

Next Meeting July 13th 2009

SPORES Afield

The newsletter of the Colorado Mycological Society

July 2009

President's Column



"Mycophagy and Nutrition"

Noun 1. Mycophagy – the practice of eating fungi (especially mushrooms collected in the wild)

The major reason most people join a mycology club is because they like to eat mushrooms. They may have heard that wild mushrooms are more flavorful than store bought or cultivated mushrooms and want to learn how to find, identify, and collect their own mushrooms from the wild. Mushrooms can be eaten for their taste, texture and nutritional value. Shiitake mushrooms are recognized for their ability to invoke the “umami”, or “savory” flavor in food. Today, mushrooms are getting attention as a “health food”. An add posted by The Mushroom Council on the CBS New York Time Square “Super Screen” presents mushrooms as “Nature’s Hidden Treasure”. There are many scientific studies showing that mushrooms may be able to play a role as a “functional” (medical or nutritional) food. While not claiming to cure diseases, mushrooms are eaten for their effects on cholesterol, glucose regulation and as preventative medicines. We will address that aspect of mushroom biochemistry next time.

So what makes mushrooms good food? Twenty years ago very little was known about mushroom nutritional content. Some people considered mushrooms to be vegetable steaks (mainly based on their texture), while others considered them to be practically devoid of nutrients (based mainly *(Continued on page 8)*)

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Speaker for the July Meeting: Dr. Jack States

"Diversity and ecology of truffle fungi in the Rocky Mountains"

Dr. Jack States has this to say about his July presentation for CMS:

My research in collaboration with wildlife resource managers has shown that the ecological importance of hypogeous (truffle) fungi goes well beyond their beneficial symbiotic relationship with forest tree root systems (as mycorrhizae) and nutrient cycling. Truffle fungi are an important, and in some cases essential, food source for many forest animals, including arboreal and ground dwelling squirrels, small rodents, deer and elk, and even insects. Comprised of many genera and species, truffle communities perform interconnecting, and in some cases interdependent roles in food webs of Rocky mountain conifer forests, wherein the fungi develop symbiotic root associations with trees thus providing nutrients to the host and receiving in return photosynthates (sugars) to fuel their growth. Forest adapted animals, particularly tree squirrels, consume the truffle fruiting bodies as major parts of their diets and disperse the fungal spores throughout the forest. Healthy squirrel populations provide an essential prey base for forest carnivores, especially northern goshawks and northern spotted owls, and these birds are thus intimately connected to the fungi through both the prey base and the trees (supported by the mycorrhizae) for nesting habitat. So tightly linked are these food web components in Rocky Mountain ponderosa pine forests *(Continued on page 9)*

Upcoming Events

- July 13th Dr. Jack States "Diversity and ecology of truffle fungi in the Rocky Mountains".
- Aug. 15th Fair Setup, for more information see page 3. Much more in next months issue of SporesAfield.
- Aug. 16th Annual CMS Mushroom Fair at Denver Botanic Gardens, The Fair identifier this year is Cathy Cripps.
- Aug. 17th Cathy Cripps, (TBA).
- Aug. 22-23rd Buena Vista King Boletus Festival, contact buenavistaheritage@msn.com.
- Sept. 14th CMS Annual Cook & Taste. This year CMS member Pete Marcyzk will be preceding the festivities with a talk on cooking with mushrooms and choosing the right wine for your mushroom dish.
- Oct. 12th CMS Annual general meeting and Election of Officers.
- Nov. 1st CMS Mushroom Dinner, see note this page.

Bring mushrooms for identification and display to any meeting.

All meetings are held the second Monday of each month from Mar. to Oct. at 7:30 pm unless otherwise announced. In 2009 the Colorado Mycological Society will be meeting in the Asbury Event Center at 3011 Vallejo Street in historic North Denver. The Asbury Event Center is in the old Asbury Methodist Church (built in 1890) complex which is today privately owned and no longer functioning as a church. There are several entrances into the facilities. The door to our meeting room is at the northeast corner of the building.

Upcoming Forays

Friday, August 14th, 2009 -- We will be collecting specimens for the CMS Annual Mushroom Fair (Sunday, August 16th). It should be emphasized that this is not a teaching foray, but rather a collecting foray. Nevertheless, people who have participated in this foray in the past have found it very informative. The leader of this foray will be Ellen Jacobson. If you need more information, you may contact Ellen at 303-741-3836 or by email at egj538@aol.com.

Please mark your calendars!!!

The 2009 CMS
End-of-Season Fungi Feast
is scheduled for Sunday, November 1ST.
Look for details in the
September issue of SPORES!

I'm back!

I'm Norm Birchler and you may recognize this SporesAfield format from a couple years ago, I'm stepping in for the previous editor for the remainder of the year. If you have any submissions for Spores please send them to me (my contact info is in the roster) by the 15th of each month.

