



April 12, 2007

## **Eye on the Environment: Mushrooms and Their Role in the Forest**

By Anne Dahl for the Seeley-Swan Pathfinder

Hidden in the soil and in other dank and dark places is a weird, complicated community of living matter that helps trees, plants and animals thrive. A rich, mysterious fungal world supports all who inhabit the surface of the earth.

Scientists have been “mapping” this fantastic underground fungal network that includes the concealed parts of mushrooms, conks and toadstools. “Mycelia” is the name given to the hidden thread-like cells that are the non-fruiting components of fungi. Some mycelia stretch for miles and would make monstrous balls if we could roll them up like yarn. Mycelia can exist for years and in addition to inhabiting the ground, they thrive in rotting logs, stumps, live tree roots and trunks, grassroots, tree needles and leaf litter.

When two or more organisms work directly together, scientists call it “mutualism.” There are thousands of examples of mutualistic relationships between fungi and plants. Some fungi prevent parasites in plants. They are famous for gathering nutrients that plants use, according to Paul Stamets, the author of “Mycelium Running, How Mushrooms Can Help Save the World.”

Stamets’ book is full of enticing photos and captions that help readers digest the complicated concepts and big words that mycologists are familiar with. Mushrooms can be divided into a mouthful of difficult to pronounce categories—mycorrhizal, endophytic, saprophytic, and parasitic—which are terms that describe their relationships with other matter.

Mycorrhizal fungi form sheaths around the roots of trees and inhabit the insides of roots in a beneficial way. They can extend beyond the length of roots to gather nutrients and water that are farther afield. Some mycorrhizal fungi connect trees of different species, supporting more than one kind of tree at a time.

Matsutakes, boletes and chanterelles are three types of mycorrhizal fungi that work for plants underground and then are delicious to eat and worth a lot of money when their fruiting bodies pop to the surface. They are also some of the mushrooms infamous for causing mushroom wars among gatherers in West Coast forests.

Endophytes transport nutrients to plants by threading their way between the cell walls, but without entering the cells. Some endophytes protect plants from insect attacks.

The saprophytic mushrooms serve by breaking down matter. They are the decomposers that build soils. The filaments of saprophytic mycelia work their way into and between the cell walls of dead plants. They secrete acids and enzymes that breakdown complex molecules into simpler parts and convert them into nutrients that living plants can use. Oyster mushrooms are a good example of a saprophyte. Many conks are saprophytic. Our common red belt fungus that we find on dead trees in the Swan Valley is a good example.

So what is in it for the mushrooms? One way fungi benefit from their relationships with plants is by being able to absorb the sugars plants create and secrete. The plants and fungi work together in symbiotic ways, which means they help one another.

On the other hand, there is no great good without some small loss. Living among the beneficial fungi are the parasitic mushrooms. The edible honey mushroom which fruits infrequently in shiny clumps is a visual clue to the presence of *Armillaria* root rot, notorious in Swan Valley forests for killing Douglas-fir by spreading root-to-root underground and causing the trees' trunks to rot and break off before reaching maturity. An *Armillaria* network may constitute the largest mushroom in the world. Its mass of filaments can cover many acres underground, creating "pockets" of dead and dying trees above ground.

More easily found than the occasional clump of honey mushrooms are the thickets of dense saplings growing among the downed timber and the 10-30-foot-high snags of Douglas-fir. Without the overhead canopy of tall, mature trees, these root rot thickets are open to the sky, allowing light to shed on the young growth. But the thickets are hard to see into at eye level, so they make good places for does to hide their fawns in early summer.

*Armillaria* mushrooms create dry fuels that in large concentrations and in the right weather conditions can burn hot enough during wildfires to kill the *Armillaria* mycelia.

This makes me wonder if effective fire suppression is allowing root rot pockets to flourish and grow larger until one day a lightning strike creates a stunning conflagration. Yet, with or without fire suppression, the cycle will roll on. Eventually a lightning strike will create an opening that will create a young stand, that will create a dense fungal-supported mature forest, that will create root rot pockets, that will create fuel for a lightning strike...long after we are gone.

Almost all animals eat mushrooms. If you like to walk in the woods, you probably have seen mushrooms scarred with rodent bites or drying on branches where birds or squirrels have left them for later.

I remember years ago being taught that mushrooms had little or no nutritional value because they are 90 percent water. I was led to believe people picked them for their taste alone. In fact most mushrooms are good sources of protein. They are high in antioxidants and low in fats. They are excellent sources of essential minerals people need for good

health, including selenium, copper and potassium. Fungi are also used as medicinals to treat cancer, diabetes and many other maladies.

Some mushrooms, of course, are deadly poisonous and others will just make you good and sick. Gatherers need to know which species are safe to consume.

So far this spring we have had warmer than usual weather. The mushrooms many people are most likely to go crazy over may make an early arrival as warm air wafts up the sides of the Swan Range and heats up the soils exposed last summer during the Holland Peak Fire.

If it's anything like the aftermath of the 2004 Crazy Horse Fire, pickers will be out in great numbers. But the Swan Range is steep and it lacks the road system that interweaves the 2004 burned area. Maybe a few more morels will "fruit" long enough this spring to release their spores and spawn a new crop that our grandchildren, or great grandchildren, will find after some future fire on the mountains.