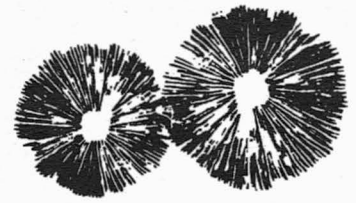


SPORE PRINTS

BULLETIN OF THE PUGET SOUND MYCOLOGICAL SOCIETY
Number 338 January 1998



THE WEB BELOW

Carl Zimmer

Discover, page 44, Nov. 1997, via *NJMANews*, Jan./Feb. 1998

Walking through a forest is like sailing past an iceberg: you're missing a big part of the picture. Trees hide nearly half their biomass in a vast tangle of roots, which in turn are usually woven into an even bigger web made of fungi. This benign fungal infection is a classic example of symbiosis, a relationship in which both organisms benefit. Trees can make new tissue from sunlight, water, and air, but their roots can't extract enough vital nutrients such as nitrogen and phosphorus from the soil. Fungi produce digestive enzymes that free these compounds, but they can't draw carbon from the air. So the organisms collaborate, the fungus taking carbon from the roots and pumping in soil nutrients in return.

Scientists have known about this relationship for decades, but recent experiments are revealing unsuspected complexity. One was conducted by Suzanne Simard, a forest ecologist at the British Columbia Ministry of Forests in Kamloops. Simard had been taught to view trees as rugged, competitive individuals, each trying to struggle above its neighbors to get as much light as possible. But she couldn't help being struck by the subterranean partnerships trees form with fungi and that the same fungal threads often connected to other trees, even trees of other species. "I was always perplexed by the fact that we could explain only 10 to 20% of the variation in how these species grew—their height, their density—by competition," says Simard.

Simard's experiment shows just how interlinked the trees are. She planted seedlings of Douglas fir and paper birch, letting them become infected by local fungi. After a year Simard returned and put tents over some of the trees. A Douglas fir trapped in the shade would photosynthesize less, while a paper birch in the sunlight would continue to draw its usual amount of carbon from the air.

After six weeks Simard began to track what was happening to the carbon the trees were capturing. She put sealed plastic bags over the trees and injected carbon dioxide loaded with different carbon isotopes into the bags. (Isotopes are atoms of a given element that have varying numbers of neutrons.) After nine more days Simard uprooted the trees, ground them into a paste, extracted the isotopes, and measured how much of each the trees had.

She discovered that the isotopes absorbed by one tree often ended up in another, and that shaded trees took far more carbon from their sun-drenched neighbors than they gave. This happened even if it meant that carbon absorbed by a paper birch traveled not to another birch but to a Douglas fir. Simard could only conclude that the fungus was managing the trees, extracting carbon from healthy ones and pumping it to shaded ones, regardless of species. The fungus gave shaded trees 6% or more of their carbon, an amount that can ultimately make the difference between being able to produce seeds and being barren.

Simard's results force a fresh look at some conventional notions in biology. How, for example, can the standard view of evolution—an every-organism-for-itself scramble for resources—be

squared with trees that surrender precious carbon to trees from another species? For one thing, Simard suggests, this arrangement aids the fungus: "There's definitely something in it for the fungus if the trees are doing well." And perhaps the trees themselves can evolve only in a partnership. "The survival of a group of plants may depend on an individual and its neighbors as well. From a strictly evolutionary perspective it may not make sense, but from an ecological one it does."

That perspective should give pause to foresters. In many forests Douglas fir is the preferred species and paper birch, a fast-growing tree that can shade the slower-growing firs for decades, is considered a weed. But Simard says the birches may be nurturing the firs. "These species that we think of as weeds are serving as critical links, and once we sever these links, we affect the stability of those ecosystems. Our practices are still based on the notion that forests act like gardens, and we should weed out what we don't want. But forests are far more complex than that, and we need to maintain this diversity."

DOGS DYING IN ITALIAN TRUFFLE WARS Various

More than 30 valuable dogs have been poisoned since the start of the truffle hunting season in Italy last October. Most of the victims have been truffle hunters, though some that gobbled up the deadly bait, mainly meat laced with strychnine, have been game hunting dogs. The deaths are centered in a swathe of land stretching about 30 miles north of Perugia and about 12 miles wide, just one of the places in the regions of Umbria, Tuscany, and Piedmont known for truffles. No one knows who is killing the dogs, but most fingers point to truffle seekers trying to scare away competitors from their favorite hunting grounds.

"When dogs are dying, people don't go looking for truffles in that area," said Inspector Rolando Radicchi, a forest ranger based in the region. "We are investigating, but it's not easy to find the culprits."

