THE QUEENSLAND MYCOLOGIST

Bulletin of

The Queensland Mycological Society Inc

Vol 15 Issue 1/2. Autumn/Winter 2020

The Queensland Mycological Society

ABN No 18 351 995 423

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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, but issues may be combined if there is insufficient material for four issues. Members are invited to submit short articles or photos to the editor for publication. It is important to note that it is a newsletter and not a peer-reviewed journal. However we do aspire to high standards of accuracy.

Material can be in any word processor format, **but not PDF.** The deadline for contributions for the next issue is **1 August 2020**, but if you have something ready, please send it **NOW**! Late submissions may be held over to the next edition, depending on space, the amount of editing required, and how much time the editor has. I use sans-serif fonts for text, mostly Gothic 720BT,10pt, but also others, especially for headings and captions. Font sizes may vary if required to make articles fit the available space, and text may be edited for the same purpose.

Photos should be submitted separately at full-size to allow flexibility in resizing and cropping to fit the space available while minimising loss of quality. Authors who have specific preferences regarding placement of photos should indicate in the text where they want them, bearing in mind that space and formatting limitations may mean that it is not always possible to comply. Material from published sources (including internet sites such as Wikipedia) may be included **if that complies with copyright laws and the author and source are properly acknowledged.** However extensive verbatim copying is not acceptable.

Cover Illustration

This beautiful photograph of a mushroom fluorescing under UV light was taken by Linda Reinhold. © Linda Reinhold. See page 5 for many more.

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QMS Activities

COVID-19 update

Due to the COVID-19 pandemic, in person meetings and workshops are suspended until further notice. It is planned to hold meetings via Zoom. Forays with limited number and appropriate social distancing may proceed. Check the website and watch out for emails from Wayne Boatwright on that.

Meetings

Please note that since November 2019, meeting times have changed and at present in-person meetings are suspended because of the COVID-19 crisis. When they can be held, meetings are held in the F.M. Bailey Room at the Queensland Herbarium, Mt Coot-tha Botanic Gardens, Mt Coot-tha Road, Toowong, from 4 pm – 6 pm on the second Tuesday of the month from February (no January meeting), unless otherwise scheduled. **Check the website for details and any changes.** There are typically 3-4 guest speakers invited during the year, with the other meetings informal. Suggestions from members for topics or names of potential speakers will be welcome at any time. Please contact a member of the Committee.

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

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 Wayne Boatwright or another member of the Committee.

Workshops

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

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

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

QMS Calendar 2020*

MONTH	MEETINGS	FORAYS/WORKSHOPS
Note: This information is tentative. It is now uncertain which talks can go ahead. Please check the website, and look out for emails from Wayne Boatwright.		
July	Warwick Nash: Fungi for Healing	
August	Kaylene Bransgrove: Hunting endophytes – what they tell us	
September	Diana Leemon: Entomopathogenic fungi: zombies, mummies and other insect horror stories	
October	TBA: Wood Decay fungi	
November	Tony Young: Cleland slide collection?	
December	TBA: Lichens and the environment?	

*Check the website and look out for emails for updates on the COVID-19 situation. **Please note. Meetings (when they are held again) are at 4 pm in the F.M. Bailey Room at the Queensland Herbarium, Mt Coot-tha Botanic Gardens, Mt Coot-tha Road, Toowong.**

Editor's comments

With the continuing COVID-19 lockdown, it is uncertain when normal meetings will resume. As I write this, easing of some restrictions has been announced, but it is likely to be some time before a return to normal meetings is possible.

In the meantime, it is hoped that members can get together in the virtual meetings being arranged by Wayne, via Zoom. However, I am not sure how many of the presentations will be possible, so check the website and look out for email announcements from Wayne.

The newsletter is a good way to share your fungal discoveries, and all the more so now that we are not meeting in person. There are also many members who cannot attend regular meetings when they are on.

So please, if you have anything of interest, from foray reports, short notes, recipes or any other interesting ideas or discoveries, **please write it up and send it in.**

Apologies for a late newsletter that has turned into an "Autumn-Winter edition. Along with other delays along the way, I did not have enough substantial material for a newsletter in March until Linda Reinhold sent a fascinating piece on fluorescence in fungi (and other things) with photos so good that it was easy to choose one of them for the front page. This phenomenon is new to me, though I have used fluorescence microscopy in the past, so maybe that has something to do with my enthusiasm for Linda's article.

As to why so many organisms fluoresce, that remains unknown. Possible reasons range from protection against UV light to attracting organisms that can spread spores to an accident of chemistry that evolved for other reasons, e.g some toxins. All that just illustrates yet another set of uncertainties waiting for scientists (amateur and professional) to sort out!

