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# Mycena News

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The Mycological Society of San Francisco April, 2012, vol. 63:08

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Christian Schwarz:

## Mushrooms of Santa Cruz and the Redwood Coast

The Redwood Coast is home to a very distinctive assemblage of mushrooms, something of a biogeographic island, bounded by boreal forest to the north, the Pacific to the West, and hot, dry deserts to the South and East. The Redwood Coast has enjoyed a long history of amateur mycological investigators, but there is still much to learn. What we don't know may surprise you...

Christian Schwarz has been seriously interested in fungi since age sixteen. He got his start in San Diego, but in 2006 he emigrated to Santa Cruz: the land of milk (caps) and honey (mushrooms). He studied mycorrhizal ecology at UCSC, and is currently on an indefinite road trip collecting, photographing, and teaching about mushrooms. Mushrooms satisfy his curiosity with their seemingly endless forms; from the grotesque to the bizarre to the sublime. This has led him to search for mushrooms throughout the United States, as well as in Costa Rica, Mexico, and Europe.

## Mycodigest: A Look at Fungal Laccases

By Jennifer Kerekes



*Pycnoporus cinnabarinus*, a white-rot fungus, is used as a model organism for understanding the role of laccases in lignin degradation.

Photograph courtesy of Wikipedia.

It is well known that fungi decompose plant matter. But, how do they do this? Fungi are able to decompose plant matter, such as lignin and cellulose, by releasing extracellular enzymes that degrade these polymers. Some fungi, such as most white-rot basidiomycete fungi, are capable of producing several types of extracellular enzymes, including lignin peroxidases, manganese peroxidases, and laccases. These enzymes allow the fungus to break down and utilize organic substrates as an energy and nutrient source (Osono, 2007). Lignin is a recalcitrant compound that provides strength and support to plant cells, bonds cellulose fibers, and makes the limited nitrogen in wood less available. In addition to lignin degradation, laccases also play an important role in soil organic matter cycling.

Laccases have been found in almost all wood decay fungi; however, *Phanerochaete chrysosporium*, a well studied white-rot basidiomycete, does not produce laccases, and likely breaks down lignin using a variety of peroxidases (Martinez et al. 2004; Larrondo et al. 2003; Hoegger et al. 2006). Litter-decomposers are also capable of producing extracellular enzymes, such as laccases and manganese peroxidases. However, litter-decomposers vary in their ability to decompose lignin in leaf litter. Basidiomycete genera such as *Clitocybe*, *Collybia*, *Marasmius*,  
Continued on page 4

## PRESIDENT'S POST

April showers at last! Its been a dry winter and finally this month the rains picked up giving us better hope for our spring forays looking for morels and spring kings. Yellowfeet, blacks, and hedgehogs continue to be reported by members picking to the north. See the Web site this month for details on our annual Yosemite foray and also for details about other forays including a car-camping outing in search of morels that will take place in the weeks leading up to the Yosemite trip.

This month started with a great culinary group dinner captained by Al Carvajal featuring Spanish seafood stew. The general meeting in March featured Daniel Winkler giving us a nice presentation on mushrooms from Europe to Asia with a side trip to the Amazon region and was full of information about the unusual Cordyceps genera of fungi that infect caterpillars and other insects as their hosts. Thanks to Daniel for his great presentation.

My column is never complete without reminding all of you about the importance of volunteering to support our entirely volunteer-run society. We have had several new people joining our board in recent months including Brother Mark Folger who was confirmed as a councilor in February replacing Thomas Jenkinson. Brother Mark is trying his hand as our newsletter editor so the Mycena News will soon reflect his labors. I'm also thrilled to welcome Jessica Ahmadi who was confirmed in March as our new librarian. Look for Jessica at general meetings to help you with finding books in the library and checking out or returning books from our collection. We are now looking for new volunteers to fill the roles of Education co-chair and also Program Chair to replace Wendy So who is stepping down after having done an amazing job of organizing speakers for our meetings over the last two years.

Reminder: MSSF scientific advisor Dennis Desjardin will lead his annual spring class at the Sierra Nevada Field campus in early June. More information can be found at this url [http://www.sfsu.edu/~sierra/Course\\_Fungi.html](http://www.sfsu.edu/~sierra/Course_Fungi.html). Also please remember that we are still in the process of collecting old MSSF or other mushroom-related T-shirts to be sewn into one of two quilts in the fall as a fundraiser.

