SPORE PRINTS

BULLETIN OF THE PUGET SOUND MYCOLOGICAL SOCIETY
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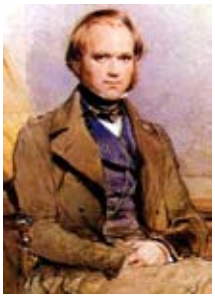
SCIENTISTS FIND "LOST" DARWIN FOSSILS IN GLOOMY CORNER OF BRITISH GEOLOGICAL SURVEY

Cassandra Vinograd

Christian Science Monitor, Jan. 17, 2012



Charles Darwin at the time of the Beagle *voyage.*

AP - Dr. Howard Falcon-Lang, a paleontologist at Royal Holloway, University of London, was curious about the contents of an old wooden cabinet that had been shoved in a "gloomy corner" of the massive, drafty British Geological Survey. Using a flashlight to peer into the drawers, he discovered they were filled with glass slides containing fossils. One of the first specimens he picked up was labeled "C. Darwin Esq."

"It took me a while just to convince myself that it was Darwin's signature on the slide," the paleontologist said, adding he soon realized it was a "quite important and overlooked" specimen. He described the feeling of seeing that famous signature as "a heart in your mouth situation," saying he was wondering "Goodness, what have I discovered!"

Falcon-Lang's find was a collection of 314 slides of specimens collected by Darwin and other members of his inner circle, including John Hooker—a botanist and dear friend of Darwin—and the Rev. John Henslow, Darwin's mentor at Cambridge, whose daughter later married Hooker.

The first slide pulled out of the dusty corner at the British Geological Survey turned out to be one of the specimens collected by Darwin during his famous expedition on the HMS *Beagle*, which changed the young Cambridge graduate's career and laid the foundation for his subsequent work on evolution.

Falcon-Lang said the unearthed fossils—lost for 165 years—show there is more to learn from a period of history scientists thought they knew well.

"To find a treasure trove of lost Darwin specimens from the *Beagle* voyage is just extraordinary," Falcon-Lang added. "We can see there's more to learn. There are a lot of very, very significant fossils in there that we didn't know existed."

He said one of the most "bizarre" slides came from Hooker's collection—a specimen of prototaxites, a 400 million-year-old tree-sized fungus.

Hooker had assembled the collection of slides while briefly working for the British Geological Survey in 1846, according to Royal Holloway, University of London.

The slides—"stunning works of art," according to Falcon-Lang—contain bits of fossil wood and plants ground into thin sheets and affixed to glass in order to be studied under microscopes. Some of the slides are half a foot long (15 cm), "great big chunks of glass," Falcon-Lang said.

"How these things got overlooked for so long is a bit of a mystery itself," he mused, speculating that perhaps it was because Darwin was not widely known in 1846 so the collection might not have been given "the proper curatorial care."

Royal Holloway, University of London, said the fossils were "lost" because Hooker failed to number them in the formal "specimen register" before setting out on an expedition to the Himalayas. In 1851, the "unregistered" fossils were moved to the Museum of Practical Geology in Piccadilly before being transferred to the South Kensington's Geological Museum in 1935 and then to the British Geological Survey's headquarters near Nottingham 50 years later, the university said.

The discovery was made in April, but it has taken "a long time" to figure out the provenance of the slides and photograph all of them, Falcon-Lang said. The slides have now been photographed and will be made available to the public through a new online museum exhibit opening Tuesday.

Slide signed by Charles Darwin.

Falcon-Lang expects great scientific papers to emerge from the discovery. "There are some real gems in this collection that are going to contribute to ongoing science."

Dr. John Ludden, executive director of the Geological Survey, called the find a "remarkable" discovery. "It really makes one wonder what else might be hiding in our collections," he said.

PRICE OF CATERPILLAR FUNGUS RISES TO MORE THAN US$30,000 PER KILO

http://www.wantchinatimes.com/, Jan. 16, 2012

The price of a kilogram of the caterpillar fungus—"dong chong xia cao," literally meaning "winter worm summer weed"—has risen to more than 210,000 yuan (US$31,600) in Chengdu since Jan. 2, after a price increase of 5,000–10,000 yuan (US$790–$1,580) compared to the previous month.

A kilogram of premium caterpillar fungus produced in Qinghai costs 212,393 yuan (US$33,636), 5,000 yuan more than the previous month. Sichuan's fungus goes for 210,000 yuan (US$33,257) per kilogram, 15,000 yuan (US$2,375) more than a month ago. Caterpillar fungus produced in Tibet is also traded at around 210,000 yuan.