I am surprised that the phenomenon of fungal fluorescence is not more widely known outside specialist circles, but maybe it is at least partly because cheap portable LED-based UV lights have only recently become readily available.

There are also notes on scorpions and mammals fluorescing – scorpions are well known to do that but not so mammals, so while not fungi those notes add extra interest. OK, another bias: my first degree was in zoology. Linda is also a zoologist.

Fran has contributed two short notes (there can never be too many of those!), and Theresa Bint sent in a recipe for Lion's Mane "Crab" Cakes. Now where can I get lion's mane mushrooms?

Finally we have a presentation on "Bugs and Beads", a small business owned by Vivian Sandoval, who is donating part of her proceeds to QMS. If you have not seen her creations, go to the end of the newsletter, then link to her website. – David Holdom

Some links

Ancient fossil fungi. Three different claims! But no matter which are the oldest, there is no doubt that fungi are truly ancient.

https://www.newscientist.com/article/2231068-the-oldest-fungi-fossils-have-been-identified-in-a-belgian-museum/ (Full article not available except to subscribers. Your library may have it: Issue 3267 , published 1 February 2020).

https://www.theguardian.com/science/2019/may/22/canadian-arctic-fossils-are-oldest-known-fungus-on-earth

https://www.nationalgeographic.co.uk/science-and-technology/2020/01/worlds-oldest-fungi-found-fossils-may-rewrite-earths-early-history

https://www.bbc.com/news/science-environment-39656089

Fluorescent forests:
Of mushrooms and marsupials
Linda Reinhold

This is an account of 12 nights exploring the phenomenon of fluorescence in the rainforests of Tropical North Queensland. My UV torch lit up at least 14 species of fluorescent mushrooms, and three species of fluorescent marsupials.

Fluorescence: Fluorescence, measured using a fluorometer, is a type of luminescence called photoluminescence, where a substance needs to have light shone on it in order to glow. Differing from the chemical process of bioluminescence (where an organism creates its own light through an enzymatic chemical reaction, visibly glowing to the unaided human eye), fluorescence is a physical process in which fluorescent molecules absorb ultraviolet (UV) radiation and translate it to colours visible to the human eye. As the molecules return from an excited to a ground state, the photons they absorbed are released at a longer wavelength and hence a different colour (Smith and Roman 2020). Fluorescence in living organisms is also known as biofluorescence or natural autofluorescence.

Fluorescent road signs contain specially developed intensely fluorescent pigments and appear brighter under sunlight because they absorb invisible ultraviolet light and re-emit it at visible wavelengths. Particularly at dawn and dusk, or when overcast, the signs appear to glow and can be seen at a greater distance (3M Company).

Ultraviolet vision in animals: Humans generally can't discern natural fluorescence during daylight because the ambient visible light is too bright, and that probably applies to most other animals as well. Because our eyes are shielded by ultraviolet-filtering pigments in our lenses we also cannot see ultraviolet light reflected from surfaces (Primack 1982; Cronin and Bok 2016). Some Antarctic and Arctic animals which do see in UV wavelengths have a different mechanism for protecting their retinas from intense UV reflection off snow (Hemmingsen and Douglas 1970; Hogg et al. 2011).

Ultraviolet vision means an animal can see in UV wavelengths and therefore see patterns and images formed by reflected UV light (Cronin and Bok 2016). Some flowers have UV-reflective patterning to guide in pollinators such as bees (Primack 1982). Invertebrates, in general, have a wide vision spectrum, including ultraviolet (Salcedo et al. 2003). Some mammals such as rodents and bats also have UV vision (Jacobs and Deegan 1994; Zhao et al. 2009). Many more animals have UV photosensitivity, which simply means that they have a behavioural response to ultraviolet light (Cronin and Bok 2016).

Fluorescence, however, involves the absorption of UV light and its retransmission as visible light. It is not known to what extent animals can perceive the faint fluorescence generated by ambient UV. If they cannot then fluorescence may simply be a mechanism of absorbing UV either for protection, or to make them less visible to organisms that can see in ultraviolet. Its role, if it can be seen, is uncertain.

Occurrence of fluorescence in nature: A review of fluorescence in nature lists plant leaves, fruits, flowers, birds, butterflies, beetles, dragonflies, millipedes, cockroaches, bees, spiders, scorpions and sea organisms (Lagorio 2015). The property of fluorescence in fungi, initially for use in the medical detection of tinea, has been known since 1925 (Margarot and Deveze 1925).

For several decades, the presence of fluorescence has been used by some authors as a taxonomic character for *Cortinarius* species in Europe and South America (Moser 1969; Moser and Horak 1975). Fluorescence has also been used as a character to differentiate species of *Cortinarius* in New Zealand (Soop 2005, 2017). In Australia, intense fluorescence has been described in the flesh of a species of *Dermocybe* (Gill 1995).

