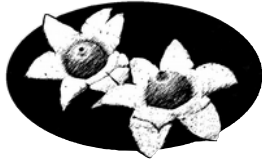


THE QUEENSLAND MYCOLOGIST



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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. Material can be in any word processor format, but not PDF. The deadline for contributions for the next issue is **1 November 2016**, but earlier submission is appreciated. Late submissions may be held over to the next edition, depending on space, the amount of editing required, and how much time the editor has. Photos should be submitted separately at full-size to allow flexibility in resizing and cropping to fit the space available while minimising loss of quality. Authors who have specific preferences regarding placement of photos should indicate in the text where they want them, bearing in mind that space and formatting limitations may mean that it is not always possible to comply. Material from published sources may be included if that complies with copyright laws and the author and source are properly acknowledged.

Cover photo:

Warwick held their Jumpers and Jazz Festival in July this year, with one of the activities to decorate trees in "jumpers". QMS was involved, led by Ronda Warhurst, and the cover photo is of the result of her efforts. More on this in the next newsletter. Photo © Ronda Warhurst.

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Contents

| | |
|---|----|
| QMS Calendar | 4 |
| Editor's Comments | 4 |
| How fungi help trees tolerate drought | 4 |
| What does the Atlas of Living Australia tell us about the distribution of <i>Mycena interrupta</i> in Queensland and South Australia? | 5 |
| Feasting flies at stinkhorns | 10 |
| Mt Mort Foray | 14 |
| Cunningham's Gap Foray 28 May 2016 | 15 |
| Ravensbourne National Park Truffle Foray | 16 |

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

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

This year there will be a Workshop on "**Collection and Description of Fungi**". It will be on 29th October at Maleny Uniting Church Hall. Book now with Fran or Judith. Numbers are limited to 25.

It is important that all members who wish to collect under the QMS Members' Permit undertake this type of training before they apply to be on the Permit.

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 Fran or Judith (info@qldfungi.org.au).

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

QMS Calendar – 2016

| MONTH | MEETINGS | FORAYS/WORKSHOPS |
|-----------------|---|------------------|
| November | 8 th Fungal diversity in maritime Antarctic soils Workshop report | ----- |
| December | 13 th Christmas Party | Christmas Break |

Editor's Comments

We are fortunate to have articles by two leading scientists in this issue. Tom May has written an article about the Atlas of Living Australia in the context of recent records of *Mycena interrupta* in north Queensland, and revealed much about the capabilities of ALA that I for one had no idea of.

I heard Geoff Monteith give a talk on flies on stinkhorns to the Entomological Society of Queensland in June, and knew it would be of interest to QMS members. I was fortunate in getting permission to reproduce his article from the News Bulletin of the Entomological Society of Queensland. Many thanks to Geoff and ESQ Newsletter Editor Kathryn Ebert. Geoff is one of Queensland's leading Entomologists and his sharp observations and great photos provide some fascinating insights into stinkhorn biology.

It has been an odd year for forays, though I am beginning to think they are all odd when it comes

to the weather. We had a dry summer in Brisbane, but there was much better rain further north, which led to a very successful weekend of forays in the Sunshine Coast and Gympie areas earlier in the year, as reported in the last newsletter.

This time we have three fairly short foray reports:

The first, from Susan Nelles, was not a QMS foray, but part of a Queensland Naturalists survey of a site at Mt Mort.

The two QMS forays were to Ravensbourne and Cunningham's Gap. The Ravensbourne foray was focussed on truffles, those fungi that fruit underground. Cunningham's Gap was quite dry, though there had been a little rain previously, and also cold and windy, so few fungi were recorded.

There has been good rain during the winter and hopefully that will continue into summer and generate some really successful forays in the new year.

David Holdom

How fungi help trees tolerate drought

Ectomycorrhizal (ECM) fungi are key players supporting the growth, health and stress tolerance of forest trees globally, and help boost the productivity of bioenergy feedstock trees, including poplar and willow. The most common ECM fungus is *Cenococcum geophilum*, found in subtropical through arctic zones and especially in extreme environments. It is also the only mycorrhizal fungus in the Dothideomycetes, a large class comprised of some 19,000 fungal species, many of them plant pathogens.