Caterpillar fungus, Cordyceps sinensis

An owner of a caterpillar fungus shop said that the price is usually stable apart from the Lunar New Year period when people stock up on goods for the holidays. He said prices will fall back to normal after the New Year and consumers don't have to be in a rush to buy the fungus.

Spore Prints

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CALENDAR

Feb. 14 Membership Meeting, 7:30 pm, CUH

Feb. 21 Board Meeting, 7:30 pm, CUH Board Room
Spore Prints deadline

Mar. 5 Ballot reception deadline

BOARD NEWS

Denise Banaszewski

Because bad weather and vacation schedules made scheduling too difficult, the January board meeting was canceled. At the January membership meeting, the members passed the revised version of the bylaws with a few corrections. We will post the new bylaws to the Website soon. Also, the board approved (via e-mail) the slate of candidates proposed by the Nominating Committee.

[Mushroom] hunting in the forest is more than scenery or flavor; it means that we face many of the dangers that those who hunt for meat encounter: wild animals (not wounded, we hope), bad weather, dangerous terrain, and—in late autumn—meat hunters with excellent weapons, terrible eyesight, trigger-happy index fingers, and poor judgment. You can get lost—really and truly lost, which is the ultimate wilderness experience…You can die hunting mushrooms; indeed, many do. But the real difference in danger between the meat hunter and the mushroom hunter is that we can die after the hunt.

—Susan Goldhor, Boston Myco. Club *Bulletin, 66*(3), 2011

MEMBERSHIP MEETING

Tuesday, February 14, 2012, at 7:30 pm at the Center for Urban Horticulture, 3501 NE 41st Street, Seattle.

Our speaker tonight is **Ian Gibson**, who will speak on his widely acclaimed MatchMaker program for Mushrooms of the Pacific Northwest and will demonstrate its use. Ian and his son Eli started work on the program in 1996. Their earlier 2001 version contained descriptions of 2,087 species. MatchMaker now contains a list and descriptions of 2,092 gilled and 1,904 non-gilled mushrooms that have been reported to occur in the Pacific Northwest, making it an epic accomplishment as well as a very useful and popular tool for mushroom identification.

Ian lived in Uganda until he was eight. When his family went on holidays they looked at wildlife. His mother started him on bird watching and he has seen more than 2,000 species over the years. Mushrooms became an interest in about 1995 when Adolf Ceska introduced him to the South Vancouver Island Mycological Society. Ian then thought, “What’s a mycological society?” He was most surprised to see forty people at the meeting and soon became an active member of SVIMS and of the Pacific Northwest Key Council. The MatchMaker program was not only a way for Ian to learn fungi, but also a way to spend time doing computer programming with his son. Eli rescued his Dad whenever he got stuck. Reading journals became a regular night time activity (when mushrooms are hard to see). Collaborating with hundreds of photographers and identifiers has been Ian’s greatest pleasure—there are always new friends to be found on forays and there is always new beauty to be found in the mushrooms.

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

HOSTS AND EARLY BIRDS NEEDED FOR SPRING FIELD TRIPS

Brian Luther

It’s only a few months before our spring field trips and not too early to be thinking about hosting. A hallmark of PSMS field trips has always been our long-standing tradition of having members volunteer to greet you in the morning and provide muffins, bagels, and other breakfast goodies, along with plenty of hot coffee and juices, etc. What a great way to start the morning. How many of you have enjoyed this wonderful membership benefit in the past? Well, we hope you’ll step forward, in turn, and give us a hand. It’s very satisfying knowing you’re contributing. All food expenses incurred will be reimbursed, just keep the receipts.

PSMS is entirely an all volunteer club, and we rely on the participation of our members. Without this involvement, we would not exist. It’s very rewarding being a host, and we’re always hoping to get new recruits as well as the ongoing help from all of you who have generously given a few hours of your time and effort in the past. So please consider hosting. It’s fun.

The complete spring field trip schedule will come out in the March or April issue of *Spore Prints*. I’m hoping this notice will encourage you to make up your mind to host, then you’ll have a choice of locations.

Early birds are members who volunteer to get to nonreservable field trip locations early, to ensure we get a good spot or hold onto a shelter for our use—a day or so early helps a lot. I only have two such locations this coming spring, and you'll find out about these when the field trip schedule appears so please consider helping.

Field Trip Hosting Chair Debra Lehrberger (host@psms.org) would be delighted to hear from you and can fill you in on all the details about what these duties include. Thank you.

WORLD'S BIGGEST BLACK TRUFFLE GOES ON SALE

Damien Gayle

http://www.dailymail.co.uk/, Jan. 16, 2012

What could be the world's biggest black truffle was sold yesterday in the south of France.