The compound responsible for yellow fluorescence in *Cortinarius* is the glycoside leprocybin (Kopanski et al. 1982). The intense blue fluorescence of *C. infractus* is generated by compounds that are also responsible for its bitter taste (Steglich et al. 1984). These compounds are derivatives of β-carboline, which is the dominant compound involved in the intense blue fluorescence of scorpions (Stachel et al. 1999).

The nephrotoxin orellanine contributes to secondary fluorescence in the mushrooms of *C. fluorescens* and several other *Cortinarius* species in Europe and the Americas. After exposure to light of 366 nm, extracted orellanine breaks down into orelline and gives off a bluish-white fluorescence (Rapior et al. 1988; Laatsch and Matthies 1991). This fluorescence has been used to discriminate species of highly toxic *Cortinarius* from non-toxic ones (Kidd et al. 1985), but Oubrahim et al. (1997) cautioned that the amount of fluorescence displayed is not an indicator of a mushroom's toxicity to humans as is claimed by some mushroom handbooks. These substances may have different roles, e.g. extracts of mushrooms containing orellanine inhibit growth of the bacterium *Bacillus subtilis* (Koller et al. 2002).

All species of *Russula* that Henkel et al. (2000) tested were fluorescent, distinguishing them from *Lactarius* in which none have yet been found to be fluorescent, but that may not apply world-wide. In Europe, the intensity of fluorescence is used by some authors as a taxonomic characteristic differentiating species of *Russula* (Fellner and Landa

1993). In *Russula spp.,* fluorescence is facilitated by water-soluble pteridines (lumazines), the russupteridines. Pro-lumazine gives a strong violet-blue fluorescence and russupteridine-yellow gives a strong yellow fluorescence (Iten et al. 1984).

Interest in looking for fluorescence in general biology is only recently gaining momentum, with a fluorescent sea turtle being discovered in 2015 (Gruber and Sparks 2015) and the first of many fluorescent frogs only discovered in 2017 (Taboada et al. 2017). Mammalian fluorescence was first discovered in opossums in 1983 (Meisner 1983), but not until 2017 in flying squirrels (Kohler et al. 2019).

There has been relatively little interest in the phenomenon of fluorescence in Australia. This article documents the discovery of fluorescent mushrooms and marsupials in the Wet Tropics Region of Queensland.

Fluorescence observations in the Wet Tropics

Over the last couple of wet seasons, I've spent numerous nights observing luminous mushrooms, foxfire and fireflies in the forests around Cairns. On 2 March 2020, I went on an excursion to the rainforest of Lake Barrine on the Atherton Tablelands to look for glowing mushrooms, but this time took a 395 nm UV light, also called a black light. While looking at a cluster of mushrooms that were glowing, I used the UV light to test them for fluorescence. They did not show any, but some small fungi in the nearby leaf litter lit up. That was useful to see an example and determine as fluorescent anything that lit up noticeably brighter than its surrounds in the UV beam. Continuing, while my buddy walked ahead looking for luminescent mushrooms, I used the UV light to look for fluorescent ones. Later that night, on the other side of the lake, a hollow log full of smallish mushrooms lit up in the beam of the UV light. The pileus surface and stipe were a stunning

Pale yellowy brown fungus in visible light (above) and ultra blue fluorescence in UV light (below). Note the lamellae are not fluorescing. © Linda Reinhold.

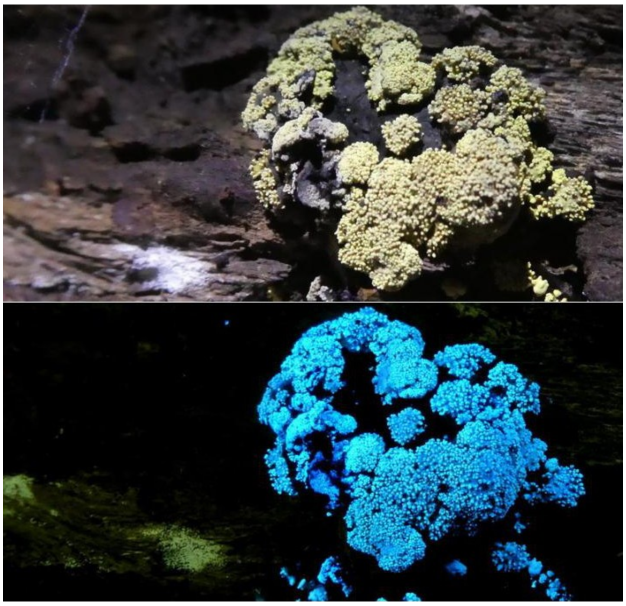
pale blue, yet the lamellae remained dull. In regular torchlight, these mushrooms were a drab pale yellowy brown, the sort of colour that would go relatively unnoticed in the daytime. Another species of mushroom growing on the opposite wall of the same log did not fluoresce at all. The occurrence of blue in fluorescence may arguably be partly due to blue visible light produced from the UV source, but the stark contrast between different parts of the same fungus, and between different fungi on the same log, demonstrate that actual fluorescence was occurring.