I look forward to seeing many in April for the culinary dinner I will captain featuring roasted spring lamb and for our general meeting on April 17 featuring Christian Schwartz who will be giving a presentation on the fungi of Santa Cruz county. Until then I thank you for your ongoing support and your participation in all of our events.

-Lou  
[president@mssf.org](mailto:president@mssf.org)

## CULINARY CORNER

The March Culinary Dinner was an outstanding feast from Spain. Dinner Captain Alvaro Carvajal outdid himself with the Zarzuela de Mariscos, George Collier made exquisite saffron rice. The Hellums produced a wonderful gazpacho. Sheila Harman made a scrumptious salad and Mary Ann Swazo made a delightful citrusy bread pudding topped by my version of Alvaro's Candy Cap Rum Carmel Sauce. Two of the dinner's recipes appear below. Alvaro's Zarzuela recipe and David Campbell's extraordinary Forbidden Black Spanish Mushroom Balls can be obtained by contacting me via email at [lisa.bacon@comcast.net](mailto:lisa.bacon@comcast.net).

Sheila Harman's Spanish Salad Dressing

"My personal musings of how to make the dressing for the event were solidified when I did the 911 call to my Aunt Sue, who is not only a French teacher but just so happens to teach Spanish too. 'I need a Spanish style French dressing. Know any good ones?' I inquired. She proceeded to tell me that French dressing wasn't French (no DUH), but we eventually got to the bare bones of things. We knew Thousand Island dressing, which you could make, but people didn't bother since there was Wishbone. And we knew that the 'wedge' deemed 'wiltless' was standard fare in restaurants from our past in New York."

Combine: ¼ cup fresh lemon juice, ¼ cup red wine vinegar  
Sauté in 1 ½ cups olive oil: 1 large onion chopped fine, 5 cloves of garlic. Mix into liquid.

Add 1 jar ( 3.75 oz) of capers, ¾ cup of mayo, 1 jar ( 8 oz) of tomato sauce. Add salt to taste. Chop a dozen hard boiled eggs and add fresh marjoram. Drizzle over iceberg wedges and sprinkle with egg

Candy Cap Rum Sauce

Go to your friend Alvaro's house to use kitchen and ingredients. Equal parts: butter, cream, brown sugar. Melt butter, add brown sugar and heat to dissolve. Add cream bit by bit as it will boil up. Take two handfuls of dried candy caps ground into a powder (coffee mill is ideal). Recipe apparently calls for several tsps. of the powder fortified with maple syrup to taste. Error by adding ALL of the powder (about 4 Tbls.). Candy Caps are fairly dear so I recommend sticking to the recipe. However, the look on Alvaro's face was PRICELESS and we had a good laugh...later. His stash will be replaced by this correspondent at a later date. Reduce mixture by 1/2 and add rum to taste.

The Captain for the April 2nd Dinner will be MSSF President, Lou Prestia. Ya'll (sorry, writing from New Orleans) should know the drill by now for registering - if not please go [mssf.org/calendar](http://mssf.org/calendar). Please bring appetizers. Thank you all for the outstanding March contributions.

Lou's tantalizing Spring menu:

Wild mushroom grilled pizetta with shaved gruyere and italian parsley lemon gremolata  
Porcini Crusted herb stuffed boneless leg of lamb with roasted Fingerling potatoes and brussel sprouts  
Salad of baby spinach, ruby grapefruit, mint  
Spring berry crisp, cobbler or buckle (volunteers needed please)

To volunteer please contact: [Lou.Prestia@efi.com](mailto:Lou.Prestia@efi.com). The May dinner will be the last for this season.

Your roving foodie,  
-Lisa Bacon

## WANTED! VINTAGE MSSF T-SHIRTS

Attention all MSSF members! Wanted! Your old MSSF t-shirts and other mushroom related t-shirts. If you attended the most recent MSSF fungus fair at the Lawrence Hall of Science you may have noticed the mushroom t-shirt quilt displayed behind Curt Haney's, "Just Mushroom Stuff" vendor booth. The plan is to collect as many old MSSF t-shirts as possible and have a mushroom t-shirt quilt made to raffle off at next year's fungus fair as a fund raiser. If we receive enough donations, we will have two quilts made, one for the raffle, and one to display in the future at MSSF fungus fairs as a work of art. Please look through your dressers and closets for old MSSF t-shirts, or any other t-shirt with mushrooms on them to donate to the cause. T-shirts in any condition will be accepted; stains and holes are ok and will not affect the quality of the quilts. Get your t-shirts to Curt Haney at a general meeting, mail them to him, or drop them off at the address below. If you have a large number to donate, arrangements can be made to pick them up from you. All donated t-shirts are needed not later than 1 May 2012 in order to have time to make the quilts and start selling raffle tickets at the first general meeting in September 2012. Thank you all for your generosity!

