THE 26TH NZ FUNGAL FORAY, RIVERTON, May 2012

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Introduction

This year's annual NZ fungal foray was held in Riverton, west of Invercargill, from Sunday 6th to Saturday 12th May 2012. Accommodation was based at the Globe Backpackers and the RSA Memorial Club Hall across the road accommodated the display tables, microscopes, driers and other paraphernalia of the foray. Meals were also had at the RSA.

Twenty-three people attended the foray, mostly from New Zealand, one from the USA and one from Germany. In terms of numbers it was one of our smaller forays. Geographically it was the furthest south, second only to the 9th foray held in the Catlins in 1995. Each year we gather in a different place, usually North Island one year and South Island the next.

Getting to the foray proved to be somewhat of an adventure for some of us. Our flight to Invercargill was forced to divert to Dunedin when, just as we were descending for a landing, an unexpected fog came out of the sea and forced a closure of Invercargill airport. We were put on a bus to make the long trip back by land, and then finally by taxi, arriving in Riverton at 12.45am, exhausted and hungry.

The number of records (424, representing 241 taxa) added to the FUNNZ database was a lot less than on previous years, perhaps due to fewer attendees. By way of comparison the 2011 foray had 746 records representing 347 taxa. The most productive site we visited was Lake Monowai with around 90 collections.

Monday 7 May, Lake Hauroko

The following day, Monday 7 May, we headed south along the coast to Lake Hauroko. Common fungi found here included *Fomitopsis hemitephrus*, *Stereum versicolor*, *Cerrena zonata* and *Lycoperdon pyriforme*. Near the lake edge we found fruiting bodies of fly agaric (*Amanita muscaria*) growing amongst mountain beech with not a pine in sight. This fungus associates with *Pinus* but for several years now has been observed invading native forest.

Tuesday 8 May, Cascades Rd

On Tuesday 8 May we took the opposite direction to Cascades Rd in the Longwood Conservation Area. The road was quite rough and full of potholes. We had a reporter with us who later published an article in Southern Rural Life about the foray (Hitchcock, 2012). There were not many fungi about. Off the side of the track we found a nice collection of *Clavogaster virescens*, some quite large.

Further along, growing amongst litter on the ground, were a group of slimy red *Cortinarius peraurantiacus*, an unusual mushroom looking like a small red ball that has such a short stipe it can't be seen or is absent. Growing on wood, *Ganoderma* was very common; one large specimen was half a metre across and was photographed for Southern Rural Life (Hitchcock, 2012). Growing on the same log were several examples of *Fomitopsis hemitephrus*.

On the way back we stopped to take soil samples from under 20 mountain beech trees. Scattered about, the violet pouch fungus *Cortinarius sp.* was common growing on soil. At that time this species was recorded as C. *porphyroideus* but more recent work has determined that there are five similar species and *C. porphyroides* is not the most common.

Back at the RSA a lady told us of some tall mushrooms with conical caps growing near the golf course next to *Eucalyptus*. These turned out to be a large group of *Coprinus comatus* growing on the lawn of a private house.

Wednesday 9 May, 11th NZ Fungal Foray Mycology Colloquium
The first talk was by Roy Halling and he told us about boletes with ornamental spores.

Abstract: Fleshy mushrooms with pores (Boletes) are commonly encountered in forest and woodland habitats obligately associated with certain trees. Among the 30+ genera worldwide, there are a few genera that produce spores sporting some kind of external wall ornamentation. Specifically, *Austroboletus*, *Boletellus*, *Heimioporus*, and *Strobilomyces* are genera with ornamented spores found in the Southern Hemisphere. It is a distinct possibility that *Afroboletus* occurs in Australia, since it has been recently discovered in peninsular Malaysia, but that remains to be seen. Some species of the first four genera appear to be endemics, and some have a very convoluted nomenclature in a bit of disarray. Others are known but are yet to be described while masquerading under north temperate names. Basidiome morphology, spore colour, and type and degree of spore wall ornamentation are used as distinguishing features at the genus and species rank.

One little titbit Roy imparted was of a recently described species, *Spongiforma squarepantsii*, which was named after a cartoon character (SpongeBob SquarePants).

Next came Shaun Pennycook, whose talk entitled "Fungal names — cracking the Code. Everything [?] you wanted to know about ICBN, but were afraid to ask!" described the ins and outs of fungal nomenclature, specifically illegitimate and invalid names.

Suliana Teasdale followed with a talk on her work on genus *Cortinarius*.