Correction: due to a mix up last month an incorrect membership roster was printed, the correct membership roster for 2009 is printed below. Sorry for any inconvenience this may have caused.

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SporesAfield is published from March through October by the Colorado Mycological Society. CMS dues are \$28 for the first year and \$25 thereafter. Send membership dues to Linda deLeon, CMS Membership Chair, 14310 W. Fifth Ave. Golden, CO 80401-5226. All CMS members receive *SporesAfield* as part of their membership

CMS is an affiliated member of the North American Mycological Association.

CMS web site: www.cmsweb.org

MAKE TIME FOR THE MUSHROOM FAIR!

One of the best ways to help CMS, meet other club members and learn about mushrooms is to volunteer at CMS' annual Mushroom Fair. You won't need advanced mushroom expertise, and there are many long-time club members who will be taking lead roles. It's a fun way to learn more about our favorite subject!

On Saturday August 15th, we'll start sorting mushrooms at 1 pm (until about 6 pm) in **Classroom C** (downstairs below Mitchell Hall at the **Denver Botanic Gardens**). On Sunday **August 16th** we'll be setting up Mitchell Hall starting as early as 7 am for early risers -- the Fair opens at 11 am and ends at 5 pm.

Following are some of the things that need to be done. **Please contact Fair Chair person Marc Donsky (303-556-3201 or email Marc.Donsky@ucdenver.edu) to volunteer** or to learn more about what's involved.

- **Physical Arrangements:** Help set up and/or take down the tables and displays. Lots of good clean fun!
- **Fair Forays:** these take place on August 14th (collecting for the Fair, under the guidance of Ellen Jacobson) and on the morning of the Fair (Sunday 15th), a bicycle foray in the city, with Manny Salzman
- **Sorting** (placing the identified mushrooms on the display tables -- a perfect job for beginners & new members). Saturday starting at 1pm; Sunday from 9am.
- **Kiddie Korner** – watch over children who want to spend a few minutes drawing while their parents pore over mushrooms
- **Membership:** Greet fair-goers and potential members at the door
- **Food/soft drinks** for volunteers
- **Book and T-shirt Sales**

For most of the tasks listed below, what's needed is someone to oversee a table or give the person who manages the table a break.

- **Arts and Crafts display (let us know if you'd like to work at this table or if you have items (handmade or commercially produced) with a mushroom theme that you'd like to display.** Photographs of mushrooms are included.
- Cultivation display
- Dyeing & Paper Making display
- Edible and Poisonous mushroom displays
- City Mushrooms display
- Natural Habitat display
- Toxicology/Rocky Mountain Poison & Drug Center display
- In recent years, we haven't had displays for either Preservation or Photography. Either of these tables can be your own personal creation if you are interested.

Don't know what you want to do? Volunteer to "Help Where Needed." Whatever you do, don't miss this once-a-year fun event!

What's for dinner?

Marilyn Shaw, CMS toxicology chair, and consultant to RMPDC

At our last meeting the consumption of *Amanita muscaria* was discussed, and a recipe was given which was purported to detoxify the species. A few members have asked for that recipe. Those people should contact Debbie Viess directly at <amanitarita@sbcglobal.net>.

It should be understood that CMS cannot endorse this practice, nor can it assume responsibility for any undesirable effects that might occur as a result of following those directions. In my opinion, most if not all professional mycologists in the country would concur. There are many factors that we all need to consider, among them, variations in toxin content in various collections, individuals' adherence to the instructions, individual sensitivity, quantity consumed, etc.

Members might even have inferred that *A. muscaria* is not poisonous, while *A. pantherina* is seriously so. The two species, in general, contain the same toxins. Poisonings by both species (and a few other related species) can progress to a coma-like state. These are not considered to be life-threatening illnesses, but none-the-less are hardly an experience most people would choose. It should be noted, however, that there are those who intentionally ingest these species for their intoxicating effects. Even when this is the case, many knowledgeable mycophiles have regretted their decision. In past years, two confirmed deaths occurred in the U.S. during the coma-like state, one from aspirating vomit, the other from freezing to death. The victims were unaware of their conditions, so were unable to help themselves.

Wild mushroom collecting and consumption is much more common in many foreign countries than in the U.S. "They know mushrooms." Unfortunately, not well enough. According to a World Health Organization (WHO) publication, OVERVIEW OF THE ENVIRONMENT AND HEALTH IN EUROPE IN THE 1990s EUR/ICP/EHCO 02 02 05/6 page 7 (29 March 1999)

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"Outbreaks of disease caused by chemical substances are rare, apart from intoxication caused by consuming poisonous fungi. In some CCEE and NIS with a tradition of collecting and consuming wild mushrooms, the death toll from mushroom poisoning reaches hundreds of people each year."