Curt Haney, 150 Sadowa St. San Francisco, CA 94112 (415)333-8820

## MSSF ANNUAL HOLIDAY DINNER 2012

Plans have not yet been made for next year's holiday dinner, but the council has suggested that we alternate the location between North, South, East, and West of San Francisco each year. The East and West were utilized over the past two years, anyone in the North or South ready to step forward to organize next year's holiday dinner? If not, an organizer from the East or West is welcome to step forward as well. Anyone who is interested in organizing the holiday dinner and a location for it next year, please contact Lou Prestia, [President@mssf.org](mailto:President@mssf.org), or any of the society's council members. Thank you all and I look forward to seeing everyone at the 2012 holiday dinner.

~ Curt Haney

## Contribute to the Mycological Society of San Francisco

Since 1950 the Mycological Society of San Francisco has been an innovative, cultural, and educational icon in San Francisco, the greater bay area, and beyond. Would you like to see this great educational organization thrive for many years to come? You may have assets to donate that can help ensure the long term future of this great organization. Remember, MSSF is a 501(C) (3) non-profit organization, so all contributions in support of this great organization are tax deductible as allowed by law. Please remember the Society in your living will or trust.

Send contributions or inquiries to:

Henry Shaw: MSSF Treasurer c/o MSSF  
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April 2012, vol. 63:08

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*Mycena News* is the members' newsletter of the Mycological Society of San Francisco, published monthly from September to June.

Please e-mail photos, comments, corrections, and correspondence to [mycenanews@mssf.org](mailto:mycenanews@mssf.org).

To subscribe, renew, or make address changes, please contact Alvaro Carvajal: [alvaro.carvajal@sbcglobal.net](mailto:alvaro.carvajal@sbcglobal.net) or (415) 695-0466.

Past issues of *Mycena News* can be read online at [www.mssf.org](http://www.mssf.org).

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and *Mycena* have been studied for their bleaching activity and enzyme production (Osono, 2007). Bleaching of leaf surfaces and humus is correlated with ligninolytic activity of fungi in that lignin content has been found to be lower in both bleached leaf surfaces and humus as compared to non-bleached surfaces.

Recently, there has been an interest in linking the relationship between fungal diversity and functional diversity. Researchers are interested in using molecular markers, such as laccase-encoding genes, as a proxy for functional diversity. Therefore, looking at laccase-encoding gene diversity would provide information regarding potential for litter degradation and soil organic matter cycling. Previous studies using molecular approaches have looked at the diversity and distribution of laccase genes from basidiomycetes. Luis et al. (2004) first described the Cu1F/Cu2R basidiomycete specific laccase primer pair and identified a number of laccase genes from mycelial cultures and fruit-bodies. They also demonstrated that saprotrophic fungi have a greater diversity of laccase genes as compared to mycorrhizal fungi. In a follow-up study, they found that soil fungi with laccase genes occupied different niches and showed a vertical distribution in the soil profile with the greatest number of laccase genes found in the upper horizons (Luis et al., 2005). Understanding soil enzyme functional diversity could significantly increase our understanding of the linkages between resource availability, microbial community structure and function, and ecosystem processes (Caldwell, 2005).

Laccases are a multigene family, and some fungi, such as *Coprinopsis cinerea*, have as many as 17 different laccase genes (Kilaru, Hoegger, & Kües, 2006). It should also be noted that fungal laccases also appear to be involved in a variety of physiological functions, including fruit-body development, detoxification of phenolic compounds, pigment production, and antimicrobial activity (Levin, Forchiassin, & Ramos, 2002; Thurston, 1994). In addition, fungal laccases also appear to have roles in stress defense and fungal plant-pathogen/host interaction (Thurston, 1994).

