fungimap newsletter **58**

March 2018

AUSTRALIA'S FUNGI MAPPING SCHEME

Coordinator's report

Sapphire McMullan-Fisher

Happy 2018! We are pleased to tell you that this year will bring a new Fungimap website that will be refreshed with new content as the year progresses. You may have experienced some difficulties with our website in the past, so the good news is we are moving from the Joomla system to a Wordpress one.

Fungimap is passionate about sharing mycological knowledge with groups around the country. As we will not organise large events ourselves in the near future, we hope to be invited to others' events to enrich their programs. This model has been successful on a small scale in Victoria and South Australia over the last two years. Please read the Regional News sections for more details.

Fungimap has been successful in receiving Victorian Government funding for a Biodiversity On-Ground Action project called 'Putting Victoria's fungal biodiversity on the map.' So will be rolling out some fungal conservation education across Victoria in fungi seasons 2018-19. We believe these materials will also be of interest to groups in other states. We hope to undertake population studies and continue to work towards better conservation of the threatened Tea-tree Fingers fungus, which has been found (as reported in the eNews 7 & 8) at:

- new Yarra Valley, Victoria, site on a new host plant, Burgan *(Kunzea ericoides).*
- the original site in Adams Creek Nature Conservation Reserve, Lang Lang, near Nyora, during some surveys by Biosis. To our great relief 5-7 living individuals were observed - the first time for several years.

Finally, all of these events and actions are enabled by the ongoing support of our financial members and dedicated volunteers. One reason for our website upgrade is problems with the online membership system. We hope the new website shop will enable members to easily renew, until then a manual system is in place. The 2018 membership prices (next page) show we are moving to a Household membership for people at the same address and no longer will have individual associate membership.

With fewer available funds in 2018, the time allocated to Fungimap coordination will decrease, so we will be further relying on the wonderful volunteers whose generous contributions are acknowledged, as always, in the final pages of this newsletter.

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Fungimap Committee

Why your support of Fungimap is so important

Fungimap is a national not for profit organisation dedicated to advancing knowledge and conservation of Australian fungi, with a focus on (but not limited to) macrofungi.

Fungimap aims to:

- Stimulate and support the study of Australian macrofungi through the accumulation, storage, analysis and dissemination of information about fungi
- Promote the appreciation of fungi with a focus on Australian macrofungi in the natural environment
- Link and bring together those with an interest in Australian macrofungi, providing opportunities for sharing and learning; and fostering relationships between groups and individuals that share the objectives of Fungimap; and
- Foster the conservation of Australian macrofungi.

Fungimap Membership 2018

Full Fungimap $55
Concession $45
Household $65
Group & Library $55

Regional News

Western Australia

The spread of Favolaschia calocera in south-west Australia

Katrina Syme

On Saturday, June 10th, fungi forays were held at two sites in the Manjimup/Pemberton region, organized by Lee Fontanini through the Warren Catchments Council. The first took place in a restoration area in the riparian zone next to the Warren River and the second on the shores of Big Brook Dam. Despite the continuing warm, dry weather in the south-west, more than fifty species of fungi were recorded, including *Cortinarius persplendidus, Xerula australis*, and a splendid group of *Mycena kuurkacea* growing in clumps all the way up a moss-covered fallen tree. We also found large numbers of the exotic species *Favolaschia calocera* next to the Warren River and a smaller number on twigs near the Big Brook Dam.

Fig. 1. *Favolaschia calocera:* (left) a colony of growing on a fallen tree, showing the underside with distinctive hexagonal pores (Image: Katrina Syme); and (right) a large colony growing on a tree stem near Warren River (Image: Lee Fontanini).

On Monday, June 19th, Prue Anderson and I led twenty year 5 and 6 students from Walpole Primary School on a foray to Horseyard Hill, just a short walk from the school. There were not many fungi to be seen, but after spotting *Hebeloma aminophilum*, a few species of *Russula* and some pretty little red and yellow waxcaps, Prue suddenly darted into the bush next to the track and found some small *Favolaschia calocera* growing on a twig.

Richard Robinson made the first Western Australian record of this species west of Manjimup, where he collected it from twigs of native waterbush (*Bossiaea aquifolium*) in virgin Jarrah (*Eucalyptus marginata*) forest in 2010, and shortly afterwards at Beedelup National Park. It has since been found on the margins of Lake Seppings in Albany and I have recorded it growing on the east bank of the Denmark River near town and at the wetlands area east of Denmark. This tiny, fluoro-orange, tough little fungus is here to stay.

Fig. 2. *Mycena kuurkacea:* (left) growing in clumps among moss (Image: Lee Fontanini); (right) a group growing gregariously in moss and litter near Warren River (Image: Katrina Syme).

Fig. 3. *Podoscypha petalodes* growing amongst eucalypt leaf litter near Big Brook Dam (Image: Katrina Syme).

Fig. 4. *Ramaria sp.* growing near Big Brook Dam and persisting despite the continuing warm, dry weather (Image: Lee Fontanini).

Fungal foray near Waroona – 23-25 June 2017
Elaine Davison

The WA Naturalists held a fungal foray at Cypress Farm, a private property on the west of the Darling Scarp, over the weekend of 23 to 25 June. The property is in the northern jarrah forest, about 2 hours' drive south of Perth. Cypress Farm is largely uncleared and includes dense jarrah (*Eucalyptus marginata*)/marri (*Corymbia calophylla*) forest with Swan River blackbutt (*E. patens*) in the creek lines. It is one of the wettest places in the northern jarrah forest, which is just as well as 2017 had an extremely dry autumn. The aim of the weekend was to provide the owners with a list and images of the fungi we had seen.

Fig. 5. Foyayers hard at work in the unlogged jarrah forest at Lane-Poole Reserve, near Cypress Farm (Image: Jolanda Keeble).

On Saturday morning the 12 of us split up into two groups each tackling a different habitat. One group headed for an upland slope with fairly open forest, whilst the other group recorded in a wetter, lowland area. On the Sunday we all walked to the adjacent Lane Poole Reserve, recording what we saw in this jarrah/marri forest with almost no understorey.

Altogether we saw over 75 different species of fungi, and put names to as many as possible. There were large conspicuous mushrooms like *Austroboletus occidentalis, Cortinarius archeri*, and *Amanita hiltonii*, although not all were easy to see unless the leaf litter was removed. There were smaller mushrooms too, like species of *Inocybe* and *Mycena.* There were some known to be undescribed like *Inocybe* sp. 'chunky' and *Amanita* sp. 'eucalypti Perup', and many which were easily recognised such *Leucopaxillus lilacinus*, *Boletellus obscurecoccineus, Fistulina hepatica* and *Hydnum repandum.*

Fig. 6. Sectioned mature and immature *Inocybe sp. 'chunky'* (Image: Neale Bougher).

Fig. 7 *Amanita sp. 'eucalypti Perup'* (Image: Elaine Davison).

With the ongoing support by the WA Naturalists, and enthusiasm of individual collectors, we are starting to document diversity of larger fungi within Western Australia.

South Australia

Adelaide Fungal Studies Group – Forays 2017
Pam Catcheside

The Adelaide Fungal Studies Group have had four forays from May until early July. Our first foray to Mount Lofty Botanic Garden is a chance to meet up again after the summer's lack of fungi. We have been going to the Garden since 2003 and enjoy seeing the 'faithfuls' in the birch grove, the species that appear year after year such as *Leccinum scabrum*, Birch Bolete, the pretty pale orange, 'woolly fringed' *Lactarius torminosus,* the rather plain lead-grey *L. turpis* and the large orange *L. deliciosus*. The first two of these Milkcaps bleed white milk when the gills are cut, *L. deliciosus* bleeds a bright orange milk. There were fewer fungi recorded this year, 24 species whereas 36 had been found in 2016. After the morning foray we repair to a local pub for a convivial lunch.

Our second foray was on 27th May to Springmount Conservation Park on the Fleurieu Peninsula south of Adelaide. We were pleased to find a number of Russulas including *Russula clelandii* and *R. persanguinea*. Boletes were fruiting with beautiful specimens of *Boletellus obscurecoccineus* (Fig. 1) as well as gilled boletes *Phylloporus rhodoxanthus* and *Austropaxillus infundibuliformis* group. We were delighted to find several clumps of the puffball *Lycoperdon pyriforme* (Fig. 2). Although common in Tasmania and Victoria it seems not been previously recorded in South Australia (from records of Atlas of Living Australia).

Fig. 1. *Boletellus obscurecoccineus* (Image: David Catcheside).

Fig. 2. *Lycoperdon pyriforme* (Image: David Catcheside).

Monarto CP is a sandy semi-arid park north of Adelaide. It is home to a few small, black to brown Entolomas, *Entoloma fuscum*, *E. rubromarginatum* and *E. moongum* which has a bluish-black stipe. We collected the glutinous white *Limacella pitereka,* its generic name meaning 'little slug' is apt for this slimy fungus. A small stalked puffball was also collected and tentatively identified as *Tulostoma berteroanum* (Fig. 3). Tulostomas are difficult to identify with often no very clear diagnostic macrocharacters. It is necessary to look carefully at the sandy outer collar (the exoperidium), the inner spore case (the endoperidium), the area around the mouth or stoma (peristome) as well as spores and capillitium (hyphae within the spore mass).

Fig. 3. *Tulostoma berteroanum* (Image: David Catcheside).

Our annual foray on 18th June for the Junior Field Naturalists was, as usual, very popular. About 40 children and their parents come along and we

always enjoy the enthusiasm of the children as they shout 'Fungus' and the group converges to admire its colour, form, stickiness and so on.

Unfortunately, the foray to Deep Creek CP on 8th July was marred by torrential rain and hail, resulting in soggy, shredded fungi. So, at the following Tuesday meeting, instead of looking at fungi we had found on the foray, we compared the spore production in Basidiomycetes and Ascomycetes and examined basidia, basidiospores, asci and ascospores.

In all, we are finding this fungal season, which goes from mid-May until late August, to be more unpredictable than usual. Few fungi in mid-May at Mount Lofty, good fruiting in late May at Springmount, moderate in mid-June at Monarto but poor since then.

SA Events with Fungimap
Sapphire McMullan-Fisher

South Australians, especially from Adelaide and surrounding regions, are keen to learn more about fungi. This year was the second year in a row that I (Sapphire, SMF, the Fungimap Mycologist) was able to come over and be involved in a series of events.