To learn more about what ectomycorrhizal characteristics are dominant in *Cenococcum geophilum*, a team led by researchers at the French National Institute for Agricultural Research (INRA) and the Swiss Federal Institute for Forest, Snow and Landscape Research WSL, and including researchers at the U.S. Department of Energy Joint

Genome Institute (DOE JGI), a DOE Office of Science User Facility, compared its genome with the genomes of close relatives *Lepidopterella palustris* and *Glomium stellatum*, neither of which are ECM fungi. The study was published online September 7 in *Nature Communications*. They found specific adaptations in the *C. geophilum* transcriptome – messenger RNA molecules that reflect actual biochemical activity by the fungus – that could help their hosts be more resistant to drought stress, a finding that could be useful in developing more plant feedstocks for bioenergy amidst the changing climate.

These adaptations were the same as in other previously sequenced ECM fungi and included reductions in plant cell wall-degrading enzymes and increases in water channels.

This note is extracted from material made available online by the Lawrence Berkeley National Laboratory. Follow the link below for the full story:

<http://www.newswise.com/articles/how-fungi-help-trees-tolerate-drought>

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

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 on-line. 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). Sometimes however, 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 *Mycena 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 *Mycena 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 in terms of 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.

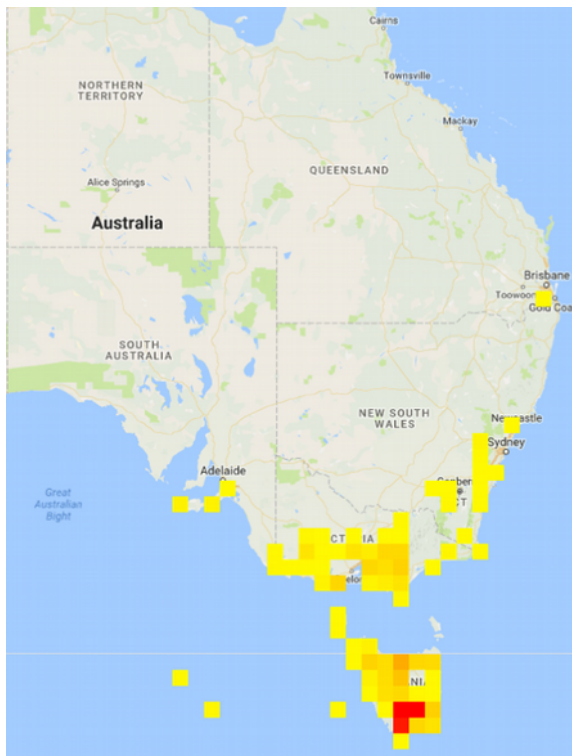


Fig. 1. Distribution of *Mycena interrupta* in Australia from Atlas of Living Australia (August, 2016). Coloured grid cells indicate at least some records for the area under the grid. Grid cells are coloured by the density of records (yellow: less dense; red: most dense).

