

# inoculum

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## Newsletter of the Mycological Society of America

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### President's Corner

#### ***Working toward a North American Mycobiota for macrofungi — what's stopping us?***

My graduate training was in botany, and as part of this training I took, and helped teach, plant taxonomy courses. My first such course was one called *The Spring Flora of Minnesota*, which was taught by Thomas Morely and was based on a book of the same name that he had authored. The amazing thing about that book was that it contained every vascular plant in the state that flowered before mid June and yet it was small and easy to use. It was the first flora I ever owned, but it turned into a gateway drug for others such as Gleason and Cronquist's Manual of the Vascular Plants, The Flora of the Pacific Northwest, and the Jepson Manual. I love



Tom Bruns, MSA President

these books because they allowed me to learn new plants and to retrieve some basic information about their distributions and their status as a native or introduced species. Florist work also forms the necessary basis for discovering biogeographic patterns.

After moving to Berkeley California from Ann Arbor Michigan I was immediately struck by the impressive differences in mycobiota (i.e., mycoflora, or mycota if you'd rather) in the two regions. Many species and even genera that were common in Michigan were absent or rare in California and unfamiliar genera and species were everywhere. Furthermore many species that are called by the same names in Michigan and California often looked subtly different in the two regions. Finer scale differences within the California mycobiota were also were obvious. Genera such as *Ramaria* and *Phaeocollybia* for example seem to increase in species diversity as one moves up the coast, and the Sierra Nevada has its own set of unique species not seen on the coast, including an impressive set of snow melt fungi.

But these observations on mycobiota differences are anecdotal. Where are the data that demonstrate these patterns? Early on in my training I learned that mycobiotas did not exist for North America, or even for any state or region within the continent. Of course there were some field guides to mushrooms, and there were some monographs to particular groups, but the field guides available at the time didn't contain most of the species one would find, and the monographs tended to

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**Fig 1. A curation party in which members of the Bay Area Mycological Society, helped to box and label collections from the Pt Reyes "mycoblitz" forays. Not shown are the many people from the Mycological Society of San Francisco, Soma Mycological Association, and the Santa Cruz Fungus Federation, that were responsible for many of the collections and identification.**

be expensive, difficult to use, and often out of date. In any case field guides and monographs are not mycobiotas. They generally don't contain the distribution patterns that would reveal what our biogeographic patterns look like. The one exception to these generalities are the lichenized fungi, which do have a beautiful, modern treatment for North America <sup>1</sup>, and a website [http://www.sharnoffphotos.com/lichens/lichens\\_home\\_index.html](http://www.sharnoffphotos.com/lichens/lichens_home_index.html).

The reasons for the lack of mycobiotas became clear as I began to learn more about mycology: the basic information was not available. Many of the species were still undescribed, or called by European names, and we lacked good images and detailed distribution data even for many well-known species. Existing herbarium records, especially older ones, often erroneously record the presence a particular species simply because the identification tools were primitive at the time of collection, and because collectors are probably always biased toward applying existing names rather than describing new species (e.g., historical records for *Amanita phalloids* <sup>2</sup>). Furthermore the ability to discern species-level differences from dried material is often limited, especially if the material was poorly dried and notes about the original collection are absent or limited. Fungal herbarium records are also strongly biased by collecting patterns; as a result distribution data tend to correlate with the favorite collecting sites of a handful of avid fungal systematists.

Another obvious problem for assembling mycobiota data is that there are very few mycologists versus a large number of fungi. Most of you reading this are aware of aware of Hawksworth's estimates that were originally based on a ratio of six species of fungus for every one vascular plant in Europe <sup>3</sup>. This ratio now looks conservative <sup>4</sup>, particularly when tropic region are included <sup>5</sup>. Thus from an organism perspective alone the job of assembling a mycobiota is very conservatively six times more difficult than the job of assembling a flora. But the problem of being outnumbered by the organisms is further exacerbated by the small number of mycologists. To get a rough estimate of the

problem I used the 1:5 ratio of mycologist to botanist based on MSA to BSA membership numbers. Combining these two numbers means that we have a ratio of organism to scientists that is about 30 times worse than that of plants and botanists! The problem does get better if we lower our sights to only macrofungi, essentially the mushrooms, polypores, truffles (and false-truffles), corticoid fungi, and Ascomycota with large sporocarps. I hate to suggest this, but I think it is the only practical way to proceed in the short-term. As I will argue below, we are going to need the public for this effort, and I think that requirement will make assembling distribution data on microfungi impractical.

The good news is that three important things have changed since the days I was a student: 1) there are much better field guides (to mushrooms), 2) the internet allows instant access to distributed data and allows one to deposit image-rich descriptions, and 3) cheap, easy, nucleic acid sequences allow us to compare collections in an objective way. With these tools, lots of help from the public, and some coordination, I think we could start to make some real progress on a continental mycobiota at least for the macrofungi. Ultimately, we need some serious funding for this, a point I will return to, but even with minimal funds I think we can get started.

First, we absolutely have to work closely with the informed public, because there are simply not enough professional mycologist to accomplish this task (see above). Other countries, such as the Netherlands, Switzerland, and Germany, <sup>6-9</sup> have already embraced this approach. Here we have the North American Mycological Association (NAMA) and all of its associated local organizations that are already engaged in collecting and identifying. I have no doubts that they would willingly enlist in the goal of producing a North American Mycobiota. These are "citizen scientists" (in NSF lingo), and many of them are highly competent taxonomists. Let's formally enlist them.

Second, this must be a specimen-based effort and specimens must be coupled to at least basic metadata (location, date, habitat, specimen notes). Foray lists, even when supplemented with good photos, are not great evidence for the presence of most species. Dr. Barbara Ertter, who worked on the Jepson Manual (a flora for California), summarized this best when she said: "**without a specimen, it's a rumor**". Specimens provide the necessary ground truth that can be reexamined as species concepts change, without them we stand on weak ground. However, the requirement for specimens adds two additional complexities to the problem: curation and herbarium space. These are respectively time-consuming and in increasingly short supply.

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Third, nucleotide sequencing is a must. Most of our fungal diversity probably resides in difficult species complexes, and it is at this level where regional differences in the mycobiota are likely to be most numerous. The fastest and most objective way to sort out these complexes is with sequence analysis. Deposited sequences are also an easy way for those doing monographic work to screen for collections that might be of special interest. Ideally sequencing would be a multilocus process, but even if we started with a single locus (like ITS) it will greatly aid in the process of sorting out species. Fortunately, there are some really easy DNA sampling, preservation and extraction methods now available (see <sup>10</sup>) that are very well suited to this goal.

