THE 27th NZ FUNGAL FORAY, MATAWAI, May 2013

Petra Gloyn

Introduction

The 27th New Zealand Fungal Foray, was based at the The Matawai Hall, Matawai, between Opotiki and Gisborne, from 12-18 May 2013. We had thirty-seven attendees from New Zealand, Australia, Japan and USA.

As a general rule mycologists aren't great on actually eating mushrooms, but this foray got to be dubbed "the fungilicious foray". During the week the following fungi were eaten by different people: *Stropharia rugosoannulata*, *Calvatia gigantea*, *Armillaria novae-zelandeae*, *A. limonea*, *Suillus granulatus*, *Coprinus comatus*, *Agrocybe parasitica*, *Agaricus* sp., and *Tremella fusciformis* (as a pudding, boiled in butterscotch sauce).

Monday 13 May, Te Wera Reserve

We travelled northwest to Te Wera Reserve in the Matawai Conservation Area. The reserve was dominated by red (*Nothofagus fusca*) and silver (*N. menziesii*) beech, with some kahikatea (*Dacrycarpus dacrydioides*) at the entrance and a sub-canopy dominated by wheki (*Dicksonia squarrosa*) and wheki-ponga (*D. fibrosa*). There was a very dense ground tier of crown fern (*Lomaria discolor*), kiokio (*Blechnum novae-zelandiae*), *Asplenium gracillimum* and *Astelia nervosa*. By the track there was a small patch of matata (*Paesia scaberula*), looking larger and more lush than usual in the forest setting.

In terms of fungi *Cortinarius* spp. were abundant and included *C. canarius*, *C. elaiochrous*, *C. mariae*, and a species that had us excited, *C. cycneus*, a white species growing within *Blechnum discolor* and *Astelia nervosa*. One of the purple pouch *Cortinarius* species was also quite common. *Mycena epipterygia* was quite common growing in litter and I found a patch of *Stereopsis hiscens*. Common wood inhabiting fungi were *Armillaria novae-zelandiae*, *Ganoderma* sp., *Neofomitella hemitephra*, *Mycena interrupta* and *Galerina patagonica*. I also found *Barya agaricola*, an ascomycete, growing on an unidentified mushroom.

Figure 1 *Cortinarius elaiochrous*.

Figure 2 *Cortinarius cycneus* growing in *Blechnum discolor*.

Figure 3 *Mycena interupta*. Photo Sapphire McMullan-Fisher.

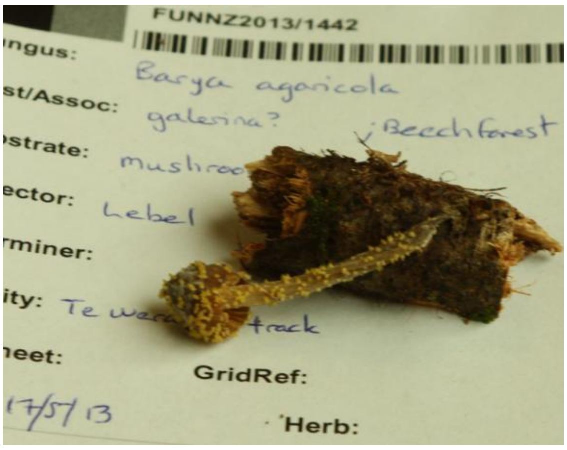

Figure 4 *Barya agaricola***.**

Tuesday 14 May, Whinray Scenic Reserve

Changing direction, we went southeast to Whinray Scenic Reserve, a podocarp-broadleaf forest dominated by tawa (*Beilschmeidia tawa*) and with emergent rimu (*Dacrydium cupressinum*). Wheki and katoti (*Cyathia smithii*) were very common through but wheki-ponga was locally common. Also common in the understorey were tree fuschia (*Fuchsia excorticata*) and *Olearia rani*.

