# Mycena News

The Mycological Society of San Francisco January 2009, vol. 60:01


## Speaker for the January 19 MSSF Meeting

**Else C Vellinga**

**Mushrooming in Northern Thailand**

Else Vellinga is a researcher in Tom Bruns' lab at UC-Berkeley. Her work focuses on the systematics and phylogenetics of the beautiful parasol mushrooms in the genera *Leucoagaricus* and *Leucocoprinus*. The main questions she tries to answer are: which species are there in California,

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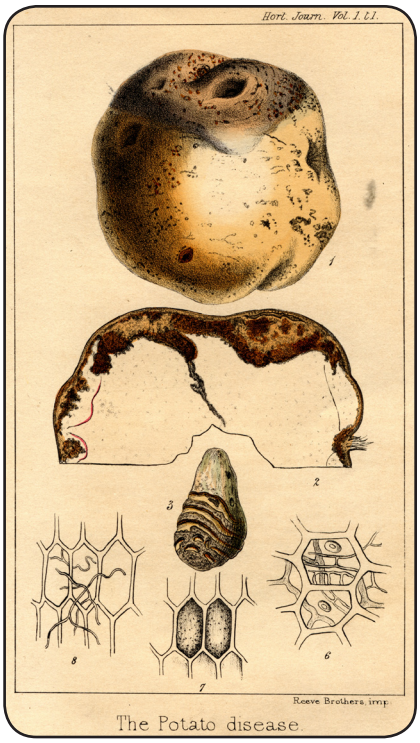
## Inside This Issue...



# MycoDigest: The Intricate Story of Late Potato Blight

Else C .Vellinga

Potatoes: staple food for many! I grew up with them in the Netherlands, and when we talk about a Dutch dinner, it is: potatoes, meat and veggies – in that sequence. My home country is big in potato growing and is the world's leading exporter of seed potatoes. Apples of the earth is the Dutch word for potatoes, and like apples, they come in many, tasteful varieties.




**Potato blight (from Berkeley (1846). Potato tubers in various stages of disease with details of cells with fungal growth in them, or (7) a dark brown substance.**

But there is a darker side. Potatoes are target for the late potato blight, a disastrous disease, with deep socio-economic consequences. This was the disease responsible for the infamous 19th century Irish famine and for the birth of plant pathology. The history of how this disease was understood reads like a layered detective story.

Potatoes are the tubers of *Solanum tuberosum* and related species. They grow naturally in the Andean countries of South America – Bolivia, Ecuador and Peru – and were an important part of the food of the native people before the arrival of the Europeans. Ancient potato-shaped vessels still show the reverence in which they were held.

Potatoes were brought to Europe in the second half of the 16th century, but at first were looked at with suspicion. It did not help that eating the berries ended in disaster, as all above-ground and green parts of the plant are highly toxic. But, at some point, potatoes really took off,

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

# PRESIDENT'S POST

Happy New Year everyone! I hope it is prosperous for you, at least mushroom-wise. I suppose it is too much to wish you wealth in these times.

I'm still recovering from the Fungus Fair, I must say. It doesn't help that last week was the last week of regular session at SF State, where I teach biology, and that finals are this week. You know—grading and exam writing—awfully time consuming.

Anyway, once again it was a tremendously successful Fair. They just seem to keep getting better. If you didn't see the numbers yet: over 200 volunteers (thank you, thank you – see the note in the next column), over 3300 paid attendees (we probably had more last year but a lot of people were able to get in for free then), and 319 fungi species identified over the weekend. To quote Mike Wood: "Anything over 300 is a good year." That, after a week and a half of dry weather. Go figure. Mushrooms are so unpredictable.

You may have heard that we won't have access to the Oakland Museum of California for the next two Fungus Fairs. They have just begun a major renovation project that will entail parts of the museum closed for long periods of time. We will be actively searching for an alternative venue in the next couple of months. Already we have some interesting prospects. More on that as things develop.