This year the first four days' events were funded thanks to the efforts of a small organising committee who were able to secure funding from the Discovery Circle through the auspices of the local environmental group Vale Park Our Patch (VPOP).

The funds covered:

- Fungi in the Classroom – teacher professional development with Dr Sapphire McMullan-Fisher (29 June 2017, 4.00 - 5.30 pm).
- Fungi Questions – two classroom sessions for students at Vale Park Primary School and including Behind the News filming with these select students from these sessions (29-30 June 2017). Hopefully the media from this popular children's show will increase the understanding and delight of fungi.
- Public talk to over a hundred people 'The Vital Importance of Fungi' for Discovery Circle (30 June 2017), which is a great turnout for what was a chilly winters night.
- And last but not least, Fungi Walk for Vale Park, Our Patch. Pam Catcheside the local convener of the Adelaide Fungal Studies Group (AFSG) kindly came along. So despite dry conditions participants saw some fungi and were delighted by stories of what fungi are doing in their local bushlands. For more on this see the article by Lisa Bailey (reference in Media section below).

Fig. 4. Sunday fungi walks with Pam Catcheside and SMF at Vale Park Our Patch (Image: Greg Coote).

Fungimap Educators Forum in SA

Thanks to the organisation efforts of Rose, Shanelle and Jasmin, the first Fungimap Educators Forum was held at the wonderful Arbury Park Outdoor School, Bridgewater, SA. The day was designed to bring together experienced mycologists and educators to view, learn, share and discuss teaching mycology resources. The day was more successful than we could have hoped with thirty-five people sharing ideas and learning from each other and their wealth of experience.

One of the highlights according the participant survey was the Fungi walk and identification session by Pam Catcheside, Thelma Bridle, Teresa Lebel and SMF. Participants were able to take home a range of teaching resources: from posters and cards to digital information on a USB stick.

Teaching resources included:

- *Forgotten Flora* – posters set and educational materials by Teresa Lebel
- *Fabulous fungi and Fungimap educational materials Wanted! How to recognise native and weed Amanitas* by Ian Bell
- *The AFSG Morphogroup Posters* by Thelma Bridle
- *Fungi Roulette* (FunID card game) Teresa Lebel and SMF
- *Downy Mildew* Secondary School teaching notes by Tijana Petrovic

- *Bush Buddies* - Scott Creek Primary School & Sturt Upper Reaches Landcare Group (SURLG) by Kim Lau
- *Fungi and how to restore their habitat* by Jasmin Packer SURLG
- *Fungi of the Adelaide Hills* by NRM Education Adelaide Mount Lofty Ranges / Adelaide Fungal Studies Group
- *Web of Forest Life* by Richard Geytenbeek
- *Fungi species list example* Sturt Upper Reaches Landcare Group.

In the long term, if we managed to get some funding we would like to have part of our new website with resources like these that are available for download.

The day was great and one participant came all the way from South East Queensland, so we are also keen to hear from anyone who would like to help us hold another Educators Forum. If anyone is interested in information about any of the materials please email us at info@fungimap.org.au and a volunteer will be in touch.

Media

These events had great media coverage both locally and nationally with the profile of fungi being raised through:

- 'Fungi are amazing' Sapphire McMullan-Fisher interviewed by Suzy Ramone and Bec Kemp ABC National Digital Radio (1 July 2017) http://www.abc.net.au/radio/programs/saturdayafternoons/fungi-are-amazing/8709906
- 'Fungi Fun!' Behind the News, ABC Me episode published 5 Jul 2017
- 'To foray or forage' article by Lisa Bailey, The Royal Institution of Australia https://www.australiascience.tv/to-foray-or-forage-australian-native-mushrooms/

These events were followed by two more days in the Adelaide Hills region managed by the great team Natural Resources SA Murray-Darling Basin. This included a Fungi Walk at Prospect Hill on one of the local properties (3 July 2017). Attended by some very enthusiastic locals, it was weather better suited to ducks and fungi than people. Again we were supported by AFSG with Thelma Bridle sharing her knowledge about the local fungi.

In the evening local school Cornerstone College, Mt Barker offered their environment centre as the venue for the talk, 'Fabulous fungi – the ties that bind'. The final event the next day was a walk with locals at Totness Recreation Park, where there was light rain and a lovely display of fungi. We were looking for the new genus 'Amylotrama' that had been observed at the end of the 2016 walk and found it! However we are amazed that this might be a second species found within 50 metres of the original observation.

Fig. 5. Habitat of Messmate Stringybark *(Eucalyptus obliqua)* over a heathy understory, Totness Recreation Park (Image: SJM McMullan-Fisher CC-BY-SA).

Fig. 6. New genus 'Amylotrama' a bolete relative: (left) 2016 observation with pink tint to the context and (right) 2017 collection (Images: SJM McMullan-Fisher CC-BY-SA).

Eyre

My last event in SA in 2017 were during National Science Week for the inaugural Nature of Eyre Peninsula Conference. I was delighted to be supported to join this great new Conference organised by Natural Resources Eyre Peninsula. This two day event was full of interesting speakers who took us on natural history journeys across the Peninsula. I gave a well received talk on 'Fungal Ecology and Soil Fungi: What do fungi do?'

This was my first visit to the region, which is bounded to the east by Spencer Gulf, the west by the Great Australian Bight, and the north by the Gawler Range. The conference was based in Coffin Bay, and the golf club turned out to be a perfect location as the recent rain had half a dozen macrofungi popping up between the fairways. This made leading the fungi walks as part of the Conference Bioblitz easier as there were at least some fungi to be seen. Usually I think that National Science Week is "outside" the fungi season. We were lucky. For futher information: https://biocollect.ala.org.au/ala-cs/project/index/3595e826-4d38-423a-a9f1-683ed6c34e7a

The Eyre Peninsula has a dry climate, but after rain there is a wonderful diversity of macrofungi. If anyone is travelling to the region, and I recommend they do, they should take a copy of the local fungi guide 'Admiring the fungi of Lower Eyre Peninsula: a preliminary guide to the larger fungi of the region' by Brian Saunders (2015).

Tasmania

Myxomycetes in the treeferns
Sarah Lloyd

Soft treeferns (*Dicksonia antarctica*) are common in Tasmania in the rainforest, wet eucalypt forests and in sheltered gullies in drier forests. They sometimes attain great heights of around 12 metres but at Black Sugarloaf they are between one to two metres tall and therefore an ideal height to inspect.

Over the decades, leaves, twigs and branches fall from the forest canopy and accumulate among the fronds. In 2014 I discovered this slime mould hotspot and it has been productive ever since. A few days after rain from about May to July, plasmodia can sometimes be seen creeping through the fallen litter and up the living and dead fronds, eventually to form fruiting bodies. It is not unusual to find several different species on the same leaf or branch.

Interestingly, some treeferns have numerous species, while others alongside have none. For instance, on May 24 2017 I saw masses of *Craterium minutum*. Like many slime moulds, its sporangia were evenly spaced with 1-1.5 mm between each sporangium. After some rough calculations, we estimated that there were more than 3 500 sporangia. Judging by their colour, I reckon the sporangia appeared in three flushes: 1100 appeared a day or so before May 24; the May 24 flush had about 1250 sporangia; and a fresh flush of about 1050 appeared on 26 May.

Fig. 1. *Craterium minutum* **on fern frond (Image: Sarah Lloyd).**

On May 26 I collected *Didymium clavus* and *D. squamulosum* from the same treefern, and noticed some immature fruiting bodies among the fresh flush of *Craterium*. These turned out to be *D. melanospermum*, an uncommon species here. A few weeks later *Physarum bitectum* and *Physarum bivalve*—both additions to my species list—appeared in another treefern. In early July *Physarum contextum* appeared on litter in two treeferns about 10 metres apart.

Fig. 2. *Physarum bitectum* **growing on a treefern (Image: Sarah Lloyd).**

Fig. 3. *Physarum bivalve* **growing on the same treefern as** *P. bitectum* **(Image: Sarah Lloyd).**

The most productive ferns are those under a canopy of eucalypts (*Eucalyptus* spp.), Blackwood (*Acacia melanoxylon*) and dogwood (*Pomaderris apetala*) whose leaves, sticks and bark accumulate among the fronds and remain wet for months. These ferns grow on a damp, shaded hillside so a hand lens and strong torch or headlamp are essential when searching for them. The treeferns in the paperbark (*Melaleuca ericifolia*) swamp forest are not as productive, possibly because the site is more exposed; paperbarks don't regularly shed limbs; and their tiny leaves don't become sodden like those of the dogwood.

These litter-dwelling species also appear—sometimes in large masses—on litter that accumulates on old stumps and logs. It is likely they also occur on the thick layer of litter on the forest floor. However, to find such a concentrated source of these species saves much back-breaking crawling around on the ground.

https://sarahlloydmyxos.wordpress.com/2017/05/26/myxomycetes-in-the-treeferns/

South-Eastern Australia

Fungi gain new followers – report from around and about
Alison Pouliot

This report spans 800 km^2 in south-eastern Australia where I hooked in with all sorts of fungal folk through a series of workshops this autumn. It's always wonderfully exciting to witness an ever-growing interest in fungi among a wide demographic from farmers and Landcarers, rangers and naturalists, to aesthetes and unexpected corners of society. Whether it's in their biology, conservation, survey, role in agriculture or land rehabilitation, or other areas, people are hungry for fungal knowledge and experiences.

Along the southern Victorian coast, Southern Otways Landcare ran their seventh consecutive autumn of fungus workshops with local landholders. This year's workshop focussed on fungi in fire-affected areas following the 2016 Wye River fires. The Green Army crew participated in a second workshop with the aim of incorporating fungi into their biological surveys. Back in the hills in the Otway Forests, forayers enjoyed a dramatic display of fungi this autumn and also documented the distribution of *Amanita muscaria* growing in association with *Nothofagus*.

Fungi are gaining popularity in West Gippsland with Bass Coast and Neerim South Landcare groups both hosting their first fungus workshops. The West Gippsland region is radically modified by agriculture but it was inspiring to see the success of landholders' habitat restoration work with one landholder in Ryanston reestablishing a wet temperate rainforest ecosystem crammed full with fungi, all within just thirty years.

