THE QUEENSLAND MYCOLOGIST

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The Queensland Mycological Society

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Society Objectives

The objectives of the Queensland Mycological Society are to:

1. Provide a forum and a network for amateur and professional mycologists to share their common interest in macro-fungi;

2. Stimulate and support the study and research of Queensland macro-fungi through the collection, storage, analysis and dissemination of information about fungi through workshops and fungal forays;

3. Promote, at both the state and federal levels, the identification of Queensland's macrofungal biodiversity through documentation and publication of its macro-fungi;

4. Promote an understanding and appreciation of the roles macro-fungal biodiversity plays in the health of Queensland ecosystems; and

5. Promote the conservation of indigenous macro-fungi and their relevant ecosystems.

Queensland Mycologist

The *Queensland Mycologist* is issued quarterly. Members are invited to submit short articles or photos to the editor for publication. Material can be in any word processor format, but not PDF. The deadline for contributions for the next issue is 1 August 2014, but earlier submission is appreciated. Late submissions may be held over to the next edition, depending on space, the amount of editing required, and how much time the editor has. Photos should be submitted separately at full-size to allow flexibility in resizing and cropping to fit the space available while minimising loss of quality. Authors who have specific preferences regarding placement of photos should indicate in the text where they want them, bearing in mind that space and formatting limitations may mean that it is not always be possible to comply. Material from published sources may be included if that complies with copyright laws and the author and source are properly acknowledged.

Membership

Membership of QMS is $25 per annum, due at the beginning of each calendar year, and is open to anyone with an interest in Queensland fungi. Membership is **not** restricted to people living in Queensland. Membership forms are available on the website, http://qldfungi.org.au/.

Could members please notify the membership secretary (memsec [at] qldfungi.org.au) of changes to their contact details, especially e-mail addresses.

Cover photo: Ronda Warhurst holding a magnificent fungus (*Phylloporus* sp?) found by Peter in the Warwick area. © Peter Warhurst

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QMS Field Guide Committee
Frances Guard, Patrick Leonard & Sapphire McMullan-Fisher

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QMS Calendar 2014

2014 Meeting Schedule

Meetings are held in the F.M. Bailey Room at the Queensland Herbarium, Mt Coot-tha, commencing at 7pm on the second Tuesday of the month from February (no January meeting), unless otherwise scheduled. Check the website for details and any changes. There will be 3-4 guest speakers invited during the year and other meetings will be informal. Suggestions from members for topics or names of potential speakers or talks will be welcome at any time. Please contact a member of the executive.

To assist those unable to attend meetings, notes on the talks are included in the Queensland Mycologist wherever possible. However, the notes never do justice to the topic as they do not reflect the enthusiasm of the speaker or cover the discussion that follows. So remember, where possible it is better to attend the meetings, get the information first hand and participate in the invaluable information sharing opportunity.

Supper. Suppers are provided by volunteers. Check the website for details of the roster and if you are able to assist please contact the secretary.

July 8
Members' talks

August 12
Informal-Members' talks

September 9
Speaker- Nigel Fechner "Fungal Biology"

October 8
Speaker-Andrew Franks "The Wonderful World of Bryophytes"

November 12
Informal-Members' talks

December 10
Christmas Meeting

QMS Forays

The Foray season for 2014 has now concluded

QMS hold regular forays during the first half of the year. The dates are normally the Saturdays following the QMS meetings of February to July, but additional forays are also held.

Field trip details may change as a result of drought or other unforeseen circumstances. Check the website for changes.

Members are invited to suggest venues for additional forays. If you have any suggestions (and especially if you are willing to lead a foray), please contact Fran or another member of the executive.

QMS Workshop Program 2014

The 2014 workshop program is still in development, but it is intended that workshops will be held in September and October. We are currently working on a Spore ID Workshop and a Beginners' Workshop.

Members are invited to suggest topics for workshops. Send your ideas to Fran or Ronda (info@qldfungi.org.au).

Details will be included in future newsletters and on the QMS website.

Editor's Comments

Here at last, the first newsletter for 2014! It has been an odd year with dry weather seeing the usually highly productive Mt Cordeaux (Cunningham's Gap) foray cancelled. And so far I have received little in the way of reports on forays that have been held, though there have been several that were successful. For the next issue, perhaps.

However we do have the notes from John Dearnaley's excellent talk on mycorrhizae, sadly minus many of the pictures, which are subject to copyright. Not everything that is presented at meetings can be published in the newsletter, so it really does pay to go along.

