



Spore Print

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Macrolepiota rhacodes, The Shaggy Parasol

(a.k.a. *Lepiota rhacodes*, *Macrolepiota rhacodes*)

When asked what their favourite edible mushroom is, many people say the old standards; morels, king boletes, portabellas, etc. But when I am asked, eyebrows either lift in interest or are furrowed in confusion when I unequivocally state "*Macrolepiota rhacodes*". Most edible mushrooms are a variation on the theme of the basic mushroomy flavour – some a little more earthy like morels, some a bit sweeter like chanterelles, others with different textures - and although there's certainly nothing wrong with a mushroomy flavour, it can get a little old. You can spice them up and cook them in creative ways to be sure, but the great thing about the Shaggy parasol is that you don't have to! They have a unique and delicious nutty flavour that stands out on its own, and makes any mushroom dish unique. So, being a bit of a unique person (read "oddball") myself, I can't help but love the "shaggies".

Another great thing about shaggy parasols is that when you find just one, you've got a meal. No coming home from a foray with



Macrolepiota rhacodes usually appear in groups and are easy to identify but can be mistaken for a non-edible variety. Photo courtesy: Loretta Puckrin.

two morels or one hedgehog thinking, "What am I going to do with this puny thing?" With a single mature shaggy in hand, you have to think, "What will I do with the leftovers?" And I do recommend waiting until they are mature – you get a bigger meal, they rarely go buggy, and they taste just as good big in my humble opinion. As if you needed more

reasons to love them, they almost always appear in large gregarious groups, produce several crops per year, and come back year after year. It should be noted that some people have gastric reactions to shaggies, and it is best to cook them with high heat because they can become a bit watery.

(The *Macrolepiota rhacodes* ...continued on page 3)

FEATURE MUSHROOM
Macrolepiota rhacodes
... pg 1

RECIPE
... pg 5

PRESIDENT'S MESSAGE
Welcome to 2006 and another successful year
... pg 2

WEIRD & WACKY
... pg 4

WHAT IS A FORAY?
... pg 5

AGM
What a way to start the year off
... pg 6 & 7

NAMA FORAY
... pg 10

PAST EVENTS
Polypore Foray
... pg 7

FORAY 2005 UPDATE
page 8

UPCOMING EVENTS
... pg 9

MEDICINAL MUSHROOMS
... pg 11 & 12

Macrolepiota rhacodes

(continued from page 1)

Now that I've got you completely convinced of the superiority of *M. rhacodes* you of course want to know where to find them. First shot: check your yard: I found my first shaggies growing in mine. Then check your neighbours', the park down the road, or other disturbed areas, especially near conifers, shrubs, and compost (but in woods and fields occasionally too).

Shaggy parasols are pretty easy to recognize, if you know what to look for. *If not, you could mistake it for a deadly Amanita or Lepiota and die: not the recommended course of action.* Their size is the first clue. The caps are 5-20 cm across (although I've rarely seen a mature mushroom less than 15 cm across), and lack an umbo (a swelling or bump at centre of cap). These features distinguish it from the generally smaller and usually umbonate Lepiomas. The caps have a whitish background with large, light to dark brown scales that go



The Shaggy Parasol with one of the near 'look alikes'. The cap is not as scaly and the veil is substantially different. This particular look-alike is non-edible and tends to grow shorter than the average parasol mushroom.



The gill structure of the Shaggy Parasol is strongly notched with varying length of gills. Although the gills detach very easily, they should be taken as part of the harvest. On mature species, the stipe may be very fibrous, so, some people only pick the caps.

fairly equally all the way to the margin – again unlike most Lepiomas, which have smaller scales that tend to be concentrated towards the middle in mature mushrooms, although this may not be clear until the cap is fully extended. Note that they are scales (sections of cap that have curled up), and not warts (sections of universal veil that sit relatively flat on the surface, and start loose but may become attached with time) like the poisonous Amanitas. Shaggy parasol scales are soft and fragile and come off easily; just lightly rubbing the cap is usually enough to get your hand covered in them. Like Amanitas and Lepiomas, however, the gills are free and the spore print is white. The spore print becomes very important if the mushroom is found in a greenhouse, by a recently-planted plant, or in warmer climates, as the poisonous *Chlorophyllum molybdites* is virtually indistinguishable aside from its green spore print; however, *C. molybdites* does not appear to be able to survive in our cold climate.