The next night expedition, to the Ivan Evans Walk in suburban Cairns on 6 March, revealed similar mushrooms, glowing the same ultra blue, yet less numerous and growing on the outside of a log.

A drab yellowish mushroom in torchlight (above) and under UV (below) on the Ivan Evans Walk. The lamellae don't glow. © Linda Reinhold.

The same log hosted another fluorescent blue lifeform, looking like a head of coral, possibly an anamorph similar to *Xylocoremium*.

Back at Ivan Evans on 10 March, the coral-like fungus was still fluorescing. Higher up on the trail, there was a log covered in fan-shaped polypore fungi, very mildly fluorescing pale cyan. In regular torchlight, they were drab pale orangey brown. Growing on a stick down towards the wet gully, a single infundibuliform polypore fluoresced spectacularly with a pale blue pileus edged in pale pink, pale pink pores and a bright orange base.



Fungus that looked like a head of coral, under torchlight (above) and UV (below). © Linda Reinhold.

A single infundibuliform polypore on the Ivan Evans Walk, drab under torchlight (left) and under UV (right), with spectacular coloured fluorescence. © Linda Reinhold.

Numerous scorpions were also fluorescing along the Ivan Evans Walk, sharing the forest with fluorescing and luminescing fungi. Their fluorescence was similar in colour and intensity to the ultra blue mushrooms.

On 15 March, the only fungus fluorescing along the walking trails at Malanda Falls Conservation Park was a single ground-growing mushroom with a pale blue pileus, pale blue lamellae and a bright yellow stipe. In regular torchlight, the mushroom was drab pale brown.

On 29 March, two more species were fluorescing on a rainy night at the Tulip Oak Walk at Malanda Falls. Both were less than 3 cm in diameter and appeared a drab whitish tinged with brown in regular torchlight. One species resembling *Polyporus grammocephalus* fluoresced wildly with purple, pink and orange. Only the two mature specimens did this though; the over-mature specimen did not fluoresce; neither did the immature specimens growing out of the same stick. A single tall-stiped ground mushroom fluoresced bright pale blue all over, including the lamellae.

A polypore resembling *Polyporus grammocephalus* on the Tulip Oak Walk, under torchlight (above) and UV (below) Upper (left) and lower (right) views. © Linda Reinhold.

Back along the Ivan on 14 April there were two more faintly fluorescent aged, colonies of wood-growing polypores, which may have been the same species as I had seen already. A single old *Cymatoderma elegans* was fluorescing a very mild cyan (a fresh one I had seen on 10 March was not noticeably fluorescent). On previous nights I had discounted any fluorescence perceived from fungi which were white, in case what I was seeing was just reflected

***Microporus* sp. in normal (above) and 395 nm UV (below) photographed on the Ivan Evans walk, 6 May 2020. © Linda Reinhold.**

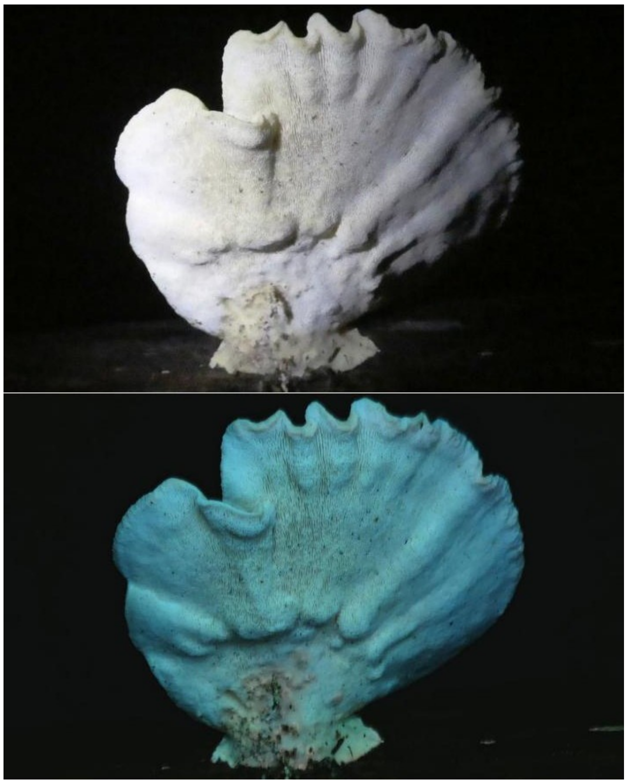
light. This night I stopped to photograph a colony of *Microporus* sp., which were mildly fluorescent. Although white, the uneven distribution of glow across the under-surface suggests they were faintly fluorescing as well as just reflecting light. The immature stipes were also fluorescent.

