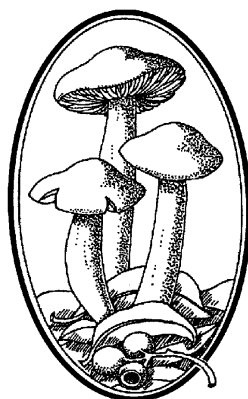


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Front cover: **Plate 1.** Royal Worcester plate, *Cortinarius* 8A by W. Hart (after P. Clarke). © Powerhouse Museum.

A COMPARISON OF THE ENDOPHYTIC FUNGI FROM LEAVES OF *BANKSIA INTEGRIFOLIA* AT THREE SITES ON THE EAST COAST OF AUSTRALIA

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Abstract

Fungi were isolated from healthy leaves of the xeromorphic shrub *Banksia integrifolia* at two locations from each of three sites in New South Wales. From a total of 2,399 isolates, eleven common species were found at each site. Of the eleven species, the seven that remain unidentified appear to be specific endophytes of the host species. Most of the remaining species were rare being found at only one site. While more detailed sampling may indicate a wider array of potential endophytes, many fungi appear to be occasional colonists of the host plant.

Introduction

A range of fungi exists within plants (Farr *et al.* 1989, Petrini 1991, 1996). The function of most leaf-borne fungi remains unclear: some are pathogens, while others remain asymptomatic and are referred to as endophytes. Endophytes live asymptotically within healthy plants, for part or all of their life cycle (Petrini 1991). They can be ubiquitous, host specific or even tissue specific (Petrini 1996). The endophyte is dependent on the plant for its nutritional and environmental requirements (Petrini 1996). Some specific endophytes induce changes in host plant physiology, protect the host from pathogens and deter herbivores (Clay *et al.* 1985, Clay 1988, Clay *et al.* 1993, Tudzynski 1997). Thus the maintenance of a population of endophytes may be of ecological advantage to the host plant (Parbery 1996).

Variation in the diversity of fungi colonising a specific host may be associated with location, climate and leaf age. Plants removed from their natural habitats are exposed to an unpredictable source of inoculum. Thus the incidence of colonisation by endophytes may be much higher in areas where the plants are endemic than where introduced (Fisher *et al.* 1993). Species abundance in endophyte assemblages may differ between sites (Rollinger & Langenheim 1993). Climatic conditions, including air pollution, influence colonisation (Asai *et al.* 1998, Petrini 1991). The dynamics of the interactions in endophyte communities is also dependent on the season (Cabral 1985). Increased frequency of colonisation and species richness in a host plant are related to foliage age. The increases probably result from increased exposure to propagules (Bertoni & Cabral 1988, Fisher *et al.* 1986, Stone 1987). Thus to study the dynamics of communities of endophytes it would be necessary to sample both new and old leaves from endemic plants across their natural habitats.

Much of the information currently available on endophyte function in plants is based on research on grasses. Examination of endophyte assemblages of perennial plants, especially Australian trees and shrubs, is less well developed. Perennial plants may harbour a diversity of endophytes. Plant species growing on mineral poor soils are likely to utilise efficient mechanisms to deter or reduce herbivory (Coley *et al.* 1985), some of which may be microbial. Selection of plants from their native habitat should also result in the recovery of an endophyte population adapted to the host and habitat. Thus this study examines the diversity of endophytes of the xeromorphic plant species *Banksia integrifolia* L.f. at one time across a broad geographic range. The aim was to determine which fungi were found in this host and to detect geographic patterns in the distribution of the fungi.

Materials and Methods

Banksia integrifolia was chosen because it is native to Australia (Sedgley 1996, Taylor & Hopper 1988) where it is found in very poor sandy soils (Johnson & Burchett 1996) along the east coast of Australia. The leaves are xeromorphic. Stomata are protected by lignified hairs in deep crypts on the abaxial surface. New shoots mostly grow from December to March, though limited shoot growth continues throughout the year (Taylor & Hopper 1988). Leaves are long-lived. Little is known of the fungi found in the leaves (see for example Crous *et al.* 2000).

Samples were collected from three heathland sites in New South Wales: Sydney, the Central Coast and the North Coast, each consisting of two proximate locations. The two locations within the city of Sydney, South Head (33°51'00"S 151°17'00"E) and Nielsen Park (33°51'00"S 151°16'00"E), consist of remnant endemic vegetation. The mean daily maximum temperature in Sydney is approximately 21.5°C and the mean annual

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rainfall is 1220 mm. The locations of the Central Coast site Copacabana (33°29'30"S 151°26'00"E) and Terrigal (33°26'30"S 151°26'30"E) are adjacent to a moderately populated coastal strip. The mean daily maximum temperature is approximately 21.5°C and the mean annual rainfall is 1240 mm. The locations of the North Coast site, Corindi Beach (30°02'00"S 153°12'00"E) and Red Rock (29°59'00"S 153°13'00"E) are located on a rugged coastline and the area is sparsely populated. The mean daily maximum temperature is approximately 23.2°C and the mean annual rainfall is 1700 mm.

Three old and three young healthy leaves were randomly selected from ten trees at each location. Leaves were put into plastic bags and placed in chilled containers for transport to the laboratory where they were stored at 4°C. Leaves were processed within 48 hours of collection. Sampling commenced in July 1999 (mid winter). Collection at each site was separated by one week to allow for processing.

Entire leaves were cut into 12 segments and then surface sterilised. Following preliminary experiments to determine methods to remove epiphytes, the following procedure was used. Leaf segments were placed in sodium hypochlorite (2% Cl), which was in turn placed in a vacuum flask. The pressure in the container was reduced for one minute, during which time bubbles formed on the leaf segments. When pressure was returned to normal, the sterilising solution was presumably pulled into the stomatal crypts. The segments were further soaked in the NaOCl solution for five minutes, and then rinsed in sterile deionised H₂O. Segments were then placed on PDA containing antibiotics (3_10⁻⁶ g l⁻¹ tetracycline, 5_10⁻⁵ g l⁻¹ streptomycin sulphate), with all segments from one leaf per plate. Hyphae emerging from segments were subcultured onto fresh PDA, and the remnant segment discarded to avoid contaminants emerging from the leaf segment. All isolates that emerged within four weeks were subcultured. All subcultures were grown at 23°C, and where necessary under blue light to induce sporulation (Linden *et al.* 1997, Petrini & Fisher 1988). The isolates were identified where possible and otherwise grouped into morphological species (Bills 1996, Christensen 1969).

The data were analysed using three-way ANOVA to compare age, site and location.

Results

Of the total of 2399 isolates, 490 were from Sydney, 750 from the Central Coast and 1159 from the North Coast. The isolates comprised 96 species, of which 80 were from old leaves, 42 from young leaves, with 26 from both. Of the 26 species, 11 were common to the three sites though not necessarily in old and young leaves at each site. They represented 90 per cent of the isolates (Table I). No other species were found at each site. Twelve fungi were isolated from two sites, totalling 89 isolates (3.7% of total), with a maximum of only eight fungi at a particular site. The remaining fungi were mostly slow growing or late emerging isolates. Some fungi were not subcultured successfully: 18 of the emerging fungi, 15 from old leaves, did not grow following subculture. Fungi did not emerge from 12 young leaves or from one old leaf.

Data on only five of the 11 common species demonstrated homogeneous variance after transformation using log (X + 1) (Zar 1996): *Colletotrichum* sp. 1, *Nigrospora sphaerica* (Sacc.) Mason, *Pestalotiopsis* sp., Fungus 5 and Fungus 28. Between 43 and 309 isolates of *Colletotrichum* sp. 1 were obtained from sites, and age of leaf was unimportant. *Nigrospora sphaerica* and *Pestalotiopsis* sp. were more evenly distributed with reference to age, site and location. Fewer isolates of Fungus 5 were found in Sydney collections ($p < 0.05$), and colonisation of leaves increased with age. Few isolates of Fungus 28 were obtained from all sites and ages of leaf.

Discussion

The aim of this study was to establish any patterns in the distribution of endophytic fungal species from the leaves of *B. integrifolia* across a broad geographic range. The ultimate intent is to isolate widespread fungi that may be specific to *B. integrifolia*. Of the 11 species universally present, *Aureobasidium pullulans* Viala & Boyer, *Epicoccum purpurascens* Ehrenb. and *Nigrospora sphaerica* are widely associated with plants (Farr *et al.* 1989) and are thus nonspecific. Species of *Colletotrichum* may be either host specific or generalist (Farr *et al.* 1989), and some species cause disease. As all samples were isolated from apparently healthy leaves, *Colletotrichum* fulfils the requirement of an endophyte, living at least part of its life cycle asymptotically within healthy tissues. The fungus was isolated from both old and new leaves with a trend towards more isolates from young leaves, possibly due to the increased number of other fungi in older leaves. The blastomycete is possibly an epiphyte. Yeasts are common epiphytes on a wide range of plants including this species, though some are isolated from vascular tissues as well. The remaining five of the 11 species are unidentified, potentially host specific and warrant further investigation.