The 1.3 kg black Périgord truffle (*Tuber melanosporum*) went on sale in the farm market of the French southwestern town of Sarlat.

The massive subterranean fungus is the biggest ever found and sold in Périgord, which is historically the most famous truffle producing region of France.

Black truffles are sold for about 1,000 euro (US$1,200) per kilogram on southern France farmer's markets.

Edible truffles are held in high esteem in French, Spanish, northern Italian, and Greek cooking, as well as in international haute cuisine.

The black truffle, which is named after Périgord, one of Europe's most unspoilt regions, grows near the root systems of oak and hazelnut trees.

They come into season in late autumn and winter, and typically reach 7 cm in diameter and a weight of up to 100 g.

Most black truffles are produced in Europe, with France accounting for 45 percent, Spain 35 percent, Italy 20 percent, and small amounts from elsewhere.

Production has diminished considerably in the past century, however. France produced some 1,000 tons of truffles in 1937, but harvests these days peak at about 50 tons in the best years.

The biggest truffle ever found in Périgord, France's historic truffle producing region.

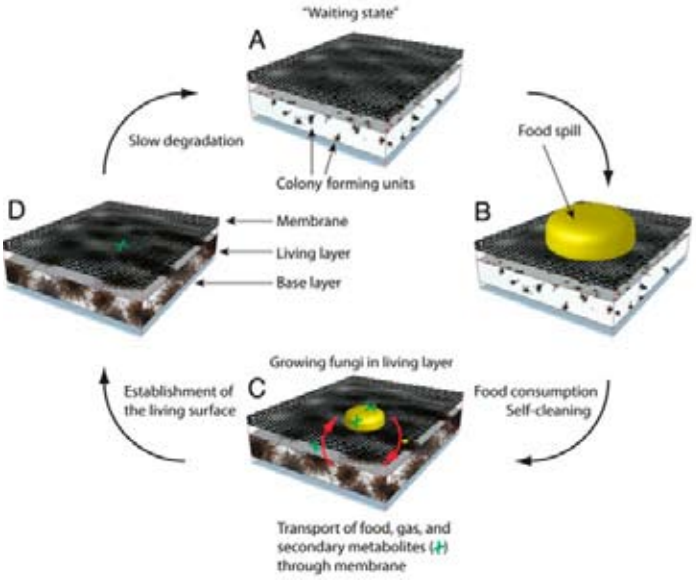
CAPTIVE CHEESE FUNGUS GOBBLES UP SPILLS, FORMING A LIVING, SELF-CLEANING SURFACE

Discover Magazine, Jan. 10, 2012

The crusty rinds of cheeses like Camembert provide more than texture: they are miniature fortress walls, made of fungus, that protect the cheese's creamy insides from bacterial invasions. Now, taking inspiration from this delicious snack, chemical engineers at ETH Zurich in Switzerland have shown that such a fungus can be enclosed in porous plastic and will digest spills, with implications for creating antibacterial surfaces from living material.

The team sandwiched a layer of *Penicillium roqueforti*—from, you guessed it, Roquefort cheese—between a plastic base and a top sheet of plastic with nanoscale pores that allowed gas and liquids to move through, but did not allow the fungus to spread. Then, they mimicked a kitchen spill by pouring sugary broth on the surface and watched as, over the course of two weeks, the captive fungus gradually consumed the entire spill, leaving the surface clean. As shown in the figure below, the fungi can go dormant when there is no food around, so if you had a countertop of such a material, you wouldn't need to keep spilling sugar on it to keep the fungi happy.

Gerber et al. and PNAS



How a living material of cheese fungi sandwiched between plastic sheets works.

FUNGI GET THE LEAD OUT

Sabrina Richards

The Scientist, Jan. 13, 2012

Lead can be converted into pyromorphite, the most stable mineral form of the metal, by some fungal species, according to a study published online January 12 in *Current Biology*.* The findings add to work highlighting the important role of microbes in geological processes and suggest a possible avenue for bioremediation of lead polluted soils.

"This is the first example of fungi acting to mineralize lead," said Silvia Perotto, a plant biologist at the University of Torino, who did not participate in the study.

It's common knowledge that lead is extremely toxic. Implicated most famously in neurodevelopmental problems in early childhood, the metal has been phased out of products such as household paint. But there are still sources of lead contamination, such as mining operations and shooting ranges, where bullets can impregnate the soil. Once in the soil, lead can leach into the water supply and enter the food chain, Perotto explained.