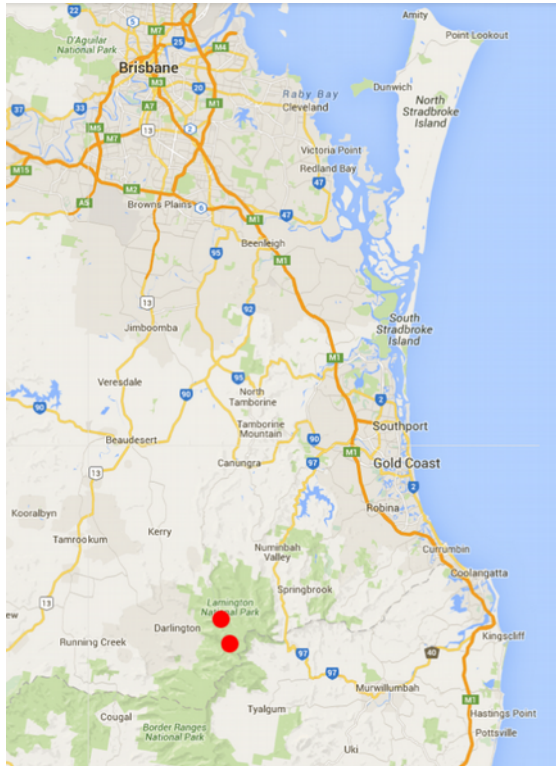


Fig. 2. Occurrence of *Mycena interrupta* in Queensland. Both the dots are for records in the vicinity of O'Reilly's.

Mycena interrupta in Queensland

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

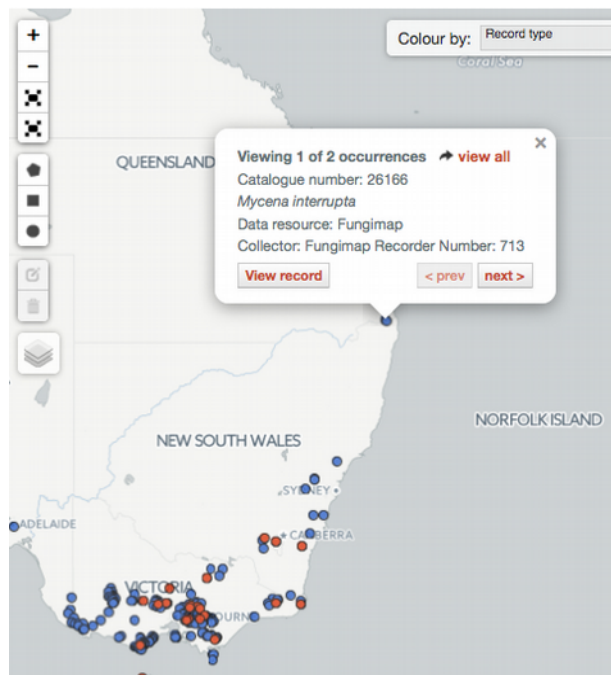


Fig. 3. Clicking on a point in maps in the Atlas of Living Australia shows associated data. Full data can be accessed by choosing 'view record'.

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 *Mycena 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'Reilly'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 *Mycena 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.

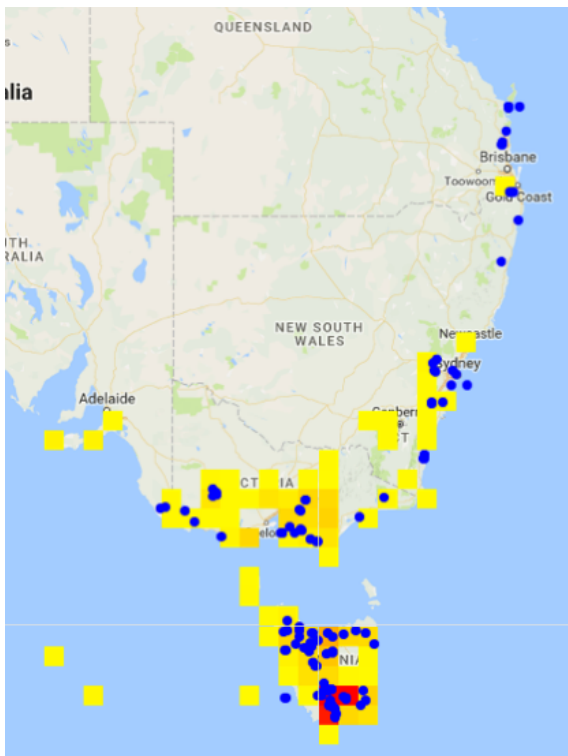


Fig. 4. Distribution of *Porpolomopsis lewelliniae* (blue dots) overlaid on distribution of *Mycena interrupta* (yellow to red-coloured grid cells, as in Fig. 1). From Atlas of Living Australia.

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 *Mycena 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.

