

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.

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@qldfungi.org.au) of changes to their contact details, especially e-mail addresses.

The Queensland Mycologist

The Queensland Mycologist is issued quarterly. Members are invited to submit short articles or photos to the editor for publication. It is important to note that it is a newsletter and not a peer-reviewed journal. However we do aspire to high standards of accuracy.

Material can be in any word processor format, **but not PDF**. The deadline for contributions for the next issue is **15 November 2019**, but if you have something ready, please send it **NOW!** 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. The standard font used for text is Gothic 720BT, 10pt, with other sans serif fonts used for headings and captions. Font sizes may vary if required to make articles fit the available space, and text may be edited for the same purpose.

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 possible to comply. Material from published sources (including the internet sites such as Wikipedia) may be included **if that complies with copyright laws and the author and source are properly acknowledged**. However extensive verbatim copying is not acceptable.

Cover Illustration

Marasmius aff elegans one of the *Marasmius* species Fran discusses in her article on page 5. Image © Fran Guard.

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QMS Activities

Meetings

Meetings are held in the F.M. Bailey Room at the Queensland Herbarium, Mt Coot-tha Botanic Gardens, Mt Coot-tha Road, Toowong, 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 Committee.

To assist those unable to attend meetings, notes on the talks are included in the Queensland Mycologist and on the website if 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, and not all talks are written up for the newsletter. So remember, where possible it is better to attend the meetings, get the information first hand and participate in the invaluable information sharing opportunity.

Suppers are provided by volunteers. Please bring a plate if you can.

Forays

QMS hold regular forays during the first half of the year. The dates are nominally the 4th Saturday of the month, but actual dates may vary and additional forays may also be 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 Susie Webster or another member of the Committee.

Workshops

What do you, our members, want to learn more about that could be presented in a workshop? QMS is always on the lookout for workshop ideas. Members are encouraged to suggest topics, whether new or reruns of past workshops.

Send your ideas to Vivian Sandoval-Gomez or Wayne Boatwright (info@qldfungi.org.au).

Details of workshops will be included in newsletters and on the QMS website as they become available.

QMS Calendar – 2019*

MONTH	MEETINGS	FORAYS/WORKSHOPS
October	Speaker: Ed Kerr – Wild Yeast for Fermentation	
November	Speakers: Various – A Year of Forays and Reports	
December	Speaker: Dr Tony Young – The Michael Howie Slides	

Check the website for updates

Editor's comments

This Newsletter has been a long time coming, but so few people have provided articles until recently. I started writing up two finds from several years ago, but both need a lot more background work. Hopefully I can get them done for the next newsletter.

However, I do not want to both write the articles AND edit the newsletter. Please try to write up forays and any items of interest, no matter how short. There are often gaps in newsletters that can be filled with very short articles.

Fran Guard came to the rescue with a write-up of her talk on *Marasmius* and Pat Leonard with his talk on Fungal Conservation and an article on “Small fan-

shaped poroid fungi“ (*Favolaschia* and *Panellus* species). Enough for one newsletter at last! Fran and Pat have been among the fairly small number of stalwarts who have contributed so much over the years.

Dr Miranda Mortlock has written a review of a new book on slime moulds. Now I could get all pedantic and say that slime moulds are not fungi, but they have been lumped with fungi in the past, they can LOOK like fungi, and non-specialists with an interest in fungi will inevitably come across them and wonder what they are. They are also incredibly interesting organisms in their own right.

Welcome to a new contributor, albeit long-standing member of QMS.

Some Links

A Science Show episode entirely about fungi:

<https://www.abc.net.au/radionational/programs/scienceshow/magic-mushrooms-can-mycelia-give-us-safe-plastics/11477878>

The Way Through the Woods, On Mushrooms and Mourning By Long Litt Woon. A review of a book by a woman whose developing interest in mushrooms helped find new interest in life after the death of her husband:

<https://www.nytimes.com/2019/08/14/books/review-way-through-woods-mushrooms-mourning-long-litt-woon.html>

Bhutan Fungi Expedition (the subject of Fran's talk at the September meeting):

[mushroaming Bhutan 2019 gallery](#)

The Mycelium Foundry:

<https://ecovatedesign.com/ourfoundry>

Your Newsletter Needs You!

This newsletter exists to provide a semi-formal way for members of QMS to share information. It is a newsletter, not an academic journal and so is much more flexible regarding content and style.