What can we do with little or no funding? We can certainly start to organize, by improving connections between professional mycologists and citizen scientists. We can do this by using existing web technologies such as the Mushroom Observer and Google Docs to help report and coordinate effort within and between groups, and if spare funds are available, we can start to sequence through the collections. My involvement with this approach started when David Rust, a co-founder of the Bay Area Mycological Society (BAMS), approached me and asked what local mushroom clubs could do to contribute to science. His question came on the heels of the Asheville, NC MSA meeting, where the “mycoblitiz” of the Great Smoky Mountains National park had occurred. So using the mycoblitiz as our model we started a survey of the macrofungi of Pt Reyes National Seashore. This has been an ongoing project for several years and has now expanded to Yosemite National Park. It's been a very rewarding experience that provided me with a great excuse to learn many fungi that I didn't know previously, and it's helped two national parks to start cataloguing their fungi. In Pt. Reyes we have now increased the known number of fungi in the park by over four-fold, and in Yosemite we doubled the number of known fungi in a single year; this says a lot about how little the parks knew, but it also says a lot about what can be done with shoe-string budget and some hardworking volunteers. This work has primarily driven by members of the public, who did most of the collecting and identifying, helped produce web content (see <sup>11</sup>), and helped curate the specimens (Fig 1). We have started to sequence these collections with help from Mike Davis (UC Davis) and with a series of undergraduate projects at Berkeley. The results have revealed many novel fungi even among common species that we thought we knew.

What could we do if the mycological community had funds to produce a North American mycobiota for macrofungi? Here is my short list: 1) digitalize all major fungal herbaria in a way that allows a single search to retrieve records for all available collections; 2) pay for travel for people to collect in different areas of the continent, and to participate in targeted forays; 3) pay for expanding and centralized DNA extraction and sequencing, and give advanced members of the public access to it; 4) pay for training workshops on taxonomically difficult groups; 5) pay for curation of new specimens 6) develop a wiki-style website for the North American Mycobiota that would coordinate the data, display distributions, and provide modern identification tool for all taxa, and 7) begin expanding to other groups of fungi (i.e., microfungi). To do the job right, I think we would

need at least 18 million dollars over 15 years<sup>12</sup>, with the money being distributed across six regional centers.

Where is this level of funding going to come from? The Consortium for the Barcoding of Life would be a likely source for some of the sequencing, but I think this would represent a relatively small portion of the cost. NSF might pay for some of it. Specifically there seems to be a growing push for the digitalization of collections and I think mycological collections are well positioned to benefit from this initiative. Training and workshop programs are another area where NSF funding might be possible. But at the risk of raising David Minter's ire again (see *Inoculum* 62(1)), I have to say that I don't think it is likely that NSF would ever target 18 million dollars to assemble a North American mycobiota, especially in the current funding climate (ditto USDA, DOE, NIH, EPA, DOD, or any other federal funding agency).

Where does this leave us? It leaves us in the position of doing the best we can with limited funding, while looking for substantial private investment. I have little experience with private funding, but I do see major foundations that have the kind of money necessary, and I think that if we can actually get through the door to make our case we stand a good chance of getting this long overdue project moving more quickly. In the meantime I think we need to get together on this and start to getting organize. I'd be happy to hear from anyone that has experience or idea along these lines.

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- 10 Dentinger, B. T. M., Margaritescu, S. & Moncalvo, J. M. Rapid and reliable high-throughput methods of DNA extraction for use in barcoding and molecular systematics of mushrooms. *Molecular Ecology Resources*. *Molecular Ecology Resources* **10**, 628-633 (2010).
- 11 Mike Wood, of the Mycological Society of San Francisco, helped design the Pt. Reyes Mycoblitiz website, and Debbie Viess of the Bay Area Mycological Society provided text to Pt Reyes National Seashore that is now on that park's website.
- 12 This number comes from a funding level of \$200,000/center/year X 6 centers. This would be enough to hire a postdoc to coordinate the logistics, support training of at least one graduate student, pay for undergraduate help with specimen curation, and provide travel and supply money for the project.

## A Prairie Polypore

In June our mycology lab was invited to attend a Bioblitz on the American Prairie Reserve in Central Montana. The reserve is in a remote area with few people and fewer still are willing to drive the 50 miles of dirt roads that turn to gumbo in wet weather to reach the Yurt Camp (Fig. 1). We were fortunate that spring rains had been uncharacteristically consistent and that a dramatic thunderstorm moved in the night before the Bioblitz. A thunder and lightening storm on the open prairie with no place to hide is a seriously memorable event but it brought the rain needed to find fungi. In all, 28 species of fungi were collected by my graduate students Erin Lonergan and Ed Barge, two citizen volunteers, my husband and me (Fig. 2). In total, 480 species of birds, bats, mammals, invertebrates, insects, plants and fungi were recorded in a 24 hour period.

One fungus seemed an unlikely candidate for special attention. It was a tiny polypore with a pale cap one centimeter across supported by a central black stem one cm tall (Fig. 3). At first we thought it was a miniature version of one of the black-footed polypores (*P. varius*, *P. badius*, etc). But the diamond-shaped pores were evident even on such a small fruiting body and the next designation was *P. arcularius*, which is distinguished by this type of hymenium. However, there was one troubling aspect—the fungus was terrestrial and not on wood. An anomaly perhaps, but after finding several fruiting bodies nestled



**Fig. 1. Collecting fungi at the Yurt camp on the American Prairie Reserve. D. Bachman Photo.**

in the grass and always on the ground, a pattern began to emerge. The caps might be mistaken for flattened puffballs lying on the prairie. The specimens keyed to *Polyporus cryptotopus* Ell. & Barth. (1896) in Gilbertson and Ryvarden's *North American Polypores* (1987). What did we know about it? The substrate was stated as “terrestrial, fruiting on the ground in pastures or prairie habitats. According to Overholts (1953) it is attached to dead grass roots.” Here was a polypore that had found a unique niche on the tough roots of prairie grasses! Gilbertson and Ryvarden further stated that “it is likely to be found in the Great Plains region in grassland ecosystems. It is not known elsewhere in the world.”

A follow-up search of the National Fungus collection and NYBG herbarium revealed a few more records, including 8 from Kansas, 3 from North Dakota, one from Washington and one from Montana, all reported between 1895 and 1917. The 1917 specimen from Montana was dubious as it was found on lodge pole pine (Weir 1917); photo examination of the voucher revealed it to be in poor condition (in pieces) and its identity couldn't be confirmed. Two subsequent collections were made by Clark T. Rogerson in Kansas in 1954; he found the polypore to be common in two prairie areas that year associated with bluestem grass clumps (Rogerson 1956). He collected it not far from where the type collection was made. These appear to be the last reports of the fungus in North America, at least as far as we could discern.



**Fig. 2. The 2011 Bioblitz mycology crew: Ed Barge, Don Bachman in back; Mary Jones, Cal Cummin, Cathy Cripps and Erin Lonergan.**

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However, a check of Index Fungorum revealed the current synonymized name of *Polyporus rhizophilus* (Pat.). Armed with this new information, several interesting papers turned up including one on the rhizophilic (root-loving) species of *Polyporus* (Sotome et al. 2007, 2008, 2009). Apparently *P. rhizophilus* is a well known species from prairie habitats on a global scale! It is reported on “steppe grasses such as *Stipa*, *Agropyron*, *Rudbeckia*, *Elymus* or *Cynodon*, etc” and is known from Poland, Hungary, Czechoslovakia, Romania, Tajikistan, Kazakhstan, Morocco, Ukraine, Mongolia with one possible report from Argentina (Akulov et al. 2003, Hruby 1931, Kreisel 2006, Kubat 1975, Silveira 2006, Silveira and Wright 2005, Stasinska 2008). Interestingly, it is on Red Lists in many of these countries as a species of special concern. A related species has been reported on bamboo roots in Japan (Sotome 2007). While Nunez and Ryvardeen (1995) casually synonymized the two names, the North American *P. cryptopus* is kept separate from the Eurasian *P. rhizophilus* in Sotome’s key (2009). Whether the two taxa are one in the same or not, the ‘prairie polypore’ appears to have been forgotten in North America and so we bring it to light here. If you visit the prairie, look for it; if you have access to a herbarium, check for possible vouchers. The Great Prairies of the world appear mycologically united by this unique little fungus that is either overlooked or rare.