In the meantime, I'd like to acknowledge the fact that we've enjoyed an excellent relationship with the Oakland Museum over the past five years. They have a hard-working, highly skilled, and dedicated staff that put a tremendous amount of work into making our Fair as successful as it is. This year thanks to Douglas Long and his Natural Sciences staff, including Lindsey Dixon (expert logistician and utterly indispensable), Carolyn Rissanen (for always seeming to be there, before and during the Fair), Chris Richard (a stabilizing and calming influence for many years), and Gail Binder (makes a heckuva nametag among other things) for their help this year. I'd like to thank Elizabeth Whipple and Adam Rozen for setting up the publicity for the Fair (excellent coverage this year with articles in the Bay Guardian and S.F. Chronicle to name a couple) and Amy Billstrom and Terri from the Education Department for another excellent Family Activity Center. Finally, I'd like to thank Dorris Welch, who has coordinated the Fungus Fair from the Museum side since its inception. She is now semi-retired from the Museum and has a time-consuming project of her own to work on. Yet she did what she could as long as she could early in the process, when we very much needed her experience and expertise.

**Continued to the right**

# ANNOUNCEMENTS

## 2008 Fungus Fair Thank Yous

Well another Fungus Fair has come and gone. Saying THANK YOU just isn't enough. It couldn't have happened without the volunteers who stepped forward to help out. Not only do we have great MSSF members who volunteer year after year to make this event a big success, we also have great partners in the Oakland Museum who help us put it together. There are just a few people I would like to personally thank:

**J.R. Blair**: For taking on more than you should have and doing more of my work than I did.
**George Willis**: For helping me get in contact with so many volunteers from last year and coordinating the vendors.
**Stephanie Wright**: For organizing all the volunteers.
**Phil Brown**: For helping to put together the chefs.
**Sherri Carvajal** and her crew: For feeding us during the weekend.
**Dennis Desjardin, Mike Wood** and the other experts: For sorting and identifying all of those mushrooms.
**Ken Litchfield, Bill Freedman, Paul Koski, Thomas Jenkinson, Dan Nicholson, Mo Mei Chen, Chris Thayer, Earth & Fire, Dorothy Beebe and the Lichen Society**: For putting together excellent displays.

These are, by all means, not the only people who need to be thanked; there are just too many of you. There are those of you who went out on forays, picked up bags of oak leaves and pine needles, set up the displays on Friday, took it all down on Sunday, and more.

Once again, thank you all,
Roy Coto
2008 Fungus Fair chairperson

## Fourth Annual Oregon Truffle Festival

Held in Eugene, Oregon from January 30–February 1, 2009. For information call 1-503-296-5929 or visit oregontrufflefestival.com

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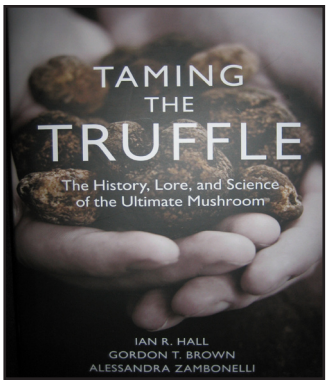
Regarding our future collaboration with the Museum, there are many variables at play and nothing has been discussed formally; but I hope we can maintain a relationship with this fine institution through this disruptive time. I firmly believe both organizations have benefited greatly by the work we've accomplished together as a team.

Good hunting, everyone. It's raining…

~J.R. Blair

# What's Bookin?




*Taming the Truffle: The History, Lore, and Science of the Ultimate Mushroom* by, Ian R. Hall, Gordon T. Brown, and Alessandra Zambonelli

This book was published in 2007 and will be available for sale at the next MSSF general meeting at a 10% discount to members in good standing.

**Summary:**
The art and science of cultivating the fungus worth more than gold. The most comprehensive practical treatment of the gastronomic treasure to date, *Taming the Truffle* brings the latest research and decades of experience to enthusiasts and professionals alike, with coverage of the leading truffle areas including France, Italy, Spain, and Asia, and the newcomers: Australia, New Zealand, and the United States.

