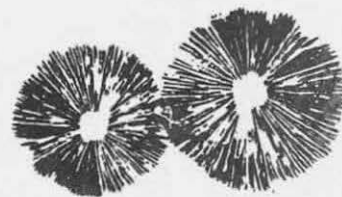


SPORE PRINTS

BULLETIN OF THE PUGET SOUND MYCOLOGICAL SOCIETY

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ONE MAN'S POISON

Warren R. Froelich

UCSD Perspectives, Summer, 1994

A group of chemists at the University of California, San Diego, has discovered that a chemical derived from a lethal compound found in *Omphalotus illudens* [= *O. olearius*], the poisonous jack-o-lantern mushroom, can kill stubborn cancer cells without any measurable side effects.



The mushroom—a bright yellow and orange fungus that grows on rotten logs or tree stumps in moist terrain and gets its name from the eerie glow it emits at night—is reasonably common. In San Diego, for instance, it's found in the canyons of Balboa Park. Mushroom pickers avoid it, however. If eaten, it causes serious illness and possibly death.

And yet it's the extreme toxicity of the jack-o'-lantern that attracts Trevor McMorris, a professor of chemistry at UCSD. To McMorris, a specialist in the chemistry of natural substances, the mushroom's poison was not to be feared, but harnessed...into a drug that selectively kills cancer cells.

The drug is a third-generation analog, or modified version, of an illudin, one of the family of chemicals found in *Omphalotus illudens*. Studies suggest that the analog works in ways not seen before in other anticancer agents.

"As little as one molecule binding to every 6 million base pairs of DNA is enough to kill a [cancer] cell," said Michael J. Kelner, an associate professor of pathology at UCSD Medical Center who is collaborating with McMorris. "Basically, the cells cannot repair themselves. In contrast, you can have 100 times that amount with cisplatin or some other type of anticancer agent and the cell will repair itself."

The amazing thing, according to Kelner, is that the analog seems to be most effective against the most lethal tumors. "It seems like the more metastatic the tumors," Kelner said, "the better this chemical works against them."

When tested at UCSD on laboratory mice and human tumor cell cultures, the illudin analog was extremely effective against cancers found in the liver, lung, pancreas, breast, ovary, and cervix, in addition to myeloid and t-cell leukemias.

In recent studies of dogs with untreatable breast tumors, an Ohio State veterinarian wiped out all signs of cancer using the illudin analog. A dog with incurable myeloid leukemia, injected with the chemical, went into remission. In addition, the cancers in dogs had already been treated with five chemotherapeutic agents, including all the standard agents, and they had all failed. Moreover, Kelner added, "there were no systemic side effects, no organ toxicity at all."

"At this stage it looks exceedingly promising," McMorris said in a recent interview. "It appears that we have a compound that will get into the clinic."

Years of Research Vindicated

Research on illudin began about a half-century ago when scientists at the New York Botanical Garden—inspired in part by the discovery in 1928 of penicillin from a common mold—were studying fungi in search of antibiotic activity.

In 1950, the New York scientists reported that a compound isolated from this mushroom exhibited powerful antibiotic activity. Unfortunately, the compound was also extremely toxic: Mice injected with tiny doses died. So the compound sat on a laboratory shelf for more than a decade and gathered dust.

In 1963, McMorris became the first to describe in a scientific journal the chemical structure of the illudin compounds. About the same time, the chemical was submitted for tests to the National Cancer Institute for screening.

"Indeed, it was found to have anticancer activity," McMorris said. "But unfortunately, because of the chemical's high toxicity, it was of no use in treating cancer. So the cancer institute quickly lost interest."

In 1979, McMorris' interest in illudin was rekindled when a British scientist to whom he had sent some samples wrote back describing illudin's remarkable lethality in animal studies. Among other things, McMorris wanted to know why the compound was so toxic, and if its toxicity could be tamed into a therapeutically acceptable drug.

McMorris first tried piggybacking illudin on a monoclonal antibody. However, the experiment—like many other early but promising research avenues with monoclonal antibodies—failed.

Then, in 1985, Kelner arrived at UCSD and, as a favor to McMorris, began working with illudin. Kelner, like others before him, was struck by the chemical's talent for wiping out living cells. But Kelner noticed that chemical had certain other unique characteristics: First, it was particularly lethal to cancer cells after only short exposure, about 2 hours. Second, it was far more toxic in cancer cells than in normal cells, even though it was highly lethal to both after longer exposure.

McMorris and his colleagues prepared and studied the reactivity of illudin analogs, hoping to find a compound that was both safe and effective in treating cancer.