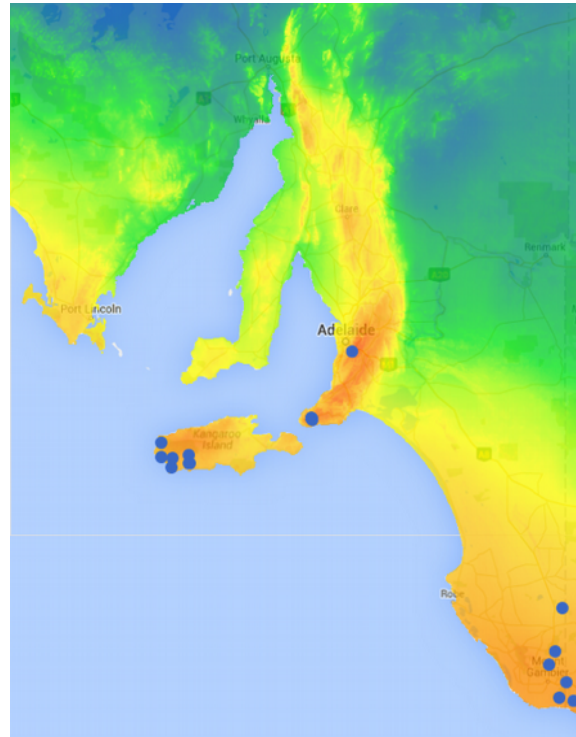


Fig. 5. Distribution of *Mycena interrupta* in South Australia (blue dots) overlaid on Mean Annual Precipitation [coloured from blue-green (low) to orange (high)]. Map produced in Atlas of Living Australia Spatial portal.

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 *Mycena 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 *Mycena 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 *Mycena 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.

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-N.S.W., 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.

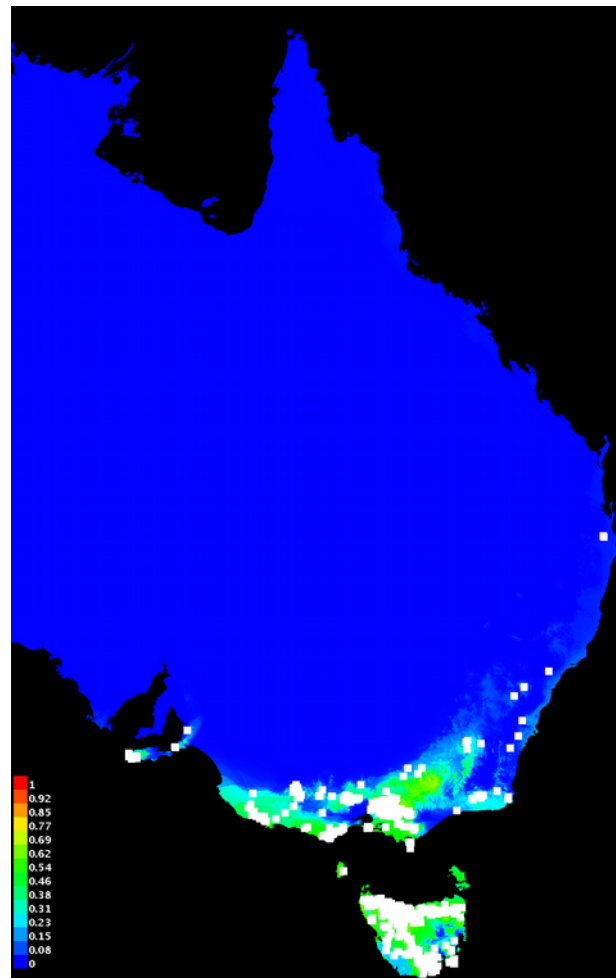


Fig. 6. Known distribution of *Mycena interrupta* (white rectangles) overlaid on predictive model layer derived from the 'BIOCLIM 1960 Best 5' set of climatic variables. Prediction scale is lower left: very low (blue) to medium (green) and high (red). Analysis carried out in the Spatial portal of the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

Where to look for *Mycena interrupta*

The presence of *Mycena interrupta* in Lamington National Park is a significant outlier, with a large distance to the occurrences in mid coastal N.S.W. 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 New South Wales 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 *Mycena interrupta* in northern New South Wales 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.