If Monday had been a day for fungi on soil, this was a day for fungi on plants. On a large tawa log I found *Favolaschia claudopus*, *Conchomyces bursiformis*, *Tremella fusciformis*, *Ganoderma* sp., *Exidia* sp., *Hypholoma acutum* and *Auricularia cornea*. Further along the track on another tawa log was *Galerina patagonica* and *Daldinia* sp. *Humidicutis mavis* and several bunches of *Lycoperdon* grew from the ground. On bush rice grass (*Microlaena avenacea*) we found a *Campanella* species and on *Dicksonia squarrosa* a *Mycena*. Other fungi we found included *Pluteus* sp., *Hygrocybe* sp., *Lycoperdon* sp., *Schizophyllum commune*, *Calocera* sp., *Mycena interrupta*, *M. atroviridis* (on *Dicksonia fibrosa*), *M. roseoflava*, *Cerrena zonata*, and the funnel-shaped *Clitocybe clitocyboides*. An interesting find for me was a collection of *Crepidotus fulvibrillorus*. Though *Ganoderma* was very plentiful, *Neofomitella hemitephra* was almost absent (only one mature fruiting body seen). *Australoporus tasmanicus* was also common.

The Dept. of Conservation sign at the top said four hours return but we found the reserve so prolific that it took us seven hours to walk the track (Motu Falls Track) from top to bottom. The reserve is managed by the Whinray Ecological Charitable Trust. North Island brown kiwi (*Apteryx mantelli*) and North Island weka (*Gallirallus australis greyi*) are present in the reserve.

Toward the end of the day children from Matawai School came to the hall to see what we were doing.

Figure 5 *Australoporus tasmanicus*.

Figure 6 *Crepidotus fulvibrillorus*.

Figure 7 *Pluteus* sp.

Figure 8 *Mycena roseoflava*. Photo Sapphire McMullan-Fisher

Figure 9 *Lycoperdon* sp.

Figure 10 *Tremella fusciformis*.

Wednesday 15 May, 10th NZ Fungal Foray Mycology Colloquium – Title, Abstract and Notes

SAPPHIRE McMULLAN-FISHER – Fungi all sorts: macrofungi, ecology, fire and Australia

Abstract: Many people are focused on what species are. I like names but am interested in what species do—so focus on the ecology of species. Over the last seventeen years I have been involved in a number of macrofungal projects across Australia. I will take people on a short tour of these projects highlighting the ecology and conservation issues. This includes the collaborative work I have done on the understanding of fire on Australian fungi. I will include as many pretty images as I can too.

Notes: In Australia forest clearance is still happening while in New Zealand it is being conserved. We need to conserve at least 30% of the original cover. Fire is used as a conservation tool in Australia. Fire burns 5-10% of the soil, so only mycelium below this level will survive. The effects of fire on numerous fungal components of ecosystems are complex and less understood than for their vascular plant counterparts. Negative impacts are likely to occur when habitat and substrates are lost or severely modified. Symbiotic partners are also lost.Fire sensitive fungi inclue those in litter, ectomycorrhizal fungi, mychorrhizal fungi, fungal partners of late seral species and, in the case of rainforests, fungi that are home to this specific environment. There are fire loving fungi though. *Geopyxis carbonaria* (*Pyronemataceae*) is common after fire as are a small group of fungi that are stimulated to fruit after fire, e.g. "stonemaker fungi" - *Neolentinus dactyloides*, *Laccocephalum mylittae*, *L. tumulosum* and *L. sclerotinum*.

At the end of her talk she showed photos of fungi taken on forays in Australia.

SULIANA TEASDALE – Fungal diversity from the canopy and terrestrial soil systems of a southern *Nothofagus menziesii* forest in New Zealand