This is the next report on new and existing fungi related books available to MSSF members at a 10% discount. In each *What's Bookin?* will be highlighting a different book, or series of books in each issue of the *Mycena News*.

~Curt Haney
MSSF Books Chairman

# Membership Update

Membership in MSSF expires now. Unless you renew for 2009, you will no longer receive the *Mycena News* or have access to the "members only" section of the MSSF website. To find out if you need to renew, please check the label on the January *Mycena News*. If you are an e-member, and you download the *Mycena News*, go to the Members section of www.mssf.org and find your name on the "Membership Status" document.

You can renew by mailing a check to MSSF Membership, c/o The Randall Museum, 199 Museum Way, San Francisco, CA 94114 or by using the PayPal option on the MSSF website. If you have not changed any of your particulars (address, Phone, e-mail), the check is all that is needed.

The regular, adult/family membership fee is $25.00. For seniors over 65 and for full-time students, it is $20.00. For e-members, who must download the *Mycena News* for themselves from the website, the fee is $15.00.

If you have changed your name(s), mailing address, telephone number(s), or e-mail address, please notify Alvaro Carvajal. E-mail is preferred at membership@mssf.org, or by phone at (415) 695-0466

The rains are finally here and the hills are brimming with mushrooms, so get out there and look at (or pick) the beauties. Happy New Year and Successful Foraging!

-Alvaro Carvajal
MSSF Membership Chair

Mycena News

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

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# Feeding the Multitudes at Mendocino

Carol Hellums

The first time I attended the Mendocino Woodlands foray, almost 20 years ago, it was rainy and muddy and cold, the cabin was damp and smoky, and there were almost NO mushrooms (the rains had just started). But the Woodlands still seemed magical to me—as if I were privileged to spend a weekend in Rivendell or Lothlorien. For the first few years I was happy to bask in the fairy-tale scenery, learn from the forays and talks, and gobble the wonderful food. As time went by, though, my husband and I were drawn more and more into volunteering, and began to appreciate the vast amount of work that makes the magic happen.

For the past few years (excluding last year), Sherry Carvajal has managed the feeding of the foray, with major assistance from her husband, Al. (This year she was also the on-site coordinator of the foray. Wow.) It's been fascinating to see the logistics required to keep us fed, caffeinated, and happy.

Here's how the weeks before the foray go for Sherry.

*Two weeks before*: Prepare the menus, taking into consideration what's in season, what was served the previous year (to avoid duplication), and any new ideas or suggestions from others. Reserve a rental trailer to carry the food from the Bay Area to Mendocino. Line up volunteers to prepare Friday night's dinner and breakfasts on Saturday and Sunday.

**A portion of the bounty collected in Mendocino.** Photo by Henry Shaw

*Foray week, Monday/Tuesday:* By this time there should be a tentative head count. Prepare the grocery list. All the quantities have to be calculated, based on the number of people coming. To take a simple example: Sandwiches. How many loaves, at approximately 20 slices per loaf? How many slices of cheese, sandwich meat? Not to mention peanut butter, jelly, mayonnaise, mustard, lettuce. Repeat for every item on the menu for all six meals, plus napkins, butter, sugar….

*Wednesday:* Shop all day for non-perishable items, with Al, and sometimes another volunteer. Start packing boxes and grouping them by weight to load into the trailer (heavy boxes at the front, light ones at the back).

*Thursday:* Pick up the trailer, ice down the coolers and put them in the trailer. Drive to Costco for meat and other groceries. Load the shopping from the Costco carts (four flatbed carts this year!) into the trailer.

*Friday:* Finish loading trailer, including groceries stored in house refrigerator. Make a final stop (or two) for forgotten items and extremely perishable groceries, such as lettuce. Drive to Mendocino. Unload groceries and organize them on the shelves of the walk-in refrigerator and the storage room, so that all the cooks will be able to find things. Can't just pile 'em anywhere!

*Friday evening:* Assist and coordinate the volunteer cooks and paid staff in preparing the dinner, setting up the serving line, and cleaning up after dinner. Try to keep Norm and Bill semi-sober (until the chili's done) and/or out of the kitchen.