Foray Reports have been the backbone of this newsletter, but in recent years they have dried up as Powerpoint presentations have been posted on the website and findings reported on the SEQ Fungi Facebook page. We really do need people to write up forays, and to produce articles based on presentations at meetings. Powerpoint presentations alone are not sufficient – it is the author speaking to the slides that makes the story. I can help knock things into shape, but I need those words first!

It is also best if I have original photos, as the fewer times they get pulled through the editing process, the less detail is lost. Getting everything in the right place and correctly sized can take a lot of time and effort, and there is often more scope to trim originals to fit the format of the article than there is with pre-edited photos.

Articles do not need to be long, or technical (this is a newsletter, not a journal), so a paragraph with a photo will do, and can be very useful for filling spaces. In general, anything from that paragraph, to a page, to several pages. Any word processor format is acceptable, but NOT PDF files.

Missing *Marasmius* data

Frances Guard

Marasmius is a large, diverse and cosmopolitan genus, especially well represented in the tropics and subtropics.

Living in the tropics and subtropics, Queenslanders are ideally placed to find and identify species of *Marasmius*. However, the reality is that most mycologists, both professional and amateur, ignore *Marasmius*, or say they are way too difficult to sort out. This attitude has led to a paucity of collections in our herbaria. Many of those collected are simply dubbed “sp.”

Over the last 25 years, however, a lot of work has been done overseas (including Africa and Asia!) in an attempt to clarify the genus in its strict sense, in the process splitting off many species that do not fit the narrow criteria of *Marasmius*. This work has been aided and driven by the growing science of DNA sequencing and the construction of phylogenetic trees. Sometimes as one question is answered, a number more are raised! However, we are currently in a position where *Marasmius* sensu stricto is a manageable concept, and one which enables us to identify a number of species in the field.

Marasmius elegans is a species that we feel familiar with – larger than many *Marasmius*, with bright apricot–orange, velvety cap, crowded gills, slightly fleshy texture, and tough stem – pale above and dark brown at the base, arising from a hairy mycelial mat.



Marasmius elegans sensu Qld © Frances Guard

However, DNA is beginning to suggest that *Marasmius elegans* (sensu Qld – as we know it) is actually a different species from the one in

southern Australia, which fits the original J.B. Cleland description of 1933, when he called it *Collybia elegans*. The description was re-written by Cheryl Grgurinovic in 1997 and correctly placed in *Marasmius*¹. There is no holotype available, but the lectotype, as selected by Grgurinovic, is from Mt Lofty, S.A. Other collections from that area have been examined. They fit together with Victorian and Tasmanian specimens (both microscopically and with DNA). The southern species are larger and more robust than Queensland ones. Grgurinovic was working from dried material, and says the caps are up to 32 mm diameter. However, other field guides, including *Fungi Down Under*, put the size up to 50 mm diameter. In my experience, Queensland specimens rarely exceed 30 mm, and are often 10-20 mm. So this is another common species where more information is needed and further DNA analysis necessary on new collections, to clarify the matter. It will be important to learn its distribution.

To complicate things, there is another species, which we have until now called *Marasmius* aff *elegans*. That species occurs from the Kimberley (W.A.), across the Top End (N.T.) to Cairns and far north Queensland (FNQ). We do not know how far south it extends. It looks very similar to *Marasmius elegans*, but has an all-white stem and cross-venations between the gills. DNA confirms that it is not closely related to either *M. elegans* or *M. elegans* (sensu Qld).



Marasmius aff *elegans* © Frances Guard

Marasmius haematocephalus is striking with its bright pink or blood red cap. There are other colour forms (e.g. cinnamon and vinaceous), which appear morphologically to be the same species. This awaits DNA confirmation. Again, we need more data on the distribution of those forms.



Marasmius haematocephalus © Frances Guard.

Marasmius bambusiformis is a common little 'orange-cap' *Marasmius*, which I've found in SEQ and FNQ. I've seen a few images, but no collections from Maleny to Mt Carbine. Surely, it must occur in suitable habitats between those sites? Because of their ephemeral nature, *Marasmius* have to be collected at just the right time when they fruit. More local collectors are needed.



Marasmius bambusiformis © Frances Guard.

Likewise, *Marasmius tenuissimus*, the sessile rusty *Marasmius*, has been collected twice – once on Mt Glorious and once on the Atherton Tableland. It is readily recognisable, so is it rare, overlooked or simply not yet surveyed for?