### Acknowledgments

We thank Kayhan Ostovar for inviting us and the American Prairie Foundation for hosting the Bioblitz.

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**Fig. 3. *Polyporus cryptopus* (= *P. rhizophilus*?) on the American Prairie Reserve. E. Barge Photo.**

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- \_\_\_ Distribution of *Polyporus rhizophilus* (Pat.) Sacc. across Russia. [http://www.binran.ru/infosys/fun\\_map/polrhi.htm](http://www.binran.ru/infosys/fun_map/polrhi.htm) (in Russian).

**Cathy L. Cripps**  
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## MYCO HUMOR

### Mix o’ my seaties

Professor R.P. Korf in an early lecture at Cornell (circa 1953), just after his return from a one-year exchange in Glasgow, told the story of a Scottish Professor who found his carefully prearranged chairs in the mycology lecture room were all jum-

bled up with the students facing in all different directions. His first remark was: “WHOOO has made a mix o’ my seaties?”

**Robert Shoemaker**  
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# MSA BUSINESS

## Secretary's Report

Wishing you all a glorious end to summer and a rainy autumn!

**Council Business:** There were no email polls conducted by Council since my last report.

**New Members:** It is my pleasure to extend a warm welcome to new or returning members. Their membership will be formally approved at the 2011 Annual Business Meeting in Fairbanks, AK.

*France:* Melanie Roy

*New Zealand:* Gwen-Aelle Grelet

*Thailand:* Siangjeaw Piriayapin

*United States:* Leonora Sophia Bittleston, Harvey Gordon, John-Erich Haight, John Hobbie, Jose R Perez-Jimenez, Alistair Ross McTaggart, Luisa Santamaria, Dylan Smith, Jennifer Talbot, Mark P Waldrop

**Emeritus Members:** Dr. Alan Parker, Waukesha, WI, has requested emeritus status. He has been an MSA member since 1971.

**Reminder:** Renewing your MSA membership is easier than ever! Just log in to the MSA website at <http://www.msafungi.org>. There is now an email reminder system available if you have forgotten your MSA user id or password.

**REMINDER: MSA Directory Update:** Is your information up-to-date in the MSA directory? The Society is relying



**Jessie Glaeser,**  
Secretary  
(Photo by Tom Volk)

more and more on email to bring you the latest MSA news, awards announcements and other timely information, and our newsletter. To ensure that you receive Society blast emails and the *Inoculum* as soon as it comes out, and so that your colleagues can keep in touch, please check the accuracy of your email address and contact information in the online directory. This can be accessed via our web site at [www.msafungi.org](http://www.msafungi.org). If you need assistance with updating your membership information, please contact our Association Manager at Allen Press, the always-helpful Kay Rose at [krose@allenpress.com](mailto:krose@allenpress.com).

Please do not hesitate to contact me about MSA Business or any questions that you may have about the Society. **Please remember to renew your membership for 2011!** In recent years we have suffered an alarming decline in member-

ship and it would be wonderful to reverse this trend. The first step is for everyone who is currently a member to renew for the upcoming year. And don't forget to recommend MSA to your amateur or professional colleagues who are interested in fungi – be they pathologists, geneticists, ecologists, or people who like to wander around in the woods. There is room in MSA for all!

**Jessie A. Glaeser**  
MSA Secretary

## MSA 2011 Late Abstracts and Errata

### NEW:

Drees, Kevin<sup>1</sup>, Lorch, Jeffrey<sup>2</sup>, Gillece, John<sup>3</sup>, Beckstrom-Sternberg, Stephen<sup>3</sup>, Blehert, David<sup>2</sup>, Paul Keim<sup>1,3</sup>, Foster, Jeffrey<sup>1</sup>. <sup>1</sup>Center for Microbial Genetics and Genomics, Northern Arizona University, Flagstaff, AZ, <sup>2</sup>USGS-National Wildlife Health Center, Madison, WI, <sup>3</sup>Translational Genomics Research Institute, Division of Pathogen Genomics, Flagstaff, AZ. [Kevin.Drees@nau.edu](mailto:Kevin.Drees@nau.edu). **Genomic Analysis of *Geomyces destructans* from North America and Europe.**

The origin of the fungus *Geomyces destructans*, the likely etiologic agent of the white-nose syndrome epizootic decimating eastern North American bats, remains uncertain. *G. destructans* is known to infect European bats without causing any apparent mortality. So, was this fungus introduced to North America where it is now behaving as an exotic pathogen among naïve bat populations, or did a native North American *Geomyces* sp. strain become pathogenic? We used a genomic approach to determine the phylogenetic relationships among isolates of *G. destructans* from infected bats of North America and Europe. 100 bp paired-end whole genome sequences were generated on an Illumina Genome Analyzer IIx, aligned to the publicly available reference genome of *G. destructans* 20631-21, and analyzed for single nucleotide polymorphisms (SNPs). SNP data were used to prepare an unrooted phylogenetic tree of the isolates. North American isolates of *G. destructans* comprised a low-diversity clade, corresponding to its observed rapid spread, and supporting the hypothesis that the organism reproduces asexually and spreads clonally. In comparison, European isolates were more genetically diverse and were divergent from each other as well as from the North American clade. Nonetheless, the limited genetic distance between genomes of *G. destructans* from North America and Europe is consistent with a European source population. More extensive sampling and analysis of isolates from

Europe may reveal a more genetically similar source population. 928-523-1120

Oberle-Kilic, Jennifer<sup>1\*</sup>, Dighton, John<sup>2</sup>, and Arbuckle-Keil, Georgia<sup>3</sup>. <sup>1</sup>Pinelands Field Station, Rutgers University, PO Box 206, 501 Four Mile Road, New Lisbon, NJ 08064, <sup>2</sup>Department of Chemistry, Rutgers University, 315 Penn St., Camden, NJ 08102, <sup>3</sup>Department of Chemistry, Rutgers University, 315 Penn St., Camden, NJ 08102. [joberle@eden.rutgers.edu](mailto:joberle@eden.rutgers.edu). **Atomic force microscopy and FTIR-ATR microspectroscopy reveals physical and chemical substrate changes at the hyphal scale of resolution.**

In a new application of AFM to mycology this study addresses fungal functionality at the hyphal scale of resolution. The results indicate the extent of exoenzyme influence from the hyphal tip of three fungal species. Surface roughness of the cellophane substrate is significantly lower adjacent to hyphae of *Armillaria* and *Aspergillus*, which produce cellulase enzyme than for *Mucor* which has lower cellulase activity. Additionally, the adhesive force of the cellophane surface is significantly altered within the sphere of influence of the enzyme. Fourier Transform Infrared analysis using a focal plane array detector supports these physical changes with evidence of chemical changes of the substrate in the area of exoenzyme influence. Using the AFM and FTIR-ATR allows the potential to evaluate the branching and space-filling behavior of hyphal growth in terms of functionality and energetics to see if fungal hyphal growth minimizes self competition in enzyme production on various natural substrates.