*Saturday:* Up at 5 a.m. to start the coffee for the cooks. Supervise breakfast. Round up volunteers to set out the sack-lunch materials as soon as breakfast is over. Deputize a couple of sandwich police to strong-arm the over-eager types who try to snatch up the food before setup is complete. After everyone's lunch is packed, inventory the remaining lunch and breakfast supplies to be sure there's enough for Sunday. Drive to Mendocino to replenish supplies as necessary.

*Saturday evening:* Repeat of Friday evening, except with a professional chef, a much more elaborate menu, and even more trouble keeping Norm and Bill in line – not to mention that half the kitchen is tied up with cooking demos.

*Sunday:* Breakfast and lunch as for Saturday. Yep, up at 5 a.m. again. Afterward, deal with all the leftovers. Figure out what can be used later – for the Christmas dinner, the fair, or the hospitality committee – and package it up accordingly. Arrange to donate leftovers to charity as appropriate. Load up the trailer and go home.

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**Mendocino continued**

And every year there are crises, calling for a level head and good management skills. The sausage is scorched? Add some spices and call it "Blackened Cajun Sausage." The sauce curdles? Put it through a sieve and no one will ever know.

In my experience, though, the most exciting crisis happened on a Sunday morning many years ago. Folks stumbled out of bed and into the cookhouse to discover that THERE WAS NO COFFEE!!!! When the problem was first discovered, someone was immediately sent to town to remedy the omission—and she had car trouble and didn't come back.

**Norm and helpers in the cultivation class.** Photo by Henry Shaw

**Brandon Matheny and Else Vellinga discussing our finds.**
Photo by Henry Shaw

I don't remember how the crisis was resolved—I was just a bystander back then—but I can still see that pack of cold, sleepy, cranky mushroomers circling the coffee machine like hungry wolves. It has never happened again.

So, much appreciation to Sherry and the kitchen crew, and to all the other folks who work so hard every year to make Mendocino happen.

And a fine weekend it was. There were fabulous fungi, many excellent talks and classes, and a good time was had by all. ❁

# Holiday Dinner Recap

Pat George

Your MSSF's annual Holiday Dinner was held on a beautiful December 1st evening. Thanks to Curt Haney and Carol Reed with help from friends, the big room at the Hall of Flowers was artfully decorated with many lovely mushroom specimens scattered amongst the bright colors and lights. Our dinner began with a grand array of appetizers including lots of mushrooms, pates, cheeses and inventive personal creations provided by Culinary Group members and other volunteers—all this accompanied by a memorable punch made by Liana Hain. Diners had their choice of beef tenderloins with a porcini gravy, salmon with morels, or a vegetarian mushroom pasta dish. Alongside were brussels sprouts with pistachios, shallots and garlic, parsnip and potato puree, a big green salad, and olive bread rolls. For dessert we enjoyed candy cap bread pudding and, of course, coffee. Why am I relating the menu? Because I want you all to know how well MSSF'ers and their guests dine, that's why. It was a memorable feast.

Not just food was a highlight. Everyone who brought appetizers got a raffle ticket for an unusual and very special array of prizes. Curt Haney, purveyor of books and mushroom "stuff" for the MSSF organized and orchestrated the fun.

