SPORE PRINTS

BULLETIN OF THE PUGET SOUND MYCOLOGICAL SOCIETY
Number 463 June 2010

RARE *SQUAMANITA PARADOXA* FOUND

The Spore Print, L.A. Myco. Soc., January 2010

Vancouver Island, Canada - An extremely rare mushroom that looks as if it's wearing yellow rubber boots has been found on Observatory Hill in Saanich, B.C.

Victoria mycologist Oluna Ceska, who is working on a fungi inventory for scientists at the National Research Council's Dominion Astrophysical Observatory, found *the Squamanita paradoxa* mushroom on Nov. 27 and has now had its identity confirmed.

A. Ceska

Squamanita paradoxa

It's the first time the *Squamanita* has been found in Canada, she said.

Ceska's husband, Adolf, former botany curator at the Royal B.C. Museum, was with her when the strange mushroom was found. "Adolf almost wanted to throw it away and I said, 'My God, put it back and take pictures,'" said Ceska, who did not know exactly what it was but sensed it was rare. "I thought it was just a new species of a genus I knew, but when I got home I couldn't find out what it was."

When she realized what she had found, her excitement grew and she contacted other mycologists around the world.

Squamanita was described by University of Washington mycologists in Seattle in 1948 and some have been found in the Mount Hood area. There was another report of the species from Priest Lake, Idaho. "Our find is the first in Canada and perhaps only the third record from North America," said Adolf Ceska.

Even in Europe it is rare, with about half a dozen reports from areas such as France, Italy, and the Czech Republic, said Oluna Ceska.

What makes the mushroom particularly interesting is that it grows parasitically on more common species of mushrooms, she said. That means the bottom of the fungus, which resembles the yellow boots, is a completely different species. "The lower part is not even related."

Samples of the mushroom have been sent to the University of B.C. herbarium and to the University of Tennessee, where a DNA analysis will be conducted.

Photos have been sent to other researchers, and the find will probably be included in a paper written by a U.S. mycologist on North American species of fungus.

"Now we know where it grows, we can go every year to see if it's fruiting. Everything depends on the weather," Ceska said.

The *Squamanita* could also be growing in other areas of Vancouver Island, said Ceska, who would like to hear from anyone who thinks they have seen the mushroom.

Southern Vancouver Island has a wealth of fungi, said Ceska, who believes someone should be compiling an in-depth inventory of species in B.C. During the five years Ceska has been working on the Observatory Hill inventory, she has documented 850 species. "And I am sure that is not close to the final number," she said.

FUNGUS SPREADS SOUTH FROM B.C., BECOMES MORE DEADLY various sources

It sounds like a villain from a science fiction film.

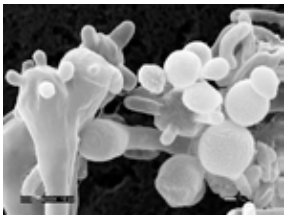
Cryptococcus gattii—an airborne fungus that appeared on Vancouver Island in the late 1990s—is real, and it's gathering strength as it spreads to the south. According to research published April 22 in the journal *Public Library of Science Pathogens,* it has mutated into a more lethal strain since it moved into Oregon. The fungus has now spread to California.

So far, Washington cases of cryptococcosis caused by *C. gattii* have been reported in Whatcom, King, and San Juan counties. "The cases in Washington—and there's only been eight or nine of them—are strongly linked to the British Columbia strain," said Dr. Tom Locke, public health officer for Clallam and Jefferson counties.

Fortunately, though potentially deadly to humans and animals infections of *C. gattii* are still rare. According to the Oregon Department of Human Services (April 26, 2010), since 2004 about 50 people have been identified with the illness in Washington, Oregon, and California and about 10 people have died.

Cryptococcus gattii is not transmitted from person to person or carried by insects or animals. Rather, the fungus forms spores that are blown in the wind or moved by disturbances of the soil. People who stir up the soil—landscapers, loggers, outdoor recreationalists—are the most likely to encounter the fungus. Besides being spread by the wind, the fungus can be spread by humans on shoes and even on car tires.

The spores are inhaled and colonize the lungs before they spread throughout the body. Symptoms include shortness of breath, chest pain, long-lasting coughs, fever, and headaches—even weeks after exposure. Most cases are like a pneumonia that slowly gets worse and worse.



Treatment involves six to eight weeks of intravenous antifungal medications followed by months of pills.

Cryptococcus gattii

Spore Prints

is published monthly, September through June by the

PUGET SOUND MYCOLOGICAL SOCIETY

Center for Urban Horticulture, Box 354115
University of Washington, Seattle, Washington 98195
(206) 522-6031 http://www.psms.org
User name: Password:

OFFICERS: Marian Maxwell, President[2010–2012]
Milton Tam, Vice President[2009–2011]
John Goldman, Treasurer[2010–2012]
Denise Banaszewski, Secretary[2009–2011]

TRUSTEES: 2009–2011:
Brenda Fong, Debra Lehrberger, Randy Richardson, Jennifer Slack, Kim Traverse
2010–2012:
Louise Asif, Jim Hughes, Pacita Roberts, Ed Sakai, Tony Tschanz
Patrice Benson (Immed. Past Pres.)

