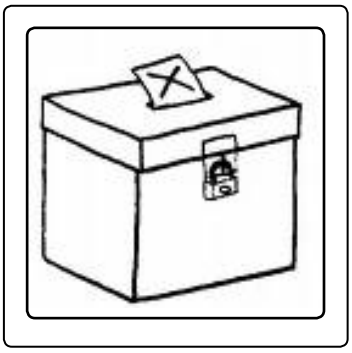
Mycena News

The Mycological Society of San Francisco May 2008, vol. 59:05

MSSF General Meeting May 20, 2008



Election of Society Officers

There will be no speaker for the month of May; instead we invite members to bring an appetizer with fresh or dried mushrooms to share. We will hold our election of officers downstairs in the Buckley Room. There will be a children's play in the auditorium, and parking may be difficult.

Inside This Issue...

MycoDigest: Citizen Science

Brian Perry

The enjoyable presentation by Nathan Wilson at the March General Meeting, as well as Dimitar Bojantchev's excellent contribution to this column in the March newsletter, have led me to think quite a bit lately about the idea of "citizen science." More specifically, the information and ideas expressed by Nathan and Dimitar have led me to consider the sorts of valuable contributions members of the MSSF and other amateur societies can make to scientific studies of fungi.

For those of you not familiar with the term "citizen science," it refers to the idea that non-professionals can play an active role in scientific investigations, typically by helping collect the data upon which research is based. Some great examples of citizen science that have been very successful include the Christmas Bird Count (www.audubon.org/bird/cbc/index.html) overseen by the Audubon Society and partner institutions, and of course the Point Reyes Mycoblitz (www.mykoweb.com/PtReyes/index.html and http://pmb.berkeley.edu/~bruns/tour/mycoblitz1.html) orchestrated by Dr. Tom Bruns of UC Berkeley, and sponsored by the MSSF and other local clubs. The Mycoblitz has relied upon participants primarily to get out and sample the numerous and diverse habitats of Point Reyes National Seashore, after which professional and amateur mycologists identify, photograph and make vouchers of the material collected. Both projects have made possible large-scale observations of organisms that otherwise would require the investment of hundreds or thousands (and in the case of the bird count, perhaps hundreds of thousands) of man hours, and have yielded large amounts of immensely valuable data.

Aleuria sp. **Photographed by Mike Wood, webmaster of www.mykoweb.com**

What I am curious about, however, is whether it is possible for amateurs to make even larger contributions to our understanding of fungi (and other kingdoms,

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MycoDigest is a section of *Mycena News* dedicated to the scientific review of mycological information.

PRESIDENT'S POST

So, this is my last Post until September. In the meantime I will have served a full year as president (end of July to be exact). It has been an eventful, sometimes aggravating, often rewarding season.

Let me indulge in a bit of boasting about our accomplishments this past year. First of all, we have sponsored some terrific events: Mendocino Woodlands Foray was very fun this year with everyone going home with lots of edibles, full of good camaraderie, and loaded with activities and learning opportunities. (Thank you Charmoon for organizing the foray; but a lot of people went above and beyond for this one). The Fungus Fair, under the competent direction of Monique, was a great success. As far as I know, it wins the prize for the highest attendance of all time with about 3,400 paid attendees over the weekend. Not only that, we had as large a list of volunteers as we've ever had. Thanks to all of you; we can't do it without you. Terri chaired the committee that put on the second annual Marin Mushroom Mania—and the second successful MMM! The Marin Art and Garden Center is very pleased with what we do and have invited us to do it again, and even better, next year.