Because of a particularly dry summer, the price of truffles has soared, with top-notch specimens of white truffles fetching around 2.5 million lire (\$1,430) a kilogram (2.2 lb). Truffle hunters, generally part-timers who must pass an exam and be licensed, can earn up to \$18,000 a season.

Truffle hunters are known as a highly secretive and competitive bunch. They frequently deal only in cash to avoid taxes, and fraud is not uncommon say truffle regulators and buyers. Unscrupulous ones mix tasteless Chinese truffles with the real thing to pad their sales, said Olga Urbani, whose Spoleto-based company is Italy's largest exporter and manufacturer of truffle products.

Restaurateur Pierluigi Manfroni, a nationally recognized truffle expert, said another trick is to fill truffles that have holes with dirt or buckshot to increase their weight. One hunter even sold him a large, and thus more valuable, truffle that actually was made from several truffles stuck together.

Spore Prints

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PUGET SOUND MYCOLOGICAL SOCIETY

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Annual dues \$20; full-time students \$15

CALENDAR

- Jan. 13 Membership meeting, 7:30 PM, CUH
- Jan. 19 Board meeting, 7:30 PM, CUH Board Room
- Jan. 23 *Spore Prints* deadline
- Feb. 4-8 Flower and Garden Show, Seattle Convention and Trade Center.

BOARD NEWS

Agnes Sieger

The roster and the March *Spore Prints* will be mailed to members who are active as of February 28, 1998. Raffle and card sales at the December meeting totaled \$118. Book sales were \$54.60. Henry Lingat volunteered to help with a book inventory in January. Dan Tanabe distributed the December income statement and a budget proposal for 1998. The Nominating Committee reported that they had five board candidates so far; no one had yet agreed to run for Treasurer. Doug Ward volunteered to make up a calendar of events for 1998. The exact date and place of the Survivor's Banquet in March are still pending. Doug Ward was thanked for purchasing and assembling the new desk in the office. Coleman Leuthy retrieved the old desk, which he had loaned the Society. Joanne Young reported that Gail Dahm of Olympia would like to make a donation to the Society in the name of her aunt Gladys (Lee) Underwood, who recently died. The heating system in the board room was not on. Henry Lingat and Irwin Kleinman fiddled with the heat control with no success. By the end of the meeting, several members showed early signs of hypothermia, but Henry and Irwin looked comfortable.

BOOK WANTED

Patrice Benson, (206) 722-0691, would like a copy of *Wild Foods* by Roger Phillips to replace a copy she lost.

MEMBERSHIP MEETING

Tuesday, January 13, at 7:30 PM at the Center for Urban Horticulture, 3501 NE 41st Street, Seattle.

Our first speaker of the year is lichenologist Katherine Glew. Her talk is entitled "The Importance of Lichens."



Katie Glew,
lichen class,
NAMA Foray,
Fort Worden State
Park, 1993

Katie is an instructor in the Department of Botany at the University of Washington. She holds a Masters degree in Science Education, and for 20 years taught biological, oceanographic, meteorological, and environmental sciences in the public school system. In 1990 she was selected "Washington State Biology Teacher of the Year."

Ms. Glew will complete her Ph.D. in March 1998. Her current projects include lichen taxonomy and ecology, an inventory of alpine lichens in the Olympic and North Cascades mountains, and their associations with vascular plants. She has been curator of the lichen herbarium at the University of Washington for 15 years and serves on the Executive Board for the American Bryological and Lichenological Society.

Those who attended the 1993 NAMA Foray will remember Katie's fascinating presentation on lichens as the foray's surprise hit. Welcome back, Katie!

If your last name begins with the letters F-K, please bring a plate of refreshments for the social hour.

MEET MASAKO SEKIMOTO

Inga Wilcox

Masako came to Seattle in 1979 directly from Tokyo. With a degree in chemistry, she is working for Pacific Coca Cola Bottling Company in their quality control laboratory. In Japan she lived in a number of different places since her father was engaged in trading. Among other merchandise, fungi—Shiitake—was one of the commodities he dealt in. Masako enjoyed eating mushrooms and cooking with fungi.

When Masako lived in Japan, one mushroom industry dominated the scene. They owned a mountain and hotel, the "Kinoko Kaikan," in Kiryu, northwest of Tokyo. It served seven-course dinners, all with shiitake, and the decor of the hotel was mushroom oriented, with mushroom patterns on the linens, etc. Tours of the growing facilities and a look at the inoculated logs and related cultivation activities were also available.

Masako joined PSMS in 1995 after receiving a flyer on the society during a visit to the Bellevue Botanical Gardens. While she enjoys Seattle's cool climate, being outdoors getting cold and wet is not to her liking. Going on some field trips in the Icicle Creek area, she found her first morels, which don't grow in Japan, but she also remembers trips when she didn't find anything. Once she got separated from her group, and even her whistle could not bring her in contact. So now Masako has a sure-fire hunting grounds and is willing to let us in on it—she picks her mush-

rooms at Larry's, Uwajimaya's, and The Mushroom Lady's booth at the University District farmer's market.