In Central Victoria farmers in the Baringhup area attended a workshop on the role of AM fungi in agroecosystems. Some of them have developed a series of trials to investigate methods for building carbon content in arable soils by burying organic matter and monitoring increases in biological activity including fungi. In nearby Shelbourne a project is underway to fence off isolated farm paddock trees to protect them from stock damage and stubble fires and to improve conditions for the reestablishment of mycorrhizal fungi. Students from LaTrobe Uni and TAFE in Bendigo participated in surveys to monitor fungi in local box and ironbark forests subjected to different management regimes of thinning and burning. Despite the dry conditions, the Friends of Bald Hill Reserve north of Kyneton still managed to document some interesting fungi at the Reserve. Although the mercury dropped to zero, over sixty people turned up to an evening session in Harcourt North on fungi in forests and farms.

Fungi require protection not just on public land and many private property owners are developing inventories of fungi on their properties. It was heartening to visit several covenanted properties in the Ashbourne area in central Victoria where

property owners have resisted government propaganda to 'clean up fuel loads'. Consequently, we encountered a staggering profusion of fungi and the Ashbourne Landcare group is planning to add fungi to their Strategic Plan's objective of biodiversity protection. Wineries and private gardens in the Mt Macedon region are also jumping

Fig. 1. In the field with foray participants from Shellharbour, NSW (Image: © Alison Mellor).

Back toward the escarpment the NSW Parks and Wildlife Service held a foray for the Friends of Minnamurra Rainforest Volunteer Bush Regeneration Group in Budderoo National Park, while in Gosford, the Central Coast Council hosted their first fungus workshop.

Fig. 2. Friends of Minnamurra Rainforest Volunteer Bush Regeneration Group (Image: © Rayner Zuch).

The groundswell of interest in fungi in recent years by diverse groups contributes toward raising the profile of fungi and getting them onto the conservation agenda. I'm now in Europe preparing for some fungus events over here but am already looking forward to the Australian 2018 autumn and the chance to meet new fungi and their followers.

New South Wales

Introduction to Fungi and Field Recording – Presentation Report

Jenny Talbot and Bev Robinson

Jenny and Bev were enthusiastic participants in Ian Bell's final mycology training held at Fungimap 8 in 2015. Since then they have been using the educational materials provided to inform their local 'botanical' groups in the fungi season. Below is an example of a structure that works well for this pair and may help other educators. If you are interested in copies of the Fungimap educational materials contact the Fungimap Office.

Monday 1st May 2017 - attended site 1 week prior to the talk to:

- liaise with Australian Plant Society North Shore Group leader
- check venue facilities
- run through presentation
- check what fungi were visible for walk.

Saturday 6th May 2017 - attended site day prior to talk to:

- check what fungi were still visible for walk
- prepare listings of fungi found (not much as very dry April), in 2 areas visited
- prepare slightly modified presentation - tailoring some slides to the local Ku-ring-gai Wildflower Garden Area.

Mon 8th May 2017 - presentation to Australian Plant Society (APS) North Shore Group (22 attendees)

Talk – 10 –11:30 am (1.5hr)

- Bev started the presentation, including an acknowledgement of the work Ian Bell had put into creating it and advising the group of his recent passing.
- Jenny used a visual aid (PVC pipe plus yarn 'hyphae') to demonstrate mycorrhizal interaction

- Jenny continued the presentation
- Bev concluded the presentation
- displayed animations at end and audience were delighted
- played video segment from Australia Wide - Series 2017 Ep 11 ABC - interview with Steve Axford & Tom May.

Walk – 11:30 am – 12:30 pm (1hr)

- Split into groups to cover 2 areas (each group to visit in turn)
- Jenny – 11 people (started at Picnic area)
- Bev – 11 people (started at Garden area).

Feedback: very positive – at least 6 people had not attend previous year's Fungi Presentations.

Reference to talk on APS on North Shore website: http://www.blandfordia.org.au/wtdownloads_15/Fungi%20Talk%20April%202015w&t.pdf

Victoria - Events with Fungimap

Sapphire McMullan-Fisher

Manningham - Fungimap was once again supported by the Manningham Council environmental seminars (7-8 June 2017). This began in the afternoon with a workshop 'Explore your local fungi with ALA and share records with Fungimap' and then an evening talk 'Fungi - Ecological Interactions' at the Grand Hotel Warrandyte. Fungi activities were rounded off by a 'Fungi ecology fungi walk' at Jumping Creek by the Yarra River. This is a fungal hot spot made famous by Bruce Fuhrer's wonderful photography.

Goulburn - This is the first year Fungimap has been invited up to the Goulburn Broken Catchment (GBC) by the local Catchment Management Authority. This is a central Victoria region with lots of irrigated and dryland farming. Back in January 2017, I gave a talk 'Fungi basics and Fungimap' as part of their brainstorming day 'Nature@Work (Ecosystem services) & Magical Mystery Tour of the Goulburn Broken Catchment'. This was a great day with us all trying to work out how to help land managers understand their fauna, flora and fungi and how to begin to monitor and restore some of their land by working with locals.

There were enough good questions asked during the day that the GBCMA and one of the local landcare groups invited me back for two days of workshops and fungi walks (20-21 Aug 2017). They supported us to adapt one of my talks to focus more on soil, so for both days and locations I presented 'Fungal Ecology and Soil Fungi' to audiences at Euroa and Mooroopna. Once again the late winter rain meant there were sufficient fungi popping up during the fungi walks to keep participants keenly searching.

These Goulburn events led to the following media:

- Soil Fungi, interview with Emma Nobel for the Victorian Country Hour ABC Goulburn Murray (21 Aug 2017).
- Over the fence, Interviewed by Camille Smith for The Weekly Times (7 Sept 2017). http://www.weeklytimesnow.com.au/agribusiness/farm-magazine/over-the-fence-having-fungi-in-soil-ensures-healthy-crops-and-pasture/news-story/35e3ec498266b2fe30fc80a313e3e460

Queensland

News from Cairns

Barry Muir

This is my first entry in Fungimap Newsletter. There are many people interested in fungi in and around Tropical North Queensland, but it would appear that those naturalists amongst us who are studying fungi on a more than casual basis are either few in number or we are all beavering away without knowing there is someone else just down the road doing the same thing! The main players would seem to be, at this time, a truffle ecology group at James Cook University here in Cairns, one semi-professional photographer, one keen taxonomist, and myself, with my bias being fungal ecology. Not a huge local team, but we all talk to each other and swap stories, so that has to be a step in the right direction!

In an attempt to correct this situation a small newsletter called "Cairns Fungi Foragers" (CFF) is now produced by my wife and I and distributed free and un-copyrighted (but acknowledgement appreciated) to any who wish to receive it.

We produced the first one in February this year with 10 people receiving it and now we have about 40 casual receivers, plus another ten groups like Fungimap, Queensland Mycological Society, etc. It seems to be causing some interest because it is (1) largely non-technical; and (2) it has a heavy

bias towards fungal ecology, a topic that is not well covered in most newsletters and magazines. The latter tend to report on the outcomes of excursions and/or have taxonomic articles. While these latter articles are of great interest to the specialist and citizen scientist, they are, perhaps, of less interest to bushwalkers and high-school kids. Our aim is to provide some information on fungal "behaviour" and introduce people to their fascinating biology so they start looking more closely and thinking about the fungi they find rather than just stomping on them. As examples, our first newsletter introduced mycorrhizae; the second contained an article on fungal toxicity and some discussion of collecting and identifying fungi; the third was on the Cairns regional climate and introduced the topic of lichens; and the fourth discusses truffles, rates of growth, and air pressure as a possible trigger to fruiting. All very basic and brief, but seem to be well-received so far.

Anybody interested is welcome to send me an email at unit57.may@gmail.com and I will forward pdfs of all back copies. I would also be keen to get any brief articles on fungal ecology that may be included in later editions, especially if they relate to the tropics. All material will be fully acknowledged.

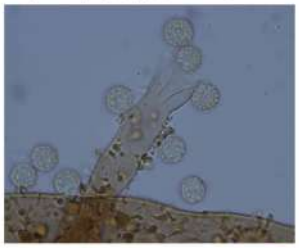
Myxomycete Plates

Sarah Lloyd is preparing a series of plates of Myxomycetes (slime moulds). The plates cover the 115 species that Sarah has observed at Black Sugarloaf, near Birralee in northern Tasmania. So far, 31 species are covered, including the two reproduced here. Each plate has descriptions and photographs of mature fructifications plus micrographs of peridium, stem, columella, capillitium, calyculus and spores. Most plates are less than 1.7 MB. Plates can be viewed and downloaded at: https://www.disjunctnaturalists.com/myxo-species/index.htm

Background information can be found on the Slime Mould Log:
https://www.disjunctnaturalists.com/slime-mould-log/index.htm

Alwisia lloydiae Leontyev, S.L. Stephenson & M. Schnittler

Date Aug. 2011. Black Sugarloaf, Birralee (big tree track). **Habitat**: Closed wet Eucalypt forest. **Substrate** bryophytes on log. **Description** Extensive colony of stalked sporangia 2.5–5 mm high. **Sporotheca** egg-shaped to globose, 1–1.5 mm long x 0.7–1.2 mm diameter; dehiscence in upper part leaving cup. **Stalk** reddish brown, darker at apex in some collections, some fused, flattened and twisted, longitudinally striate, 1.5–3.5 mm long. **Hypothallus** inconspicuous. **Peridium** in two parts: upper part membranous, fragile, beige; lower part shiny, red brown. **Capillitium** tuft of threads mainly arising from the edge of the cup; threads taper at apex, shiny brown, 0.9–1.2 mm long; swellings can be seen with oil immersion lens. **Spores** ochraceous in mass, almost hyaline in transmitted light with complete or broken reticulate pattern, 6–8 µm. **Notes**: This species has appeared numerous times on large old bryophyte-covered eucalypt logs or stumps:
2010 - photographed but not collected on stump near house.
Aug. 2011 #0210; 13 Sept. 2012 #0213 MEL91; 29 Sept. 2012 #0214; 19 Jan. 2013 #0715, 7 Nov. 2013 #0214; 16 Feb. 2014 #0716; 3 Oct. 2015 #0717.
2016 - appeared on four large logs 50–100 meters apart: 8 July 2016 MEL646 (photo below); July 29 2016 did not mature before we left for New Zealand and was not collected. Aug. 2016 appeared on large log near the house, affected by rain and was not collected.
14 Sept. 2016 upper gully bryophyte-covered log #0761.

