

Next Meeting April 14th, 2008

SPORES Afield

The newsletter of the Colorado Mycological Society

April 2008



President's Column

As I mentioned last month, this column will be devoted to the 2008 Rocky Mountain National Park (RMNP) mycoblitz. The mycoblitz is a scientific endeavor, not a typical mushroom foray where mushrooms are collected for food. The purpose of this mycoblitz is to collect, identify, and begin an inventory of mushrooms that grow in RMNP. Examples of all specimens that are collected will be housed in the Denver Botanical Gardens Herbarium of Fungi. No other specimens will be allowed out of the park. In this column, I'll explain why it is important for the club and explain the details of the weekend.

We will meet at the research station in the park at 9 AM on both Saturday August 23rd and Sunday August 24th. I'll give a 15 minute introduction and distribute wax paper bags and collection tags for the mushrooms. We'll assemble into groups of 10. Each group will be led by a knowledgeable CMS member and each will be sent out to a different part of the park. I met with park officials a few weeks ago to pick locations that target a diverse set of mushroom habitats – we have some great habitat picked out. The more people we have, the more groups we have, the more sites we can hunt, and the more mushrooms we'll find. Participation is not restricted to CMS members, so be sure to invite a friend along.

Each group will have a number of responsibilities. Each group will bring back a single collection of each species they encounter. A collection will consist of a few specimens of a single species in a variety of developmental stages, if possible. A collection tag will be filled out and placed in a bag with each species, and necessary information will include which location they went to, the approximate elevation, habitat, nearby trees, etc. Between 1 and 2 PM, groups will meet back at the

Examples of all species that are collected will be housed in the Denver Botanical Gardens Herbarium of Fungi.

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April The speaker for the April Meeting is Hope Miller.

At times, the history of science is just as interesting as science itself. The race to liquefy Helium, the dispute between Luigi Galvani and Alessandro Volta regarding the nature of electricity, and Galileo's belief in the ignorance of experts all make the eventual discoveries that much more profound. Beatrix Potter's contribution to Mycology is equally compelling. In this month's presentation, Hope Miller tells us why.

Hope has authored a mushroom cookbook containing more than 320 recipes using both wild and commercial mushrooms. She was Orson Miller's constant companion in the field doing

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Morels Morel Workshop

Please join us before the April meeting from 6:30 to 7:30 for a presentation on the "How, When and Where" of finding morels in Colorado. Identification, habitat and plant and flower indicators will be shown together with strategies for maximizing the number of morels you take home for your dinner plate.

For anyone interested in finding morels, this is a "can't miss" workshop.

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Beatrix Potter

Hope (continued from page 1)

all manner of support work, such as collecting, recording, culturing, drying, and storing fungi. She has been on television, radio, The Denver Botanical Gardens, and many forays and mycology classes doing cooking demonstrations. She taught classes at the Open University at Virginia Tech on "How to know your mushrooms," lectured at a workshop in Thailand explaining collection, recording, and preservation of fungi, and has been the recorder at more than 100 fungus forays. She has also had a cooking column in the local Blacksburg newspaper and has received the Life Time Achievement Award for Contributions to Amateur Mycology from the Texas Mycological Society. ☺

Books For Sale

There is a table at our meetings filled with wonderful books available to our members at a discount. What you may not know is that a portion of the book sales also funds our programs. Please support the CMS by purchasing your mushroom reference books from us. ☺

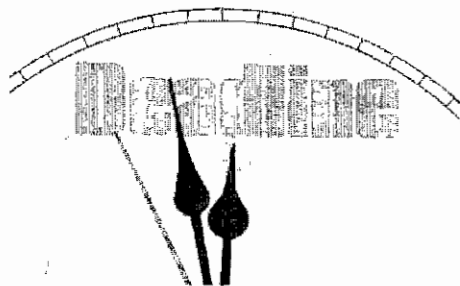
Spores Afield

President (continued from page 1)

research station for identification. We will fly in an expert to serve as the chief identifier, and identification will be similar to how we do it at our mushroom fair: mushrooms will be sorted, identified, documented, and finally packaged for the herbarium. To finish off the day, we will have a round-table discussion of the mushrooms we find - the mycoblitz will also be a learning experience.