Abstract: The formation of canopy soil in old growth temperate rainforests has been globally documented. Canopy soil is a term used to describe the accumulation of humus rich soil along canopy branches of woody tree species. Canopy soils can promote growth of traditionally non-epiphytic plants as well as 'canopy roots' from the host. As with terrestrial roots of some species, canopy roots have the potential to host ectomycorrhizal fungi, however this relationship is largely understudied. Old-growth *Nothofagus* (Southern beech) forests are known to accumulate canopy soils, and have also been shown to grow canopy roots that were colonised with ectomycorrhizal fungi. The knowledge of *Nothofagus* canopy fungi is, however, limited to descriptions of ectomycorrhizal genera present. While the presence/absence and abundance of ectomycorrhizal colonisation has been compared between the canopy and terrestrial systems of some host species, to date there are comparisons between the diversity of these fungi. This project aimed to identify and describe differences and similarities of ectomycorrhizal fungal communities in *N. menziesii* canopy and terrestrial soil systems. There are a number of techniques to explore the diversity of fungal communities; the most successful involve environmental DNA investigated by molecular methods. Hyphal ingrowth bags were incubated for twelve months in canopy and terrestrial environments of five *N. menziesii* trees. Fungal ergosterol was extracted from hyphal ingrowth bag samples to calculate biomass. DNA was extracted and amplified, then analysed using terminal restriction fragment length polymorphism (TRFLP). TRFLP profiles represent communities of fungi; these communities were combined to describe richness, evenness, and diversity of the canopy and terrestrial environments. Ergosterol concentrations were not significantly different between the canopy and terrestrial environments, showing that the hyphal growth rates of fungi into the ingrowth bags were not affected by environment. Analysis of community TRFLP profiles from the canopy and terrestrial hyphal ingrowth bag samples show that the TRF richness, evenness and total diversity were not significantly different between the two environments. While total diversity was similar, two ordination analyses show the communities profiles form two environmentally specific groups. Dice's index (0.876) revealed that the two environments share some terminal restriction fragments (TRFs). The two environments share 30 % of TRFs, with 41 % of TRFs being unique to the terrestrial environment and 29 % unique to the canopy. These results show that both environments have similar characteristics, accumulation rates into ingrowth bags, evenness, richness and diversity of species within communities. The richness of the fungi present is similar for the number of unique and shared potential species. These results differ from other canopy fungi comparative studies where total canopy fungal biomass and colonised root-tips was much lower than terrestrial systems. This is the first report showing similarities between characteristics of ectomycorrhizal fungal communities in canopy and terrestrial systems, and showing potentially unique species associated with only canopy roots. Phylogeny and systematics of the sequestrate basidiomycete genus, *Rossbeevera* and allies (*Boletaceae*, *Boletales*).

XINJUE (CECILIA) WANG – Are truffles animal dispersed?

Notes: Truffle-like fungi (TLF) don't disperse spores, they are hypogeous or epigeous and can have stalks. TLF are suggested as important food sources. Their spores remain viable after being digested. They evolved later than mushroom-type fungi, which are dispersed by wind. Higgins et. al. (2003)[i] and Nathan et. al. (2008)[ii] suggested plant seeds can be dispersed by animals, so maybe fungal spores are likely to follow the same route.

TAKAMICHI ORIHARAA – Phylogeny and systematics of the sequestrate basidiomycete genus, *Rossbeevera* and allies (*Boletaceae*, *Boletales*)

Abstract: Sequestrate fungi are highly polyphyletic within *Ascomycota* and *Basidiomycota*, and are characterized by enclosed fruitbodies that make forcible spore discharge impossible (e.g., truffle-like fungi, secotioid fungi). The sequestrate basidiomycete genus *Rossbeevera* T. Lebel & Orihara, as well as *Chamonixia* and *Octaviania*, is closely related to the epigeous bolete genera *Leccinum* and *Leccinellum*. Although they all belong to a monophyletic lineage within *Boletaceae* (*Boletales*), their genus-level relationships have not been resolved. Furthermore, additional collections from East Asia indicate that there are still a number of morphologically related but undescribed taxa.

In this study we conduct phylogenetic analyses focused on *Rossbeevera* and allied taxa based on three nuclear and two mitochondrial DNA loci (ITS, nLSU, *EF-1α*, *ATP6* and mtSSU) as well as precise morphological observations. The five-locus phylogenetic analysis provides a well-resolved phylogeny that clarifies relationships among the target genera. Moreover, ancestral state reconstruction suggests that sequestrate forms have evolved independently either two or three times in this lineage. Our analysis also detected a previously unrecognized sister clade to *Rossbeevera* as well as several new infrageneric lineages within *Rossbeevera*. Accordingly, we will propose one new *Rossbeevera* species and a new sequestrate genus, *Turmalinea* Orihara & N. Maek. nom. ined., that includes four new species and one new

subspecies. The three-locus nuclear phylogeny readily resolved species-level divergence within the *Rossbeevera - Turmalinea* lineage, whereas the phylogenetic signal from the two mitochondrial genes followed geographic distance within each species-level lineage and suggests the possibility of gene introgression between closely related taxa. In the Australasian *Rossbeevera* species, the above-noted comparison documented significant infraspecific biogeographical diversification of the mitochondrial loci but very low differentiation in nuclear loci, suggesting that, phylogenetically, they are merely geographical variants despite the fact that they are morphologically well-differentiated. Additional collections of *Rossbeevera* species from less investigated areas in Australasia will give further insights into their taxonomy and phylogeography.