Further species isolated from two of the three sites are potentially host specific. Species isolated from the North Coast and either Sydney or the Central Coast were infrequent and slow to emerge. It is conceivable that slow growing species are present at all sites, but masked by the emergence of faster growing fungi. Some fungi isolated from Sydney and the Central Coast also emerged late and at low frequencies. These latter fungi may be geographically specific. An examination of the endophytes of other plant species at the sites would be required to determine if the fungi are located within a geographic range, or general within species within a geographic range.

The approach to isolation may have influenced the results. Use of a severe surface sterilisation, while removing most epiphytes, may have also removed some vascular endophytes. In this experiment leaf segments were discarded as fungi were subcultured from them. The purpose of this approach was to prevent fast growing fungi from overgrowing the plate and to prevent any other fungi present in the leaf segments contaminating the cultures. The approach selects for rapidly emerging and fast growing isolates and masks slow growing fungi. The approach also possibly reduces the potential for some fungi to form fruiting structures. Different fungi emerged from some leaf segments indicating that segments may be occupied by more than one fungus. Fungi that emerge late, and these were usually also slow growing, may have been discarded prior to detection.

Not all fungi that emerged from segments were successfully cultured. Either the hyphae were destroyed as they were isolated, or they were species that require a specific substratum for growth. Of the 18 isolates that did not grow in culture, 15 were from old leaves. Clearly, the host is an appropriate substratum for growth, and the use of leaf fragments in culture is warranted in further investigations. However, their infrequent appearance indicates that the fungi were rare and may be ignored for the present.

The fungi were isolated at one time of the year, chosen to reflect potential newly arrived endophytes and more mature colonists. This approach does not indicate if the population changes with time or if the endophytes are interacting with one another. Further, by using large leaf fragments and discarding the fragment as soon as an isolate emerged, slower growing isolates and less competitive fungi were masked. Techniques for detecting and culturing these fungi need to be refined.

Table 1: The total number of isolates of eleven common endophytes found in young (Y) and old (O) leaves.

FUNGUS	SOUTH HEAD		NIELSEN PARK		COPACOBANA		TERRIGAL		CORRINDI BEACH		REDROCK		TOTAL
	Y	O	Y	O	Y	O	Y	O	Y	O	Y	O	
<i>Colletotrichum</i> sp. 1	33	23	87	115	54	36	31	12	194	115	168	87	955
<i>Nigrospora sphaerica</i>	5	22	3	5	2	13	2	19	11	16	5	33	136
<i>Pestalotiopsis</i> sp.	0	12	0	3	1	5	0	0	5	9	6	17	58
Ascomycete A	1	6	3	1	51	187	17	162	64	145	42	96	775
<i>Aureobasidium pullulans</i>	7	3	2	1	2	2	9	5	1	1	1	7	41
<i>Colletotrichum</i> sp. 2	3	2	0	0	5	11	0	0	9	19	2	6	57
<i>Epicoccum purpurascens</i>	0	1	0	1	7	0	0	1	1	2	2	1	16
Sterile brown mycelium	4	8	8	10	0	3	13	9	4	2	2	3	66
Sterile crusty mycelium	0	0	3	4	1	0	0	0	1	0	0	0	9
Blastomycete	5	6	2	3	4	1	3	1	0	1	0	0	26
Ascomycete B	0	1	0	0	2	2	2	3	0	3	5	9	27
Total	58	84	108	143	129	260	77	212	290	313	233	259	2166

The aim of this study was to detect geographic patterns in the distribution of fungal endophytes of *B. integrifolia*. Eleven endophytes were isolated from leaves of the host plant, of which four appear to be ubiquitous. The remaining seven species were also common in *B. integrifolia* and widely distributed. Their distribution in other plants and plant parts remain to be determined. Geographic patterns were not detected among the remaining fungi because they were rarely isolated. In future studies, the endophytes need to be identified; this will probably involve molecular markers to distinguish each fungus due to the difficulty in obtaining fruiting

structures. We also wish to determine whether the fungi are specific to *B. integrifolia* and whether some of the specific endophytes play a role in plant interactions with herbivores.

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AUSTRALIAN MUSHROOMS ON HAND PAINTED ROYAL WORCESTER PORCELAIN

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Abstract

A short history of the Royal Worcester Porcelain Company is provided. Mushroom designs for painting on porcelain by the Australian artist Phyllis Flockton Clarke are discussed, as is the series of plates and teawares produced for the Australian market and painted with these designs.

A short history of the Royal Worcester Porcelain Company

The Worcester Porcelain factory was established on 4 June 1751 in Worcester, England by a Deed of Partnership between Dr John Wall and a group of fourteen other local businessmen. The factory was formed for the purpose of acquiring the moulds and equipment of the Bristol porcelain factory owned by Benjamin Lund and William Miller, and to manufacture porcelain using soapstone mined in Cornwall, the licence for this having also been acquired from Lund. (Barrett 1966.)

At the time when the making of porcelain first began at Worcester, there existed no English-made china that could be relied upon to stand up for long to regular usage. The pastes of Chelsea and Derby were apt to crack and the china of Bow to chip badly. All were liable to crazing of the glaze especially when it was subjected to the alternate expansion and contraction caused by contact with hot fluids. This made the advent of the soapstone porcelain of Worcester, with its ability to resist hot water without cracking and crazing, a notable technical advance (Barrett 1966). This allowed the company to meet the demand for useful china. Some of the first Worcester wares were decorated using an underglaze blue. Blue painting was used for domestic wares by nearly all the eighteenth century factories (Barrett 1966), and Worcester soon established a reputation for having the finest craftsmen in the country for blue and white wares (Wavecrest Studios 2000). The use of underglaze blue decoration not only allowed the wares to be sold at a low price, but also offered the advantage that, being protected by the glaze, the decoration was more durable and permanent than that of enamelled colours (Barrett 1966).

The Worcester factory was the first to produce porcelain decorated with transfer prints on a large scale, early transfer prints being monochromes. The origin of this process is controversial, with some writers believing that the person who first applied it to the decoration of porcelain was the great engraver Robert Hancock who joined the company from Bow in 1756. (Royal Worcester 2000.) Although a smaller part of the early production, the art of painting on the glaze in enamel colours was also mastered.

In the 1760s, large amounts of Worcester porcelain were decorated by a London porcelain painter, James Giles, in glowing enamel colours, and were then gilded. The closure of the Chelsea factory in 1768 led to the arrival at Worcester of many skilled craftspeople with new ideas and techniques. The rococo influence was sustained, and wares began increasingly to be decorated with the famous 'fish scale' pattern. Vases decorated in this way, except for blank reserves, were delivered to James Giles to complete, often with birds and flowers. (Wavecrest Studios 2000.)

In 1776 one of the founders of the company, Dr Wall, died, followed in 1783 by the managing partner William Davis. Worcester's London agent, Thomas Flight, purchased the company for the sum of £3,000 to provide occupations for his sons, Joseph and John (Barrett 1966). The Flights encouraged new ideas, particularly elegant decorations in dark blue and gold, the forerunners of the Regency style. With the transfer of ownership, the chief decorator, Robert Chamberlain Sr left the company eventually to form his own rival works. In August 1788, King George III, accompanied by Queen Charlotte and the Duke of York visited the factory, and they were so impressed that the King granted the company the prestigious 'Royal Warrant' as 'Manufacturers to their Majesties' (Barrett 1966). The word 'Royal' was inserted into the name of the company (the Royal Worcester Porcelain Company), and a showroom was opened in London, both features being retained to this day (Wavecrest Studios 2000).

By 1790, the Flight manufactory was well established and, despite technical and other difficulties, was able to compete successfully with the then flourishing Derby factory for the patronage of Royalty and of influential people in Court circles (Barrett 1966). John Flight died in 1791 at the age of 25, and in 1793 Martin Barr was made a partner, the firm becoming Flight and Barr. His son Martin Barr Jr also joined the firm. When Martin Barr Sr died in 1813, the name of the firm was changed again to Flight, Barr and Barr.

In 1814, a highly talented ceramic painter by the name of Thomas Baxter moved to Worcester, having been forced to move by ill health from the unhealthy air of London. He established a ceramic painting school and created a great many classic images for Flight, Barr and Barr, including many of the famous pieces featuring feather and shell designs. Craftsmen were encouraged to regard their work as jewellery and, by paying them by the hour instead of by the piece, it was ensured that every possible pain was taken in the search for excellence. (Wavecrest Studios 2000.)

Not surprisingly, the Flights and Barrs were responsible for the creation of some of the finest porcelain ever made in England, and it was sought by Royalty and the aristocracy all over Europe. As Henry Sandon, the former curator of the Dyson Perrins Museum at Worcester says 'Today it is avidly collected all over the world and one only has to look at the fine moulding, the superb painting and the rich deep colours to appreciate why this period of English ceramic making is universally respected' (Sandon 1973).