Abstract: The development of specific primers for the ectomycorrhizal fungal genus *Cortinarius* was investigated *in vitro* and *in silico* on ectomycorrhizal sporocarps and a variety of soils including exotic species *Pinus radiata* and the subantarctic Campbell Island. The PCR-based protocol was tested on sporocarp and environmental soil DNA to assess non-specific binding. The diversity of *Cortinarius* was determined in ectomycorrhizal host soil to determine the range of amplification within the genus by the primers.

The specificity of the primers for amplifying soil DNA was 100%, while the amplification of sporocarp DNA ranged from 90–95%. The primers amplified DNA from a wide phylogenetic range in the genus *Cortinarius,* with 31 molecular operational taxonomic units (MOTUs) detected from two native and one exotic ectomycorrhizal host forests. While fungal DNA was amplified from the Campbell island soil samples the developed *Cortinarius* primers did not amplify DNA from the non-ectomycorrhizal hosts.

While some non-specific amplification was observed with sporocarps this was not a practical problem in the analysis of environmental soil DNA. While the short variable sequences provide satisfactory DNA barcoding and MOTU separation, it is a limiting factor in using the cort4/cort5 primer pair to construct phylogenies. However, the cost effectiveness of this PCR-based protocol will allow for the assessment of baseline *Cortinarius* diversity from a variety of environmental samples.

Renee Johansen then gave a talk on the evidence for a ‘leaf-only’ clade of xylariaceous fungal endophytes.

Abstract: The *Xylariaceae*, known for their wood rotting ability, are also regularly isolated as leaf endophytes, which are a diverse non-pathogenic group that generally fruits on dead tissue. Some xylariaceous endophytes have been matched with *Xylariaceae* taxa which fruit on dead wood, but others have never been matched genetically to specimens collected as fruiting bodies. Several of these form a monophyletic clade within the *Xylariaceae*, potentially a group with an exclusively endophytic lifestyle.

This study built on previous work to investigate the monophyly of the leaf endophyte only clade, and examined its biology. The Hunua and Waitakere Ranges host *Xylariaceae* in genera common on fallen wood in New Zealand forests, and species in the endophyte clade of interest. *Xylariaceae* fruiting bodies were collected there and sequence data generated from them was compared to that from leaf endophytes. Both ITS and multi-gene trees were generated, which helped name previously collected leaf endophytes and supported the hypothesis that there are *Xylariaceae* solely in leaves. Decomposition experiments testing whether specimens from the ‘leaf endophyte only clade’ retain the same wood rotting abilities as those that have been identified from both leaves and fruiting bodies were less conclusive but still suggested differences between the groups. The existence of an endophyte only clade raises many questions, particularly with regards to the group’s reproduction and dispersal mechanisms.

Peter Johnston told us about pyrosequencing technology as a way of adding to our knowledge of the distribution and diversity of fungi at a site.

David Orlovich reported on research done with Bettye Rees on the genus *Hebeloma*.

After lunch Renee Johansen took the floor again and described her PhD topic.

Abstract: Most healthy plants support a community of arbuscular mycorrhizal fungi (AMF) in their roots and some rely heavily on these obligate symbionts. The fungi provide nutrients to their hosts, and possibly other benefits such as disease resistance, in exchange for photosynthates. Studies using new gene sequencing technologies suggest there are many more AMF species than those currently described and that AMF communities may differ between places, even if the physical environment is the same. This has implications for plant invasion biology, particularly given there is evidence fungal communities can accompany their host plants to new locations and that some species of AMF benefit some plants more than others. This talk will briefly discuss invasive plant/AMF relationships and introduce my PhD topic. I will investigate whether marram grass (*Ammophila arenaria*) changes AMF communities when it invades dunes and whether these changes are likely to negatively impact native plants. My study will provide the first formal look at dune fungi in New Zealand and suggest whether action might be needed to restore AMF diversity following marram invasion.

Max Crowe described his study using molecular methods to investigate the small-scale spatial and genetic diversity of AMF communities associated with the invasive weed *Hieracium lepidulum* in subalpine grassland.

Abstract: As ecosystem engineers plants can be seen to influence the distribution of various organisms, including birds, insects and fungi. In turn these organisms can be involved in

feedback, either positive (i.e., pollination) or negative (i.e., herbivory, parasitism), influencing the distribution of the plants. Arbuscular mycorrhizal fungi (AMF) (Phylum *Glomeromycota*) are a major microbial component of the rhizosphere, however their distributions and diversity are relatively poorly resolved due to their cryptic belowground habitat and their complicated genetic organisation.