I'm also very proud of the work our committees have been doing this past year. I've had a chance to attend a couple of the Culinary Committee dinners this year and what can I say but yum. Under the expert guidance of Pat, they continue to impress, including putting on the Holiday Dinner. Thank you all for that delicious spread! My predecessor, David Campbell, resurrected and revitalized two important committees, Hospitality and Education. Liana has been terrific as Hospitality Chair. Isn't it nice to go to a General Meeting and get a name tag? Oh, and the refreshments are a nice touch too. Alice and Paul deserve major kudos for taking a nearly non-existent Education Committee and turning it into something special. Not only have they created a nicely done hands-on display at the Fungus Fair, but they are working hard to develop rich learning opportunities for our members. For example, there is the Quick Start Guide to help people hone their observation skills, get mushrooms identified, and become self sufficient. Also, we've begun a series of ID workshops for our members (beginner and intermediate so far, advanced is in the works). Finally, the Education Committee secured a relationship with the Jepson Herbarium at UC Berkeley, starting with giving us space for display tables at Cal Day this past month (thanks to all of you who helped with that!). Other events with the Herbarium are possible in the future. I'd also like to make special mention to our Books and Merchandising Committees. Thanks to Curt, Ron , and Lou, we've been able to generate a cash flow that will allow us to better serve our membership, enhance our public outreach, and reward our volunteers. Of course, there are the other committee chairs that are so vital to the operation of our organization: Terri with Archives, Ken with Cultivation, Norm with Forays, Denise and Monique with the Library, Bob and Fred with Scholarships, Bill with Toxicology, and Mike with Systematics (also our long-time and much appreciated webmaster). I'd like to give a special shout out to our Membership Chair Al, our Programs Chair Mark, and our Newsletter Editors Jeff and Cordelia. That's a hard working bunch of folks with tough jobs. Thanks. I also want to acknowledge the excellent work of the Officers and Councilors. Our councilors at large; Roy, Dennis, George, and Henry; are always among the first to volunteer and are consistently providing the council with insightful advice. I am eternally grateful to our Officers; Dan, Phil and Lisa; three of the hardest working and most dedicated people in the Society—I couldn't ask for a better team of smart, thoughtful, and supportive people. (Are you tearing up yet? It's not over.) In particular, I want to thank David Campbell for his support and advice over the past year. I credit much of the effectiveness I have as the President of this Society, such as it is, to David's help. Maybe I can do it on my own next year (not!).

Speaking of next year, there is still much to be done, and I'm appealing to those of you out there who are not listed above. We could use your help in some very specific ways. Several of our "committees" are one- or two-person operations, and that is fine for some of them but not all. For example, Liana has a few people who help her out with the Hospitality Committee, bringing refreshments and greeting people who attend our General Meetings. They could use a few more helping hands with that and Liana would love to hear from you if that sounds like something you could do once in a while. Pat George is looking for some members to divvy up some of the work incumbent upon her position as Culinary Chair. Give her a call if you can lend a hand there. Paul and Alice are always looking for fresh ideas for Education. If you are an educator (or not) and have ideas for them, give them a call. Norm has been doing a great job as Foray Chair for about a hundred years now, but he can't do it alone. In conjunction with the Education Committee, he will be establishing a training regime for foray leaders. If you think you'd like to lead forays but perhaps feel you need a bit more knowledge, then keep your eyes open for future workshops and seminars in mushroom identification, woods smarts, and other skills that make for a good foray leader. If you'd like to be a little (or a lot) more involved with the Society there are many ways to help us out. Don't hesitate to give any of the council members a call if you'd like to learn more about how you can help to make the Society even better next year.

Have a great summer, see you at the picnic, and good hunting!

~J.R. Blair

ANNOUNCEMENTS

Morel Identification and Cultivation Discussion

Saturday, May 31, 2008, 10am-4pm, UC Berkeley

Mo-Mei Chen will present an overview of *Morchella sp.,* including new research and information on commercial production. Please contact him at mmchen@nature.berkeley.edu for more information.

There may be a small fee to attend.

Thank You to Mycena News Contributors

In this final issue of *Mycena News* for the 2007-2008 mushroom season, we'd like to acknowledge a handful of authors who have had their work reprinted in the newsletters of other mushroom societies. The Ohio Mushroom Society reprinted Curt Haney's review of *North American Truffles*, as well as Brian Perry's *MycoDigest: Are Mushrooms Genetic Individuals or Genetic Mosaics* and Lisa Bacon's *Houby Hunting* in its *Mushroom Log* newsletter. Recently, the Mycological Society of Toronto reprinted Peter Werner's two-part guide: *Camera's and Equipment for Shooting Mushrooms.* Thanks also go out to Peter for another great two-part series on microscopes, wrapping up in this issue.

We would also like to acknowledge the hard work of Else Vellinga, who, in addition to authoring articles, has been the ongoing organizer of the monthly *MycoDigest* column. Thanks, Else, for your help with one of the signature aspects of *Mycena News*!