Compare this with the reported average mortality rate of fewer than 1.5 a year from mushroom poisonings in the U.S., a rate that has been pretty uniform for over 100 years.

A particularly tragic event was reported from Mexico a few years ago. This case undoubtedly involved consumption of one of the deadly amanita species, such as *A. phalloides* or one of the white "destroying angels".

"Death Toll at 10 in Mexico Mushroom Poisoning Friday, August 04, 2006

TUXTLA GUTIERREZ, Mexico - A 7-year-old boy and his father died Friday, bringing to 10 the number of Indian family members killed after eating poisonous mushrooms in Mexico's southernmost Chiapas state. All 10, from the community of Tenejapa, had eaten a soup made with wild mushrooms gathered deep in the mountains of Chiapas. Eight other relatives died earlier in the week. The 11th member, a 69-year-old man, did not eat the soup, authorities said. Wild mushrooms flourish during the rainy season in the forests and jungles of Chiapas, and are a common dietary staple for mostly Indian families. But recent genetic mutations have made some forms of mushrooms consumed for years in Indian communities newly poisonous, officials say. Authorities have been inspecting open-air food markets, collecting all mushrooms sold there to prevent further deaths. Medical officials said the type of venom contained in the mushrooms ingested by the family had immediate and severe effects on the liver, making it difficult for doctors to help them."

NOTES:

It is doubtful that edible species have recently developed genetic mutations causing them to become toxic, but rather that similar appearing, but toxic species had been mistakenly collected. It appears that mushrooms sold in open-air markets were suspect.

Rules for trying a mushroom (after reasonably accurate identification).

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(*President's continued from page 1*)
on their high water content). The increase in mushroom popularity generated more research so more is known today. We all know something about nutrition. We need proteins, carbohydrates, fats (lipids), vitamins, and minerals to make up a complete and balanced diet. We also need a certain amount of indigestible matter, fiber. Mushrooms have all of these. The nutritional make up of mushrooms varies with species and with growing conditions.

According to NutritionData.com, a single serving of button mushrooms (1 cup, 156 g fresh mushrooms) cooked without salt contains; 44 Calories, 1 gram fat (unsaturated), 3 g sugars, 3 g dietary fiber, and 3 g protein. Mushrooms contain no cholesterol (some mushrooms actually provide statins for lowering cholesterol). Mushrooms also contain substantial amounts of calcium and iron and other essential minerals, as well as vitamins C and D, and a number of the B vitamins, including thiamine, and niacin.

Protein is arguably the most critical nutrient. Elementally, protein provides nitrogen, carbon, and oxygen and some sulfur. Protein is our main source of nitrogen. The most commonly eaten mushrooms (*Agaricus*, *Pleurotus*, *Shiitake*) contain about 19-35% protein on a dry weight basis. This ranks mushrooms below meat, and at the same as level as milk and beans. Not all of the protein in mushrooms is digestible but the estimation of protein by using total nitrogen content multiplied by a digestibility factor takes this into account.

Proteins in our body are made up of 20 different amino acids. The 20 amino acids are like an alphabet. A unique sequence of amino acids creates a particular protein with a particular function. We can synthesize many amino acids ourselves from other amino acids and sugars. There are however nine essential amino acids which we do not have the machinery to make. These must be obtained in our diet. Mushrooms contain all nine essential amino acids. Amino acids are also the building blocks for hemoglobin and the nucleic bases that are used to make DNA and RNA.

Proteins provide structural, protective, and many

dynamic functions. For example: Collagen, the most abundant protein in vertebrates provides structure and strength to joints (among other functions). The immune system with its complex of responses is protein. Oxygen is transported by protein, as are many other compounds (glucose for example), the balance of charge across the cell is maintained by proteins. Almost all reactions: Catabolic (breaking down food and old tissue), and Anabolic (synthesizing or building cells, tissues, muscles, all that which makes us; us) are done by proteins.

Carbohydrates, also known as sugars, occur as simple sugars (e.g. glucose, fructose, ribose), disaccharides (e.g. sucrose, trehalose), amino sugars, and polysaccharides (among other forms). In *Agaricus bisporus* the carbohydrate content is about 60% (dry weight). *Pleurotus* species contain about 47-82% (dry weight) carbohydrates. Some of the carbohydrate content is in the form of dietary fiber such as chitin and β -glucan polysaccharides. These β -glucans are getting attention for their anti-cancer properties and their ability to stabilize glucose profiles of diabetic patients.

Much of the fat content in mushrooms occurs in the form of essential unsaturated fatty acids. In *Agaricus bisporus* 80% of the total lipid content is unsaturated. Linoleic acid makes up the bulk of the unsaturated fraction. Unsaturated fatty acids are needed for the synthesis of a group of molecules called the eicosanoids. The Eicosanoids include the prostaglandins, leukotrienes, and thromboxanes. They are most well known for initiating signaling response pathways that control inflammation and blood clotting.