The park has offered collectors free camping on Friday and/or Saturday night. You are encouraged to participate both days, or even drive up and camp over on Friday night if you'd like. I will have to provide the park with the names of those wishing to participate in the mycoblitz and the license plates of the vehicles that will be in the park that weekend. I don't have to provide this list until the beginning of August. In June, I will begin to make a list of members who are interested in participating.

This is a great opportunity for you to participate in the scientific collection of mushrooms, and a great way to learn new mushrooms. This is a very exciting event for CMS. It will not be successful without ample participation from the club, so I hope you can join us. ☺



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The deadline for submissions to the May addition of Spores Afield is the 15th of April. Photos, letters to the Editor (I'm tough, I can take criticism), artwork and topics you'd like to see covered are all welcome. Please email Gretchen at lindygrey@yahoo.com. ☺

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Upcoming Events

April 14th -

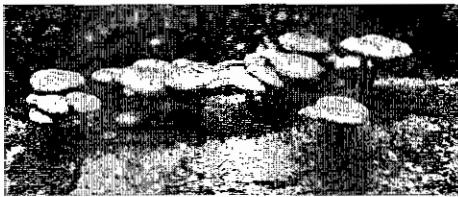
7:30 PM - Beatrix Potter

Hope Miller will be speaking about one of the most famous women mycologists of all time.

May 12th -

7:30 PM - Trees of Colorado

Dina Clark, botanist and curator of vascular plants at the Denver Botanic Gardens, will help us learn to identify those Colorado trees which constitute the habitat for so many of the mushrooms we love to hunt.



June 9th -

7:30 PM - Myco-restoration

CMS member Marc Donsky will discuss the use of fungi to help repair or restore ecologically harmed habitats.

July 14th -

7:30 PM - "Tricholomas"- CMS member Ed Lubow

August 17th -

Annual CMS Mushroom Fair at Denver Botanic Gardens. The Fair identifier this year is Else Vellinga.

August 18th -

7:30 PM - Else Vellinga

September 8th -

7:30 PM - Cook & Taste - A 10-minute introduction will be given by Rob Hallock on the mushrooms we will be eating.

October 13th -

7:30 PM - "Ethnomycology" - Dr. Roberto Garibay -

Coprinus comatus in February!?!?

By Gretchen Cheverton

A fall mushroom makes an early debut

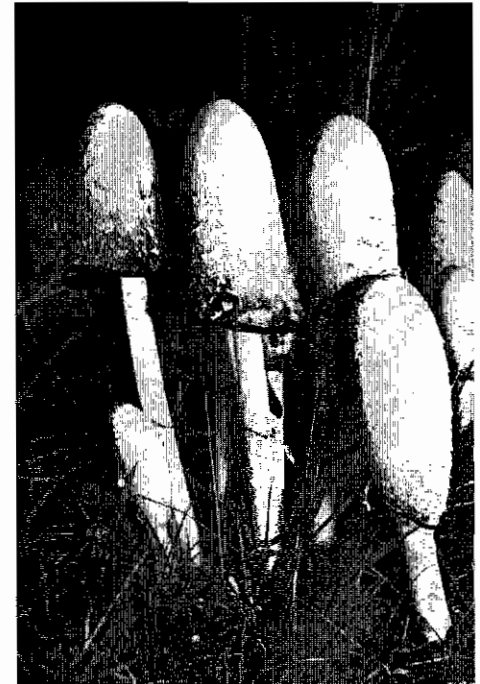
Bucking a longstanding trend of fall appearances, a stand of Shaggy Inkcaps (*Coprinus comatus*), as reported in an article by the Daily Mail [1], has emerged in February in South Devon, England. The historic tradition, now blatantly disregarded by the fungus, has been followed closely by Alan Gange from the University of London. The daring move by the fungus may be a simple case of confusion, though alternate theories attribute their emergence to a general warming of the southern English climate. Gange is quoted in the Daily Mail as saying, "I am quite astonished by their appearance now and can only assume it is because of the extraordinarily warm weather."

Gange analyzed 56 years of data [2,3] on the fruiting patterns of 315 fungal species and has noted a statistical link between general warming of the southern English climate and a longer fungal fruiting season in that region. He found that the current average fruiting season is more than double its 1950's average of 33 days. Beyond noting that the increased fruiting season follows the trend of increased August temperatures and October rains, he found a correlation between the first and last fungal fruiting and the local monthly temperature and rain records as noted in a recent study published in Science [3].

