SPORE PRINTS

BULLETIN OF THE PUGET SOUND MYCOLOGICAL SOCIETY

Number 240 March 1988

SURVIVORS' BANQUET **Ingeborg McGuire**

Plans for the banquet are progressing nicely. It will be held on March 11th at the Officers' Club at the Naval Station Puget Sound, 7300 Sand Point Way, Seattle, 98115. You will be asked for your name at the gate. A no host bar opens at 6:30 and dinner is served at 7:30. There will be a choice of three menus: baked salmon, roast Cornish hen, or a vegetarian plate.

Bill and Peggy Stark, pioneers of the Enchantments and the Alpine Lakes Wilderness for over 30 years, will present a narrated slide show from their unpublished book about the Enchantments, *How Deep the High Journey*. If you know the prose and poetry of Peg and the superb photography of Bill, set in that high granite habitat of the Enchantments, with golden larches abounding the the fall, you won't want to miss this event.

Tickets are still available, but please make your reservations now. Time is getting short, and the deadline is March 7, 1988. The tickets are $14 each. Please send your check and a self-addressed, stamped envelope to:

Ingeborg McGuire
4258 7th Ave. N.E.
Seattle, WA 98105

Specify your choice of menu, please. Call 633-5778, evenings, for further information.

TOXIC MUSHROOMS, FLIES, AND WORMS **John Jaenike**
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Mushrooms, as any collector knows, are often infested with the larvae of a variety of species of insects. Among such mycophagous insects in eastern North America are several species of the genus *Drosophila*, whose more famous members can be found around garbage and in genetics laboratories. These flies consume a tremendous variety of fungi; most remarkably, their diet includes the most deadly of all mushrooms, the amanitin-containing species of the genus *Amanita*.

Humans and most other animals are poisoned by alpha-amanitin, because this small polypeptide binds to the enzyme RNA polymerase II, the enzyme that transcribes DNA into messenger RNA. As RNA transcription winds down, so must protein synthesis eventually come to a halt. Before too long, a poisoned animal will die.

Yet at least five species of *Drosophila* are able to consume these toxic mushrooms with apparent impunity. Such observations beg two questions: how do the flies do it, and why do they do it? The former is a physiological question, the latter an ecological one.

At present, we have little information on how flies can cope with ingested amanitin. That they do actually consume this compound is strongly suggested by the observation that when larvae are fed an artificial medium prepared with an amanitin solution the mycophagous species can survive concentrations of amanitin at least 500 times greater than can the fruit-feeding species *D. melanogaster*. In fact these mushroom-feeding drosophilids are the most amanitin-tolerant animals known. A possible means by which flies could tolerate amanitin would be to produce an RNA polymerase that is not affected by this toxin. In vitro studies, however, have revealed that the polymerases of mycophagous species of *Drosophila* are just as sensitive to amanitin as are those of non-mycophagous species. Thus, resistance must reside in preventing the alpha-amanitin from reaching the polymerase. Possible mechanisms include detoxification, either in the gut or the fat body of the larval fly, and selective deposition in the insect's cuticle.

Given the fact that there are so many other, nontoxic species of mushrooms available as breeding sites for these insects, why have they bothered to evolve tolerance to amanitin? There are two general ways this could arise: (1) if the physiological cost of being amanitin-tolerant is negligible, so that a larva's ability to develop on the more commonly used fungi is not compromised in any way; and (2) if, for some reason, toxic mushrooms provide better than average conditions for larval development. The first possibility seems unlikely, as studies of antibiotic resistance in bacteria and of pesticide resistance in insects show that when application of these toxic agents is halted populations loose their previously evolved resistance; in other words, in the absence of toxins, the sensitive genotypes are competitively superior.

With respect to the second idea, we now have evidence that toxic mushrooms may be particularly good breeding sites for mycophagous *Drosophila*. Most species of mushrooms that are used by *Drosophila* are also bred in by crane flies and wood gnats, *Diptera* that are much larger than *Drosophila*. Experimental field studies have shown that all of these species of mycophagous flies experience some degree of larval competition for food. However, crane flies and wood gnats do not (or cannot) utilize amanitin-containing mushrooms; hence, for *Drosophila*, larval competition for food may be reduced in these toxic fungi.