Some ascomycetes, primarily xylariaceous fungi (Pointing et al., 2003), are capable of degrading lignin, though they are less capable than white-rot fungi. This was recently explored further in a study by Shary and colleagues (2007). There is also evidence that laccases, or laccase-like genes, are also present in bacteria. Less is known about the presence, diversity and function of these laccase-like genes in bacteria, compared with fungi (Kellner et al., 2008). However, fungal basidiomycete laccases are the primary ligninolytic enzymes in the environment and play a critical role in plant matter decomposition.

#### Literature Cited:

Caldwell, B. (2005). Enzyme activities as a component of soil biodiversity: A

review. *Pedobiologia*, 49(6), 637-644. doi:10.1016/j.pedobi.2005.06.003

Edwards, I. P., Zak, D. R., Kellner, Harald, Eisenlord, S. D., & Pregitzer, K. S. (2011). Simulated atmospheric N deposition alters fungal community composition and suppresses ligninolytic gene expression in a northern hardwood forest. *PloS one*, 6(6), e20421. doi:10.1371/journal.pone.0020421

Eggert, C., Temp, U., & Eriksson, K.-E. L. (1997). Laccase is essential for lignin degradation by the white-rot fungus *Pycnoporus cinnabarinus*. *FEBS Letters*, 407(1), 89-92. Federation of European Biochemical Societies. doi:10.1016/S0014-5793(97)00301-3

Hoegger, P. J., Kilaru, S., James, T. Y., Thacker, J. R., & Kües, U. (2006). Phylogenetic comparison and classification of laccase and related multicopper oxidase protein sequences. *The FEBS journal*, 273(10), 2308-26. doi:10.1111/j.1742-4658.2006.05247.x

Kellner, Harald, Luis, Patricia, & Zimdars, B. (2008). Diversity of bacterial laccase-like multicopper oxidase genes in forest and grassland Cambisol soil samples. *Soil Biology*, 40, 638-648. doi:10.1016/j.soilbio.2007.09.013

Kilaru, S., Hoegger, P. J., & Kües, U. (2006). The laccase multi-gene family in *Coprinopsis cinerea* has seventeen different members that divide into two distinct subfamilies. *Current genetics*, 50(1), 45-60. doi:10.1007/s00294-006-0074-1

Larrondo, L., Salas, L., & Melo, F. (2003). A novel extracellular multicopper oxidase from *Phanerochaete chrysosporium* with ferroxidase activity. *Applied and environmental microbiology*, 69(10), 6257-6263. doi:10.1128/AEM.69.10.6257

Levin, L., Forchiassin, F., & Ramos, a M. (2002). Copper induction of lignin-modifying enzymes in the white-rot fungus *Trametes trogii*. *Mycologia*, 94(3), 377-83. Retrieved from <http://www.ncbi.nlm.nih.gov/pubmed/21156508>

Luis, P, Walther, G., Kellner, H, Martin, F, & Buscot, F. (2004). Diversity of laccase genes from basidiomycetes in a forest soil. *Soil Biology and Biochemistry*, 36(7), 1025-1036. doi:10.1016/j.soilbio.2004.02.017

Luis, Patricia, Kellner, Harald, Zimdars, B., Langer, U., & Martin, Francis. (2005). Patchiness and Spatial Distribution of Laccase Genes of and Unknown Basidiomycetes in the Upper Horizons of a Mixed Forest Cambisol. *Microbial ecology*, 50(4), 570-579. doi:10.1007/S00248-005-5047-2

Martinez, D., Larrondo, L. F., Putnam, N., Gelpke, M. D. S., Huang, K., Chapman, J., Helfenbein, K. G., et al. (2004). Genome sequence of the lignocellulose degrading fungus *Phanerochaete chrysosporium* strain RP78. *Nature biotechnology*, 22(6), 695-700. doi:10.1038/nbt967

Osono, T. (2007)



Jennifer Kerekes is studying the ecology and diversity of saprotrophic fungal communities with Dr. Tom Bruns at the University of California, Berkeley.

## To Serve or Not to Serve

By: Bob Sommers



Those of us who collect wild mushrooms for the table face difficult decisions when it comes to preparing dishes for guests. As hosts we are cognizant of the consequences of faulty identification and assess risks accordingly. It seems morally acceptable for us to operate under a “forager beware” ethic when it comes to eating what we find in the forest and carry home. But can the same be said for our dinner guests? Is it morally correct to subject non-mycophiles to risks that we are willing to assume for ourselves? It’s true they see us healthy and smiling, obviously having survived previous mushroom dinners. This provides some reassurance that they will survive too and probably enjoy this dinner apart from lingering suspicions that everyone makes mistakes some time, and of course they can sue if something goes terribly wrong. This is a litigious society and suing friends (What are friends for?) is part of modern life. The latter realization feeds our “host be cautious” ethic.

