



February 18
General Meeting Speaker



J.R. Blair

*“Getting to the Bottom of It All:
Life Cycles and Ecology of Fungi”*

J.R. Blair will be exploring how familiar fungi grow, from spore to mushroom, as well as the importance of fungi in the environment - what and how they eat and what eats them.

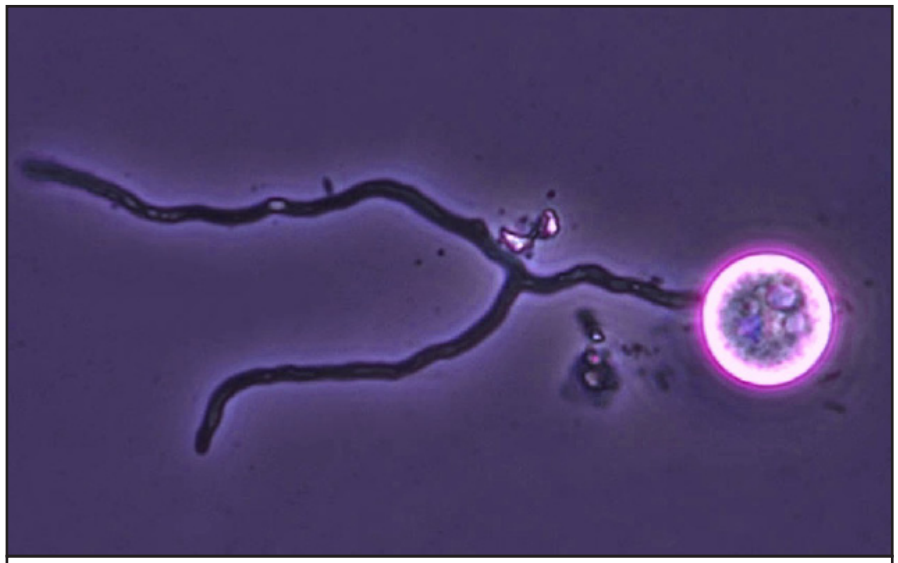
He received his Master’s degree at San Francisco State University in 1999 studying with the accomplished mycologist, Dr. Dennis Desjardin. His thesis was “Fungi Associated with *Arctostaphylos* in Northern California”. Since that time he has been an active member of the Mycological Society of San Francisco. He served a two-year term as President and was its Fungus Fair chairperson for five years. He has been teaching mushroom identification workshops for MSSF for about five years. Currently he is a lecturer of biology at SFSU and is the director of the University’s Sierra Nevada Field Campus.

MycoDigest:

The Evolution and Devolution of Hyphae

Peter G. Werner

We are often told that fungi are organisms that are made up of an oddball filamentous cell type known as hyphae. Hyphae are the basis of most fungal life—strands that grow through the soil or other substrate, releasing digestive and binding enzymes, and re-absorbing the resulting nutrients along with water. A mass of hyphae will grow visibly as either undifferentiated mycelium or as a fruiting body with various degrees of tissue differentiation. This indeed describes most fungi, but if one pauses to think of other examples, one might remember that the fungi also include a variety of single-celled yeasts, notably the all-important fermenter *Sacchromyces cerevisiae*, as well as many other yeast species. And if you’ve studied biology, you might also remember a group of “primitive” fungi known as chytrids, a protozoa-like group existing mainly in the form of motile flagellate zoospores, much analogous to the single-celled flagellate ancestors of animals or single-celled green algal plant ancestors – all simple marine life forms which gave rise to an array of more complex multicellular organisms that colonized the land.



Chytrid (unidentified species) sporangium with long rhizoids; phase contrast micrograph.
Image courtesy of David Patterson/Census of Marine Life E&O, licensed under CC BY-NC-SA 2.0.

But how did this variation in fungal growth form come to be? The revolution in molecular biology is telling us much about the fungal kingdom, both in terms of molecular phylogenetics revealing the details of the “fungal tree of life”, and

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PRESIDENT'S POST

Greetings MSSF Members!

