

Learn-Along-Guide

Fungus Among Us

The Children's Hour radio show podcast

<https://www.childrenshour.org/fungus-among-us/>



We hope you enjoyed listening to our interview with mycologist Peter McCoy, founder of Mycologos <https://mycologos.world> and author of Radical Mycology <https://www.radicalmycology.com/>.

This guide may help your understanding of fungi. Also, it will link you to resources where you can learn more. [Connect to Curriculum here.](#)



What do you know? After listening to the radio show, answer these questions:

1. What is one new fact you learned about fungi?
2. What is one new question you have about them?
3. What is an important thing about fungi that you think everyone should know?

About Us

The Children’s Hour Inc is a New Mexico-based non-profit organization that produces an award-winning children’s radio program that is educational, entertaining, and engaging, and includes kids who participate in its creation. The program is internationally syndicated broadcasting on more than 120 public radio stations worldwide. Program themes focus on civics, STEM, culture, and music education, featuring New Mexico children as co-hosts and lead interviewers. Katie Stone has been the executive producer of *The Children’s Hour* for 20 years.

For more information, contact: Katie Stone | (505) 850-3751 | katie@childrenshour.org

©2022 The Children’s Hour Inc

Tell us about you!

We at the Children’s Hour would like to know:

1. How old are you?
2. Was this your first time listening to a radio show or podcast for kids?
3. Was this radio show less fun or more fun compared to other things you do for fun, like playing video games or watching TV?

Less fun More fun

4. Would you listen to a radio show again if you could?
5. Of everything you heard in the radio show, what will you remember most?

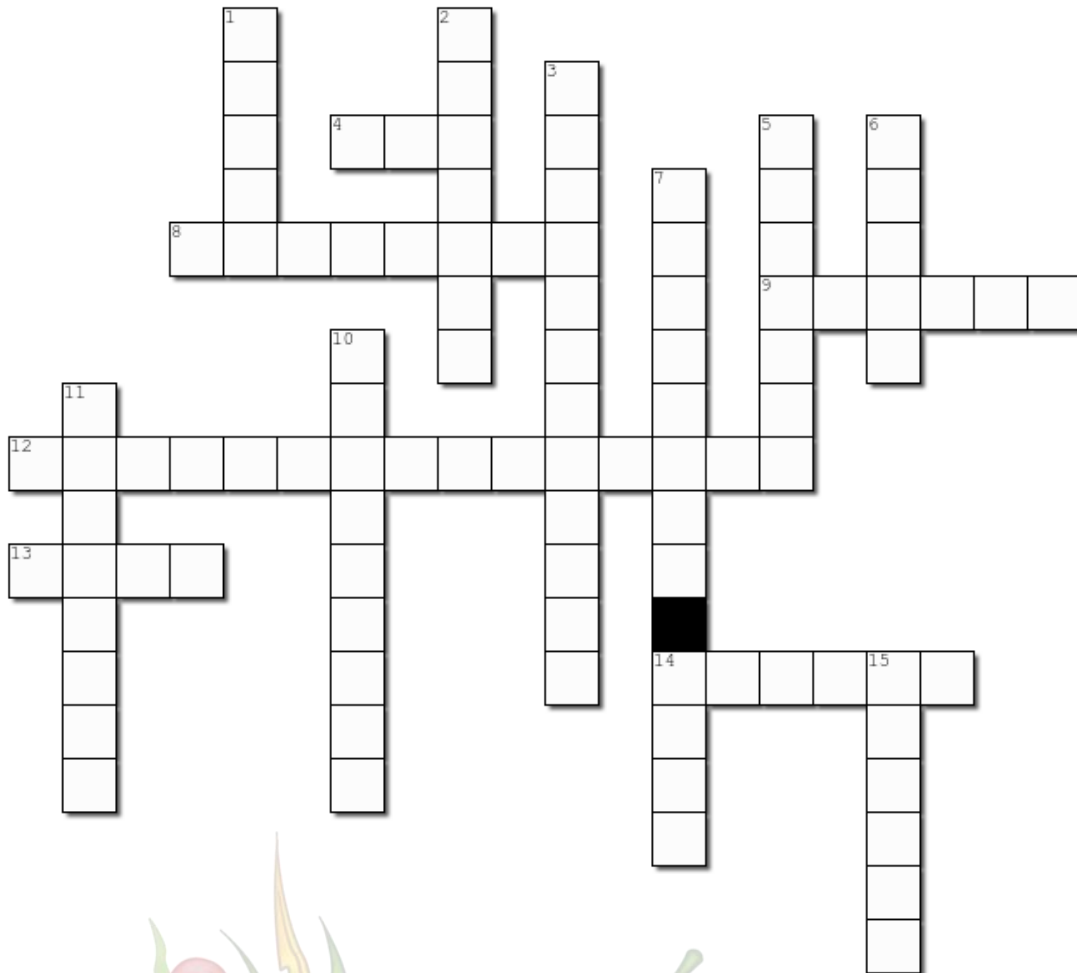
If you would like to draw a picture about anything you learned on the radio show, you can do so below, or on a blank page. Scan and email it to us, and we may display it on our online space.

