



# The Mini Page

Betty Debnam, Founding Editor and Editor at Large



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At Home in the Dark

## The Kingdom of Fungi

Mushrooms and toadstools in the woods, mold on your forgotten leftovers, mildew on your shower curtain and the yeast that makes your bread rise: These are all types of **fungus**. More than one fungus are called **fungi** (FUN-jie).

Fungi look like plants, but they aren't. They are more closely related to animals, but they aren't animals either. Fungi have their own separate kingdom.

To learn more about what makes these organisms special, The Mini Page talked with a biologist and fungus expert.



The foxfire fungus glows and can light up a dead tree. It eats the insides of wood, causing it to decay. Many mushrooms digest wood, which is why mushrooms often grow near dead trees.

photo by Ylenn, courtesy Wikimedia Commons



photo by J. Schmidt, courtesy National Park Service

The ridges under mushroom caps are called gills. Both sides of each gill produce spores, allowing the mushroom to produce many more spores than if the underside were flat.

The caps and stems of the mushrooms are called "fruiting bodies" because they are the sections for reproduction. (The fruits of plants hold the seeds for reproduction.)

### Traveling threads

Fungi have tiny threads, or **hyphae** (HI-fee), that can spread out over great distances. The hyphae grow through surrounding material, such as soil, wood, bread or even brains, to take in food.

These hyphae make up the body of a fungus. We do not usually see the hyphae making up the body.

For example, with a mushroom, we usually see the stem and the cap. But these do not make up the main body. They are part of the reproductive system.

The mushroom's body is made of many hyphae spread out under the ground, sometimes for great distances.

Fungi reproduce by releasing **spores**, which are usually single cells. These special cells can produce new fungi.

### Dining in style

Unlike plants, fungi cannot make their food from the sun. And unlike animals, they do not digest their food inside their bodies. Fungi digest their food outside their bodies.

When we eat our food, we chew it and swallow it. Chemical substances, or **enzymes** (EN-zimes), inside our bodies digest what we eat, breaking it apart into forms our bodies can use.

When fungi eat, they dump enzymes on the food while it is outside their bodies. Once the food is broken down, they absorb it.

If we ate that way, we would order a hamburger and dump enzymes from our bodies onto it. Then we'd stick our fingers into the digested hamburger and soak it up into our bodies.

# A Special Place in Nature

## Fungus kingdom

There are about 75,000 known **species**, or types, of fungi, but experts estimate there are actually about 1.5 million species.

Fungi do not have **chlorophyll** (KLOR-uh-fil), a green substance that plants use to help them make food with sunlight, carbon dioxide and water. This process is called **photosynthesis** (fo-toe-SIN-thuh-sis). This means that fungi can't make food through photosynthesis.

However, the lack of chlorophyll has advantages too. Fungi can live in dark places. Their threads can grow in any direction. These two factors allow fungi to live inside substances such as food, wood or soil.



Mushrooms such as this one from Yellowstone National Park often stand out in the fall.

photo by Ed Austin/Herb Jones, courtesy NPS



The orange peel fungus is found growing on dead wood throughout North America and Europe. It is a type of fungus called a cup fungus. The orange, cuplike forms are the fruiting bodies. They usually appear in late summer or fall.

photo by The High Fin Sperm Whale, courtesy Wikipedia Commons

## Environmentally friendly

Fungi and bacteria are the biggest recyclers on the planet. By digesting their food outside their bodies, fungi **decompose**, or break down, materials. Fungi and bacteria break down once-living matter and release carbon, oxygen, nitrogen and other matter back into the soil and atmosphere.

People use fungi to help recycle ordinary waste. Fungi can break down almost anything except for most pesticides and plastics. Scientists are searching for ways to use fungi to break down toxic waste.

Some fungi live on the roots of about 90 percent of all plants on Earth. These fungi help the plants take in minerals and water. In return, the plants give sugars to the fungi. Fungi help plants grow bigger faster.