(cont. on page 4)

Spore Prints

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PUGET SOUND MYCOLOGICAL SOCIETY
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University of Washington, Seattle, Washington 98195
(206) 522-6031

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EDITOR:	Agnes A. Sieger, 15555 14th N.E., Seattle, WA 98155

Calendar

Mar 11	Survivors' Banquet, Sand Point
Mar 14	Board meeting, 7:00 pm, CUH
Mar 19	Field Trip, MacDonald County Park
Mar 25	*Spore Prints* deadline
Apr 2	Field Trip, Maple Valley
Apr 4	*Spore Prints* mailing
Apr 4	Public mushroom ID 3:00-7:00 p.m., CUH
Apr 9	Field Trip, Rockport

Library Hours - Library materials may be used during the hours indicated for educational activities.

PRESIDENT'S MESSAGE — Coleman Leuthy

Our club during the past two years, though going through changes, including location, has realized many positive results. I feel we are in a good position and can continue well the purposes of our club as established by our founders and our founding advisor.

I greatly appreciate the many hours of conscientious effort you have all generously contributed. It has certainly been an experience and a pleasure to have served our club as president. Thank you.

BOARD NEWS — Dick Sieger

Lois Skoor resigned because personal obligations prevent her from continuing as PSMS secretary. Mari Bull was elected to complete Lois' term.

Laurelhurst residents say parking is limited in their neighborhood. They ask people attending meetings at CUH to use the center's fifty-cent parking spaces.

Membership Meeting

Our annual meeting will be held during the Survivors' Banquet on Friday, March 11, 1988, at the Naval Station Puget Sound Officers' Club, 7300 Sand Point Way, Seattle.

EDUCATION — Coleman Leuthy

Mini Displays - Mini displays will continue at each membership meeting. Arrive early with specimens to share. Fill in a label and distribute your collections on trays. Our identifiers will help you. By the end of the program, collections will have been verified for you to review.

Public Mushroom Identification - On Mondays, April 4 through May 23, from 3 to 7:00 p.m., an identifier will be available at our office or boardroom in Isaacson Hall at CUH to identify at least the common edibles, poisonous species, and look-alikes, and to tell you who can help you with less easily identified mushrooms.

Seminars for Intermediates - For these sessions, you should know the common genera. We will use Northwest Key Council keys. A complete set is about $45, or they can be purchased individually as needed. (Keys range from $.15 to $6.50.) Various leaders will use slides and available specimens and have you use keys individually or as a group. Sessions will be Mondays, April 11 and 25 and May 2, 9, and 23, from 7:00 to 9:00 p.m. at Isaacson Hall, CUH, in the boardroom near our office.

Beginners' Classes - Learn the basic groupings of mushrooms and the characteristics used in identification. We'll cover common genera and stress edible and poisonous forms. The class includes field trip opportunities, and will be held Tuesdays, April 19 and 26 and May 3, 17, 24 and 31, from 7:00 to 9:00 p.m. at the Isaacson Hall classroom. To sign up, send a check for $15, payable to PSMS, to 2455 E. Lake Washington Blvd., Seattle, 98112, by March 26.

ANOTHER NORTHWEST POISONING — Denis R. Benjamin

With the late rains last year, recreational mushrooming persisted somewhat longer than usual. On the first of December a 20 year old male was admitted to a hospital in the Olympia area, approximately 12 hours after ingesting an unspecified quantity of LBM's, some of which had been brewed into a tea. At least a few of these mushrooms were identified as *Galerina autumnalis* at Evergreen State College. His initial symptoms of severe abdominal cramping, vomiting, and diarrhea developed on the day after his feast. He was transferred to a Seattle hospital with evidence of moderate liver dysfunction. Fortunately, this did not progress to liver failure nor were his kidneys seriously affected. Unlike the recent case in California that required a liver transplant, he gradually recovered with conservative and supportive care. He was discharged after almost 3 weeks, better but still having some diarrhea. It was reported that this was his second episode of serious misidentification.

Galerina autumnalis

SPRING FIELD TRIPS

Irwin Kleinman

We have scheduled eight field trips for the spring season. Please check the society's message recorder for last minute changes. Except for the trip to MacDonald County Park mentioned elsewhere, all are weekend trips. On Saturday, hosts will greet you and keep a coffee pot going. An expert will be on hand to help with identification. Bring a main dish, salad, or dessert so you may join the Saturday evening pot luck dinner. Camp overnight, if you wish, and continue collecting on Sunday.

Enjoy a special features field trip on May 14th at our most popular site, Crystal Springs, near Snoqualmie Pass. Expert leaders will share tips on collecting, ID, and cooking. Then we'll have a party!