Like the cap, the stipe or stalk of the shaggy is also huge (5-24 x 1-3 cm, although again I've never seen them below 10 cm tall). It is smooth (no scales!), hollow, and whitish becoming reddish brown in age. On the stipe is a huge, thick annulus - a biteful in itself! - that is collar-like (not skirt-like) and double-edged. The stipe base is always thick and bulb-like (to 7 cm), and may be mistaken for an



One of the characteristics of the Shaggy Parasol is the rapid staining which occurs when the mushroom is cut.

indistinct volva; however, the cap featuring darker scales on a lighter background instead of lighter warts on a darker background, as well as the annulus characteristics, reliably distinguish *M. rhacodes* from similar Amanitas. Another distinguishing characteristic comes when you cut the mushroom, and the white flesh of the cap, gills, and the entire stipe quickly turns reddish, especially around the edges.

So there you have it. The shaggy parasol is big, beautiful, and delicious. If you haven't tried one yet, get going! Then, the next time someone asks you what your favourite mushroom is, you might just move some eyebrows.

Michael J. Schulz

Weird and whacky fungi

– how some fungi and some plants mimic each other

Mimicry from a biological perspective is defined as “the resemblance of one organism to another or to an object in its surroundings for concealment and protection from predators”. You probably have seen the “walking stick insect”, which resembles a twig on a plant, or heard of some butterflies that resemble other butterflies with known defense mechanisms, such as spines or toxic chemicals on their exoskeletons.

There are thousands of examples worldwide. In all cases, mimicry in animals is used as a defense mechanism to avoid being eaten by a predator. Well, there’s a new kid in town...

Flowering plants produce flowers and scents to attract pollinators, such as insects or bats. In some cases, these scents are delightful, in others they’re putrid. In any event, they get the job done and the plant can produce seeds following pollination. From a reproduction perspective, usually only the plant benefits from this interplay (although the insects often get some nectar as well). Here is where it gets interesting. Some flowers emit scents and produce flowers that mimic mushrooms to attract specific pollinators. Classic examples include fungus gnat flowers, such as species belonging to the flowering plants *Asarum* (wild gingers), *Aristolochia* (dutchman’s pipe or pipevine), *Arisarum* (mouse plant), *Arisaema* (jack-in-the-pulpit or cobra lilies), and *Dracula* (orchid, sorry, it grows in South America, not in Transylvania). Almost all of these plants have some species



Figure 1. The *Dracula chestertonii* has developed features and scents that attract fungus flies and help pollinate the flowers.

growing in North America, including Canada.

For example, *Dracula chestertonii*, common in the Colombian Andes, is an orchid that grows a large lip that resembles the underside of a gilled basidiomycete (Figure 1; Kaiser 2006). Along with the emitted mushroom scent, females of the fungus fly are attracted to the visual and olfactory cues of this flower, lay their eggs into the lip, and pollinate the flower at the same time. Sadly, the eggs never hatch. Other species of *Dracula*, such as *D. vampira* and *D. chimaera*, use a similar approach to attain pollination at the expense of fungus flies. There are four chemicals that constitute about 70% of the volatiles this plant emits to attract the insects (Kaiser 1993). The names of these chemicals are not important, suffice it to say that they are complex organic molecules also produced by fungi.

Another striking example of mushroom mimicry is that of *Aristolochia arborea*, a small tree growing in the Central American rainforests. It produces flowers at the base of its stem, which are perfect imitations of *Marasmius* fruiting

bodies (Neinhuis et al. 1994). To attract pollinators, again some poor fungus gnats, the flowers emit an earthy, meaty, mushroom scent. The major volatiles are all terpenoids, which are common in many essential oils derived from plants, e.g., camphor.

So, some plants can mimic fungi. What about the other way around – fungi mimicking plants?

The rust fungi, a

group of pathogenic basidiomycetes, are experts at mimicking plants. Rust fungi belonging to the genus *Uromyces* can form impressive pseudoflowers when they infect *Euphorbia cyparissias* (Cypress spurge, common to North America and Eurasia; Figure 2). Like the true flowers of this plant, the rust fungus’ yellowish pseudoflowers produce a flowery scent and sweet-smelling nectar on its surface to attract insects, which end up transferring fungal reproductive structures to other plants (Pfundner and Roy 2002). The chemical constituents of these volatiles vary and are quite complex in nature, often varying slightly among regions and among the species of the rust fungi.