And to everyone else who has submitted an article, photo, recipe, or anything at all. Thanks very much. Without you there wouldn't be a newsletter.

Cordelia & Jeff
Co-Editors

Problem with mycenanews@mssf.com E-mail Address

It has recently come to our attention that some of the e-mails sent to mycenanews@mssf.com may have bounced back. We expect to have this issue resolved shortly, and apologize if any submissions did not make it into this issue of the newsletter. Thank you for your patience.

-Eds.

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Past issues of *Mycena News* can be read on-line at www.mssf.org.

MSSF Officers 2007-2008

A Buyers Guide to Compound Microscopes for Mycology, Part 2: Microscope Lenses

Peter G. Werner

In this installment, I'm going to discuss magnification and resolution, then focus on several of the most important components of a compound scope, the objective lenses, the condenser, and the eyepiece lenses. Knowing about these components is very helpful, not only in buying new parts for an existing scope, but in evaluating the features of a new scope.

Numerical aperture and resolution versus magnification

Numerical aperture, or NA for short, is a rather technical sounding term, but an important one. For reasons of space, I won't go into the gory details of the concept here (though for those who are interested, I'll post an explanation on my blog, at the URL given at the end of this article), except to note that it correlates directly with the degree of resolution of which the lens system is capable, that is, how small of an object or detail you can distinguish before it blends into a neighboring point. To put it even more simply, numerical aperture is your friend, and, generally speaking, you want to maximize your effective NA at a given magnification so that you can view smaller objects and more detail.

(L) Example of an objective lens, with text describing the lenses functions: Ph2 = phase contrast lens (which I'll describe in an upcoming installments), and phase ring size, Plan = plan achromatic lens, 16 = 16X magnification, 0.35 = 0.35 NA, 160 = for 160 mm microscope tube, 0.17 = use with 0.17 mm slide cover. (R) Example of an ocular lens, with text meaning: W = widefield, Kpl = (Zeiss-specific code) use with plan objective, 10x = magnification, (glasses) = high point focus.. Photo by Peter Werner

It's also very important to make a distinction between magnification and resolution, because this is a great source of confusion for people buying microscopes and lenses, and something some microscope sellers take advantage of to make their scopes sound better than they actually are. Magnification, quite simply, is making a given image larger. Resolution is how small of an object or detail you can distinguish in the image. An increase in magnification without increase in resolution is called "empty magnification," that is, the image is larger, but no more details are revealed. It is analogous to taking a 10x10 pixel jpeg and blowing it up to 100x100—the image may be bigger, but obviously, additional details are totally lacking.

Many microscope dealers will advertise that their scopes are capable of "1600X magnification." This is meaningless—typically, it means that the scope has been fitted with 16X power eyepiece lenses rather than 10X ones, but since the 100X objective lens has the same numerical aperture regardless of the eyepiece, there is no greater resolution from the additional magnification. With these concepts introduced, we can discuss the lens system of a compound scope.

Objective lenses

The objective lenses, or "objectives" for short, are the characteristic lenses on the nose of a compound scope, the ones you rotate into position to change magnification. A set of objectives will differ in magnification and also resolution and NA, with these numbers written next to each other on the barrel of the lens. Because the effective numerical aperture in air cannot be greater than about 1.0, any lens with a higher numerical aperture must be immersed in lens immersion oil to realize its full resolution and even to focus properly. Virtually all 100X objectives have an NA of 1.25 or greater and are oil immersion lenses (or, more rarely, water immersion lenses).

Objectives come in a number of types with increasing degrees of correction for various kinds of optical aberrations. The most basic type are what are called achromatic lenses, or "achromats," which partially correct for what is called chromatic aberration, the tendency for an image to be slightly unfocused when the different wavelengths of the light spectrum don't quite focus on the same plane. Achromats are also typically corrected to give reasonable flatness of field, that is points on a single plane appear flat rather than distorted like a fish-eye lens, though points

toward the edge of the lens may appear slightly out of focus. "Plan" lenses have a greater degree of correction for flatness of field, typically having good focus through the entire field of view. Lenses that are "fluor" have a higher degree of correction for chromatic aberration, and a resultingly higher NA, than achromats, and apochromatic lenses have the best NA and chromatic correction of all. Plan apochromat lenses are some of the most corrected lenses you can buy, and are correspondingly very expensive – I've seen such lenses sell used for over $900! The objective set sold as part of a larger microscope are typically achromat or occasionally plan achromat lenses. A scope sold with a set of plan lenses is worth paying some extra money for, since they can be expensive when sold individually.