ALTERNATES: Ruth Buttler-Rhese, Sharon Chappell

SCI. ADVISOR: Dr. Joseph F. Ammirati

EDITOR: Agnes A. Sieger, 271 Harmony Lane, Port Angeles, WA 98362
sieger@att.net

Annual dues $25; full-time students $15

CALENDAR

June 5	Field Trip (see website)
June 8	Membership Meeting, 7:30 pm, CUH
June 21	Board Meeting, 7:30 pm, CUH
July 19	Board Meeting, 7:30 pm, CUH
Aug. 13–15	NAMA Foray, Winter Park, CO
Aug. 16	Board Meeting, 7:30 pm, CUH
Aug. 24	*Spore Prints* deadline
Sept. 14	Membership Meeting, 7:30 pm, CUH

BOARD NEWS

Denise Banazewski

We had the best turnout at Mushroom Maynia! this year that we've ever had, and as a result, we have 12 new members! We also have an outreach opportunity coming up at the Arboretum called the Bioblitz. Bioblitz is a 24-hour event starting on May 21 where scientists, students and citizens will help to inventory all of the life they can find in the Arboretum, including mushrooms. You can even tent out in the Arboretum! If you are interested in volunteering, please contact Marian Maxwell, 425–235–8557. The board also discussed lease renewal options, as our lease at CUH expires in 2014; however we have only tentative information on our options at this time. The spring classes went really well, the students are great, and the classes well attended. Next year, we may look into offering more classes than we usually do in order to meet the demand.

MEMBERSHIP MEETING

Tuesday, June 8, 2010, at the Center for Urban Horticulture, 3501 NE 41st Street, Seattle

Our featured speaker this month will be Jack Czarnecki, speaking on "Oregon Truffles—Old World Pleasures, New World Treasures." Jack is a noted wild mushroom hunter, cooking authority, and award-winning cookbook author. He received the James Beard Award in 1996 for *A Cook's Book of Mushrooms,* and his other books include *Joe's Book of Mushroom Cookery* and *The Portobello Cookbook*. Jack has also written articles for many food and wine publications, has appeared on television, and has judged wine competitions for over 20 years. He moved from his native Pennsylvania where he ran Joe's, the family business, for 22 years, to Oregon and opened The Joel Palmer House Restaurant in 1997. He featured the local mushrooms and paired them with fresh produce such as fiddleheads, seaweeds, and top-notch regional wines to create a wonderful restaurant with an enthusiastic following. Jack also learned to harvest the native white and black truffles, which he began to use, in addition to the local mushrooms, in his restaurant. He has since turned the restaurant over to his son, and now makes and sells a line of Oregon white truffle oil. Jack is currently a director of Distinguished Restaurants of North America, a board member of the American Institute of Wine and Food, a founding member of the Society of American Cuisine, and an advisory board member of Penn State University.

Would members with last names beginning with the letters A–K please bring a plate of refreshments to share after the meeting.

FIELD TRIP REPORT, APRIL 17

Brian Luther

We had a very good day in terms of membership turnout and the diversity of fungi brought in. The weather was overcast but not especially threatening. Between 2:00 and 3:30 pm we got a brief drizzle which dampened our clothes a bit but certainly not our spirits.

Forty-six people signed in, but I suspect a few forgot to, which is common. We were lucky that John Goldman just retired in March, because PSMS has already received the benefit of John and Andrea's involvement in hosting. The Goldmans got there Friday evening and had already touched bases with the Forest Service Ranger, so when it came to Saturday morning they were super organized. They had their RV right in front of the gate, which made it easy for getting all the hosting supplies in and out. It was a great spread of goodies and coffee. Doug U-Ren, in his usual manner, also provided tables and water and other things that really helped. These kinds of cooperative contributions by members are what PSMS is all about. Thanks Andrea, John, and Doug!

I brought over 100 lb of firewood from home and had a fire going all day in a beautiful spot next to the ID table overlooking the river, and it felt pretty good.

Hildegard Hendrickson did an admirable job by personally taking a large group of people out collecting. Thank you, Hilda, for your time, knowledge, and patience.

I was lucky to have Larry Baxter helping me ID in the morning. He and I went collecting briefly when everybody was still out and about. Later in the day one of our youngest new members, Adrian

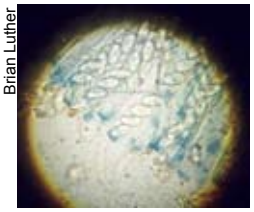
Lee (7), was helping me as well. Adrian is showing a remarkable interest and aptitude for fungi at his age, which I am delighted to see. I've never before seen a kid his age accurately identify so many genera and species. I don't even remember Josh Birkebak being this good at his age. I will always encourage this interest in the future.

A number of people found *Verpa bohemica*, and a few true morels were located, some right in the campground. Forty-seven species were displayed, but this does not include several resupinates that I still have to work on. Interesting species found included two specimens of *Hygrophorus pratensis*, which is normally only found in fall; two peculiar black Discomycetes, *Pseudoplectania melaena*, and a surprising collection of *Sarcosoma latahense* (formerly known as *S. latahensis*). A specimen of *Polyporus badius* was found with its pore surface covered with the bright orange parasite *Hypomyces aurantius*.