Witch’s Broom, caused by the rust fungus *Puccinia arrhenatheri* on *Berberis vulgaris* (barberry), is another example of a fungus mimicking a plant to further its own cause, namely dispersal of propagules (Naef et al. 2002). Infected leaves of barberry appear yellowish, reminiscent of flowers, and emit a strong fruity and/or

(Weird and Wacky ...continued on page 10)





What to expect from a Mycological Foray

When my sister and I first joined the Edmonton Mycological Society we did so to enlarge our knowledge of edible mushrooms. We knew that there were many mushroom which we were not picking as we weren't comfortable with identification. In our opinion going to the foray was to find great picking locations and have a timely harvest of edible mushrooms.

Although this can happen we learned that we were wrong in our idea of the purpose of EMS forays.

Think in terms of a field study rather than a harvesting session.

The forays are wonderful opportunities to increase your knowledge of fungi – and not just the edible kind. The diversity is truly amazing! As you learn more about identification you will find that it is not as simple as seeing an illustration in a book and understanding which mushroom to pick. If that were the case there would be no need of identification forays. Some varieties are easy to spot while others require microscopic, or even DNA testing, to make the identification reliable.

Fortunately there are a large number of fungi that are more easily identified. It is those which the forays address.

- ❖ Be prepared to pick one sample of a mature member of each new species (new to you that is) and bring them to the common area for identification. Young specimens are not normally developed enough to identify.
- ❖ Be prepared to spend the entire day on site to allow for adequate time for the foray, identification and meals.
- ❖ Be prepared to learn.
- ❖ Be prepared for identification with your mushroom key, mushroom book and magnifying glass. A sharp knife to bisect the fungi is

also a handy tool. Normal hiking items such a bottled water, sun hat, sun screen, insect repellent, wet weather gear, camera or drawing materials, etc. are always handy on a foray.

Use the foray to increase your knowledge and help the association increase the data about fungi in Alberta. We have been discovering new species and species never before recorded as growing in Alberta. Sometimes these discoveries are more of a reward than finding a field of edibles.

The primary result of our forays is an enjoyable day with people who have similar interests in the great outdoors. Come rain, come shine – the forays will happen and the fun will flow. And at the end of the season you will find that instead



Photos courtesy: Loretta Puckrin

of knowing only 3 edible mushrooms you will have discovered and developed comfort in positive identification of more than 10 edibles. You will have learned what type of terrain your favourite varieties prefer. You will be well on your way to finding your own 'private' sites to fuel your harvesting trips. Come, enjoy and learn – the mushrooms will follow.

 Loretta Puckrin

Recipe

Mushroom Soup

Ingredients:

- 1 cup each of both Shaggy Mane and Shaggy Parasol mushrooms. Keep the mushrooms separate. Chop each into bite-sized pieces
- 4 tbsp butter
- 1 medium onion chopped
- 1 clove garlic - crushed
- 3 3/4 cup of stock (*chicken is preferred but any stock will do*)
- 4 tbsp of cream
- 2 tbsp of lemon juice
- Salt and Pepper to taste

1. Take 1/2 of the butter and fry the Shaggy Mane mushrooms with the onion and garlic until all are soft.
2. Add the stock and bring to a boil. Simmer for 15 minutes.
3. Put in a blender and liquify.
4. Melt remaining butter and cook the Shaggy Parasol mushrooms until soft. Add the parasol mushrooms to the liquified stock. Bring to a boil.
5. Add cream and lemon juice.
6. Serve with additional cream swirled into the soup for contrast.
7. Serve with parsley or garlic bread.

Recipe courtesy of Loretta Puckrin



Another First and a Huge Success

The Edmonton Mycological Society's First Full Day Annual General Meeting



Some of the members that attended our first all day annual general meeting

The Edmonton Mycological Society Annual General Meeting was held on Saturday, February 25, 2006 in the Pine Room at the Northern Forestry Centre.

The all day event had many interesting and informative moments.

The meeting began with the President's report. Markus highlighted our many accomplishments of 2005 and discussed some year end goals and long term goals that he envisions for the Society. Among the year end goals were: increasing membership to 175; more members from outside the Edmonton area; the conclusion of the Provincial Mushroom Campaign headed by PAWMA.

