The World's Largest Living Thing Is… A Fungus?

The honey mushrooms shown above belong to the largest known living thing on earth – a fungus infesting the woods of eastern Oregon.

(1) The white button mushrooms sold at grocery stores may be cute and bite-sized, but they have a relative out west that is huge. This humongous fungus is a species

of honey mushroom living in Oregon's Blue Mountains. Scientists believe it covers over 2,384 acres of soil, which is equal to about 1,665 football fields! The fungus is the largest known living thing on Earth. It may also be the oldest. Estimates for the fungus's age range from 2,400 to 8,650 years.

(2) The scientific name of this fungus is Armillaria ostoyae. When many people first hear about it, they imagine a huge mushroom standing taller than the treetops. The truth is that the largest part of the fungus is its underground **mycelium**. The fungus's mushrooms are not unusually large, but there are a *lot* of them spread over a very large area. In fact, mushrooms belonging to this fungus can be more than a mile apart from each other!

(3) As in other soil-dwelling fungi, the **hyphae** of this fungus grow mainly along tree roots. The fungus uses nutrients from the roots as food. Usually, this relationship, called **mycorrhiza**, is good for both the tree and the fungus. As the fungus gets food from the tree, its hyphae bring extra water from the soil to the tree's roots. This enables the tree to grow more quickly.

(4) Armillaria, however, is not as friendly to trees as most of its relatives. Along with its hyphae, Armillaria extends structures called rhizomorphs. These look like flat shoelaces, and they allow the fungus to reach over greater distances. The fungus attacks tree roots aggressively and causes Armillaria root disease, which kills many **conifer** trees in parts of North America.

(5) A team of scientists wanted to find a way to protect Oregon's trees from Armillaria root disease. In 1998, they began mapping the fungus's population in the Blue Mountains. They collected samples of the fungus from many different places and tested their **DNA**. They found the same DNA in samples collected over a wide area. This led the scientists to conclude that all of the samples belonged to the same huge fungus.

(6) Oregon's Armillaria may be the largest living thing ever discovered, but it is not the only giant fungus. In 1992, scientists discovered a 37-acre Armillaria bulbosa in Michigan. This fungus is not harmful to trees. In fact, it is celebrated at the annual "Fungus Fest" in the nearby town of Crystal Falls. The same year, scientists discovered an even larger fungus covering 1,500 acres in Washington State. One day, scientists may discover fungi even larger than the one living in Oregon.

(7) Even button mushrooms from the grocery store aren't as tiny as they look. A large mushroom farm can produce up to one million pounds of them in a year. According to Myron Smith, a scientist from Carleton University in Canada, the mushrooms produced by growers all have nearly the same DNA. "In a large mushroom-growing facility," Smith says, "that would be a genetic individual – and it's massive!"

(8) Tom Volk is a biology professor at the University of Wisconsin – La Crosse. He says that the discovery of the giant Armillaria has gotten more people interested in fungi. "People had ideas that maybe they were big, but nobody had any idea they were that big," Volk

says. Still, it is possible that enormous fungi like those in Michigan, Washington, and Oregon may not be unusual. With further study, scientists may learn that many mushroom species produce huge mycelia. “We think that these things are not very rare,” Volk says. “We think that they’re in fact normal.”

Note: This reading was adapted by Toby Jacobson from the article “Strange but True: The Largest Organism on Earth Is a Fungus” by Anne Casselman. The article appeared in *Scientific American* on October 4, 2007.

Key Vocabulary

Mycelium: a large underground network of thread-like hyphae

Hyphae: thread-like structures that mushrooms are made of

Mycorrhiza: a relationship between fungi and plants in which a fungus obtains food from the plant’s roots, while the plant obtains water from the fungus’s hyphae

Confier: a type of tree that usually has needles instead of leaves and produces cones (like pines, cedars, firs, and spruces)

DNA: the type of molecule found in the cells of all living things; DNA contains each organism’s genetic code