Marasmius pellucidus was collected and correctly identified by F.M. Bailey a long time ago (he did not date specimens). That knowledge was then lost for many years. The species was collected again by Pat Leonard in 2008, written up in *Fungi of Qld*, and called *Marasmius* sp. 231108. A fresh find in the Cairns region (2018), and a read of Wannathes paper, "A Redescription of *Marasmius pellucidus*....."¹. has given it back its name. I



Marasmius tenuissimus © Frances Guard.

believe that this is a not uncommon species, but we definitely need more collections to plot its distribution.



Marasmius pellucidus © Frances Guard.

For anyone foraging for *Marasmius*, the following key to the macroscopic features (adapted from FunKey) is helpful:

***Marasmius* s.s. Macroscopic Features**

- Small to medium agaric with thin flesh.
- Substrate: litter, mulch, aerial rhizomorphs, or wood.
- Spore print: white to cream.
- Cap: white, cream, yellow, orange, brown, red, pink or purple, not viscid.
- Gills: free, adnexed, adnate, sinuate or notched, rarely subdecurrent, sometimes attached to a collar, or radiating from a lateral point (Sect. Neosessiles).
- Stem: central, totally dark or very dark below and paler above, sometimes resembling horsehair, often glossy, occasionally hairy.

- Stipe absent: (Sect. *Neosessiles*).
- Partial veil remnants absent.
- Reviving (marcescent)².

A new set of descriptions of the above species and others has been incorporated on the QMS Website, Fungi of Queensland³. Other species will be added as they are discovered and described.

I am eager to assist anyone who would like to begin collecting *Marasmius*.

A few hints to start:

1. 10-20 fruiting bodies are needed for an adequate collection – remember they are often very small.
2. A spore print is very helpful/essential

3. Count the gills of at least 10 fruiting bodies
4. Fill out a description for *Marasmius* (available from franguard@icloud.com)
5. Good photos essential, but do not replace 1. to 4. (above).

References:

- ¹ Wannathes, N., Desjardin, D.E., Retnowati, A., Tan, Y.S. and Lumyong, S. (2004). A redescription of *Marasmius pellucidus*, a species widespread in South Asia. *Fungal Diversity* **17**: 203-218.
- ² *FunKey: Key to Agarics: An interactive guide to the macroscopic fungi of Australia*. Available as an app for Android and iOS.
- ³ Queensland Mycological Society Website: gldfungi.org.au Fungi of Queensland.

Small fan-shaped poroid fungi in SEQ rainforests

Pat Leonard

We are all familiar with small-fan shaped fungi with pores growing in troops on woody substrates. If they are bright orange we immediately refer to them as *Favolaschia calocera*. This is an introduced weed species first recorded in the Lamington National Park circa 2006 and now observed widely across SE Queensland as far west as the Bunya Mountains and north to the Gympie region.



Favolaschia calocera © Pat Leonard

Also on wood, and a pale fawn colour, is *Panellus pusillus*. This species is very common and widely distributed along the east coast of Australia from Cape York in the north to Tasmania in the south. It has quite large pores for such a small fungus and they tend to be radially elongated and somewhat angular. A Fungimap target, this is by far the most commonly recorded of this group of fungi in Australia.

Two recent finds by QMS members at Bellthorpe and Mary Cairncross in the Sunshine Coast hinterland were recorded in the field as *Panellus pusillus*, but closer examination revealed that they

had much smaller ovoid pores and they were growing on decaying fronds of the picabeen palm (*Archontophoenix cunninghamiana*).



Panellus pusillus Caps (L) and pores (R) © Susie Webster

A search of the literature revealed that two small poroid fungi had been recorded on palm fronds: *Favolaschia peziziformis* described from the Bonin Islands (Japan) and *Favolaschia minima* described from Java. Neither species is recorded for Queensland or Australia.

A recent paper by Peter Johnston et al (2006) reviewed *Favolaschia* and related species in New Zealand. It moved *F. minima* to *Panellus minimus* on the basis of sequencing results. In New Zealand *Panellus minimus* grows on monocotyledons; the original description from Java was of a fungus



Favolaschia peziziformis © Pat Leonard



Panellus minimus © Jerry Cooper



Favolaschia cyatheae © Jerry Cooper

growing on palm fronds. It is close to *Favolaschia cyatheae* and *Favolaschia austrocyatheae*, both of which grow on dead tree fern fronds in New Zealand; neither are known from Australia.

Sequencing has confirmed that both *Favolaschia* and *Panellus* are good and distinct genera.

In the more tropical parts of Queensland the larger white *Favolaschia pustulosa* has also been recorded a few times.

So how does one distinguish these species?