Among the long term goals were: becoming the leading authority on mycology in Alberta and Western Canada; a name change that would be more inclusive of Albertans; chapters

in other major centres; a membership goal of 500; scholarship fund for mycology students.

Reports from the other members of the executive followed including our financial status.

The first presenter of the day was Dr. Adrienne Rice and her topic "*Blue-stain fungi associated with mountain pine beetle in Alberta*" was both informative and of concern to all of us who love to walk in the Albertan forests and pick mushrooms and enjoy nature. The combination of the mountain beetle and the blue-stain fungi has decimated huge areas of lodgepole pine in British Columbia and there is a fear that they will attack our jack pine here in Alberta. Evidence has already been documented of their destructive powers here in Alberta. Research is being done to see what can be done and what environments the beetle and the fungi need to flourish.

Robert Rogers had a presentation of "*Hallucinogenic mushrooms*" and for all those who have asked "What are they?"; "Do they grow in Alberta?"; "What are the effects? -- well, they should have attended the AGM. We have a wealth of psycho-active mushrooms in this province that need further investigation especially the part they may play in our evolution.

Our third presenter was Melissa Day on "*Fungal diversity in arctic and alpine ecosystems*". Her talk was both humorous and informative on the relationships between various groups of fungi and their effect on the ecosystems that they inhabit.

Melanie Fjoser updated us on the "*Pick A Wild Mushroom Association*" progress and surprised us with the official unveiling of "A Provincial Mushroom" poster and bookmarks. Everyone who attended the meeting were given both posters and bookmarks to take home and give to friends and businesses (see our website for more information on what they are and how to get some).

Martin Osis provided information on the upcoming **NAMA Foray that will be held in the Hinton area August 17-20, 2006**. Some of the best scientists from around the world will be there to identify the mushrooms that are found during scheduled forays in various areas around Hinton and William A. Switzer Provincial Park. We will be able to obtain photos, learning about identifying mushrooms and attend lectures that will be given throughout the weekend.

Our club will be involved to a certain degree and Martin will need



Whitemud Creek Foray

- February 26, 2006

As a follow-up to the Annual General Meeting, members of the Edmonton Mycological Society met at Whitemud Creek for a Sunday morning Polypore foray. First, I need to apologize to anyone who may have come and missed the parking lot as I had propagated some misinformation that I had received.

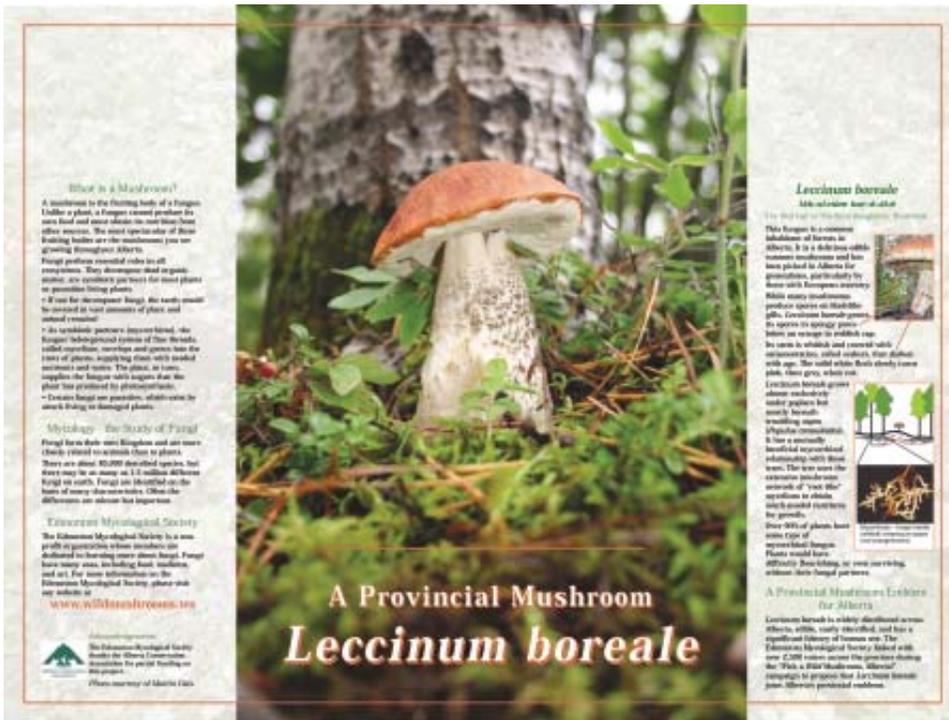
In all five people showed up for the walk in the old growth forest along the Whitemud Creek. In total 16 species were identified. In addition, five unidentified species were collected for future determination.