Objective lenses should have the magnification factor and NA written on the barrel of the lens, along with other critical information. The barrel length that the objective is made for will also be included, typically 160 or 170 (millimeters), or ∞ (infinity corrected, the newest generation of compound scopes)—note that if you have a 160 mm barrel-length scope, you should not use 170 or ∞ objectives, and vice versa. The thickness of cover slip (in millimeters) the objective calls for is also given, either as a number, like 0.17, or a "–" symbol, indicating it can take any cover slip of 0.17 or less, or no cover slip at all. (There are also the rare "O" lenses, which indicate that they *must* be used be used with no cover slip—be wary of these for mycology, because one typically needs a cover slip to prepare slides of fungal tissue.

My condenser collection: (front) What I use mostly—typical Zeiss "flip-top" style Abbe condenser, with a 0.9 NA "dry" top lens, and lower lens with even lower NA for illumination of low-magnification objectives; (back) for really good images—turret style phase contrast/darkfield/brightfield condenser, with 1.4 NA dedicated oil-immersion achromat/aplanat top lens (not necessarily easy to set up and clean, but the image quality—WOW!). Photo by Peter Werner

The Condenser

It comes as a surprise to many beginners that the condenser is an absolutely critical component of the microscope and plays as important a role in determining resolution as the objectives. The condenser is the lens apparatus found immediately below the stage; its function is to focus light on the specimen. A condenser has a set maximum NA, though its NA can be varied up to this point by adjusting the condenser diaphragm. Matching the NA of the condenser with the NA of the objective is a critical step in realizing the full resolution of which the objective is capable, and is an important part of Kohler illumination.

The relationship between the components in getting resolution is a bit complex—if the condenser NA is greater than that of the objective, the objective NA represents the greatest possible resolution. If the objective resolution is greater, than resolution comes out as an average between the NAs of the condenser and objective. A complicating factor for condensers is that, like objectives, achieving an NA of greater than 0.9 requires an oil immersion layer between the top condenser lens and the slide, using a very thick high-viscosity immersion oil. In practice, this requires a lot of cleaning every time one sets up a slide, and is not typically used for most microscopy, except in situations where one wants to achieve the highest resolution possible, such as publication-quality microphotography.

A "dry" condenser is one with an NA of 0.9 or less, which can therefore be used without oil immersion. A 0.9 NA dry condenser will give you the best resolution possible without oil immersion – better than with higher NA condensers, in fact. Higher NA condensers are of two kinds "dry/oil" condensers that get their best resolution and focus under oil immersion, but focus reasonably well without oil, and dedicated oil condensers that absolutely require oil immersion for proper focus.

Like objectives, condensers come with various degrees of correction. The simplest and most common is the Abbe-type condenser, which has some simple correction for spheric and chromatic aberration. There are also achromatic condensers, more fully corrected for chromatic aberration, and aplanatic condensers, with a greater degree of correction for spherical aberration, and achromatic/aplanatic condensers, with both corrections. For simple achromat and plan achromat objectives, an Abbe condenser should be fine, though more highly improved objectives should be matched with more highly improved condensers.

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Microscopes continued

Oculars

The ocular, or eyepiece, lenses are the final component in the lens system, adding the final magnification, focusing the image from the objective on the eye, and making it visible. The total magnification of a scope is found by simply multiplying the objective lens magnification by the ocular lens magnification (typically 10X). Note that the microscope head (or other components) may have an additional magnification factor as well (typically 1.25X) which is also factored into the total magnification.

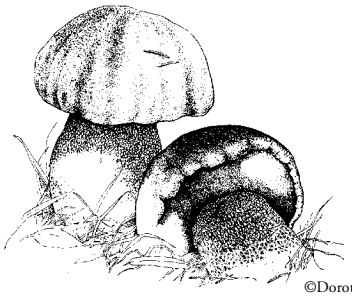
Good oculars are "widefield," which means that they have a wide field of view, and "high point," which means the focal point is high enough above the lens surface that the viewer does not have to press their face right up against the eyepieces, and the image can be viewed even by someone wearing glasses. Plan objective lenses typically require ocular lenses with matching correction in order to get an image with full flatness of field.