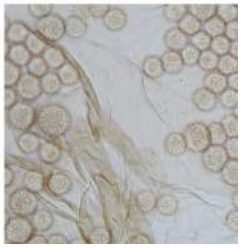
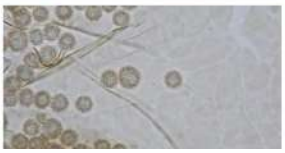


Tubifera ferruginosa (Batsch) J.F. Gmelin subsp. *ferruginosa* Leontyev, Schnittler & S.L.

Date: 27 Sept. 2016. Black Sugarloaf, Birralee (big tree track). **Habitat**: Closed wet Eucalypt forest. **Substrate**: Bark (with leafy liverwort) of strongly decayed *Banksia marginata*. **Fruit body** Several pseudoaethalia 20–100 mm wide, rounded, pulvinate, greyish brown; surface formed of free tips of sporothecae. **Sporothecae** cylindrical, straight from base to external surface, 2–3 mm high x 0.3 mm diameter with rounded apex. **Hypothallus** foamy white at first becoming pale yellow. **Peridium** membranous, light brown in reflected light, iridescent, faint marbling seen with oil immersion lens. **Spores** umber-brown in mass, brownish by transmitted light, banded reticulate, 6–9.5 µm. **Plasmodium** bright scarlet.
Notes: Pseudoaethalia (above right) appeared on 18 Sept. 2016 and were covered to protect them from rain. A further two pseudoaethalia (pictured below) appeared on 27 Sept. 2016. *T. ferruginosa* has appeared previously on this log.
Ref: Leontyev et al. 'A critical revision of the *Tubifera ferruginosa* complex.' *Mycologia*, 107(5), 2015, pp. 959–985.
N.B. Photo on p. 344 of *A Field guide to Australian Fungi* (Fuhrer 2005) is *T. ferruginosa* not *Dictydiaethalium plumbeum*.





My Mycological Stay in Denmark

Tarquin Netherway (Fungimap Volunteer)

Recently I spent eight months living in Copenhagen. The purpose of my visit was to immerse myself in mycology, more specifically I went to undertake mycological training as part of my masters degree at the University of Melbourne, as opportunities to do this were lacking in Australia. The University of Copenhagen offers great mycology related courses, great mycologists, and great resources for studying fungi. My training/studies covered broad aspects of mycology including fungal diversity, fungal populations and genetics, ecosystem mycology, and fungal interactions, I also undertook a course specific to field mycology and the identification of fungi.

Tarquin standing next to *Fomes formentarius*, the tinder conk fungus.

One of the areas I focused on studying was the hidden world of arbuscular mycorrhizal fungi (AMF) from the Glomeromycota. I was particularly fascinated by the molecular signalling pathways between plants and AMF, which enables the AMF to invade a plant's root cells and form their characteristic arbuscules, which facilitate the exchange of nutrients (primarily phosphorus) from the AMF in return for carbon from the plant. This is by far the most common type of mycorrhizal symbiosis occurring with most plant species, which is extraordinary given that the entire fungal division of Glomeromycota, represents only between 200-400 species in total, and all of these species are obligate symbionts (one in a lichen-like symbiosis with cyanobacteria and the rest as AMF) in which sexual reproduction has never been observed. There is still a massive knowledge gap in our understanding of AMF.

Another interesting study I worked on as part of a team involved capturing members of the airborne fungal spore community in a greenhouse on agar filled petri dishes. Once fungal communities established, we distinguished and categorized the taxa based on the morphology and colour of their asexual sporulating structures. Each taxon was then isolated in pure culture, including both yeast forming fungi and filamentous fungi. We then performed qPCR on the ITS gene region for each taxon to identify it to species or at least genus. Once isolates were identified we set up a number of experiments, which included growing each isolate on concentration gradients of NaCl and fungicide. Colony growth rates were measured at regular intervals. Surprisingly the results revealed that a number of isolates were able to slowly but surely establish across all variable concentrations, however most species showed a high degree of sensitivity to either NaCl or fungicide concentrations or both.

During my free time I headed out into the forests around Copenhagen to become familiar with the local macrofungi. I became friends with some experienced mushroom foragers, who shared their knowledge about edible fungi. I learnt to confidently identify over twenty edible species and their poisonous lookalikes; although there seems to be only a handful that are tasty enough to warrant the effort. I also dabbled in mushroom cultivation, where I worked with a company called Beyond Coffee who grow oyster mushrooms on used coffee grounds. I helped out in production, which involved collecting coffee grounds from cafes, mixing oyster mushroom spawn with the coffee grounds, adding water if needed and $CaCO_3$, putting the inoculated substrate into perforated plastic bags and hanging them in a dark establishment room for a couple of weeks. They were then transferred to a climate controlled growing room that maintains around 90% relative humidity and 18-20°C, and also has automatic lighting that mimics the natural day/night cycle. After a few weeks the mushrooms begin fruiting and are harvested and delivered to restaurants.

Perhaps the highlight of my trip was taking a field mycology and identification of fungi course through the Natural History Museum of Denmark. This involved a residential intensive week collecting fungi in the field and taking them back to the lab

for identification using macro and micro characters, and keying them out to genus using the synoptic multi-access MycoKey, an amazing resource for identifying the fungi of Northern Europe. Once at genus the key then provides links to dichotomous keys to get to species. These are usually from Funga Nordica, another amazing resource for identifying fungi from Northern Europe.

Following the week long intensive I then had to undertake an individual project which involved setting up plots in two different forest types, a coniferous plantation composed of *Picea abies* (Norway spruce) and a deciduous forest composed of *Fagus sylvatica* (European beech). I visited each plot a number of times over during September and photographed and collected all of the visible macrofungi that popped up and took the specimens back to the lab for identification. Once identified to species or at least to genus, I then had to upload the photos and descriptions of the fungi (ecology etc.) to the Danish Fungal Atlas (https://svampe.databasen.org/), where experts and other users interact with your posts by either approving them or requesting more information about the specimen or suggesting an alternative identification, once approved the identification will receive three stars. I managed to identify over 150 species, some quite rare while others were more common. I found Cortinarius and Inocybe particularly difficult genera to work with.

The results revealed that over the particular month of September 2017, the two forest types had similar total macrofungi diversity. There was some species overlap between the contrasting forests, while most species in each forest were either specific to coniferous or broadleaf forests, or specific to the species of trees. The fungi surveyed had a wide range of ecological strategies ranging from an *Elaphocordyceps* species that parasitises the fruiting bodies of false truffles from the genus *Elaphomyces*, to saprotrophic and ectomycorrhizal species. Most species were from the Basidiomycota and few were from the Ascomycota.

I am now keen to use my newly acquired knowledge here in Australia.

Left: A petri dish covered in fungal colonies derived from the airborne spore community; Right: Beech roots colonised by an ectomycorrhizal fungus.

The quite rare in Denmark *Cortinarius talus* that has a strong scent of honey.

The highly prized choice edible *Boletus edulis*, or Karl Johan as it is known in Denmark.

What does the Atlas of Living Australia tell us about the distribution of *Mycena interrupta* in Queensland and South Australia?

Tom May, Royal Botanic Gardens Victoria

Introduction

[Reprinted with permission from Queensland Mycologist 11(3): 5–9 (2016).]

The report of the bright blue *Mycena interrupta* from Cairns in north Queensland in a recent issue of *Queensland Mycologist* (Webster & Leonard 2015) is intriguing because it would extend the known distribution of this distinctive fungus by more than 1,500 km. This record, and a recent record of the same species from near Adelaide, are examined using the Atlas of Living Australia, to showcase the tools available in the ALA and to promote further recording of *M. interrupta* and other species of fungi.

The Atlas of Living Australia

The Atlas of Living Australia (ALA) (http://www.ala.org.au/) provides a 'one stop shop' for viewing and interpreting distribution information for Australia's flora, fauna and fungi. The ALA aggregates data from a variety of sources and puts all the occurrences for each species on a map that can be viewed at different scales.

The power of the ALA is that it brings together both specimen data (compiled through Australia's Virtual Herbarium, which in turn brings together data from all the major herbaria in Australia) and observation data, such as from Fungimap. This is much more efficient than having to consult websites of each individual data contributor, if indeed their data are available online. Fungi are fully integrated into the ALA, and it is a fantastic resource for exploring the distribution of Australian fungi. [However, see Endnote about names].

ALA Spatial portal

In the ALA, maps of individual species are presented on species pages. There are more advanced mapping options in the Spatial portal, where it is possible to overlay distribution records over other layers. These layers can be the distribution of other species, or a large number of environmental variables, such as climate and soil characteristics. The ALA Spatial portal also enables creation of predictive models, based on combinations of environmental variables.

Information about records

In ALA maps, by clicking on a point for an individual record, you can see information associated with the record, including who made the observation or collection, the date, the description of the locality and so on. Unfortunately, there are not specific fields in the ALA at the moment for associated vegetation, host and substrate (even if these fields are present in the original data). However, sometimes notes (especially if they come from Fungimap records) contain information on the substrate and host and/or the vegetation type in which the fungus occurred.

Species lists

The ALA allows searching for particular species, and also the useful facility for assembling a species list (including for fungi) for a particular location or region (http://www.ala.org.au/species-by-location/). The location can be radius (1, 5 or 10 km) around a specific point. Various pre-defined regions are also available such as states and local government areas.

Mycena interrupta distribution

There are a staggering 2,858 records across Australia and New Zealand for *M. interrupta*. Some records may be doubled up such as when individual recorders supply the same data to different organisations, such as state biodiversity atlases (e.g. the Tasmanian Natural Values Atlas) and Fungimap. Nevertheless, the level of recording of this species is impressive, given that at the start of the Fungimap project the species was known in Australia from only a handful of records.

Mapping *M. interrupta* in the ALA (Fig. 1) shows a distribution from Kangaroo Island in South Australia to the far south of Queensland, and throughout Tasmania (where the species is most commonly recorded as far as records per grid cell). In mainland Australia, the distribution is more or less continuous between the South Australia-Victoria border and the Sydney region, with more isolated occurrences to the west, on Kangaroo Island and near Adelaide, and to the north in Lamington NP in south Queensland.