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#### ABSTRACT REPLACEMENT:

Kumar, TK Arun<sup>1</sup>, Healy, Rosanne A<sup>1</sup>, Spatafora Joseph W<sup>2</sup>, Blackwell, Meredith<sup>3</sup>, McLaughlin, DJ<sup>1\*</sup>. <sup>1</sup>Department of Plant Biology, University of Minnesota, St. Paul, MN 55108, <sup>2</sup>Department of Botany and Plant Pathology, Oregon State University, Corvallis, OR 97331, <sup>3</sup>Department of Biological Sciences, Louisiana State University, Baton Rouge, LA 70803. [davem@umn.edu](mailto:davem@umn.edu). ***Orbilia* ultrastructure and Pezizomycotina phylogeny.**

Molecular phylogenetic analyses indicate that the monophyletic classes Orbiliomycetes and Pezizomycetes are among the earliest diverging branches of Pezizomycotina, the largest subphylum of the Ascomycota. Although Orbiliomycetes is resolved as the most basal lineage in some analyses, molecular support for the node resolving the relationships between the two classes is low and topologies are unstable. We provide ultrastructural evidence to inform the placement of Orbiliomycetes by studying a representative species of the only order (Orbiliales) of the class. The truncate ascus apex in *Orbilia* sp. is thin-walled except at the margin, and an irregular wall rupture of the apex permits ascospore discharge. Ascus, ascogenous and non-ascogenous hyphae were simple septate, with septal pores plugged by unelaborated electron-dense, non-membranous occlusions. Globose Woronin bodies were located on both sides of the septum. Nuclear division was characterized by the retention of an intact nuclear envelope, and a two-layered disc-shaped spindle pole body. The less differentiated nature of the spore discharge apparatus and septal pore organization support the earliest diverging position of Orbiliomycetes within the subphylum, while the closed nuclear division and disc shaped spindle pole body are interpreted as ancestral state characters for Ascomycota.

#### CHANGES IN CO-AUTHORS:

Dianese, José C.; Souza, Erica SC; Vale, Helson MM and Boiteux LS. Depto. de Fitopatologia, Universidade de Brasília, Campus Darcy Ribeiro, Asa Norte, 70910-900 Brasília, DF, Brazil. [jcarmine@unb.br](mailto:jcarmine@unb.br). **Interaction between a non-gloeosporioid endophytic *Colletotrichum* species and *Uromyces euphorbiae* on leaves of *Chamaesyce hirta*.**

Piriyaaprin, Siangjeaw<sup>1\*</sup>, Manoch, Leka<sup>1</sup>, Sunantapongsuk, Vanlada<sup>2</sup>, and Somrang, Ard<sup>2</sup>. <sup>1</sup>Department of Plant Pathology, Faculty of Agriculture, Kasetsart University, Bangkok 10900, Thailand, <sup>2</sup>Land Development Department, Ministry of Agriculture and Cooperatives, Bangkok 10900, Thailand. [agrilm@ku.ac.th](mailto:agrilm@ku.ac.th). **Utilization of halophilic fungi as biological agents for controlling *Fusarium moniliforme* and *Pythium aphanidermatum*.**

Lindner, Daniel L.<sup>1\*</sup>, Lorch, Jeffrey<sup>2,5</sup>, Foster, Jeffrey T.<sup>3</sup>, Gargas, Andrea<sup>4</sup>, and Blehert, David<sup>5</sup>. <sup>1</sup>Center for Forest Mycology Research, US Forest Service, One Gifford Pinchot Dr, Madison, WI 53726, <sup>2</sup>Molecular and Environmental Toxicology Center, University of Wisconsin – Madison, Medical Sciences Center, 1300 University Avenue, Madison, WI 53706, <sup>3</sup>Center for Microbial Genetics and Genomics Northern Arizona University, Flagstaff, AZ 86011, <sup>4</sup>Symbiology LLC, Middleton, WI 53562, <sup>5</sup>US Geological Survey – National Wildlife Health Center, 6006 Schroeder Road, Madison, WI 53711. [dlindner@wisc.edu](mailto:dlindner@wisc.edu). **Discovery and whole-genome sequencing of close relatives of *Geomyces destructans*, the fungus associated with White Nose Syndrome in bats.**

## MYCOLOGICAL NEWS

### Isabelle Irene Tavares, 1921-2011

Isabelle Tavares, a longtime member of the MSA, passed away on May 21. Her academic career began at City College of Los Angeles, but was interrupted by service in the Women's Army Corps during World War II. Post-war, she continued at Berkeley and received her B.A., M.A., and Ph.D. degrees from the University of California. Known through the years as a lichenologist, Isabelle's doctoral dissertation, conducted under the guidance of Prof. Lee Bonar, investigated the Laboulbeniales, an order of minute fungi that parasitize insects. This research continued after her dissertation and eventually resulted in her magnum opus "The Laboulbeniales" published in 1985. During her graduate student years she began working in the UC Berkeley herbarium, eventually as curator of fungi, including lichens, and bryophytes. Her service continued uninterrupted until her retirement in 1993. Her research with lichens centered on *Usnea*, a widespread and notoriously taxonomically difficult genus. Isabelle was a founding member of the California Lichen Society, actively promoted California lichenology, and was extensively involved in the California Botanical Society.

A perspective on Isabelle's durability and personality comes from Shirley Tucker (UC Santa Barbara). "Isabelle was a dedicated mycologist; I first encountered her when I was a graduate student at UC Davis [in the 1950s] and needed help on lichens I was collecting as an avocation." Isabelle patiently took time to foster

lichenological appreciation in the "younger generation." Her expertise in the herbarium and championing of lichenology will be missed.