Brian Luther

Peziza praetervisa

Looking in several of the campground fire pits that had not been used since last year I found lots of fruitings of *Peziza praetervisa*. This cup fungus is common on ash and charcoal in burned sites, especially in old fire pits; it starts out with a beautiful purple or violaceous color when young, then becomes purple-brown or just brown at maturity. The ascal tips in all species of *Peziza* turn a beautiful blue (amyloid or J+) in iodine reagents such as Melzer's or IKI. This particular species has ellipsoid ascospores that measure 11–14 × 6–7 µm and are distinctly finely ornamented (see photomicrograph at left taken under 1000× magnification showing the ascal tip bluing and ornamented spores).


Brian Luther

There was plenty of food at the potluck, but the light rain was heaviest right while we were serving and eating. There was a 15 foot long slightly sheltered kiosk that we all tried to huddle under, but it really didn't matter because we all had a fun day.

FIELD TRIP REPORT, MAY 8 — Brian Luther

The timing was perfect for this location, which I reserved months ago. I urged most members to walk around and comb the immediate area, and many returned with at least a few choice morels. One new member focused on the large Cottonwoods lining the nearby river and came back with both *Verpa bohemica* and a lovely collection of gorgeous true morels, both in prime condition. Although morels do occur under Cottonwoods, we don't normally see such abundant fruitings as this, so we came at just the right time.

Forty-nine people signed in, with a few camping both Friday and Saturday nights. Our hosts for the day were new members Jim Boril and Anna Possek, who are neighbors. When I arrived at 8:20 am, they already had some of the picnic tables in the shelter covered with breakfast goodies, juices, and hot coffee. Everything went so smoothly, you'd think our hosts had been doing this for years. This is the kind of new member involvement we love to see. Thank you, Jim and Anna, for a job well done. Anna brought her youngest child, Daniel (9), and after a brief demonstration on how to use our Motorola two-way radios, I let Daniel have one while they were out collecting for a couple of hours. As you can imagine, I got rather frequent updates on their progress. Daniel also wanted to help me keep the fire going once I started it.

Although this is a large campground, the exclusive use of the group camp and shelter was extra nice, with plenty of parking and lots of space. This is one of the nicest facilities available to us with a comfortable shelter, lots of picnic tables, good running water, electricity, bathrooms nearby, and a big inside fireplace hearth. My wife, Pam, and I were staying at our property nearby for a couple of days prior doing rototilling, and Friday evening I cut a car full of wood for Saturday. Starting about mid-morning I kept a fire going in the shelter throughout the day. This warm fire was even more appealing in the early afternoon when dark clouds rolled in and it suddenly got quite cold. We got a little bit of everything with the weather: sun and some white puffy clouds in the morning, then dark, cold conditions in the afternoon with hail and rain. We were very glad to have the shelter, but many were still out collecting, then maybe an hour before potluck, it got sunny and warm again.

I would like to thank Daniel Winkler, who lead a group of five or six members out collecting all day, as well as helping me with ID. Thirty-four species were collected. Besides verpas and morels (*Morchella elata*), other edibles included several collections of *Calbovista subsculpta* almost all of which were in prime condition. Again, the timing was impeccable—a week later and they would have started to form spores. Rare or unusual species included a single *Pluteus romellii* with a dark brown cap, yellow gills, and a lemon yellow stem and the delightfully colorful and glutinous little *Chromasera cyanophila* (*Mycena lilacifolia*), with yellow caps and lilac gills.


Brian Luther

Calbovista subsculpta

Our host set the potluck for 4:00 pm, and those who stayed enjoyed a small, but delightful meal. We had lots of interest and involvement by members, and I don't think we could have had a nicer day overall.

FIELD TRIP REPORT, MAY 15 — Brian Luther

The conditions at this location are never the same, though we usually come at about the same time. Some years everything is wet and moist, others it is dusty and dry; some years certain wildflowers are blooming, others not. Just as the prevailing conditions can vary wildly from year to year, our success at finding morels is a fickle adventure. Well, this was a good year, with a few to many morels being collected.

I arrived at 7:50 am Saturday morning and found only Doug U-Ren out and about with his pooch Ginger. Pretty soon I saw John Goldman pretending to be awake, and not long after that we started to see others wandering about—presumably looking for coffee. Again, we are most grateful to our hosts, Andrea & John Goldman, for supplying a welcome spread of munchies, coffee, and juices first thing in the morning and for greeting members. True to form, Doug also contributed to the field trip's success in many ways.

We had excellent weather all day, which is not a sure thing at this location. Some people arrived a couple of days early to find a good camp spot and get a jump on collecting. Doug U-Ren staked out an area of morels to take beginners to, and it worked out well. I had invited a group of Washington Conservation Corps folks for a

cont. on page 4

Field Trip, May 15, *cont. from page 3*

mushroom ecology walk, and Doug's morel patch was our starting point in the woods. Thanks, Doug, for always thinking of ways to help and encourage beginners.