Fig. 1. Distribution of *Mycena interrupta*. Coloured grid cells indicate at least some records for the area under the grid. Grid cells are coloured by the density of records (yellow: less dense; red: most dense).

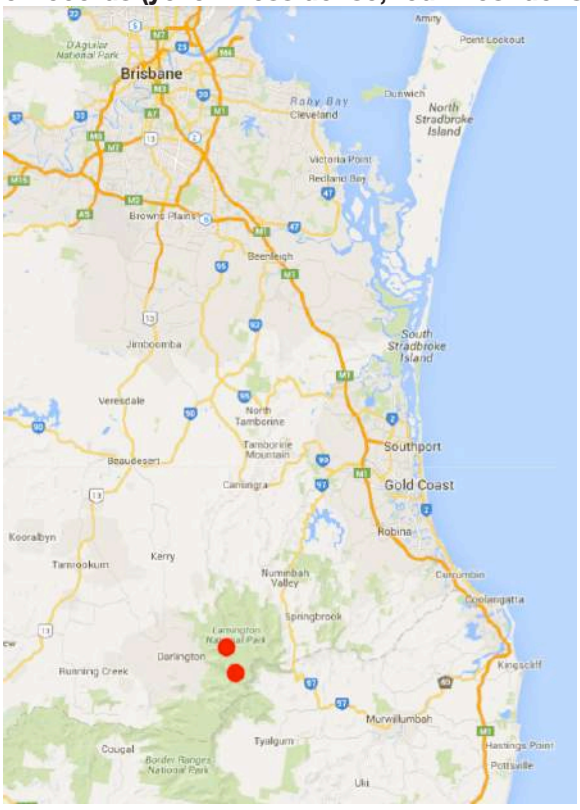
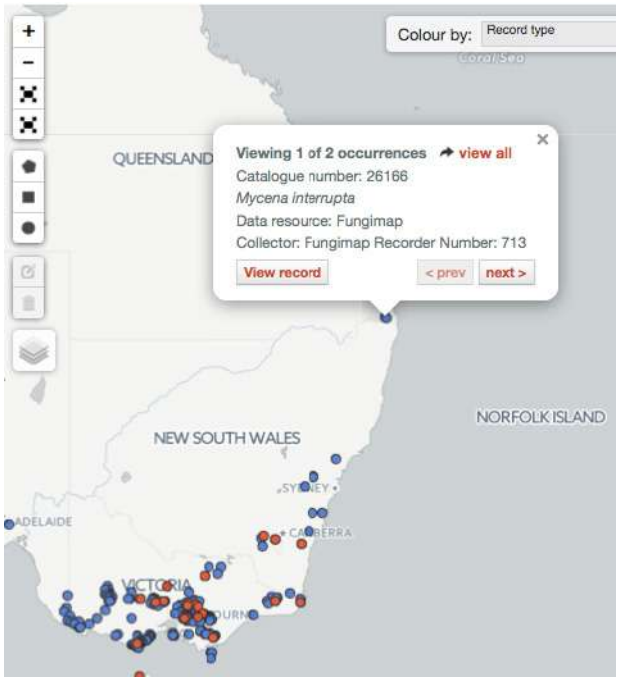


Fig. 2. Occurrence of *Mycena interrupta* in Queensland. Both the dots are for records in the vicinity of O'Reilly's.

Mycena interrupta in Queensland

There are two dots on the map for *M. interrupta* in Queensland (Fig 2). Data for particular records in the ALA can be viewed by clicking a point (Fig 3).

Fig. 3. Clicking on a point in maps in the Atlas of



Living Australia shows associated data. Full data can be accessed by choosing 'view record'.

Both Queensland records are from Fungimap. The first (record no. 26166) is from 'Lamington NP: O'Reilly's' and is on the basis of a photo taken by Taylor Lockwood. The ALA record indicates that the georeference was 'located on map using description of location'. Therefore, there is some uncertainty around the exact point, which has been assigned 1000 m (i.e. the true georeference could be anywhere within 1 km of the latitude/longitude assigned to the record). The second record (no. 32224) is from 'Lamington National Park, Border Track near O'Reilly's' and again the georeference has been determined by Fungimap from the descriptive location provided with the record, although without an indication of uncertainty. It will be of interest to confirm and more precisely locate the occurrences of *M. interrupta* at Lamington NP, and find out how widespread the species is and what is its habitat.

The Cairns record (Webster & Leonard 2015) from the photo, appears to be mis-identified (the stipe is too long in relation to the pileus diameter). However, the species could well occur in other Queensland locations.

Co-occurring species

Species with similar distributions can provide pointers for where to check for novel occurrences. Where one species is present, the other may be there too, but unrecorded.

Using the 'Explore your area' feature of the ALA (http://biocache.ala.org.au/explore/your-area) enables compilation of a list of species from a particular location. Placing the pointer at the cafe at O'Reilley's there are 193 species of fungi (including lichens) recorded from a 5 km circle centred on this location. Among these species is *Porpolomopsis lewelliniae* (=*Humidicutis lewelliniae*). Comparing the distribution of this species with *M. interrupta* (Fig. 4) shows a rather similar overall distribution, but *P. lewelliniae* is present in South Australia only in the very far south-east, and occurs in other sites in Queensland in the south-east of that state.

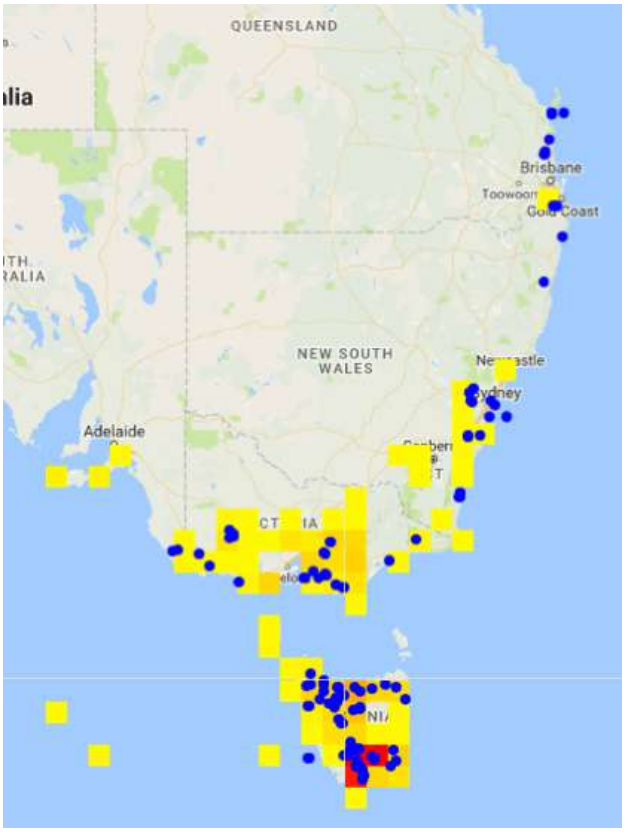


Fig. 4. Distribution of *Porpolomopsis lewelliniae* (blue dots) overlaid on distribution of *Mycena interrupta* (yellow to red-coloured grid cells, as in Fig. 1). From Atlas of Living Australia.

The occurrences of *P. lewelliniae* in north-east New South Wales along with the other Queensland sites are places to check for occurrence of *M. interrupta*.

There might be other species of fungi that have a more similar distribution, which provides better pointers to likely occurrences. Other methods that could be applied to predicting further locations for *M. interrupta* are analysis of associated vegetation and bioclimatic modelling (see below).

***Mycena interrupta* in South Australia**

Looking more closely at the South Australian records (Fig. 5), they are specifically from (1) the western end of Kangaroo Island, (2) the foot of the Fleurieu Peninsula, (3) near Adelaide, and (4) in the far south-east of the state. For this map, the Spatial Portal was utilised to provide a background layer showing rainfall.

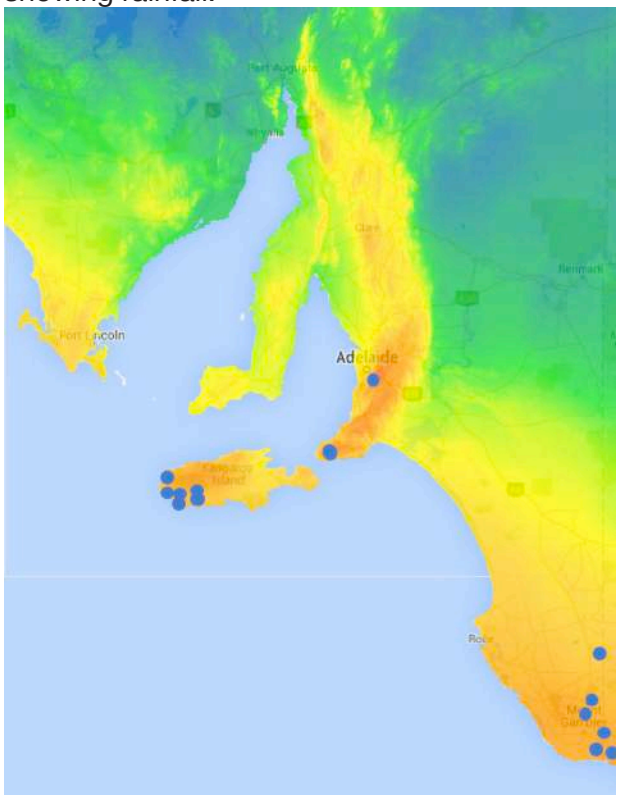


Fig. 5. Distribution of *Mycena interrupta* in South Australia (blue dots) overlaid on Mean Annual Precipitation [coloured from blue-green (low) to orange (high)]. Map produced in Atlas of Living Australia Spatial portal.

The record from near Adelaide is the most recent, from 2012. The location is 'Mitcham, Adelaide foothills, 150m along Melville Gully Rd from Karka', which is within the Belair National Park. Given the intensive collecting for fungi in this and other locations around Adelaide by mycologist John Cleland in the first half of the 20th century, it was surprising to receive a new record of a mushroom as distinctive as *M. interrupta*. However, when compared to the known distribution from South Australia, the record is credible, because the habitat, *'Eucalyptus obliqua* woodland' is the same as that occurring at the *M. interrupta* site at the foot

of the Fleurieu Peninsula to the south. The rainfall at Mitcham is also within the same higher rainfall zone as the other South Australian sightings.