**Richard L. Moe**  
University of California, Berkeley



**Isabelle Tavares**  
(used with permission of the UC Herbarium).

## Festivals and News from FUNGI Magazine

The *31st Annual Telluride Mushroom Festival* (August 18–21) is a lot of fun, set in a gorgeous location. If you made it to the NAMA foray in Colorado last year, you know how tremendous the mushrooms can be in Colorado in August. Many experts will be on hand for lectures, workshops, ID clinics, and forays, including Gary Lincoff, Paul Stamets, and Michael Beug. Website: [www.tellurideinstitute.org](http://www.tellurideinstitute.org)

The *7th Annual Sicamous Fungi Festival* (September 18–25) in British Columbia features music and mushrooms with experts Larry Evans, Paul Kroeger, and others on hand to give lectures and lead forays. Website: [www.fungifestival.com](http://www.fungifestival.com)

The *10th Annual Texas Mushroom Festival* (October 21–22) in *Madisonville* is more about the gourmet aspects of mushrooms, rather than wild edibles, and attracts more than 15,000 attendees each year for a huge celebration of food, wine, vendors, and an incredible array of mushroom dishes. Website: [www.texasmushroomfestival.com](http://www.texasmushroomfestival.com)

In time for summer reading, *FUNGI* is presenting a huge 72 page double issue on the science, lore, and history of *Psilocybe*! This issue is textbook in breadth—with beautiful images—and features many experts of this group of interesting and widespread mushrooms. Authors include: Michael Beug, Else Vellinga, Nicholas Money, and Paul Stamets. Now in its fourth year of printing, *FUNGI* covers all topics fungal and appeals to mycological enthusiasts and academics alike. The focus is on North American fungi with a sprinkling of articles from outside our region, original research and review papers, cultivation and culinary, how-to photography, book and Web reviews, recent literature and myco events, plus lots and lots of gorgeous images. *FUNGI* has 3,000 subscribers from more than 50 countries (with subscriptions at just \$38 for USA addresses). Check the website for subscription information and to get a look at the current issue and archives ([www.fungimag.com](http://www.fungimag.com)).

**Britt A. Bunyard**

Publisher and Editor-in-Chief  
FUNGI  
[bbunyard@wi.rr.com](mailto:bbunyard@wi.rr.com)



Advertisements for the Telluride, Sicamous, and Texas mushroom festivals and cover of the 2011 Summer issue of FUNGI Magazine.

**7th Annual Fungi Festival**  
**Sept. 18th ~ Sept. 25th**

The 2011 Fungi Festival will be an exciting week of identifying, picking, and eating Wild Mushrooms!

Including: -Presentations, Workshops, and Slide Shows  
-Live entertainment, Guided Tours, \*The Grand Camping Tour.

**FEATURING: -Larry Evans -Tyson Ehlers -Paul Kroeger**

**The Fungi Festival Grand Tour**  
An exciting week of touring different locations including: Revelstoke, Nakusp and Sicamous...all rich in beauty and Mushrooms!

**2011 Weekend Fungi Festival**  
Held in the Red Barn Arts Center in Sicamous. Including: Lectures, Tours, and slide shows.

There will be Live Entertainment and Beer Gardens!

For reservations, costs, and other information please call **250.836.2220** or visit **fungifestival.com**

Celebrate the end of summer in Beautiful British Columbia and enjoy a Wild Mushroom Experience!

**fungifestival.com**

**shroomfest**  
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telluride mushroom festival  
telluride co **august 18-21 2011**  
for tickets and more info please visit **shroomfest.com**  
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this year's speakers:  
paul stamets  
gary lincoff  
michael beug  
britt bunyard  
david rose  
and more!

Join us for our 10<sup>th</sup> Annual

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# MYCOLOGIST'S BOOKSHELF

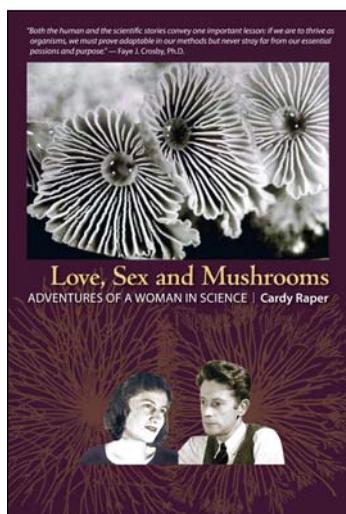
## Love, Sex and Mushrooms

**Love, Sex and Mushrooms. Adventures of a Woman in Science.** 2011. Cardy Raper. ISBN-13: 978-0615434407. Paperback: 270 pages, 55 illustrations.

[www.cardyraper.com](http://www.cardyraper.com)

A young woman sat down next to me at a local Berkeley coffee shop and asked, "Are you really reading about Love, Sex and Mushrooms? Awesome!!!" The book of the same title by Cardy Raper "Love, Sex and Mushrooms. Adventures of a Woman in Science" is truly awesome, with an equal measure of enthusiasm for all three topics. The travel adventure with Cardy is a candid, sometimes sorrowful and often humorous, walk through the many byways of her life.

Cardy grew up in a pack full of brothers "Little Cardy, her head is so hardy," with an interest in science from a very early age. She lived during a time when women in scientific positions of power were very few in number, but pursued her interests in biology with Bachelor's and Master's degrees, and with a short stint as a technician, working on such mycological treasures as the enigmatic sex hormones of *Achyla*. Her career in science and fungi in particular was shaped by her relationship with the famed mycologist John (Red) Raper; Cardy was Red's first graduate student at the University of Chicago. Their work



relationship blossomed into a love relationship that continued through marriage, children and relocation to Harvard.

After raising two children, Cardy's personal and scientific career was shaped by loss: Red's untimely death. Many people would have shut the door on that episode of their lives and gone onto other things, but not Cardy. She pursued a path that many take at a much earlier age: a Ph.D. degree (at 52), a post-doc, a tenure-track position, a new position as a research professor, grant denials and awards and collegiality highs and lows. Her journey has not been an easy one, with disappointments, bereavement, denied tenure, split sex hormone and near-death trauma. Through it all, Cardy's enthusiasm, joie de vivre, love of science and ability to take on new challenges (including learning molecular biology in her 60's) rises triumphantly. Cardy officially retired in 2004, after running her own laboratory for 30 years. Her work on deciphering the many sexes of *Schizophyllum commune*, the fungal love of her life, is landmark. Cardy followed her heart and her instincts (a trait apparently passed onto Cardy from Red) in science, love, music and social justice; her book is interspersed with recollections of her life and family and wonderful tidbits of science and fungal lore.

Having finished Cardy's book, one is left with the feeling that if her life played out again, she and Red would somehow find each other again and together they would work on sex in fungi. It was meant to be. As Alvin Levin wrote of Red and Cardy "The two of you brought us so much joy. That must have been because you know the secret of getting the very sap out of life and savoring it fully...". Apt words for the life and work of Cardy Raper as reflected in her book "Love, Sex and Mushrooms. Adventures of a Woman in Science."

**N. Louise Glass**

University of California, Berkeley  
[lglass@berkeley.edu](mailto:lglass@berkeley.edu)

# MYCOLOGICAL CLASSIFIEDS

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## Mycological Books for Sale

I am selling the following books. Buyer pays shipping. Eric Boehm, 42 Longacre Drive, Livingston, NJ 07039. Email: [eboehmjr@gmail.com](mailto:eboehmjr@gmail.com) Tel. 973-652-6981