The two larger species, *F. calocera* and *F. pustulosa* can be distinguished easily by cap colour, cap size

Species	<i>F. calocera</i>	<i>P. pusillus</i>	<i>F. peziziformis</i>	<i>P. minimus</i>	<i>F. pustulosa</i>
Cap colour	Orange	Fawn	White	White	White
Cap texture	Glabrous	Velutinate	Powdery	Glabrous	Pustulose
Cap size mm	5 - 20	2 - 5	0.5 - 3	1 - 3.5	5 - 85
Pores per mm	1 - 3	2 - 4	8 - 10	3 - 5	1 - 3
Spore size μm	9-12.5×6.5-8.5	4-5.5×2-3	8-11×5-6	6-8.5×3.5-5	7.5-10×5-7
Substrate	Woody substrates	Woody substrates	Palm fronds	Monocot leaves	Logs and dead trees

Fungal conservation: The road to global red listing of Queensland fungi

Pat Leonard

Extinction – a history

The International Union for Conservation of Nature (IUCN) is one of a series of international bodies



Favolaschia pustulosa © Pat Leonard

and cap texture. The three smaller species are best distinguished by cap texture, pore size and substrate (table below).

Conclusion

The recent finds of a small poroid fungus on palm fronds in SEQ are most likely to be *Favolaschia peziziformis* on the basis of the morphological information. *Panellus minimus* is clearly defined in its New Zealand form, but whether this is the same fungus as *Favolashcia minima* described from Java and Sri Lanka (Pegler 1986) remains to be seen.

References

- Johnston, P.R., Whitton, S.R., Buchanan, P.K., et al. (2006) The basidiomycete genus *Favolaschia* in New Zealand. *New Zealand Journal of Botany*. **44**: 65-87.
- Kuntze, O. (1898). *Revisio generum plantarum*. 3(2) 576 p.
- Patouillard, N.T. and Lagerheim, G. (1892). Champignons de l'Équateur. Pugillus II. *Bulletin de la Société Mycologique de France* **8**: 113-140
- Pegler, D.N. (1986) Agaric flora of Sri Lanka. *Kew Bulletin Additional Series* XII.
- Singer, R. (1974). A monograph of *Favolaschia*. *Beihefte zur Nova Hedwigia* **50**: 1-108.

created after the Second World War in an attempt to make a saner and safer world, one in which wars were less likely. The IUCN is unusual in that its members are both Governments and NGOs. From its early years it has focused on identifying species threatened with extinction and seeking to protect them. Its principal means has been the creation of a list of threatened species (the Red List) and publication of red data books.

Life is thought to have originated on earth some 3500 million years ago (mya) and it is instructive to ask whether that first organism, commonly known as Luca (Last universal common ancestor) grew in to our immensely complex modern world with millions of different living creatures via a smooth and easy path. Not so is the answer.

Some 2400 mya the cyanobacteria perfected the process of using the sun's rays to undertake photosynthesis and as a result began the production of oxygen. We cannot live without it now, but early life was unable to live with the changing atmosphere and what was probably the first great extinction resulted from this simple chemical change. At about 540 mya, at the end of the Ediacarian era, predators arrived. Species that did not have protective strategies died out. Further extinctions followed 450 mya and 375 mya, probably due to anoxia: the depletion of oxygen in the oceans.

The Permian extinction, 250 mya resulted in up to 96% of all marine and 70% of terrestrial vertebrate species becoming extinct, including all species of trilobites. The Triassic extinction 200 mya again resulted in 70-75 % of all species going extinct. Unlike earlier extinction events the K-T extinction of 66 mya was dramatic and sudden, believed to have been caused by a massive meteorite strike. The dinosaurs were the best known victims of that extinction. And now we are at the beginning of the Anthropocene extinction, so called because it is being caused by humans.

With many past extinctions and the recovery of life, albeit slowly, one has to ask whether in the long run extinction really matters. Is species conservation in general and fungal conservation in particular a sensible strategy?

Conflicting theories

Charles Darwin explained the mechanism for natural selection, but not what the results would be in his landmark book: *Origin of Species* (1859). Herbert Spencer, the British philosopher went on to coin the phrase: 'the survival of the fittest'. A series of subsequent scientists have pursued this thought, most eloquently Richard Dawkins in *The Selfish Gene* (1976). This group, commonly known as the neo-Darwinists, exemplify reductionist science and by implication suggest that the loss of species is a natural process which leads to a better outcome for those that remain.