Sixty-four people signed in, and the surprise of the day was a retired couple from Texas who flew to Chicago, took the Empire Builder Amtrak train all the way to Seattle, and then rented a car just so they could come to this field trip. Wow! They found only one morel, but I gave them some more. They were very interested in mushroom hunting and were going to look up a local club in their part of Texas. I was not only impressed with their enthusiasm and commitment to make arrangements for split second timing between train, plane, and automobile for their trip, but was also flattered that they wanted to come to one of our field trips.

Most people found at least some morels, with a few hitting the jackpot. True morels this year have been common under the Cottonwoods—definitely not the case every year by any means. Forty-six different fungi were displayed. Interesting species included an unseasonal specimen of *Hygrophorus chrysodon* (normally a fall mushroom) and three specimens of the beautiful and petite *Calocybe onychina*, with a purplish brown cap and stem and yellow gills. Thanks to Danny Miller who assisted me with ID.

We had left the specimen table in the sun and at the end of the day we had a lovely assortment of shriveled up and unrecognizable species.

The potluck was especially good, with a lot of hearty and very tasty dishes. I started a fire just before leaving, and everybody was settling in with their camp chairs for a pleasant evening of conversation around the campfire. Great weather, lots of participants, and plenty of morels. I'd call that a successful field trip.

BOOK REVIEW

Ron Post

Taming the Truffle
Ian Hall, Gordon Brown, and Alessandra Zambonelli
Timber Press 2007

A good friend of mine left the area suddenly in March and before she left gave me this book about the history and science of truffling and *truffieres*.

The book has all the concise technical information found in classics such as *The Advance of the Fungi* by E.C. Large, but few of the storytelling attributes. As for the subtitle, "History, Lore and Science of the Ultimate Mushroom," perhaps the famous truffle is really just the mushroom with the ultimate price tag.

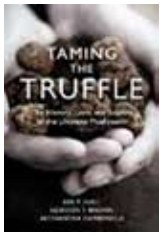
The first 100 pages or so deal largely with truffling history and species identification, This section is an indispensable starting point for anyone who intends to gain a comprehensive knowledge of these edible, ascomycetous, hypogeous fungi. Later there is much about the ins and outs of environmental management of *truffieres,* the truffle-tree orchards. And there is much discussion about marketing the final product, legally and illegally. The appendices are really a gold mine of information, obtained over many years (although much of it will be useful only to the serious mycologist or arborist.)

I found the book most interesting because of its information on tree species that host truffles. But one thing I found distasteful was the authors' consistent implication that any competing ectomycorrhizal fungi are bad guys. The message is clear: keep away all other ectomycorrhizae from your truffle trees! Yet the trees don't seem to mind their presence, indeed, often preferring them to the ones that humans desire.

Throughout the book there are plenty of close-up pictures, especially of edible truffles and beautiful truffle spores. These photos make the book a worthy purchase; you'll probably never see many of these species, or see them in such good shape.

I do feel pity for the pigs that used to find the favored truffles for their masters. If they did occasionally gobble up a few delicacies, well, I'm sure that was a small price to pay for a treat that is now all but denied to them. Do pigs have truffle dreams?

I don't dream of them, nor have I ever rooted one out with my nose, but I have tasted fresh white truffle and I have to say that it may very well be an overrated delicacy. Reading this book was almost as good as eating one. In any case, because of my lack of enthusiasm for the subject, this book is going into the PSMS library where you also may read and learn truffle trivia, such as the identity of "smell-alikes" that are substituted on the market for real Italian white truffles.



RESUPINATE FUNGUS OF THE MONTH: *Ceriporia purpurea*

Brian Luther

In my introduction to this series on resupinate fungi of Washington State (*Luther*, 2010), I said that these fungi share only a common growth habit and that they have many different hymenial forms. The fungus I chose to discuss this month is a resupinate polypore with a fine poroid (pored) hymenium (spore-bearing layer of tissue). This species was traditionally placed in the old genus *Poria* (Lowe, 1966), which is now known to be artificial and includes many unrelated genera and families of fungi. The genus *Ceriporia* is one of the modern segregates of that old genus.


Brian Luther

Ceriporia purpurea

Traditionally placed in the Polyporaceae, *Ceriporia* was put in the family Phanerochaetaceae by Julich (1981). A subsequent DNA study by Kim & Jung (2000) confirmed that the genus belongs in that family. In a separate DNA study of the genus *Laetiporus*, Lindner & Banik (2008) found that, curiously, *C. purpurea*, a white-rot genus, is closely related to the brown-rot pileate (capped) polypore *Leptoporus mollis*.

The species of *Ceriporia* are some of my favorite resupinates because many are brightly colored. These fungi are almost always on the underside of woody debris against deep forest duff and soil and are reported on both hardwoods and conifers in North America (Lowe, 1966; Gilbertson & Ryvarden, 1986). My experience with this genus has been that they're often associated with hardwoods.

Widely distributed throughout the world, *Ceriporia purpurea* is also found in Europe (Ryvarden, 1976) and Africa (Lowe, 1966). One of the neat features about this fungus is that it has sausage shaped (allantoid) spores (see drawing).

Good macro-characteristics for distinguishing this species in the field are its pale purplish to rosy-purplish finely pored fruiting body

which has a narrow whitish margin when actively growing. The fruiting body becomes reddish or dark reddish brown with age or bruising. All of these features, along with the allantoid spores, are diagnostic for this species.

