



FantasticFungi

Presents

Fifty Fungi Facts  
By Eugenia Bone

With Forward By Louie Schwartzberg



# Welcome Mycophiles!

We think fungi are truly the most remarkable organisms on earth. They feed us, protect us, cure us and provide solutions to some of our biggest environmental threats. Neither plant nor animal, fungi thrive in virtually any environment and, given the right conditions, can grow forever. So, while they support the natural life cycles of all other life forms, they themselves defy it. We marvel at their resilience!

We at Fantastic Fungi are passionate about promoting the myriad benefits of fungi. The conservation of fungi is critical for the health of our bodies and our ecosystem. Together with Tribe member and author Eugenia Bone, we've crafted a visually stunning e-book full of fascinating fungal factoids that are sure to educate, surprise, and delight you.

Thank you for joining us on this "fantastic" exploration into the wild world of fungi!

~ Louie Schwartzberg



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## Nº. 1

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Fungi are classified in their own kingdom.

The three most biologically complex kingdoms are animals, plants, and fungi.



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## Nº. 2

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Fungi are closer on the tree of life to animals than they are to plants.





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№. 3

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Plants make their food.  
Humans and fungi  
gather their food.

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## Nº 4

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Humans and fungi both digest their food, although humans digest inside our bodies and fungi digest outside their bodies.

## Nº 5

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Fungi eat by secreting enzymes that predigest food and then they absorb the nutrients. They live in their food.

## Nº 6

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Mushrooms are the fruiting bodies of some fungi.  
They are like flowers, or fruit.



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Nº. 7

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Only a tiny percent of  
all fungi produce  
mushrooms.

Nº. 8

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Mushrooms produce  
spores, lots of spores,  
which are microscopic.

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## Nº. 9

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For every cubic meter of air, there are more than 10,000 fungal spores. You breathe up to 10 spores with every breath.

## Nº.10

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The spores land on their preferred food, and then germinate, growing in three dimensions if they can, as long as there is food to grow into.







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## Nº.11

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One mycologist said if all the spores on earth germinated at once the bio-load would be so great it would knock the earth off its axis.

## Nº.12

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It has been suggested that a fungus, given the right conditions, can grow forever.



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## Nº.13

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The largest living organism on earth may be a fungus. It's 2,200-acres large and at least 2,400 years old. It lives underground in Oregon. It's the clone of an *Armillaria ostoyae*, the honey mushroom.



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Photo Credit: Judith Hoch



## Nº. 14

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Fungi are the second largest group of organisms (after insects), with 1.5 million species. That's 6X more species than plants.

## Nº. 15

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Fungi live on rocks, in sand dunes, under water, inside highly radioactive nuclear reactors, in space, and in your lungs.



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## N<sup>o</sup>.16

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Fungi live and feed in 3 primary ways: as decomposers, as mutualists, and as parasites, though remember, these are categories that we have imposed on nature. Nature doesn't color in the lines we draw.

## N<sup>o</sup>.17

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Decomposers can break down anything carbon based, anything that lived. They are the recyclers of nature.

## N<sup>o</sup>.18

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If it weren't for these kinds of fungi, we'd be buried under miles of dead organic matter.



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## Nº.19

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Some mycologists think that if it weren't for decomposing fungi, we wouldn't have fossil fuels. The earliest fungi could only degrade one part of wood, cellulose. It wasn't until millions of years later that fungi evolved to degrade all parts of wood, cellulose and lignin. In the time between, the wood that created the fossil fuels of the future was laid down. That's not going to happen again.



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## Nº. 20

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Some fungi can break down toxic chemicals like dioxins, pesticides, petroleum products, and chemical warfare agents like VX and sarin, among others, into their inert molecular parts.





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## Nº. 21

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90% of all plants live in a mutualistic relationship with fungi that live on and in their roots.





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## Nº.22

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These fungi extend the plant's root system, and supply water and nutrients in the soil in exchange for sugars from the plant.

## Nº.23

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In some cases, like conifers, a plant needs its fungal symbiont in order to live.

## Nº.24

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100% of all green plants have fungi living between their cells, which begs the question, where does the plant stop and the fungus begin?





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## Nº. 25

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Some of these endophytic fungi function as a kind of immune system, employing toxins to ward off predators like insects or grazing animals.

## Nº. 26

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Others help plants tolerate stress from drought. The fungus produces chemicals that calm down the plant.