Later that night a single ground-growing fluorescent mushroom proved that being white alone is not enough to fluoresce: its cream-coloured pileus and stipe fluoresced a pale purplish blue, yet the white lamellae did not.

The lamellae of this mushroom are pure white, yet they don't fluoresce; it is the cream-coloured parts of the mushroom that fluoresce, proving that fungi don't reflect UV light just because they are white. © Linda Reinhold.

Checking Lake Eacham for fluorescence on 16 April, there were some dishevelled fan fungi, both gilled and pored, that were very mildly fluorescing. I had not seen the gilled ones before. Another set of fresh, mature, pored fan fungi faintly fluoresced a very pale blue all over, edged underneath with pinky-orange and yellow, despite the surface being cream-coloured in regular torchlight. There were also very mildly fluorescing fan fungi at Malanda Falls that night, but I am not sure if they add to the fluorescent species tally.

Also on the Lake Eacham night I had seen a couple of quickly-moving fluorescent animals that looked like small mammals. They stood out brilliant white against the dark forest floor. The third time I saw one, it paused long enough and close enough for me to shine regular torchlight on it for a few seconds, then switch back to the UV torch which confirmed its brilliant white fluorescence before it darted away. Under the regular torchlight it had a distinctly long pointy face, black eyes and brown fur, an antechinus, *Antechinus adustus* or *stuartii*. Further on, a larger animal fluoresced white as it loped off. It stopped a few metres away, too far for my camera to focus with the low light emitted from the UV torch, but close enough for colour flash photos. It was a long-nosed bandicoot, *Perameles nasuta*.



Underneath a Lake Eacham polypore fan fungi, it is plain cream-coloured in torchlight, but under UV, looking like something from the depths of the ocean, very mildly fluorescing a pale blue edged in pink and yellow. © Linda Reinhold.

On 17 April, I went to Lake Placid and Stoney Creek at the base of Barron Gorge. Apart from the scorpions, the only lifeforms even mildly fluorescing were foxfire-like logs and a couple of polypore species similar to ones I had seen before. A rodent paused close to me, but it did not fluoresce. Previous walks through Sawpit Gully Reserve and the Cairns Botanic Gardens had revealed nothing.

I had not seen any fluorescence in plants, yet the fluorescence of fungal fruiting bodies was so intense that it could be seen in a single pass of a UV torch powered by a single AA cell. More effort would be required to see it in plants. However, there had been trees that were covered in mildly fluorescent bark, which could have been caused by lichen. There were also fallen leaves that fluoresced, but this might have been the doings of decay fungi. Fungal mycelium was also mildly fluorescing on raw wood, a little like the foxfire of luminescent fungi.

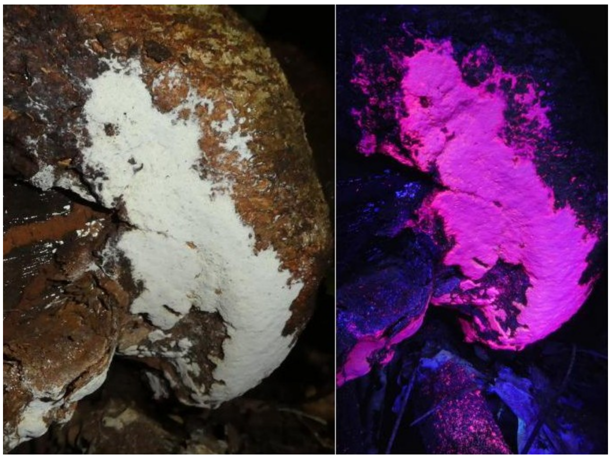
Not because of this limitation but because I wanted to get photographs of the fluorescing marsupials, I bought a new torch, a 51 LED 395 nm black light powered by three AA cells and very much brighter than the one-cell torch used up until now. It boasted a brightness of 20,000-22,000 mcd (millicandela), eclipsing the 80-150 mcd of the original torch. New torch in hand, I headed back up to Lake Eacham on the night of 30 April. It lit up the forest like tins of fluorescent paint had exploded all over the place.

The torch turned most plants purple, but patches of orange, yellow, green and a dash of peach stood out against the mostly dark forest. Whereas lichen look like camouflage on tree trunks during the day, it is the opposite at night. My original one-cell torch struggled pitifully in comparison. Fallen leaves that were pale white with the one-cell were bright yellow with the three-cell.