With the death of Joseph Flight in 1840, the Flight, Barr and Barr company was merged with its former rival, the Chamberlain porcelain works which had been started by its former employee Robert Chamberlain (Barrett 1966). This company had flourished by providing tea, dinner, and dessert services, for the nobility, gentry, and the increasingly wealthy middle classes. There was, however, little design development, and the merger was not a happy one. In 1852 the Chamberlain era was followed by that of Messrs. Kerr and Binns, and the new owners re-established the old Worcester quality with new styles, bodies, and glazes. Their new Ivory porcelain, a form of unglazed parian, attracted the attention of Queen Victoria and Prince Albert, who commissioned an important royal dessert service to be painted by Thomas Bott in the newly developed Worcester Enamels. (Wavecrest Studios 2000.)

During the reign of Queen Victoria, the company achieved great success. Manufacturing was consolidated at the current factory site in 1840 and following a program of major modernisation, in 1862 the factory changed its name to The Worcester Royal Porcelain Company (Royal Worcester 2000). The Managing Director, Richard William Binns, was to lead the company until the end of the century and under his control the number of employees was increased from 80 to 800 (Royal Worcester 2000). During the second half of the nineteenth century, Royal Worcester took great steps to develop new decorative skills and techniques. Apprenticed at fourteen years old, boys were instructed in anatomy and botany and were encouraged to study old master paintings. They were taught skills such as gilding, ground laying, printing and painting before specialising in one area. For the remainder of the nineteenth century, the company expanded its reputation worldwide, with Royal Worcester being successfully displayed at major international exhibitions (Royal Worcester 2000).

Australian themes

At the beginning of the twentieth century, Federation led to an increased interest in Australian images. Australian flora and fauna motifs were popular in jewellery, wood carving, ceramics and other decorative arts. Royal Worcester produced a series of plates and tea wares around 1912–1929, featuring uniquely Australian themes of flora and fauna. Capturing the new spirit of nationalism and with an eye to capitalising on a new commercial venture, four well-known Australian retailers and jewellers commissioned a variety of local artists to provide designs with Australian themes, which they then sent to England. They were Flavelle Brothers of Sydney, Flavelle Brothers and Sankey of Brisbane, Prouds of Sydney and Thomas Webb of Melbourne, who, in conjunction with Royal Worcester in England, encouraged this new idea especially for the Australian market. The project was also encouraged by Richard Baker, the then Curator of the Technological Museum in Sydney (now the Powerhouse Museum). (Dowe 1998.)

Plate 2. Royal Worcester plate, *Psalliota* [*Agaricus* sp.] 8B by W. Hart (after P. Clarke). © Powerhouse Museum (upper left).

Plate 3. Royal Worcester plate, *Lepiota dolicaulis* [*Macrolepiota dolichaula* (Berk. & Broome) Pegler & R.W. Rayner] 8C by W. Hart (after P. Clarke). © Powerhouse Museum (lower left).

As well as a series on flowering gums, waratahs, Christmas bells, flannel flowers and fuchsia, mushrooms were also used to form delicate centre motifs. These mushrooms are the only ones to be found on hand painted Royal Worcester porcelain. Phyllis Flockton Clarke, an Australian artist, was commissioned to provide the original paintings of the mushrooms.

The artist Phyllis Flockton Clarke

Phyllis Flockton Clarke was born at Charters Towers, Queensland on 18 January 1891 and died on 13 December 1989. She married Dr David North OBE, a scientist at CSR. They had three daughters, including one set of twins. Phyllis was the niece of Margaret Flockton, a well known natural history artist at the Royal Botanic Gardens and National Herbarium in Sydney. Margaret Flockton was the middle sister of three: Dora, Margaret and Phoebe (P. McWilliam pers. comm.). Phoebe Flockton's daughter Phyllis Clarke inherited the artistic talents of her aunt Margaret.

It was while on holiday in Fiji at the age of 19 that Phyllis was told of a position at the Australian Museum in Sydney. She returned to Australia to apply for the position which she won. (J. Woodhouse pers. comm.). Phyllis was an experienced painter of mushrooms. She was commissioned many times by Sir John Burton Cleland to provide paintings of mushrooms and other fungi for him while he worked in Sydney as the Principal Government Microbiologist in the Central Bureau of Health, Bureau of Microbiology. These paintings were used in his papers with Edwin Cheel between 1914 and 1923 and in his book *Toadstools and Mushrooms and Other Larger Fungi of South Australia, Parts I & II* (1934 and 1935). Many are now housed at the Botanic Gardens and State Herbarium of South Australia. A number have been reproduced in *Larger Fungi of South Australia* (Grgurinovic 1997). Phyllis Clarke has four mushroom species named in her honour, *Lactarius clarkeae* Cleland (1927), *L. subclarkeae* Grgurinovic (1997), *Mycena clarkeana* Grgurinovic (1997, Plate 17a) and *Volvariella clarkeae* Grgurinovic (1997, Plate 23b).

The series of plates

The Museum of Worcester Porcelain has four coloured drawings of mushrooms on wax tracing paper in its archives. These are reproduced in Plates 6–9 and can be seen to have badly discoloured. They are most likely to be factory recordings, traced from Phyllis Clarke's original watercolours (W. Cook *in litt.*). The whereabouts of the original watercolours is unknown.

The Powerhouse Museum, Sydney has five plates in the mushroom series. The fanciful mushroom plates are painted to suggest a child's innocence in a woodland world—they are accurate but imaginative. Four of the plates have an acid etched Quaker grey (with self-coloured pattern) and gilt border surrounding the central, hand-painted scene and were all painted by William Hart (Plates 1–4; Plate 1 on journal's front cover; Plate 4, p. 109). The other one (Plate 5, p. 109) has a narrow gilt border embossed with grapevines and was painted by Reginald Austin. The plates with Quaker grey borders are labelled '*Cortinarius* 8A' (Plate 1), '*Psalliota* 8B' (Plate 2), '*Lepiota dolicaulis* 8C' (Plate 3) and '8D' (Plate 4). ('8D' is also a species of *Psalliota*, now known as *Agaricus*.) These four plates have the onglaze handwritten pattern number 'W9762' in grey ink.

It is likely that these mushroom plates were trial pieces and never manufactured in volume. The entries relating to all of the floral series are quite detailed and listed in the indices held at the The Museum of Worcester Porcelain. The mushroom series is not included in any of the lists. The fact that the existing plates have the series numbers written on them also suggests that they were trial pieces. (W. Cook *in litt.*)

Plate 6. Factory record, *Cortinarius* 8A. © The Museum of Worcester Porcelain, The Dyson Perrins Museum Trust (upper right).

Plate 7. Factory record, *Psalliota* [*Agaricus* sp.] 8B. © The Museum of Worcester Porcelain, The Dyson Perrins Museum Trust (lower right).

Plate 8. Factory record, *Lepiota dolicaulis* [*Macrolepiota dolichaula* (Berk. & Broome) Pegler & R.W. Rayner] 8C. © The Museum of Worcester Porcelain, The Dyson Perrins Museum Trust (upper far right).

Plate 9. Factory record, [*Agaricus* sp.] 8D. © The Museum of Worcester Porcelain, The Dyson Perrins Museum Trust (lower far right).

In the Museum of Worcester Porcelain archives, the pattern number 'W9762' is recorded as a floral design with an etched Quaker grey border on a dessert service (Regal shape), painted by Albert Shuck. It appears that the fungal series was created by combining this existing border design with some new illustrations. The Export record books at Worcester include some original watercolours for the series, entitled 'Fungia Drawings' by Miss P.F. Clarke. The drawings are titled as follows: 8A *Cortinarius* New S. Wales, 8B *Psalliota*, 8C *Lepiota dolicaulis*, 8D not named. (W. Cook *in litt.*).

The painting by R. Austin (Plate 5) is derived from the same watercolour as the painting by W. Hart ('*Lepiota dolicaulis* 8C' (Plate 3)). It can be seen that each artist has retained the accuracy of the original watercolour but has given their painting on porcelain a very different artistic treatment.

From 1926 onwards a more economical and therefore cheaper series of Australian flora was produced. This was created by a printed outline in black with hand-filling details executed by junior painters and apprentices. A different border was used and pieces found with this combination are unsigned. The last date found for 'Australian Worcester' is 1929, at which time the Great Depression had a tremendous impact on decorative wares forcing the Worcester factory to closed for a short time. (Landis 1996.)

The ceramic painters William Hart and Reginald Austin

Little is known about William Hart. He painted fruit for a short time after the First World War and is known to have painted some Australian flowers after Ellis Rowan (W. Cook *in litt.*).