Previous bioclimatic prediction

Bioclimatic predictions use knowledge of the climate of known locations to predict where a species might occur. Using a set of climate variables, known locations are matched against locations with similar climate. A bioclimatic analysis of the distribution of *M. interrupta* was carried out by Tonkin & May (1999), when there were around 200 records. The particular program used (BIOCLIM) was able to predict most of the known distribution (at that time) from a 'training set' that was a subset of the records for which altitude was known. However, the analysis was not able to predict some known areas that were far away from the main distribution, probably due to the low number of records in the 'training set' (because BIOCLIM required knowledge of altitude, and there were only nine records that included altitude).

The bioclimatic analysis did not predict the later discovery of *M. interrupta* from Kangaroo Is. However, the analysis did predict occurrences in Victoria in the Strzelecki Ranges and Mount Buffalo that have later been confirmed, although another predicted region approximately between Falls Creek in Victoria and Perisher Valley in N.S.W. has not yielded any records yet.

Current bioclimatic prediction

The ALA Spatial portal includes a modelling facility. Using a set of climatic layers, the program Maxent generates a prediction layer showing where a species is expected on the basis of the climate of the known occurrences. A prediction was generated for *Mycena interrupta* (Fig. 6), excluding points in the ocean. A set of five climatic variables was utilised: the ''BIOCLIM 1960 Best 5' set, consisting of: Precipitation driest quarter, Precipitation seasonality, Radiation seasonality, Radiation warmest quarter and Moisture Index highest quarter mean.

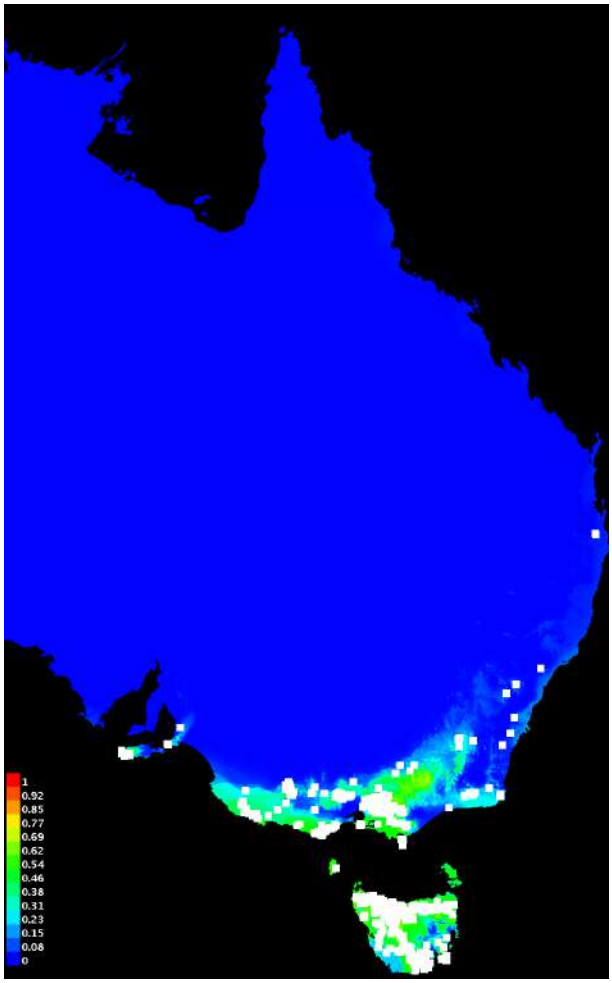


Fig. 6. Known distribution of *Mycena interrupta* (white rectangles) overlaid on predictive model layer derived from the 'BIOCLIM 1960 Best 5' set of climatic variables. Prediction scale is lower left: very low (blue) to medium (green) and high (red). Analysis carried out in the Spatial portal of the Atlas of Living Australia.

The prediction layer shows medium predictive strength broadly coinciding with the existing distribution. It is possible that other combinations of variables might make a better model. Nevertheless, the predicted area (the greener colouring) fits the known sites reasonably well. The prediction layer shows additional areas where the species might be expected, particularly in the alpine areas of Victoria-NSW, on Flinders Is. in Bass Strait, and in central Tasmania. Lack of sightings in parts of the latter area might be related to land clearing leading to lack of suitable vegetation.

Where to look for *Mycena interrupta*

The presence of *M. interrupta* in Lamington National Park is a significant outlier, with a large distance to the occurrences in mid coastal NSW. Searches of seemingly suitable intervening habitat, such as in the Border Ranges and cool, wet forests

at Barrington Tops and New England NP, are of interest. Indeed, much of NSW north of the Sydney-Newcastle region is poorly recorded for fungi.

The distribution of co-occurring species such as *Porpolomopsis lewelliniae* (see above) suggests additional sites for survey of *M. interrupta* in northern NSW and Southern Queensland. However, in the bioclimatic analysis, the prediction layer shows very low values for these areas.

Data errors

Maps from the ALA are shown here 'warts and all'. With thousands of records there are bound to be some mistakes. Most misplaced dots on maps result from simple numerical errors in the georeference, such as transposition of numbers (34 for 43), either in the data as supplied, or introduced during data entry. Mistakes in identification are another potential source of error.

For Fungimap records, we check and correct these as they are detected. Inspecting maps is one useful method of spotting likely incorrect occurrences. Dots in the sea are obviously incorrect (there are several in Fig. 1), but dots a long way outside of the distributions are also inspected and checked against the original record details, and images if available.

Is your data in the ALA?

It should be noted that the ALA does not collate every known record, because it relies on three things (1) the record must be digitised (i.e. in a database or submitted directly to the ALA as an individual record), (2) the digitised record must have a georeference, and (3) the digitised data must be supplied to the ALA.

For specimens, herbaria supply data to the ALA at different intervals. Additionally, in some herbaria many fungal collections remain to be databased, or those that are databased do not have georeferences. The ALA itself is a wonderful example of full integration of fungi into a biodiversity portal, but unfortunately the coverage of fungi in individual institutions (in terms of databasing) is not always at the same level as for vascular plants. It must also be remembered that there are considerable collections of Australian fungi in non-Australian herbaria, and most of these are not yet available online. If you have supplied specimens or sight records to an institution or organisation, and there is no dot in the ALA - ask what has happened to your data!

For Fungimap, the data upload to the ALA occurs about once a year, but we plan to increase the frequency of updates.

Supporting data for new observations

For readily recognisable species, Fungimap accepts observations without photos. The Fungimap image database is not set up to cope with tens of thousands of photos! However, photos are always welcome, especially if you have any doubt about identification. If your observation is a long way from the known distribution, it is ideal to submit a photo with the record, and if possible to lodge a voucher collection in your local herbarium.

Conclusion

The Atlas of Living Australia offers a variety of ways of exploring occurrence data. There is sufficient data in the ALA for many species of fungi to show the overall distribution, but there is still much scope to add further data to flesh out known distributions. Keep an eye out for *Mycena interrupta* - your record could add valuable information on the distribution of this iconic mushroom.

References

Tonkin, J.E. & May, T.W. (1999). A preliminary bioclimatic analysis of the distribution of *Mycena interrupta*, *Fungimap Newsletter* 11: 3-4.

Webster, S. & Leonard, P. (2015) Cairns Foray, *Queensland Mycologist* 10(4): 10-13.

Endnote about names

There are some issues at present with names of fungi in the ALA. The ALA is underpinned by the National Species List (NSL). Fungi names in the NSL come from AusFungi, a database maintained by Royal Botanic Gardens Victoria. AusFungi is the successor to ICAF (The Interactive Catalogue of Australian Fungi) which is still on line (http://data.rbg.vic.gov.au/cat/index.php/fungicatalogue), but was last updated around 2004. AusFungi is not available on line at present, but there are plans to deliver an online version. At present, AusFungi does not cover all Australian fungi, and because the ALA relies on having names in the NSL, if the name is not present in AusFungi and is also absent in global fungi names lists such as Species Fungorum, no results are retrieved from searches in the ALA, even if there are records from Australia. This problem is being addressed.

Arachnocrea, a perithecial ascomycete

Heino Lepp

Moravec (1956) introduced the genus *Arachnocrea* and now Mycobank records two species: *A. scabrida* and *A. stipata*. The orange to brown perithecia are embedded in a thin, whitish to ochraceous sheet (or subiculum) with some resemblance to thick cobweb or compressed cotton-wool. The colourless, 1-septate spores break at the septa (so each 8-spored ascus generates 16 part-spores) and the part-spores are conical. There is some variation in the species' descriptions in my references but in the rest of this paragraph I summarize some of their observations. The perithecia are up to 0.4 mm in length; the subiculum is up to 0.8 mm thick; the part-spores measure 4-8 x 2-4 mm. *Arachnocrea scabrida* is more robust in that its subiculum, perithecia and spores are generally larger or thicker than those of *A. stipata* but the major differences are: (1) the spores of *A. scabrida* are finely warted but those of *A. stipata* are smooth or almost so, (2) the apices of *A. stipata* part-spores are often very sharply pointed or apiculate (not so in *A. scabrida*) and (3) in *A. scabrida* rounded cells make up the top layer of the subiculum (at least where there are perithecia) but those rounded cells are absent in *A. stipata*.

In 2001 I collected what I initially noted as a corticioid fungus that was "even; white with abundant brown dots; wispy margin in parts" and a three days later what I took to be an ascomycete with brown perithecia on a thin subiculum. In fact both are ascomycetes. I had assumed the brown dots of the former to be droplets, as found in some corticioid species, but they are perithecia. In making that mistake I was in good company, for Leonard Rodway named a similar specimen *Kneiffia*, a corticioid genus. These specimens measure between about one and three square centimetres and microscopic study showed that all are species of *Arachnocrea*. The spore walls are warted in one but smooth and apically pointed in the other two and perithecia, subicula and spores fall within, or close to, the appropriate size ranges and this led me to identify the collections as follows:

A. scabrida: NSW: H.Lepp 3398 - near Gunningbland, 33° 08' S, 147° 54' E, 280 m; on well-rotted Eucalypt wood in woodland with mixed tree species; 8 Nov 2001.