Notes: Sequestrate fungi (SF) – e.g. *Cortinarius* (*Thaxterogaster*) species – are fungi with fully or partially enclosed hymenia, so they can't disperse spores by wind. SF have evolved many times from other fungal forms. Many unknown genera are still unnamed. SF include *Leccinum*, *Chamonixia* (Asian and Australian spp.), *Octaviania*, and the new genus *Rossbeevera* (closest relatives *Leccinellum*). *R. griseovelutina* is characterised by a bluish to blue green discoloration of the basidiomes. Its intergeneric relationships within the leccinoid clade is unresolved. Several undescribed sequestrate fungi are morphologically similar to *Rossbeevera* and *Chamonixia*. A new group, *Turmalinea*, strongly related to *Rossbeevera*, has four species – *T. persicina*, *T. yuwanensis*, *T. chrysocarpa*, *T.mesomorpha* – and the subspecies *T. mesomorpha* subsp. *sordida*.

TERESA LEBEL – The truffle-like genus *Stephanospora* (*Stephanosporaceae*) in Australasia

Abstract: The truffle-like genus *Stephanospora* is aligned with the resupinate polypore *Lindtneria*, based on the strong similarity in spore structure and ornamentation. Currently four species of *Stephanospora* are recognised worldwide, *S. aurantiaca* and *S. caroticolor* from Europe, *S. chilensis* from South America and Europe, and *S. flava* from Australia, New Zealand and South Africa. All four species have ochraceous, yellow or orange pigmented basidiocarps, lacking a stipe columella, with a fragile, evanescent pileus, a loculate, olivaceous-yellow to orange hymenophore, and similar spores with spines or crests and a basal appendicular corona. Recently, Castellano et al. (2007)[iii] described a new genus and species, *Mayamontana coccolobae*, from Belize. Although the basidiome morphology is similar to *Stephanospora* in pileus colour, size, texture and fruiting habit, the spores differ markedly in the lack of a basal appendicular corona and barely roughened to warty appearance.

In the hopes of gaining greater insight into species diversity and the phylogenetic relationships of *Stephanospora* and *Mayamontana*, herbarium material from Australia and New Zealand, Mexico, Panama, Guadeloupe, Puerto Rico, and New Caledonia, was examined both morphologically and molecularly. Preliminary analyses of molecular data (ITS, LSU and tef-1), suggest that four – five species can be recognised from Australia and New Zealand, *S. flava* and *S. flava forma tetraspora* which is raised to species level, and three new species, 'S. arokai sp. nov.', 'S. ellipsospora sp.nov.' and 'S. robust ornamentation sp. nov.' One new species from New Caledonia '*S.* caledoneae' sp.nov.' was also distinguished. Preliminary analyses of molecular data (ITS, LSU and tef-1), suggest that *S. arokai* is likely a New Zealand endemic which has recently been introduced to Australia (only a single collection currently known from Australia). The lack of available sequences

from *Lindtneria* and other allied resupinate fungi, makes placement of *Mayamontana* difficult.

Notes: *Stephanosporaceae* are thin crusts on rotting wood – e.g. *Cristinia gallica*, *Lindtneria trachyspora*, *Stephanospora caroticolor* and *L. leucobyrophila*. *L. caroticolor* is the type species. Four species are described – *S. chilensis* (South America and Europe), *S. caroticolor* and *S. aurantiaca* (Europe), *S. flava* (New Zealand, Australia and South Africa). All have orange to yellow fruiting bodies. *Mayamontana coccolobae* has fruiting bodies similar to *Stephanospora*, thick walled smooth spores. *S.* 'aorangi' sp. nov. from New Zealand may be endemic. A 'megasporoid' sp. nov. from Puerto Rico has an orange-pink sporocarp. *S. flava*, type species from Tasmania, is looking to be restricted to there.