Sources:

[1] "The astonishing summer mushroom that has sprung before spring," Daily Mail, 25 Feb 2008. The article is available online at www.dailymail.co.uk.

[2] Alan Gange, "Climate Changes Means More Mushrooms," Scitizen, 2 May 2007. The article is available online at scitizen.com.



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[3] A. C. Gange, E. G. Gange, T. H. Sparks, L. Boddy, "Rapid and Recent Changes in Fungal Fruiting Patterns," Science 316, 71 (2007). See also the supporting online material at www.sciencemag.org.

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A little knowledge is . . . devastating

By Gretchen Cheverton

I unsuspectingly placed an order at Max's Gill and Grill, beginning a quest for the rare, divine and ultimately the disappointing. It was an innocuous decision that led to a downright positive experience, and then devolved into one of the darkest periods of my life. Some would say I'm prone to exaggeration but they haven't tried the Parmesan Truffle Fries.

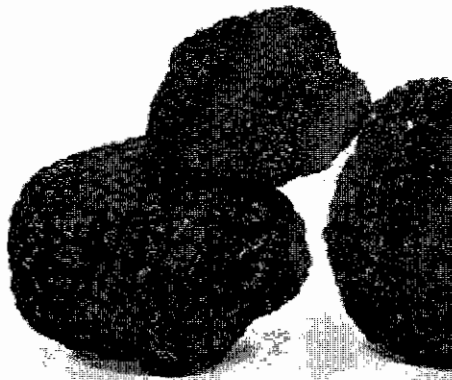
A truffle, as most of you probably know, is a type of fungi. A delicious, rare and really expensive fungus. In fact, a 3.3 pound white truffle (*Tuber magnatum*) from Pisa in Italy set the record in 2007 for the most expensive mushroom ever sold at \$330,000. What's more, this ancient fungal treasure is becoming more and more scarce in areas it's traditionally been harvested. In 1900, around 1,100 tons of Black Périgord Truffle (*Tuber melanosporum*) were harvested in France; presently the harvest is around 22 tons. Truffle markets are virtually barren, economies are suffering and food snobs the world over are going to starve. It's a genuine crisis. And guess what that's done to the prices?

The blame clearly lies on urban sprawl. Obviously on over harvesting. Undeniably on global climate change.... Someone said, anyway. Nonetheless, Europe is undeniably in the midst of a serious truffle shortage.

So you can see why I'd be excited to find such a rare flavor liberally sprayed over a side of fries at a neighborhood restaurant in south Denver. Just blocks from my home! I ate far more fries than Lobster Roll (which was also excellent by the way), and even found it necessary to swat the hand of my dining companion away from my heavenly fries more than once. I'd found a \$5.00 example of pure magnificence!

At my local Whole Foods the next day,

there was a bottle of Truffle Oil right there on the shelf for a mere \$14.99. Oh, the joy! How could I have possibly overlooked this dazzling and fundamental food?!? I pictured a campaign to replace the base of the food pyramid with Truffle Oil, imagined the delighted look on the faces of my friends as they drooled over the new heights of my culinary achievement (White Bean Hummus with Scallions and Truffle Oil?), and imagined the joy of scrambled eggs drizzled with the divine elixir for dinner on weeknights. Sigh.



© Christoph Hähnel - Fotolia.com

The euphoria of my find was short-lived. I googled Truffle Oil and boy am I sorry. The New York Times has broken my heart with an informative article about the true origin of Truffle Oil. Yep, you guessed it: a laboratory. Turns out most of the truffle oil sold in the US is light olive oil with a synthetic flavoring agent whose chemical name is 2,4-dithiapentane. I feel ripped off. I mean, REALLY betrayed. I checked the bottle in my fridge and there it was, right on the ingredient list, "Truffle Aroma."

We all have our passions in life and if I keep eating the way I have in the past, my passions will become visibly obvious. So far I've been pretty lucky in avoiding the humiliation of being weighed on the elephant scale at the zoo but it's not a possibility I've ruled out in my lifetime. I love food. I dream about mixing flavors, I fantasize about winning the lottery and traveling all

over the world just to try regional dishes. I've experienced some remarkably uncomfortable intestinal symptoms when I've shrugged off my friends shocked looks of horror as I ordered something questionable on the menu of a seedy café in Mexico ... but at the moment of consumption it was divine. So it would seem that my mycology habit and my food fixation would meet sublimely in the Truffle. But with my recent discovery of the sham that is truffle oil it dawns on me that I've never even tasted a Truffle. So I set out to try one.