If you would like to tell the creators of this radio show something in your own voice, you can send a voice message to *The Children’s Hour* here: <https://www.childrenshour.org>. Look for the orange button and click to record.



Fungi: Crossword Puzzle

Hint: Words used in this puzzle appear in **boldface** in this learning guide.



Created using the Crossword Maker on TheTeachersCorner.net

Horizontal

4. Fungi live inside the _____ of humans.
8. main body of the fungus
9. a complex life form made up of one or more fungi and an alga living together in partnership
12. using fungi to clean up the environment
13. there are more than 100,000 different types of this fungus on earth
14. Fungi are classified on their own separate _____ on the Tree of Life.

Vertical

1. The largest living thing in the world is a _____ mushroom.
2. A mushroom digests its of food _____ its body.
3. the process done by yeast that's important to making beer and bread
5. There are an estimated 2.3 _____ species of fungi.
6. Lichens and molds have survived experiments in _____.
7. the part of the mushroom that we see; it releases spores
10. when two different species of living things live close together in partnership
11. the study of fungi
15. a molecule that gives structure to fungal cells

These are the jokes, folks!

**#1 What happened when Alice Algae and Freddy Fungi went out on a date?
They took a lichen to each other.**

In nature, a **lichen** is a complex life form made up of one or more fungi and an alga living together in partnership.

Video: What's in a Lichen? https://youtu.be/Fkw_VF5zDT0



#2 A mushroom walked into a bar, and the bartender said, "Sorry we don't serve food here."

Did you laugh at Isaac's joke? He had a good delivery. Below are a few more mushroom jokes. Practice your delivery by telling them to your family and friends.

**What room can you never enter?
A mushroom.**

**How much room do fungi need to grow?
As mushroom as possible.**

**Momma always told me, "You are what you eat."
So I started eating mushrooms every day. I wanted to become a fun guy.**

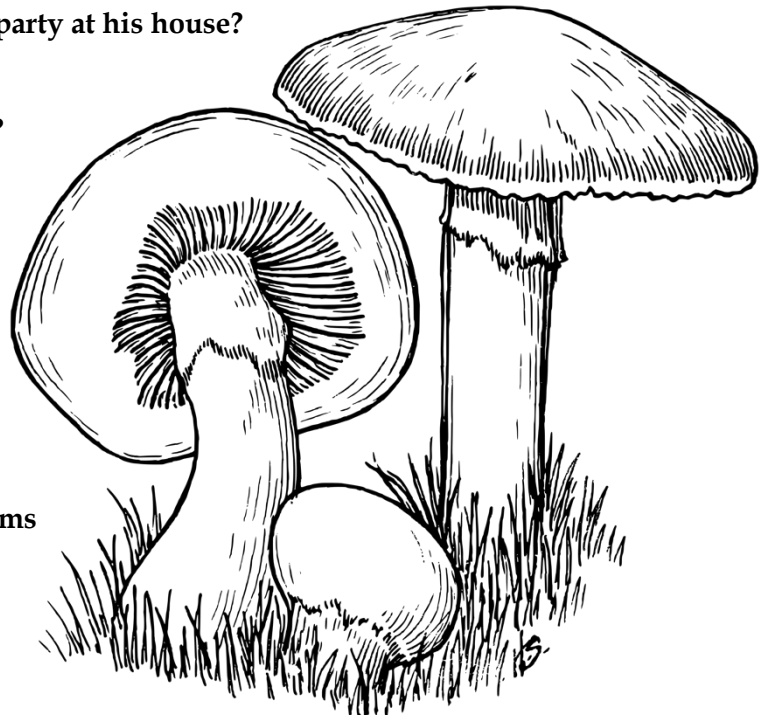
**Why was the mushroom invited to the party?
Because he was a fungi.
But if he was such a fun guy, why wasn't the party at his house?
Because there wasn't mushroom.**

**What kind of vehicle does a mushroom drive?
A spores car.**

**What are the easiest mushrooms to carry?
Portobello mushrooms.**

**My uncle always hated eating mushrooms.
But now that he's dead, they're beginning to
grow on him.**

**A mushroom walks into a bar.
The bartender says, "We don't serve mushrooms
here. You're always ruining jokes."
The mushroom says, "Come on. I'm a fun
person."**





Song: **What in the World** by The Happy Racers

Listen for these lyrics:

“What makes a rainbow?
How sharp is a T. Rex tooth?
What makes the Moon glow?
Who invented Krazy Glue?”

Do you know the answers to these questions?