Bill Richards

Species List

- Bisporella citrina*
- Chlorociboria aeruginascens*
- Exidia truncata*
- Fomes fomentarius*
- Fomes pinicola*
- Fomitopsis cajanderi*
- Ganoderma applanatum*
- Hypoxylon mammatum*
- Hypoxylon cf. fragiforme*
- Phellinus punctatus*
- Plicaturopsis crispa*
- Nectria cinnabarina*
- Spongipellis unicolor*
- Stereum hirsutum*
- Stereum striatum*
- Trametes elegans*



The fronts of our new bookmarks. On the backs of each bookmark there is information on the mushroom that appears on the front. Also a look at our new poster. The PAWMA Committee has done an excellent job and deserve a huge THANK YOU.



many of us to volunteer in various areas:

- ❖ a need for Foray leaders.
- ❖ members to man the registration tables.
- ❖ transportation coordinators
- ❖ members to man the vendor tables.

These are some of the main areas that volunteers will be needed. If you can make a commitment, please let Martin know.

The Photo Contest 2005 Winners were also shown as well as some examples of what to do when taking photos and what not to do,

especially if you are entering the contest. We are encouraged to take our cameras into the field and get pictures. These will be invaluable as our database is being setup and photos are very important.

There will be a Photo Contest 2006 as well. For updates on the contest and to see the 2005 winners, please access our website: www.wildmushrooms.ws

Oh yes!!! and then there was the Potluck Lunch. It was mushroom heaven. The number of dishes that arrived containing mushrooms was awesome and all the food was excellent.



Geraldine Kolacz

Foray review 2005

As most of our membership knows, we try to maintain a fairly active foray schedule, which we hope to continue into the future.

Annual Forays

The introduction of a **Winter Polypore Foray** several years ago has extended our season several months and allows me at least to spend more time in the "bush". On March 12 we had approximately [I do a better job of recording the fungi than the forayers'] 14 members out to Poplar Creek Natural Area, west of Breton. Twenty-three species were noted, some of which were not polypores, like *Russula nigricans*, which we found because of the low snow cover under the white spruce. No unexpected polypores were seen.

Our **Annual Morel Foray** on May 14 in Jackpines Provincial Grazing Reserve, south of Gainford was a huge hit even if the morels were few. I was unfortunately not available but the 30 or so participants had a good time by all accounts. From a mycological standpoint, it was very interesting with a wide arrangement of ascomycetes available for immediate comparison. These included *Gyromitra esculenta*, *G. gigas*, *Morchella elata*, *Verpa bohemica* and *V. conica*.

Thirty participants attended our **Poplar Creek Oyster Mushroom Foray** held June 18-19, where we had weekend campout and pig-roast with other great foods and many fungi. It was wet, however and why that should disturb mycophiles, I will never know. Thanks to Pieter for arranging the warm dry New Moose Hill Hall for our use and to all the other organizers and participants. Identification sessions and lectures were also provided. Oyster mushrooms were among the 51 species found but their low numbers attest to the continual habitat change of the area.

Our **New Members Field Orientation** on July 9-10 at Ashland Dam gave new and old members 45 species to study. The king bolete failed to show to the disappointment of all who were expecting his presence, but this king does no one's bidding.

The August 6 forays "to various habitat" for the pre-expositions



Bill Richards, EMS's Foray coordinator, studies his books as he identifies the varied mushrooms that were picked by EMS members on a foray. Photo courtesy: Loretta Puckrin

collections were very productive, I have yet to see a final species count but collections were a great success again.

Our **Foothills Foray** took us to Lambert Creek and area on August 27-28. A species new to most of us *Chanterelle tubaeformis* was found, and a *Boletus* sp., which has yet to yet to be identified. Most of the 14 participants camped out giving us more time to identify 43 species.