If I lived in France and schlepped my way to the annual Christmas markets I'd pay a meager \$560 per pound. However, I live in Colorado and to get a pound of truffles shipped here -- overnight of course-- would cost me over \$4,400. If I could get them at all. That's around \$50 for a small truffle. I'm not holding my breath.

All around the globe intrepid entrepreneurs are betting on a long shot: growing truffles. February of 2007 saw the first commercial quantity of — — Black Périgord Truffle (*T. melanosporum*) in the Western Hemisphere on a farm in Tennessee, and others are hot on their trail. New Zealand has grown Black Périgord truffles for years. Oregon has long been enjoying its own species of both white and black truffles. Wiltshire, in the UK, experienced a bumper crop of Summer Truffles (*T. uncinatum*) and China grows two varieties in large quantities, although some connoisseurs turn up their noses at them all.

The high prices commanded for truffles has brought new opportunities to the unscrupulous. Thieves dig truffles from orchards before farmers can harvest them, dealers are robbed of their stock and inferior Chinese truffles are substituted for their more expensive cousins.

I guess for now the taste of a true truffle will remain a distant dream. I bet they suck anyway. ☹

Secrets Of Cooperation Between Trees And Fungi Revealed

ScienceDaily (Mar. 6, 2008) — Plants gained their ancestral toehold on dry land with considerable help from their fungal friends. Now, millennia later, that partnership is being exploited as a strategy to bolster biomass production for next generation biofuels. The genetic mechanism of this kind of symbiosis, which contributes to the delicate ecological balance in healthy forests, also provides insights into plant health that may enable more efficient carbon sequestration and enhanced phytoremediation, using plants to clean up environmental contaminants.

These prospects stem from the genome analysis of the symbiotic fungus *Laccaria bicolor*, generated by the U.S. Department of Energy Joint Genome Institute (DOE JGI) and collaborators from INRA, the National Institute for Agricultural Research in Nancy, France, and published March 6 in the journal *Nature*. This international team effort also involved contributions from 16 institutions, including Oak Ridge National Laboratory; Ghent University, Belgium; Lund University, Sweden; Goettingen University, Germany; CNRS-Aix-Marseille University, France; Nancy University, France; and the University of Alabama, Huntsville.

In a manner of speaking, trees are the lungs of the earth. They draw CO₂ from the atmosphere and convert it into sugars, which then become a source of energy. In the process they breathe O₂ back into the atmosphere. This "green" production of biomass — trees account for 90% of the planet's land-based biomass — is a major influence on the health of our planet.

Trees' ability to generate large amounts of biomass or store carbon is underpinned by their interactions with soil microbes known as mycorrhizal fungi, which excel at procuring necessary, but scarce, nutrients such as phosphate and nitrogen. Most of these nutrients are transferred to the growing tree. When *Laccaria bicolor* establishes a partnership with plant roots, a

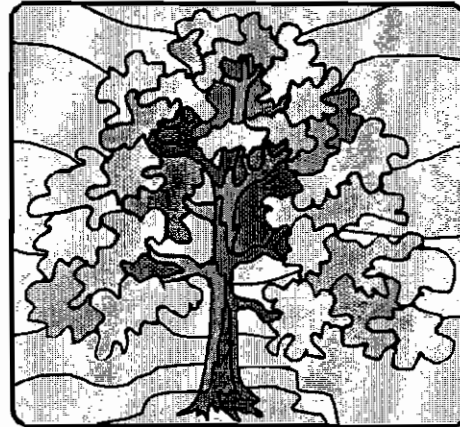
mycorrhizal root is created. The fungus within the root is protected from competition with other soil microbes and gains preferential access to carbohydrates within the plant. Thus, the mutualistic relationship is established.

"Forests around the world rely on the partnership between plant roots and soil fungi and the environment they create, the rhizosphere," said Eddy Rubin, DOE JGI Director. "The *Laccaria* genome represents a valuable resource, the first of a series of tree community genomics projects to have passed through our production sequencing line. These community resources promise to advance a systems approach to forest genomics."