Song: **Mycelium Around Ya** by Formidable Vegetable

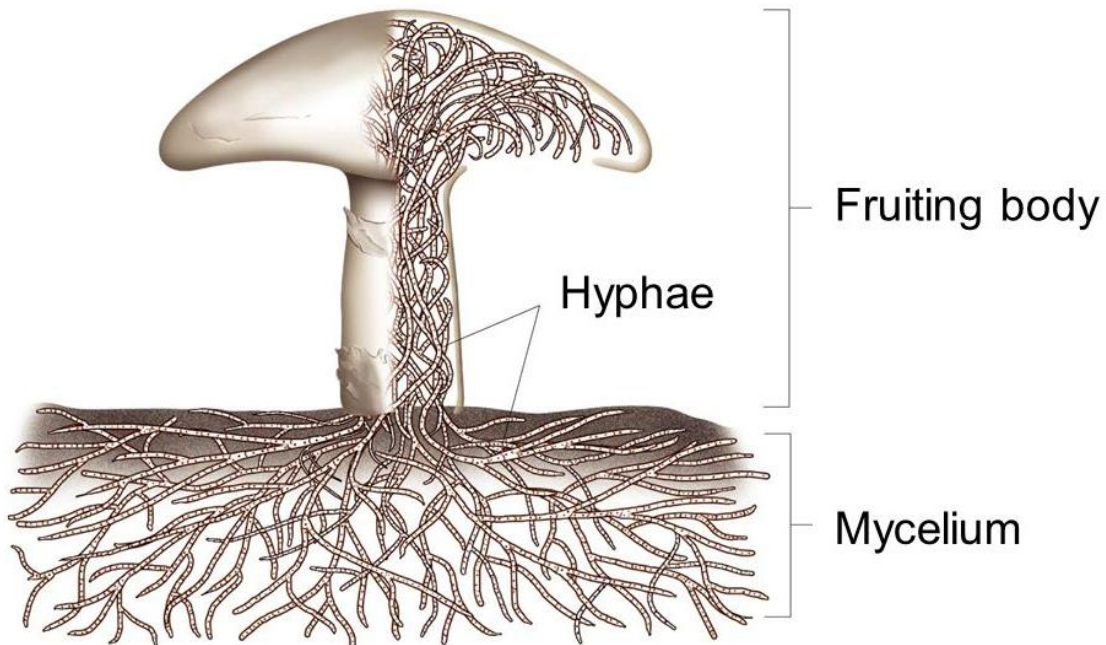
Listen for these lyrics:

“Well you know a fungi like me
need a bit of fun-gal company.
I’m gonna decompose you a love
song - ‘Symbiosis’ in the key of
G”

This song is full of puns. Can you identify a few of them?

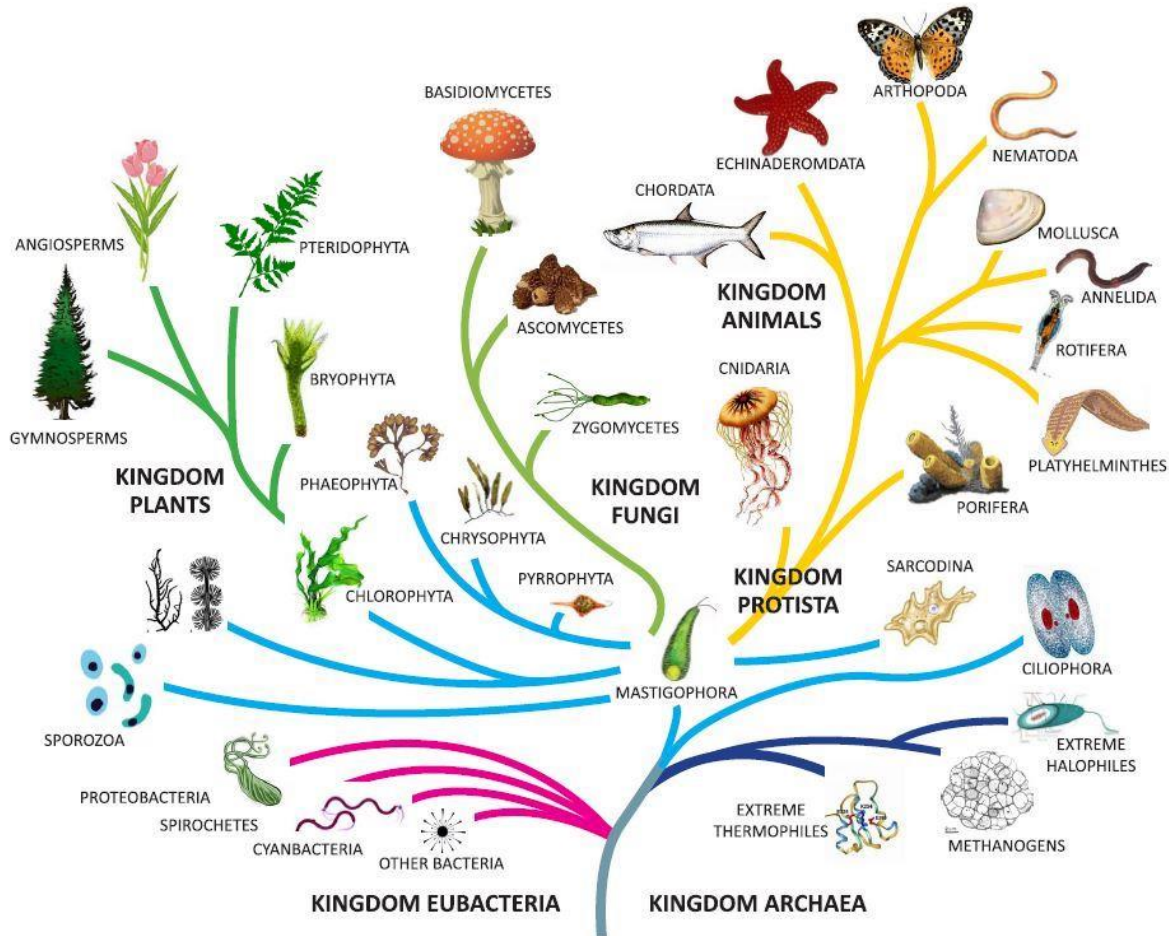
Mycology is the study of fungi. All fungi are classified in the Kingdom Myceteae, also called Kingdom Fungi.