Air, moisture, and pH exposure can produce oxides and salts of lead. Remediation strategies for lead-contaminated soil have focused on converting it to the most stable form, pyromorphite (also known as lead chlorophospate). Fungi are known to detoxify other

*Y.J. Rhee et al., "Lead transformation to pyromorphite by fungi," *Current Biology*, doi:10.1016/j.cub.2011.12.017, 2012.

cont. on page 4

Fungi Get the Lead Out, *cont. from page 3*

toxic compounds such as uranium by converting them into mineral forms, so Geoff Gadd of the University of Dundee in Scotland reasoned they might be able to do the same for lead.

Gadd's group took samples of several fungal species from a defunct lead mining operation in Scotland. After scattering lead shot (ammunition used in shotguns) over agar media in Petri dishes, they introduced the fungi to some dishes, and allowed them to grow for several months.

Analyzing the element composition and mineral structure of the compounds deposited on the lead, the researchers found that lead incubated with certain species of fungi showed much higher levels of pyromorphite than lead left in sterile dishes, suggesting the fungi are indeed detoxifying the metal.

Gadd thinks the fungi's ability to solubilize elements could inform remediation strategies, which currently fail to remove all lead from contaminated soil. "We kept asking ourselves how to get above 30 percent [pyromorphite yield]," said Joselito Auroceno, a mineralogist at the University of North British Columbia who was not involved in the work.

Lead-mineralizing fungi might be a future bioremediation strategy, agreed environmental engineer Robin Brigmon of Savannah River National Laboratory in South Carolina, who was not involved in the study, but first the work needs to be repeated outside the lab. "Bioremediation is a black box," he explained, and getting key pieces of evidence, like how fungi are involved, can help scientists design long-term strategies for land usage of contaminated sites.

SMART FUNGI CAN MATE WITH OTHER SPECIES DESPITE GREAT GENETIC DIFFERENCES—RESEARCHERS LOOK BACK ON 100 MILLION YEARS OF EVOLUTION

http://www.physorg.com/, Jan. 17, 2012

For about 100 million years, grass smut fungi have been breeding in a three-gender system. This was discovered by Dr. Ronny Kellner and professor Dr. Dominik Begerow of the RUB Geobotany Laboratory in cooperation with colleagues from the Heinrich Heine Universität in Düsseldorf. Using genetic analysis, they showed that the structure of the responsible regions in the genome has hardly changed since then.

In the journal *PLoS Genetics*, the team also reports that the fungi in the experiment not only mate within their own species, but also form hybrids with other species—and that after millions of years of separate evolution. "If you look at the time periods, it is almost as if mice could mate with humans" Begerow illustrates.

Gathering and Genetically Analyzing Fungi

Grass smut fungi live as parasites on plants such as corn, wheat, and grasses and cause various plant diseases. For the study, the researchers tested 100 species, which they partly gathered themselves in Ecuador, Mexico, or Germany. For all the species they decoded the area of the genome that contains the genes for pheromone receptors. These make it possible to distinguish one's own species from others. "What makes the work special is the successful synthesis of biodiversity research and functional genetics, which was made possible by the collaboration with Prof. Michael Feldbrügge and with Dr. Evelyn Vollmeister of the University in Düsseldorf" says Kellner.

How Genes Change over 100 Million Years

The researchers analyzed ten species especially thoroughly using complex sequencing technologies. Instead of the usual 1,000 DNA building blocks (base pairs), they sequenced 20,000 base pairs. "In this way, we were able to gain entirely new insights" explained Begerow. "Although the actual gene structure has changed little in the last 100 million years, within the structure, the genetic information has changed dramatically. That should really mean that different species can no longer mate with each other."

Mixing with Other Species

Nevertheless, in the experiment the team proved that grass smut fungi of different species can mate. Now they want to investigate whether this phenomenon also occurs in nature. "This is a fascinating discovery," says Kellner. "The hybrid formation would have far-reaching ecological consequences." A new species of fungus could, for example, be more harmful than its two predecessor species because it infests several different host plants. Leaps to new hosts would also be conceivable. "It's like in the current debate surrounding the bird flu virus, which could combine with another strain of the virus" explained Begerow. "Here, new 'super parasites' could emerge whose properties are completely unpredictable. If different species of fungi did actually mate, that would speed up evolution enormously."

More information: Kellner R., Vollmeister E., Feldbrügge M., Begerow D. 2011: Interspecific sex in grass smuts and the genetic diversity of their pheromone-receptor system. *PLoS Genetics*, doi:10.1371/journal.pgen.1002436

FUNGI-FILLED FORESTS ARE CRITICAL FOR ENDANGERED ORCHIDS

http://www.physorg.com/, Jan. 24, 2012

Roughly 10 percent of all plant species are orchids, making them the largest plant family on Earth. But habitat loss has rendered many threatened or endangered. This is partly due to their intimate relationship with the soil.