Are 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 on-line. 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 is 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. Especially, 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 are 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.

Feasting flies at stinkhorns

Geoff Monteith
Queensland Museum

Reprinted from the *Entomological Society of Queensland News Bulletin* vol 44(4), June/July 2016, with kind permission from the author and Kathryn Ebert, *ESQ News Bulletin* Editor.

Most flowering plants have their pollen transmitted by flying insects and this is one of the success stories of evolution. The larger basidiomycete fungi produce special fruiting bodies which release fine, particulate spores, which in many ways resemble pollen grains because their dispersal is vital to the plant. With these fungi, however, spore dispersal is usually by wind or water and it is not often that winged insects play that role. One group of fungi DOES actively solicit insects for spore dispersal and these are the stinkhorns.

Stinkhorns produce their spores in a foul smelling brown slime, called the “gleba”, which coats the receptive area of the fruiting body. The smell resembles faeces and/or carrion and insects which normally feed on such material are attracted by the smell, feed on the gleba, and eventually pass the spores elsewhere. There are about 9 genera of stinkhorns in Queensland and most have quite striking appearance. Some form a cage-like structure (the Family Clathraceae) and others have an erect stalk with a cap on top (the aptly named Phallaceae).



Fig 1. A group of *Phallus multicolor* in a wood chip mulched garden at Tinaroo. The youngest in the foreground still has flies feeding on the gleba, while the older ones are licked clean and progressively collapse. All photos by G.B. Monteith.

They are readily identified by the keys and excellent photographs on the Queensland Mycological Society's website at

<http://qldfungi.org.au/resources-2/fungi-keys/fungi-key-queenslands-stinkhorns>.



Figs 2-4. Origin of a stinkhorn. The spherical “eggs” form near the soil surface (2). At night the skin ruptures under pressure (3) and the spore body rises upward as the compressed tissues expand (4) to form the final structure. Flies begin to feed on the smelly gleba before daylight as soon as it appears.

I recently spent a week in May at my sister's place at Tinaroo on the Atherton Tableland and there were scores of an orange and white stinkhorn called *Phallus multicolor* Berk & Broome (Fig 1) emerging from bush garden beds that had been mulched with wood chip a year earlier. They were attracting thousands of flies and new stinkhorns were apparent every morning, so there was opportunity to make some observations.

Stinkhorns arise from a subspherical structure (the "egg") which forms at the surface of the soil and is enclosed in a thin leathery skin (Fig 2). These eggs become increasingly turgid and the ones that are going to sprout on a particular night split their skin about 1-2 hours before dawn (Fig 3) which was about 6am at Tinaroo at the time. Soon after, the translucent inner tissue is ruptured as the cap pushes through and rises rapidly above the soil surface (Fig 4). The smell is apparent straight away and flies start to arrive immediately (especially Muscidae) even when this occurs an hour before dawn (Fig 4). The last part of the central column to lengthen is the part inside the cap, and, as this happens, a lacy skirt (the "indusium") appears within the lower rim of the cap. In about 50% of cases this expands downwards to form a striking perforated skirt reaching almost to the ground (Fig 5). Only a few species of *Phallus* have the skirt and I have not seen a function attributed to this remarkable structure.

The whole structure takes about 4-5 hours to rise to its full height, which can be 20cm tall, and most have stopped growing by about 9-10 am.