Vanessa Ryan has produced a very interesting report on *Podaxis beringamensis*, with her usual meticulous observations that add to our knowledge of the biology of this termite-mound fungus. Fran has produced an account of the identification of an interesting *Amanita* that in my view illustrates both the value and weakness of keys. Fran has also provided a copy of a report prepared for the Laidley Shire Council on a survey of fungi in the Lockyer Valley, a site that QMS had not previously visited.

For my own part it has been all too easy to put the newsletter aside in favour of the other things I have taken on since my "retirement".

The Qld Fungi Festival was a great success, with fascinating talks from leading authorities in their fields, forays, and workshops. Many thanks to the hard-working organisers for their sterling efforts.

David Holdom

President's Report, AGM 2014.

Frances Guard, 7th May 2014.

The last 12 months have been interesting and challenging for me in my first year as President.

QMS membership is currently 70, including several new people .

Our **Website** has been updated and greatly enlarged. It has become a resource that is being used by the public as well as members, both local and interstate. The mail generated by the Website is an indicator of its usefulness: our sincere thanks to Vanessa who has done almost all of the work on the Website.

The Society has continued to hold **forays** in the summer and autumn months. This year has been a bit difficult as we had a prolonged drought, and the first 3 forays were either limited or cancelled because of dry weather and lack of specimens. Since then there have been huge numbers of fungi, and it is almost overwhelming. (Feast or famine!)

New foray sites included: Maroochydore Wetlands (an interesting and different habitat in the mangroves)

Murrumba Downs (drought affected – but should be great in a good season)

Bellthorpe (fantastic after good rain)

Lockyer Valley (some new and completely different habitats)

Mt Nebo/Mt Glorious sites – (Fungi Festival forays that turned up a lot of interesting fungi.)

One of the most important parts of the forays is the **record keeping** and data collection. It may not be the most exciting part, but if we are to make a difference in the world of fungi, then these scientific records are really important.

Patrick has been the chief Permit holder and has sent records to the Department. Last year there were **729 records**, which was more than ever before. That brings the total for QMS to 2750! More people are needed to keep individual records, including written descriptions. Our thanks go to Patrick for being the data collector for many years.

As well as forays, last year we organised two **Workshops**: one on **Gasteromycetes**, and one for **Beginners**. They were both very successful. Participation of members in leading the Gasteromycetes Workshop was particularly good.

The sub-committee formed in 2009 to write a book of the fungi of the region has finally produced the goods. After many adventures and some misadventures, we are very pleased that "***Australian Subtropical Fungi"*** was launched by Dr Tom May at the Brisbane Fungi Festival on 24th April, 2014. This book has been well received and is a useful resource for workshops, community talks and forays.

On a slightly less ambitious note, and with a much faster timeline, QMS now has a new brochure. It is several years since we last had one, and it was long overdue. Thanks for this go to Bev, Vanessa, and Leesa.

The major project for this year has been the combined **Fungi Festival** organised with Fungimap, and the Herbarium. About 75 people attended the Day of Talks on "Why Mushrooms and Moulds Matter". The Workshops and Forays, which followed were very popular. Events such as this are a great way to learn more about fungi, to meet with other fungi enthusiasts, to network and to educate the public. I felt the Kids Activities were particularly useful in this regard. They were fully booked, with a waiting list. Thanks to the many people who helped make this event successful.

I would like to say thanks to all on the Management Committee for their support, commitment and patience and hard work keeping the Society running.

Fungilinx

A few links on fungal symbiosis and its importance have been sent in by Megan Prance and Susan Nelles and another I found in *Nature*. The subject seems to be getting deserved attention at last.

Little marsupial diggers may hold key to preventing bushfires

http://www.abc.net.au/environment/articles/2014/06/30/4029166.htm

http://www.abc.net.au/local/videos/2014/04/15/3986047.htm

"Symbiosis or capitalism? A new view of forest fungi"

http://www.eurekalert.org/pub_releases/2014-05/iifa-soc052214.php

Fungi borrowed bacterial gene again and again

http://www.nature.com/news/fungi-borrowed-bacterial-gene-again-and-again-1.15496

And a company is selling them in Australia: http://www.maiaustralia.com.au/home

SURVEY OF FUNGI IN THE WESTERN LOCKYER 2013-14

By Frances Guard

Project Aim

The **aim** of this project was to survey the macro-fungi of a number of sites in the Western Lockyer district with varying habitat, terrain and degree of disturbance.