Last month I reminded everyone that dues were due by December 31st, depending on your membership plan. Our long time membership chair, Nathan Heilman, has recently stepped down from his position due to personal reasons. Thank you, Nathan, for your many years of service. Renewal notices have been sent out by our newly appointed membership chair, Stephanie Wright, who has agreed to fill the position on a temporary basis and correct many of the errors that exist in our membership database. I am actively seeking someone to fill the membership position to train under Stephanie during this upcoming summer and take over in September 2014. Stephanie plans to have the membership database updated by that time, so it will be much easier for someone to maintain from then on. Please contact me at President@MSSF.org if you are interested in filling this important council position. If you have any questions about membership, please contact Stephanie Wright at Membership@MSSF.org

It's official; 2013 has been declared the driest year on record in the state of California since they have been keeping records. No moisture means little to no fungal fruiting activity for those of us who love mushrooms! It's been a pretty bleak winter foraging season so far, and there is no real rain in sight. February could be a much wetter month, if weather patterns from similar past drought seasons repeat themselves. We can only hope.

Maybe we will have a fabulous morel season this year, but we will need sufficient spring rains to ensure a successful season. There are two main burn zones in the Sierras from 2013 forest fires: the Rim and the American. The American burn zone in the Tahoe National Forest is expected to be open for mushroom gathering with a permit. The Rim fire burn zone has been closed by the Stanislaus National Forest until September 2014. However, the MSSF has requested a special use permit for several weekend forays organized especially for MSSF members. I will keep you updated on our progress to obtain permission to lead organized forays into this huge burn zone.

Taylor Lockwood was our guest speaker in January. His new presentation, "The Greatest Show on Earth: Sticks, Leaves and Logs," was a hit with everyone who attended.

Our guest speaker in February will be our own J.R. Blair, who has not given a presentation to the general membership in some time. J.R. always gives a great presentation, and I am looking forward to it

I hope to see many of you in the forest soon, or at a future MSSF event!

--Curt Haney, President@MSSF.org

CULINARY CORNER

CULINARY CORNER "IN A CORNER" THIS SEASON WITH SO FEW FUNGI

Normally, this column is about what good edibles are being found and how to cook them in creative and satisfying ways. However, as we all know, this mushroom season is a bust due to what some call the "solar vortex": too much sun and not enough moisture to bring out the fungi for our kitchen creations. Fortunately, there are various other uses for fungi that delight the palate.

I remembered a beer made with chanterelles someone brought to an MSSF Mendocino Woodlands foray years ago. I was curious to know if fungi are being used in making spirits and beer for the public, so I went on the Internet.

Troegs Brewery, located in Hershey, Pennsylvania, makes a small batch ale with mushrooms grown in Pennsylvania. The project was a collaborative effort between the brewery, the American Mushroom Institute, the Pennsylvania Department of Agriculture and Pennsylvania mushroom farmers. They chose a blend of champignon, maitake, shiitake and portabella. They dried the fungi, ground them into a powder which they added during the brewing process. The distribution of Troegs Scratch Series Mushroom Ale is limited to eastern states. Beer brewers out here in California, rise to the occasion!

As far as fungi used in the creation of spirits, Amy Stewart, the witty and knowledgeable author of "The Drunken Botanist", writes that *Laricifomes officinalis*, the larch agaric, is a Fomitopsidaceae and potentially toxic. It is one of the only fungi known to flavor spirits. It's used as a bitter flavoring in alcoholic beverages in limited quantities and it's a known ingredient in Fernet-style amaros.

The January Culinary Group dinner was a paean to Italian cuisine. It heralded back to a 2007 dinner inspired and directed by Liana Orsolini-Hain. Great dinners deserve repeating. Our cooks, captained by Lou Prestia and directed by Liana's recipes, outdid themselves with this fine "peasant" fare. They made a ragu with polenta and cheese, a refreshing salad to compliment it and candy cap biscotti for a simple, perfect dessert. As usual, the feast began with an amazing array of appetizers brought by diners themselves.