A. stipata: NSW: H.Lepp 3530 - Goobang National Park, 32° 49' S, 148° 23' E, 490 m; on rotten wood in Eucalyptus-dominated woodland; 11 Nov 2001. Tas: L. Rodway s.n. (HO130772) - Cascades, 43° 54' S, 147° 17' E; on wood; June 1919.

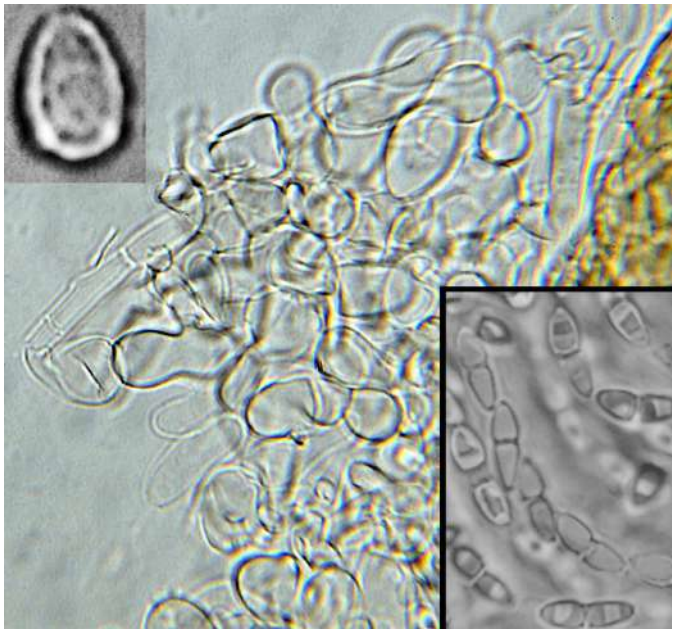


Fig. 1. *Arachnocrea scabrida* *H.Lepp 3398*. The bulk of this image shows rounded subicular cells (with part of a yellowish-brown perithecium). Inset at the lower right are spores and at the upper left an enlarged view of a part-spore showing the fine ornamentation.

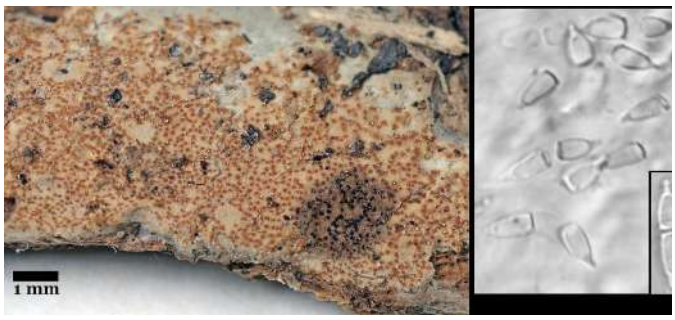


Fig. 2. *Arachnocrea stipitata* *Rodway*. In colour you see the bulk of the specimen and alongside are part-spores and (in the inset) an entire spore.

Both species occur on wood or plant litter but *A. stipata* has also been reported to grow on other fungi, in particular old polypores. According to the references listed below *A. stipata* is found in Europe, Morocco, North America, Cuba, Japan and New Zealand and *A. scabrida* has been found in Japan, south China, New Zealand and French Guiana. I am not aware of any other record of *Arachnocrea* from Australia but, given its occurrence in Tasmania and central NSW, it must occur elsewhere, so I

urge you to look for it and (if legally possible) lodge specimens in a herbarium. Species identification requires microscopic study but the genus should be easy to recognize in the field. Look for abundant brownish dots on a thin, whitish mat that is fairly loosely attached to the substrate. Dried specimens may change colour slightly but otherwise look much like fresh ones, so it should be possible to pick out mis-identified or unidentified herbarium collections.

My collections are lodged at the Australian National Herbarium, Canberra and I thank Gintaras Kantvilas, curator of the Tasmanian Herbarium, for the loan of Rodway's specimen.

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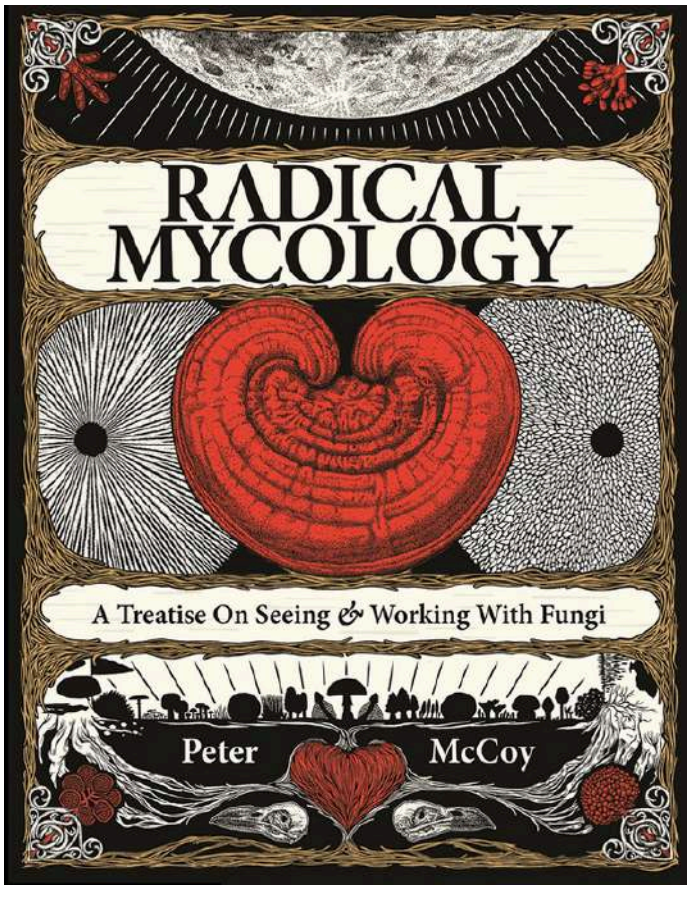

Book Review Radical Mycology

by Alison Pouliot

'All life is connected. This is the primary lesson that fungi teach', so begins *Radical Mycology – A Treatise on Seeing and Working with Fungi*.

A hefty 700-page compendium by self-taught mycologist, Peter McCoy, the book represents his work over the last decade since founding Radical Mycology, a grassroots network of fungus enthusiasts who share skills for cultivating mushrooms and working with fungi for ecological and societal resilience. A self-published effort, this broad-reaching account encompasses the science, history and culture of fungi in a very accessible and readable style.

The last great big book on fungi that I read was Moore, Robson and Trinci's encyclopedic resource, the comprehensive academic textbook on fungal biology, *21st Century Guidebook to Fungi* (2011). *Radical Mycology*, however, is a very different book. While it also covers aspects of fungal biology and

Moore's influence on McCoy is evident, Radical Mycology focusses largely on human relationships with fungi and how to actively develop and maximise the use of fungi as food, medicine and in mycoremediation. The book also spans other areas including mushroom identification, ethnomycology, lichenology, the ecological significance of fungi, conservation, psychedelic fungi and the influence of fungi on human cultures including, unusually, a specific chapter on women's knowledge of fungi.

I've not met McCoy but reading his words one gets the impression of a passionate, enthusiastic and insightful thinker. Not only is his book extremely informative, McCoy delivers comprehensive information in an appealingly personal and quirky style, moving across scales of time and space and often drawing on human analogies, thus making abstract concepts accessible. *Radical Mycology* feels like the culmination of a life's work, all the more astounding given McCoy is barely 30, incredibly young to prepare such a comprehensive tome.

The book's breadth of themes is its main strength. Much of it is based on McCoy's own experience, experimentation and research, providing the reader with many different access points to the world of fungi. McCoy lays down his concerns right from the start and rather than adopting the more usual taxonomic approach, he begins with mycelium as a literal and metaphorical framework for thinking about fungi, nature and society. He questions language, concepts and the ways in which knowledge is generated in relation to fungi, using the notion of mycelial connectivity as a model for augmenting scientific knowledge with insights from alternative sources. McCoy describes mycology as a 'neglected megascience', expressing his concern about the loss of traditional whole-organism mycology and other areas in the biological sciences for both the scientific world and the non-scientific community.

In the preface, McCoy identifies his influences as coming from artists and poets, ecologists, permaculturalists and bioremediators, natural medicine practitioners, fermenters and herbalists, independent media makers and social critics among others, giving the reader a sense for the tone and shape of the book to follow. The book's twelve chapters are encompassed within the sections: Expression, Connection, Relation, Collaboration and Integration. These section titles lay the foundation for how McCoy approaches fungi and within the first paragraphs he advocates the significance of the interconnectivity of fungi and their uniqueness, especially in fulfilling ecological roles not provided by other organisms, particularly their role in building soil. I especially liked his emphasis on soil, a theme too often overlooked in other books on fungi.

McCoy has an extensive understanding of scientific, social and political aspects of fungi. He writes technically without being encumbered by jargon. Following a brief overview of the significance of fungi, he launches straight into their taxonomy and biology with a brief account of spores and other microscopic structures and fungal reproduction. Almost half of the book is then devoted to mushroom cultivation, beginning with basic principles, followed by detailed instructions, methods, recipes, charts and advice on sourcing and recycling materials and supported by extensive appendices.

Radical Mycology is not so much a book for mycologists. It is more an instructive guide for mushroom cultivators and a broad range of fungus enthusiasts. While accessible to novices, it also includes a level of technical detail for those with a stronger grasp of fungi and their biology and chemistry. It is very much a homegrown, low-tech, low-budget manual with a strong permacultural influence. Cultivators will find the detailed practical information on preparation and techniques especially useful. Several books appeared in the last couple of decades that document foraging for edible fungi, usually in America (e.g. Fine 1998; Carluccio, 2003; Marley 2010; Bone 2011; Cook, 2013; Lowenhaupt Tsing, 2015), psychedelic fungi (Stamets, 1996; Letcher 2006) and more generic accounts (Marren, 2012; Money, 2012) but McCoy takes another approach again, by being both more broad-reaching thematically and underpinning it with a strong activism motivation.