Field work – (unimproved pasture site) - QMS members and Lockyer Valley Citizens beginning the survey on April 12th.

The vegetation types included in the survey areas were:

1. unimproved pasture with open eucalypt and acacia forest
2. rainforest remnant along Sawpit Gully
3. vine scrub on steep slope
4. brigalow and belah remnant forest

All four areas are important representative communities of rare and, in places, threatened species of vegetation, in this region. It was hoped that in this survey, examination of the fungi would show if there were also uncommon and perhaps undescribed macro-fungi in association with these plant communities.

Project Method

Two members of the **Queensland Mycological Society**, (QMS), Dr Frances Guard (President) and Vanessa Ryan (Committee member), visited and surveyed the sites three times. Two members of the **Citizens of the Lockyer Inc**. helped with the initial surveys.

Collecting specimens and recording details were part of the exercise.

Twelve members of the QMS attended on the third day of surveys to conduct field work, photograph fungi, collect specimens for the Queensland Herbarium, and share information with local community members. Seven members of Citizens of the Lockyer assisted in the field work.

The visits took place in December 2013, February 2014 and April 2014.

Community involvement in a project such as this is vitally important in gaining an understanding of the significance of fungi in different habitats. Engagement in a practical way through fieldwork gave opportunity for knowledge transfer, and shared discovery of new species of fungi.

Achievements and Outcomes

1. Overall, in the period of the project, **60 species of fungi** were found.
   - •11 species in the pasture and open eucalypt forest
   - •27 species in the rainforest gully remnant
   - •16 species in the brigalow and belah community
   - •8 species in the vine scrub

Two species found in open eucalypt and acacia forest: Left: *Hymenopellis trichofera*,Right: *Amanita albovolvata*

(This would represent a small fraction of the total number of species actually present, as many fungi fruit rarely, and at different times of the year, depending on rainfall.) The most serious challenge we faced was the drought from July ’13 to March ‘14. This significantly impacted on the number of fungi found on the first two visits to the Lockyer. Fortunately good rain had fallen just prior to the third visit.

2. Although many of these fungi are common and widely distributed, **significantly**, several of them have never been described or collected before. Most of these were found in the brigalow /belah community, which is an outlier of the much larger brigalow /belah bioregion west of the Great Dividing Range. These finds are therefore highly significant.

Left: *Xerocomus* sp., an undescribed blue staining bolete from the brigalow/belah community Right: At work identifying and displaying specimens

This plant and fungal community should be managed to maintain natural processes, and to avoid significant disturbance, including over-grazing. Any future development proposals would need to take these findings into consideration.

The rainforest remnant gully was highly significant in terms of the diversity of fungi found. It remains a source of fungal spores when other areas in the district become too dry for fungi to survive. Thus it acts like a **Spore Bank** to recolonise other areas after periods of drought and possible fire. It too needs a high degree of protection.

The unimproved pasture and vine scrub had lower numbers of fungal species, but because these vegetation types are rare and often in isolated pockets, they are vitally important remnants in the broader landscape. It may be that in future surveys unique fungi will be found in these areas as well.

Continued survey effort needs to be done in all four vegetation types.

(This was part of the report written for the Laidley Shire Council following our survey. It is hoped that QMS can repeat the visits in the next year after good rainfall.)

More links from Megan Prance:

Facebook now has several really GOOD groups devoted to Mycology.

One is The Mushroom Identification Forum at: https://www.facebook.com/groups/117808248330980/?fref=nf

another is Fungi magazine at : https://www.facebook.com/groups/43995545858/

Also Tasmanian Fungi at : https://www.facebook.com/groups/tasfungi/ . The photos on here every day are great, and Genevieve is doing a LOT of ID's.

A friend has just set up a new group SEQ Fungi at: https://www.facebook.com/groups/1468627836708011/

Mycorrhizal fungi

By John Dearnaley, University of Southern Queensland

Mycorrhizas are symbiotic associations between plants and fungi. In mycorrhizal associations a fungus provides an enhanced surface area for plant roots leading to increased uptake of nutrients such as phosphorus, zinc, copper and water. In return for its services the mycorrhizal fungus is provided with plant carbon compounds such as sugars. It is estimated that 80% of all plant species form mycorrhizas. Plant species that do not form mycorrhizas, such as members the Proteaceae, often have specially modified roots which increase the uptake of inorganic nutrients from the soil.