Reginald Harry Austin (1890–1955) was one of the principal painters at Worcester in the 1900s and 1910s and specialised in flowers, birds and fruits (Sandon 1973).

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Glossary

body: the material from which porcelain is made (Gates 2000).

bone china: true porcelain of clay, feldspatic rock modified with the addition of bone ash. Introduced by Joseph Spode in about 1794, it is almost exclusively used in England. The Worcester recipe being 50 per cent ox bone, 25 per cent china stone (feldspar) and 25 per cent china clay, in its finest form, firing at about 1250°C (Sandon 1973).

Bow: this factory was established in about 1744 and with the Chelsea works ranks as the earliest British manufacturer of transparent porcelain.

Chelsea: a factory for porcelain manufacture established in Chelsea, London in about 1743. The work of the Chelsea factory was extensively influenced by Meissen until about 1756, the styles of Sèvres superseding it.

Derby: William Duesbury commenced the manufacture of porcelain at Derby, in about 1750. The original factory closed in 1848 (a small works continued in the same tradition under the name Stevenson & Hancock) and a new factory was formed in 1878. (Birks 2000.)

enamels: paints that are applied over the glaze are commonly called enamels. Most of them are made from metallic oxides, such as iron, copper, and manganese. Enamel colors require additional firings to make them permanent.

ground laying: a coat of ground laying oil is evenly applied, then carefully 'bossed' with a fine silk pad packed with cotton wool to remove brush marks. The ceramic powdered colour is applied using a cotton wool pad and worked into the ground laying oil. This highly skilled operation, at its best, can produce beautifully smooth and even ground colours. (Sandon 1973.)

onglaze: colours put on after the glaze has been fired. They have to be fired into the glaze at lower temperatures than the glaze is fired at. No glaze is put on the top of onglaze colours, as the temperature needed for firing the glaze would burn away the enamels. The colours change in the firing, often quite considerably, and great

knowledge and skill is needed to learn and use these changes successfully. Most paintings require two or more onglaze firings to build up the final colours necessary. (Sandon 1973.)

parian: named after the island of Paros, also called statuary porcelain, as the body imitated Greek marble statues so well. An unusually high amount of feldspar, about 70 per cent, forms the body, plus nearly 30 per cent china clay and a small amount of cullet (scrap glass). The body did not need glazing but it could be. Parian was always slip-cast as it was not a very plastic body. It was used mainly for ornamental wares but also for many useful wares at Worcester. It was fired at 1200–1250°C. (Sandon 1973.)

porcelain: a hard, translucent and generally white ceramic substance. There are three main kinds of porcelain: hard-paste or true porcelain; soft-paste or artificial porcelain; and, bone china. The differences between the types of porcelain are based on the material from which they are made and temperatures used for firing. Methods of decoration include glazing, painting and transfer printing. The process of shaping varies and includes wheel throwing, moulding and modelling.

soapstone porcelain: soapstone or steatite was first used as an ingredient of the English softpaste porcelain paste at a Bristol factory, and was adopted as the basis of early Worcester porcelain.

transfer printing: in this process a design is engraved on a copper plate, inked with ceramic color, and transferred to tissue paper. While the color is still wet, the tissue paper is pressed against a porcelain object, leaving the design on its surface.

underglaze: painted or printed decorations applied to ceramics before they have been glazed; these colours develop at about the same temperature as that needed to vitrify a glaze. The colour possibilities are limited with cobalt blue, which is exceptionally tolerant of high temperatures, being the commonest underglaze.

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HYGROCYBE KULA GRGUR. REVISITED

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Abstract

The characteristics of *Hygrocybe kula* Grgur. are reviewed and the current description shown to be a mixture collated from two separate taxa. A new description of *Hygrocybe kula* is provided based solely on the holotype collection and new information obtained from the associated watercolour. The new taxon *Hygrocybe rubronivea*, previously considered to be *Hygrocybe kula*, is here described. The species *Hygrocybe lanecovensis* A.M. Young is considered separate from *Hygrocybe kula*.

Introduction

Hygrocybe kula Grgur. (Grgurinovic 1997) is based on a collection (AD 5716) made in 1916 by J.B. Cleland from the Royal National Park (just south of Sydney), New South Wales. The exact location of the collection within the park is not known. Cleland & Cheel (1919) published a description under the name of '*Hygrophorus miniatus* Fr.' and in the list of collections believed to be this taxon they included the Royal National Park material. Grgurinovic (1997) described the species *Hygrocybe kula* and cited two other collections (AD 5717, AD 5718) that were then considered identical to the holotype, both of which were collected near Adelaide, South Australia. Grgurinovic's approach was also followed by Young & Wood (1997).

During 1998, the *Hygrocybeae* of Lane Cove Bushland Park, New South Wales were examined and the new species *Hygrocybe lanecovensis* A.M. Young was described (Young 1999). Some of its diagnostic characteristics are shared by *Hygrocybe kula* but the present definitions of each taxon permit good separation. Both species are currently defined as having red pilei, red stipes and white lamellae, but differ in that *H. kula* has a dry pileus and stipe (both of which have a simple cutis) and white lamellae that are adnate with a decurrent tooth at most; *H. lanecovensis* has a viscid pileus and stipe (an ixocutis on both) and lamellae that are deeply decurrent.

A re-evaluation of *Hygrocybe kula* data

Recently, the author had occasion to check the description of *Hygrocybe kula* in Grgurinovic (1997) and noted that a watercolour (Phyllis Clarke No. 128) had been associated with the species. Subsequently, a difference between the species text and its associated watercolour (Grgurinovic 1997, Plate 20c) became evident. The text describes the lamellae as 'adnate to slightly decurrent' whereas the watercolour made by Clarke from the holotype material shows deeply decurrent lamellae. This difference made the taxonomic separation of *Hygrocybe kula* and *H. lanecovensis* uncertain and indicated that a revision of the holotype collection of *H. kula* (and the two collections from the South Australian site) was required.

The paper by Cleland & Cheel (1919) describing '*Hygrophorus miniatus* Fr.' contains no reliable information applicable to the holotype collection of *Hygrocybe kula*. The description of '*Hygrophorus miniatus*' is a summary of characteristics based on the nine cited collections believed to be that taxon, but there is no doubt that different species were contained in those nine collections. (Cleland & Cheel *loc. cit.* do not include herbarium numbers so that it is usually impossible to be certain which Cleland collections are relevant or if they still exist.) For example, the description of '*Hygrophorus miniatus*' states that the species has pilei that are 'convex, sometimes a little dimple in the centre or umbilicate, sometimes irregular, sometimes upturned, sometimes slightly rugose and sometimes slightly squamulose...'. These characters will fit at least four currently accepted taxa occurring in the Sydney region: *Hygrocybe cantharellus* (Schwein. : Fr.) Murrill, *H. miniata* (Fr. : Fr.) P. Kumm, *H. sanguineocrenulata* A.M. Young and *H. siccatopapillata* A.M. Young and these species will also fit the very loose collection of characters for the lamellae and stipe that are given in the Cleland & Cheel paper.

Re-examination of the field notes that apply to the three collections listed for *Hygrocybe kula* now suggests strongly that the currently accepted description is a composite of at least two taxa because it contains pertinent information from all three collections originally believed to be *Hygrocybe kula*. Field notes with collection AD 5717 state that the pileus is convex and finely mealy while the lamellae are white and adnate but the holotype

collection is now known to have deeply decurrent lamellae and a probably viscid, striate, translucent pileus, at least in the juvenile stages. Similarly, field notes with collection AD 5718 indicate that the lamellae are adnate with a tendency to decurrency, but not deeply decurrent as occurs in the holotype; also, the material in AD 5718 has a pileipellis with a cutis, and is not the ixocutis found in *Hygrocybe kula*. For these reasons, both these collections (AD 5717, AD 5718) are no longer considered similar to the holotype collection of *Hygrocybe kula*.

Materials and Methods

A re-description of *Hygrocybe kula* based solely on the herbarium material and field notes made in 1916 from the Royal National Park holotype collection, together with the relevant Phyllis Clarke watercolour, was completed. The re-description uses the exact wording of the field notes made by Cleland with slight changes to the following aspects of the original pencilled script: dimensions in inches are converted to mm; the terms of cap, gills and stem are changed to pileus, lamellae and stipe respectively; and a single, indecipherable word just before the note on the yellowish stem base has been omitted. Where additions to the macrocharacters have been made by the author on the basis of information from either the watercolour or the microscopic examination, they are shown in square brackets []. The main difference in the microcharacters when compared with previously published data (Grgurinovic 1997, Young & Wood 1997) is that the spores in the holotype are shown to be slightly shorter than the dimensions already published (6.2–9 _ 3.4–4.6 μm); other differences are not considered significant.