Fungi are organisms made of complex cells that form a mass of strands called mycelium. A **mycelium** is the main body of the fungus. Similar to the roots of a plant, the mycelium grows underground. A mycelium is made of many filaments called **hyphae**.



Plant cells use **cellulose** to give them structure, but fungal cells use **chitin** instead.

Fungi are on their own separate branch on the Tree of Life.



Fungi came into existence soon after bacteria and have been around longer than plant and animals.

What is **the role of fungi** on Earth?

- Fungi eat dead organic matter.
- Fungi recycle nutrients, breaking down complex molecules into simpler compounds.
- Fungi move nutrients from one place to another, so other organisms can use them.
- Fungi are symbiotic partners with most every kind of plant and animal.

Video: Watch a lively review of the fungi: <https://youtu.be/GjFkkgW7Fgs> (in English); <https://youtu.be/dMZRAIDxvWo> (in Spanish)

Symbiosis is when two different species of living things live close together in partnership. A well-known example of symbiosis is a **lichen**, which forms when a fungus lives with certain kind of algae.

See many kinds of lichens here: <https://www.fs.fed.us/wildflowers/beauty/lichens/biology.shtml>

Fungi are on and inside other living things, including **humans**.

Older kids (advanced students) and adults can listen to a conversation between two scientists talking about how a certain yeast (*Candida*) is important in the human gut (Science Friday podcast): <https://www.sciencefriday.com/segments/fungus-gut-microbiome/>



Song: Church of the Woods by Okee Dokee Brothers

Listen for these lyrics:

“May you lose yourself in the woods to find yourself again. May you keep on singing and dancing ‘til the end. May your dark turn to light and your death into birth. May your spirit be wild, and may your heaven be on earth.”

Draw a picture to represent this song.



Song: Like a Hobbit in a Mushroom Field by Brobdingnagian Bards

(Instrumental – commercial break)

What musical instruments do you hear in this song?

How many species do we share our planet with?

This is a question that scientists have not yet answered. Or they disagree on the answer. We know that we have only seen and counted a fraction of species that exist, so we can only estimate how many there are.

Peter McCoy says that there are possibly **2.3 million species of fungi** on Earth (the majority are molds) and only about 300,000 species of plants. But what about animals? Some experts say there about 9 million species of animals. How many species altogether? Recent estimates lie somewhere in between 5 million and 10 million species on Earth.

This is a table (from [Science Trek](#)) with estimated numbers of species in each Kingdom.

Make a bar graph to compare the numbers of species in each Kingdom.

Kingdom	Number of Cells	Type of Cells	Feeding Type	Named Species	Estimated Species
Archaea	unicellular	prokaryote	both	502	950
Bacteria	unicellular	prokaryote	both	11,000	21,000
Protist	mostly unicellular	eukaryote	both	115,000	600,000
Fungi	mostly multicellular	eukaryote	heterotroph	100,000	1,500,000
Plant	multicellular	eukaryote	autotroph	310,000	350,000
Animal	multicellular	eukaryote	heterotroph	1,367,555	9,812,000