Classification Hierarchy for *Ceriporia purpurea* (derived in part from Hibbett, 2006)

Phylum Basidiomycota
Subphylum Agaricomycotina
Class Agaricomycetes
Subclass Agaricomyetidae
Order Polyporales
Family Phanerochaetaceae
Genus *Ceriporia*

Materials & Methods

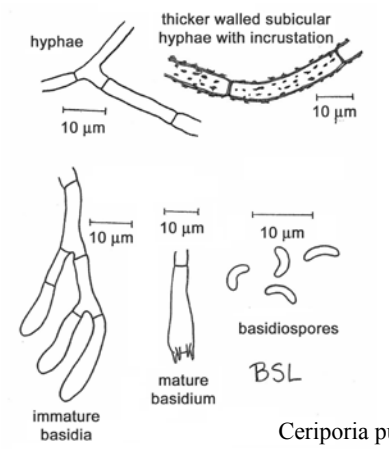
I made both thin sections under a dissecting microscope and squash mounts. I used 3% ammonium hydroxide or 3% KOH, with phloxine as a protoplasm stain, or (separately) Melzer's Reagent to check for amyloidity.

Although application of tincture of Guaiac resin directly on a piece of the fresh fruiting body did not show any color change after a few hours, soaking the sample in the reagent and leaving it on filter paper overnight resulted in a definite positive (pale blue) stain on the paper the next day, confirming the presence of extracellular polyphenol oxidase enzymes, indicative of a white rot fungus.

Description of Collection

Ceriporia purpurea, Brian S. Luther collection # 2010-59-1. Eagle Creek, Leavenworth, Entiat Mountains, Chelan Co., WA., elev. 1800 ft. On old, downed Maple branches of both Bigleaf Maple (*Acer macrophyllum*) and Douglas Maple (*Acer glabrum* var. douglasii) in deep mixed woods.

Fruiting body (basidiocarp): Resupinate, annual, forming elongate patches several centimeters square, soft and cottony when fresh, membranous and easily peeled from the substrate intact, up to 1 mm thick, becoming fragile on drying; context tissue paler than the pore surface; without any odor or taste. *Pore surface* pale purplish, pinkish-purplish to rosy brown (Pale Vinaceous, Corinthian Pink to Light Corinthian Red),* becoming darker with age or when bruised and finally purplish-brown, dark reddish-brown, or dark brown (Purplish Vinaceous to Brownish Vinaceous) when overmature or desiccated. *Pores* 3 to 5 per millimeter, up to 1 mm long, mostly roundish in outline, but sometimes slightly angular, fertile tubes paler than the outside. *Margin* whitish when young and actively growing, arachnoid (covered with thin, soft entangled hairs) to tomentose (densely covered with short matted woolly hairs), up to 1 mm wide, but soon becoming very pale rosy (Flesh Pink, Pale Flesh Color, or Shell Pink) from newly formed pores.



Ceriporia purpurea *microstructure.*

Microstructures: *Hyphal system* monomitic (i.e., containing only generative, relatively undifferentiated hyphae), hyphae 2.5–6 µm wide, lower (subicular) hyphae pale yellowish with slightly thicker walls, heavy incrustated, and in a compact horizontal layer, upper hyphae thinner walled, hyaline, and smooth, forming a much more open tissue that is vertically oriented around the hymenium; without clamps; crystalline material is abundant throughout the fruiting body tissue. *Basidia* 15–19 × 4–5 µm, clavate, thin-walled, four sterigmate, without a basal clamp, arising from long subhymenial hyphae and forming terminally in a way that is very reminiscent in my opinion of the resupinate genus *Athelia* in the family Atheliaceae. *Basidiospores* 5–6 × 1.5–2 µm, allantoid, thin-walled, hyaline, smooth and with polar guttules (oil drops), one on each end, as mounted in 3% ammonium hydroxide, inamyloid. *Cystidia* none, but long sterile hyphal elements common on the pore edge.

Lindsey & Gilbertson (1978) and Gilbertson & Ryvarden (1986) observe that *C. purpurea* found on conifer wood has longer spores (5–9 × 2–2.5 µm) than that found on hardwood debris (5–6 × 2–2.5 µm). The collection described here is consistent with their observations for specimens growing on hardwoods.

Similar Species

There are nine species of *Ceriporia* in North America (Gilbertson & Ryvarden, 1986) and five other species of *Ceriporia* here in Washington State. Two of these five species (*C. excelsa* and *C. tarda)* can be pinkish-purplish and confused macroscopically with the featured fungus, *Ceriporia purpurea*; they can be distinguished positively only microscopically. Both of these species have oblong to cylindric-ellipsoid spores, very different from the allantoid spores of *C. purpurea*.

Another fully resupinate species found here that's easily confused with *C. purpurea* is *Gloeoporus taxicola* in the Meruliaceae. *Gloeoporus taxicola* differs by having a much thicker fruiting body (up to 4 mm), more merulioid (wrinkled) pores, generally a lighter more brownish color when fresh, and a very wide white margin giving the fruiting body a bicolored appearance. Microscopically it can be distinguished by the presence of subulate (awl shaped) cystidia or cystidioles that are up to 30 µm long, slightly narrower allantoid spores, and hyphae that are much thicker walled. In addition, it's found only on conifer wood.