Orchids depend entirely on microscopic fungi in the early stages of their lives. Without the nutrients orchids obtain from these fungi, their seeds often will not germinate and baby orchids will not grow. While researchers have known about the orchid–fungus relationship for years, very little is known about what the fungi need to survive.

Biologists based at the Smithsonian Environmental Research Center launched the first study to find out what helps the fungi flourish and what that means for orchids. Led by Melissa McCormick, the researchers looked at three orchid species, all endangered in one or more U.S. states.

After planting orchid seeds in dozens of experimental plots, they also added particular host fungi needed by each orchid to half the plots. Then they followed the fate of the orchids and fungi in six study sites: three in younger forests (50 to 70 years old) and three in older forests (120 to 150 years old).

After four years they discovered orchid seeds germinated only where the fungi they needed were abundant—not merely present. In the case of one species, *Liparis liliifolia* (lily-leaved twayblade), seeds germinated only in plots where the team had added fungi. This suggests that this particular orchid could survive in many

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RESUPINATE FUNGUS OF THE MONTH: The Genus *Vararia* - Part I © Brian Luther

The genus *Vararia* is characterized by fully resupinate fruiting bodies with a dimitic hyphal system (but refer to "The Hyphal System" discussion below), with or without clamp connections on the generative hyphae or basidia. Gloeocystidia are present in all species. The genus has conspicuous dichohyphidia (repeatedly dichotomously branched, thick-walled modified hyphal cells) that are always dextrinoid (turn red-brown in iodine solutions). The basidiospores vary wildly in shape and characteristics from species to species and can be globose, ovoid, ellipsoid, exaggerated teardrop shaped, navicular (boat shaped), fusiform (spindle-shaped) to fusiform-subfalcate (somewhat sickle-shaped). Some species have amyloid spores or just an amyloid supra-hilar region (surface of the spore facing inside and just above the apiculus), while others are inamyloid. The spores may or may not be ornamented. This is a really unusual spread of spore characteristics for one genus.

Description of Collections

Vararia phyllophila (Massee) Rogers & Jackson
BSL colls. 2011-710-1 & 2011-710-3
On the flaky, fibrous bark of an old living stem of *Clematis ligusticifolia* buried in forest duff, and also on buried Douglas Fir (*Pseudotsuga menziesii*) cones all around, in deep mixed forest of Douglas Fir and Maple (*Acer macrophyllum & A. glabrum var. douglasii*), Eagle Creek, Leavenworth, Entiat Mountains, Chelan Co., WA. Elevation 2,000 ft. July 10, 2011.

Basidiocarp: Fully resupinate, thin, varying from 100–250 µm thick; *hymenium* creamy-white when fresh, drying essentially the same color, uniform and smooth to very finely granular under higher magnification, easily separable from the subiculum underneath when fresh or when re-hydrated; *subiculum* byssoid (consisting of fine fibers or threads) and a brighter white color compared to the hymenium; *margin* abruptly thinning, hypochnoid (thin, open, and granular) under magnification and concolorous with the fertile hymenophore. (Refer to color habitat photos in on-line *Spore Prints* at www.psms.org.)