Mycorrhizas have been intensively studied over the past few decades. Methods to visualise mycorrhizal fungi include clearing of roots with hot alkali and staining of fungal structures with chlorazol black or trypan blue. In some cases the fungi involved in the association produce diagnostic fruiting bodies which facilitate species identification. However in many mycorrhizal interactions, the fungal partner does not produce spores or those that are present are largely indistinguishable between taxa. A common contemporary approach to mycorrhizal fungal identification is now DNA sequencing. This involves extraction of fungal DNA, amplification of taxonomically important DNA regions via the polymerase chain reaction and then sequencing these DNA regions. Sequences can then be compared to DNA databases such as GenBank and identification obtained.

There are a number of different types of mycorrhiza. The most widespread association are arbuscular mycorrhizas (AM) which are found in many agriculturally important crop species such as rice, wheat, cotton, corn, soybean etc. AM are so named as the fungus forms a highly branched tree-like structure inside roots cells called an arbuscule (Fig 1). The arbuscule appears to be the main nutrient exchange surface between fungus and plant. AM fungi are ubiquitous in soils and are large compared to other fungal spore types having diameters of between 50 and 800 micrometers. Sometimes these spores are aggregated into clusters called sporocarps with a mass of surrounding hyphae which forms a protective peridial layer. There are only 250 species of AM fungi and these are all members of the phylum Glomeromycota. Common AM fungal genera include *Glomus*, *Gigaspora*, *Acaulospora* and *Scutellospora*. AM are ancient associations and may have been key to the successful establishment of the first land plants. Fossil AM fungal spores have been found in Ordovician rocks (460 million years old) while fossil plant arbuscules have been dated at 400 million years old.

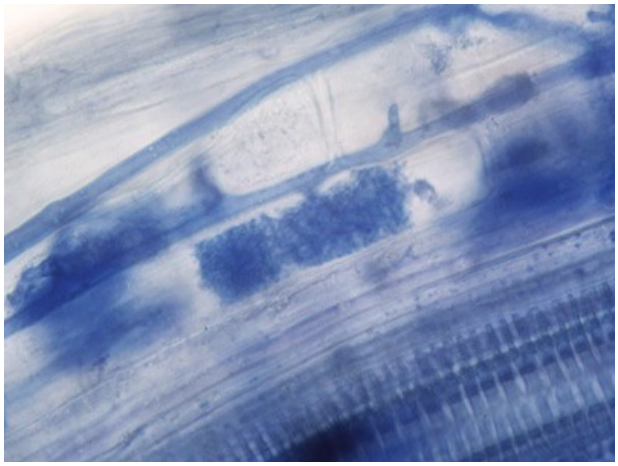


Figure 1. An arbuscule inside a colonised plant root (photo courtesy of Peter McGee).

The second most common mycorrhizal association are ectomycorrhizas (ECM). These occur in shrubs and trees around the world and are most common in Australia on *Eucalyptus*, *Casuarina* and *Acacia* tree roots. In ECM the fungus surrounds the plant root system forming a structure called a sheath or mantle. Fungal hyphae also grow between root cells forming a nutrient exchange surface called a Hartig net. A wide variety of fungal taxa form ECM in Australian ecosystems (See Table 1) and the most important are *Amanita*, *Russula* (Fig 2) and *Cortinarius* spp as well as members of the Boletaceae. Although most ECM fungi are members of the phylum Basidiomycota, Ascomycetes can also form this mycorrhizal type. In Australia this includes the genera *Helvella*, *Pulvinula* and *Tricharina*. The famous culinary “truffles’ obtained from European woodlands are also examples of ECM Ascomycete fungi (the genus *Tuber*). Another, less widespread mycorrhizal type is ericoid mycorrhizas

Figure 2. *Russula* fungi are important ECM fungi in Australian ecosystems.

(EM). These are commonly found in members of the Ericaceae and in Australia this includes plant genera such as *Leucopogon* (Fig 3), *Epacris*, *Woollsia* and *Styphelia*. EM are a structurally distinct mycorrhizal type consisting of a loose mycelial mantle around plant roots while hyphae form coils within root cells. The fungi that form EM include members of the Ascomycete genera, *Hymenoscyphus*, *Rhizoscyphus*

Figure 3. *Leucopogon bifloris* which is dependent on EM associations.

and *Oidiodendron*.