Our **First Alberta Wide Foray** was an exceptional success. It was held in the vicinity of Crimson Lake Provincial Park on Sept 3-5. We acquired a collection permit, which allowed us to collect within the park.

Thanks to all those who participated and a special thanks to Dr. Leonard Hutchison who assisted with the identifications. We had phenomenal success with over 220 species identified (all groups); 120 species of *Cortinarius* identified to genera; 20 species of *Russula* identified to genera; six *Lactarius* species identified to genera and nearly 200 more specimens yet to be determined. We may even have some new species for the province and possibly one new to North America. We also found some truffles thanks to Dr. Hutchison.

A much smaller group again met at the **Lambert Creek** area on September 10. As it was wet, we did a non-scientific pot collect only.

Summer Evening Forays

We had four well-attended evening forays. The first was at **Sherwood Park Natural Area** on June 8. Nearly a dozen participants braved the few mosquitoes and cool evening (for some) to find 17 species assorted fungi. June 29 was a more pleasant evening and ten of us found our way to **North Cooking Lake Natural**, and searched 29 identifiable species. Our **Boulevard Blitz** brought out the average complement of forayers on July 13 in the Mill Creek area. It was the intent to search lawns and boulevards but the good citizens must be conserving water, as few fungi were on the lawns so we retreated to the slightly moister woods along the creek, where 11 species were found. Our last summer evening foray of 2005 took place on August 17. Markus led these eager 12 participants to **Whitemud Creek Ravine** for a successful hunt of 27 species.

Thanks to the foray leaders who picked up the slack in my frequent absences. In addition, a special thanks to all the members and guests who make these forays worth the effort of arranging. Here is to an equally good 2006 foray season.

 Bill Richards

EMS Calendar of Events for 2006

Please Join Us!!

All forays are undertaken at your own risk. You are responsible for transportation and accommodation.

March

22 Meeting: New member orientation by Alan Fleming and Introduction to Field Guides by Martin Osis

April

26 Meeting: Foray Fashion Show and some do's and don'ts by Bill Richards

May

13 Asbland Parkland / Boreal Forest Regions
Mushrooms: Morels, Verpas and Spring Agarics
Location: Rannach Provincial Grazing Reserve

24 Meeting: Morels and other spring mushrooms by Mike Schulz

June

17 Volunteer Steward Commitment
Mushroom: Various seasonal
Location: Poplar Creek Natural Area

21 Summer Evening Foray in the Edmonton River Valley
Mushroom: Various seasonal
Location: TBA

28 Meeting: Mushroom identification DVD/Video by Taylor Lockwood

July

8/9 New Members Field Orientation and Camp-out
Mushroom: Various seasonal
Location: Ashland Dam Site

19 Mid-Summer Evening Foray in the Edmonton River Valley
Mushrooms: Various
Location: TBA

21/22 Footbills Foray
Mushrooms: Leccinum, Russula, Lactarius and other Agarics
Location: Bow Valley Provincial Park

26 Meeting: Mushroom identification aids - stains and other chemicals
Final discussions and plans for the mushroom exposition at the Devonian

29 Pre-exposition foray
Mushrooms: As many different varieties as possible.
Location: Members choice.

30 "City of Champignons" Mushroom Exposition
Mushrooms: Any and all types of fungi
Location: Devonian Botanic Garden

August

17-20 North American Mycological Association (NAMA) Foray
Mushroom: Mushroom Collection for the Database.
Location: Hinton & Area

13 Meeting: Talk and presenter TBA

30 Summer Evening foray in the Edmonton River Valley
Mushrooms: Various
Location: TBA

September

9/10 Footbills Campout and Foray
Mushroom: Honey Mushrooms, Hedgehogs and Chanterelles
Location: Lambert Creek Area

28 Meeting: Honey mushrooms - the multiple faces of Armillaria by Markus Thormann

October

25 Meeting: Scary and nasty mushrooms by Martin Osis

November

TBA President's Dinner



General Member Meetings

Fourth Wednesday of every month -
March 22th is our first meeting for 2006

Time: 7:00 pm

Location: Riverbend Library



The North American Mycological Association Foray (NAMA) is coming to Alberta

NAMA is coming to Alberta for their annual foray being held in Hinton from August 17th through to August 20th!