Cooking with friends can be such a pleasure, as is the food created. Lou worked with Norm Andresen, Toni Kiely and Kristin Jensen to make the ragu and polenta for our 60 or so diners. Sandy Waks made a salad with mixed greens, pistachios and a very flavorful dressing which held up well to the richness of the ragu, polenta and cheese. Superb biscotti were made and delivered by Vicki Frankel who came through for us despite being ill. Dipping the biscotti in coffee or vin santo or another sweet wine was a great way to

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Mycodigest continued

genomic and gene expression studies revealing how fungal structures and functions are genetically encoded and how they have evolved.

The overall fungal tree of life shows a general evolutionary pattern that might tell us about the disappearance of flagellate zoospores and the appearance of hyphae. Most phylogenies show the Chytridiomycota or “true” chytrids as the first branch away from all other fungi at the base of the fungal tree, with the next divergence being between another chytrid group, the *Blastocladiomycota* and the remaining, largely terrestrial fungi, the *zygo-*, *asco-*, and *basidiomycetes* with which we are more familiar.

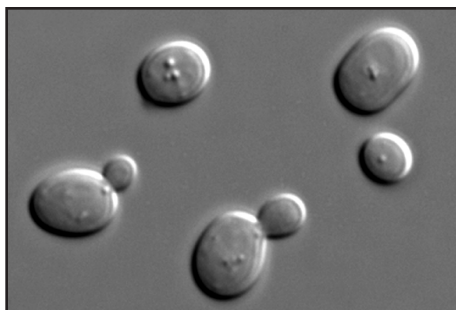
Most *Chytridiomycota* lack true hyphae. Such chytrids reproduce either by direct cellular fusion and production of progeny zoospores, or by morphing from zoospore to reproductive sporangium, then reproducing by means of fusion of simple rhizoids that branch off of the sporangium. These rhizoids are not true hyphae in that they do not contain regular nuclei or organelles that would allow more complete cellular function, but rather simply allow the passage and exchange of reproductive nuclei – in some ways analogous to the role of a pollen tube in a flowering plant. Rhizoids, however, may very well be the evolutionary predecessors of regular nucleate hyphae.

At the other extreme are the majority of fungal species, which are mainly hyphal through their life cycle and have lost zoospores entirely. The *Blastocladales*, of which the soil fungus *Allomyces* is perhaps the best known example, seem to be an intermediate step between the two. These fungi are “hyphal chytrids”, alternating between a hyphal phase produced from germinating zoospores, or zygotes from fused zoospores, and the production of new zoospores from sporangia at the terminal ends of their hyphal branches.

This would seem to point to a stepwise pattern of the emergence of vegetative hyphae and the loss of motile zoospores. Ah, but if things were so simple! First, there are also hyphal chytrids within the “true chytrid” clade as well, which would indicate that hyphae may have arisen from rhizoids more than once. A further complication is that, based upon repeated and robust molecular phylogenetic findings, it seems that there is an entirely non-hyphal chytrid, a plant root parasite called *Olpidium*, whose closest relatives, both ancestrally and in sister groups, are entirely-hyphal species of fungi that more or less fall into in the zygomycete group. (I hesitate to say “line” or “clade”, because it’s unclear at this point whether the zygomycetes form a real group with a single direct common ancestor.)

To make things even more complicated, one recent molecular phylogeny seems to show a group of hyphal chytrids known as the Monoblepharaceae as the earliest branch at the base of the fungal tree of life, an earlier branching than even Chytridiomycota. (I should note that this placement of the Monoblepharaceae is at odds with all other phylogenies of the fungal kingdom found so far – most place this group within the Chytridiomycota.)