MAHAJABEEN PADAMSEE – Molecules and morphology: an exploration of morphological characters in the *Psathyrellaceae* using molecular phylogenetic analyses.

Abstract: Molecular phylogenetic analyses of mushrooms have demonstrated that various morphological characters traditionally used to delimit genera are homoplasious. However, molecular phylogenetic analyses can also provide the framework within which the evolution and taxonomic utility of morphological characters can be examined. Evidence is presented for a new genus in the mushroom family *Psathyrellaceae* based on a combination of morphological and molecular evidence. This genus consists of psathyrelloid mushrooms with reddish, smooth spores that typically also possess thick-walled encrusted cystidia. Phylogenetic analyses of nuclear ribosomal large subunit DNA and elongation factor 1-alpha sequences confirmed the placement of this new genus as a unique lineage sister to the ornamented-spore genus *Lacrymaria*. The evolution of certain morphological characters is interpreted and discussed in light of the two sister lineages.

Notes: Psathyrella are the "clean up genus" or LBMs (Little Brown Mushrooms). They break down leaves and other litter and most people leave them. They can have broad or narrow substrate relationships. The traditionally used characters are – dark brown to brownish black or reddish brown spore print, fragile and cruble when picking up, most with elliptical spores, absence or presence of veil tissue (but never have veil remnants).

Clade Gi	**Clade Gii**
Psathyrella	*Lacrymaria*
No sign of veil	Fibrillous veil
Found closely associated with trees	Found on ground/humus
Thick-walled ornamented cystidium	Thin-walled cystidium
Reddish smooth spores	Brown decorated spores
No apical pore	Truncated by apical pore

The proposed name for the new species is *Rhodopsathyrella*, which is in Clade Gi.

VINCENT P. HUSTAD – Geoglossomycetes of Australasia and the Northern Hemisphere.

Abstract: The class *Geoglossomycetes* is among the newest classes of the fungal phylum *Ascomycota* and is currently comprised of one family, *Geoglossaceae*, and fifty species in six genera (*Geoglossum*, *Glutinoglossum*, *Nothomitra*, *Sabuloglossum*, *Sarcoleotia* and *Trichoglossum*). Commonly known as earth tongues due to their terrestrial habitat and morphology, *Geoglossomycetes* are characterized by large, dark, club-shaped, terrestrial fruitbodies. While most species (34/50) have been described from Eastern North America and Western Europe, seven species have been reported from Australasia. Analysis of ITS sequences available on GenBank and sequences obtained through herbarium material indicates Australasian *Geoglossomycetes* species are not conspecific with North American and European synonyms, despite being morphologically identical. This presentation will discuss the current progress and future directions in the assembly of a species-level taxonomic treatment of *Geoglossomycetes*; including cryptic speciation, species complexes and the taxonomic obstacles involved in the modern treatment of this well-studied group of fungi.

Notes: "Earth tongue" fungi have a sterile stipe with parallel internal hyphae, spathulate hymenium, terrestrial habitat and inoperculate asci. The genus *Geoglossum* (type species *G. glabrum*) was first described by Christian Hendrik Persoon (1794).[iv] The *Geoglossomycetes* include *Geoglossum* (22 spp. worldwide, black ascocarps), *Thuemenidium* (purple brown ascocarps), *Sarcoleotia* (4 spp., capitate hymenium, polyphyletic), and *Nothomitria* (3 spp.).

There is a new genus, *Glutinoglossum* (type species *G. glutinosum*).

The *Geoglossomycetes* have a long history of study in the northern hemisphere but not so much in the southern hemisphere. There are 15 Australasian species reported of which 7 species are described. The genus has almost no monophyletic species. It's unknown how spores are dispersed. *Trichoglossum* appears to be polyphyletic. Australian *Geoglossum* species are distantly related to northern hemisphere species. More data is needed.

JERRY COOPER – Sequencing NZ mushrooms – a medley of interesting results.

Notes: Originally from the United Kingdom, his year was Jerry's 12 year attending the FUNNZ forays. He uses forays to learn about New Zealand species. He's looked at 4-5,000 collections and taken 15,000 images, all of which are on the BiotaNZ website. There are names for only about 20% of NZ's estimated 35,000 species of fungi. He gave some examples of data collected from this work and sequencing collections.