We need hosts for all the outings scheduled. Call Irwin Kleinman at 323-2903.

Lake Wilderness Park **April 2, 3**

From Seattle go south to Renton. Take the Maple Valley Road (Hwy 169) south to the junction with Hwy 18. Continue on the Maple Valley highway to the next stop light. Turn right on Witte Road. Go 1 mile to Lake Wilderness Park.

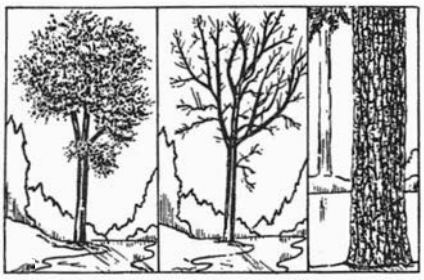
Steelhead Park, Rockport **April 9, 10**

This is a regular spring field trip. You may camp in this beautiful campground located on the Skagit River. There are full hookups, if desired, for the customary fee. There are two possible routes, both lined with cottonwoods so you can look for *Verpa bohemica* on the way. Either take the Arlington exit #208 from I-5 and drive through Darrington, or take the Burlington exit #230 to Rockport. Steelhead Park is on the river bank. Bring your binoculars, because if we are lucky we may see some bald eagles.

Lake Easton	April 30
Lake Wenatchee	May 7
Crystal Springs (special features)	May 14
Swauk Camp	May 21
American River Ski Lodge	May 27-30
Clear Lake	June 4

LEARNING FIELD TRIP

Monte Hendrickson

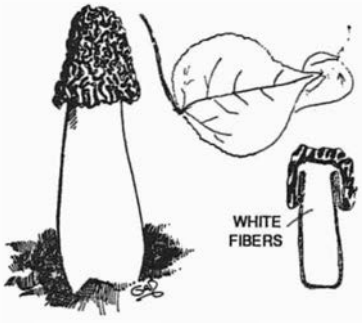


After the dry autumn season when none of us found very many wild mushrooms, we are anxious to get out and start looking for fungi. Even if you think that "spring has not yet spring," it is time to schedule our very first (one-day) learning field trip. The prime purpose of this field trip is to learn to recognize cottonwood trees and how to hunt for the *Verpa bohemica* and other spring fruiting fungi.

Rain or shine, mushrooms or no mushrooms (our success rate for finding fungi on this trip is 85%), this field trip will be held on Saturday, March 19, 1988. Bring your lunch, but there will be no potluck dinner for this event.

Come to MacDonald Park on the Tolt River a half mile south of Carnation in King County. Enter the park via N.E. 40th Street from Hwy 203 (watch for the PSMS signs at the corner). Come to the parking lot for the day-use area of the park. Cross the suspension bridge over the river to get to the shelter.

Arrive by 9:00 a.m. There will be a lecture by Monte Hendrickson on how to recognize cottonwood trees, under which the early morels *(Verpa bohemica)* fruit, and on the basics of hunting wild mushrooms; then Monte and others will lead the hunt. Be sure to wear sturdy, waterproof footwear (no tennis shoes, unless you want to slosh around in them all day) and rain gear, and bring a basket (no plastic sacks). PSMS provides coffee and cookies. We are scheduling this field trip as early as we expect to find spring fungi so you can enjoy a long spring mushroom season.



CONSERVATION AND ECOLOGY

Margaret Dilly

Hurrah! We're half way there with SSB6240. Thanks to all of you who contacted your legislators, we passed the full Senate 49 to 0. How exciting to be there for the roll call. But now it's time to gear up for the second half, the House of Representatives. We only have until March 5th, but I am optimistic that we will make it. When we do get this bill passed, it will mean not only the commercial people will be required to keep mushroom harvesting data, but we, too, will be expected to make a voluntary collecting report. More on that next month.

Other bills to back: (1) Native Plant Society HB1451 now in the State Senate; (2) Mt. Baker - Snoqualmie Forest Plan G (write Forest Supervisor, Mt. Baker - Snoqualmie Forest, 1022 1st Ave., Seattle, WA 98104). (3) Arctic Wildlife Refuge HR39 (U.S.).

Let's do our part, before we lose the things we love.