Mushrooms are excellent sources of minerals. They are highest in potassium (K), followed by phosphorous (P), sodium (Na), calcium (Ca) and magnesium (Mg). They also contain the micronutrients copper (Cu), zinc (Zn), iron (Fe), manganese (Mn), and selenium (Se). According to The Mushroom Council the high content of selenium, compared to other produce, makes mushrooms a "health food". Selenium is part of our anti-oxidation protection and has been shown to be involved with cancer pathways, particularly prostate cancer prevention. However, selenium is toxic at high levels.

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Finally we consider vitamins. Mushrooms are probably best known for their ergosterol content. Ergosterol is pro-vitamin D and in the presence of sunlight it is converted to V-D. Ergosterol is also used to quantitate the growth of fungi in culture and in soils. Mushrooms are also a good source of thiamine (B1), niacin, biotin, and ascorbic acid (V-C). Only yellow mushrooms have appreciable amounts of vitamin A.

The Mushroom Council (<http://www.mushroom-council.org/>) has an excellent website which contains a great deal of information and links about mushroom nutrition, including a link to the USDA National Nutrient Database. Tables detailing the protein, amino acid, carbohydrate, lipid (fat), mineral, and vitamin content of various cultivated and wild mushrooms can be found in the references.

References:

<http://www.mushroomcouncil.org/>

<http://www.nutritiondata.com/>

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Mattila, Pirjo, et. al., Contents of Vitamins, Mineral Elements, and Some Phenolic Compounds in Cultivated Mushrooms., J.Agric. Food Chem., 2001, 49, 2343-2348

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Key (sort of) to last month's pictures. (Match the names to the pictures):

Agaricus sp., *Amanita bisporigera*, *Chlorociboria aeruginascens*, *Lycoperdon perlatum*, *Mycena interrupta(?)*, *Pleurotus pulmonarius*, *Ramaria sp.*, *Strobilomyces strobilaceus*, *Trametes versicolor*

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- 1) Save at least one whole untrimmed, unwashed specimen in a paper bag in the refrigerator.
- 2) Cook specimens for consumption thoroughly, approximately 10 minutes or more, until moisture has evaporated and edges begin to brown.
- 3) Eat only a small amount, then wait 24 hours before eating more.
- 4) NEVER eat large quantities of any mushroom.

As I requested at the meeting, if you are determined to try eating *A. muscaria*, please have them for breakfast, not for dinner. That way I'll get the call from Rocky Mountain Poison and Drug Center during the day, and not in the middle of the night.

(Speaker continued from page 1)

that forest managers have selected tassel-eared squirrels, *Sciurus aberti*, to be the official indicator of forest health and ecosystem sustainability. The steps leading to the discovery of this remarkable relationship and its current application in forest management policy and guidelines will be presented.

Blooming Bernardii

By Ellen Jacobson

They seem to be everywhere; on the edges of golf courses, city mainstreets and backstreets, vacant lots, bus stops, playgrounds, and anywhere else they can find a bit of bare dirt. The first bunch I saw this season in late June was in the City Park Golf Course. They had grown in round fairy rings consuming all in their greedy path and leaving behind barren scars on the manicured greens. Where two rings touched, they formed figure eights. We are, of course, looking at *Agaricus bernardii*, a prolific mushroom that has found a perfect home in Denver.

About 15 years ago, this fungi appeared in Littleton for possibly the first time. I tried to ID it, but had no luck. As close as I could get was *A. bernardii*, but dismissed that identification as it only grows near the ocean in California. I sent a sample back to Rick Kerrigan, the United States *Agaricus* expert, and to my surprise, he confirmed it as *A. bernardii*. It appeared to be growing in response to the magnesium chloride used in the Metro area as a snow and ice melter.

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And now, the rest of the story. The genus, *Agaricus*, has chocolate brown spores, a veil, and free gills that are never white. They are saprophytes or decomposers of organic matter. (Be sure to distinguish *Agaricus* from the genus *Amanita* which has white spores and white to off-white gills.) *Bernardii* has pink gills initially, a cottony veil that becomes socklike or peronate as the mushroom matures, a strongly inrolled often cracked or scaly cap in maturity; it is sturdy and very firm. When the mushroom is broken open or cut it turns pinkish red very quickly. This last characteristic distinguishes it from *A. bitorquis* which does not stain red. It smells somewhat musty or briney and grows in dirt usually in fairy rings or clusters.

A. bernardii is plentiful and many enjoy eating it. It does not dry well, but may be lightly sautéed and then frozen. In the past few days, there has

been a decrease in the fruitings, but our sturdy buddy may reappear with the August rains.



Photo Vera Evenson

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