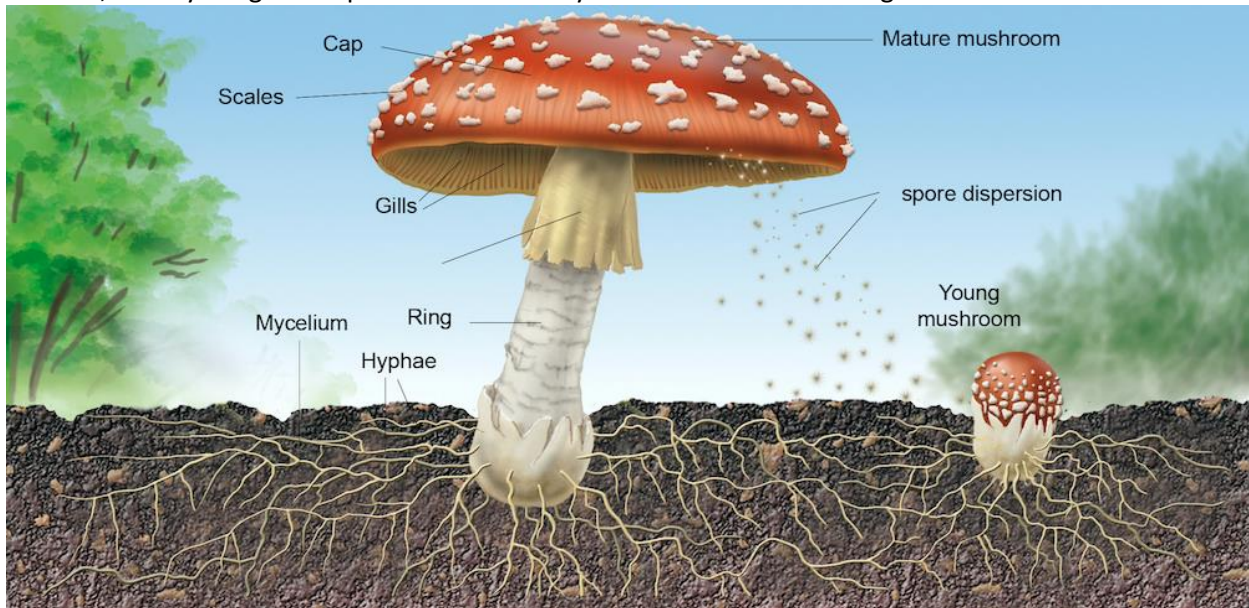


A mushroom is a kind of fungus.

Many **mushrooms** are sources of food for wildlife. Some are poisonous to eat. The part of the mushroom that we see growing on the ground is only part of a much bigger organism. We see the **fruiting body**, a fleshy structure with a stem and a cap. It's like the apple on a tree. Most of the biomass of the mushroom is unseen, because it is growing underground (remember what that part of a fungus is called?).

The fruiting body releases millions of microscopic **spores** so they can be scattered by the wind. In that way, spores are like the seeds of a plant.

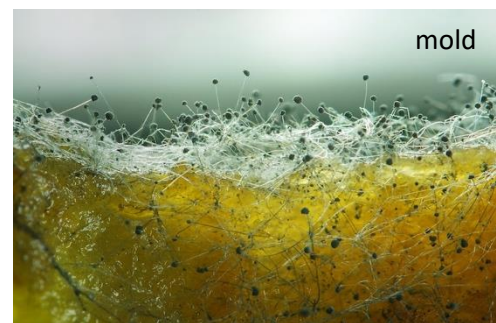
There are more than 10,000 species of mushrooms that we know about. That may seem like a large number, but mycologists suspect that this is only a fraction of what's living on earth.



Read more about mushrooms here: <https://kids.kiddle.co/Mushroom>

Mold is also a fungus.

You may have seen blackish **mold** growing on old bread, or fuzzy greenish mold growing on rotten fruit. Molds do not make a fruiting body like mushrooms. Instead, the mycelium appears like very fine, fluffy white threads over the surface. The dusty or fuzzy texture of many molds is caused by many millions of **spores**. Some Asian foods rely on the action of molds to make them. *Penicillium rubrum* is a mold which led us to the discovery of the antibiotic penicillin. There are over 100,000 different types of mold.



Read more about molds here: <https://kids.kiddle.co/Mold>

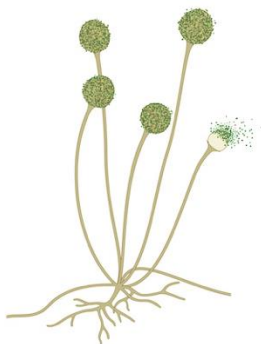
Yeast also are fungi.

One **yeast** is only a single cell; it is not multicellular like mold or mushrooms. They don't ever form a mycelium. Because they do **fermentation**, yeasts are necessary for making beer, wine, kombucha, and bread. A type of yeast lives inside the human **gut**.



Read more about molds here: <https://kids.kiddle.co/Yeast>

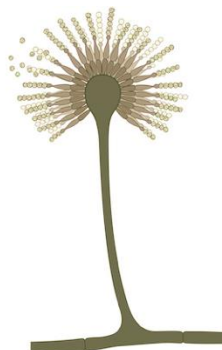
Fungi are found everywhere on Earth.



Bread mould



Penicillium



Aspergillus

on the forest floor
on the ocean floor
floating all throughout the ocean
in the sands of the desert
on the tops of mountains

Lichens and molds have survived experiments in space.

Medications

Penicillin, which fights bacterial infection, is released by strains of the mold *Penicillium*. Another medicine that comes from fungi is called **cyclosporine**. It enables people to get organ transplants. It comes from *Tolypocladium inflatum*, a sac fungi that was found in Norwegian soil. **Lovastatin** is a drug that comes from the mold *Aspergillus terreus*. It lowers cholesterol.

Read more about secret fungi in everyday life here:

<https://www.kew.org/read-and-watch/everyday-fungi-food-medicine>



Song: **Mushrooms, Blue Cheese, Mold, Bacteria, Fungus** by Bram Barker

Listen for these lyrics:

Sing along with this one!