Some oculars are made with an internal resting flange, where one can add a measuring reticle or pointer disc. (I'll discuss measuring reticles more in an upcoming article.)
In upcoming articles in next season's *Mycena News*, I'll discuss other components and features of a compound scope, as well as the accessories one needs for mycological work and for cleaning the scope.

Further reading

As I did in the last article, I've put more information and links on my blog. The article can be found here:

http://germpore.blogspot.com///yet-more-on-microscopes.html ❁



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MycoDigest continued

for that matter) than simply collecting data points? I believe the answer to this question is an overwhelming yes, but there are a number of interesting factors to consider.

The first thing to consider, of course, are the various levels of experience and expertise that exist in the MSSF and other mycological clubs, and how this relates to the types of research in which members may be able to play a larger role. Not all members of the MSSF and other clubs are interested in the scientific side of mycology, and many are perfectly satisfied with learning to recognize and collect specific species for culinary or other purposes, and of course for the camaraderie that society membership offers. And there is nothing wrong with this! We all give to and take from the society what we require for our own needs, and this is what makes us a diverse and interesting group. For many of you out there, however, I know the desire to take your mycological interests to the next level is very strong indeed. The article by Peter Werner in last month's newsletter on how to shop for and purchase a personal microscope is a perfect indication of this. I know that a fair number of the MSSF members own microscopes and, often much to their partner's displeasure, spend many a weekend collecting specimens and many an evening at the microscope, attempting to identify and document their weekend bounty. Many of these members have become impressively knowledgeable of not only our local mycological diversity, but of that for other regions as well.

As someone who's research has often benefited directly from fungal specimens collected by others, I know personally how valuable the contributions of such taxonomically knowledgeable members can be. I do not know a single professional who would tell you that they have not had local amateur mycologists bring them exciting specimens, many of which have turned out to be taxa not previously reported from the region, and occasionally even some that represent species new to science! The simple truth is that many of you spend a great deal more time in the woods collecting our local fungi than do the professionals in the area (hey, somebody has to fly off to distant lands to study all those exotic species!), and this is where I feel some of the largest contributions can be made. The local species *Pseudobaeopsora stevensii* Desjardin, for example, was named in honor of MSSF member Fred Stevens who originally collected the material that became the holotype of the species. Because Fred has such an extensive knowledge of the local fungi, upon collecting this unrecognized taxon he realized it was something interesting and brought it to the attention of Dr. Dennis Desjardin. The end result was the documentation and publication of a previously un-described species. It should be stressed here that experienced collectors such as Fred know that quality specimens must always be accompanied by detailed notes on the macromorphology of

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MycoDigest continued

the specimens, locality, and associated habitat. Without such information, even the most intriguing specimens can often be of little use.

Those of you who regularly collect fungi with the intent to bring material home to identify with a microscope and existing literature, know that there are many groups of fungi in California that have not been adequately documented. While professionals such as Dr. Dennis Desjardin and others have had numerous students prepare monographic treatments for genera as part of their thesis studies, there are many more groups out there in need of such work. Perhaps it is time for the amateur mycologists to start preparing monographic treatments for these fungi, complete with species descriptions, keys, and illustrations? Much of this would of course be a simple extension of some of the excellent work that has been done by MSSF members to document the fleshy fungi of California. A quick scan of the information available on MSSF member Mike Wood's website, Mykoweb (www.mykoweb.com), will give you an idea of the impressive work that has already been accomplished. The knowledge base and expertise to prepare monographic treatments of our local fungi are certainly present. What may be lacking however, is access to some of the necessary resources.