I had also bought a one-cell 365 nm torch to compare with the original and see if it was better targeted to fluorescence. The same under-the-sea scallop-shaped fan fungi I saw the previous time, still in good condition, fluoresced a very mild blueish white, with the same pink patch at the base with the new bright torch, but with the 365 nm torch, they just fluoresced the mild blueish white colour all over, the multicoloured highlights not showing.

With the more powerful torch, through the undergrowth a couple of metres away I saw an animal fluorescing orange. As it turned, parts of it momentarily appeared red and yellow, with paler belly fur. I recognised the familiar shape as a northern brown bandicoot, *Isoodon macrourus*. Further round the lake I saw a long-nosed bandicoot at a distance. It fluoresced white, almost yellow. Neither animal hung around to be photographed. Several microbats flew up to me, but did not fluoresce.

Back on the Ivan on 6 May, the three-cell torch turned the scorpions a bright citrus yellow/green instead of the pale cyan blue I was used to seeing. It also brought out the fluorescence of non-fruiting fungi on logs, turning one patch of whitish fungus bright pink. There were four species to add to the tally of fluorescent fungi, although they were only mildly so. One looked somewhat like the leather *Podoscypha* sp., growing on wood. There was a brownish polypore fan fungus also growing on wood, which with the three-cell torch fluoresced underneath a pale cyan with pink stipes. A different brownish fan fungus had wide-set honeycomb-like



The white areas on this wood fungus fluoresced pink. © Linda Reinhold.

pores underneath that fluoresced pale yellow with the three-cell. The other species was a smallish mushroom growing on the buttress of a tree stump. It was cream/white, and fluoresced with patches of light purple at the base. The fluorescence and colour was distinct with both the 365 and the 395 nm one-cell torches.

Realising that the marsupials were too skittish for fluorescence photography, I spent three days looking for roadkills. On 14 May I found two northern brown bandicoot roadkills by a paddock just west of Millaa Millaa, and a platypus south of Malanda. The fur of the platypus mostly appeared dark/purple as expected under the UV light, but some of it turned moss green, although not brightly so.

The bandicoots were both males with total lengths of about 50 cm. One had a fluorescent dorsum, but the soft belly fur did not fluoresce. It was similar to the live one I had seen at Lake Eacham, but not nearly as bright. Just as the stiff dorsal fur was brindled brown, black and tan, the fluorescence was also multicoloured. The fluorescence was mostly pink, with strands of fur pink most of the way up from the base, with yellow tips. Some strands of fur remained brown or white. Some fur, particularly behind the ears, was dark pink, a strong fuchsia or magenta, appearing almost red. This explains why the live bandicoot I saw appeared orange, but red and yellow as it turned. The dorsum of the other roadkill bandicoot did not fluoresce, yet its normally whitish belly fur fluoresced very bright pink, like fluoro spray paint. With the 365 nm torch, the fluorescence appeared more orange. The skin did not fluoresce in either bandicoot.

***Bandicoot fluorescence.* © Linda Reinhold.**

Summary

I searched for fluorescence on 12 expedition nights during autumn 2020, in tropical rainforest within 55 km of Cairns. Numerous fungi did not fluoresce, including bioluminescent species and some that were pure white.

Species identification of the fluorescent fungi is beyond the scope of my expertise. Photographs were taken with a Panasonic Lumix TZ80 camera, with UV exposures between five and 30 seconds.

There was no obvious pattern to the occurrence of fluorescence in fungal fruiting bodies. The (at least) 14 species seen so far were growing on wood or from the ground, had lamellae or pores, and comprised various shapes of mushrooms or fans. Fluorescent mushrooms could either be inside the dark of hollow logs, or out in the open. In some the fluorescence was a uniform colour; in others the fluorescence was multicoloured, and could encompass the whole structure, or just parts.

Bioluminescence (glowing) in mushrooms was recorded as far back as 1555 by Swedish scholar Olaus Magnus (Glawe and Solberg 1995). Hundreds of years on, scientists are still speculating on the light's ecological function. Perhaps different species employ luminescence and fluorescence in different ways. Fluorescence could simply be a by-product of fungal chemistry.

I hope this article will generate some interest in Queensland's fluorescent forests. If keen naturalists get outdoors with a UV torch, they can build a picture of how widespread fluorescent fruiting bodies are in the fungal kingdom. These observations have shown mushroom fluorescence not only occurs in our forests, but in many more taxa than previously known.

A note on mammals: Although mammalian fluorescence is known from the Americas, the sightings of the fluorescent marsupials at Lake Eacham is the first time it has been documented in Australia. Faint green fluorescence had been noted in strands of the fur of brushtail possums, *Trichosurus vulpecula*, but in New Zealand. The researchers however noted that this could be due to contamination from the possums' fluorescent green urine (ZIP 2018). It is remarkable that such a vivid phenomenon as marsupial fluorescence has been of no interest in Australia.