The flies build up in numbers rapidly after dawn and other families, such as calliphorids, sarcophagids and drosophilids become more frequent (Fig 9). When the cap first appears, its surface is relatively smooth and the gleba forms a continuous film over its surface (Fig 4). As the cap expands, the reticulate pattern on its surface become more pronounced, with the ridges becoming more raised and the enclosed hollows becoming deeper (Fig 5,7). The fluid gleba then retracts into distinct "puddles" in the bottom of the depressions and the ridges become high and dry. This clearly enhances the



Fig 5-8. A pair of *Phallus multicolor* stinkhorns soon after dawn with their lacy skirts fully expanded (5) and caps covered with spore-rich gleba. Fig 6 shows the same pair on the second day with the gleba fully consumed by flies. Figs 7 and 8 show detail of the cap surface of the same pair on Day 1 (7) and Day 2 (8).



Fig 9. The four dominant families of flies visiting the stinkhorns were the sarcophagids, muscids, calliphorids and drosophilids.

feeding of the flies, since it gives them dry, non-sticky ridges to place their tarsi on, and deep puddles of fluid into which they can insert their mouthparts to efficiently suck up the fluid (Fig 7). By the second day the gleba has been completely removed by fly feeding (Figs 6,8) and the skirt has sunken flat. By the third day the whole structure is starting to fall over and collapse (Fig 1).

A remarkable observation was that, despite a week of sporadic observations of scores of stinkhorns during day and night, only flies came to the stinkhorns of this species. There are numerous Coleoptera (dung beetles, staphylinids, etc) which would be expected to be attracted to the kind of smells which attracted the flies, but not a single beetle was noted. The flies on several stinkhorns became the target of predatory attack by a nearby nest of "trap-jaw" ants of the genus *Odontomachus*. These ants are fierce, stinging predators with remarkable jaws that open and lock at an angle

of 180°. They have sensory hairs between the jaws which trigger the jaws to snap shut with violent force when the hairs make contact with the prey. The jaws lock onto the prey and the sting is brought forward between the legs to deliver the coup de grace. One is seen in attack mode in Fig 10. A trail of ants were leading to the targeted stinkhorns with ants ascending one at a time to the cap to kill one of the swarming flies and carry it back to the nest. This was a very efficient operation and many flies were being taken from the targeted stinkhorns. It was notable that attacks only occurred on stinkhorns which had no indusial skirt or where the skirt had not expanded properly as in Fig 10.

Perhaps the function of the skirt is to form a confusing barrier to such predators which deprive the stinkhorn of its essential dispersal agents, the flies.

An even finer indusial skirt occurs on the closely related stinkhorn, *Phallus indusiatus* Vent. In December 2010 we took visiting University of

California (Berkeley) coleopterist Kipling Will to Iron Range to chase carabids. One night a stinkhorn of this species popped up out of the ground right in front of the door to Kip's tent (Figs 11-12). It is easy to see how such a magnificent indusial skirt as that would be a barrier to attack by ants.

At Tinaroo, my brother Lindsay used a small GoPro camera to record 744 30-second time-lapse still photographs to record the full growth sequence, from daylight to midday, of a pair of stinkhorns of *Phallus multicolor*. The images were strung together to make a short movie which showed not only the spectacularly rapid expansion of the fruiting body but also the almost complete removal of the gleba by flies by the end of the sequence. This was shown at the meeting, but unfortunately readers of the News Bulletin will have to use their imagination. This story just goes to demonstrate the old adage that wherever there is a bad smell there is probably some interesting entomology happening.



Figs 10. A stinkhorn with unexpanded skirt has *Odontomachus* ants (see inset) predated on the flies.



Figs 11-12. Coleopterist Kip Will examines the intricate stinkhorn *Phallus indusiatus* which came up in front of his tent entrance at night at Iron Range.

Mt Mort Foray

Susan Nelles

'Aroona', Mt. Mort is a working cattle farm west of Ipswich near the Scenic Rim; the homestead and four other properties within a 20 km radius cover an area of 2000 hectares.

Nine different ecosystems are represented on these properties.

Queensland Trust for Nature, which owns 'Aroona', invited Queensland Naturalist Club members to conduct an initial survey of flora, fungi and fauna between July 1-4, 2016.