Does this indicate that the ancestral state of the fungi was perhaps the “hyphal chytrid” form, with some branches retaining the zoosporic state and losing hyphae, while the great majority of fungal species did the opposite? Perhaps, but as we often say in science, “More data is needed.”



Budding yeast cells, *Saccharomyces cerevisiae*; differential interference contrast micrograph, 100X objective.

Image courtesy of Masur/Wikimedia Commons, made available under the Public Domain.

However hyphae originated among the chytrids, we know that 99%+ of fungal species are non-zoosporic and that the emergence of a totally hyphal form was critical to the “advance of the fungi” onto land and into the many niches that fungi occupy.

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Mycena News



February 2014, vol. 65:06

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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

To subscribe, renew, or make address changes, please contact Stephanie Wright: Membership@MSSF.org

Past issues of *Mycena News* can be read online at www.mssf.org

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MycoDigest continued

(As was the later emergence of hyphal septa, which allowed a more differentiated and often complex morphology.) But where does that leave single-celled yeasts? Yeasts are in fact widespread in the fungal kingdom – two primary branches of the Ascomycota, the Taphrinomycotina and the better-known Saccharomycotina, consist mostly of yeasts. There are other small groups of yeasts found in many other places in the fungal kingdom, including many fungi with yeast and hyphal stages at different stages of their life cycle.

Phylogeny points to a clear pattern – within the fungal tree of life, yeasts inevitably show a multicellular hyphal ancestor. In fact, sometimes they are very close relatives – *Ashbya gossypii* is in the same family as the yeast *S. cerevisiae* and the two share 95% identity between their genomes, yet the former species is entirely hyphal in growth form, without a known yeast stage. Single-celled yeasts are a derived form, a good example of evolution from a complex to a seemingly simpler form.

Research on the growth of hyphae has led to a better understanding of the development of yeasts. Septate hyphae grow by continually elongating at the growing tip, then branching off or laying down septa (cross-walls) downstream. Some alterations of this process will produce yeasts. Initial budding of a yeast cell resembles hyphal branching (albeit, without the emergence of the characteristic “Spitzenkorper” characteristic of the hyphal growth tip). This “branch” polarizes and extends, but its further polarization and tip growth is terminated soon after it lays down a septa dividing itself from the parent cell. Finally, the newly formed yeast cell splits off from the parent. Likewise, yeast sexual conjugation is similar in many ways to hyphal merging. Under the right conditions, yeasts like *S. cerevisiae* will even produce short hyphal segments sometimes called “pseudohyphae”.

There is much that remains to be understood about the development of fungal morphology, notably how fleshy, differentiated fruiting bodies (aka, mushrooms) emerged from a basic vegetative mycelial state. Indeed, only a few whole genomes of mushroom-producing species (*Coprinopsis cinerea* and *Laccaria laccata*) are even fully sequenced. Fungal “evo-devo” (evolutionary developmental biology) is still in its infancy, but will yield many fascinating insights in the years to come.

For references and further addenda on this topic, please check my blog page at: <http://bit.do/hyphae>

**About the Author:**

Peter G. Werner has been a long-time member of MSSF and has studied mycology at the University of Washington and SFSU, and later completed a professional certification program in microscopy at Merritt College. He is currently a light, electron, and atomic-force microscope technician and science educator at Merritt and Ohlone Colleges, and has been president of the San Francisco Microscopical Society since 2010.

MSSF Scholarship Extended

The Mycological Society of San Francisco offers scholarships to full time graduate students majoring in mycology who are attending colleges and universities in northern California.

These scholarships vary in amount from \$500 to \$1,500 and are given in the name of Esther Colton Whited and Dr. Harry Thiers.

All research proposals are welcomed, but special consideration will be given to taxonomic studies of the higher fungi of the Pacific States.

Requirements include two letters of recommendation, one from a professional mycologist, a brief statement describing the research project, and agreement to present the results at a general meeting of the MSSF.

Send inquiries/materials to J.R. Blair at 895 Sierra St., Moss Beach, CA 94039; email: jrblair@mssf.org.