Just as in this article, New World flying squirrel fluorescence was discovered by accident whilst scanning the forest for fluorescent fungi, lichens and plants with a 395 nm torch (Kohler et al. 2019). Unlike our gliding possums, flying squirrels are rodents. America also has marsupials, called opossums, and it was in these that fluorescence was initially discovered (Meisner 1983). Pine et al. (1985) went on to document the phenomenon in 23 out of 31 opossum species tested. As in the northern brown bandicoots, the skin of the flying squirrels did not fluoresce, but it did in observations of opossums.

All but one of the 114 individual flying squirrels (three species) examined had varying intensities of pink fluorescence over their dorsal and ventral surfaces. Neither the study on squirrels nor opossums found patterns of fluorescence related to age, sex, season or latitude. The squirrels inhabited forests from Canada to Guatemala. One thing they all had in common was their nocturnal or crepuscular habits. Three species of diurnal non-flying squirrels did not fluoresce (Kohler et al. 2019).

The rainforest is already a low-light environment, and the three species of fluorescent marsupials I saw are also mostly nocturnal. The twilight of dusk and dawn is dominated by ultraviolet wavelengths, so it is at these times that fluorescent fur is most likely to be visible to other animals (Johnsen et al. 2006; Cronin and Bok 2016). Even the ultraviolet of moonlight is enough to make scorpions fluoresce (Heathcote 2017).

One of the theories Kohler et al. (2019) suggested was that their flying squirrels may not display fluorescence to stand out, but to blend in to an ultraviolet-saturated fluorescent environment, camouflaged against fluorescing lichen-covered trees. Our ground-dwelling mammals though, are startlingly conspicuous. Fluorescent fur may be widespread within marsupial taxa and, a feature of many Australian forests.

Acknowledgements

Thanks go to my 'shrooming buddy, Lori Lorenz, for his enthusiasm and for sharing in the first four of the night expeditions to the Atherton Tablelands and suburban Cairns. Barry Muir has continued to provide encouragement and mentoring for my fungal exploits, as well as instigating this manuscript. Frances Guard has also provided encouragement, and specimens of luminescent and fluorescent tropical fungi have been collected under her permit, issued by the Queensland Department of Environment and Science. Specimens of fluorescent basidiomes from Malanda Falls (LMRFNQ3 and LMRFNQ4) were collected and sent for lodgement in the Queensland Herbarium. Comments from Patrick Leonard greatly improved the manuscript.

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A note on fluorescent torches

The unbranded 395 nm ultraviolet torches I used also throw enough visible light to see the way along a forest trail on a dark night. Longer wavelengths such as this may also be picked up as regular blue light by a camera. The fluorescence viewed with the 395 nm light was so wildly colourful compared to the rest of the forest that it has proven to be a useful tool. However ultraviolet lights of a different wavelength, such as 365 nm, may be found to be better for more targeted and standardised fluorescence viewing. As noted in the article, results differ slightly with the wavelength and intensity, and that needs to be considered when choosing a light.

Portable black lights are readily available from the internet or from electronics and outdoors stores for $10-$20. Unfortunately, covering a regular torch with red and blue, or purple, cellophane does not have the same effect. Alternatively, filters which cut out the visible spectrum leaving only the ultraviolet can be attached to a camera.

Editor's note:

I bought a 360 nm hand-held blacklight from Jaycar for $16.95. That light is based on a small fluorescent tube so does not produce a beam. I also bought a 395 nm torch from them for $14.95. It uses 3 AAA batteries. Other models are available online, and from scientific supply companies, though you can expect the latter to be more expensive. Torches look to be the better option – DH

Lion's Mane "crab" cakes

Theresa Bint

Mushroom-growing friends recently gave me a bag of Lion's Mane *(Hericium erinaceus)* mushrooms – I know, lucky me! Lion's Mane is reputed to taste a lot like crab (it does a bit, I reckon) and I've had it fried in olive oil with garlic and lime juice before – delicious. This time I had enough to experiment with, so I adapted a recipe for vegan crab cakes. Very moreish!

Ingredients

Lion's Mane mushroom – one large or two smaller, chopped into 1 – 2 cm pieces to make about 1 ½ cups
Olive oil
1 clove garlic, crushed
1 egg
Tablespoon Worcestershire sauce
Tablespoon mayonnaise
Juice of ½ a lemon
Handful chopped parsley

½ small red onion, chopped finely
1 cup breadcrumbs (panko would work well)
Salt
Pepper

Sunflower or peanut oil to fry

Method

Heat oven to 350°C. Put the mushroom pieces in a mixing bowl, add crushed garlic and a couple of drizzles of olive oil. Mix well with your hands then spread on a baking tray. Bake for 10 – 15 minutes until a little browned.