Microscopic work was completed on an Olympus CX40 microscope with drawing tube attachment. Herbarium material was reconstituted in ammoniated congo-red. The microstructures of the pileus, hymenophoral trama and stipe are not depicted because they conform to standard forms (Young & Wood 1997). For the new taxon, 20 spores and 10 basidia were selected at random, drawn and measured. Scale bars are provided for all drawings: habit sketches, 10 mm; all microstructures, 10 μm . The derived parameter 'Q' is defined as the quotient of the length divided by the width of the relevant spore or basidium; the mean 'Q' is the quotient of the mean length and width respectively of a sample.

Holotype material for the new taxon has been deposited at the Queensland Herbarium, Mt. Coot-tha, Queensland (Herbarium BRI). Holotype and other material from the Cleland collection is held at the State Herbarium of South Australia, Kent Town, S.A. (Herbarium AD). Where no collector number has been assigned the convention 's.n.' is used. The author's personal herbarium number (*hb. young*) is cited for reference purposes—all material has been deposited at the relevant herbarium.

Taxonomic Information

Plate 1. *Hygrocybe kula*. Phyllis Clarke watercolour No. 128.

Figure 1. *Hygrocybe kula* (holotype AD 5716). A. spores; B. basidia. (Scale bars = 10 μm .)

A redescription of *Hygrocybe kula*

Hygrocybe kula Grgur., *Larger Fungi of South Australia*, 336 (1997). Plate 1.

Pileus 19 mm, blood-red, convex, then slightly depressed, [viscid at least when young], edge a little striate [distinctly striate and even]. *Lamellae* cream, slightly decurrent [deeply decurrent], rather distant. *Stipe* 38 mm, blood-red, base yellowish, slightly hollow, [viscid at least when young]. On ground. Under trees. Nat. Park. 15/7/16. Plate 1, Figure 1.

Spores 5–7 \times 2.7–4.7 μm , mean 6.2 \times 3.8 μm , Q: 1.3–2.0, mean Q: 1.61, ellipsoidal to cylindrical and a few slightly constricted, hyaline, smooth. *Basidia* 33–55 \times 6–9 μm , mean 41.5 \times 6.8 μm , Q: 4.3–8.0 (–10.0), mean Q: 6.09, (2-) 4-spored, clamped. *Cystidia* absent. *Hymenophoral trama* regular and consisting of parallel chains of cylindrical to ellipsoidal, hyaline, thin-walled, rather inflated elements 14–67 (–100) \times 4–10 μm , clamps present; lactifers present as tortuous, thin-walled, highly refractive hyphae 4–8 μm diam. *Pileipellis* an ixocutis (which may be weak and possibly resembles a cutis if dry) consisting of repent, cylindrical, hyaline, thin-walled hyphae 3–5 μm diam., clamps abundant. *Stipitipellis* an ixocutis (which may be weak and possibly resembles a cutis if dry) consisting of repent, cylindrical, hyaline, thin-walled hyphae 2.5–3 μm diam., clamps abundant.

Habitat: On ground under trees; [probably gregarious to caespitose].

Material examined: N.S.W.: Royal National Park, 15.vii.1916, *J.B. Cleland s.n.* (AD 5716, holotype). S.A.: Greenhill Rd nr Adelaide, 1.vii.1922, *J.B. Cleland s.n.* (AD 5718); 27.vi.1921 (AD 5717).

Remarks: It is unfortunate that, in this particular instance, Cleland did not place a reference to the Phyllis Clarke watercolour number on the field notes with the holotype collection. Although Cleland usually did this when a watercolour existed, there is very good reason to believe that Clarke's watercolour 128 is of the holotype material because no other Cleland collections of that date, location and name exist and the watercolour does conform very well with both the material and Cleland's field notes.

The holotype of *Hygrocybe kula* is in very poor condition, but sufficient material still remains of a single basidiome (almost certainly the larger one illustrated in the Clarke watercolour) and it shows very clearly that the lamellae are deeply decurrent and run down the stem for quite some distance. Cleland's field notes state that the lamellae are 'slightly decurrent', however Phyllis Clarke's watercolour displays a basidiome with deeply decurrent lamellae which conforms with the basidiome fragment in the holotype collection. Cleland's note of 'slightly decurrent' lamellae therefore becomes his personal interpretation. Both the Clarke watercolour and Cleland's notes agree that the stipe has a yellow base and that the pileus margin is striate; the watercolour also shows the pileus margin is even.

Both the pileus and stipe of the remaining intact basidiome in the herbarium material have a 'varnished' surface which indicates either dried, gelatinised hyphae or a gluten layer, and there are quantities of sand grains adherent to the surfaces of both. Microscopic confirmation of a possible ixocutis is often very difficult (as is also agreed by Boertmann pers. comm.), but large numbers of spores were found to be firmly adherent to the cuticular hyphae of the pileus which also supports the supposition that an ixocutis was present on the pileus. There was almost certainly an ixocutis on the stipe as well. Cleland's field notes give no indications as to the viscosity of the pileus and stipe but this is not considered critical because many taxa within the Hygrophoraceae are at first viscid in the juvenile stage but will be described as 'quite dry or tacky at most' if they are collected at maturity, especially during dry weather.

The microdrawings of spores and basidia of *Hygrocybe kula* in Grgurinovic (1997) were taken from the holotype and are still relevant. The microdrawings of spores of *Hygrocybe kula* in Young & Wood (1997) were also done from the holotype and remain relevant. The habit sketch of *Hygrocybe kula* in Young & Wood (1997) is now replaced by the Phyllis Clarke watercolour No. 128 as depicted in Plate 1.

It is extremely desirable that this species be recollected as soon as possible from the holotype locality. This may prove very difficult as there are no records which indicate precisely where Cleland made his collection in the Royal National Park. The Park is very large, has a considerable number of locations which will fit the holotype habitat of 'under trees' and some previously suitable areas are now covered by buildings associated with park management.

No species designation is suggested for collections AD 5717 and AD 5718 although both definitely belong to the genus *Hygrocybe*. In both cases, the material is very fragmented and extremely difficult to examine microscopically. It is possible that either or both collections may represent a new taxon, but it would be very

inadvisable to describe a new species on the basis of the fragments and incomplete descriptions that comprise both collections. Re-collection of similar material from Cleland's original locality will provide the most satisfactory solution to this problem.

Separation of *Hygrocybe kula* and *Hygrocybe lanecovens*

Hygrocybe kula and *Hygrocybe lanecovens* may be assumed to have red, convex pilei that are viscid at least in juvenile stages. The pileus of *H. kula* has an even, striate margin, while *H. lanecovens* has no striations and very strongly crenulate margins. It is presumed impossible that such crenulate margins would not have been observed and neither noted by Cleland nor depicted by Clarke. The striate margin also suggests that *H. kula* has a basidiome with at least a partially translucent pileus; such a pileus does not exist for *H. lanecovens* which remains opaque at all stages.

The lamellae of *H. kula* are stated to be 'cream'; those of *H. lanecovens* are pure white until very late maturity when they may have a faint cream tint. The Cleland collection clearly shows that several basidiomes were collected and at least one of these was juvenile. If white lamellae were present in the early stages, it is reasonable to assume this fact would have been recorded because Cleland's field notes are usually very reliable as to colour. The stipe base of *H. kula* is described in the text and depicted in the watercolour as distinctly yellow; yellow is never found on the stipe of *H. lanecovens* which remains consistently red throughout its length, even in old specimens.

Spore dimensions of the two taxa are very similar [(6.0–) 6.7–8.0 \square 3.7–5.0 (–5.3) μm in *H. lanecovens*] although those of *H. lanecovens* are slightly wider. The shapes and dimensions of other microcharacters of the two taxa are also very similar and are not considered further here.

Although the two species are obviously close, there are sufficient macrocharacters to permit their separation and for the moment the two taxa are retained. It is conceded that future collections of *Hygrocybe kula* may possibly reduce *H. lanecovens* to a variant of *H. kula*; however, the currently known information about the two taxa make this possibility unlikely.

A new species based on the original misinterpretation

The description of *Hygrocybe kula* presented in Grgurinovic (1997), Young & Wood (1997) and Young (1999) is a collation of characters for at least two taxa. However, the mixed description was applied consistently by Young & Wood (1997) and Young (1999) to a widely occurring species which was interpreted as *H. kula* in all relevant collections but is now known to be separate. It has a convex pileus which is smooth, red and dry; adnate, white lamellae with at most a decurrent tooth; and a red, dry stipe which is often sinuous. A formal description of this taxon now follows.

***Hygrocybe rubronivea* A.M. Young, sp. nov.**

Hygrocybe kula auct. non p.p. Grgur.: Grgurinovic, *Larger Fungi of South Australia* 336 (1997).