As a club we are very excited about this for several reasons. The main reason is we get to mingle and learn from some of the best experts in the world. If you aren't familiar with NAMA, their annual foray is an international gathering of both professional and amateur mycologists who meet for both an extensive series of presentations as well as field gathering and identifications as a result of daily forays. NAMA is an organization dedicated to, and to a large extent run by, amateurs who are interested in the fruiting bodies of fungi, the mushrooms. This is what interests most of us as well.

The second reason we are excited about NAMA coming to Alberta is that the foray leaves no mushroom

unidentified. We get the opportunity to see and record the names of mushrooms which we have never been able to identify before.

Normally the NAMA foray is only open to members but this year we have been given permission to invite all EMS members as well. For people who are not NAMA members this foray represents a unique opportunity to be part of an international event. The best way to get the most out of this event is to volunteer and become an integral part of the organisation. We will be looking for local volunteers to help out in a number of areas.

☂ Volunteers who could collect door prizes and other sponsorship items as well as helping in the running of an on-site market selling books, dvds, discs, drinks, poster and such.

☂ Volunteers to help man registration and information/ help desks.

☂ Volunteers to help coordinate and lead forays making sure that no one is left out in the woods.

Any volunteer participation usually has its own rewards and in the Alberta tradition of active volunteerism we will make this event a great success for NAMA, EMS and all our individual members.

Please contact Martin with any questions, comments and suggestions on how you can help. Make your decision to participate soon and book your accommodations early as, due to industrial activity in Hinton, there is expected to be a shortage of accommodation. We have identified and reserved a number of camping spots for this event but hotel and bunking accommodations are only arranged for out-of-town participants.

 Martin Osis

Weird and Whacky (continued from page 4)



Figure 2. Rust fungi have pseudoflowers that attract insects, thus helping to carry the fungi to other plants

Puccinia punctiformis. Here, the fungus colonizes thistle shoots and produces a strong floral scent to attract pollinators in order to disperse its sexual reproductive structures (Connick and French 1991).

So, both fungi and plants can “(ab)use” each other to further their own causes. Both can

produce volatile chemicals or form visual attractants that attract various pollinators. By the way, these same scents can also elicit strong human responses and are often used as a base for new perfumes. Hence, in the end, we may be the ultimate benefactors of these mimicking efforts by plants and fungi.

 Markus Thormann

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Medicinal Mushrooms

Part II (this article is being continued from the Winter Issue of Spore Print)

Champex, a patented field mushroom derivative, is a functional foodstuff designed to deodorize the body in the digestive system. It is 400% more effective than parsley seed extract.

As a nutritional supplement it helps eliminate breath and body odour, improves intestinal function and regularity, helps blood cleansing and detoxifies the kidney and liver by suppressing the increase of serum levels of creatinine.

It has been clinically proven to repress production of indole and tryptamine in-vivo.

In pets, it helps reduce fecal/ ammonia odour, and suppresses odours internally, resulting in cleaner litter.

Dr. Tatsuo Shiigai of Toride Kyodo General Hospital, found that serum creatinine levels, a measure of the progress of kidney failure, was significantly suppressed by used Champignon extract. Six of nine patients with glomonephritis that did not respond to a low protein diet, were helped by the extract. It is possible that the mushroom extract works, in part, by reducing the production of nephrotoxic substances in the intestines.

It is extremely safe with a LD50 value of >50,185 mg/kg (*LD stands for lethal dose for 50% of test subjects*).

Work by Werner and Beelman, *Int J Med Mush*, 2002,4:2, found selenium enriched button mushrooms can be produced for the functional food or nutraceutical industry. Mushrooms containing 20% of RDA of selenium could be marketed as an excellent source of this important mineral.

In Traditional Chinese Medicine, the button mushroom is used to regulate body energy, and remove phlegm from the body. It is also good for the stomach and intestines, measles, contagious hepatitis as well as coughs and hiccoughs.

According to one report, a polysaccharide from button



mushrooms can be used to treat leukocytopenia, inhibit bacterial growth and reduce blood sugar levels. They can also be taken after cancer operations to prevent metastasis.

Experiments by Wardle and Schisler in 1969, shows that the growth of mushroom mycelium in vitro was stimulated by the addition of lipids. Safflower oil added to the cultivated mushroom enhanced the growth and size. It appears that linoleic acid stimulates both mycelial growth and initiation of fruiting bodies.