Beat together egg, Worcestershire sauce, mayonnaise, lemon juice and parsley. Stir in onion, mushrooms, breadcrumbs, salt and pepper.

Mix well and shape into small patties. Shallow fry over a low to medium heat until nicely browned. Serve with a squeeze of lemon juice.

Editor's note: I believe you can get vegan Worcestershire sauce and mayonnaise if you want to make it as a vegan dish – DH

Short note on *Neolentinus* sp.
a fungus mentioned in 2017, Vol. 12, Issue 1, *Queensland Mycologist.*
Frances Guard

This species grew on a hoop pine log that I was observing over a number of years, following the chronological sequence of fungi that were decomposing the log. In the midst of all the white rotters that attacked the wood, this was the only brown rotter. It first appeared three years after the tree was killed, and held a small territory for close to four years. It fruited on several occasions. I have recorded this fungus on *Araucaria* species (both Bunya and hoop pines) for many years at Dilkusha Nature Refuge, and have never seen it on other hosts or in other locations.

However, its identity remained a mystery. Its tough brown fruitbodies, serrated gills and hairy appearance are distinctive. In the end, Dr Matt Barrett did the molecular sequence and morphology and concluded it is in the genus *Neolentinus*. *Neolentinus* is in the family Gloeophyllaceae, order Gloeophyllales. Though very different in appearance, it is related to *Gloeophyllum*, another brown rotter. It appears to be a new species. Others in the genus cause brown rot in conifers, one of which is called the “Train Wrecker” because it could cause rot in railway ties that had been treated with creosote!

***Neolentinus* sp on bunya (left) and hoop pine (right) © Frances Guard.**

Neolentinus sp. is one to keep an eye out for when among Hoop and Bunya pines.

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Old Friends in a New Place
Extension of distribution of *Marasmius lebeliae*
Frances Guard

In the natural world, documenting the distribution of flora, fauna and fungi is vitally important to understanding and conserving the biodiversity of our planet. If, for example, a fungal species has been found in only one location, that population is at significantly more risk of loss (even extinction), than a more widespread species. Both natural (fire, drought, etc) and unnatural (e.g. destruction of habitat for housing or industry) processes can cause the loss of one population. Finding a second population is like taking out an insurance policy against that potential loss.

So, when Wayne Boatwright found a collection of what looked like *Marasmius lebeliae* in Tuan Environmental Reserve in March this year, I was delighted. Tuan is in the Sunshine Coast hinterland, Conondale-Kenilworth region and adjoins Maleny National Park. It was purchased by the Sunshine Coast Council for conservation in 2014, adding another 27 hectares to the council’s environmental reserves. Of course, I had to check out the specimen. The colour, size and gill number all fitted. On microscopy, the spores were very long, and then the pleurocystidia were like beads on a necklace, or swollen with a constriction near the apex – typical for this species.

Last year, I published a new, distinctive species of *Marasmius,* which at that time had only been collected on Dilkusha Nature Refuge. I had found it on a number of occasions, in various microhabitats in the 30 hectares reserve. I came to know it as *Marasmius* “cinnamon long spore” for its colour and extremely long, even for *Marasmius*, spores (30-34 µm.) The species also has very sparse gills (7-11), another distinctive feature. There was nothing unique about the substrate and the microhabitats included road verges, regenerating subtropical rainforest, *Allocasuarina* leaf litter and weedy banks. My thinking was that it should have a wider distribution than one property.

***Marasmius lebeliae.* © Frances Guard.**

Although these two locations are probably no more than 30 km apart, the two populations of the fungus would certainly be separate. So, the insurance policy comes into play. My hope is that more populations will be discovered in the near future and the distribution extended much more widely.

(For details of the species description see Fungi of Queensland at www.qldfungi.org.au)
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QMS partnership with "Bugs and Beads" Shop

"Bugs and Beads" is a small business owned by Vivian Sandoval, an entomologist based in Brisbane who works with insect-fungi interactions, and who is also QMS Secretary and Permit Data Collector. She usually sets up a small display table with her handmade fungi jewellery during our monthly meetings at the Herbarium in Mt Coot-tha and kindly donates 10% of her sales to the Society. Due to the COVID-19 restrictions, all our meetings are temporarily cancelled and Vivian cannot reach you to show her products in person, but you can now find her **online!** Please visit her online shop at www.bugsandbeads.com and use the coupon code **QMS2020** to ensure the donations to QMS are correctly earmarked during checkout.

What about buying a mushroom/fungi themed gift for a special person? Or a customised item?
A new collection has just been released!