Rubin indicates that by using DNA sequence to survey the forest ecosystem, from the plants to symbiotic and pathogenic fungi, researchers can ultimately optimize the conditions under which a biomass plantation would thrive. "We now have the opportunity to gain fundamental insights into plant development and growth as related to their intimate interaction which symbiotic fungi. These insights will lead to bolstered biomass productivity and improved forests."

Laccaria bicolor occurs frequently in the birch, fir, and pine forests of North America and is a common symbiont of *Populus*, the poplar tree whose genome was determined by the JGI in 2006. The analysis of the 65-million-base *Laccaria* genome, the largest fungal genome sequenced to date, yielded 20,000 predicted protein-encoding genes, almost as many as in the human genome. In sifting through these data,

researchers have discovered many unexpected features, including an arsenal of small secreted proteins (SSPs), several of which are only expressed in tissues associated with symbiosis. The most prominent SSP accumulates in the extending hyphae, the tips of the fungus that colonize the roots of the host plant.



"We believe that the proteins specific to this host/fungus interface play a decisive role in the establishment of symbiosis," said Francis Martin, the *Nature* study's lead author. This genome

exploration led Martin and his CNRS-Marseille University and DOE JGI colleagues to the unexpected observation that the genome of *Laccaria* lacks the enzymes involved in degradation of the carbohydrate polymers of plant cell walls but maintains the ability to degrade non-plant cell walls, which may account for *Laccaria*'s protective capacity. These observations point towards the dual life that mycorrhizal fungi like *Laccaria* possess, that is, the ability to grow in soil fending off pathogens and using decaying organic matter while serving as a custodian of living plant roots.

The genome, Martin said, shows a large number of new and expanded gene families compared with other fungi. Many of these families are involved in signaling and other processes that drive the complex transition between two distinct lifestyles of *Laccaria*: the benign saprotroph, able to use decaying matter of animal and bacterial origins, versus the symbiont, living in mutually profitable harmony with plant roots. The team also discovered new classes of genes that may be candidates for the complex communication that must

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Trees (continued from page 5)

occur between the players in the host/plant subsoil arena during fungal development. They report that fungi play a critical role in plant nutrient use efficiency by translocating nutrients and water captured in soil pores inaccessible to roots of the host plant.

"The *Laccaria* genome sequence, its analysis, associated genomics, and bioinformatics tools provide an unprecedented opportunity to identify the key components of organism-environment interactions that modulate ecosystem responses to global change and increased nutrient input needed for faster growth, said Martin. "By examining and manipulating patterns of gene expression, we can identify the genetic control points that regulate plant growth and plant-mutualist response in an effort to better understand how these interactions control ecosystem function."

Mycorrhizae are critical elements of the terrestrial ecosystems, Martin said, since approximately 85 percent of all plant species, including trees, are dependent on such interactions to thrive. Mycorrhizae significantly improve photosynthetic carbon assimilation by plants.

"Host trees like *Populus* are able to harness this formidable web of mycorrhizal hyphae that permeates the soil and leaf litter and coax a relationship for their mutual nutritional benefit," said co-author DOE JGI and Oak Ridge National Laboratory researcher Jerry Tuskan. "This process is absolutely critical to the success of the interactions between the fungi and the roots of the host plant so that an equitable exchange of nutrients can be achieved." The DOE JGI and its collaborators have now embarked on characterizing several other poplar community symbionts that will provide a more comprehensive understanding of the biological community of the poplar forest. These include *Glomus*, a second plant symbiotic fungus, *Melampsora*, a leaf pathogen, and several plant endophytes, bacteria and

fungi that live inside the poplar tree.

"DOE JGI's expanding portfolio of community genomes provides the researchers with a set of resources that can be used to map out the processes by which fungi colonize wood and soil litter. These fungi interact with living plants within their ecosystem in order to perform vital functions in the carbon and nitrogen cycles that are so fundamental to sustainable plant growth," said Tuskan.

The DOE JGI *Laccaria* effort was led by Igor Grigoriev. Other authors include Andrea Aerts, Erika Lindquist, Asaf Salamov, Harris Shapiro, Peter Brokstein, Chris Detter (Los Alamos National Laboratory), the DOE JGI Production Genomics Facility sequencing team led by Susan Lucas, and partners at the Stanford Human Genome Center, Jane Grimwood and Jeremy Schmutz.