Boletus edulis, introduced in Canterbury, has a broad association with *Quercus robur*, *Fagus sylvatica*, *Betula pendula*, *Cedrus atlantica* and *Quercus ilex*.

The introduced *Xerocomellus cisalpinus*, like *B. edulis*, doesn't care what Ectomycchorizal host it has.

In the *Paxillus* genus we have in NZ *P. ammoniaocrescens* and *P.* aff. *involutus* (i.e. not the real *P. involutus*).

The indigenous *Austropaxillus* always occurs in association with *Nothofagus*.

Chalciporus – *C. aurantiacus* is endemic; *C. piperatus* occurs always with *Amanita muscaria*; *C. piperatoides* occurs with *Cedrus atlantica* and *A. muscaria*.

DAVID ORLOVICH – Editing DNA sequences with polymorphic indels to improve sequence quality and phylogenetic analyses.

Abstract: DNA sequencing is an essential and integral part of modern systematics, but direct sequencing of amplified PCR products from mushroom collections can be problematic when the DNA sequences are polymorphic and vary in length within a collection. This can result in electropherograms that have double peaks and are difficult to interpret. Such polymorphism in the internal transcribed spacer (ITS) region can occur in 40% of sporocarp collections, reducing sequencing success considerably. I will demonstrate a workflow for dealing with these sequences that frequently permits a complete sequence read without cloning, significantly improves sequence quality and results in improved phylogenetic resolution.

JERRY COOPER – Naturewatch NZ – Citizen Science portal mark 2.

Notes: In 2005 NZBRN launched Naturewatch NZ, a web app for entering, exploring and exporting species observations. It was initially based on the Swedish Artportalen system. It was created with funding from TFBIS in 2011. NZBRN became a charitable trust. It incorporates eBird, NZBRN, NZPCN, TERRAIN, BiotaNZ, Bioweb (DOC), NIWA (freshwater fish database).

In August 2012 Naturewatch NZ became powered by iNaturalist.org, an open-source project that incorporates Google Maps, GBIF and NZQR. Users can upload photos and ask for identification, challenge or agree with IDs, comment on other observations and follow other users. It is linked to Wikipedia, allows for Life Lists, species lists per place, is phone/tablet away and iPhone friendly. It is much more popular than the old portal. Currently there are 400 active users and 30,000 records since its launch and the growth is currently exponential.

INGA MEADOWS – Chestnut Blight and Ink Disease: A Few Lessons Learned

Abstract: The introduction of the chestnut blight fungus (*Chryphonectria parasitica*) to New York, USA in the early 1900s resulted in the near loss of mature American chestnuts (*Castanea dentata*) in forests of the eastern United States. This iconic tree species once dominated the forest canopy, provided a major source of food for wildlife, and served as a valuable lumber species. One hundred years after the introduction of chestnut blight, The American Chestnut Foundation has succeeded in breeding blight-resistant chestnuts after three decades of work by dedicated staff and volunteers. However, blight-resistant chestnuts planted in orchards and some forested areas began dying at an alarming rate from ink disease, caused by *Phytophthora cinnamomi*. This disease was nothing new as it had already eliminated chestnuts from some parts of the southern end of their geographic range even before the blight fungus was introduced. But, as the trees disappeared from the forests, ink disease disappeared from the minds of pathologists. Not all breeding efforts have been lost—some resources that remain for the chestnut will be presented. This story re-emphasizes some lessons for plant scientists, biosecurity regulators, and forest tree growers.

Notes: Twentyfive percent of the chestnut tree, an iconic species in the USA, is used for lumber (e.g. 100 year old chestnut fence posts are still standing). Chestnuts are food for squirrels, farm stock and people. In 1904 there was a chestnut blight in Bronx Zoo, characterised by cracked wood that encircles the whole stem and the wood dies above. The tree resprouts and become shrubs rather than trees. The blight spread southwest. Inga’s work showed that the Phytophthora species affecting the trees was not *P. cinnamomi* as previously thought but *P. cambivera*.