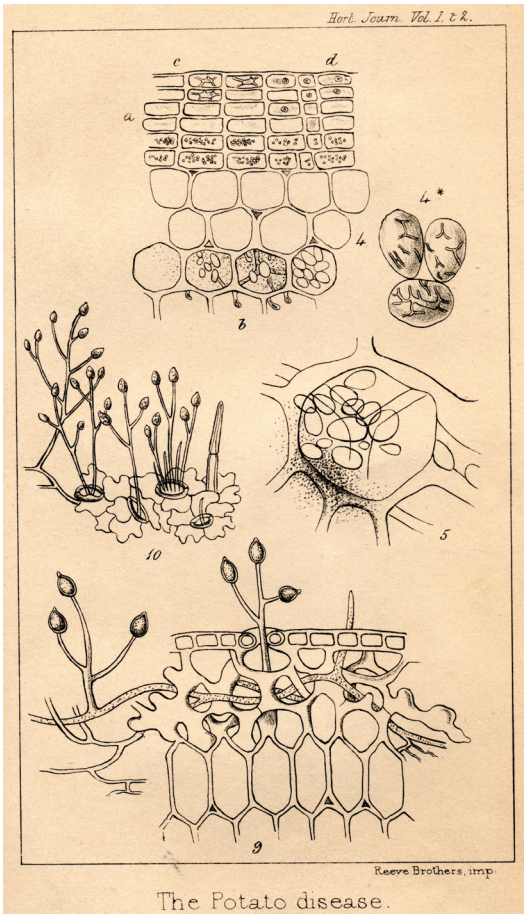
A grand time was had by all. The organization and follow-up work were done by our usual crowd of dedicated volunteers. Consider becoming one for next year's dinner, won't you? Our fabulous chef was Tanya Vetzmadian, assisted, of course, by a hard working crew who helped slice, dice, cook, get nervous, serve and clean up the place. It went smoothly and with grace. We thank you all!

See you in December, 2009, for another festive night of good food, good company and good cheer. ❁

**MycoDigest continued**

and became the main carbon and food source for many people, especially small poor farmers. All the potatoes cultivated in Europe at that time came from the same small selections brought from South America, and there was great genetic uniformity among them. Some years the crops did well, but some times there were minor disasters, and the potato harvest disappointed. However, what happened in the 1840s changed this dramatically; the potato plants, and most importantly the tubers, rotted until all that was left, over a wide area, was a putrid-smelling mess. The rot appeared first in north eastern North America in 1843, spread west, east and north, and reached Belgium in the summer of 1845. In Europe that summer stood out because of its wetness and the relatively low temperatures. Within a few months, potato plants were affected from Ireland in the west to Germany in the east. At least a quarter of the potato harvest was ruined. The next year was even worse, and 90% of the potato harvest in Ireland failed. A catastrophic famine ensued as a third of the Irish peasantry was entirely dependent on potatoes.

What was the cause of the rot? That was at the core of great philosophical discussions at the time. A white fungus was found on the potatoes, but was it the result of the wetness and the decay, or the cause of the rot? The ideas of '*generatio spontanea*' were still widely held and in this mood of credulity the disaster in the fields was variously ascribed to bad weather, bad luck, God's will, or the devil's. Plant pathology was an unknown branch of science.




**Potato blight (from Berkeley (1846). A vertical section through a potato showing the water mold in the cells (4, 5), and the sporangia emerging through the stomata of the lower leaf surface (9, 10).**

The English clergyman M.J. Berkeley, who described so many mushroom species from all over the world, gave a detailed description of the 'potato murrain', and realized that the mold was the same species described by Montagne as *Botrytis infestans*. But it took some more time before it was generally accepted as the cause for the disease. The credit for swinging opinion in favour of the parasite goes to De Bary, a German scientist, who established the whole cycle of the organism on plants. De Bary also changed the name into *Phytophthora infestans*. He infected healthy plants which consequently showed the symptoms, while healthy non-infected plants stayed healthy, despite being exposed to the same wet weather as the infected ones. It was a milestone in the understanding of disease, whether of animals, humans or crops. Phytopathology was born.

The culprit is not a fungus, but a water mold in the Straminopila, to which the giant kelps and the tiny diatoms also belong. Water molds differ from the real fungi because of the cellulose in the cell wall (fungal cell walls are made of chitin), and the fact that they store starch. The organism now ravaging the Coast live oaks and tanbark oaks in California is a close relative of the potato blight mold.