HUNTER'S STYLE CARROTS

The Silver Palate

[Reprinted with permission from *The Silver Palate Cookbook*, Rosso & Lukins, Workman Publishing, 1982]

- ½ oz dried mushrooms (*Boletus edulis*)
- ½ cup Madeira
- 3 tbsp olive oil
- 1½ lbs thin carrots
- pinch salt
- 1 oz prosciutto
- 2 large garlic cloves, minced
- 3 tbsp coarsely chopped Italian parsley
- black pepper

Wash the mushrooms in a sieve in running water. Soak them in the wine for 2 hours. Drain, reserve liquid, and chop finely. Cut carrots diagonally into ½ inch pieces and cook in the oil for 10 minutes over medium heat, stirring occasionally. Add salt, mushrooms and any remaining wine. Continue cooking, stirring and tossing, for 10 minutes until carrots begin to brown lightly. Thinly slice the ham, cut into fine julienne, add to the carrots and cook a minute until heated. Stir in the garlic, parsley, and pepper.

Flies, etc. *(cont. from page. 1)*

An even more significant advantage of breeding in species like *Amanita virosa* and *A. bisporigera* is that the larvae that develop in these mushrooms are virtually never infected by the parasitic nematode *Howardula aoronymphium*. These nematodes infect mycophagous species of *Drosophila* during the larva stages of the flies and persist in them to adulthood. The nematodes reside, feed, and multiply in the abdomens of adult flies, and as a result parasitized females are almost always sterile. Parasitized adult males are in some cases rendered sterile, and they are significantly less successful when it comes to obtaining females for mating than are unparasitized males. Thus, there is a severe cost in terms of fitness to individuals that are parasitized by these worms. Furthermore, the incidence of parasitism is often quite high. In *Drosophila testacea*, for instance, an average of 35% of the flies at any one time were found to be infected from August 1984 through April 1987 in a population near Rochester, New York. This nematode, therefore, must represent one of the major factors limiting the fitness of individual flies and the potential rate of growth of their populations. As mentioned above, however, amanitin-containing fungi represent a virtual haven from this parasite. Almost 500 individuals of several species of mycophagous *Drosophila* have been bred from *Amanita virosa* and *A. bisporigera* collected around Rochester, and of these only a single fly was found to be infected by nematodes. It is this advantage of breeding in toxic mushrooms that I believe may be largely responsible for the evolution of amanitin tolerance in mycophagous *Drosophila*.

MAILING COMMITTEE **Millie Kleinman**

Thank you for helping with the *Spore Prints* mailing: Larry Baxter, Mae Green, Bob Hamilton, Marian Harris, Bob Judd, Margaret Dilly, Coleman Leuthy, Russ Kurtz.

Our next mailing will be on Monday, April 4th, at 10:00 a.m. at CUH. Everyone is welcome to help.

OF MUSHROOMS AND THE SOVIET UNION **D. Bowman**

For those of you who might have missed me at the January membership meeting, sorry I didn't make it, but that evening I was deep in the Siberian forest having a sauna complete with beer thrown onto the hot rocks, shakilka cooked over birch coals, and, of course, mushrooms. Although these mushrooms were hand carried from the Pacific Northwest, they were especially prepared by several Soviet women and then served to a number of families gathered for a festive evening.

That's part of how I spent January. The rest was similar, but with different people and in different locations. I searched out the popular Moscow version of salted mushrooms that Dick Sieger had told me about, and tasted a most interesting pickled mushroom that included such varied ingredients as black current leaves. I had several kinds of *Lactarius*, the long-leg (honey) mushroom, and of course the biligrebe, the white or king bolete. Pickled, canned, salted, or dried, there seemed to be no end to the number of mushroom preparations the Soviets wanted to share with me. In turn, I have brought some of their recipes and stories back to the Pacific Northwest to share with you.

Russia must be the most mycophilic country on earth. Little children sniff them in the subway like nosegays. Instead of state capitols or national holidays, date books feature mushroom fruiting schedules. I met many Soviets who have a genuine craving for information about mushrooms. There are people in both Novosibirsk and Leningrad who would love to start a mycology study group. It is difficult to imagine, however, trying to study such a subject as mycology when publications, any publications, are next to impossible to obtain. I urge any of you who may have an extra book or publication on your shelf to consider passing it on to me to take back to the Soviet Union for them. It will be appreciated.

Next month: Mushroom Mania.

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GF-15, University of Washington
Seattle, Washington 98195

Order Survivors' Banquet tickets from Ingeborg McGuire by Monday, the 7th.