1. *Fungus Flora of Venezuela and Adjacent Countries*, Kew Bulletin Additional Series III, R.W.G. Dennis (\$125 Abe Books): Asking \$50.
2. *Compendium of Soil Fungi Vols. 1 & 2*, K. H. Domsch, W. Gams, Traute-Heidi Anderson (\$695.00 Amazon): Asking \$100.
3. *Studien Über Die Morphologie und Systematik der Nicht-Lichensierten Inoperculate Discomyceten*. Nova Acta Begiae Societatis Scientiarum Upsaliensis, Ser. IV, Vol. 8, No. 2, 1932. J.A. Nannfeldt (\$95 Alibris): Asking \$40.
4. *British Stem & Leaf Fungi (Coelomycetes) Vols. 1 & 2*, W.B. Grove, Cambridge University Press, 1935 & 1937 (\$218 Alibris): Asking \$50.
5. *Palm Microfungi*, Jane Fröhlich and Kevin D. Hyde (\$100 new): Asking \$20.
6. *Genera of Ascomycetes from Palms*, Kevin D. Hyde, Joanne E. Taylor & Jane Fröhlich (\$100 new): Asking \$20.
7. *Bio-Exploitation of Filamentous Fungi*, Eds. Stephen B. Pointing and Kevin D. Hyde (\$100 new): Asking \$20.
8. *Integration of Modern Taxonomic Methods For Penicillium and Aspergillus Classification*, Eds. R.A. Samson, J.I. Pitt (\$173.95 Amazon): Asking \$40.
9. *Trichoderma & Gliocladium Vol 1*, Eds. C.P. Kubicek & G.E. Harman (\$99.59 Amazon): Asking \$20.
10. *Fungal Protoplasts - Applications in Biochemistry & Genetics*, Eds. J.F. Peberdy, L. Ferenczy (\$42 Abe Books): Asking \$10.
11. *Nuclear Division in the Fungi*, Ed. I.B. Heath (\$32 Amazon): Asking \$10.
12. *More Gene Manipulations in Fungi*, Eds. J.W. Bennett & L.L. Lasure (\$10 Abe Books): Asking \$5.
13. *Meiosis, Cell Biology Monographs*, Ed. P.B. Moens (\$18 Alibris): Asking \$5.
14. *The Mushroom Cultivator*, P. Stamets & J.S. Chilton (\$23 Amazon): Asking \$5.
15. *Investigative Mycology*, R.F. Sharp. Asking \$5.
16. *Endophytic Fungi in Grasses & Woody Plants*, Eds. S.C. Redlin & L.M. Caris (\$47 Amazon): Asking \$10.
17. *The Synnematos Genera of the Fungi Imperfecti*, E.F. Morris, Western Illinois University, 1963. Asking \$5.
18. *Hyphomycetes*, K. Tubaki, J. Cramer Publ., 1981. Asking \$5.
19. *Plant Pathologist's Pocketbook, 2<sup>nd</sup> Ed.*, Eds., A. Johnston, C. Booth (\$50 Amazon): Asking \$5.
20. *Fungal Genetics, 4<sup>th</sup> Ed.*, J.R.S. Fincham, P.R. Day A. Radford (\$20 Alibris): Asking \$5.
21. *The Preservation and Maintenance of Living Fungi, 2<sup>nd</sup> Ed.*, D. Smith, A.H.S. Onions (\$110 Abe Books): Asking \$20.
22. *Mycologist's Handbook*, D.L. Hawksworth (\$40 Alibris): Asking \$10.
23. *Introductory Mycology, 2<sup>nd</sup> Ed.*, C.J. Alexopoulos. Asking \$5.
24. *Fifth Kingdom, 1<sup>st</sup> Ed.*, B. Kendrick. Asking \$4.
25. *Researches on Fungi, Vol. VII*, A.H. Reginald Buller. University of Toronto Press, 1950 (\$595.00 Alibris): Asking \$80.
26. *Dictionary of the Fungi, 7<sup>th</sup> Ed.*, D.L. Hawksworth, B.C. Sutton, G.C. Ainsworth. Asking \$5.
27. *Dictionary of the Fungi, 8<sup>th</sup> Ed.*, D.L. Hawksworth, P.M. Kirk, B.C. Sutton, D.N. Pegler. Asking \$10.
28. *KARSCHEIA, Beihefte zur Nova Hedwigia, Heft 62*, J. Hafellner (\$227 Alibris): Asking \$40.
29. *A Revision of Melanconis, Pseudovalsia, Prosthecium & Titania*, Bibliotheca Mycologica, Band 41, L.E. Wehmeyer, J. Cramer (reprint) 1973. Asking \$10.
30. *A World Monograph of the Genus Pleospora and its Segregates*, L.E. Wehmeyer; University of Michigan Press, Ann Arbor, 1961 (Belonged to C.T. Rogerson w/ notes) (\$100 Alibris): Asking \$30.
31. *A Laboratory Guide to Common Aspergillus species & their Telomorphs*, M.A. Klich & J.I. Pitt (\$195 Alibris): Asking \$50.
32. *A Laboratory Guide to Common Penicillium Species*, J.I. Pitt (\$495 Alibris): Asking \$50.
33. *Illustrated Genera of Imperfect Fungi, 3rd Ed.*, H.L. Barnett & B.B. Hunter. Asking \$5.
34. *The Coelomycetes: Fungi Imperfecti with Pycnidia Acervuli and Stromata*, B.C. Sutton (\$185 J. Cramer): Asking \$80.
35. *Coelomycetous Anamorphs with Appendage Bearing Conidia*, Nag Raj; Hardcover: 1101 pgs. Mycologue Publications, 1993 (\$395 Alibris): Asking \$100.
36. *Tropical Mycology, Vol. 2. Micromycetes*, Eds. R. Watling, J.C. Frankland, A.M. Ainsworth, S. Issac & C.H. Robinson (\$50 Alibris): Asking \$20.
37. *Biodiversity of Tropical Microfungi*, Ed. K. Hyde (\$100 Amazon): Asking \$20.
38. *Biodiversity of Fungi, Inventory & Monitoring Methods*, Eds. G.M. Mueller, G.F. Bills, M.S. Foster (\$92.88 Amazon): Asking \$40.
39. *The Plant Rusts*, Joseph C. Arthur, John Wiley & Sons, 1929 (Belonged to C.W. Dodge) Asking \$20.
40. *Rust Fungi on Legumes & Composites in N. America*, G.B. Cummins (\$125 Alibris): Asking \$20.
41. *The Rust Fungi*, Eds. K.J. Scott, A.K. Chakravorty (\$50 Alibris): Asking \$20.
42. *Ultrastructure of Rust Fungi*, L.J. Littlefield, M.C. Heath (\$175 Alibris): Asking \$20.
43. *Monographia Uredinearum, Vol. III, Bibliotheca Mycologica, Band 33, III*, P. et H. Sydow; J. Cramer (reprint), 1971. Asking \$20.
44. *Coffee Rust in the Americas*, Ed. R.H. Fulton; Symposium Book No. 2, APS Press, 1984. Asking \$5.
45. *Genetic Basis of Biochemical Mechanisms of Plant Disease*, Eds. J.V. Groth, W.R. Bushnell Symposium Book No. 4, APS Press, 1985. Asking \$5.
46. *The Tree Rusts of Western Canada*, W.G. Ziller; Canadian Forestry Service Publ. No. 1329, 1974 (\$30 Alibris): Asking \$20.
47. *The Myxomycetes*, G.W. Martin, C.J. Alexopoulos (comes w/ *How to know the True Slime Molds* M.L. Farr) (\$170 Alibris): Asking \$40.
48. *Genera of Bioretaceae, Hypocreaceae & Nectriaceae, Studies in Mycology 42*. CBS Press, 1999, A.Y. Rossman, G.J. Samuels, C.T. Rogerson, R. Lowen. Asking \$20.
49. *Ascomycete Systematics, The Lutrellian Concept*, Ed. D.R. Reynolds. (Belonged to C.T. Rogerson) (\$85 Alibris): Asking \$30.
50. *Ascomycete Systematics: Problems and Perspectives in the Nineties*, Ed. D.L. Hawksworth; NATO ASI Series, Vol. 269, 1994 (\$200 Alibris): Asking \$40.
51. *The Fungal Holomorph*, Eds. D.R. Reynolds, J.W. Taylor (\$121 Amazon): Asking \$30.
52. *Evolutionary Biology of the Fungi*, Eds. A.D.M. Rayner, C.M. Brasier, D. Moore (\$60 Amazon): Asking \$20.
53. *Taxonomie et Nomenclature des Diatrypaceae Asques Octosporae*, Mycologia Helvetica, Vol. 2(3), 1987, F. Rappaz. Asking \$10.
54. *PCR Protocols, A Guide to Methods & Applications*, Eds. M.A. Innis, D.H. Gelfand, J.J. Sninsky, T.J. White (\$67 Amazon): Asking \$10.
55. *A Dictionary of the Flowering Plants & Ferns*, Student Edition, 8<sup>th</sup> Ed., J.C. Willis, Revised by H.K. Airy Shaw. Asking \$5.
56. *Growing Shrubs & Small Trees in Cold Climates*, N. Rose, D. Selinger, J. Whitman Contemporary Books, 2001 (\$23 Amazon): Asking \$5.
57. *The Biology of Parasitic Flowering Plants*, Job Kuijt, University of California Press, 1969 (\$65 Alibris): Asking \$10.
58. *Introduction to Plant Biochemistry, 2<sup>nd</sup> Ed.*, Goodwin & Mercer. Asking \$5.
59. *Flora of West Tropical Africa, Vols. 1-5, 2<sup>nd</sup> Eds.*, J. Hutchinson & J.M. Dalziel; Revised by R.W.J. Keay, Softcover 2<sup>nd</sup> Eds. (fully illustrated), Crown Agents for Overseas Governments & Administrations, London, 1954 (\$60 per volume Alibris): Asking \$50 (all 5 volumes)
60. *Families of Flowering Plants, Dicotyledons & Monocotyledons (2 Vols.)*, By J. Hutchinson, Illustrated by W.E. Trevithick & the author, Macmillan & Co., Ltd., London, 1926 (\$75 Alibris): Asking \$20.
61. *Manual of the Grasses of the United States (Vols. 1 & 2)*, A.S. Hitchcock; Revised: A. Chase (\$20 Amazon): Asking \$10.

