MYCORRHIZA NEWSLETTER 4 – November 2006

Editorial note

Dear fellow Mycorrhiza

Firstly, I would like to welcome Dr Richard Robinson, a new special friend to our list. He is from Western Australia and has many interesting, forestry-related research interests. One of them is fungi of the Western Australian forests, which resulted in the field guide Fungi of the South-West Forests (about mushrooms). Thank you very much for joining and I hope you will enjoy.

Thank you Dr Glen for you help (always) with the meanings of the names. The better sounding ones are his, the others I quickly borrowed from Arora, Stearn's or the Latin dictionary. He also provided the names of the past botanists/mycologists (except Battara came from Walter Gams from the Netherlands). From now on Riana Jacobs will also provide us with distribution info (as pie charts) for the fungi of the month. This is based on the specimens that people collected in the past and which are being preserved by Riana and her colleagues. Riana is, amongst many other things, the lady at our National Collection of Fungi who handles basidiomycete samples, and she thus has the whole collection and about 100 years of history at her disposal. Thanks so much Riana for doing this in between your many other responsibilities. She also wrote us something about the Collection, which I included after the Feature.

There are not many UFO's this time. We have one extra Fungus of the months and by the time I got to the UFOs, the newsletter started to become too bulky. More soon…

Enjoy!
Marieka

BOOKS & WEBSITES

There is a new book out for North American mushrooms by Orson and Hope Miller. It is an update on Orson Miller's first book, which was one of the first field guides for macrofungi written for amateurs as well as mycologists. I have not seen it myself, but the feedback I had from others are quite good. It includes about 700 illustrations and descriptions, and thus gives you lots of identifications and information. The title: North American Mushrooms: a field guide to edible and inedible fungi. Falcon Guide, Globe Pequot Press.

I learned about/stumbled upon two other websites. The first deals with rot fungi and you can use it to identify them. This includes many of the macrofungi, especially the polypores and brackets, so may proof useful. Here is some more info:
A new website on identifying conks of wood decay fungi has been developed by Dr. Gary Emberger at Messiah College. It is based on Dr. Leonard Fergus' Wood Decay Manual, which, in turn was based on Overholt's keys, both from Penn State. I think it would be very useful in Forest Pathology courses, especially those taught in eastern USA. There is a lot of depth in the material, that is not readily apparent at first glance. The web site is: http://www.messiah.edu/Oakes/fungi_on_wood/
Don Davis, Forest Pathologist, Penn State

The second website I have not yet fully explored, but it houses MycoKey, a program that can be used to identify fungi (there is also a CD-ROM out). http://www.mycokey.com/UK.html. Thomas Laessoe, the author of the one book I told you about, is involved with it.

BOF

Mushrooms

All fungi reproduce by means of **spores**, which are usually microscopically small. These spores are produced in masses and are dispersed in an amazing variety of different ways. When a spore lands on a suitable medium with enough moisture and nutrients, it will swell up with water. The cell wall expands through a pore and will then form a **hypha**. This hypha will grow longer and will branch and soon you will have a matt of **hyphae**, called a **mycelium**. This mycelium excretes a variety of **enzymes** that can break down many different organic compounds. It also excretes **mycotoxins** (harmful to animals) and **antibiotics** (harmful to other microbes) to make sure there are enough nutrients around.

When the environmental conditions are right, the new fungus will produce its own spores. These spores can be formed asexually (like cuttings, the progeny are the same as the parent) or sexually (like seeds, genetic recombination occurs, the progeny are varied and different). The structures that produce these different spore types are different in appearance and function (a feature for another day), and most of the different groups that we treat in the Features, do things differently. For this newsletter, I will only focus on mushrooms.

(Pictures taken with help of Mariëtte.)

The button mushrooms you see at the grocer are just baby mushrooms of the typical mushroom we all know. A mushroom is formed from many hyphae that clump together and have different forms and functions. Most of the time the mushroom will start off as a little button or protrusion (arrow, top left), or it will literally look like an egg, with a membrane covering it entirely. As the mushroom develops, it forms the stipe, gills, etc. as you can see in the photographs, and literally unfolds into a mature mushroom.

The membrane that covers the entire mushroom is called a universal veil. When the mushroom expands, parts of the veil will remain on the mature mushroom. The extent of this differs between different mushrooms and these differences are used to identify genera and some species. The volva looks like a cup and covers the base of the stipe (diagram of mushroom in previous newsletters). The warts you can sometimes see on the cap are also pieces of this universal veil. The most famous example of this is *Amanita muscaria* (fly agaric), the red one with the white "dots" that are actually warts.

There is also another veil that covers the gills from the stipe to the edge of the cap (arrows, bottom left). This veil is called a partial veil and when it breaks it may remain as a ring or annulus on the stipe. The genus *Cortinarius* has a different, cobweb-like veil that you can see covering young mushrooms.