James Lovelock in his The Gaia Hypothesis suggested that natural systems are self-adjusting and aim for stability. More recently, Richard Fortey has suggested that over the majority of life on earth, biodiversity has been the norm and extinction events the exception. It is very hard to forecast what

species will survive an extinction event. Biodiversity and complexity lead to stability and increase the odds that life will survive. Simplification leads to risk and reduces the chance that life will survive. Fortey is a Fellow of the Royal Society, the world's leading authority on the extinct trilobites and a talented amateur mycologist in his spare time. (*Life: an unauthorised biography* – 2008).

Why conserve?

So why should we conserve species? Naturally occurring ecosystems are complex and work best when all their components, including fungi, are present. Clearly some species can be lost over time and others adjust but we are in no position to know which elements may be removed without undermining the whole system. Think of an expensive car. You can probably lose the wheel hubs and still be able to drive the car, but take the smallest component out of the on-board computer and then see how far you get.

Simplification of ecosystems is something that humans have done since they became settled and adopted agriculture. The main objective of agriculture (and commercial forestry) is reductionist; we now have vast areas under a single variety of a single species of crop or livestock. The farmer battles against pests and diseases that assail such systems. Even those most involved accept that this is a high risk strategy.

Many people believe that *Homo sapiens* has no moral authority to remove species from the planet. But, whether or not you share that belief, removing species without full knowledge of the consequences risks our survival as a species. Life may survive but we and our successors will not.

Extinction Threats

The IUCN have sought to analyse threats to all species be they animals, plants, insects or fungi. Whilst these risks will differ in importance in different areas, they are present worldwide and ranked on that basis. They are:

- Residential and commercial development.
- Agriculture and aquaculture.
- Energy production and mining.
- Transportation and service corridors.
- Biological resource use – e.g. hunting.
- Human intrusion – e.g. recreation; wars.
- Natural system modification – e.g. fires; water management.
- Invasive species – e.g. pigs; myrtle rust.
- Pollution – e.g. nitrates; soil loads and the barrier reef.
- Geological events – e.g. earthquakes.

- Climate change – e.g. soil moisture levels; temperature and seed setting; sea levels and storm surges.
- Other.

For any particular species one can identify and assess the extent to which each threat poses a risk of extinction. So, for example, fire or increased nitrogen levels may be fatal for some species of fungi. Some fungi such as myrtle rust or wheat rust

may be existential threats to some species of plants. Those species with small populations, which we may think of as 'rare' may be at great risk, but it is important to understand that conservation is about protection from extinction and that does not necessarily correlate with rarity.

The IUCN has attempted to classify the risk of extinction for all species in a single system. There are nine formal categories.

IUCN – classification of risk of extinction – Fungi

A species is:	When:
Extinct (EX) or Regionally Extinct (RE)	The species has previously been resident and there is no reasonable doubt that the last individual has died. Due to the cryptic nature of fungi, we recommend RE to be used only if exhaustive surveys in known and/or expected habitat throughout its historic range during an adequate time period have failed to record an individual. Extinct (EX) refers to the global scale and RE to any lower geographical scale.
Critically Endangered (CR)	The best available evidence indicates that it meets any of the criteria A to E (see the list on page 12) for CR, and it is therefore considered to be facing an extremely high risk of regional extinction.
Endangered (EN)	The best available evidence indicates that it meets any of the criteria A to E for EN, and it is therefore considered to be facing a very high risk of regional extinction.
Vulnerable (VU)	The best available evidence indicates that it meets any of the criteria A to E for VU, and it is therefore considered to be a high risk of regional extinction.
Near Threatened (NT)	It has been evaluated against the criteria and does not qualify for CR, EN, or VU, but is close to qualifying for, or is likely to qualify for, a threatened category in the near future.
Least Concern (LC)	The species has been evaluated against the criteria and does not qualify for CR, EN, VU or NT. Species in this category are normally widespread and abundant.
Data Deficient (DD)	There is inadequate information to make assessment of the species risk of extinction based on its distribution and population status. DD is not a threat category and species designated DD are rarely targets for conservation action. Mueller and Dahlberg (see <i>preliminary assessment</i> , page 12) recommend using whatever information is available and relevant to make assessments at one of the threat categories and place species into the DD category only when there is no alternative.
Not Applicable (NA)	The taxon is not native to the region or of lower taxonomic rank than considered eligible for red-listing within the region. This category is not used at the global level.
Not Evaluated (NE)	The species has not yet been evaluated against the criteria.

The Red List Process

The IUCN have adopted a completely open system in which anyone can propose a species for assessment. The likelihood of success in obtaining a listing is however directly related to the strength of the case mounted and this can be a lengthy and burdensome process.