“Fungi are consumers and that is why they need to live near their food supply. Most are multicellular with structures called hyphae which then all twist together in a mass called the mycelium.”



Song: **Gentle Chase** by Podington Bear

(Instrumental – underscores poem)

What musical instruments do you hear in this song?

Mushrooms by Sylvia Plath

Overnight, very
Whitely, discreetly,
Very quietly
Our toes, our noses
Take hold on the loam,
Acquire the air.
Nobody sees us,
Stops us, betrays us;
The small grains make room.
Soft fists insist on
Heaving the needles,
The leafy bedding,
Even the paving.
Our hammers, our rams,
Earless and eyeless,
Perfectly voiceless,
Widen the crannies,
Shoulder through holes. We
Diet on water,
On crumbs of shadow,
Bland-mannered, asking
Little or nothing.
So many of us!
So many of us!
We are shelves, we are
Tables, we are meek,
We are edible,
Nudgers and shovers
In spite of ourselves.
Our kind multiplies:
We shall by morning
Inherit the earth.
Our foot's in the door.





Song: **Fungi** by Peter Weatherall

Listen for these lyrics:

“They help us make medicine,
beer, wine, and bread, and
decompose stuff after its dead.”

Watch the **video** of this song at:
https://youtu.be/mv_lgBPPVnQ

How do you know which mushrooms growing in the wild are poisonous?

There’s no way to tell. **Never eat any old mushroom you come across**, unless you have an expert identify it or unless you yourself are an expert. Wild mushrooms can be poisonous and make you very sick or even kill you.



Song: **Portobello Mushrooms** by KB Whirly

Listen for these lyrics:

“I love celery. Beet juice tastes so grand. I love eating tomatoes I grew with my own hands. And eggplants are so beautiful but taste like squished up ants. So give me a portobello and let me do my dance!”

This song is very upbeat... Get up and dance your best mushroom dance!

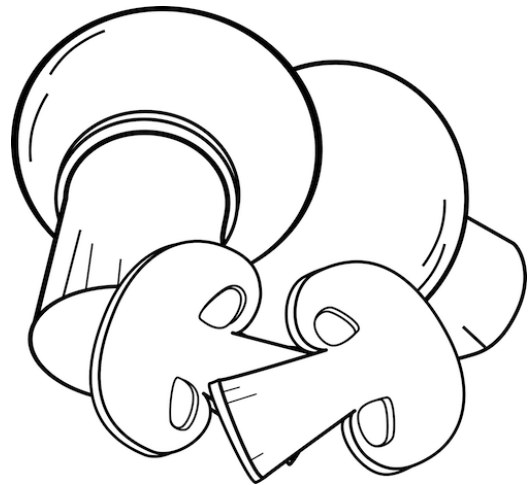
Have you ever eaten a portobello mushroom?

How do mushrooms eat?

Mycelium grows around and through whatever it likes to eat. It releases **digestive compounds**, break down stuff around it, then soaks it in. Digestion of food happens **outside** its body, and then it's absorbed.

How do Fungi reproduce?

Mold spores are genetically the same as the parent. Mushrooms mix genes with a mate before making spores.



What happens to mushrooms in winter?

Mycelium lives in the ground even through the winter (**dormant**).

Mushrooms come in all different colors, shapes, and sizes.

Video: Watch scientists investigate bioluminescent (Glow-in-the-Dark) mushrooms (National Geographic): <https://youtu.be/EDkR2HlIEbc>

Mushroom Infographic <https://www.mushroomcouncil.org/wp-content/uploads/2021/04/Mushrooms-in-Schools-Sustainability-Infographic.pdf>

Read about 39 different kinds of edible mushrooms: <https://cleangreensimple.com/article/different-types-of-mushrooms/>



IRYNA'S UKRAINIAN MUSHROOM SOUP



This vegan soup is delicious and nutritious! Sometimes it's served as a dish on Christmas Eve, but you can enjoy it any time of the year. Making this soup is a good opportunity to learn how to chop vegetables.

Ingredients:

1½ oz. dried porcini mushrooms, soaked in water
4 Tablespoons canola oil
6 garlic cloves, minced
1 onion, chopped
2 pounds assorted fresh mushrooms (such as white button, baby bella, oyster, and shiitake), stemmed, washed, and broken into chunks
4 ribs celery, chopped
4 carrots, peeled and chopped
2 bay leaves
8 cups vegetable broth (2 1-quart boxes, or make your own)
2 teaspoons kosher salt
freshly ground black pepper (to taste)
spices (such as coriander, thyme, and allspice, to taste)
¾ cup pearl barley
parsley, finely chopped (to taste)

Instructions:

1. In a small bowl or measuring cup, soak dried porcini in 1½ cups warm water until softened, about 20 minutes. Strain porcini from liquid and reserve liquid. Chop porcini.
2. In a large soup pot, heat oil over medium heat. Sauté the garlic until lightly brown. Add onion. Sauté for 5 minutes or until tender. Add fresh mushrooms. Cook uncovered for 7 minutes or until mushrooms just begin to brown.
3. Into the pot, pour the vegetable broth. Add porcini and its liquid. Add celery and carrots.
4. Add bay leaf. Season with salt, pepper, and spices. Stir.
5. Bring to a boil. Add barley.
6. Reduce heat to low, and simmer covered for 45-60 minutes, until barley kernels bloom.
7. Fish out and discard bay leaves. Season to taste with pepper and more salt. Add parsley to finish.