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## Nº.27

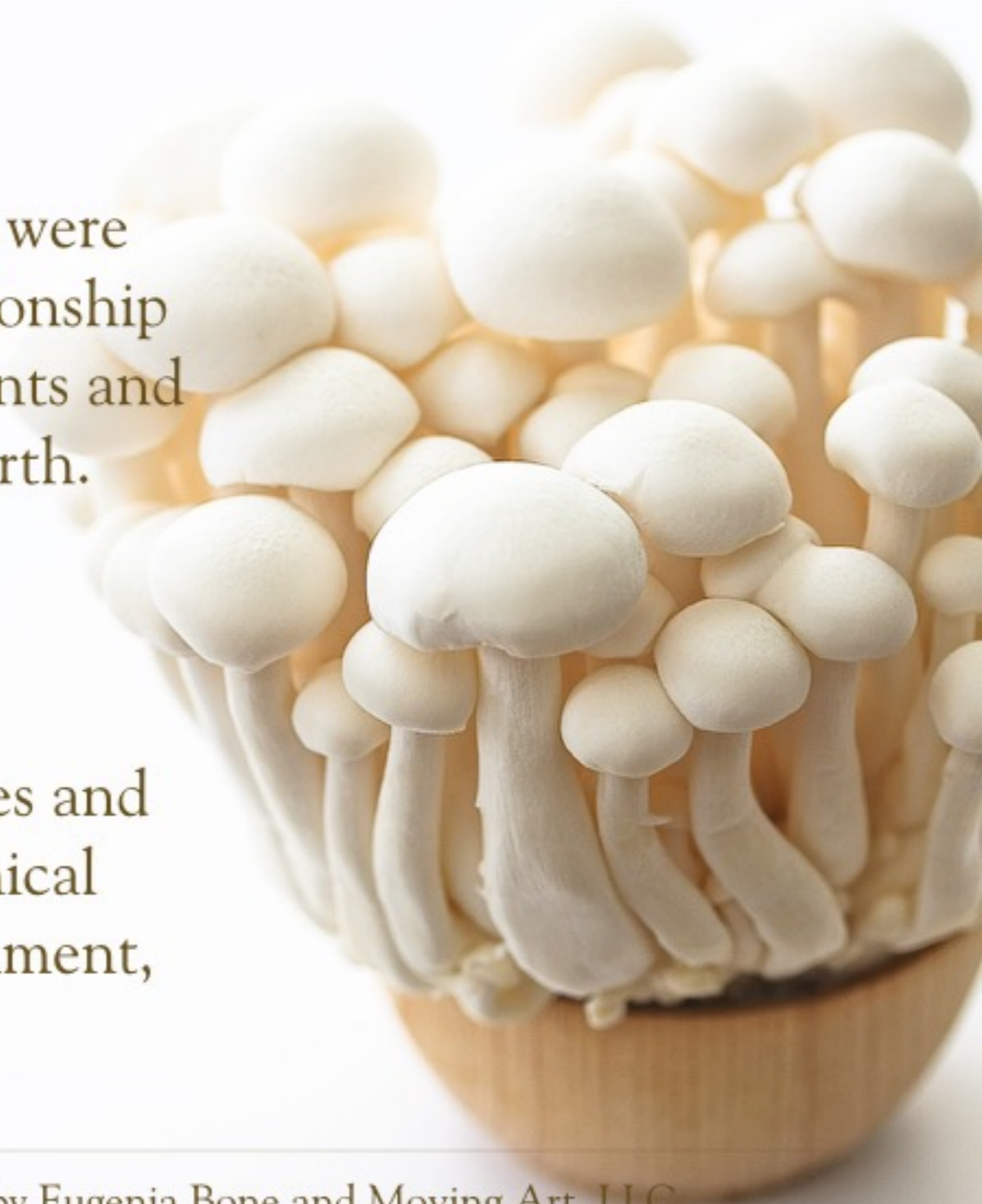
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According to the fossil record, at no time were plants terrestrial without fungi. This is a relationship on par with animals and their bacterial symbionts and typical of the pluralistic nature of life on earth.

## Nº.28

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Fungi can be used to control pests in homes and on crops, proving more effective than chemical pesticides as well as being safe for the environment, people, and other organisms.





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N<sup>o</sup>.29

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Cordyceps fungi are a genus that parasitizes insects; sometimes one species of fungus is particular to one species of insect.

N<sup>o</sup>.30

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The most expensive natural medicine is the *Cordyceps sinensis*, which feeds on the caterpillar of the ghost moth of Tibet.

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## Nº.31

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The fungus infects the worm and produces a fruiting body from its head. The fungus produces chemicals toxic to bacteria and other competitors for the caterpillar's carcass. The Chinese believe we can benefit from those antimicrobial chemicals.



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## Nº. 32

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Another Cordyceps is the parasite of the scarab beetle, the Egyptian symbol of rebirth. This fungus was synthesized to make cyclosporine, an immune suppressant drug that gives people with a transplanted organ another chance at life.



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Nº.34

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Mushrooms, if replacing meat in a diet, will help you lose weight and yet you will feel as full as if you had eaten red meat.

Nº.33

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Fungi are the source of many important drugs, like immune enhancing medications, immune suppressant medications, antibiotics, and cholesterol-lowering drugs, even Beano.





## Nº. 35

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Mushrooms are good for you. They are low in calories, fat-free, cholesterol-free and very low in sodium, yet contain a higher grade of protein than beans. They provide several important nutrients, including selenium and Vitamin B12.

## Nº. 36

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If mushrooms are irradiated, the equivalent of being put on a tanning bed, the ultraviolet light converts a hormone in the mushrooms to large quantities of vitamin D2.