When tested against tumor cells, a first-generation analog proved to be more effective than most conventional anticancer agents. A second generation did better, although it produced some side effects in animals, including reduced counts in platelets and white blood cells.

The third-generation analog worked beyond expectation, wiping out all signs of a wide variety of previously untreatable cancers in laboratory mice without measurable side effects.

Much of the recent work at UCSD was supported under a three-year \$225,000 grant from the California Tobacco-Related Disease Research Program, which is funded by a statewide tax on tobacco products.

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CALENDAR

- March 14 Morel Project Meeting, 7:00 PM. CUH
- March 15 Cultivation Class, 7:00 to 9:00 PM., Isaacson Classroom, CUH (registered students only)
- March 18 Survivors' Banquet and Annual Meeting, 7:00 PM, the Polish Home, 1714 18th Avenue, Seattle
- March 20 Board Meeting, 7:30 PM. CUH
- March 22 Cultivation Class, 7:00 to 9:00 PM., Isaacson Classroom, CUH (registered students only)
- March 24 *Spore Prints* deadline
- March 25 Field Trip, 9:00 AM, McDonald Park, Carnation
- March 29 Cultivation Class, 7:00 to 9:00 PM., Isaacson Classroom, CUH (registered students only)
- April 5 Cultivation Class, 7:00 to 9:00 PM, Section A of NHF, CUH (registered students only)
- April 9 Field Trip, Steelhead State Park, Rockport

BOARD NEWS

Dick Sieger

Patrice Benson led a discussion of the society's finances preliminary to preparing a budget and a report to the membership. Patrice asked the Daniel E. Stuntz Foundation for a grant to produce an educational video tape on organizing an annual exhibit; PSMS received \$450 for editing and adding sound. PSMS will host the Stuntz Foundation's Memorial Lecture, which will be held at the October meeting; Dr. Jim Trappe will speak. Carol Smith and Russ Kurtz are evaluating sites for a Fall foray. The 1995 roster will be prepared from our March 1st membership list. PSMS will purchase a \$75 fourth-class nonprofit mailing permit. Joy Spurr was voted funds to pay for slide duplication.

MEMBERSHIP MEETING

This month is the Annual Meeting and Survivors' Banquet, Saturday, March 18, at the Polish Home, 1714 18th Ave., Seattle.



The banquet will begin at 7:00 PM. The doors will open at 6:30 PM. The banquet is potluck with the theme of *Boletus*, so bring an appropriate dish for 6-8 people. Reservations are required. If your last name begins with A-M, please bring a main dish, appetizer, or salad; if N-Z, please bring a dessert. Cups, plates, cutlery, nonalcoholic punch, and coffee will be provided. Bring your own wine. Admission is \$4; pay at the door.

BASIC MUSHROOM ID CLASS Marshall Palmer

A Basic Mushroom ID Class will be held on six consecutive Monday evenings, 7:00-9:00 PM, at the Center for Urban Horticulture April 3 through May 8. This class will introduce participants to the identification of gilled and nongilled fungi, and will include information on the ecology of fungi, collecting and cooking edible mushrooms, and recognizing toxic look-alikes. *Mushrooms Demystified*, 2nd ed., by David Arora will be the text. Some copies will be available for purchase at the first session.

Please note that the class will be limited to the first 25 registrants. (The class will be offered again in October.)

To register, send (1) a check for \$20, payable to PSMS, and (2) a self-addressed, stamped envelope to

Marshall Palmer
P.O. Box 95677
Seattle, WA 98145

You will receive confirmation of your registration and further information after March 16. If you have any questions, call Marshall Palmer at 527-6207. (I will be out of town from March 10-15.)

MUSHROOM CULTIVATION CLASS Curt McClive

An Introduction to Mushroom Cultivation class will be held on four consecutive Wednesdays, from 7:00 to 9:00 PM., starting on March 15, at the Center for Urban Horticulture in the Isaacson Classroom. Topics to be covered are sterile technique, contamination and how to address it, fungal nutrition, sources of supplies and materials, and fruiting strategies. Each class will have a lecture followed by either a lab period or a demonstration.



Admission fee is \$25. Enough tools, equipment, and material will be provided to get participants started, including a sleeve of Petri dishes, a canning jar with filter, agar, grain, and a scalpel. To register, hand or mail a check, payable to PSMS, to either Greg Chew or Curt McClive. Participation will be limited to the first 25 registrants.