The potato blight was so successful because of its rather simple life cycle. A spore which lands on a leaf surface, grows into the plant and emerges on the under-side of the leaf. There it forms a branched sporangiophore, a small tree-like structure with sporangia at the tips. Each sporangium is a sack containing up to 8 zoospores. In wet cool weather a sporangium disperses as a unit, which opens up and lets the zoospores out. In warm dry weather, the sporangium itself will germinate and the zoospore phase will be skipped. The zoospores have swimming devices in the form of 2 flagella and reinfect the plant. They can only survive on a wet leaf surface. The sporangia from the leaves get into the soil to infect the tubers, and they can spend the winters in stored tubers, to spread through the growing plants in spring. A potato plant can be turned to mush in less than three weeks.

The use of copper fungicides protected the potatoes from the blight, but in World War I, Germany needed copper to make bullets, not to protect the potatoes, and hundreds of thousands people died, because of the failing potato harvest.

The blight proved to be particularly devastating in the cool and wet countries of Europe. In the Andes many genetically different cultivars were grown, some more, some less susceptible to the disease, but the weather there is not particularly cool and wet.

New potato cultivars were made with the help of a resistant Mexican close relative, but the arms race with the pathogen kept going.

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**MycoDigest continued**

In the 1970s, a new aggressive strain of the blight appeared with devastating effects. Till then the European version of *Ph. infestans*, had lacked the capacity for sexual recombination, but this new strain, which originated in the central highlands in Mexico, was of a different mating type. The blight could now fulfill the complete life cycle with a sexual part, and through genetic recombination soon was resistant against the applied 'fungicides.

Debate on the origin of the original 1840s strain has kept researchers busy. Did it co-evolve with *Solanum tuberosum* in the Andes, as the original researchers suggested? Did it originate in Mexico where wide genetic variation in *Ph. infestans* existed (this was the prevailing theory in the latter part of the 20th century)? Or did it migrate from Mexico to the Andes and, from there, to the rest of the world? Where do we have to go to find resistant potatoes or less virulent *Phytophthora*?

The problem of origin was solved only in 2007, by careful comparison of the genetic make up of *Ph. infestans* in the Andes, in Mexico and in other parts of the Americas. These strains were then compared with ones found in Ireland and elsewhere. Fortunately herbarium material of some infected Irish plants had been preserved, and DNA could still be isolated from this one and a half century old material. Historic material from South America, not as old as that from Ireland, but from before the second wave of pathogenic immigrants, was also instrumental in clinching the problem.

After the arrival of the new Mexican strain in Europe, the genetic diversity of *Ph. infestans* in the Netherlands became as great as that in Mexico – one reason to discard the out-of-Mexico theory. It is significant, too, that potatoes were not grown in Mexico in the first half of the 19th century. It is more plausible that the parasite came from South America in the 1840s, with the many new fast boats, than that it came with early potatoes. Even if it was on 16th century potatoes, the potatoes were likely to have been so affected by the long voyage that the diseased tubers were definitely not used for new plantings.

However, the most convincing evidence comes from comparison of nuclear and mitochondrial DNA of strains collected over a wide area. This shows that an ancestral population of *Phytophthora* diverged into different lineages in the Andes, growing on wild *Solanum* species; two of these developed into the present day types of *Ph. infestans*, capable of infecting potatoes, tomatoes and some other closely related *Solanum* species. Others evolved into several distinct species, one named *Ph. andinum*. The South American strains were transported to areas where potatoes were cultivated and wreaked havoc on a grand scale.

Late potato blight serves as the prototypical plant disease. Its story illustrates many of the hazardous aspects of agriculture, such as the role of the unwelcome companions who arrive with introduced species, the fragility of genetically uniform crops, and the social costs from the impacts plant diseases have on the lives of ordinary people, but also the strength of scientific evidence throughout the years. Alas, these stories can be told for many other equally devastating plant pathogens. ❁

Some further reading:

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Fry, W. E. & S. B. Goodwin, 1997. Resurgence of the Irish potato famine fungus. Bioscience 47: 363-371.

Gómez-Alpizar, L., I. Carbone & J.B. Ristaino, 2007. An Andean origin of *Phytophthora infestans* inferred from mitochondrial and nuclear gene genealogies. Proceedings of the National Academy of Sciences of the U.S.A. 104: 3306-3311.