BEVAN WEIR – A species concept for *Phytophthora* “taxon Agathis” (PTA) — causal agent of root and collar rot of *Agathis australis* in New Zealand

Abstract: Kauri Dieback has been identified as an increasing problem affecting kauri (*Agathis australis*) across the Auckland and Northland regions. *Phytophthora* “taxon *Agathis*” (PTA) has been identified as a causal agent of a root and collar rot of kauri. ‘PTA’ shares a place in *Phytophthora* ITS Clade 5 with *P. heveae* and *P. katsurae*. PTA was originally misidentified as the morphologically similar *P. heveae.* It has been established that PTA has a different oogonial morphology to both *P. Heveae.*

Notes: Kauri grows to 50m tall and 5m diameter, has a lifespan of 600-2,000 years and is found north of 38°S latitude. It has a shallow root system and these are easily damaged. *Phytophthora* is a genus of plant-damaging *Oomycetes* (water molds). A famous example is *P. infestans*, cause of the potato blight that caused the Great Irish Famine (1845-1849).

PTA causes gummosis. There is a strong correlation between kauri dieback and disturbance factors (e.g. track building, pig rooting). There are environmental stress factors also (drought, soil compaction, water-logging). In 2009 the PTA name was given when it was discovered to be morphologically distinct from *P. heveae*, thought originally to be the cause of kauri dieback. Data suggests there is good support that PTA is a new species, *P. agathidicida* ined. Its origins are still unknown.

PETER JOHNSTON – Genetic diversity of *Botrytis* in New Zealand vineyards.

Abstract: Genetic diversity of *Botrytis* in New Zealand vineyards was surveyed over the period 2008 to 2012 from five wine growing regions. Isolates were gathered from symptomless flower buds immediately prior to flowering and, from the same vines, from diseased fruit at harvest.

Two species were found, *B. cinerea* and *B. pseudocinerea*. All of the *B. pseudocinerea* isolates detected were fenhexamid resistant. The distribution of *B. pseudocinerea* was structured geographically, common in the two Auckland vineyards sampled, infrequent elsewhere. However, even in the Auckland vineyards, it was rarely isolated from diseased fruit.

The presence of the Boty and Flipper transposons were assessed using a PCR-based method. Isolates with all four transposon states (Boty only, Flipper only, both Boty and Flipper (transposa isolates), no transposons (vacuma isolates) were found for both species. Both of the vineyards sampled in the Auckland region had relatively high numbers of Flipper-only isolates in samples taken at flowering; both of the vineyards from the Waipara region sampled had relatively high numbers of Boty-only isolates in samples taken at flowering. The large majority of isolates collected from diseased fruit at harvest contained both transposons.

The isolates collected in spring represent the total genetic diversity of *Botrytis* associated with fruit in the vineyard, whereas the isolates collected in autumn comprise only that part of the *Botrytis* population that causes disease at harvest. Our results suggest that *B. pseudocinerea*, and isolates with one or both of the Flipper and Boty transposons missing, are less capable of causing disease than *B. cinerea* or of isolates with both transposons present. Pilot scale pathogenicity testing using detached grapes in the laboratory, appear to confirm that transposa isolates are more pathogenic. *Botrytis* is known to form both latent and truly

endophytic infections on some hosts and it is likely that the part of the population not associated with diseased fruit at harvest remains present in the vineyard, on fruit in symptomless infections.

Two distinct clades were resolved within *B. pseudocinerea*. Isolates in both clades share the fenhexamid-resistant phenotype, both have a similar geographic and regional distribution within New Zealand, and we accept both as *B. pseudocinerea*. Only one of these clades has been reported from Europe from grape. However, based on matching hsp60 sequences, the second New Zealand *B. pseudocinerea* clade could be the same fungus reported as an endophyte of *Centaurea* from Europe.

Phylogenetic diversity within *B. cinerea* in New Zealand was similar to that known from Europe, including the occurrence of isolates that appear to match genetically the recently reported *Botrytis* 'Group S'.

The taxonomic implications of this genetic diversity will be discussed.

Notes: The NZ wine industry is our eighth most valuable export and *Botrytis*, being fungicide resistant, is the industry's biggest disease problem. The genetic diversity of *Botrytis* in NZ vineyards is unknown. Seven vineyards were sampled between 2008 and 2012, resulting in 2500 isolates. New Zealand has two species – *B. cinerea* and *B. pseudocinerea*, the latter frequent only at Auckland vineyards, and sampled less at fruiting. B. cinerea is not present outside of Europe except one report in South Africa – why? What drives regional and seasonal differences in New Zealand?

