

## **LESSON ONE: There's Fun in Fungi!**

**Unit Theme:** Identify the species in Kingdom Fungi.

**Conceptual Lens:** Species diversity

**Concepts:** Identification, Classification, Measurement

**Vocabulary:** (These words should be defined before the lesson (perhaps in a unit planner as they will pop up again))

[Fungi](#)

[Mycelia](#)

[Ascomycetes](#)

[Basidiomycetes](#)

### **Enduring Understandings:**

- A fungus is neither plant nor animal.
- Fungi include, among others, mushrooms, puffballs, rusts, lichens and molds.
- There are over 72,000 describes species in Kingdom Fungi, with one 1 million or more species waiting to be found by scientists.
- Mycelia are the part of the fungus that is long-living, takes up food, and interacts with the environment the roots of the fungus (growing part).
- Mushrooms are the fruiting body (reproductive part).

### **Guiding Questions:**

1. What organisms make up Kingdom Fungi?
2. How can you tell different mushrooms apart?
3. Do all mushrooms have caps and stems?
4. How do mushrooms reproduce?
5. What ecological role do mushrooms play?
6. What's the difference between a basidiomycete and an ascomycete?

### **Critical Content:**

The species in Kingdom fungi are neither plant nor animal because they do not make their own food, carbon dioxide or water, rather they secrete digestive enzymes into the substrata where they grow (wood, leaves, skin) and then absorb their food. The species that make up Kingdom Fungi are mushrooms, boletes, puffballs, rusts, molds, yeasts and lichen, as well as slime fungi. Many fungi develop either [symbiotic](#) or [parasitic](#) relationships with the organisms they grow on. Mycorrhizae (fungal roots) give many plants their water and nutrients in return for excess sugars that the plants make through photosynthesis.

### **Skills:**

**Illinois:** Science 11A, 11B; Mathematics 7A, 10B; Language Arts 1A, 1B

**National:** Science 9-12.1, Mathematics 9-12.1; Technology 12.3

### **Instructional Activities & Methods:**

1. Brainstorm with students about the definitions of the words: fungus, mushroom, lichen, mold and list the words that define or illustrate these things. Textbook photos or internet images are a great guide for this discussion.

**Organisms in the Kingdom Fungi include yeasts, molds, cup fungi, rusts and mushrooms. The mushroom is the fruiting body, or reproductive organ, of certain fungi. Mushrooms produce spores that germinate and produce mycelia, tiny, thread-like strands of fungus that decompose wood, recycle dead plant or animal material for food, or form symbiotic relationships with plants. There can be miles of mycelia in just a handful of forest soil. A few mushrooms are serious plant pathogens that cause millions of dollars of damage to forests each year. However, most mushrooms are play helpful roles in forests either by recycling dead organic material (wood, leaves, etc.) for use by other organisms or by forming mycorrhizal partnerships with the roots of various species of trees such as species of oaks and pines. Lichen is a symbiotic relationship between a fungus and algae.**

2. Read the [About the Expedition](#) area of the [expeditions@fieldmuseum®](#) website aloud with your class and help them define unknown words. Make sure to sign your class up to [receive emails](#) from Dr. Mueller. Go through the [Photo Gallery](#) and use some of the guiding questions to talk about the different mushrooms you observe in the photos.

3. Talk about fungus as we see it everyday: in food, in nature...where else? Bread mold, rusts, etc. Assign the conceptual inventory worksheet “Grocery Store Foray” to see how many different types of products that include, are made with or are fungus that students can identify either at home or in the grocery store.

4. Use the “Parts of a Mushroom” diagram to illustrate the specific parts AND use the photos in the [Photo Gallery](#) or elsewhere on the [expeditions@fieldmuseum®](#) website to illustrate the different types and parts of mushrooms in Costa Rica. Have students fill in the diagram. See if students can point out these parts as they look through the photos.

**While all mushrooms have mycelia, it is impossible to differentiate species without seeing the mushroom, or fruiting body. The basic parts of the mushroom are used for species identification. Most mushrooms have a cap and stem, with gills located under the stem where the spores are produced. Beneath the stem there is often a ring, called an annulus, which is important in the identification of a species. At the end of the mushroom’s stem there is usually a volva, or cup-like structure, that connects the mycelium to the mushroom. There is also another group of mushrooms that do not have gills, but rather cups that produce spores on the outside of the cap. These types are called Ascomycetes, and include all the morel mushrooms.**

### **Culminating Performance Assessment:**

**What?** Mushroom Measurement and Identification

**Why?** To review the parts of mushrooms used for identification and introduce some of the tools and concepts that [mycologists](#) use to identify mushrooms.

**How?**

Supplies:

Mushrooms	Forceps or tweezers
Rulers	Microscope
Scale	Glass Slides
Recording Sheets	

Bring in store-bought mushrooms: oyster, button, shiitake, crimini, portabella, etc. Remind your students that even though these mushrooms are safe to handle, they should NEVER handle or eat mushrooms in the wild, as many are poisonous.

1. Assign your students into groups of 3-5 and give each group a different set of mushrooms, a recording sheet, ruler and scale. Each group should have a recorder, a measurer, a practitioner (to actually dissect the mushroom) and a writer to summarize the details. Demonstrate each portion of the activity first.
2. Students should try to take as many measurements as possible: length of stem, width of cap, girth of cap, etc.
3. Once measurements have been taken, students should dissect and identify the parts of the mushroom for the “Parts of a Mushroom” diagram.
  - A) Draw a diagram of the mushroom labeling the cap, stem and gills. If gills are not visible, gently remove the veil (fleshy part covering gills) with tweezers being careful not to touch the gills.
  - B) (If you have a cap and stem) Grasp the end of the stem and wiggle the stem away from the cap. Once it’s free, split the stem in half, and examine the inside. The long filaments inside are called hyphae. Describe them on your worksheet.
  - C) Look under the cap and locate the gills. Using the forceps, grasp one gill close to where it attaches to the cap and wiggle it loose. Place the gill onto a glass slide and examine under high power. At the end that was not attached to the gill, look for long-fingerlike protrusions. These are called the basidia (your mushroom is a basidiomycete). Can you locate any spores? Describe them on your worksheet.
4. Finally, have students research their mushroom to determine what the scientific species name they have. Some great places for this are [www.fungiperfecti.com](http://www.fungiperfecti.com) as well as the National Geographic textbook series by Glencoe McGraw-Hill.

**Assessment Codes:**

CP, WS

**Credits:**

British Mycological Society and the BBSRC.

The Western Montana Mycological Society Mushroom Educational Trunk.

Georgia Learning Connections, Corrie Keese

**GROCERY STORE FORAY:** Look for as many items as you can that contain a type of fungi. List those items under “Product Name” and then fill in the type of fungus: yeast, mold or mushroom. Examples: Bleu cheese (mold), beer and wine (yeast), cream of mushroom soup.

**PRODUCT NAME**

**TYPE OF FUNGUS**

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**Bonus: What is a foray?**

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# Parts of a Mushroom