Adapted from materials provided by DOE/Joint Genome Institute. ☉

Compound Safely Quells Bee-Killing Chalkbrood

ScienceDaily (Mar. 11, 2008) — From rabbits to horses to cows, many animals love alfalfa. America's premier pollinator of that crop, the alfalfa leafcutting bee (*Megachile rotundata*), is vulnerable to a deadly fungal disease called chalkbrood. But the bees might be best protected from chalkbrood if their leafy nests are sprayed with an iprodione fungicide, according to Agricultural Research Service (ARS) entomologist Rosalind R. James.

Caused by the *Ascosphaera aggregata* fungus, chalkbrood kills bees while they're larvae—wormlike young that hatch from eggs laid in nests by female bees.

Healthy larvae spin cocoons within those nests, and later emerge as young bees.

But chalkbrood-infected larvae may die before cocooning, according to James. She leads the ARS Pollinating Insect Biology, Management and Systematics Research Unit in Logan, Utah.



Microscopic spheres, called fungal spores, on dead larvae serve as potent reservoirs of the disease. A healthy female alfalfa leafcutting bee may—after emerging from her cocoon and nest in spring—inadvertently pick up some of those spores. If she spreads them to nests that she makes for her eggs, she may doom her young.

James worked with alfalfa seedgrowers in Washington to determine how to best protect alfalfa leafcutting bees from chalkbrood. The disease is so pervasive in the United States that these seedgrowers buy at least 50 percent of their alfalfa leafcutting bees each year from Canada, where chalkbrood is less prevalent.

In experiments, James sprayed an iprodione fungicide on the leafcutting bees' nests in spring, shortly before the adult bees left their cocoons and nests. The treatment reduced the incidence of chalkbrood in the bees' next generation by up to 50 percent, with no measurable loss of young, James reported.

Continued on page 7

Bees (continued from page 6)

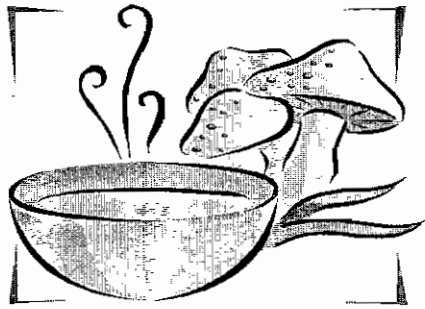
Now, James and her colleagues are looking for fungicides that may be even more effective.

The research is part of ongoing studies to discover more ways to safeguard wild bees, so they can help America's harried honey bees with pollination chores.

Adapted from materials provided by US Department of Agriculture.

Reuters. "Compound Safely Quells Bee-Killing Chalkbrood." ScienceDaily

Fruits of THE FORAY



MUSHROOM RECIPES FOR GOOD DINING

The recipes this month come from Hope's Mushroom Cookbook by Hope Miller. We've asked her to pick out some of her favorites for us. Her book will be available for purchase at the April meeting. Members receive a discount. If you're lucky Hope will even sign your copy!

Mushroom Bacon Salad

Yield 6-8 servings

1 lb medium sized fresh mushrooms, sliced about 1/8 inches thick
3 green onions (including part of the

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tops), thinly sliced
2/3 cup salad oil or olive oil
4 Tbsp lemon juice
1 tsp Worcestershire sauce
1/2 tsp each salt and dry mustard
1/8 tsp pepper
12 slices of bacon, cooked well and crumbled
lettuce, torn into bite-sized pieces

Place mushrooms in a bowl. Combine onions, oil, lemon juice, and spices in a jar and shake well to blend. Pour over mushrooms. Toss together to mix well. Cover and refrigerate overnight or at least 4 hours. Stir several times. Just before serving, add bacon, and lettuce. Toss to cover with dressing and serve.