The many hyphae spread out over such a large area that they greatly increase the ability of plant roots to take in minerals and water.

## Ready Resources



The Mini Page provides ideas for websites, books or other resources that will help you learn more about this week's topics.

### On the Web:

- TomVolkFungi.net
- bit.ly/16P8EBP
- bit.ly/T36QCF

### At the library:

- "Our Living World: Fungi" by Jenny E. Tesar
- "Alexander Fleming: The Man Who Discovered Penicillin" by Salvatore Tocci



Words that remind us of fungi are hidden in the block below. Some words are hidden backward or diagonally. See if you can find: AMPHIBIAN, ANT, CORDYCEPS, DARK, DECOMPOSE, DIGEST, EAT, ELM, ENZYME, FOOD, FRUITING, GILL, INFECT, KINGDOM, MILDEW, MOLD, MUSHROOM, PENICILLIN, SPORES, SOY, THREADS, YEAST.

DO MUSHROOMS  
GROW IN YOUR  
YARD?



## Fungi

## TRY 'N' FIND

A	M	Y	D	G	E	G	N	I	T	I	U	R	F	T
M	I	O	E	A	I	L	M	O	D	G	N	I	K	H
P	N	S	L	A	R	L	M	E	M	Y	Z	N	E	R
H	F	P	E	D	S	K	L	W	E	D	L	I	M	E
I	E	O	A	N	V	T	T	S	E	G	I	D	A	A
B	C	R	T	M	U	S	H	R	O	O	M	L	N	D
I	T	E	N	I	L	L	I	C	I	N	E	P	T	S
A	L	S	Y	O	S	S	P	E	C	Y	D	R	O	C
N	M	D	O	O	F	E	S	O	P	M	O	C	E	D

# Mini Spy . . .



Mini Spy and her friends are collecting mushrooms. Mini is very careful to make sure they are safe! See if you can find:

- ice cream cone • horse head • arrow
- letter D • letter A • man's face • letter V • frog
- pig's face • canoe • cat • number 6 • word MINI
- chicken • butterfly • fudge pop • fish • mouse



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# Rookie Cookie's Recipe Spinach and Rice

## You'll need:

- 1 "boil in the bag" package brown rice (2 cups cooked)
- 2 cups packed fresh spinach, chopped
- 1 teaspoon butter
- salt and pepper to taste



## What to do:

1. Cook rice according to package directions.
2. Place chopped spinach in the bottom of a medium bowl.
3. Pour hot cooked rice on top.
4. Add butter and mix thoroughly. Hot rice will wilt spinach slightly.
5. Season with salt and pepper.

*You will need an adult's help with this recipe.*

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# Meet Ryan Reynolds

photos © 2013 DreamWorks Animation LLC. All Rights Reserved



Ryan Reynolds stars as Turbo in the movie "Turbo." He has starred in many movies, including "Green Lantern" and "X-Men Origins: Wolverine." He was the voice of Guy in "The Croods." He has also acted in TV shows, including the Nickelodeon series "Fifteen."



**Turbo**

Ryan serves on the board of directors for the Michael J. Fox Foundation for Parkinson's Research. In 2008, he ran in the New York City Marathon in honor of his dad, who has Parkinson's disease.

Ryan, 36, was born in Vancouver, British Columbia, Canada.

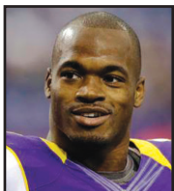
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# Gus Goodsport's Report

## Supersport: Adrian Peterson



**Height:** 6-1    **Birthdate:** 3-21-85  
**Weight:** 217    **Hometown:** Palestine, Texas

When Adrian Peterson crumpled to the turf with a serious knee injury in 2011, it looked as if his days as a running back might be over.

But in 2012 the Minnesota Vikings veteran was back, running rampant again. He gained a career-best 2,097 yards and won several individual awards, including NFL Most Valuable Player honors.