Being so far-reaching, *Radical Mycology* is likely to appeal to a broad audience, the trade-off being that inevitably some sections will be of greater interest than others. As I am not a mushroom cultivator, I enjoyed those chapters with an ecological, conservation and philosophical focus, particularly the second last chapter, 'The Mycelium is the Message' where McCoy's writing echoes that of mycologist, Alan Rayner, who reflects on the parallels between mycelial and human social networks. McCoy develops interesting arguments in linking mycelial networks with systems theory, political movements and social justice. In the final chapter, 'Mycognosis', McCoy explores the history of the use of psychedelic fungi. He offers a sensitive and measured approach, explaining their chemistry,

effects and cultural uses and along with guest author Peter Sjöstedt-H, critiques some of the more controversial authors who have written on the subject. However, more scientifically-oriented readers might, for example, be less inspired by some of the ideas in the seventh chapter, 'The Pharmycopeia', particularly the homeopathic preparations, hermetic philosophy and alchemical and astrological correspondences.

The book is cheap for US$50. If there is another print run, thorough proofing to eradicate the many small typographical errors and repetitions would increase its professionalism. Fungi are such wonderfully evocative and visual organisms and McCoy writes about them with great verve. I therefore thought it was a shame that the quality of the photography and reproduction didn't match McCoy's talent as a thinker and writer. However, these are not really criticisms of McCoy, but perhaps more so a reflection of the lack of recognition for fungi and the challenge of finding a major publisher willing to invest in such a tome.

McCoy casts a wide mycelial web and in doing so will certainly attract new fungus advocates. The strongest message McCoy imparts is about how fungi offer a framework for more expansive ways of thinking: ‘challenging us to look beneath the surface, live on the edge, explore the unknown, adapt, respect imperfections and differences, and to look for another way forward'.

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Records

	Records	Photos
Australia (by email)		
Anointed One	1	2
Shona Archer	1	2
Chris Avram	1	2
Stanley Barker	1	1
Patrice Baxter	3	3
John Bestevaar	1	3
Simon Beveridge	1	1
Mary Blntyne	1	1
Wayne Boatwright	2	4
Rob Bone	1	1
Geoff Boyes	4	4
Ken Bradley	1	1
Jacquie Brett	1	1
Mark Cachia	1	2
Michelle Cleary	1	1
Steve Cooley	1	1
Marghanita da Cruz	1	1
Vivien Davidson	1	1
Philip Dubbin	1	7
Vicki Durston	1	1
Neale Dyster	1	1
Jeffrey Evans	1	1
Chris Everett	1	1
Laurie Faen	1	1
Keith Fisher	1	1
Ben Florance	1	1
Fungimap Inc	491	0
Melanie Gray	1	1
Ingrid Hagstrom	1	1
Joan Hammond	1	1
Sandra Henderson	1	1
Neil Hickman	1	4
Cathy Hooper	1	2
Christina Maree James	1	1
Robbie Jefferies	1	1
Rigel Jensen	2	3
Glenda Jones	2	3
Mirko Karan	1	1
Mirko Karan	2	4
Bernard Katthagen	1	1
Frank Kennedy	2	3
Peter Krisch	6	8
Barry Lingham	1	3
Cheryl Macaulay	1	2
Cameron MacLeman	1	2
Main Creek Landcare	10	0
Neil Mansfield	1	1
Roisin McCann	3	3
Peter McMillan	1	2
Jeff Melvaine	1	1
Lyn Meredith	10	0
Robbie Moles	3	3
Alison and Angus Moore	2	3
Leanne Murphy	2	2
David Naylor	3	2
John Newman	1	3
Meryl Newton	1	2
Carole O'Neill	2	2
Leigh Owen	3	2
Danny Reddan	1	1
Justin Renehan	1	1
Clare Robertson	1	1
Gordon Rouse	6	7
Gayle Samuel	1	1
Doug Sawkins	1	1
Adam Schulze	2	2
Rosemary Tennent	1	1
Gus Tillers	1	2
Luba Tomaska	2	2
David Unknown	1	1
Deborah Unknown	1	2
Jo Vaughan	1	1
Jon Wee	2	3
Linda White	1	5
Catherine Wilby	1	1
ACT		
Edwina Robinson	1	1
Kerryn Robinson	2	2
Leesa Southwell	1	1
NSW		
Steve Axford	50	51
Elisabeth Burton	2	4
Martin and Frances Butterfield	1	1
Kay Chan	1	1
Norm Clarke	3	6
Robin Corringham	290	0
Natasha Darcy	1	2
Helen Drewe	1	2
Ben Elke	1	1
Maree Elliott	8	8
Janet Grevillea	1	2
Judy Harvey	1	1
Jenny Hawkins	1	1
Kylie Hyde	1	1
Gary, Megan & Jessie Johnson	1	1
Lyndy Landers	8	6
Melody Lord	1	1
Anna Ludowici	1	1

Craig Magnusson	1	1
Meg McGowan	4	5
Andrew Murray	1	1
Mike Nicholas	1	1
Shirley Peters	1	1
Michael Priest	13	0
Paul Scannell	1	1
Margery Smith	1	1
Richard Stow-Smith	1	2
Teresa Van Der Heul	97	1
Amy Wallace	4	4
NT		
Helgi Stone	2	2
QLD		
Theresa Bint	1	3
Fflur Collier	1	1
Natalie Dearden	1	1
Frances Guard	1	1
Glenda Henry	1	2
Rod Hobson	9	0
Paul Koch	1	1
Marilyn Mellino	1	1
Rhonda Melzer	2	2
Ray Palmer	28	41
Yvonne Powers	1	1
Kristine Sihto	1	1
Dennis Thomas	1	1
Rob van Hattem	1	1
Ronda and Peter Warhurst	2	0
Nicole West	1	1
Juanita Wood	1	1
Susan Zilberstein	1	3
SA		
Adelaide Fungal Studies Group	99	0
Pamela Catcheside	70	0
Waltraud Haberberger	1	1
Natural Resources SA Murray-Darling Basin	21	4
Rhonda Smith	1	1
Sturt Upper Reaches Landcare Group	43	0
Liz Thompson	19	19
TAS		
Gary Beard	2	2
Sarah Lloyd	64	64
VIC		
Marita Albert	1	2
Edward Atkin	1	1
Grace Ayliffe	1	2
Robert Bender	21	21
Michael Brennan	4	4
Lawrie Conole	1	2
Wendy Cook	110	0
Patrick Deasey	1	1
Teagan Denholm	1	1
Doug Evans	1	1
Cecily Falkingham	132	0
Field Naturalists Club of Victoria	903	87
Sue Fisher	4	2
Ruth Forbes	2	1
Friends of Westgate Park	36	29
Geelong Field Naturalists Club	4	0
Julianne Graham	1	1
Sally Green	10	0
Pat & Ed Grey	2	0
Jemma Hall	1	1
Joy Hick	2	2
Eileen Laidlaw	34	41
Geoff Lay	224	242
Jean Lightfoot	75	0
Elyce MacDonald	4	4
Ivan Margitta	302	26
Malcolm McKinty	231	280
Sapphire McMullan-Fisher	2	3
Andre Messina	1	2
Robyn Miles	3	3
Ian Moodie	1	2
Graham Patterson	29	4
Win Pietsch	67	0
Robyn Reid	1	2
Dr Bruce Richardson	1	2
Reiner Richter	24	25
Graham Riley	2	1
Ringwood Field Naturalists Club	35	0
Kristin Sicha	1	1
Kaye Stacey	1	1
Peter Sutherland	4	4
Neil Tucker	22	39
Ken Wakefield	1	2
Phil Zachariah	3	2
WA		
Peter Bayly	1	0
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Neysa Fontanini	1	1
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Royal Botanic Gardens Victoria provides significant in-kind assistance to Fungimap Inc. through hosting the Fungimap office at their Melbourne Gardens site and providing IT and administrative support for Fungimap staff and volunteers.

Donations

We greatly appreciate the substantial support from our regular donors Frances Guard, Blanche Higgins and Susan Nelles. Thanks to these individuals who made donations Fungimap since March 2017: Lyn Allison, Karen Anderson, Grace Ayliffe, Ian Bell, Boroondara Bushwalkers Inc., Fiona Duggan, James Ferguson, Roz Hart, Herbarium Tea Table, Emily Jordan, Valerie La May, Latrobe Valley Field Naturalists Club Inc., SJM McMullan-Fisher, Main Creek Catchment Landcare Group, Alison Moore, Miranda Mortlock, Dave and Lyn Munro, Jasmin Packer, Ray Palmer, Mary Phillips, Redhill South Landcare Group, Bev Robinson and Jenny Talbot, Kerryn Robinson, Vanessa Ryan, Bernie Schedvin, Elizabeth Sevior, Margery Smith, Jim Szymanski, Liz Thompson, Victorian Indigenous Nurseries Co-op, Warringal Conservation Society and Heather Whiting.

Sponsor a species

We are delighted that species have been sponsored by: Pam Catcheside,Heather Elson, Fran Guard and Bob Philpot, Kate Rohde, Elizabeth Sheedy and Kaitlin Wright. If you would like to sponsor a species please check out fungimap.org.au/index.php/get-involved/sponsor-a-species.

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We appreciate these individuals and groups who helped support fungal education in Adelaide and the Adelaide Hills in 2017: Rose Dow, Vale Park Our Patch, Heather Whiting, Greg Coote and Vale Park Primary School, Shanelle Palmer, Pam Catcheside, Teresa Lebel, Jasmin Packer, Thelma Bridle, Tijana Petrovic, Arbury Park Outdoor School, Nicola Barnes, Renate Faast, Natural Resources SA Murray-Darling Basin, Sturt Upper Reaches Landcare Group and the Discovery Circle, and University of South Australia.

Volunteers

Fungimap volunteers worked over 1240 hours over the last year. Work was carried out recording and replying to over 400 batches of fungi data. One Volunteer has adapted to working with voice activated software and the great work continues.

Thanks to our regular volunteers: Wendy Cook, Graham Patterson, Luke Vaughan, Vanessa Ryan, Philippa Perry, Grace Boxshall, Katrina Syme, Lachlan Tegart, and Ang Little. Thanks to Pat Grey, Heather Whiting, Thelma Bridle, Shanelle Palmer and Sturt Upper Reaches Landcare Group for raising funds through book sales. We are also grateful the efforts of our management committee: Tom May, Roz Hart, Sara Romberg, Paul George, Jasmin Packer, and Lyn Allison.

This newsletter was compiled and edited by Christina Hall.

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