Masako owns many cookbooks and is always looking forward to *Spore Prints*, checking out recipes first. She has lots of fun helping in the mycophagy section at the annual exhibit and takes photos at cooking demonstrations. She took photos of this year's special creations for the Christmas party. Live theater, and especially cabaret, is of great enjoyment to her.

The Kinoko Kaikan still is in operation. How about a field trip to Kiryu? Masako will interpret.

CRAP FOR CHRISTMAS

Dick Sieger

This Christmas will be memorable in our family because of our friend Denny Bowman's unusually thoughtful and unique gift, a sack of crap. Denny arranged for it to be carried by messenger for 8,000 miles from Thailand to Seattle so it would arrive fresh and in time for the holidays. His gift included elephant, water buffalo, and gecko droppings.

To understand my delight, you have to know that I developed a fondness for dung while attending Dr. Dan Stuntz's ascomycete class in 1980, where I learned that wonderful fungi grow on herbivore dung that is kept in a moist chamber.

Dung fungi are easy to cultivate. Moisten a folded paper towel and put it in a 2-cup Pyrex dish. Add fresh or air-dried herbivore dung and cover the dish with its glass lid. Put it in a cool room and keep the towel moist but not wet. Every other day, examine your crop with a magnifying glass or, better still, one of PSMS's dissecting microscopes. If you want to identify your fungi, you'll need a compound microscope and some arcane literature, both of which are available from the PSMS library.

There seems to be a typical progression of fungi in these tiny fungus gardens. Molds appear first, followed by zygomycetes that fling sticky spore capsules at the glass lid. Next come the ascomycetes—first pimples (pyrenomycetes) and then cups (discomycetes). Finally you may see an exquisite *Coprinus* with a minute cap that appears to be encrusted with diamond chips.

Deer, elk, and rabbit dropping are easy to find and culture. Many fungi are particular about the kind of dung they will grow on, so to see a variety of fungus species, select dung from a variety of animal species. I suspect that dung from different places will produce a greater variety of fungi. Elephant dung from Thailand will likely produce fungi quite different from the fungi produced on elephant dung from Seattle.

Avoid carnivore dung. Unlike herbivore dung, which smells earthy or even sweet, carnivore dung smells, well, crappy, and it may contain dangerous human pathogens. In my experience, it also produces insects that eat the fungi before they can be observed. Also, in my experience, it's best to avoid keeping your moist chambers in the kitchen if you have young daughters whose friends exclaim, "What is that!"

PSMS NOMINATIONS NEEDED

PSMS needs a new Treasurer! Our current esteemed treasurer, Dan Tanabe, will be stepping down at the end of his term. We still need someone to fill his shoes! For more information about this position or about nominations to the board of trustees, please call Wayne Elston (425) 222-6607, Marsi DiGiovanni (206) 243-0595, or Joanne Young (206) 633-0752. Nominations will close in January.

EATING RAW MUSHROOMS CAUSES PROBLEMS

Jan Lindgren

MushRumors, Oregon Myco. Soc., March–April 1997

Most of us think nothing of eating a few sliced, raw, "store bought" mushrooms in salads, on hors d'oeuvre trays, or when preparing them for the frying pan. Usually the amount eaten is so small that we don't notice any unpleasant symptoms, but it is not a good idea to eat any mushroom raw. I know the commercial growers will laugh and scoff at this statement and some of you will say you can eat lots of them with no problem, but researchers have shown that even *Agaricus bisporus*, the "store bought" mushroom, contains agaritine which metabolizes into a hydrazine.

Many hydrazines are known to be strong carcinogens and can be found in a lot of edible mushrooms. Cooking destroys some or all of the hydrazines, but the steam given off during cooking has been known to make some cooks ill. Besides this fact, the structural material or cell walls in mushrooms is made of chitin, and humans don't have the ability to digest this derivative of cellulose. The body can do several things to this undigested chitin. It can expel it by vomiting or send it the other way with diarrhea. Small amounts may pass through the gut with other food and go unnoticed, or it may stay in the gut where bacteria will work on it causing bloating, gas, and other discomfort. Cooking does not destroy chitin but may ease its effect. Once in the habit of eating *A. bisporus* raw, people think they can eat any mushroom without thorough cooking, and this is where they may experience some very unpleasant symptoms. In February, a case recorded at the Oregon Poison Center told of a woman who ate home cultivated, raw *Pleurotus ostreatus* with her lunch and experienced nausea, vomiting, and diarrhea. While this may not be a serious health problem it could have been avoided. A better job of educating people about wild collected and cultivated mushrooms is necessary.