Orchid mycorrhizas (OM) are the symbiotic associations found in the world's largest plant family, the Orchidaceae. OM typically consist solely of coiled hyphal structures within orchid seeds and roots called pelotons (Fig 4). Orchid mycorrhizal fungi can be divided into two main groups. In green orchids, including Australian greenhoods (*Pterostylis* spp.), spider orchids (*Arachnorchis* spp.) and epiphytic orchid species (eg. *Sarcochilus* spp.), the fungal partners are basidiomycetes of the genera *Ceratobasidium*, *Sebacina* and *Tulasnella*. In non-photosynthetic orchids such as Australian hyacinth orchids, the fungal partners are ECM *Russula*s. This means that the orchids parasitise the fungus for both organic (eg. sugars) and inorganic nutrients. In other Australian non-photosynthetic orchids such as potato orchids (*Gastrodia* spp.) and the bootlace orchid (*Erythrorchis cassythoides*) the fungal partners include saprotrophic basidiomycetes such as *Campanella*, *Marasmius* and *Gymnopus* spp.

Mycorrhizas continue to be the subject of much research around the world. They are more than a biological curiosity and provide a useful opportunity to research phenomena such as cell-cell communication, plant and fungal physiological processes and the key components of plant microbe interactions. Inoculation with specific mycorrhizal fungi may enable the growth of difficult to propagate

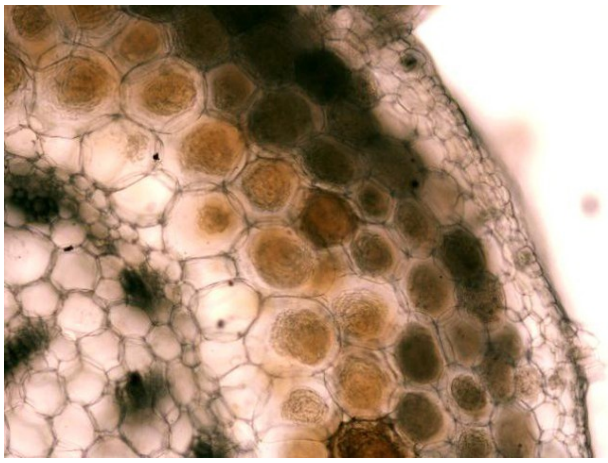


Figure 4. Fungal pelotons inside the root of an Australian terrestrial orchid.

plant species including members of the Ericaceae and the Orchidaceae. From a conservation perspective this may be valuable in boosting the numbers of horticulturally grown rare seedlings which could then be released back into the natural state. Application of ECM and AM propagules during ecosystem restoration may be pivotal to the success of such ventures. Large scale production (which is still yet to be completely achieved) and soil inoculation with different AM fungi might also increase crop yields and sustainability in agricultural systems.

Table 1. Examples of Australian ECM fungal families and genera

ECM fungal family	Example of ECM fungal genera within family
Amanitaceae	*Amanita*
Boletaceae	*Tylopilus, Boletellus, Gyroporus,*
Cantharellaceae	*Cantharellus*
Clavariaceae	*Clavaria*
Cortinariaceae	*Cortinarius, Dermocybe*
Gomphaceae	*Ramaria*
Hydnangiaceae	*Laccaria, Hydnangium*
Inocybaceae	*Inocybe*
Russulaceae	*Russula, Lactarius*
Sclerodermataceae	*Pisolithus, Scleroderma*
Tricholomataceae	*Tricholoma*

NB. This table is not exhaustive

Perseverance Pays Off - *Podaxis beringamensis*

By Vanessa Ryan

In January this year Peter Ridgway, who has a cattle property near Lake Wivenhoe, emailed us to say that he had a weird fungus growing out of some of his termite mounds. He had already identified it as the termite powderpuff *Podaxis beringamensis*, but would I be interested in coming out and collecting it? The answer, of course, was "yes!"

Unfortunately, it was some days before my husband and I could get to his property and in that time the weather was extremely dry, a bit windy and very hot. My hopes for a good collection of this striking puffball species were low, but it was still worth the hour-long drive to get there just to have a look. It was 35 degrees in the shade that afternoon and, as expected, during the week the fungi had suffered badly. They weren't suitable for collecting, but I found it still very interesting to see their remains.