CARL SOOP – Interesting Cortinarii found in 2013.

Notes: The South Island was very poor and so were many places in New Zealand, except Nelson Lakes, where he forayed with Pat Leonard. They found lots of the former genus *Cuphocybe*. There are six described species and it is endemic to the southern hemisphere, It lacks the veil present in *Cortinarius*. Peintner et. al. (2001)[v] showed it to be in *Cortinarius*. It lacks a Cortina but there are veil remnants all down the stem. He described 2013 to be the year of Cuphocybe with 3 "new-old" species found again and the consolidation of several bihemispherical clades (Defibulati, Scauri).

That evening several people went foraying for bioluminescent fungi and found Mycena spp. glowing in the dark.

Thursday 16 May, Wairata Forest Farm

Some people went to the Arboretum, others to an area of beech forest. I went with a group to Wairata Forest Farm, which consisted of kanuka (*Kunzea ericoides*) forest with emergent locally common kahikatea. The understorey consisted of wheki, *Paesia scaberula*, blackberry (*Rubus fruticosus* agg.), putaputaweta (*Carpodetus serratus*) and occasional wheki-ponga. At the start of the walk *Hypholoma* was very prolific on an old kanuka log and buried roots; it was everywhere. Other species present included *Laccaria* sp., *Tricholoma* sp., *Auricularia cornea* and *Favolaschia claudopus* on kahikatea wood, several *Leratiomyces erythrocephalus* in kahikatea litter, a couple of *Gymnopilus* on kanuka wood and a group of *Mycena parsonsii* and a single *Lentinellus* on wheki.

We had lunch by the Wairata River running through the owners' property, and afterwards went back to their house to pick up a collection of ascomycetes growing on hazel (*Corylus avellana*), which they thought might be causing dieback of their trees. There was a lot of woody debris about with a variety of fungi growing on them including *F. claudopus*, *Daldinia* sp., *Cerrena zonata*, *Tremella vesiculosa* and a single fruiting body of a *Polyporus* growing on cherry (*Prunus sp*.).

Figure 11 *Mycena parsonsii* growing on *Dicksonia squarrosa*.

Figure 12 *Leratiomyces erythrocephalus* compared to a *Passiflora* berry lying above it.

Those who went to the Arboretum found several species that hadn't been recorded in NZ before including an *Amanita* and a *Russula*. From the Arboretum also was a collection by Maj Padamsee of the toxic exotic species *A. phalloides*, which went through to the national herbarium collection. During the day the Gisborne Herald came by to do an article on the foray.

Figure 13 *Amanita phalloides*.

Figure 14 *Russula cyanorantica*.

Friday 17 May, Papata, Rakauroa and Te Wera Reserves

Our first stop was Papata Scenic Reserve, a very small reserve dominated by tanekaha (*Phyllocladus trichomanoides*) and *Weinmannia silvicola*. It was very dry and we didn't stay long. There was a *Xylaria castorea*, *Daldina* and another species in the *Xylariales*.

The next stop was Rakauroa Scenic Reserve, a tawa/broadleaf forest with emergent rimu. We saw nice displays of *Mycena epypterigia* and *Crucibulum simile*. There were slippery, moss-covered rocks to traverse in crossing a stream so we decided once again to move on.

We stopped along the Te Wera Road for a brief fossick without finding much before our final stop at Te Wera Reserve. Here we found lots of *Cortinarius*, two fruiting bodies of *Hericium novae-zelandiae*, *Ganoderma* sp., *Hypholoma brunneum* and *Chlorociboria* sp.

Back at the hall there was a lovely collection of *Gloeocantharellus novae-zelandeae*.

School children from both Motu and Matawai Schools came to the hall that day.

Figure 15 *Xylaria castorea*.

Figure 16 *Gloeocantharellus novae-zelandeae*.

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[ii] Nathan, R., Schurr, F., Spiegel, O., Steinitz, O. (2008) "Mechanisms of long-distance seed dispersal." *Trends Ecol. Evol.* 23, 638-647.

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