Pileus 7–30 mm, ruber, convexus dein planatus, siccus, glaber vel farinosus, ad marginem crenulatus. Lamellae adnatae cum dentes decurrentes, niveae dein sub-cremae, ad marginem concolorae. Stipes 11–35 \square 2–3 mm, ruber, siccus, glaber, sinuatus vel sub-sinuatus. Sporae 6.5–10.0 \square (3.5–) 4.0–7.0 μm , Q: 1.3–1.9, oblongae vel ellipsoideae, aliquot sub-constrictae, hyalinae. Basidia 27–40 \square 6–9 μm , Q: 4.5–7.6, (2-) 4-spora, fibulata. Cystidia nulla. Trama hymenophoralis regularis, fibulata. Epicutis pilei cutem eformans. Gregaria in humo sylvestri.

Holotypus: New South Wales. Lane Cove Bushland Park, 7.vi.1998, R. & E. Kearney (*hb. young 2078*) (*holotypus* BRI) hic designatus.

Pileus 7–30 mm, convex then becoming rather flattened and occasionally centrally depressed, dry, smooth or sometimes mealy, brilliant crimson (near 8A8–10A8), margins crenulate (especially when young) to even, not cracking, may be yellow tinted. *Lamellae* broadly adnate with a slight decurrent tooth, thick, widely spaced, pure white becoming cream coloured (3A2–4A2) with age, margins concolorous; veins often present on the upper lamellae surfaces and on the pileus undersurface. *Stipe* 11–35 \square 2–3 mm, more or less cylindrical although occasionally with a tendency to become flattened, often sinuous, firm, smooth, dry, at first brilliant crimson, but paling with age and may become pinkish cream, the base has a tendency to become yellow-tinted and this may spread upwards. Odour none; taste mild. Figure 2.

Spores 6.5–10 \square (3.5) 4–7 μm , mean 8.4 \square 5.4 μm , Q: 1.3–1.9, mean Q: 1.6, oblong to ellipsoidal and occasionally slightly constricted medially, apiculus prominent 1–2 μm . *Basidia* 27–40 \square 6–9 μm , mean 36 \square 6

μm , Q: 4.5–7.6, mean Q: 5.6, narrowly clavate, 2- or 4- spored, clamped. *Cystidia* absent. *Hymenophoral trama* regular, consisting of cylindrical, clamped, and occasionally inflated elements 25–60 (100) \square 2–10 μm , lactifers present as highly refractive, tortuous and sometimes branching, clamped hyphae 2–4 μm . *Pileipellis* a cutis of clamped hyphae, 3–5 μm diam., lactifers occasionally present and similar to those in the hymenophoral trama. *Stipitipellis* a cutis of hyaline, thin-walled, clamped hyphae 3–5 μm diam.

Habitat and distribution: On soil in rainforest or at least in very sheltered locations; gregarious to caespitose. Recorded from New South Wales and Queensland.

Material examined: N.S.W.: Mt Wilson, 2.vii.1980, A.E. Wood (UNSW 80/301); Watagan State Forest, 22.vi.1988, A.E. Wood & F. Taeker (UNSW 88/273); Cumberland State Forest, 31.iii.1990, A.E. Wood (UNSW 90/100). Qld: Bunya Mountains National Park, 6.v.1989, A.M. Young 1369 (BRI).

Remarks: This species resembles *Hygrocybe miniata* which differs by having yellow-pink to orange lamellae and a pileipellis that is a trichoderm. Two other bright red taxa with white lamellae are *Hygrocybe lanecovens* and *H. kula*, both of which can be separated by their deeply decurrent lamellae and the distinctly viscid pilei which remain viscid until the basidiome is at least half expanded.

Etymology: Latin, *ruber*, red; Latin, *niveus*, snow-white; referring to the combination of the brilliant red pileus and white lamellae.

Figure 2. *Hygrocybe rubronivea* (holotype BRI) A. habit sketch; B. spores; C. basidia. (Scale bars: habit sketch = 10 mm; spores and basidia = 10 μm .)

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REMARKS ON HYGROPHORACEAE IN OR NEAR LAMINGTON NATIONAL PARK, SOUTH-EAST QUEENSLAND, AUSTRALIA

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Abstract

Five previously described species of Hygrophoraceae known to occur in the Lamington National Park of south-east Queensland are listed. Two new taxa, *Hygrocybe kouskosii* (subgenus *Pseudohygrocybe* Bon) and *Hygrocybe bagleyi* (subgenus *Humidicutis* Singer) are described.

Introduction

The Lamington National Park of south-east Queensland lies on a part of the Queensland-New South Wales border ranges which include the McPherson Range and the Lamington Plateau. The Park contains large areas of subtropical rainforest and a wide variety of other vegetational types including Antarctic beech forest, heath, wet eucalypt forest and dry, open eucalypt woodland. All parts of the park receive high rainfall (usually in excess of 2000 mm annually), so that the various vegetational types are defined by other factors such as temperature and soil type. In general, beech forests are restricted to the higher, cooler portions of the park while the subtropical rainforest occurs in the lower and warmer regions. Both forests are found on basaltic soils. The eucalypt woodlands and forests are found either on poorer rhyolitic soils or on the nutrient enriched zones between the basaltic and rhyolitic soils respectively. The high rainfall of the region and the various vegetational types, provide ideal conditions for fungi, and Hygrophoraceae are found in numerous locations within the Park. All collections cited in this paper were found on or near the walking tracks on the 'Binna Burra side' of the Park. More precise geographical details are sometimes held with the specimens; however, these are often lacking or are so inexact as to be valueless.

Collections and observations of Hygrophoraceae from the Lamington National Park indicate that species are to be found in subtropical rainforest, beech forest, eucalypt forest and heath. Supporting collections for some of these habitats have been omitted because their accompanying field notes do not allow species identification with certainty. No collections have been made from the Park's dry, open woodlands: the distance to these sites makes visits less frequent. In addition, these eucalypt woodlands are so dry that basidiomes of the Hygrophoraceae only appear under ideal climatic conditions and currently these conditions are impossible to predict. Observed substrata for Hygrophoraceae in the Lamington National Park include soil, litter and moss.

Materials and Methods

Macroscopical characters of basidiomes collected from the field were described and the basidiomes were then air-dried for later examination. Dried material was hydrated and examined in ammoniated Congo-red. Microscopic characters were drawn with an Olympus drawing tube. Twenty spores and ten basidia were selected at random to obtain the measurements cited in the descriptions. The derived parameter 'Q' is defined as the quotient of the length divided by the width of the relevant spore or basidium; the mean 'Q' is the quotient of the mean length and width respectively. A 10 mm scale bar is placed beside any habit drawings and a 10 μ m scale bar is placed beside each drawing of a microcharacter. Since the intent of this paper for previously described taxa is only to provide verification of their presence within Lamington National Park, a full synonymy is not provided. Synonymy details may be obtained from Young (1999, 2000). For the new taxa, colour codes quoted are from Kornerup & Wanscher (1978). The author's collections are cited with the relevant personal herbarium number (*hb. young*) for reference purposes. Apart from the newly described taxa, the species listed here represent extremely well known and defined taxa for Australia and confirmatory descriptive details are not considered necessary. Hb. Young numbers are supplied for reference only. All material has been deposited at the relevant herbarium: BRI (Queensland Herbarium, Brisbane Botanic Gardens, Mt Coot-tha, Queensland) and BRIP (Plant Pathology Herbarium, Department of Primary Industries, Indooroopilly, Queensland).

Species: information and descriptions

Hygrocybe astatogala (R. Heim) Heinem., *Bull. Jard. Bot. État* **33**: 436 (1963).

Material examined: Queensland. Lamington National Park, 1.iv.1988, A.M. Young (*hb. young 1211*) (BRI).

Habitat and distribution: Amongst leaf litter on soil in subtropical rainforest.

Remarks: The material in this collection is sterile, but there is no doubt as to its identity. The collection's macrocharacters and microcharacters (apart from the spores) are consistent with known descriptions of this taxon (Young 1999, Young & Wood 1997). Further confirmation of the presence of the taxon in the Lamington National Park is contained in photographs by Mr N. Male which were made available to the author; unfortunately, no material was collected with the photographs.

Hygrocybe bagleyi A.M. Young, *sp. nov.*

Pileus 15–40 mm, cerasinus, convexus ad obtuso-conicus dein lato-conicus, glaber, siccus, cum marginem crenulatus vel fissuratus. Lamellae lato-adnatae, olivaceo-virideae, distantes. Stipes 35–60 □ 2–4.5 mm, pallido-cerasinus, glaber, siccus, cylindricus, cavus. Sporae 6–7.5 (–8) □ 4–5.5 μm, mean 6.7 □ 4.8 μm, Q: 1.3–1.6, mean Q: 1.42, ellipsoideae, hyalinae. Basidia 38–52 □ 6–8.5 μm, mean 45.2 □ 7.6 μm, Q: 5.1–6.9, mean Q: 5.99, 4-spora, fibulata. Cystidia nulla. Trama hymenophoralis regularis, fibulata rara vel nulla. Epicutis pilei cutem formans, fibulata rara vel nulla. Gregaria in pascuum.

