. |
| Science as a Human Endeavor | Meet the Scientists: Personal stories; Thinking About Science: Observations; Introduction and Introduction Reflection Section: What the scientists were interested in studying; Methods: Conducting research; Findings and Discussion: Results of a study set up and designed by scientists; FACTivity: Examining the parts of a mushroom. |
| Nature of Science | Thinking About Science: Making observations; Introduction: The applied nature of science (researching morel populations); Discussion: Implications for the future and the application of science to solve problems. |

Social Studies Education Standards Addressed in This Article

| National Curriculum Standards for Social Change | Location in Article |
|---|--|
| Culture | Thinking About the Environment: Hunting mushrooms is a pastime of many people. |
| Time, Continuity, and Change | Introduction: Some park managers are concerned the morel population has declined over time. |
| People, Places, and Environments | Entire article: Conducting research with people in the Mid-Atlantic region to gather information about mushrooms in the local environment. |
| Global Connections | People hunt mushrooms in many countries around the world. |



What Is the Forest Service?

The Forest Service is part of the United States Department of Agriculture (USDA). It is made up of thousands of people who care for the Nation's forest land. The USDA Forest Service manages more than 150 national forests and almost 20 national grasslands. These lands are large areas of trees, streams, and grasslands. National forests are similar in some ways to national parks. Both are public lands, meaning that they are owned by the public and managed for public use and benefit. Both national forests and national parks provide clean water, homes for the animals that live in the wild, and places for people to do fun things in the outdoors. National forests also provide resources for people to use, such as trees for lumber, minerals, and plants used for medicines. Some people in the Forest Service are scientists whose work is presented in this monograph. Forest Service scientists work to solve problems and provide new information about natural resources so that the Forest Service can make sure our natural environment is healthy, now and into the future.

For more information, visit <http://www.fs.fed.us>.

What Is the Southern Research Station?

The Southern Research Station is part of the Research and Development section of the Forest Service. The station's mission is to create the science and technology needed to sustain and enhance southern forest ecosystems and the benefits they provide. Headquartered in Asheville, NC, the station serves 13 Southern States and beyond. Since the beginning of the 20th century, the Southern Research Station's 130 researchers have excelled in studies on temperate and tropical forests, forest resources, and forest products. These studies provide a wealth of long-term information on the dynamics of tree plantations and natural stands, watersheds, and wildlife habitats. **For more information, visit <http://www.srs.fs.usda.gov/>.**

What Is the Northern Research Station?

The Northern Research Station is part of the Research and Development section of the Forest Service. The station envisions a region where trees and natural resources support a high quality of life; wildlife, fish, and plant communities thrive; clean water abounds; and people work together to sustain and restore the health of forests. To achieve this vision, the people and communities of the Northeast and Midwest need high-quality scientific information. The Northern Research Station extends across 20 States, comprising both the most densely populated and most heavily forested portions of the United States. The Northern Research Station is dedicated, organized, and staffed to provide that scientific information in a form that people can use. **For more information, visit <http://www.nrs.fs.fed.us/>.**



What Is the Cradle of Forestry in America Interpretive Association?

The Cradle of Forestry Interpretive Association is a 501(c)3 nonprofit organization based in Pisgah Forest, NC. The Interpretive Association strives to help people better understand ecology through recreation and education opportunities. Their projects include:

- Campground and recreation area management.
- Educational programs and services, including the *Natural Inquirer*, *Investigator*, *Natural IQ*, and *Nature-Oriented Parenting*.
- Sales of forest-related gifts and educational materials.
- Workshops, newsletters, and publications.
- Partnership with the USDA Forest Service to provide programming at the Cradle of Forestry Historic Site.

For more information, visit www.cfaia.org.

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