Each morning and evening, groups checked traps for small animals and fortuitously spotted fungi which added to those found by the three QMS members. Thus a wide variety of sites and habitats was covered, mainly grassland, eucalypt and vine scrub, lantana covered slopes, and creek beds with some rainforest type vegetation. It is a dry area but recent rain favoured the hunters and collectors!

There were 36 specimens, so far 14 identified to species.

A list will be added to the QMS web site, and updated as more IDs are confirmed.

The common woodland fungi were seen – *Pycnoporus* sp., *Agaricus campestris*, *Amanita xanthocephala*, *Auricularia cornea*, *Chlorophyllum molybdites*, *Cyathus stercoreus*, *Panus fasciatus*.

Cortinarius species were abundant in the lantana patches, including a bright red one, along with many *Laccaria lateritia*. No boletes were found, only one *Ramaria*, and one truffle *Hydnangium carneum*.

Woody pore and bracket fungi also were abundant. *Phellinus* sp., *Hymenochaete* sp., *Phaeotrametes decipiens*, *Hexagonia tenuis* and beautiful resupinates.

My favourite was a *Pleurotus* sp. high up in a *Xanthorrhoea* tree near the summit of Mt. Beau Brummell.



A puffball, ID yet to be confirmed but possibly *Disciseda* sp. © Susan Nelles.



Pleurotus sp. growing on a *Xanthorrhoea*. © Susan Nelles



An unidentified resupinate fungus. © Susan Nelles.

As I was leaving, the station manager on horseback and his working dogs were leading a mob of cattle to the homestead – via Fleischfresser (Carnivore) Gully!



A view of Mt. Mort Rd. with a mob of cattle in Fleischfresser Gully. © Susan Nelles.

QMS might like to visit this site at some other time after rain, as it was very productive.

Cunningham's Gap Foray 28 May 2016

Ronda Warhurst

We had visited the Cunningham's Gap site in four previous years: in October, February, March, April. This year we visited in May. The weather had been dry over the previous weeks but a brief shower on the Thursday prior to the foray did encourage several agarics to appear. The day of the foray was fine but a bitterly cold westerly wind made conditions unpleasant.

The group started up the Mount Cordeaux track recording fungi such as *Trametes* sp., *Geastrum* sp., *Ganoderma* sp., *Phellinus* sp., *Stereum ostrea*, *Lycoperdon* sp., several resupinate species and old specimens of *Auricularia* and *Amauroderma*. These fungi are either long-lived or persist for a while under dry conditions.

After a group photo at the lookout we headed back to the car park and relative warmth. Some of the group continued along the track to the picnic area. This was a wetter area and several agarics were spotted. A lovely *Xerula* was broken off by a walker before we got there but John managed a great photo. Susie spotted a *Hericium coralloides* under a log and also found a *Pluteus* and a *Psilocybe* on decaying wood. This is the first record for a *Psilocybe* in this area. Megan spotted a *Phallus multicolour*: a species which also has not been recorded at this site.

Wayne and Judith ventured along the Mt. Mitchell track and were not pleased to find *Favolaschia calocera*, but other finds were *Omphalotus nidiformis*, *Cymatoderma elegans* and a possible *Coltricia*.

The only species to have been recorded on every visit to the site is *Cymatoderma elegans*.



Some of the fungi observed. Clockwise from top left: *Lycoperdon* sp., *Geastrum* sp., *Hericium coralloides*, *Trametes* sp?. All photos (C) John Van de Geyn

Ravensbourne National Park Truffle Foray

Sandra Tuszynska

A few weeks ago (5-7th of August), Susie Webster organised a truffle foray in the Ravensbourne National Park. We spent a couple of days raking for, collecting and identifying truffles and other fungi, and enjoying each other's company. The aim was to contribute to the Queensland Herbarium collection, increasing our knowledge of Australian fungi, in particular south east Queensland truffles.

Ravensbourne National Park is about 32 km north of Toowoomba, and 33 km west of Esk. This little haven is adorned with towering trees, palm groves, trickling streams, amazing bird life and last but not least, some incredible fungi. The rainforest is the best remaining example of forest that once covered this part of the Great Dividing Range.