B. Luther

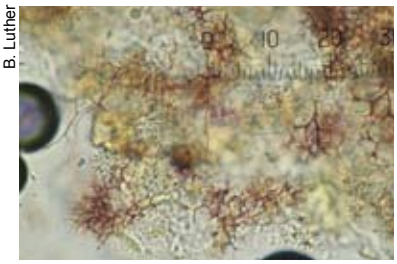
BSL coll. 2011-710-1

B. Luther

BSL coll. 2011-710-3

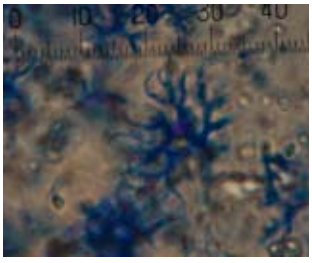
Microstructures: *Hyphal system* dimitic in the literature; *hymenial and subhymenial hyphae* 1.5–3 µm wide, hyaline (translucent or transparent), smooth, without clamp connections, often branching, non-dextrinoid; *skeletal hyphae* very uniform, up to 2 µm wide, hyaline and thick-walled, long, narrow, and without septa or branching and non-dextrinoid, often with scattered crystals; *subicular mat* consisting of skeletal hyphae mixed with very fine (0.3–1.0 µm wide) dichohyphidial-like hyphal structures with fairly long segments that are less frequently and not regularly dichotomously branched and strongly dextrinoid; *dichohyphidia* abundant, finely dichotomously branched multiple times, main branches thick walled up to 2 µm, branch tips varying from blunt to very finely pointed, the tips often noticeably reflexed (curved back), strongly dextrinoid, cyanophilous, staining deep red in 3% NH_4OH and Congo Red, dark blue in Loeffler's Methylene Blue, and appearing hyaline and highly refractive in 3% NH_4OH, Phloxine, and water. *Gloeocystidia* 42–68 × 5–7 µm, abundant, normally subulate (taper to a point), base sometimes bulbous and the extreme base often tapering suddenly and becoming narrow before the basal septa, hyaline, thin-walled and smooth, often with large oily guttules inside and appearing highly refractive, S– (negative in sulfo-benzaldehyde), cyanophilous (staining dark blue in Cotton Blue), uniformly pink or with some refractive guttules when mounted in 3% KOH and Phloxine, contents turning golden-yellow to orangish in Sudan III, cytoplasm turning mauve and guttules blue in Loeffler's Methylene Blue, apex normally acuminate (tapering to a point) to slightly rounded when mature, projecting well beyond the basidia in the hymenium. *Basidia* 20–35 (47) × 4–6 µm, quite variable in length, clavate, often flexuous or contorted, thin-walled, hyaline, simple septate (without a basal clamp connection), four sterigmate. *Basidiospores* 17–22 (24) × 3–4 µm, fusiform-navicular or fusiform-subfalcate, with the proximal (apicular) end of the spore always narrower and the distal end wider, thin-walled, hyaline, smooth, staining light blue in Cotton Blue, inamyloid (neither amyloid or dextrinoid), formed tightly together as a distinct parallel bundle on the basidia and often seen loose in mounts like this. Refer to photomicrographs and line drawings.

B. Luther



Dextrinoid dichohyphidia, 400 X.

B. Luther



Dichohyphidia in Cotton Blue, 1000X.

Comments

The combination of the unusually long, distinctive fusiform-navicular to somewhat sickle-shaped spores, the very finely and multiple dichotomously branched and strongly dextrinoid dichohyphidia with reflexed tips, and the lack of clamp connections on all hyphae are diagnostic characteristics unique within the genus for North America. The dichohyphidia are much more delicate in *Vararia phyllophila* than in any other species of the genus, having very fine branches and ends.

This species was originally found in Florida growing on dead oak leaves on the ground, thus the species name phyllos (leaf) and philus (loving).

The Hyphal System

The genus *Vararia* is characterized in the literature as having a dimitic hyphal system. However, species in this genus actually have three hyphal systems and thus should be more accurately referred to as trimitic. The three systems are (1) generative, hymenial, and subhymenial hyphae, (2) skeletal hyphae, and (3) dichohyphidia. The skeletal hyphae and the dichohyphidia are distinct, with a totally different structure. I see the dichohyphidia as being analogous to, and more specialized than, thick-walled, branched binding hyphae because, in fact, that's the structural function they play—forming a dense, fine mesh holding the basidiocarp together; also, they originate from the same hyphal tissues. Corner (1948) does not consider asterosetae (star-shaped structures) and

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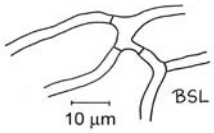
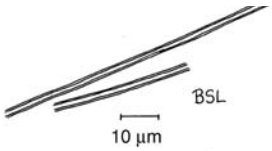
dichophyses (and dichohyphidia) as hyphal structures analogous to generative, skeletal, or binding hyphae. I find this to be very curious, because their origin is the same (refer to Corner, 1948, Figs. 1 & 9). Hyphal structures like these exhibit infinite degrees of specialization, advancing from less complex simple branched binding hyphae, to irregularly branched dichophyses, to more regularly branched, then to dichohyphidia, and ultimately to structures like asterosetae, which bear no resemblance at all to their origin from generative hyphae. The transition is gradual and continuous between all of these structures, although extremes appear unrelated.



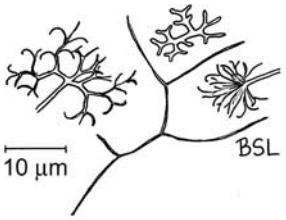
Generative and subhymenial hyphae.

Burt (1926), Gilbertson (1965), Welden (1965), Dennis (1970), and Lindsey & Gilbertson (1978) provide descriptions of *V. phyllophila*, but oddly only Lindsey & Gilbertson (1978) give any details (and illustrations) of the skeletal hyphae. I would like to note that the description (and illustrations) provided for this species by Lindsey & Gilbertson (1978, p. 192–3) is outstanding, showing all the important characteristics clearly.