My favorite species in this genus is *Ceriporia spissa* which is brilliant orange in color and always a real delight to find. Both this species and the *C. purpurea* featured above are very similar, differing mostly in the color of the fruiting body throughout development. Both have small, prominently allantoid spores and characteristically become dark reddish or purplish-brown where bruised or in old age. It's common to find collections of these species with both bright fruiting bodies and older, dark reddish fruiting body from adjacent patches. Breitenbach & Kranzlin (1986) describe and illustrate what they claim is *Ceriporia purpurea* (pp. 296–297), but this is clearly *C. spissa* as we know it in North America.

*Color names in parentheses are from Ridgway (1912).

References

Breitenbach, J. & F. Kranzlin. 1986. *Fungi of Switzerland*, Vol. 2 – *Nongilled fung*i. Verlag Mycologia, Lucerne. 412 pp.

Gilbertson, Robert L. & Leif Ryvarden. 1986. *North American Polypores*, Vol. 1. *Abortiporus – Lindtneria*. Fungiflora. Oslo. 433 pp.

Hibbett, David S. 2006. A phylogenetic overview of the Agaricomycotina. *Mycologia 98*(6)*:* 917–925.

Julich, W. 1981. Higher taxa of Basidiomycetes. *Bibliotheca Mycologica 85*: 1–485.

cont. on page 6

Resupinate Fungus of the Month, *cont. from page 6*

Kim, Seon Young & Hack Sung Jung. 2000. Phyllogenetic relationships of the Aphllophorales inferred from sequence analysis of nuclear small subunit mibosomal DNA. *The Journal of Microbiology 38*(3)*:* 122–131.

Lindner, Daniel L. & Mark T. Banik. 2008. Molecular phylogeny of *Laetiporus* and other brown rot polypore genera in North America. *Mycologia 100*(3): 417–430.

Lindsey, J. Page & R. L. Gilbertson. 1978. Basidiomycetes that decay aspen in North America. *Bibliotheca Mycologica 63*. J. Cramer. 406 pp.

Lowe, Josiah L. 1966. Polyporaceae of North America—The Genus *Poria*. State Univ. College of Forestry, Syracuse Univ. *Technical Publ. No. 90*, 183 pp.

Luther, Brian. 2010. *Spore Prints*, *460*. 4. Puget Sound Mycological Society.

Ridgway, Robert. 1912. *Color Standards and Color Nomenclature*. Wash. DC. privately published.

Ryvarden, Leif. 1976. *The Polyporaceae of North Europe*, Vol. 1: *Albatrellus – Incrustoporia*. Fungiflora, Oslo. 214 pp.

WHY SO MANY NAMES CHANGES? Nick Iadanza

MushRumors, Ore. Myco. Soc., May/June 2010

Name changes for many common mushrooms have a lot of us grumbling. It's disconcerting to find out that a scientific name that you've finally learned is no longer valid because of the redefinition of the genus based on DNA analysis. An examination of the history of mushroom taxonomy might help put this in perspective.

In 1753, Linnaeus published the *Species Plantarum*, which used the binomial species names that we now use to classify living organisms. At the time, taxonomy was based on an organism's physical appearance, characteristics that were easily observed. During the next hundred years, improvements in taxonomy relied on more careful attention to the physical features. An advance came with publication of the *Systema Mycologicum* in 1831 by Elias Fries, where spore print colors were considered. New families and genera were named, and species were placed in new classifications.

Microscopic features began influencing mushroom taxonomy in the early 20th century. The change from what could be observed with the naked eye to the use of a microscope was a huge improvement. Mushrooms that looked alike were placed in separate groups based on differences in spore ornamentation. As microscopes got better, more changes were made. Scanning electron microscopy, which revealed detailed spore images, was a boon to the "splitters," who classify organisms into numerous groups based on relatively minor variations.

In the 1990s, mushroom DNA analysis began to appear in the scientific literature, and radical changes in taxonomy occurred. Groups thought to be related based on physical appearance and microscopic features turned out to be unrelated. Others that looked different macroscopically and microscopically turned out to be related. The genus *Coprinus* is an example. They deliquesce, so if you had a mushroom that dissolved into an inky mess, you had a *Coprinus*. However, DNA studies show that deliquescing mushrooms are a mix of evolutionary lines and that deliquescence does not necessarily imply closeness. *Coprinus comatus*, the shaggy mane, is closer to the genus *Lepiota* than to many of the other *Coprinus* species. DNA analysis may not be the definitive analytical tool influencing taxonomy; it may be only the most recent one.

Mushrooms themselves did not change, so field guides can still be used to identify what you've collected, and descriptions, habitat, edibility, etc., are still valid.

FUNGI ECOLOGY: Beware, Killer Fungi! Kit Marx

One of the most fascinating aspects (there are soooo many!) of fungi ecology is carnivorous fungi. (Here's a good vocabulary word for you: nemotophagous. In this case, the kind of fungi that consume nematodes; there are more than 160 known nemotophagous fungus species.)

A few carnivorous mycorrhizal fungi have been detected, but most of the predatory fungi discovered so far are saprobes, primarily wood decomposers. Why?