A generalist life strategy would help to explain the persistence of the obligately symbiotic AMF in terrestrial systems over the last 400 Mya, however evidence for host-fungus specificity has also been found. This specificity is not necessarily benign; AMF symbioses have been shown to occur along a parasite-mutualist gradient resulting in either positive or negative feedback for the plant host. These findings have led to hypotheses that the proliferation of some invasive plants is facilitated by the positive feedback of particularly favourable AMF, either pre-adapted or co-invasive.

In this study molecular methods were used to investigate the small scale spatial and genetic diversity of AMF communities associated with the invasive weed *Hieracium lepidulum* in a subalpine grassland. The genetic data were also compared with published sequences from New Zealand and abroad to test hypotheses of AMF facilitated plant invasion.

Next Mahajabeen Padamsee gave a talk on her investigation into whether there are New Zealand-only clades of rust fungi.

Abstract: Of the 250 species of rust fungi (*Pucciniales*) recorded in New Zealand, approximately 90 are believed to be endemic since they occur on native plants. Over the last 150 years, the number of non-native rusts has risen sharply from 33 to over a hundred. Although most of these rusts are recorded on non-native plants, several have been also recorded on native hosts. This begs the question, if host jumping has been observed in such a short time, what implication does this have for the origin of endemic rusts, i.e., are they really endemic? If not, then when and from where were the rusts introduced? Recent evidence suggests that many of the nonnative rusts have been introduced from Australia by trans-Tasman airflows, which suggests that historically dispersal from Australia may have influenced the current distribution of rust fungi. A multi-gene phylogeny of New Zealand rust fungi was constructed and when combined with data from non-native rusts suggested the strong likelihood that there are New Zealand-only clades of rust fungi. Preliminary results indicate that several rust fungi may have evolved on closely related hosts in New Zealand.

Jerry Cooper followed with a talk on the New Zealand Organisms Register.

The final talk for the day was from Peter Buchanan, who spoke on the need for conservation of fungi.

Abstract: The need for conservation of fungi is new to most people and to most conservation agencies. Awareness is increasing, however, as evidenced by establishment in 2010 of the International Society for Conservation of Fungi, with founding membership including New Zealanders and Australians. A newsletter produced by the Society has significant contributions from Australasia. Within the global IUCN, there are now five Fungal Specialist Groups, focusing on conservation within each main fungal group. European initiatives in fungal conservation are the most advanced. For New Zealand, fungi have been included in nationwide threat status assessments since 2002, with 60 species listed in the highest threat category. Assessments have mainly addressed macrofungi, as well as obligate species of fungi on threatened plants.

Thursday 10 May, Lake Monowai

On Thursday 10 May we headed northwest to Lake Monowai, while another group went to nearby Borland Lodge. Lake Monowai turned out to be the most productive site so far. *Cortinarius* species were very common. Joining us for the day was photographer Emily Cannan and reporter Anna Chin whose article later appeared in the Otago Daily Times (Chin, 2012). I found one dead standing beech tree totally covered in an orange brown bracket fungus that remained unidentified. Another common fungus that day was *Hypholoma frowardii*, occurring in spectacular groups (Plate 4).

At the edge of the track, growing among moss under manuka, I found several groups of the pagoda leatherbracket (*Podoserpula pusio* var. *pusio*), a unique fungus that has neither gills, pores nor teeth, occurring in New Zealand and Australia. It has a series of horizontal shelves or caps ascending up the stem, getting smaller.

Jerry Cooper had an interesting find that day of a fungus (*Rhinotrichella globulifera*) growing on the dead portions of another fungus (*Hypomyces* cf. *aurantius*), which itself was growing on another fungus (*Fomitopsis hemitephrus*) growing on the standing trunk of a mountain beech (Cooper, 2012).

Friday 11 May, Rainbow Reach

For the last day of foraying, Friday 11 May, we travelled south again, this time to Rainbow Reach, and walked part of the Hepburn Track. Right where we parked the car there were several fruiting bodies of *Amanita muscaria* growing in association with silver and red beech trees.

Walking along the track we saw everywhere the rotting remains of trees sporting a variety of fungi from mushrooms to bracket to woody pore fungi. *Lycoperdon pyriforme* was commonly seen growing on wood, as was *Fomitopsis hemitephrus*, *Ganoderma*, *Stereum versicolor*, *Hypholoma brunneum*, *Bisporella citrina* and *Trametes versicolor*. Common species growing in soil were *Cantherellis wellingtonensis*, *Phellodon spp.* and various *Cortinarius spp*.

By the side of the track, growing from a well-rotted log I found fruiting bodies of the pagoda leatherbracket, this time the endemic variety (*Podoserpula pusio* var. *tristis*). The endemic variety has the caps encircling the stem rather than attached at the side as with *P. pusio.* var. *pusio*.

References

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