As both Nathan and Dimitar pointed out, one of the most important resources to both amateur and professional mycologists is access to information, particularly scientific journals and the often hard to find taxonomic treatments of various groups (many of which are out of print). I know that several MSSF members are the proud owners of mycological libraries that rival those found in the herbaria and labs of professionals! But this of course is not an option for everyone, and many will have to rely on the libraries of our local universities and that of the MSSF. Memberships to scientific organizations like the Mycological Society of America provide a subscription to the society's journal (*Mycologia*), and allow members access to the online archive of previous issues (back to 2002 at present, but expanding). Fortunately, there appears to be significant effort these days by both larger institutions and individuals to get much of what has been published, but is now out of print, made available to the public online (i.e. open access), including mycological treatments. For example, Mike Wood currently has an online version of Harry D. Thiers' 1975 monograph "The Boletes of California" available on Mykoweb (www.mykoweb.com), and the University of Michigan Herbarium (http://quod.lib.umich.edu/f/fung1tc/) has a number of Alexander H. Smith's monographic treatments available. The posting of such information in an electronic format, however, requires the permission of the copyright holders, and this will likely be a major hurdle to overcome for many out of print publications of interest. Perhaps the MSSF can play an active role in this by lobbying copyright holding institutions or individuals to grant permission for the electronic reproduction of desired works? A new MSSF committee? Such a contribution would benefit both amateur and professional mycologists alike.

A major issue to consider in all of this is the dissemination of information resulting from any studies conducted by amateur mycologists. If one is only documenting the species present, and not reporting any species new to science, it can be as simple as posting the information in an easily accessible format online. Once again, a quick look at Mykoweb and other MSSF member web sites provides an excellent framework to follow for presenting such information. The key to any scientific study, of course, is repeatability, and in the case of monographic treatments this means voucher specimens. Without voucher specimens that others can examine to confirm results, any information presented is only anecdotal. Aside from curating your own specimens and making them available to others, the best way to accomplish this would be to contact your closest fungal herbarium to inquire if they would be willing to house your material. You must realize, however, that most herbaria are constrained by space and lack of curatorial staff, and may not be willing or able to house your material. Perhaps the MSSF should start a fungus collection?

Of course, one of most exciting aspects of making these sorts of contributions to our understanding of the fungi is the potential discovery and publication of species that are new to science. This is a complex topic, however, and one we do not have the space to discuss in detail in this already lengthy column. I will simply say that because making such taxonomic decisions often requires examining material on loan from herbaria, including holotype specimens, it is typically necessary to be affiliated with a university or other research institution to do such work (herbaria will not loan material to unaffiliated individuals).

Members of the MSSF and other amateur societies have been making significant contributions to our understanding of the fungi at multiple levels, and all of it is greatly appreciated by the professional mycologists with whom they have been working. I think everyone in the group, no matter what level of experience with fungi they have, can make valuable contributions and take great satisfaction in the role they play as citizen scientists. I also believe that the detail and comprehensiveness of these contributions has the potential to grow. Each time I attend meetings and forays, or view member web pages, I am impressed at the level of mycological knowledge that is found within the membership of the MSSF. I hope that what I have written here, as well as Dimitar's column and Nathan's talk, will motivate and inspire many of you to get out there and play an active role in understanding and documenting our local fungi. ❁

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MSSF 2008 Summer Calendar

Monday, May 5, 2008, 7pm, Culinary Group Dinner. We will meet at our usual venue, The Hall of Flowers, Golden Gate Park, 9th and Lincoln, SF, for a very special dinner featuring Mouton (a sheep) roasted in the caja china. To make your required reservation, contact Pat George at (510) 204-9130 or plgeorge33@yahoo.com no later than Friday, May 2nd. Remember to bring your own tableware, beverage, and an appetizer to share. Dinner will be $14.00. This is our last Culinary Group dinner until September. However, we will be having our MSSF annual picnic in the summer. Don't miss it.

Tuesday, May 20, 2008, 7pm, MSSF General Meeting. Randall Museum. 7pm, mushroom identification and refreshments provided by the Hospitality Committee. 8pm, election of society officers**.** The meeting will be held downstairs in the Buckley Room, as there is a children's play in the auditorium. Parking may be limited.

Saturday, July 19, 2008, 12pm–4pm. Annual MSSF Summer Picnic. Redwood Glen Picnic Area, Joaquin Miller Park, Oakland. Join us for a potluck picnic and barbecue. Coals and grill provided; bring food to share and food to BBQ. Note: Please do not leave anything of value in your car. We have had unfortunate break-ins in years past. Our permit does not allow hard liquor or musical instruments. See you then, and have a great summer!

Deadline for the September 2008 issue of *Mycena News* is August 15.
Please send your articles, calendar items, and other information to:
mycenanews@mssf.org