The first thing that amazed me was that they were there at all. We were in the middle of a drought and had very high Summer temperatures – not exactly what you'd call good fungus weather.

Another thing I found curious was the colour of the spore mass. It was light yellow to a cinnamon-brown colour. A number of descriptions I had read said that it should be very dark brown or black. I didn't think to take any spores as specimens at the time and later regretted it.

A month later, Peter emailed again to say that some more of the "monsters" had appeared in the same termite mounds. This time, it was only a two-day wait before we could get to it, but again I was not in luck. All I could find were the chewed-off stems of the fruiting bodies. The centres of the stems were still moist, so I knew that the fungi would have been fresh and good for collection – if only something hadn't eaten them! I strongly suspect that the hungry culprit might have been one of the cattle that lived in that same paddock. There were lots of hoof prints and some fresh cow pats on the ground at the base of the mound.

Again, I tried to make the best of the situation and noted that the outside layer of the stem was extremely tough and very fibrous, while the inner core was quite spongy. It reminded me of a sugar cane stem. I also found the remains of the previous crop of fungi from the same mound. These were the tough stems of the puffballs, as the gleba had weathered away in the month since I'd seen them last. The stems were dry and very hard, like wood, but light in weight. The top portion appeared to have been stained dark by the gleba and it was interesting to see by the still-adhering substrate just how much of the fungus had been within the termite mound –

The lure... © Peter Ridgway

What I found after a week of hot, dry weather.© V Ryan

The chewed remains, top centre-left. Chewed-off old stem beneath it. Red lines show length of an intact old stem and portion that was within the mound. © V Ryan

buried quite a few centimetres deep. One of the old stems had also been chewed off a few centimetres from where it had emerged from the top of the mound. Something definitely had a taste for this fungus!

Another month later and Peter sent us a third email. Yes, more had come up on one of the same mounds as before. Again, it was a couple of days before we could get out there and I must say it was an anxious trip out. I had visions of more chewed-off stumps and smug, plump bovines...

This time I was lucky. There were two beautiful fruiting bodies poking out of the top of a mound. And not a cow in sight.

Now, I was curious to see exactly where the fungus was growing from within the mound and if it had an obvious relationship with the termites. The only reference I had found on this topic was in the book "Fungi Out West", which said that the fungus "utilises" chopped up grass that the termites store in the mound.

Using a garden fork and spade, I dug into the mound, carefully following down the sides of the fruiting bodies' stems. Two things quickly became apparent. One was that the fruiting bodies were caespitose – the two fresh bodies were joined at their bases. An older (chewed-off) stem was also attached to the base, as were two bulbous white swellings that seemed to be new growths. The second thing I noticed was that there wasn't any chopped-up grass stored in the central part of the mound from where the fruiting bodies had erupted. I did find some grass stored in the outer, warm and dry chambers of the mound, but it was well away from the central, cool and moist area where the fungus was growing. It seemed that this particular fungus wasn't utilising the termites' store of grass.

I dug out the other side of the fruiting bodies and tipped them over to look at the remains of the empty chambers directly beneath them. There, growing within the walls of the chambers, was a white mycelium. Tiny points of white fungus also dotted the surface of the walls of the chambers. Most likely it was the Podaxis' mycelium breaking through into the open, but it did cross my mind that could it be another species again?

Termite mounds are made of mud, bits of chewed up plant material (the grass?), termite saliva and faeces. It seemed that this particular Podaxis was using that mixture as its substrate. It also seemed to be using the moisture from the central portion of the mound, as that appeared to be the only place the mycelium was growing.

Once I got the collection home, I wrote up a description.

The skin of the cap, which was a shiny, silvery-white colour, was blistered all over with golden to brown

Third time lucky...© V Ryan

Dismantling the mound. © V Ryan

The fungus mycelium in and on the chamber walls that were directly beneath the fruiting bodies. © V Ryan

scales. The scales were very smooth, a bit hard to the touch (reminiscent of a fingernail) and lifted away quite easily. The upper part of the stem was also coloured a silvery-white with thinner, more papery and fibrous scales, changing quickly to a chalky white with a flaking skin near where it emerged from the mound.

The largest of the two specimens had an uneven linear-shaped cap measuring 16 cm at its longest point and 6 cm at its widest. The cylindrical stem was 9 cm long above the surface of the mound, with a further 6.5 below – a total of 15.5 cm. The diameter of the stem at its widest was 3.2 cm.