Wood is almost entirely made of carbohydrates: carbon, hydrogen, and oxygen. The key missing ingredient for making more complex substances such as proteins is nitrogen. Although what you are breathing now is almost 80 percent nitrogen, very few organisms can use atmospheric nitrogen biologically. It has to be processed by other organisms (mostly bacteria) and absorbed by other organisms (e.g., plants), which are consumed by other organisms (e.g., animals). One way saprobic fungi have developed to obtain the essential nitrogen is to capture animals and suck out their guts.

Fungi prey are mostly microscopic—nematodes (nonsegmented worms, very unlike earthworms), springtails, copepods, rotifers, protozoa, amoebae, and bacteria.

The trapping devices are mostly passive, adhesive, and built along the hyphae. During the victim's struggle to escape, some of these snares can break away from the base hyphae. Thus, the prey spreads the hyphae, while being consumed by them. Trapping devices consist of sticky primary hyphae, columnar branches, hemispherical bumps, hour-glass knobs, spiny balls, stiff sharp points, nets (2-D and 3-D), and rings. Rings can be either inert (a nematode enters the loop and gets stuck) or expanding. In the latter, the inside of the loop is pressure and heat sensitive. The nematode activates the cells (three to a ring), which expand inward to maximum size in 1/10th of a second, crushing and capturing the nematode.

In addition, traps may release chemicals that attract nematodes, chemicals given off by the nematodes may cause the fungi to initiate or increase the formation of traps, and the fungus may secret toxins that stun or kill the prey.

Upon ensnaring a nematode, new hyphae grow and penetrate the body. The hyphae exude enzymes (digestive proteins), which decompose the worm's internal components by turning large organic molecules into small inorganic molecules, which the hyphae absorb. Complete digestion takes from a few hours to a day or so. After digestion, the nutrients are translocated for use throughout the fungus.

Some predatory fungi will use the remaining nematode husks as armor to protect their hyphae from those who want to prey on them—for example, nematodes.

Many of the capture methods are probably at least partially intended to defend against myceliolphagous (hyphae-eating) predators.

All the above doesn't even get into using spores to attack microfauna. Spores can attack by swimming (they are attracted to the smell of nematodes); by being injected into the victims; by sticking to an animal's exterior (and sending hyphae inside); by entering the body as part of the food intake; or by blowing a hole in a nematode's "skin" and injecting a spore.

Yet another of those soooo-many fascinating fungi ecology stories.

Two parting thoughts:

Animals consume their food, then digest it; fungi digest their food, then absorb it.

The next time that you are enjoying those oyster mushrooms, try not to think of all the nematode guts it took to make them.

Yummm, nematode guts!

SEATTLE URBAN FORAGING STUDY Melissa Poe

Do you gather mushrooms, wild plants, fruits, nuts, or berries in Seattle? If so, we'd like to talk with you!

People gather plants and fungi for a variety of reasons, including the economic, cultural, subsistence, and other benefits they provide. But we recognize that the foraging/gathering of wild and naturalized plants and mushrooms is a practice not often discussed as an activity that takes place in urban areas. We are interested in learning about the diversity of plant and mushroom species that are gathered in Seattle, the ways these materials are used (as food, medicine, crafts, tools, etc.), and the motivations for gathering.

Ways to Participate in this Project

- Share personal stories of collecting and using plants & fungi in Seattle
- Participate in an individual interview
- Provide contacts or suggestions of people who may be able to help inform the study

Who We Are and How This Information Will Be Used

This study is being conducted by researchers at the Institute for Culture and Ecology (a nonprofit organization whose mission is to conduct collaborative, interdisciplinary, research-based initiatives to foster vibrant and resilient livelihoods, communities, and ecosystems; www.ifcae.org). This study increases the understanding of how urban residents connect with nature and has the potential to link professional planners, land managers, and gatherers in ways that could build new bridges for urban green space management that not only supports a diversity of environmental stewardship activities but also supports broader initiatives of environmental justice.

Please Contact Us for More Info & To Participate

Melissa Poe
Institute for Culture and Ecology
phone: (206) 473–7880
email: mpoe@ifcae.org
www.ifcae.org

CORM SMUT? TASTES GREAT AND IS GOOD FOR YOU TOO Martha Mendoza

(AP) – April 26, 2010

IRAPUATO, Mexico - It's now an established scientific fact: Smut is GOOD for you. Corn smut, that is.

Huitlacoche (whee-tla-KO-cheh)—a gnarly, gray-black infection of corn caused by the fungus *Ustilago maydis*—has been long-savored in Mexico. For years scientists assumed that it had nutritional values similar to those of the corn on which it grew. But test results just published in the journal *Food Chemistry* reveal that an infection that U.S. farmers and crop scientists have spent millions trying to eradicate is packed with unique proteins, minerals, and other nutritional goodies.

When *Ustilago maydis* attacks corn, the insidious-looking pustules that bubble up don't just force the husk to explode, it forces the metabolical process inside the cob to change, creating new, healthier nutrients.