The new deadline for applications is February 28

Culinary Corner continued

end a fine dinner.

The many requests for the recipes for this dinner prompted me to include them in this column. Our chefs were cooking for 60; the recipes below are for fewer people, of course. Have fun in the kitchen with them.

MUSHROOM CHICKEN RAGU

(adapted from Liana's timeless recipe)

1 whole chicken cut into 10 pieces
 1 sweet yellow onion, 2 carrots, 1 stalk of celery—all diced
 1 bunch of flat leaf Italian parsley, chopped fine
 1 28 oz. can of whole San Marzano tomatoes
 5 garlic cloves, minced
 1 bottle of dry white wine
 1-2 tablespoons tomato paste
 1 lb. mixed mushrooms—Our cooks used 1/4 lb. each of hedgehogs, black trumpets, agaricus and porcini. Any mushrooms can be used but be sure to include the agaricus.)
 6 oz. kalamata olives (or use salt cured black olives)
 Extra virgin olive oil as needed—canola oil as needed
 6 ounces of Strachino or Teleme cheese

Heat a few tablespoons of olive oil and canola oil in a heavy bottomed pan. Brown the chicken well on all sides and set aside. Add the onion, carrots and celery to the pan right after removing the chicken. Add ½ of the parsley after about one minute.

Sweat the vegetables for 3 more minutes over high heat, stirring frequently to avoid sticking. If they do stick, add a dash of wine to release. Season with salt and pepper to taste.

Add ¾ of the garlic and cook for one minute, stirring constantly.

Deglaze the pan with 2 cups of white wine scraping the bottom of the pan to release the browned bits. Cook until the wine is nearly gone.

Pour into a heavy bottom stock pot, add the tomatoes and juice from the can and buzz with an immersion blender or just break up the tomatoes by hand. Leave some nice chunks.

In a small bowl combine 1 Tb tomato paste with a few tablespoons of liquid from the stock pot. Stir until smooth and add to the sauce. For thicker sauce, add 2 Tb of tomato paste.

Cook the sauce over medium heat for about 20 minutes stirring until it is at a high simmer. During this time, sauté the cleaned and sliced mushrooms in a little oil over medium heat in the same pan used to brown the chicken. Add salt when the mushrooms start to release their juices. Cook for 4 to 5 minutes then add to the sauce. Deglaze the pan with a little white wine if the mushrooms stick. Sauté the mushrooms in batches so as not to crowd the pan.

Add the olives to the sauce, stir, and add the chicken pieces, submerging them gently. Simmer, partially covered for 2 hours, stirring occasionally. Do not boil.

Remove the chicken pieces, cool for a few minutes, pull the meat from the bones and shred.

Add half of the parsley to the sauce and stir. Simmer another hour, adjusting thickness by adding stock or wine if too thick or adding another blended tablespoon of tomato paste if too thin. Don't add tomato paste in the last ½ hour of cooking.

Add the rest of the parsley and stir in the remaining garlic.

Ideally, cool the sauce and refrigerate for 24 hours then reheat while you make a polenta with Parmigiano Reggiano cheese and butter.

To serve: place a slice of cheese on a warm dinner plate. Pour polenta over the cheese, top with ragu and serve.

Faint with pleasure.

SIX LONG-TIME MSSF MEMBERS AWARDED HONORARY MEMBERSHIP



The Honorees (from left to right): Jane Collier, Alvaro Carvajal, Carol Hellums, Bill Hellums, Sherry Ayers Carvajal, George Collier

What species extends from San Francisco to Ohio, working beneath the surface of things to provide nutrients to its host while energizing its organic growth and development?

Any guesses? We're talking about *Voluntarii venerabili*, among which the MSSF Council has decided to designate a group of six remarkable specimens as new Honorary Members in recognition of their steadfast contributions to our society. They are Alvaro Carvajal, Sherry Ayers Carvajal, Bill Hellums, Carol Hellums, George Collier, and Jane Collier. Sometimes referred to as the "Silver Six", they have worked together almost as a pack to build and strengthen our organization over the past fifteen years.