Mushroom Asparagus Soup

Yield 4 servings

1 1/2 to 2 lbs asparagus
1 Tbls butter or margarine
3 green onions, thinly sliced including tops
1 3/4 cups chicken broth
1/4 lb mushrooms, sliced
1/4 cup salsa
1 cup milk
1/2 cup shredded Monterey jack cheese
Salt and pepper to taste

Melt butter in 4- to 5-quart saucepan over medium heat. Saute onions and mushrooms, approximately 3 minutes. Add broth and asparagus whole. Bring to boil and then simmer until asparagus is tender but not limp. Snip off tips of 8 spears and reserve. Continue to simmer until very tender but not limp, maybe 5 minutes more. Place asparagus spears with broth and salsa in a blender. Puree, and then return to the pan, adding the milk and stirring until steaming hot. Use a medium heat. Ladle into bowls, sprinkle with cheese, and garnish with reserved asparagus tips.

Cheesy Mushroom Sticks

Yield: 8 dozen 3 x 3/4 inch sticks

350 Degree F oven, 35 minutes

Saute together:

1/2 cup butter or margarine
1/2 lb mushrooms, sliced, such as Morels, Shiitake, or Agaricus
1 medium onion, chopped
2 cloves garlic, chopped
1 green pepper, chopped

Mix together:

10 eggs, beaten
2 cups cottage cheese
1 lb Monterey Jack cheese, shredded
1/2 cup flour
1 tsp baking powder
3/4 tsp each nutmeg, basil, salt

Combine with mushroom-onion mixture, and put into a cookie sheet with sides (size 17 1/4 by 11 1/2). Bake for 35 minutes or until set. Cool for 15-20 minutes before cutting into small sticks, approximately 3/4 inches. Will keep in refrigerator for 2 days. May be reheated. NOTE: could be cut into squares and used for luncheon with salad and bread.

Puffball Parmesan

Slice puffballs 1/2 inch thick. Dip in flour, then in beaten egg which has been thinned with a tablespoon of water, then in Parmesan cheese. Fry in a pan with butter or margarine until each side is golden brown. Cut into small pieces and serve with toothpicks. Also may be used as a vegetable in a manner similar to eggplant.

(NOTE: Make sure you cut the puffball from the top to the point of attachment to the ground. It should look like you have cut through a block of cream cheese and should be pure white throughout. It will have a bad taste if it has started to change color).

Call for entries -

CMS is accepting submissions of photos for the 2009 mushroom calendar!

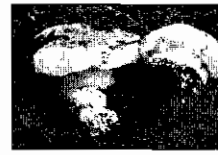
The 2008 mushroom calendar was so successful that we are starting to plan for the 2009 calendar. It sounds early for planning, but we need to have the calendar to the press in late July so it's ready for the August mushroom fair. The deadline for photo submissions is June 15th. There is plenty of time to find and photograph some nice spring mushrooms (morels, snowbank fungi, city mushrooms, etc.). Any good mushroom photo will be considered. One of our primary goals is to make the calendar a tool for learning new fungi, so special consideration will be given to pictures of mushrooms that are not found in the book "Mushrooms of Colorado". Please e-mail your photos to me at Rob.Hallock@UCHSC.edu, and include your name as you want it printed on the photo. Any medium or high resolution digital photograph will be fine. Thank you in advance for the pictures.



Trametes versicolor



Leucocoprinus birchbaumii



Hygrophorus subalpinus

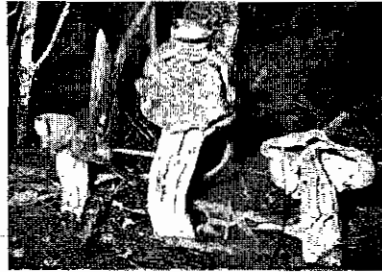


Morchella esculenta



Polyzellus multiplex

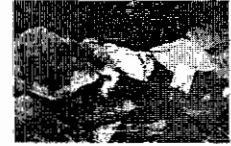
Colorado Mycological Society 2008 Calendar



Helvella lacunosa



Helvella crispa



Tricholoma papulifum



Pleurotus pulmonarius



Clavaria purpurea



Amanita muscaria



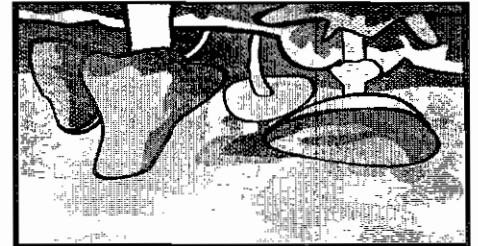
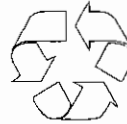
Boletus edulis

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