Should we check with a lawyer before issuing dinner invitations when wild mushrooms are to be served?

That would be expensive and probably unproductive, as the risks vary according to mushroom variety, quantity consumed, guest physiology, and psychological proclivities. Serving a small mushroom garnish to an overweight guest, particularly one who is both rotund and jolly, is unlikely to result in serious harm but preparing a main course containing wild mushrooms to be consumed by a thin nervous person is much riskier. Very few lawyers are familiar with the intricacies of mycophagy, and those who are, might suggest that guests be required to sign a release of the sort mushroom societies demand of foray participants. Whether signing a release would reduce the guest’s enjoyment of the meal should be considered.

Another possibility parallels the situation of meals prepared for guests with strong dietary preferences (very common in California). We poll prospective dinner guests on food inclinations in advance. Some may be plain vegetarians while others are ovo-lacto vegetarians. A few will eat white-fleshed but not red-fleshed meat, and if you invite Michael Pollan to dinner, he may insist on foods you have killed with your bare hands. One can avoid any taboo items altogether or prepare duplicate dishes with and without whatever the visitor avoids. This requires additional labor in the kitchen plus clear and understandable labeling in the guest’s preferred language.

Further complicating menu choice is the possibility of hysterical responses to safe dishes. A large amount of one’s response to foods is psychological, which is why food companies spend money on research into packaging, food names, and advertising campaigns. Some folks are apprehensive about the idea of eating any wild foods including berries, miner’s lettuce, or fiddleheads growing along the trail. When they see us picking mushrooms in the woods, they warn us to be careful, not certain if we are suicidal or homicidal. These are the same people who send us clippings whenever there has been a mushroom poisoning anywhere in the world. If you have dinner guests like this, the prudent course is to keep all foraged foods off the menu, Michael Pollan notwithstanding.



This raises the question of a suitable menu when the psychological proclivities of dinner guests, perhaps new neighbors or coworkers, are unknown. Fortunately there are personality tests for risk-taking, such as the Zuckerman-Kuhlman Personality Questionnaire or ZKPQ which measures a person’s desire for novel and exciting experience. Instead of requiring prospective guests to sign a release in advance of the meal, you can ask them to complete the short-form of the ZKPQ and screen out all low risk-takers. If you are a low risk-taking host, you can demand both the signed release and completion of the ZKPQ. Measuring testosterone levels, which have been found to correlate with risk-taking, of prospective guests would be onerous, but maybe no more so than consulting a lawyer.

If these caveats leave you confused, check with the Human Subjects Committee of the your mushroom club.

About the Author:

Bob Sommers is a retired professor from UC Davis. He writes the “Easy Edibles” column for *Mushroom the Journal* and is the co-author with Mike Davis and John Menge, of the forthcoming *Field Guide to Mushrooms of Western North America* to be published by the University of California Press. His mushroom watercolors also appear on the MSSF website.

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## MSSF Calendar April 2012

- April 2<sup>nd</sup>: April Culinary Dinner
- April 10<sup>th</sup>: MSSF Council Meeting
- April 17<sup>th</sup>: General Meeting
- May 7<sup>th</sup>: May Culinary Dinner
- May 8<sup>th</sup>: MSSF Council Meeting
- May 15<sup>th</sup>: General Meeting

## Volunteers Needed

Join the Council leadership, learn the inner workings of the MSSF, and help make decisions that shape our future.

**Archivist:** Scan the archives into a database for MSSF member research.

**Education Chair Position:** Help co-chair this important council position.

**Programs Chair Position:** Schedule monthly meeting speakers and coordinate with other local mycology groups.

To learn more e-mail  
[president@mssf.org](mailto:president@mssf.org)

Check the MSSF online calendar at:  
<http://www.mssf.org/calendar/index.php>  
for full details, latest updates and schedule changes.

The submission deadline for the May, 2012 issue of Mycena News is April 19th.  
Please send your articles, calendar items, and other information to: [mycenanews@mssf.org](mailto:mycenanews@mssf.org)