I am going to end off with a few additional interesting facts. Ever wondered why a mushroom looks like…well, a mushroom (like an umbrella or a shelve)? Remember that the spores fall down with gravity. The cap protects the spore-bearing structures for this reason, and also prevents rain from messing everything up. The mushroom will always grow in such a way that the gills or pores are vertical, even when its substrate is not horizontal, so as not to obscure the path of the spores. Many mushrooms also have special spacer cells, called **cystidia**, between the basidia to make some room for the spores. Besides wind, rain or water, small animals and insects can also disperse the spores, but that is a topic for another day.

How to take an informative, scientific photograph of a fungus

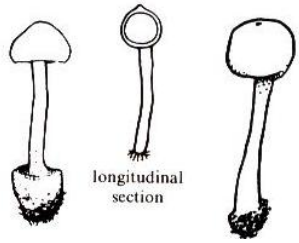
- Cap (side and/or top)
- Stipe
- Base of stipe
- Gills/pores and their attachment
- Any interesting features
- Something for scale, but take two pictures: one with and one without the scale (in case you have an exceptionally beautiful find, then a ruler will look horrible). The best is to cut off the first 5 cms of a ruler (neutral colour) and use that for scale (e.g. in the picture of *Cyathus*).
- If everything cannot fit into one picture (e.g. you only have one mushroom), take several pictures.
- It is really useful to fill out the morphological and collecting sheets (newsletter 1) or make sure you note all of the info they requires in your description. One cannot always see everything from even the best of photographs.

Feature

The different groups of macrofungi – part 3

I have tried to have representatives of these in the Fungi of the month and UFO's sections. Again, the pictures and info comes from Arora's book.

8. Stalked puffballs

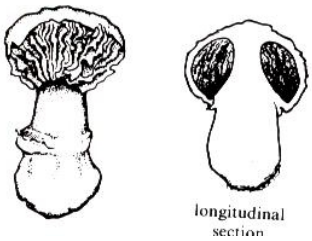


In the last newsletter we treated puffballs. Stalked puffballs literally looks like puffballs on a well-developed stalk. The stalk, however, terminates at the base of the spore case and are not part of it. The spore mass is dusty at maturity. They are usually found in dry or waste areas.

9. Bird's nest fungi

A big favourite of everyone. The fruiting bodies are often small and consists of a little cup with spore packets (called gleba) inside. It literally looks like a little nest with eggs. Some of the genera have little strands attached to the packets, while others are immersed in a sticky gel. These strands and gel help the spore packets to stick to new substrate. Often found in organic or plant manner.

10. Gastroid agarics



This is a more difficult group to grasp. They are also called sequestrate. These fungi are thought to be the same as numerous normal-looking mushrooms, e.g. *Coprinus* or *Russula*, and when you look at certain characteristics, they will fall in the same family as the normal looking mushrooms. However, their fruiting bodies look like deformed or partially formed fruiting bodies of the mushroom they are related to. This you usually will see when you dissect it.

Gastroid agarics consist of a spore case or cap, and a stalk. Here the stalk forms part of the cap, different from stalked puffballs. The spore mass are produced from plates, cavities or deformed gills, which usually are not exposed. These are adaptations that enable them to grow in very dry or harsh places. They are thus a combination between agarics with caps and stalks and Gasteromycetes (puffballs, earthstars etc.) that do not forcibly discharge the spores and where the spore mass is enclosed. (Dr. Glen, *Macowanites* is an example.)

The PREM herbarium: Mycology Unit of the Biosystematics Division ARC-Plant Protection Research Institute, Agricultural Research Council (ARC).

The Mycology unit of the Biosystematics Division ARC-Plant Protection Research Institute serves as the custodian of South Africa‘s National Collection of Fungi (NCF). The herbarium (PREM) traces its origins back to 1905, when I.B. Pole Evans, a Welshman, established the NCF with a mandate to deal with plant diseases and to experiment with fungicides. The collection includes foreign as well as South African material and contains representatives of all the major groups of fungi excluding the yeasts and mammalian pathogens. Past activities at PREM were influenced by socio-economic and political events, and most recently, the South African government committed itself to international biodiversity initiatives. Although the basic goals and needs to maintain PREM remained, various research focuses can be recognized over the past century. In the early days the emphasis was on collecting and recording of fungi, then pioneering research was done on mycotoxins and currently there was an increased demand for public-good services and innovation.

Contact person: Adriaana Jacobs; e-mail: JacobsR@arc.agric.za

Fungus recipe of the month

This one is with the compliments of Nicole.

Taglatelle El Funghi

(Feeds 4 hungry or 6 not so hungry forayers)

1 Punnet Oyster Mushrooms
1 Punnet Brown Mushrooms
1 Punnet Portebello Mushrooms
250ml Fresh Cream

500g of Taglatelle Pasta
2 Teaspoons Gaaahrlic.