Now the five-time All-Pro is revved up for his eighth season. Is the NFL single-season rushing record of 2,105 yards within his reach? Given Peterson's speed, skill and determination, it's possible.

Peterson covers a lot of ground, on and off the field. He has been on mission trips to Africa, helped with Special Olympics, and contributed through his charitable foundation.



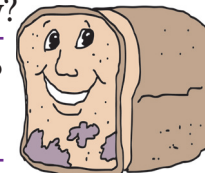
MIGHTY FUNNY'S

# Mini Jokes

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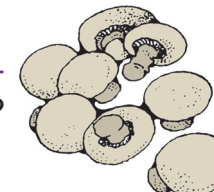
All the following jokes have something in common. Can you guess the common theme or category?

**Fred:** Why was the bread mold so popular?  
**Fergus:** Because he was a fun-gi!



**Fillene:** What sound would a mushroom car make?

**Finn:** "Shroom-shroom!"



**Fanny:** Why did the fungi leave the party?  
**Frank:** Because there wasn't mushroom!

# A Major Player

## Fungi foods

About 250 species of fungi are delicious and nutritious for humans. There are about the same number that can kill us. **Never eat mushrooms you find outside** unless you are with an adult who is an expert.

Fungi are used to develop important foods. For example, yeast is a one-celled fungus that helps bread rise. Fungi make blue cheeses, such as Roquefort, ripen. The blue color of the cheese is actually caused by fungi spores.

Other food substances such as soy sauce are made with fungi. The citric acid in colas is made by fungi.



photo by Crulina 98, Wikimedia Commons

The very first antibiotic discovered, penicillin, was from a fungus. In 1928, Alexander Fleming noticed a green mold in a dish of bacteria. There were no bacteria growing by the mold. Fleming created the first antibiotic from this mold, a fungus.

The Mini Page thanks Tom Volk, department of biology, University of Wisconsin-La Crosse, for help with this issue.

Look through your newspaper for pictures and stories about fungi.



photo by Alan Rockefeller, Wikimedia Commons

The largest known organism on Earth is an *Armillaria solidipes*, such as this honey mushroom. The fungus is in the Malheur National Forest in Oregon. The hyphae of this one fungus cover about 2,200 acres, about the size of 1,665 football fields. Experts believe it has lived for more than 2,400 years.

## Fungi friends

Fungi are often used in industry. For example, stonewashed jeans are made when fungi enzymes partially digest the cotton fibers.

Fungi are vital in medicine. About 1,600 antibiotics are made by fungi. The fungi see bacteria as a competitor for food, so they kill the bacteria that are making us sick.

Fungi are also used to make other medicines, such as cholesterol-lowering drugs and medicine used to keep the body from rejecting transplants.

Next week, The Mini Page is about the America's Cup.

## Fungi foes harm

Fungi cause many human, animal and plant diseases. They cost billions of dollars in crop losses every year. Dutch elm disease, which is wiping out most elm trees in America, is caused by fungi. Mold in homes can make people sick.

Experts believe the **chytrid** (KIH-trid) fungus is a major reason that about one-third of the amphibians in the world now face extinction. A fungus is killing millions of bats with white-nose syndrome.

## Zombie masters

A creepy group of fungi, the **Cordyceps** (KOR-duh-seps), infect insects and take over their brains.

One type of Cordyceps turns carpenter ants in the tropical rainforest into zombies.

The ants live in the treetops, but when Cordyceps spores enter the ant's brain, the ant is forced to climb down to leaves close to the ground. Right before the infection kills it, the spores force the ant to bite down on a leaf, anchoring itself there. The Cordyceps fruiting body grows through the insect's body.



photo by Erich G. Vallery, USDA Forest Service, Bugwood.org

A Cordyceps infected this wasp, eating its insides until it died. The fruiting body stalks grew from the wasp.

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