Greg Chew
5517 Seward Part Ave. S.
Seattle, WA 98136
721-3867

Curt McClive
4850 156th Ave. NE, Apt 282
Redmond, WA 98052-9642
867-5140

SPRING FIELD TRIPS



Winter is o'er, and the lengthening days and warm winds of the vernal equinox are beckoning the mushrooms up out of the ground—we hope. We have scheduled the first two field trips in homage to that harbinger of spring's bounty, *Verpa bohemica*: not the choicest of edibles, maddeningly hard to spot amid the debris of the previous fall, sometimes causing severe reactions in its consumers—but the first!

Field trip 1 is our traditional half-day trip to introduce newcomers to the mushroom and its habitat and whet the appetite of old-timers for the Spring hunting to come. Field trip 2 is to a favorite PSMS *Verpa*-hunting area which has been neglected in the past few years.



March 25

Tolt River Field Trip (30 miles east of Seattle)

The first field trip of 1995 will be Saturday, March 25, at MacDonald Park near Carnation. MacDonald Park is on the Tolt River about 1/2 mile south of Carnation in King County. Enter the park on N.E. 40th Street from State Hwy. 203. Watch for PSMS signs on the corner and use the day-use parking lot. We will meet at the main shelter across the suspension bridge at 9:00 AM. for a general introduction to mushroom hunting. Then we will break into small groups and go out to gather specimens. Identifiers will be available around 10:30 AM. There should be *Verpa bohemica* under the cottonwoods in the surrounding area. Please bring a mushroom basket, knife, brush, whistle, and compass. Wear shoes suitable for soggy ground and bring rain gear. We will meet rain or shine. You may want to bring lunch.

April 9

Steelhead County Park, Rockport (95 miles NE of Seattle)

There are two possible routes, both lined with cottonwood trees under which you can look for *Verpa bohemica*. Either take exit #208 from I-5 at Arlington and go east on State Hwy 520 through Darrington and north to Rockport or continue north on I-5 to exit #230 at Burlington and go east on State Hwy 20 to Rockport. Steelhead Park is on the river bank. We might be able to see bald eagles. Remember the potluck at 4:00 PM.

VERPAS AS AN ARTHRITIS CURE? *The Ann Arbor News*, May 17, 1994 via *The Mycophile*, July-Aug. 1994

A morel researcher has begun studying the medicinal qualities of *Verpa bohemica*, the early, or false, morel. It seems that he discovered that people who ate his *Verpa* soup and had arthritis found their symptoms alleviated. He said he has served soup—some made with false morels and some with true morels—to people with arthritis.

"The people who were eating the false morel soup got such immediate relief that they stopped taking their arthritis medicine. The relief lasted up to three weeks. The problem is that no one knows what it is about false morels that supposedly provides the relief."

Upjohn Pharmaceutical Company and the University of South Carolina will study the problem using the mushrooms on arthritic patients. People hunting morels in Michigan were asked to col-

lect *Verpa bohemica* as well and drop them off at collection sites for shipment. The article noted that few eat the false morel due to the fact it can cause stomach aches and nausea. It didn't say, however, what kind of precautions will be taken with the test subjects. What is worse, arthritis or a tummy ache?

MEET THE SCHNARRES

Inga Wilcox



Not everyone is introduced to mushroom hunting by PSMS members who happen to be relations. Harold and Beth Schnarre first were presented with a box of chanterelles by Grace and Paul Jones, who are Beth's aunt and uncle. After hunting for morels in Eastern

Washington and attending field trips, the Schnarres joined PSMS in 1983. Meetings were held in the Monroe Center. Field trips were mostly overnight, and people could travel further distances.

Both enjoy spring mushrooms, and Beth is especially fond of *Boletus edulis*. On one outing, they hunted in an area where there were horse parties. Looking under the bushes along the trail, they hit a bonanza. They went back twice, but never again found the same abundance. Last fall was a good season for them for finding matsutake, but since so many persons were looking for that choice edible, they had to work harder and to search in more difficult terrain. Beth is now on crutches, but she can still walk along a trail and spots fungi at eye level while Harold and son Mark keep their eyes on the ground. One of their all-time favorite hunting areas is American River, and they never miss the PSMS annual field trip there.

They both co-hosted forays, took an ID class through Cispus, and took a microscopy class from Judy Roger. They enjoyed learning how to prepare slides, to observe the diversity in spores, and to be able to get a look into the finite world inside a fungus.

Beth grew up in Port Gamble and California while Harold comes from Oklahoma. They came to Seattle in 1960 from the Midwest. Drawing on her background in Early Childhood Education, Beth taught preschool for the past 10 years as part of the Family Life Program at Edmonds Community College, leading classes for children who had not fully developed in certain areas. For a hobby, she collects things: Japanese dolls, music boxes with children atop, and German nutcrackers to name some. She also does watercolors, having started with oils and studied drawing. She has exhibited in juried events. Harold enjoys hiking, did cross country skiing, and hopes to spend more time in his garden now that he has retired as a manager at Blue Cross.