QMS – what we did

The QMS appointed a subcommittee in 2015 and

they oversaw the process of selecting candidates to be considered. The first step was to generate a list of all known macrofungi in the state. The sources we used were the list of fungal holdings in the Queensland Herbarium (BRI), and the list on the Atlas of Living Australia (ALA) which contained Queensland fungi deposited in other Australian Herbaria and at PDD in New Zealand. We also used the list of fungi recorded by the QMS. There are Queensland fungi deposited in other Herbaria overseas, notably at Kew in the UK, New York

Botanic Garden, Vienna and Lieden, but we were unable to readily obtain that information.

The next stage was to determine how many records there were for each species and this proved surprisingly difficult. The ALA database can contain as many as seven records for a single fungus collected at the same place on the same day. This is because it accumulates records from various sources without checking whether they are duplicates. Two QMS volunteers went through all the records to remove the duplicates, a mammoth task.



Some of the QMS red-listers. Top: Susie Webster, Pat Leonard, Chris Graves, Wayne Boatwright. Bottom, Vivian Sandoval-Gomez, Susan Nuske (on screen), Pat Leonard, Fran Guard. © Wayne Boatwright.

We then eliminated all fungi with 10 or more collections at BRI on the grounds that they were likely to be common and not under threat. We also eliminated those that were known introductions (e.g. *Favolaschia calocera*). We also eliminated all the species that were only known from a single collection. Finally we eliminated a few species that we thought to be under-represented at the Herbarium because collectors thought they were common and assumed the Herbarium already had many collections.

We were left with a long list of 186 species. We considered those that remained to create shortlist. Priority was given to those species that:

- had their main populations in Queensland.
- had evidence of decline in the species or its habitat.
- were originally described from Queensland.

We also tried to ensure that the main morphological groups of macrofungi were all represented and that our short list had parasitic,

saprotrophic and mycorrhizal fungi. This process resulted in a shortlist of 40 species.

We then prepared dossiers for the best candidates. Species were allocated to members of the subcommittee who then undertook the necessary work.

Preparing the dossiers

The IUCN have some standard headings and guidance for the information they require in order to undertake a formal assessment. There are 11 headings:

- Taxonomic notes.
- Why suggest for red list?
- Geographic range.
- Population trends.
- Frequency data.
- Habitat and ecology.
- Threats.
- Conservation actions.
- Research needed.
- Bibliography.
- Images.

Assembling information for the dossiers was challenging. Fungal records frequently consist of little more than a name, sometimes a specimen, less often a photo and usually there is a date and location. It is very difficult to deduce information about the vulnerability of individual species to threats when little is known about the biology of a species or its association with other species in an ecosystem. The IUCN encourages assessors to make the best judgement that they can on the basis of available information. The approach focuses on ensuring that all relevant information has been collected and considered.

Useful sources of information

There is a great deal of useful information now available on websites worldwide. Some of it must be used with caution and needs to be critically examined as our comments on the ALA population data above illustrate. The sites we used most often were:

- Atlas of Living Australia – (ALA) - www.ala.org.au
- Queensland Herbarium – www.qld.gov.au/environment/plants-animals/plants/herbarium/flora-census
- Land use data – Queensland Globe - www.dat.qld.gov.au/dataset/queensland-globe
- Climate change in Australia – www.climatechangeinaustralia.gov.au
- Geocat – www.geocat.kew.org

- Global Biodiversity Information Facility – GBIF - www.gbif.org/species/search
- Mycobank – <http://www.mycobank.org/>

Preliminary assessment

Once you have a completed dossier, a preliminary assessment can be carried out using the IUCN manual and Mueller and Dahlberg's advice for assessment of fungi to determine which of the 9 threat categories each species might be allocated to. The IUCN use a series of criteria to determine the degree of threat.

The five criteria used in the assessment are:

- **A – Population** – population reduction measured over 10 years or 3 generations, whichever is the longer.
- **B - Geographic range** – Extent of occurrence (EOO) or area of occupancy (AOO).
- **C - Small population and decline.**– Less than 10000 mature individuals.
- **D - Very small or restricted population.**– Less than 1000 mature individuals.
- **E - Quantitative analysis**–Calculated probabilities. (Not used for fungi).

The preliminary assessment is then added to the dossier and published on the website.

(<http://iucn.ekoo.se/en/>)

Australian Threatened Species

The Review Process

The dossiers were reviewed by the Mushroom, Bracket and Puffball specialist group at a special workshop.



Hygrocybe boothii, one of the submitted species. © Tony Young.