Holotypus: Queensland. Binna Burra, 7.v.2000, A.M. Young (*hb. young 2289*) (holotypus BRI, hic designatus).

Pileus 15–40 mm, cherry-red (12B8–12B4) becoming sooty-red (12F5) with age over most of the pileus surface, convex to obtusely conical then expanding to broadly conical but depressed at the apex, smooth, dry, margin finely crenulate and splitting or eroding at maturity. *Lamellae* very broadly adnate and usually with a small decurrent tooth but sometimes sinuately notched at the stipe, at first light olive-green (30B4) and may have buff tints (3A3) but becoming light to dark olive-green (near 30C5), distant, thick, margins even and concolorous. *Stipe* 35–60 □ 2–4.5 mm, pallid cherry-red (12A2–12B2) fading with age and at maturity may show greenish tints (28C2–28C3), smooth, dry, cylindrical, hollow, sometimes sinuous. (Figure 1.)

Spores 6–7.5 (–8) □ 4–5.5 μm, mean 6.7 □ 4.8 μm, Q: 1.3–1.6, mean Q: 1.42, ellipsoidal, hyaline, smooth, often with a large colourless inclusion. *Basidia* 38–52 □ 6–8.5 μm, mean 45.2 □ 7.6 μm, Q: 5.1–6.9, mean Q: 5.99, 4-spored, clamps present and usually of medallion form. *Cystidia* absent. *Hymenophoral trama* regular and consisting of globose, ellipsoidal, fusiform and cylindrical elements which are hyaline, inflated, thin-walled, septate 17–102 □ 5.5–28 μm, clamps absent. *Pileipellis* a cutis of repent, cylindrical, thin-walled, septate hyphae 1–8 μm diam., often pigment encrusted, clamps absent. *Stipitipellis* a cutis of repent, cylindrical, thin-walled, septate hyphae 2–4.5 μm diam., often pigment encrusted, clamps absent.

Figure 1. *Hygrocybe bagleyi*. A. habit sketch and transverse section, bar = 10 mm; B. spores, bar = 10 μm; C. basidia, bar = 10 μm.

Habitat and distribution: Gregarious in lawn of introduced 'kikuyu grass' (*Pennisetum clandestinum* Hochst. ex Chiov.). Known only from the holotype locality of the lawns within the garden area of Binna Burra Mountain Lodge.

Material examined: Queensland. Binna Burra, 7.v.2000, A.M. Young (hb. young 2289) (BRI).

Remarks: The absence of clamps throughout the basidiome, except at the bases of the basidia where they are usually of medallion form, indicates that *Hygrocybe bagleyi* belongs in subgenus *Humidicutis* Singer. The world distribution of species within this subgenus appears to show that apart from one or two taxa in North America, most species within this subgenus are to be found in the Southern Hemisphere, centred on Australia and New Zealand. There are no European taxa within subgenus *Humidicutis* (D. Boertmann pers. comm.). No Australian or New Zealand species has the macrocharacters exhibited in *H. bagleyi* and the sole North American taxon, *Hygrophorus marginatus* Peck, has bright orange lamellae (author's personal investigations).

Etymology: Named after Mr L. Bagley of Binna Burra, Queensland.

Hygrocybe graminicolor (E. Horak) T. May & A.E. Wood, *Mycotaxon* 54: 148 (1995).

Material examined: Queensland. Lamington National Park, 1.iv.1988, A.M. Young (hb. young 1208; BRI); Queensland. Lamington National Park, 17.ii.1990, A.M. Young (hb. young 1508; BRIP 23016); Lamington National Park, 30.iii.1996, A.M. Young (hb. young 1804) (BRI).

Habitat and distribution: Usually gregarious, but sometimes solitary on soil amongst litter or on deep humus in rainforest.

Remarks: Rain-washed basidiomes of *Hygrocybe graminicolor* can sometimes be confusing as they may appear pale pinkish instead of the usual green colorations.

Hygrocybe kouskosii A.M. Young, *sp. nov.*

Pileus 15–30 mm, atro-brunneus, conicus dein umbonatus, glaber, humidus vel siccus nunquam viscidus, cum marginem sub-striatus. Lamellae adnatae, distantae, albae dein sub-bubalinae. Stipes 15–40 \square 4–7.5 mm, luteus, glaber, siccus, cavus, cylindricus. Sporae 8–11.5 \square 5–7.5 μm , mean 9.8 \square 5.8 μm , Q: 1.3–2.0 (–2.3), mean Q: 1.69, lato-ellipsoideae ad cylindricae vel obovoideae ad ovoideae, hyalinae, aliquot sub-constrictae ad constrictae, saepe spinae ad 3 μm longae. Basidia (41–) 46–63 \square (6–) 7–9.5 μm , mean 54.1 \square 8.0 μm , Q: 5.1–7.9

Figure 2. *Hygrocybe kouskosii*. A. habit sketch and transverse section, bar = 10 mm; B. spores, bar = 10 μm ; C. basidia, bar = 10 μm .

(–8.9), mean Q: 6.73, 4-spores, fibulata. Cystidia nulla. Trama hymenophoralis regularis, fibulata. Epicutis pilei cutem formans. Gregaria in musco sylvestri.

Holotypus: Queensland. Lamington National Park, 26.v.1997, A.M. Young (*hb. young 1945*) (holotypus BRI, hic designatus).

Pileus 15–30 mm, dark brown (5D4–5D5), conical becoming umbonate, smooth, moist to dry but not viscid, margins even or a little crenate when expanded and may be slightly striate and often are repand with age. *Lamellae* adnate, distant, thick, pure white and then faintly buff-tinted (4A2–4A3) with age, margins even and concolorous. *Stipe* 15–40 \square 4–7.5 mm, yellow (3A4–3A5) and darker apically, smooth, dry, hollow, cylindrical, tending to split longitudinally. (Plate 1, Figure 2.)

Spores 8–11.5 \square 5–7.5 μm , mean 9.8 \square 5.8 μm , Q: 1.3–2.0 (–2.3), mean Q: 1.69, broadly ellipsoidal to cylindrical or obovoid to ovoid, smooth or frequently with spinose projections up to 3 μm long, hyaline, often with large colourless inclusions; cylindrical spores sometimes constricted. *Basidia* (41–) 46–63 \square (6–) 7–9.5 μm , mean 54.1 \square 8.0 μm , Q: 5.1–7.9 (–8.9), mean Q: 6.73, 4-spored, clamps present. *Cystidia* absent. *Hymenophoral trama* regular and consisting of globose, ellipsoidal, fusiform or cylindrical, inflated, hyaline, thin-walled elements 42–160 \square 7–42 μm , clamps abundant. *Pileipellis* a cutis of repent, parallel, hyaline, thin-walled, cylindrical, septate hyphae 2.5–7 μm diam., clamps abundant; narrow cuticular hyphae sometimes with clavate apices up to 7 μm diam. *Stipitipellis* a cutis of repent, parallel, hyaline, thin-walled, cylindrical, septate hyphae 3–8 μm diam., clamps abundant.

Plate 1. Basidiomes of *Hygrocybe kouskosii* amongst soil on a moss bank. The brilliant yellow stipes and dark brown pilei are readily visible.

Habitat and known distribution: Gregarious on soil in moss bank, subtropical rainforest. Known only from the holotype locality.

Material examined: Queensland. Lamington National Park, 26.vi.1997, A.M. Young (*hb. young 1945*) (BRI).

Remarks: No other taxon has the colouration of dark-brown pilei, white lamellae and bright yellow stipe together with the development of spinose or echinate spores that occur in this species. The spinose spores are quite plentiful in the holotype material, but further collections will be required to see if this is a consistent property. Spinose spores intermingled with regular spores are so far known from two other taxa: the Australian *Hygrocybe anomala* A.M. Young and the European species *H. insipida* (J.E. Lange) M.M. Moser, neither of which exhibit this new taxon's macrocharacters: *H. anomala* has a convex pileus and a red or orange stipe, while *H. insipida* is orange on cap and stipe and has an ixotrichoderm on the pileus. *Hygrocybe kouskosii* belongs in subgenus *Pseudohygrocybe*.

Etymology: Named after Mr Gus Kouskos, forestry worker and overseer of the Lamington National Park during the period 1937–1966.

Hygrocybe mavis (G. Stev.) E. Horak, *New Zealand J. Bot.* 9: 434 (1971).

Material examined: Queensland. Lamington National Park, 1.iv.1988, *A.M. Young* (*hb. young 1214*; BRI); Lamington National Park, 1.iv.1995, *A.M. Young* (*hb. young 1717*) (BRI).

Habitat and known distribution: Singly on soil amongst litter in subtropical rainforest.

Remarks: The pure white, dry basidiomes of *Hygrocybe mavis* are quite common in early autumn.

Hygrocybe miniata (Fr. : Fr.) P. Kumm., *Führer Pilzk.* 112 (1871).