Our little group met at 9.30 and we ventured down towards the Buaraba Creek track. Armed with truffle hunting tools, namely rakes, collecting boxes and cameras, we set out with hopes of finding some truffle treasure, beneath the rich forest soils.



Truffle-hunting tools. © Sandra Tuszynska

We scratched and scratched, determined to find some truffles, but it was looking bleak for a while. Nigel suggested that the soil might be too rich and that the season might be over. Additionally, we did not see many instances of animal-disturbed soil, suggesting that truffles may not be present. Then, from up a slope, shouts of success could be heard, so I rushed in excitement towards the joyous discoverers and their prize.

At this point, truffles were not what I would call exciting in their presentation, unlike the visible, above ground fruits of other fungi. Looking like little pebbles, I found them cute and rather funny. However, this quickly changed, as I learnt more about truffles from Susan Nuske who is doing her PhD on truffle dispersal by the northern bettong.

Our bettongs are endangered and thought to be a key species in truffle dispersal. Susan's PhD project aims at conservation efforts of the bettong and the truffles it feeds on. Truffles are mycorrhizal (symbiotic) with various tree species. If the bettong disappears, so possibly could some key tree species, as they depend on the truffle, and thus the bettong, for their survival.



Megan and Susan with the first truffle.
© Sandra Tuszynska

After the first find, there were many more and I wondered if I would actually find any truffles myself. Then, a truffle appeared as if miraculously in the soil that I was raking, and then another. I don't recall any of my desires being so instantly gratified, and it was a faith building experience. It is just a great treasure hunt, looking for truffles: once you find some, the joy is trying to find more.



My first truffle. © Sandra Tuszynska

There were few other species of fungi, although high on the slope, a gorgeous purple *Russula* seemed to be in abundance.

Another beautiful olive green *Cortinarius* jumped out at Susie, and just as she explained fungi are out of season and there would be little chance of finding more, I scratched around a little and two more of these beauties were revealed.



Russula sp. © Sandra Tuszyńska

Beside the joys of finding fruiting bodies, the fungal presence was not scarce. In fact, the forest soil and decaying organic matter were completely colonised with mycelium of different colour and structure.

When we got to Crows Nest Caravan Park, we had lunch and then set up our lab in the generously provided hall. I was graced with describing the pretty *Russula* and thoroughly enjoyed the experience. There is great joy in getting to know the fungi at the microscopic level. Photographing, drawing and describing fungi is an opportunity to merge both art and science.

Currently there are many fungal collections awaiting identification and incorporation into the database at Queensland Herbarium. Members are encouraged to learn how to make good collections, and write the descriptions of their specimens and then learn how to identify them. There are really not enough of us able to do this.

Since fungi are pioneers in ecosystem processes and other species of plants and animals rely on them; it becomes apparent that conserving fungal species, including many that are not yet recorded, is a major issue.

I find the microscopic identification of fungi by examining their spores extremely enjoyable and fascinating. Some spores are very beautiful with various ornamentations, and they are a key identifier for some genera. In spite of their appearance and habit of fruiting underground, some truffles belong to genera that are best known for fruiting above ground, such as *Russula*, where spore size and morphology is an important feature in species identification.

There is one rule I learnt from Megan Prance, during the weekend – collect only as many fungi as

you can prepare for a collection. This might be four or five, often less. We can get so excited in our passion for fungi we collect way more than we can work on.

John Dearnaley from the University of Southern Queensland joined us for a rainforest foray on Saturday. Once again occurrence was site specific, and once we found the site, there seemed to be no end to them. Some were quite large, perhaps the size of a 50 cent piece!



A large truffle, cut to show internal structure. © Megan Prance

There were also some gorgeous puffballs growing in the rainforest, which Megan identified as *Lycoperdon perlatum*.

Our afternoon and evening, was once again spent attempting to identify what we had collected. Sunday began with pancake making, followed by packing and cleaning with a final hunt at Crows Nest National Park. We had a fun filled and educational weekend and I am looking forward to the next weekend foray.