This soup can be made a day ahead to allow flavors to meld. Reheat gently. Leftovers can be frozen and reheated.

This recipe is for one large (8-quart) pot of soup. Can you cut the recipe in half so that you can use a smaller pot? Do the math!

Largest Living Thing



The largest living organism is a single gigantic specimen of honey mushroom (*Armillaria ostoyae*), discovered in the Malheur National Forest, Oregon, USA, which occupies a total area of 965 hectares (2,385 acres), equivalent to 1,350 soccer fields. The **honey mushroom** is well known for its glowing surface, caused by bioluminescent bacteria, although most of its tissue is around 1 meter (3 feet) underground, in the form of mycelium. Its age is calculated to be at least 2,400 years old but may be as much as 8,650 years old. It also holds the record for the world's largest fungus.

Video: See this massive mushroom as it kills trees (CBS Sunday Morning): https://youtu.be/Z6V_d47uyks

Nutritious and Delicious



Mushrooms are a low-calorie food that provide the body with B vitamins **riboflavin** and **niacin**, which are especially important for people who don't eat meat. Most mushrooms are also a good source of **selenium** and **potassium**. They also provide a small amount of **vitamin D**. One cup of mushrooms provides 2 grams of **protein**.

The **beefsteak mushroom** (*Fistulina hepatica*) is a rare gourmet fungus with the color and consistency of red meat and a unique earthy-lemon flavor.

Read more about the nutritional value of mushrooms here:

<https://fruitsandveggies.org/stories/mushroom-shedding-light-on-their-nutritional-value/>

Video: Picking the Right Mushroom for Every Recipe (Epicurious): <https://youtu.be/wnCCdpt8y6w>



Song: **The Fungus Song** by Richard Bull

Listen for these lyrics:

"Ya' think fungi are slimy, gross, and cause disease, but what a shock when you find our they make your favorite cheese."

Name the two musical instruments in this song. Hint: one is played by the fingers; the other is played by mouth.



Song: **I Hear Echos** by Ketsa

(instrumental – underscores mycoremediation)

What is the mood of this music?

Mycoremediation

The word mycoremediation comes from ancient Greek $\mu\acute{\upsilon}\kappa\eta\varsigma$ [mukēs], meaning “fungus” and the suffix -remedium, in Latin meaning “restoring balance”.

Fungi are powerful planetary healers. Just like they break down organic matter, fungi can use their digestive enzymes to break down chemicals like hydrocarbons and pesticides. Fungi can also extract and hold onto heavy metals. In this way, they may be helpful in **cleaning up** environmental toxins.

Video: See how fungi are being used to revitalize contaminated soil: <https://youtu.be/w4k5pkL5Me4>

Video: See more examples of how mushrooms are being used to make our world better (National Geographic): <https://youtu.be/BlcKBKJ8uro>



Song: **The Mushroom Song** by Bob LaBoube

Listen for these lyrics:

“They’re so delicious, cooked up in an omelet or a hundred other dishes, sautéed in a little bit of butter. There’s no other fungus that could compare. Yes, I love ‘em. I could prob’ly eat about a million of ‘em. They’re good on a pizza on a steak or in a stew.”

Draw a picture to represent this song.

More Fungi Resources

Instructional Materials for Teachers and Naturalists Teaching About Fungi: Grades K-12

https://namyco.org/manual_for_teachers_and_natura.php

Mushroom lesson plans: Preschool & Grades K-5

<https://www.mushroomcouncil.org/school-nutrition/classroom-education/>

Resources and Materials for schools (British Mycological Society)

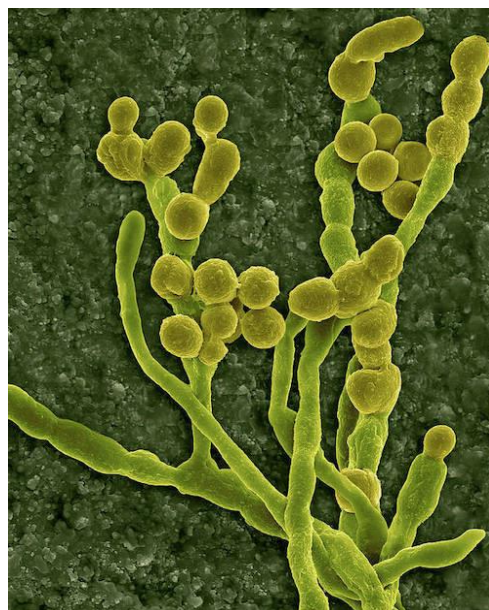
<https://www.britmycolsoc.org.uk/education/resources-and-materials>