The first such workshop in the Southern Hemisphere was held in Melbourne in late July 2019.

The QMS submitted 17 species to the Melbourne workshop and QMS member Dr Susan Nuske submitted a further 5 truffles.



Heimioporus australis, another candidate species. © Pat Leonard.

The process is rigorous with the international assessors challenging every item of the information in the dossiers. It reminds one of the process used in many European Universities where candidates for a doctorate are challenged by their peers before a decision is taken on awarding their PhD.

Results – Queensland fungi

The twenty two fungi submitted by QMS members were considered by Red List committee at the Melbourne workshop.

The resulting assessments were:

- 2 (EN) Endangered
- 6 (VU) Vulnerable
- 2 (NT) Near threatened
- 6 (DD) Data deficient
- 2 (LC) Least concern
- 4 (NE) Not evaluated

Consistency check

The specialist group will now review the workshop results to ensure consistency. These will then be put to the IUCN for formal approval and the results are expected to be published in November 2019.

Adopt a rare or threatened fungus for the QMS

In addition to the 17 fungi submitted by QMS for the IUCN red list, work has started on four more species. The Melbourne workshop showed that to protect our most important fungi we need volunteers who will adopt one or more species and keep an eye out for them. We hope that some of the fungi we put forward will be secure, either because

new locations are discovered for them or because conservation action bolsters their populations. Others may remain threatened and monitoring their progress will be vital to their survival.

What the QMS can do:

- Give you a description of the fungus.
- Provide a photo.
- Give you the known records and locations.
- Keep you up-to-date with the IUCN listing process.
- Arrange sequencing of specimens where necessary.

What QMS volunteers might do for the listed fungi:

- Keep the records up-to-date.
- Visit places where it has been recorded and check if it is still there.
- Take a photo if it is there, make a note if it's not!
- Keep a list of visits/locations when/where it has not been found.

- Check if anyone spots it on a QMS foray or QMS facebook or iNaturalist.
- Work out if there are other similar habitats where you might find it.
- Visit those other sites or get other QMS members to do so.

What all QMS members can do for fungal conservation:

- Watch out for fungal species in decline.
- Propose new candidates for red listing.
- Alert QMS to threats to fungi.

Thanks

QMS Red Listers:

Wayne Boatwright-, Jenny Eldridge, Chris Graves, Fran Guard, Beverley Miles, Susan Nuske, Megan Prance, Vanessa Ryan, Vivian Sandoval-Gomez, Susie Webster.

IUCN Assessors:

Peter Buchanan, Anders Dahlberg, Tom May, Greg Mueller, Janet Scott

Book Review

Dr Miranda Y Mortlock

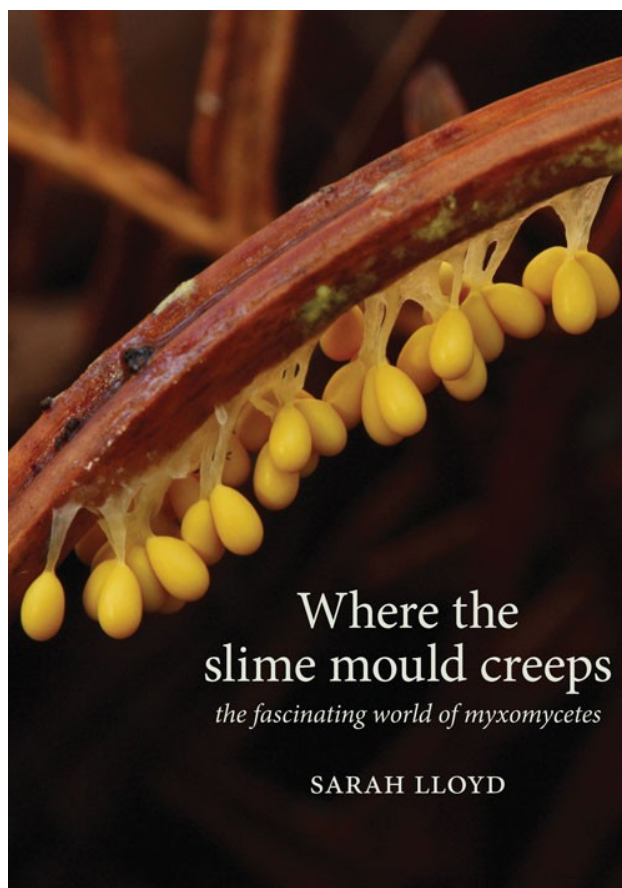
Where the Slime Mould Creeps, by Sarah Lloyd

Have you occasionally seen a bright-coloured glistening yellow mess and wondered what had been sick? Various cultures have called it dog vomit or snake poo. Maybe it is time to explore the slime moulds

Where the Slime Mould Creeps by Sarah Lloyd was published in 2014, with a revised second edition appearing in 2018. Sarah is a naturalist, writer and photographer based in Tasmania where she is surrounded by tall wet eucalypt forest that provides her much to study.