# MYCOLOGY ON-LINE

Below is an alphabetical list of websites featured in *Inoculum*. Those wishing to add sites to this directory or to edit addresses should email [dnatvig@gmail.com](mailto:dnatvig@gmail.com). **Unless otherwise notified**, listings will be automatically deleted after one year (at the editors discretion).

A New Web Page About Tropical Fungi, Hongos Del Parque "El Haya" (58-5)  
[hongosdelhaya.blogspot.com/](http://hongosdelhaya.blogspot.com/)

ASCOFrance.com, a very useful site for illustrations of ascomycetes including anamorphs (accessible in both French and English)  
[ascofrance.com/?lang=us](http://ascofrance.com/?lang=us)

Ascomycota of Sweden  
[www.umu.se/myconet/asco/indexASCO.html](http://www.umu.se/myconet/asco/indexASCO.html)

Basidiomycete Research Group (University of Helsinki, Finland) studies systematics, ecology and evolution of fungi in forest environment.  
[www.basidio.fi](http://www.basidio.fi)

Bibliography of Systematic Mycology  
[www.speciesfungorum.org/BSM/bsm.htm](http://www.speciesfungorum.org/BSM/bsm.htm)

Cold Spring Harbor Laboratory; Meetings & Courses Programs (58-2)  
[meetings.cshl.edu](http://meetings.cshl.edu)

Collection of 800 Pictures of Macro- and Micro-fungi  
[www.mycolog.com](http://www.mycolog.com)

Cordyceps Website  
[www.mushtech.org](http://www.mushtech.org)

Cornell Mushroom Blog (58-1)  
<http://blog.mycology.cornell.edu/>

Cortbase (58-2)  
[andromeda.botany.gu.se/cortbase.html](http://andromeda.botany.gu.se/cortbase.html)

Corticoid Nomenclatural Database (56-2)  
[www.phyloinformatics.org/](http://www.phyloinformatics.org/)

The Cybertruffle internet server for mycology seeks to provide information about fungi from a global standpoint (59-3).  
[www.cybertruffle.org.uk](http://www.cybertruffle.org.uk)

Cyberliber, a digital library for mycology (59-3).  
[www.cybertruffle.org.uk/cyberliber](http://www.cybertruffle.org.uk/cyberliber)

Cybernome provides nomenclatural and taxonomic information about fungi and their associated organisms, with access to over 548,000 records of scientific names (59-3).  
[www.cybertruffle.org.uk/cybernome](http://www.cybertruffle.org.uk/cybernome)

Dictionary of The Fungi Classification  
[www.indexfungorum.org/names/fundic.asp](http://www.indexfungorum.org/names/fundic.asp)

Distribution Maps of Caribbean Fungi (56-2)  
[www.biodiversity.ac.psiweb.com/carimaps/index.htm](http://www.biodiversity.ac.psiweb.com/carimaps/index.htm)

Entomopathogenic Fungal Culture Collection (EFCC)  
[www.mushtech.org](http://www.mushtech.org)

Fungal Environmental Sampling and Informatics Network (58-2)  
[www.bio.utk.edu/fesin/](http://www.bio.utk.edu/fesin/)

Fungi of Ecuador  
[www.mycokey.com/Ecuador.html](http://www.mycokey.com/Ecuador.html)

German Mycological Society DGFm  
[www.dgfm-ev.de](http://www.dgfm-ev.de)

MYCO-LICH facilitates mycology and lichenology studies in Iran.  
[www.myco-lich.com](http://www.myco-lich.com)

*Mycologia*  
[mycologia.org](http://mycologia.org)

Humboldt Institute — Located on the eastern coast of Maine, the institute is known for the extensive series of advanced and professional-level natural history seminars it has offered in Maine since 1987, along with ecological restoration seminars and expeditions to the neotropics. It publishes the *Northeastern Naturalist* and *Southeastern Naturalist*, two scholarly, peer-reviewed, natural history science journals.  
[www.eaglehill.us](http://www.eaglehill.us)

Website relating to the taxonomy of the Hysteriaceae & Mytiliniaceae (Pleosporomycetidae, Dothideomycetes, Ascomycota) to facilitate species identification using a set of updated and revised keys based on those first published by Hans Zogg in 1962. 59(4)  
[www.eboehm.com/](http://www.eboehm.com/)

Index of Fungi  
[www.indexfungorum.org/names/names.asp](http://www.indexfungorum.org/names/names.asp)