It wasn't just because all six of them lived for a time within walking distance of MSSF headquarters at the Randall Museum and were able to take on so many MSSF organizational functions. It was because they found delight in one another's company in working together on these contributions. And, not the least, they all loved great cuisine; its creation and consumption!

Take the MSSF infrastructure. Sherry contributed her skills in project management; Al—his capacity for solving complex problems; Jane and Carol—their cool-headed wisdom; Bill—his flair for Devil's Advocacy; and George—his dogged persistence, which raised the level of accomplishment in MSSF Finances, Membership, Council Deliberations and Culinary Arts.

Where would the MSSF's finances be without the work Sherry and George did to shape up the MSSF treasury? Sherry started the effort and recruited George to carry it on in two areas: the MSSF Culinary Group and the Society as a whole. This pair brought the Society's state and federal tax reporting up to date after many years' lapse. George wrote the first (and perhaps only) Treasurer's Handbook and Manual. It was their shrewd financial management that underwrote the Society's many undertakings—fairs, forays, speakers, and more.

And where would Membership be if Alvaro hadn't devised the Access database to tame the MSSF's somewhat incoherent membership records and bring them into the modern era? There would have been no MSSF Roster without the reporting functions of Alvaro's membership database. For most of a decade, MSSF membership grew under Jane and George's supervision because of the care they took in managing the Membership department—and even Alvaro! Membership innovations implemented by this crew include the E-memberships and the Life Memberships (of which George and Jane were the very first). Meanwhile, the improvements in Finances and Membership helped support MSSF's key media for communication: Mycena News and MSSF Yahoo groups listserv, which Carol ably served as its occasional editor and moderator. She also served as Secretary for four years.

All six members served on the MSSF Council at one time or another, helping MSSF navigate through some challenging shoals.

Then there was food—the delight that this crew shared in hosting and sharing culinary excellence. All six served as mainstays of the MSSF Culinary Group. It was Sherry who realized that the Mendocino Woodlands Camp could be combined with the feeding of volunteers at the Fungus Fair. Alvaro and Sherry managed the Mendocino camp's meals for many seasons; bringing Jane, George, Carol, and Bill into the food team, which later, spilled over into the feeding of volunteers at the Fungus Fair. This group has managed Fungus Fair volunteer food as a team for the last several years. So often, the preparation of food—and excellent food at that—depended on the Carvajals' pooling of MSSF cookware at their home in the Castro. Of course it didn't hurt that this crew loved to innovate for the MSSF Culinary Group, not only through inventive cooking, but through leadership.

Please join us in honoring this talented group of six, who have been instrumental in helping our organization grow and thrive in the 21st century.

The President, Officers, and Council Members of the MSSF

CANDY CAP BISCOTTI

Cream together 1 cube UNSALTED butter, 1 Tb. shortening (Liana suggests butter flavored Crisco), 1 ¼ cup sugar, 1 tsp vanilla, ¼ to ½ cup candy cap powder. Beat in 3 eggs.



Candy Cap (*Lactarius rubidus*)
Photo: Fred Stevens

In a separate bowl sift together 3 cups of flour, 2 tsp baking powder, a pinch of salt. Add flour mixture a little at a time to wet mixture and add 1 Tbs. anise seeds and ½ cup walnuts, chopped medium to small.

Roll into logs and place on a parchment paper lined cookie sheet.

Bake at 350 degrees for about 20 minutes.

Cool, but not for more than 10 minutes or the logs will be too hard to slice. Slice diagonally and put back on the cookie sheet for a second baking. Bake at 200 degrees for another hour. Serve with (or without) sweet wine or coffee.

See you at the next dinner or out in the (hopefully wet) woods. —Pat

♥ This Valentine's Day, celebrate nature's most devoted couple! ♥



Photo: Shelly Benson

Fall in Love with Lichen!