Skeletal hyphae.

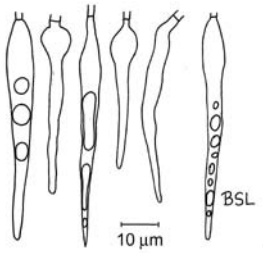
The tips of the dichohyphidia in *Vararia phyllophila* are often so fine that Rogers & Jackson (1943) refer to them as "flagellate." Another distinguishing feature of the dichohyphidia in this species is that the ends are noticeably reflexed (curved back), especially those ending in a finer point. Unlike in other species of *Vararia* where the dichohyphidia are fairly pronounced because of their size, in this species they're usually almost unnoticed because they're so slight and hyaline. However, when mounted in Melzer's Reagent (or other iodine-based stains) they become a striking dark red-brown color (dextrinoid) in contrast with everything else on the slide, and then are quite obvious. Burt (1926) calls the dichohyphidia "paraphyses" and says they're "antler shaped" in *Vararia phyllophila*. He makes no mention of their dextrinoid reaction, but his early work was done prior to our current understanding of hyphal systems and before we knew more about mycological stains and chemical staining reactions. Both Rogers & Jackson (1943) and Gilbertson (1965) refer to the dichohyphidia as "dichophyses." The latter work also says they are "often weakly dextrinoid" and "weakly to distinctly dextrinoid." I found the dextrinoid reaction to be strong overall in my collections. I also tested this reaction using IKI (iodine, potassium iodide solution) and a tincture of iodine in ethanol and all resulted in basically the same color as Melzer's Reagent.



Dichohyphidia and very fine dichohyphidial-like hyphae.

The Gloeocystidia

Gilbertson (1965), Welden (1965), and Lindsey & Gilbertson (1978) all say the gloeocystidia in *Vararia phyllophila* are negative or unstained in sulfo-benzaldehyde and similar reagents, and my testing agrees with their observations. For a discussion of the acidified reagents used to test for some gloeocystidia, please refer to Luther (2011). The oily guttules are not seen in all gloeocystidia in this species; some appear completely void of them. Lindsey & Gilbertson (1978, p. 192) say that the gloeocystidia are clamped at the base, yet their illustration (p. 193, Fig. 127d) does not show this. Because this species is entirely without clamps, I assume this was an error. Welden (1965) suggests using a variety of reagents and stains and making a series of mounts to be able to observe all of the different structures in the genus *Vararia.*



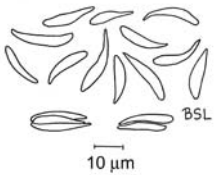
Gloeocystidia.

The Hymenium

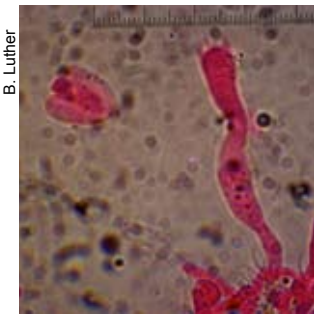
According to Lindsey & Gilbertson (1978) this species forms a catahymenium (basidia not in a tight, uniform layer or palisade but scattered at slightly different levels and elongating to reach the surface). If this is the case, it would help to explain the tremendous variability in basidial length. However, my collections of *Vararia phyllophila* show extensive areas of a more or less loosely continuous basidial layer.

The Basidiospores

Immature basidiospores of *Vararia phyllophila* are often seen in tight parallel bundles. Only loose spores unattached to one another should be measured. Even then I found a wide variation in sizes, because the spores had been dislodged prior to maturity. Lindsey & Gilbertson (1978) give the spore range as "(12) 17–22(-26) × 2.5–3.5 µm," which coincides closely with my observations. Rarely are spores almost as long as the basidia that form them, but here's a good example. Dennis (1970) gives the spores as "10–22 × 1.3–3 µ" for a Panama collection. These are exactly the dimensions given by Burt (1926), who said he took them from another source. These last measurements are narrower than most reports of this species, and it appears highly likely that immature spores were measured, given the spore size range provided.



Basidiospores, Vararia phyllophila.



B. Luther

Mature basidium with a bundle of immature spores (left) in 3% KOH and Phloxine, 1000X.

Continued in the March Spore Prints

Election Election Election

This year we are voting for a President, a Treasurer, and five Trustees. Please read the following profiles carefully and mark your choice on the enclosed ballot. Return your ballot to "PSMS Election Committee, c/o Joanne Young, 1916 N 49th Street, Seattle, WA 98103." A ballot box will also be available at the February meeting. Each family membership is entitled to two votes, and each individual membership to one vote. Ballots received after March 5, 2012, will not be counted.