Sprinkle of Garlic & Herb Seasoning
A couple of grinds of Black Pepper
A pinch and a half of Salt
A dozen tablespoons of Extra Virgin Olive Oil, but a half dozen plain Virgin will do...

Don't chop your shrooms too finely, you'll lose their presentation value, so slice 'em, or with the oysters tear 'em up.

Pour a dose of olive oil into a pan, add a generous helping of garlic (more if you're superstitious) bring to a medium heat, enough to fizzle the garlic. Chuck in your mushies, and just basically pan-fry them, add a couple of grinds of pepper, salt to taste, and only once their el dente, pour in the cream, bring heat down to low simmer, cook for 5 min.

In the mean time hopefully you've cooked your pasta to perfection, and the tester strand is still stuck to the ceiling (in layman's terms means: el dente). Strain in colander.

Place pasta in bowl and lightly toss with Olive oil and a sprinkle of "Garlic & herb" seasoning.

Viola! You'll have the hangers on begging for more.

Fungi of the month

***Podaxis pistillaris* (false ink cap/ slangkop)**

(This one is for Wendy, who wanted the info long ago.)

Etymology: Greek words, pous = a foot and axon = an axis, the stalk of the fruiting body passes through the centre (of symmetry) of the peridium as an axis; pistil-, pestle, like a pestle

You will see them on termite mounds, especially in drier regions of the interior. They occur specifically on the mounds of the harvester termite *Trinervitermes trinervoides*, but are not cultivated by them as the well-known genus *Termitomyces* are cultivated by termites (VdWesth & Eicker). In fact, Bernard Slippers tells me that the specific termites that make the mounds that *P. pistillaris* occurs on, are not growing *Termitomyces* but gathers grasses, seeds, etc., and the occurrence of *P. pistillaris* on the mounds could be by chance. However, it is rather obvious that the fungus likes the mounds, although it can also occur on the ground, and studies investigating this more closely will be interesting. Besides South Africa and the rest of Africa, it occurs world-wide.

The fruiting bodies vary in shape and appearance and in South Africa there are more than one species that differ microscopically (Van der Westhuizen & Eicker). I do, however, not know how many species there are in South Africa.

The dark brown spore powder is used in traditional medicine as a treatment for cancer and nappy rash when mixed with unsalted fat (Van der Westhuizen & Eicker).

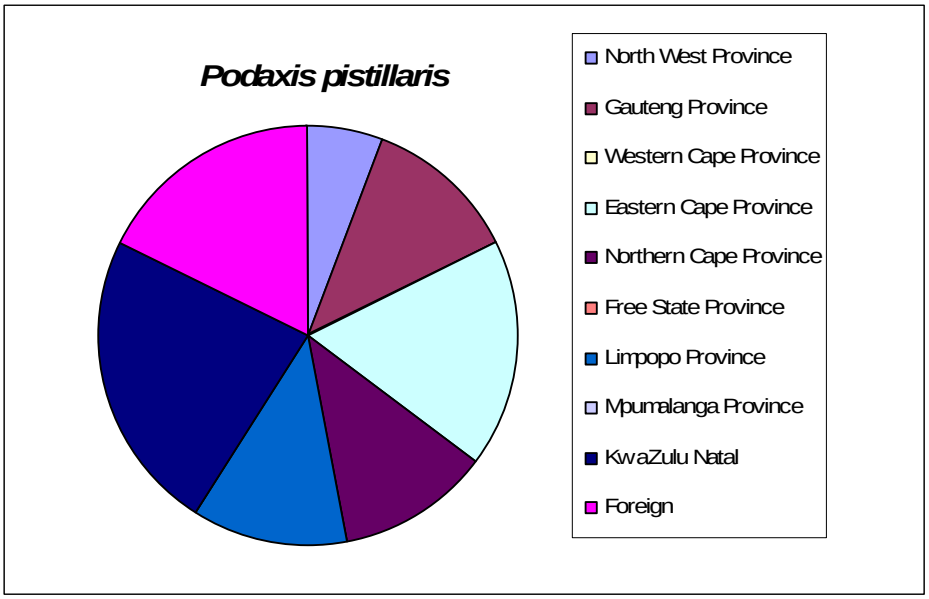
A quick search on the internet also revealed that some indigenous people use it as body paint. When you see the black spore mass you can understand why!

The top of the fruiting body represents a spore sack, and the spores are released when the sack tears from the stipe, split or disintegrate (as you can see in the photographs). Because the spores are not exposed until now, this fungus is thus quite adapted to harsh and dry conditions. Spores are also thick-walled and dark because of melanin in the walls. The melanin protects them from the sun.