February 15, 2014
10:00am – 2:00pm
Olompali State Historic Park

You've seen it hanging off trees like an old man's beard and covering rock faces in beautiful sunburst patterns. Now it's time to learn more about the fascinating fungal-algal relationship known as lichen. Join California Lichen Society president and lichenologist Shelly Benson for an easy walking tour of Olompali's amazing lichen. She will teach us about the natural history of lichen, how to identify different species and why they are important indicators of air quality and climate change. We will also have the opportunity to pilot the new *iNaturalist* field guide to Olompali lichen.

Meet at the Olompali Visitor's Center at 10 am. Bring a lunch, water and smartphone if you have one. \$8 per car for parking - event is free.

More info: (415) 898-4362 x204 or www.parks.ca.gov/olompali



California State Parks supports equal access. Prior to arrival, visitors with disabilities who need assistance should contact Samantha Toffoli (707) 769-5665 x227 or Samantha.Toffoli@parks.ca.gov



Lost in the Light: The Story of *N. Gardneri*

L.A. based Josh Garcia is an environmentalist and videojournalist who loves what he does and believes we're on Earth for short time only, to help someone, change something, contribute-somehow. He wants to share this video he shot in Brazil on *Neonothopanus Gardneri*, one of the worlds largest and brightest glowing mushrooms. It's really pretty incredible. Hope you enjoy it!



Josh Garcia

<https://www.youtube.com/watch?v=gSPHJBFQy7U>

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"A World of Wonder at Your Feet"

February 2014, vol. 65:06

MSSF Calendar February 2014

Monday, February 3, 7 p.m. - Culinary Group Dinner
County Fair Building, Golden Gate Pk., 9th & Lincoln, S.F.
"Indian Dinner": green chicken curry and vegetarian alternative, biryani (vegetable rice pilaf), dhal (spiced lentils), gajar (carrots, peas and potatoes with cumin), mushroom chutney, green mango chutney, cucumber raita, lassi, custard dessert. Pre-registration required for attendance. See calendar section at www.mssf.org. Email culinary@mssf.org to volunteer. Next culinary dinner March 3.

Tuesday, February 11, 7:30 p.m. - MSSF Council Meeting

Tuesday, February 18, 7 p.m. - MSSF General Meeting
Randall Museum, 199 Museum Way, San Francisco.
7 p.m. - Mushroom identification and refreshments.
8 p.m. - Speaker: J.R. Blair

Tuesday, March 11, 7:30 p.m. - MSSF Council Meeting

Tuesday, March 18, 7 p.m. - MSSF General Meeting
Randall Museum, 199 Museum Way, San Francisco.

The submission deadline for the March 2014 issue of Mycena News is February 15th. Send all articles, calendar items and other information to: mycenanews@mssf.org

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

MSSF Volunteers Needed

Join the Council leadership, learn the inner workings of the MSSF and help make decisions that shape the future of the society. Do your part by contributing your time to a 100% volunteer organization!

Membership Chair: The Membership Chair position will be vacated by September, 2014. Stephanie Wright has stepped in temporarily to update records and will be available to train a replacement over the upcoming summer months. This is a very important council position that will need to be filled by a dedicated competent member volunteer.

Librarian Co-Chair: Volunteer to assist the head librarian, catalog and check library books in and out of the "Bill & Louise Freedman MSSF Library" during monthly general meetings at the Randall Museum.

To learn more about all council and committee positions, go to: www.mssf.org members-only area, file archives, council member position descriptions. Or email: President@MSSF.org

Remember, our great, ALL-VOLUNTEER organization would not survive without volunteers! Volunteering to serve on the council is a great way to learn the inner workings of the society, further your education in the world of fungi, and receive the special benefits of being a council member. Please, do not hesitate to contact me if you would be interested in filling one of these important volunteer positions on the council of the MSSF.

Curt Haney President@MSSF.org 415-333-8820