May, K.J. & J.B. Ristaino, 2004. Identity of the mtDNA haplotype(s) of *Phytophthora infestans* in historical specimens from the Irish Potato Famine. Mycological Research 108: 471-479.

Salaman, R.N., 1986. The history and social influence of the Potato. Revised impression and edited by J.G. Hawkes. Cambridge University Press.

**Speaker continued**

in Hawai'i, Panama, and in Thailand; how do we recognize them; and how are they related to each other and to the other members of the Agaricaceae. She is interested in biodiversity and conservation, is involved in the Point Reyes Mycoblitzes, tries to keep track of the recent mushroom literature, and writes about new discoveries for the *Mycena News*, *McIlvainea* ,and *FUNGI*, the new mushroom magazine. She migrated from the Netherlands in December 1998 and is still an editor for the Dutch mushroom flora, *Flora Agaricina Neerlandica*. Her working time is divided between the computer, the microscope and the lab bench. She is an avid knitter and mushroom dyer. Her web site, http://pmb.berkeley.edu/~bruns/people/ev.html, shows what she is doing.

**Deadline for the February 2009 issue of *Mycena News* is January 15.**
**Please send your articles, calendar items, and other information to:**
**mycenanews@mssf.org**

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# MSSF Calendar, January 2009

**Saturday, January 10, 2009, Mills Canyon Beginner Foray.** J.R. Blair will lead his popular fact-filled study foray down Mills Canyon, Burlingame. Limited to 25 guests by reservation only. We meet at the Adeline Drive entrance at 10:00 A.M. Heavy rain cancels. Adeline Drive crosses Hillcrest Ave, which turns east off Skyline Boulevard just south of the Trousdale Ave. exit from Route 280. Parking is on the left of the second arterial stop at Adeline as you come down Hillcrest. For reservations please call Bill Freedman at 650-344-7774, or <loufreed650@yahoo.com or J.R. Blair at 650-728-9405 or jrblair@mssf.org.

**Sunday, January 11, 2009, Beginner's Foray at San Francisco Watershed.** We meet at the western end of Edgewood Road, just past the exit to Hillsborough on Route 280, on Canada Road. Park where the bicyclists park. Sunday, January 11, 2009 is the date, 10:00 AM to about 12:30 PM. Space is limited, so call Bill at 650-344-7774 or <loufreed650@yahoo.com> for a reservation. It may be wet underfoot; wear wet weather shoes. This is a study rather than a collecting trip. The Water Department doesn't supply water, so bring your own. Heavy rain cancels.

**Sunday, January 18, 10am–1pm, Quick-Start Mushroom Walk.** Held at Land's End San Francisco rain or shine. Bring your own snacks. Plan to bring specimen and I.D. sheet to Randall for the General Meeting, Tuesday Jan 20th (7pm in the basement) for verification and discussion. For info call Monique Carment at 415-474-7220

**Tuesday, January 20, 7pm, MSSF General Meeting.** Randall Museum. 7pm, mushroom identification and refreshments provided by the Hospitality Committee. 8pm, Else Vellinga will present **Mushrooms of Northern Thailand.**

**Wed. and Thurs., January 21 and 22, 7pm, Beginning Mushroom ID Workshop.** San Francisco State University, Hensill Hall 401. This workshop will introduce participants to the macroscopic features and terms used in the identification of mushrooms. Instructor: J.R. Blair. Please sign up by contacting J.R. at jrblair@mssf.org or by calling 650-728-9405. Limited to 15 participants.

**Wed. and Thurs., February 4 and 5, 7pm, Intermediate Mushroom ID Workshop**. San Francisco State University, Hensill Hall 401. This workshop will utilize popular field guides to identify fresh mushrooms. The Beginning ID Workshop is a prerequisite for this course. Instructor: J.R. Blair. Please sign up by contacting J.R. at jrblair@mssf.org or by calling 650-728-9405. Limited to 15 participants.