Fungi Games and Experiments for (Intermountain Herbarium)

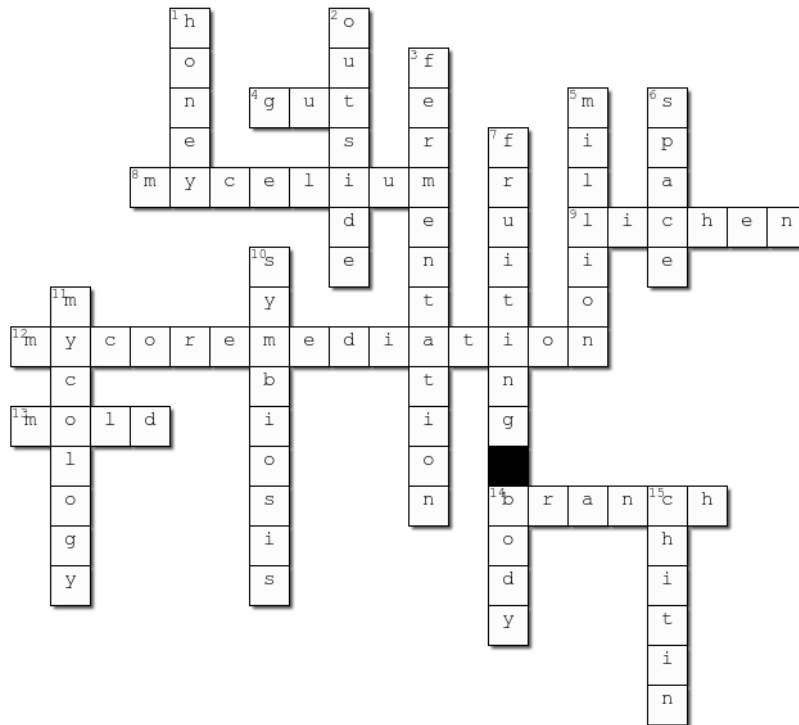
<https://www.usu.edu/herbarium/education/experiments-puzzles-games/index>

Mycology for Kids!

<https://www.fungalfocusutah.com/mycologyforkids>



Crossword Answer Key



Created using the Crossword Maker on TheTeachersCorner.net

Horizontal

4. Fungi live inside the _____ of humans. (**gut**)
8. main body of the fungus (**mycelium**)
9. a complex life form made up of one or more fungi and an alga living together in partnership (**lichen**)
12. using fungi to clean up the environment (**bioremediation**)
13. there are more than 100,000 different types of this fungus on earth (**mold**)
14. Fungi are classified on their own separate _____ on the Tree of Life. (**branch**)

Vertical

1. The largest living thing in the world is a _____ mushroom. (**honey**)
2. A mushroom digests its food _____ its body. (**outside**)
3. the process done by yeast that's important to making beer and bread (**fermentation**)
5. There are an estimated 2.3 _____ species of fungi. (**million**)
6. Lichens and molds have survived experiments in _____. (**space**)
7. the part of the mushroom that we see; it releases spores (**fruiting body**)
10. when two different species of living things live close together in partnership (**symbiosis**)
11. the study of fungi (**mycology**)
15. a molecule that gives structure to fungal cells (**chitin**)

Connect to Curriculum

<http://www.corestandards.org>

<https://artinaction.org/standards/>

<https://www.nextgenscience.org/>

<https://www.positiveaction.net/blog/sel-competencies>

Information/Activity	Core Idea	Learning Standards
p.1, 4, 8, 11, 13 Coloring	Create art that represents natural and constructed environments. Describe what an image represents.	NCAS Creating #2 K Responding #7 K
p.3 Crossword Puzzle	Use precise language and domain-specific vocabulary to inform about or explain the topic.	Common Core ELA WHST 2 (6-8)
p.4 Telling Jokes	(Report on a topic or text.) tell a story, (or recount an experience) with appropriate facts and relevant, descriptive details...; speak clearly at an understandable pace.	Common Core ELA SL 4
p.5, 7, 10, 12, 15, 16 Songs with focus questions	Recount or describe key ideas or details from (a text read aloud or) information presented orally or through other media.	Common Core ELA SL 2
	Add drawings (or other visual displays) to descriptions as desired to provide additional detail.	Common Core ELA SL K
p.5, 6, 9, 10, 12, 13, 15, 16 Reading information about Fungi	Read and comprehend informational texts, including history/social studies, science, and technical texts...	Common Core ELA RI 10
	(Plants and) animals have both internal and external structures that serve various functions in growth, survival, behavior, and reproduction.	LS1.A (4-LS1-1)
p.7 Graphing numbers of species	Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories.	2.MD.D.10
	Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories.	3.MD.B.3
p.14 Recipe math	Represent and solve problems involving multiplication and division. Apply and extend previous understandings of multiplication and division to multiply and divide fractions.	Common Core State Standards for Mathematics 3.OA and 5.NF