Marian Maxwell ***President***

Having served as President for the past 2 years, I would like to continue as President. More planning and work are required in the next few years as our club's lease will expire at CUH, we have a 50-year anniversary coming up, and we will host the national NAMA Foray in 2014 (in addition to regular business and other planned events). We have hard working people on our Board and I would be proud to continue serving.

Treasurer **John Goldman**

As the current Treasurer I really enjoy the position. I'm dedicated to keeping our finances in order, keeping our expenses low and profits healthy so that we can fulfill our mission to promote mycology to the membership and the public We have grown greatly in the past few years which brings more responsibility and accountability. I appreciate the ongoing confidence and would like to be re-elected.

Trustees

Tim Sage

I am an active hunter and mushroom photographer, and am very active on MushroomObserver.org. I love mycophagy, but my main interest is in the taxonomy and ecology of fungi. I want to move PSMS forward on a scientific level, with more focus on vouchering, microscopy, species lists, and similar scientific activities within our field.

Debra Lehrberger

I am currently Field Trip Hosts Chair and an alternate Trustee. I was the Volunteer Coordinator for the 2011 Mushroom Maynia!, a Fall Show Committee member, a field trip host, and a trip leader for the PSMS/Mountaineers Meany Lodge field trip in 2010. I just love 'shrooms and love being involved!

Luise Asif

Thank you to all for the opportunity to serve on the board for the past 2 years. It would be an honor to serve again as we move forward developing focus and preparing for the NAMA conference to be hosted by PSMS in 2014.

Danny Miller

I am on the Identification Committee, enjoy helping out at the Monday night ID clinics and field trips, and have taught both Beginner and Intermediate classes for PSMS. My interests are taxonomy, education, and science. My motto is that you can find something interesting to tell somebody about every mushroom they might find.

Ed Sakai

I believe PSMS is a unique organization. Not all mushroom clubs are blessed with our depth of talented identifiers, teachers, and cooks. I believe that it is important that we as a club grow, not only in numbers but also by producing more knowledgeable, contributing members. I would like to continue as a board member.

Larry Lee

PSMS was a remarkable discovery for our family. We have made wonderful friends, plan our spring and fall around field trips, and scan the ground more often than the sky. I have participated in the Bioblitz and voucher program, taken ID classes, and worked the Children's booth and Security for the Show. I will be a strong advocate for field trips.

Sandy Bartell

I am running for the board because I want to contribute to a group that has brought so much joy and fulfillment to my life. I have Web design skills, communication skills, and business experience from 30 years in industry that I'd like to offer PSMS to help us grow.

Orchids, *cont. from page 4*

places, but the fungi they need do not exist in most areas of the forest.

Meanwhile, the fungi displayed a strong preference for older forests.

Soil samples taken from older forest plots had host fungi that were five to 12 times more abundant compared to younger forests, even where the research team had not added them. They were more diverse as well. More mature plots averaged 3.6 different *Tulasnella* species (a group of fungi beneficial to these orchids) per soil sample, while the younger ones averaged only 1.3.

Host fungi were also more abundant in plots where rotting wood was added. These host fungi, which are primarily decomposers, may grow better in places where decomposing wood or leaves are plentiful.

All this implies that to save endangered orchids, planting new forests may not be enough. If the forests are not old enough or do not have enough of the right fungi, lost orchids may take decades to return, if they return at all.

"This study, for the first time, ties orchid performance firmly to the abundance of their fungi," McCormick said. "It reveals the way to determine what conditions host fungi need, so we can support recovery of the fungi needed by threatened and endangered orchids."

MAIDS AND MUSHROOMS

Oddly fashioned, quaintly dyed,
In the wood the mushrooms hide;
Rich and meaty, full of flavor,
Made for man's delicious savor.
But he shudders and he shrinks
At the piquant mauves and pinks.
Who is brave enough to dare
Curious shapes and colors rare,
Dainties in peculiar dresses,
Fairy-rings and inky messes?
Something sinister must be
In the strange variety.
It is better not to know;
Safer but to peer—and go.

So the mushrooms dry and fade,
Like full many a blooming maid,
With her dower of preciousness
Hid too well for men to guess.
But the toadstools bright and yellow
Tempt and poison many a fellow,
With their flaunting beauty bright,
The bold promise of delight.
Taste and suffer, ache and burn;
Generations do not learn!

—Abbie Fawell Brown

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Center for Urban Horticulture
Box 354115, University of Washington
Seattle, Washington 98195

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Remember to vote!