Interactive Key to *Hypocreales* of Southeastern United States (57-2)  
[nt.ars-grin.gov/sbmlweb/fungi/keydata.cfm](http://nt.ars-grin.gov/sbmlweb/fungi/keydata.cfm)  
ISHAM: the International Society for Human and Animal Mycology  
[www.isham.org](http://www.isham.org)

JSTOR (58-3)  
[jstor.org](http://jstor.org)

Libri Fungorum Mycological Publications (58-3)  
[194.203.77.76/LibriFungorum/](http://194.203.77.76/LibriFungorum/)

Mold Testing and Identification Services (58-2)  
[www.pioneer.net/~microbe/abbeylab.html](http://www.pioneer.net/~microbe/abbeylab.html)

McCrone Research Institute is an internationally recognized not-for-profit institute specializing primarily in teaching applied microscopy. 59(4)  
[www.mcri.org](http://www.mcri.org)

Mountain Justice Summer (58-3)  
[www.MountainJusticeSummer.org](http://www.MountainJusticeSummer.org)

Mycology Education Mart where all relevant mycology courses can be posted. [www2.bio.ku.dk/mycology/courses/](http://www2.bio.ku.dk/mycology/courses/)

MycoKey  
[www.mycokey.com](http://www.mycokey.com)

The Myconet Classification of the Ascomycota  
[www.fieldmuseum.org/myconet](http://www.fieldmuseum.org/myconet)

New Electronic Journal about mushrooms from Southeast Mexico (61-4)  
<http://fungavera.blogspot.com>

Northeast Mycological Federation (NEMF) foray database (58-2)  
[www.nemfdata.org](http://www.nemfdata.org)

Pacific Northwest Fungi — A peer-reviewed online journal for information on fungal natural history in Alaska, British Columbia, Idaho, Montana, Oregon and Washington, including taxonomy, nomenclature, ecology, and biogeography.  
[www.pnwfungi.org/](http://www.pnwfungi.org/)

*Pleurotus* spp.  
[www.oystermushrooms.net](http://www.oystermushrooms.net)

Rare, Endangered or Under-recorded Fungi in Ukraine (56-2)  
[www.cybertruffle.org.uk/redlists/index.htm](http://www.cybertruffle.org.uk/redlists/index.htm)

Registry of Mushrooms in Art  
[members.cox.net/mushroomsinart/](http://members.cox.net/mushroomsinart/)

Robigalia provides information about field observations, published records and reference collection specimens of fungi and their associated organisms, with access to over 685,000 records (59-3).  
[www.cybertruffle.org.uk/robigalia](http://www.cybertruffle.org.uk/robigalia)

Searchable database of culture collection of wood decay fungi (56-6)  
[www.fpl.fs.fed.us/rwu4501/index.html](http://www.fpl.fs.fed.us/rwu4501/index.html)

Small Things Considered — A microbe blog on microbes in general, but carries occasional pieces specifically on fungi.  
[schaechter.asmblog.org/schaechter/](http://schaechter.asmblog.org/schaechter/)

Tree canopy biodiversity project University of Central Missouri (58-4)  
[faculty.cmsu.edu/myxo/](http://faculty.cmsu.edu/myxo/)

Trichomycete site includes monograph, interactive keys, a complete database, world literature, etc. (61-4)  
[www.nhm.ku.edu/~fungi](http://www.nhm.ku.edu/~fungi)

The TRTC Fungarium (58-1)  
[bbc.botany.utoronto.ca/ROM/TRTCFungarium/home.php](http://bbc.botany.utoronto.ca/ROM/TRTCFungarium/home.php)

U.S. National Fungus Collections (BPI)  
Complete Mushroom Specimen Database (57-1)  
[www.ars.usda.gov/ba/psi/sbml](http://www.ars.usda.gov/ba/psi/sbml)

Valhalla provides information about past mycologists, with names, dates of birth and death and, in some cases, biographies and/or portraits (59-3).  
[www.cybertruffle.org.uk/valhalla](http://www.cybertruffle.org.uk/valhalla)

Website for the mycological journal *Mycena* (56-2)  
[www.mycena.org/index.htm](http://www.mycena.org/index.htm)

Wild Mushrooms From Tokyo  
[www.ne.jp/asahi/mushroom/tokyo/](http://www.ne.jp/asahi/mushroom/tokyo/)

# CALENDAR OF EVENTS

## NOTE TO MEMBERS:

Those wishing to list upcoming mycological courses, workshops, conventions, symposia, and forays in the Calendar of Events should include complete postal/electronic addresses and submit to *Inoculum* editor Don Natvig at [dnavig@gmail.com](mailto:dnavig@gmail.com).

### August 1-6, 2011

MSA Meeting  
University of Alaska  
Fairbanks, AK, USA  
<http://mercury2.iab.uaf.edu/msa>

### September 6-10, 2011

2011 UMS Congress: XIII International  
Congress of Mycology  
Sapporo, Japan  
<http://www.congre.co.jp/iums2011sapporo/index.html>

### September 10-17, 2011

Seventh International Congress  
on the Systematics and Ecology  
of Myxomycetes (ICSEM7)  
Recife, Brazil  
[icsem7@gmail.com](mailto:icsem7@gmail.com)

### October 15-20, 2011

EMBO conference: Comparative Genomics  
of Eukaryotic Microorganisms  
Sant Feliux, Spain  
<http://events.embo.org/11-comparative-genomics/index.html>

### September 19-23, 2011

XVI Congress of European Mycologists  
Thessaloniki, Greece  
[www.xvicem.org](http://www.xvicem.org)

## Mycological Society of America – Gift Membership Form

Sponsoring a gift membership in MSA offers tangible support both for the recipient of the membership as well as for mycology in general. Providing both *Mycologia* and *Inoculum*, a gift membership is an excellent way to further the efforts of our mycological colleagues, especially those who cannot afford an MSA membership. In addition to a feeling of great satisfaction, you also will receive a convenient reminder for renewal of the gift membership the following year.

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\*If this membership is given after June 1, please add \$10 to cover postage for past issues.

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The Society is extremely grateful for the continuing support of its Sustaining Members. Please patronize them and, whenever possible, let their representatives know of our appreciation.

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You are encouraged to inform the Membership Committee (D. Jean Lodge, Chair, [djlodge@caribe.net](mailto:djlodge@caribe.net)) of firms or foundations that might be approached about Sustaining Membership in the MSA. Sustaining members have all the rights and privileges of individual members in the MSA and are listed as Sustaining Members in all issues of *Mycologia* and *Inoculum*.

## **REMINDER: MSA Directory Update**

Is your information up-to-date in the MSA directory? The Society is relying more and more on email to bring you the latest MSA news, awards announcements and other timely information, and our newsletter. To ensure that you receive Society blast emails and the *Inoculum* as soon as it comes out, and so that your colleagues can keep in touch, please check the accuracy of your email address and contact information in the online directory. This can be accessed via our web site at [www.msafungi.org](http://www.msafungi.org). If you need assistance with updating your membership information, or help with your membership log-in ID and password, please contact Kay Rose, Association Manager at Allen Press, at [kröse@allenpress.com](mailto:kröse@allenpress.com).

# inoculum

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# THE MYCOLOGICAL SOCIETY OF AMERICA

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