Both Beth and Harold have served on the Board. Beth chaired the PSMS Book Sales for many years, and Harold served as Treasurer. They enjoy the wonderful mix of people in PSMS, their different backgrounds, diverse reasons for joining, and varied interests. Harold recommends that one find an area of special research, search out that fungus, and become truly informed. Beth remembers advice from her mother: Belonging to an organization, you receive—and as you receive, it is necessary to give something back.

We were saddened to hear of the death of Emery Bronner, 95, on December 22, 1994. The Bronners were active for many years and will be remembered by many.

NOTES OF THIS AND THAT

Joy Spurr gave two programs on mushrooms at the Bellevue Botanical Garden in Bellevue on February 8 and 9. The 35 people attending were enthusiastic about learning about mushrooms and their value to our ecology. All were invited to come to our meetings and field trips.

Charter member Elsie Burkman is finally giving up her 1981 Chevrolet Suburban 10 Delux, +49,022 km for \$3,995. If interested, call Elsie at (206) 282-6723.

The fourth revised printing of Joy Spurr's book *Cuttings Through the Year* is being sold in the Arboretum Foundation gift shop on the Arboretum grounds. It is for gardeners who like to increase their plantings by taking softwood cuttings.

MISC. CLASSES, FORAYS

1995 NAMA Foray: August 24–27 in Bemidji, Minnesota, on the shores of Lake Bemidji in ~~the~~ heart of the lake country. There will be three preforay workshops: "The Wonderful World of Myxomycetes" by Dr. Harold Keller," "Lactarius Identification" by Pat Leacock, and a comprehensive identification workshop by Dr. Walter Sundberg. For information, write MMS/NAMA 1995, P.O. Box 146, Afton, MN 55001; telephone (612) 625-7088; Fax (612) 625-5299; or e-mail geren002@maroon.tc.umn.edu.

Appalachian Mushroom Course: Ron Petersen will lead a two-week course on mushrooms of the southern Appalachian Mountains. Enrollment is limited to ten; tuition scholarships are available. For more information, write Dr. Richard Bruce, Director, Highlands Biological Station, P.O. Drawer 580, Highlands, NC 28741.

California Mushroom Weekend: An informal three days of exploration into the world of mushrooms, including cultivation. All levels welcome. March 30–April 2, 1995, \$105. For information, call Sandy Bar Ranch, Orleans, California, at (916) 627-3379.

FISH COOKED WITH MUSHROOMS AND CREAM

Jane Grigson, *The Mushroom Feast*

4 whole fish (trout, whiting, etc.) or 4 thick fillets (halibut, sole, flounder)	8 oz mushrooms, sliced Salt, pepper Lemon juice 2 C heavy cream Cayenne pepper
Seasoned flour 3 oz (6 TBs) butter	

Turn fish in seasoned flour. Clarify the butter: bring it to a boil in a small pan, then pour it through a muslin-lined sieve into a frying pan. Brown fish on both sides over high heat in the butter. Transfer fish to a dish, and cook the mushrooms in the fish juices. Season to taste, sprinkle with lemon juice, and put the fish back into the pan. Pour the cream over the fish, add a pinch of cayenne pepper, and bring to a boil. When the cream is bubbling gently, place the dish under a hot grill and leave it there for about 8 minutes so that a golden crusty skin forms on the top. Keep an eye on the fish when they are under the grill and adjust the heat if necessary. Serve immediately in the cooking dish. Serves four.

POTATOES GRATIN WITH CEPES

Jane Grigson

The Mushroom Feast

2 1/4 lb waxy potatoes, peeled or scraped	Butter
1 to 2 lb ceps (<i>Boletus edulis</i>)	1/2 C finely chopped onion
Salt, pepper	1/2 C chopped parsley
1 clove garlic	3/4 C grated Gruyère cheese
	1 1/4 C heavy or light cream

Slice the potatoes thinly (the cucumber blade of a grater does this well). Slice the ceps not quite so thinly. Season both with salt and pepper. Rub an oval gratin dish with garlic and butter. Alternate layers of potatoes and ceps, sprinkling each one with onion, parsley, and cheese, reserving a few tablespoons of cheese for the top. Pour on the cream, scatter remaining cheese over the whole thing, and dot with butter. Cook in a low oven, 325° F, for 1 3/4 hours, lowering the temperature when the dish begins to bubble hard. Serve in the cooking pot. Serves 6 to 8.

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522-6031. Leave a message.