This is a gastroid agaric and resembles the shaggy mane or *Coprinus comatus*. It does not, however, have gills, does not deliquesce and the spore mass is powdery. According to Arora, there is some debate whether this fungus should be in the same family as *Coprinus*, or form a family/order of its own because it has a capillitium (white arrow, threadlike hyphae entangled in the spore mass, they are remains of the hyphae where the basidia were formed) that is not present in *Coprinus*. I do not know if this question has been resolved in the mean time.

Distinguishing features: Elongated fruiting body on a short stipe, up to 300 mm high, scaly light-coloured sac, tears open to reveal dark brown spores, cannot miss them on the termite mounds.

Distribution chart based on past collections:



Note: please remember that these distributions are based on the collections in the herbarium, and may thus not necessarily reflect the true distribution of the fungus. This is because it may have not always been possible to collect everywhere, and samples often depend on chance, where the collectors were working and accessibility.

***Cyathus striatus* (striated bird's nest/geriffelde voëlnesswam – Marieka se eie uitvindsel..)**

Etymology: cyath-, cup; striatus – striate or finely furrowed/with grooves

Cyathus is a genus that has the small cords attached to the gleba. This particular species has evident striations or grooves in the cup. I am actually not sure that my identification is correct because there appear to be more than one species with the longitudinal grooves you can see in the picture. In this regard, Van der Westhuizen & Eicker mentions *C. poepigii* (after Ed. Friedr. Poeppig (1798-1868), a collector of plants), but *C. striatus* is so common in the other mushroom books. At least I know it is not *Cyathus olla* (oll-: pot or jar) that we all know from Van der Westhuizen & Eicker.

Something interesting for the mycologists, bird's nest fungi do not produce so many spores as other fungi, because each spore packet contains the correct mating strains and they are thus ready to propagate immediately.

Distinguishing features: tiny grey cups with darker grey "eggs", prominent grooves in cap with dark rim.

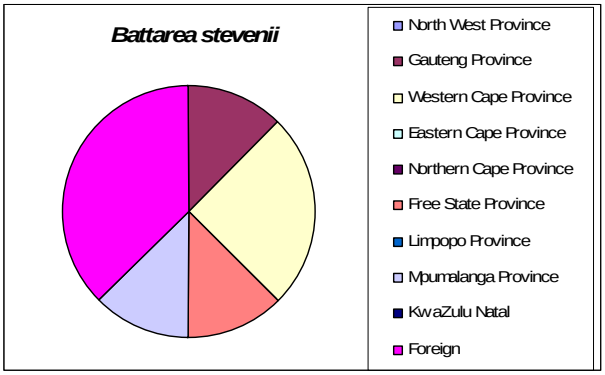
Battarrea stevenii

Etymology: *Battarrea* was named after Giovanni Antonio Battarra (1714-1789), and stevenii was named after someone called Steven.

Members of *Battarrea* are stalked puffballs. The spore mass are born in a cap on top of a long stipe. When mature, the cap will fall off or gets blown off (looks like it happened to the one in the pictures), and the spores as well. Only the base of the cap and the long stipe will remain. These fungi again like drier places, especially sandy soil. The one in the picture was in the Walter Sisulu Botanical Garden (Jhb.) and was one of the most exciting finds on the fungal walk.

I am not sure whether this species is *B. stevenii*, the only one given in Van der Westhuizen & Eicker, because *B. stevenii* has a shaggy stipe and the spore mass are rusty brown. The fungus in Bernice's picture has a straight, almost smooth stipe and lighter spore mass. But Arora says that for the species he treats, *B. phalloides*, the stalk can also vary, and other less obvious characters (e.g. to do with the spore cap and spore distribution) are usually used to delimit species. For all practical purposes we will name the one in the photograph *B. stevenii*.

Distinguishing features: long, cylindrical, grooved stipe with spore case on top, spore mass within, quite hard.



UFOs

UFO 12 – An earthstar

Etymology: Geo-, earth, astr-, star

In the last newsletter we talked about puffballs and earthstars, but there was no example of an earthstar. *Geastrum* is one of the earthstar genera. The difference between puffballs and earthstars is that the different layers of earthstars separate. The outer layer opens up in different rays (like the petals of a flower) to expose the inner layer that surrounds the spores. The rays often will push the spore sack upwards. At the tip of the spore sack there is a mouth through which the spores are expelled, for instance when a drop of water or the finger of a curious mycophile touches it.

This photograph I took in a native forest near Lydenburg in the private nature reserve that John Burrows runs. It is about 5 cm wide. I was always convinced that all earthstars I see were *G. triplex* (the one Van der Westhuizen & Eicker) but thanks to Arora I realized that there are many *Geastrum* species. *G. triplex* has a distinct collar or additional layer between the spore sack (the inner, round structure) and the outer rays. I think this one could be *Geastrum saccatum* (sacc-, sack).