Both specimens had a musty odour, like wet fur.

I was a little concerned that the fruiting bodies weren't old enough to produce mature spores, so I dampened the bit of substrate I'd left on their bases and put the fungi out in the full sun for a couple of days. I don't know if this was necessary, but when I eventually dissected the smaller of the two specimens, I was pleased to see that the gleba at the base of the puffball cap was a rich dark brown. The skin of the cap had also pulled away from the gleba, suggesting that it was following its natural process of drying out and lifting away to expose the spores to the elements.

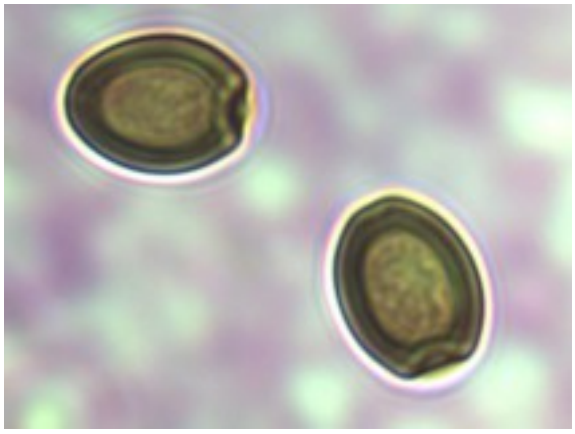
The core of the stem, even though it was very moist, was also very fibrous. The skin of both the cap and the stem was between 3 and 2 mm thick.

The young, immature gleba at the top of the cap was white, turning a lemon yellow to cinnamon-brown and eventually very dark brown at the base of the cap. These colours did not change as I dried the specimen on the dehydrator, which suggested to me that the unusual-coloured specimens I'd seen on my first visit to the mounds had gleba on them that had possibly failed to mature. The gleba appeared to be supported by very fine, white, fibrous structures that lifted away from the central stem – like the barbs of a feather.

The spores are dark brown in colour, smooth, with an average size of 10.36 µm x 8.06 µm. The Q Value is 1.28, which makes the basic shape broadly ellipsoid. However, both ends of the spore are flattened, one very much more so than the other. This larger, flattened end has a dimple in it, with a central bump – the germ pore?

And finally, what are the termites that built the mound that the *Podaxis* was growing in? They are most likely to be a Nasutitermes species, possibly *N. magnus* or *N. exitosus*.

Dissected fruiting body. © V Ryan



Spores. © V Ryan

Termite soldiers. Note the nozzles on their heads. © V Ryan

Following the Amanita Trail

By Frances Guard

One of the best things about **Amanitas** is that with very little experience we can usually recognise them at least to genus. This makes them a satisfying target for our forays. Various combinations of the following features give the clues to the genus: medium to large fruiting bodies, with an annulus, volva, stem with bulbous base, veil remnants on

the cap and white spore print.

However, getting to species level is quite a challenge. This is where I enjoy using Alec Wood's key. (Studies in the Genus *Amanita* (Agaricales) in Australia, 1997 *Australian Systemic Botany*, **10,** 723-854). It does require the use of a microscope, as spore size, shape and reaction to Melzer's solution, as well as the microscopic appearance of the velar remains, are all important in identifying the species. But, with a bit of practice, none of these are difficult microscopic techniques.

The other challenge is that not all species of *Amanita* in S.E Queensland are described in Wood's monograph, and some of our species are close to, but not the same as his descriptions. They end up as "affs." i.e. having an affinity to a described species. Until DNA analysis finally confirms their status as a variant of the same species, or puts them into a new separate species, they remain with that tag. Not withstanding these problems, Wood's key is a really useful tool.

This year has produced a huge crop of *Amanita*s especially in coastal S.E. Queensland. The following paragraphs describe the steps I took in identifying one specimen from Cooloola Foray, and a few of the difficulties I encountered in reaching an I.D.

It was a mushroom that had been found by one of the foray party a few days earlier and it was huge! She took us to the site and showed us this impressive fungus. At first glance I thought it might be a *Macrolepiota*. It was 170mm across, beige-buff in colour with darker squamules across the cap, and it had a very sturdy stem. We quickly noticed another specimen approximately 2 metres away, about half the size, but looking fresher. After many photographs, we dug

up the two specimens and examined them. (Picture 1.) The larger of the two had no obvious rings, but the smaller had a large membraneous ring close to the apex of the stem and a definite firm fixed ring close to the base. There was no volva and both had a swollen bulbous base. Had we only seen the older specimen, we would have probably reached a different identification! (Picture 2.) They both had

a strong rather unpleasant odour.