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## Nº.37

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All the wild mushrooms you find in the store are mutualists—they live on the roots of living plants, and almost all cultivated mushrooms are decayers—they live on dead plants. The vast majority of mushrooms in the market are decayers.







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## Nº. 38

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Decayers are easy to cultivate. You just need to give them their preferred food and temperature. Mutualists are very difficult to cultivate because you must create an ecosystem to support them.



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Nº. 39

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Truffles are the fruiting bodies of a mutualistic fungus, and people do try to grow them, though it is difficult, because they are very precious.

Nº. 40

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Truffles are mushrooms that have evolved to grow underground. There are hundreds of species.

They release pheromones to attract certain animals that dig up the truffle and disperse the spore.



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## N<sup>o</sup>.41

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It is not the truffle that tastes so good, but the gas that is produced to attract its animal partners.

## N<sup>o</sup>.42

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The truffles we like to eat have evolved to attract swine.

## N<sup>o</sup>.43

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So a truffle won't attract your dining companion to you; it will attract her to the truffle.



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N<sup>o</sup>.44

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There are truffle orchards all over the USA.

N<sup>o</sup>.45

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The white truffle of Italy, the most expensive food in the world, has never been successfully cultivated, probably because other symbionts are key to their fruiting.

N<sup>o</sup>.46

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Wild mushroom harvesting in the USA is estimated to be the country's largest legal cash business. 1000 circuit pickers gather wild mushrooms in the northwestern states. Most of our wild mushrooms are sold overseas.



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Nº.47

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There are mycological clubs all over America.

Nº.48

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Mycological clubs grew out of the Victorian era's interest in amateur botany. These were educational clubs with a social element.

Nº.49

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Because even though mushroom hunters are generally loners, there is a kind of communion between likeminded people.



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Nº.50

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The controlled use of psilocybin mushrooms has been shown to help terminal patients suffering from depression and end of life anxiety, as well as a variety of neurological disorders. Psilocybin has also helped scientists locate a place in the brain that, when stimulated, causes spiritual epiphany, suggesting that god is, indeed, within.



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## 10 BONUS FUNGI FACTS

- \* Mushrooms have many smells, like maple sugar, bleach, celery, pear, fish, burnt sugar, cucumber, curry.
- \* The white button, crimini, and portobello are all the same mushroom. It's just that the white button is bred for whiteness, the cremini is natural, and the Portobello is a mature crimini.
- \* Fungi are like underground apple trees, and the mushroom is the apple.
- \* Some fungi are composed of masses of filaments called mycelium.
- \* A single fungal filament is 10 times thinner than a human hair
- \* There is about 2000 pounds of mycelium in every healthy acre of soil.
- \* A fairy ring defines the outer edge of a growing mycelium
- \* 1 medium-sized mushroom with a cap 3 inches across can produce 100 million spores per hour.
- \* The tiny pilobolus mushrooms shoots out spore at 35 feet per second, summoning a thrust 10,000 times the acceleration of the space shuttle at take off.
- \* Fungi make up 25 percent of the biomass on Earth
- \* Fungi, bacteria, and viruses all live in the ecosystem that is us. I am me, and my symbionts.



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## About Louie

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Louie Schwartzberg has spent his career mastering the art of filmmaking in his quest to uncover the mysteries of the living universe, the secrets of nature, and the heart of the human soul. As the only cinematographer in the world who has been shooting time-lapse 24/7 continuously for well over three decades, Louie has connected with audiences as diverse as TED, Oprah Winfrey's Super Soul Sunday, and 3D IMAX audiences worldwide. Louie has teamed up with Dr. Paul Stamets and Dr. Andrew Weil to create an educational, inspirational and ultimately critical film called Fantastic Fungi (Fall 2015). The film explores the uses and benefits of fungi as alternatives to allopathic medicine, as a solution to our environmental challenges, and as a tool for consciousness expansion. The research, discoveries and anecdotal evidence gathered is astounding, particularly when shared through Louie's lens. For more information about Louie, visit [fantasticfungi.com](http://fantasticfungi.com) or follow him on Twitter @LouieFilms

## About Eugenia

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Eugenia Bone is a nationally known food journalist and author. Her work has appeared in many magazines and newspapers, including Saveur, Food & Wine, Gourmet, Fine Dining, Martha Stewart Living, Wine Enthusiast, Sunset, The New York Times, and The Denver Post. She is the author of five books, including *Mycophilia: Revelations From the Weird World of Mushrooms*, which was on Amazon's best science books of 2011 list and nominated for a Council on Botanical and Horticultural Libraries award. She is the founder of Slow Food Western Slope in Colorado and the president of the New York Mycological Society, which was founded 50 years ago by composer John Cage. She writes the blog, <http://www.kitchenecosystem.com/>. Eugenia lives in New York City and Western Colorado. Contact Eugenia at [mycophilia.com](http://mycophilia.com), or follow her on twitter @eugeniabone







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## Photographer Credits

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