The compound lenthionine is believed a contributing factor in the flavour of the wild button mushroom.

Cremini and Portabella mushrooms are variations of the Button with richer, meatier flavour. Crimini is high in crude protein (43.5%) and acid hydrolyzed fat.

Portabella is a large brown form previously thought un-saleable, and taken home by mushroom pickers. Today, through good marketing, and a growing appetite in North America for more fungi variety, the Portabella is available at supermarkets year round.

It contains compounds that inhibit aromatase, an enzyme

associated with tumour formation, also found in stinging nettles. The inhibition of aromatase is directly linked to prevention of breast and prostate cancer.

Portabella contains about 8% chitin. This substance has valuable application in chemistry, biotechnology, agriculture, dentistry, food processing, environmental protection and textile production. Chitosan, a derivative, is a supplement used to lower cholesterol and promote weight loss.

Work by Beelman et al., *Int J Med Mush*, 2003, 5:4 favorably compared nutritional and medicinal benefit of Portabella mushrooms to shiitaki and oyster mushroom.

Portabella contains significant amounts of mannose, glucose and sugar alcohols.

Agaratine, one of the hydrazines, is a powerful mutagen, activated by tyrosinase, a mushroom enzyme that makes it heat stable. The mushroom's SOD and aromatase inhibitors may help neutralize some of agaratine's potential danger.

One Swiss reported suggested that four grams of *A. bisporus* daily

(*Medicinal Mushrooms...continued on page 12*)

Agaricus

(continued from page 11)

led to the lifetime risk of cancer of two cases per hundred thousand lives.

Tyrosinase, on the other hand, helps lower blood pressure and is used in treating hypertension.

It is prudent to not eat this mushroom raw. Cooking only reduces the carcinogenic hydrazines by 25%, however.

In France, another fungi or green mold called *Trichoderma* is used as a spray concentrate as an alternative to the systemic fungicide, benomyl, to control *Verticillium fungicola*, a serious pathogen of *A. brunnescens*.

Flat Top is widespread but not common, and recognized by its black scales over a beige base. Studies by Cochran in 1978 indicate anti-viral potential, and contains the steroid ergosterol, that converts to vitamin D.

Yellow staining *Agaricus* (*A. xanthodermus*) and Felt Ringed *Agaricus* (*A. hondensis*) are not recommended edibles and have phenolic and metallic odours respectively. The yellow staining varieties tend to concentrate heavy metals, another reason to avoid them.

The closely related Wine coloured *Agaricus* (*A. subrutilescens*) of the B. C. rainforest is reported to be anti-fungal (Min et al., 1996).

Agaricus blazei, from Brazil, is attracting a lot of attention from the myco-medical community. It has been found to contain many of the same polyhydroxysteroids as Turkey Tail and has beta glucan levels from 9-14%. Its polysaccharides promote natural killer cells that are selective to tumour cells, but the mushroom also possesses immune modulating properties. Like other *Agaricus*, it inhibits aromatase and a rising star in the potential treatment of cancer.

It is a semi-tropical species that is cultivated under controlled

Agaricus campestris
(field mushroom,
meadow mushroom, ghost ears)

Agaricus arvensis
(horse mushroom)

Agaricus brunnescens

Agaricus bisporus

Agaricus hortensis

(wild button mushroom, cultivated
mushroom, portabella, crimini)

Agaricus bitorquis

(spring agaricus)

Agaricus placomyces

Agaricus praeclaresquamosus
(flat top)

conditions similar to *A. brunnescens*. The mushroom is very popular in Japan, and known as Himematsutake. It possesses a mild, but distinct, sweet almond flavour.

Local commercial button mushroom producers will eventually discover the marketing opportunity this fungus presents.

Robert Rogers is the author of Medicinal Mushrooms of the Prairies and ten other books related to health benefits from regional plants. He is a professional member of the American Herbalist Guild, Fellow of the International College of Nutrition, and past chair of the Alberta Natural Health Agricultural Network. Robert teaches plant medicine at both Grant MacEwan College and the Northern Star College of Mystical Studies. He can be contacted through Earth Medicine Consulting at scents@telusplanet.net or 1-780-433-7882.

This article on Medicinal Mushrooms is provided through the courtesy of Robert Rogers, author of Medicinal Mushrooms of the Prairies.