We assume that chefs at good hotels and restaurants know not to serve raw mushrooms, but this isn't the case. You may recall that on June 8, 1991, about 70 people were made ill at a large banquet in Vancouver, B.C., because they were served raw morels and other raw mushrooms in a salad.

The spring verpas, morels, and brainlike mushrooms (*Gyromitra*) are notorious for their toxicity in the raw state and, for some people, in the cooked state. Please be careful and remember that drying is not a substitute for cooking and that folding sliced mushrooms into an omelet just before serving or pouring hot vinegar and spices over raw mushrooms is not efficient heating or cooking. The best rule to follow is *cook all mushrooms thoroughly before eating* and eat them in moderation.

A good reference for more information about mushrooms and health is *Mushrooms: Poisons and Panaceas* by Denis R. Benjamin of Seattle.

FLOWER AND GARDEN SHOW 1998 Lynne Elwell

PSMS is again participating in the Northwest Flower and Garden Show February 4–8, 1998, held at the Seattle Convention and Trade Center. PSMS needs volunteers to help plan and construct the exhibit on February 3 and/or staff the booths during show hours Wednesday through Sunday. Volunteers may sign up at the January meeting or call this year's chair Lynne Elwell at (425) 885-5580. You may call at any time. Those participating are able to attend the flower show at no cost, and staffing the exhibit is lots of fun.

THANKS FROM ARIZONA

We recently received the following letter from Patricia R. Donaldson, Treasurer-Membership Secretary of the Arizona Mushroom Society:

Please thank Dick for directions to the old growth forest at Squires Creek Park in Snohomish Co. in late September. Our rainy Seattle vacation was considerably brightened and our Arizona mushroom experience was greatly broadened.

Leader Mike Lovelady, Water Tight and family, Sheryl Lamberton, and Lyla Neumann took Frank and me on a wonderful field trip amid spectacular scenery. Club hospitality included Mike's setting up the propane stove for lunching on his lobsters and Marsi DiGiovanni's chanterelles.

*Discussions of habitat and identification by Bill Bridges and others gave us confidence in the North West. We later found *Cantharellus cibarius* in the lower elevations and *Boletus edulis* above the shore line just as described. We bought an electric frying pan for motel mushroom munching and even dried some on sewing thread for future feasting.*

Please thank all Puget Sound members who changed our trip from drizzly dismal to delightfully delectable!

MUSHROOM ASTROLOGY **Bob Lehman, LAMS**

Capricorn (Dec. 22–Jan. 19): You are plodding but thorough in your mushroom hunting. While Arius has gone off to explore a distant grove of trees and Sagittarius is busy extolling the virtues of mushroom hunting, you work your way through well-tested hunting grounds and find a respectable number of mushrooms. Your organizing and planning abilities can be valuable in making a foray successful. You make careful identifications before eating anything.



POLISH BAKED STUFFED MUSHROOMS

Mushroomer, Snohomish Co. Myco. Soc., Aug.–Sept. 1994

Mushroom picking is a national pastime in Poland, and mushrooms are an important ingredient in many Polish dishes. In the mountainous region of the south, mushrooms are often combined with locally made cheeses, as in the following recipe. The Poles would use fresh *Boletus edulis* and a salty sheep's milk cheese known as bryndza, but large *Agaricus bisporus* and Greek feta cheese are an acceptable substitute outside of Poland.

16 mushrooms, about 1 lb	1 tsp mild or medium-hot paprika, or to taste
1 shallot, finely chopped	1/2 C bread crumbs
1 large clove garlic, finely chopped	1/2 C sheep cheese, finely crumbled
1 TBs fresh parsley, finely chopped	

Preheat the oven to 350°F. Carefully twist the stems off the mushrooms, leaving the cap whole. Finely chop the mushroom stems. Heat half of the butter, add the mushroom stems, shallot, and garlic, and sauté for about 5 minutes. Remove the pan from the heat and stir in the parsley, paprika, and bread crumbs. Add the crumbled cheese and mix well. Lightly brush the outside of each mushroom cap with the remaining butter. Stuff each mushroom cap with a heaping tablespoon of the filling, shaping the filling by hand into a small dome. Use all of the filling to stuff the 16 mushroom caps. Arrange the mushrooms, filling side up, in a lightly oiled baking dish. Bake for 15 to 20 minutes. Serve hot as a first course or as an accompaniment to broiled steaks or chops. Yield: 4 servings as an appetizer, 6 to 8 servings as an accompaniment. Heat scale: Mild.



*Happy New Year!
And good hunting
in the upcoming season.*

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