The cover photo on the first edition of this book is inviting – What are those yellow blobs you may ask? Could it be insect eggs, or something melted?? This book explores a rather undervalued and maybe a group of organisms that many people may not even know about. The second edition uses a less enigmatic photo that fits better with the subtitle, a white slime mould spreading over the substrate (next page)

Sarah includes quotes from an older book, Thomas McBride's 1899 "*The North American Slime-Moulds*" and thoughts about the function of



iridescence in these 'biological jewels of nature'. It is a small introductory book, packed with information. It has 110 pages and is divided into three parts with appendices including a list of species in the back. Part 3 is an image gallery of the species, and my favourite part. The photo captions include the height of fruiting bodies in millimetres to help with scale.

Myxomycetes is a class within the Kingdom Protozoa and this is within the larger Division Myxomycota. There is an appendix to assist in the classification of the six Orders, after Kirk et al (2008):

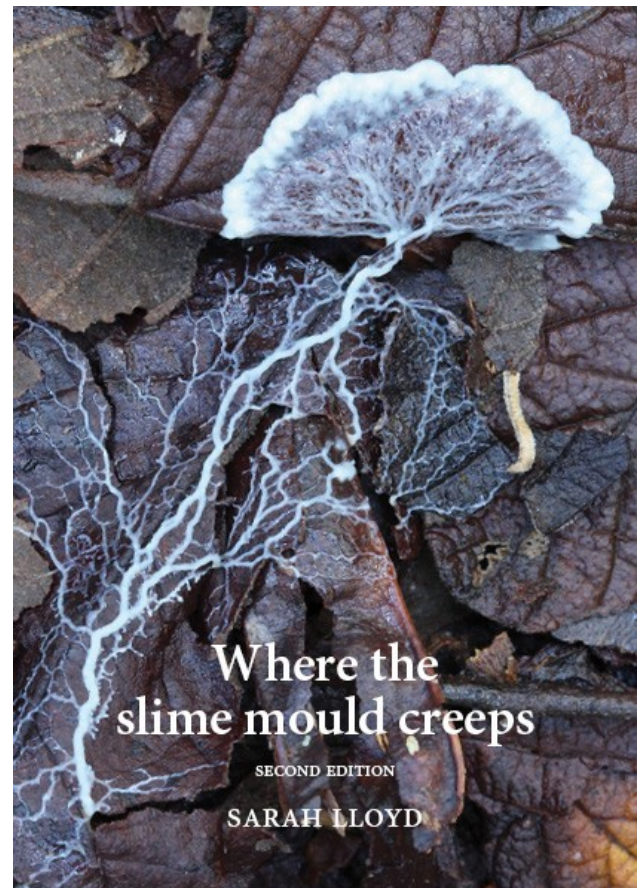
Protosteliales
Liceales
Echinosteliales
Trichiales
Physarales
Stemonitales

Slime moulds have characteristics that continually amaze and will provide questions for research into the future. At one stage of their life they are single cell amoebae, whose definition can be found in a dictionary of zoology, then they combine with other compatible amoebae to form a plasmodium-or pseudoplasmodium-defined in the Dictionary of Plant Sciences! (<http://www.myxo.info/what-are-myxomycetes-slime-moulds/> accessed April 2019). Keller and Everhart (2010) shares the importance of the slime moulds for teaching and in their 2007 paper show a nice diagram of life cycle of the Myxomycetes.

An ecological link in the book is to the Collembola (springtails) who feast on them, and there are pictures of fruiting bodies with beetles on them.

A highlight of the book is the time lapse photos of the development and growth of *Stemonitis axifera*. It really captures the change in colour, texture, glossiness, the fruitification and the final decay into a dusty pile of spores.

In summary, it is a useful book on many levels. It expands the interest in a strange group of organisms. It delves into their biology and their ecology. It is full of interesting photographs that marvel and even repel. It is a great starting point to learn about this mysterious group.



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- Dr Mortlock is a biometrician in the faculty of Science (Agriculture and Food Sciences) at the University of Queensland. <https://qaafi.uq.edu.au/profile/363/miranda-mortlock>