The spore print was white and the spores were amyloid, (turned blue with Melzer's reagent). They were subglobose to ellipsoid. The size range was 7.6-9.17 x 6.61-7.47 microns (µm). The average size was 8.5 x 6.9 µm. The Q value (length divided by width) ranged from 1.13 to1.35, with an average of 1.22.

I had never seen this fungus before, though I was sure it was an *Amanita*, so I went straight to the key, to sort out the species. (Wood's key is in the QMS library and may be

copied electronically.)

The key is arranged in steps and each step gives you a choice, for example step 1 asks:

1. Volva saccate or at least a free margin at the base of the stipe 2

1. Volva absent 30

So using the key I made the following choices:

Step 1. Volva absent. Go to 30.

Step 30. Spores amyloid. Go to 37.

Step 37. Cap orange or orange-buff. Go to 38.

Step 38. Cap orange-buff to cream-orange. Go to 39.

Step 39. Spores subglobose to broadly ellipsoid, Q 1.09-1.30; cap cream-buff. I.D. - *Amanita ochraceobulbosa.*

However, when I checked the detailed description of *Amanita ochraceobulbosa*, it has conical warts on the cap, only a single fugacious annulus, and although the spores are subglobose to broadly ellipsoid, they are significantly larger than my specimen. The velar remains are mainly inflated cells.

Reading the notes on *Amanita ochraceobulbosa*, I realised that it has two similar species – *Amanita ochrophylla*, and *Amanita ochrophylloides*. The description of *Amanita ochrophylla* is much closer to our specimen, in that it is much larger, has flat scales on the cap, and a prominent double ring. On microscopy the velar remains are mostly hyphae, which our specimen had!

So here was a dilemma. The key led to one conclusion, the detailed description led to another.

I then checked Cheryl Grgurinovic: “Larger Fungi of South Australia”.

The spores she described for A*manita ochrophylla* fitted ours perfectly.

So who to follow?

Looking up Fuhrer’s “Field Guide to Australian Fungi” and the new “Field Guide to Tasmanian Fungi” simply added to my confusion.

For the moment I will call the Cooloola specimen *Amanita ochrophylla*, as it is closer to the description of that species, and only spore size and Q value are really a problem, but watch this space! One day we may be able to look at the DNA.

The Diverse Forms of *Amanita*

The following images show some of the diversity in *Amanita* and the structures mentioned in the report. The photo on the right of the second page (labelled 3: 9/2/14) is © Susan Nelles, the rest © Frances Guard.

The captions below match the photographs in relative positions:

Amanita caps may have pyramidal warts, gills may be pink (rarely), and stems may be bulbous at the base in varying degrees.

Annuli may be long lasting, ephemeral or absent, occasionally caps are yellow, orange or red,

Some caps are metallic grey or brown with powdery floccules as remnants of universal veil; some have red staining stems

Volvae may be loose and sac-like, or mainly adherent with only a free rim

Some caps have distinctly plicate striate margins, while others are entire

Velar remains may form large white patches on the cap, or be fine powdery scales

Volvae and annuli are very variable and need to be carefully noted while specimens are fresh.






Book Review

Australian Subtropical Fungi

by Sapphire McMullan-Fisher, Patrick Leonard and Frances Guard.

I was delighted to be able to buy a book which targets the fungi of the subtropical South East Queensland area where I live. There are other good field Guides, but some of the climate-specific fungi described in those will never be seen here. The authors have purposely included fungi not described in other books, which makes it even more valuable to those like myself who as well as the internet depend on over-the-counter books as sources of information.

Things I like about this book:-

- Colour coding at the top of the pages
- Large, clear print
- Easy-to-read well-spaced glossary and index
- Brief description under the images, with more information under the 10 headings
- Good simple identifiers under the “Notes” heading
- Etymology given for each scientific name
- Clear images showing the important features
- The information and key in the early pages which is suitable for those just beginning their fungal journey as well as the more experienced.

Thanks to Sapphire, Patrick and Fran, I’ve already been able to identify (as far as is possible) four of my puzzles, and look forward to more discoveries using this well-presented book. I particularly recommend it to keen fungi hunters in Queensland and Northern New South Wales.

Glenda Walter

QMS Member