Take lysine, one of those "essential amino acids" that the body requires but can't manufacture. Corn has virtually no lysine; huitlacoche is loaded with it. It also is packed with more beta-glucens—the soluble fiber that gives oatmeal its well-known cholesterol-cutting power—than, well, oatmeal.

The name huitlacoche (also cuitlacoche) comes from two indigenous words: cuitlatl (excrement) and cochi (sleeping). In the U.S., farmers call huitlacoche "corn smut" in polite company and "devil's corn" among themselves. The fast moving blight can wipe out 5 to 10 percent of a crop, and the black dusty spores gum up harvesting equipment. Corn growers, along with the federal government, have spent millions of dollars eradicating it and developing smut-resistant strains, with only partial success.

Researchers at University of Wisconsin convinced a local organic farmer in 2007 to deliberately infect a field of corn with the fungus and then harvest and sell it. Their findings: An ear of huitlacoche costs about 41 cents to produce and sells for about $1.20. By comparison, an ear of sweet corn costs less than a dime, with profits of just a few cents per ear.

Gourmet chefs pay $20 or more per pound for a chance to add the delicacy to their menus. It has, periodically, appeared on some of the finest menus, including once at the James Beard House in New York City. Other chefs include it as a speciality on the rare days they manage to obtain some. There's huitlacoche stuffed chicken breasts at La Cocina Michoacana in Cedar Park, Texas; huitlacoche quesadillas at Tu y Yo in Boston; and at La Casita Mexicana in Los Angeles, they blend the huitlacoche into a tamale masa, then stuff the entire tamale into a large, roasted chili.

Huitlacoche is a niche product. "Our consumers are either of Mexican origin, or foodies who have traveled in Mexico and enjoy the taste," said Joseph Perez, senior vice president of New Jersey-based Goya Foods, the largest, Hispanic-owned food company in the U.S. But Perez said sales are steady—and profitable.

Admittedly, huitlacoche has an image problem. "It's kind of a like this grayish, black brain," say Steve Sando, owner of a Napa Valley speciality food company who is researching adding huitlacoche to his product line. "People might freak out at the sight...but if we can get them to taste it, we'll have them."

C. Cruz

Huitlacoche

FUNGI GENES ALLOW TINY PEA APHID TO PRODUCE CAROTENOIDS — Henry Fountain

The New York Times, May 3, 2010

There's a reason your parents kept after you to eat your carrots. The vegetables (and lots of others, too) supply carotenoids, compounds that are good for vision and overall health. Animals, humans included, cannot manufacture them.

Check that. Researchers have found the first evidence of carotenoid production in a member of the animal kingdom. The animal in question? A tiny aphid.

Nancy A. Moran, a researcher at the University of Arizona who is soon to be at Yale, and Tyler Jarvik, an Arizona colleague, report in *Science* that the pea aphid, *Acyrthosiphon pisum*, produces carotenoids using a genetic sequence that it picked up from fungi as it evolved, a process called lateral gene transfer. The carotenoid production contributes to an unusual characteristic of pea aphids: they come in two colors, red and green.

Dr. Moran, who studies genomic evolution, made the discovery while searching through the pea aphid genome, which was sequenced last year. The genes for carotenoid production are similar for every organism that makes them, she said, and they just "popped up" when she did the search. Further analysis showed that they came from fungi, and that the transfer occurred tens of millions of years ago.

All pea aphids have this carotenoid-making machinery, but the researchers found that some have a genetic mutation and cannot produce certain carotenoids that are red in color. So these aphids are green, while those without the mutation are red.

This division in color has an ecological effect: red aphids are more likely to be eaten by predators, while green ones are more likely to be invaded by parasites. In turn, this split between predation and parasitism helps maintain the split in color, ensuring that neither red nor green prevails over the long term.

VEAL SCALOPPINI — Phillip J. Speciale

Great-Chicago-Italian-Recipes.com via thegreatmorel.com

6 slices of veal cutlets, about 1 lb
½ cup chopped green onions
½ cup chopped parsley
½ cup of Marsala wine
¾ cup heavy whipping cream
2 TBs extra virgin olive oil
¼ tsp fresh ground black pepper
½ cup flour
2 cloves garlic chopped
¾ cup small dried morels reconstituted
½ cup chicken broth
2 TBs butter
¼ tsp salt

Place the veal between two sheets of wax paper and pound thin with a mallet. Season the veal with salt and pepper. Dredge veal in flour. Place 1 TBs of butter and 1 TBs of oil in a large skillet and sauté veal 2 minutes on each side. Remove veal and set aside. Add the other tablespoon of oil and butter to the skillet and sauté garlic and onions for I minute. Add mushrooms and sauté another minute. Add wine and chicken broth, bring to a boil, and reduce liquid to about half. Stir in whipping cream.

To serve, plate the veal scaloppini and top with the creamy morel mushroom sauce.

Note: To reconstitute mushrooms soak in warm water for about thirty minutes. Drain the liquid and dry the mushrooms thoroughly.

This will be your last Spore Prints until September.
Have a nice summer!

Puget Sound Mycological Society
Center for Urban Horticulture
Box 354115, University of Washington
Seattle, Washington 98195

RETURN SERVICE REQUESTED

Non-Profit Org.
U.S. POSTAGE
PAID
SEATTLE, WA
PERMIT NO. 6545