Material examined: Queensland. Lamington National Park, 17.ii.1990, *A.M. Young* (*hb. young 1511*) (BRIP 23024); Lamington National Park, 15.ii.1992, *A.M. Young* (*hb. young 1637*) (BRI).

Habitat and known distribution: Gregarious to caespitose in leaf mould in subtropical rainforest.

Remarks: This taxon appears regularly in previously known locations where its brilliant red basidiomes form spectacular groups on the forest floor. One location near the start of the Dave's Creek track has produced fruiting bodies for several years in succession.

Hygrophorus involutus G. Stev., *Kew Bull.* 16: 373 (1962),

Material examined: Queensland. Lamington National Park, 18.iii.2000, *A.M. Young* (*hb. young 2288*) (BRI).

Habitat and known distribution: Caespitose on soil amongst litter in subtropical rainforest.

Remarks: This collection is the first record of this taxon for Queensland and its discovery was noted briefly in Young *et al.* (2000). The Lamington National Park material comprised a small cluster of basidiomes amongst litter at the foot of a hoop pine (*Araucaria cunninghamii* Aiton ex D. Don) in subtropical rainforest. *Hygrophorus involutus* is now known from New Zealand, Tasmania and the Australian mainland where the distribution includes Queensland, New South Wales and Western Australia; collections of what are believed to be *H. involutus* are held by the National Herbarium of Victoria and are yet to be confirmed, but anecdotal evidence suggests very strongly that the species is present in Victoria. The wide and disjoint distribution displayed by *Hygrophorus involutus* implies that its origins are ancient and are probably linked to the cool temperate forests that once covered much of southern Australia.

Acknowledgements

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DOES CHLOROPHYLLUM MOLYBDITES OCCUR IN NEW ZEALAND?

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Published records of the occurrence in New Zealand of the Green Parasol Fungus, *Chlorophyllum molybdites*, are all traceable to a passing mention in a Russian agaric flora. Neither resident nor visiting agaricologists have recorded this conspicuous species within New Zealand, and it is assumed that the Russian reference is erroneous (perhaps originating as a mistranscription of either New Caledonia or New Guinea).

Bougher (1999) included New Zealand within the range of distribution of the Green Parasol Fungus, *Chlorophyllum molybdites* (G. Mey. : Fr.) Masee; and Moreno *et al.* (1995), in transferring the fungus to *Macrolepiota*, described it as having 'New Zealand representing its southern ... limit'. However, I have failed to authenticate any New Zealand occurrence of this conspicuous mushroom, either from herbarium specimens, or in the primary literature, or by questioning agaricologists familiar with the New Zealand mycoflora. There has also never been a New Zealand report of poisoning attributed to this mushroom, which is 'consistently the mushroom most commonly reported' in human poisonings in the U.S.A. (Augenstein 1994).

Both Bougher (1999) and Moreno *et al.* (1995) cited Reid & Eicker's (1991) review article in support of their statements. Reid & Eicker (1991) confirmed that there are no New Zealand collections of the species at Kew, and cited Wasser (1985) and Wasser & Zakordonets (1986) as the source of the information on its presence in New Zealand. Wasser (1985), in a monograph on the agaric flora of the USSR, described the non-USSR distribution of *C. molybdites* as [in Russian]—'Asia: Israel; N.America: USA; S.America: Brazil, Guyana; Africa: Kenya, Tanzania, Uganda; New Zealand'. Wasser & Zakordonets (1986), in a paper on the occurrence of *C. molybdites* in the Soviet Far East, described the non-USSR distribution of the fungus as [in Russian]—'N.America (Canada, USA, Mexico), S.America (Argentina, Brazil, Guyana), Asia (Japan, Israel, Philippines), Africa (Kenya, Zaire, Tanzania, Uganda, UAR), New Zealand'.

These two bald statements, with no supporting data or references, appear to be the only 'record' of *C. molybdites* from New Zealand. It is unlikely that a Russian agaricologist, who (to the best of my knowledge) has neither visited nor had contact with New Zealand, should be privy to information that is not recorded in any New Zealand foray list, publication, or herbarium, and that is unknown to resident and visiting mycologists with encyclopaedic knowledge of the New Zealand fungal flora. It seems more probable that Wasser made an error. A possible hypothesis is that he was aware of collections of *C. molybdites* from either New Caledonia or New Guinea (both within the confirmed range of distribution (Reid & Eicker 1991)), but copied the wrong translation from his Russian gazetteer. (There is a precedent for the occurrence of such an error. The type localities of *Flagelloscypha pseudopanacis* and *Sphaerobasidioscypha citrispora* were both published as 'Neuguinea' (Agerer 1975, 1983), in error for New Zealand [pers. comm. from E. Horak, the collector of the respective holotype specimens].)

I would welcome any information that would resolve this puzzle. In the interim, I believe *C. molybdites* should be excluded from the list of fungi recorded from New Zealand. To quote Ira Gershwin's libretto to *Porgy and Bess*—'The things that you're liable to read ... It ain't necessarily so!'

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MYCOPHAGY BY NORTH ISLAND ROBIN

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Two recent articles by Simpson (1998, 2000) consider available information on the little-known but important subject of mycophagy by birds in Australia and overseas. The following observation of mycophagous behaviour by an uncommon New Zealand endemic passerine is a further contribution to current knowledge in that regard.

On 25 April 1996, a North Island robin *Petroica australis longipes* was observed feeding on rotting basidiomata of the agaricoid fungus *Armillaria limonea* (G. Stev.) Boesew. (Family Tricholomataceae) in the South Waitaanga Conservation Area in eastern Taranaki in the North Island of New Zealand. The basidiomata in question had dropped on to a forest track from a rotting tree-trunk which had fallen across it. The robin was observed and photographed as it repeatedly fed on the ground among the fallen basidiomata.

Simpson (1998) noted that decomposing fungi of all kinds commonly contain large populations of larvae and adult invertebrates. Initially, it was thought the robin at Waitaanga was taking insects or other invertebrates off the surface of the rotting basidiomata. However, closer observation revealed that it was actually taking small pieces of the fruiting body itself, an action which is shown clearly enough in the accompanying photograph (Plate 1).

A search of the New Zealand ornithological literature has not revealed any records of fungi among items eaten by the North Island robin. Heather & Robertson (2000) note that its food is mainly invertebrates, supplemented with small fruits in summer and autumn. Ralph

Plate 1. North Island Robin feeding on a rotting basidiomata of *Armillaria limonea*, South Waitaanga Conservation Area, 25 April 1996. Photo: D. Medway.

Powlesland, of the New Zealand Department of Conservation, cannot recall seeing North Island robins feed on fungi at any time during his intensive studies of that bird in the forests at Pureora in the central North Island (pers. comm. 4/10/2000). This, therefore, would appear to be the first recorded observation of mycophagy by the North Island robin. It is of some interest to note that the North Island robin belongs to the same Family *Eopsaltriidae*, the Australasian robins, as the eastern yellow robin *Eopsaltria australis* which Simpson (2000) recorded has been seen feeding on freshly-dug sporocarps of a species of *Gymnomyces* Massee & Rodway, a hypogeous fungus.

Acknowledgements

I am grateful to Peter Buchanan for supplying me with a copy of Simpson's 1998 paper which was published before I became a member of this Society, and to Ralph Powlesland for advising that he has no personal knowledge of mycophagy by North Island robins.

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OBITUARY
ROBERT RAY (BOB) PARKER (1921–1999)

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I first met Bob Parker via the telephone several years ago. He had been given my name and number as a person who might help with some fungal identification and things rapidly progressed from there. Bob was an enthusiastic researcher into macrofungi and loved taxonomy. An excellent example of this is his short paper on *Cymatoderma elegans* in volume 18 of the *Australasian Mycologist* which also demonstrates his ‘puckish’ sense of humour with the inclusion of the Latin statement ‘*Nullius in verba!*’. Over the years, Bob, his wife Ginna and both my wife Dot, and I, thoroughly enjoyed our brief but productive contacts.

Bob was born in Seattle, Washington, U.S.A. on July 21, 1921. His mother was a school teacher while his father worked for the U.S.A. Postal Service; Bob was the ‘middle child’ between two sisters. Although somewhat of a ‘rogue’ as a child, Bob graduated from high-school and then sampled a number of different vocations.

He and an Icelandic friend built a commercial fishing boat, the *Silver Spray*, which apparently still travels the west coast of America. This was followed by crew work on commercial fishing boats and the achievement of a Mate’s rating while working for a shipping company out of Seattle. His qualifications kept Bob in the Merchant Marine during WWII, running live ammunition. Bob obviously liked exciting work tinged with a spice of danger because his next work was as a raftsman for Seattle Cedar Mill and it involved dashing about on the tops of logs lying in the water.

Bob then decided he wanted a different future and decided to enter the University of Washington, where he paid his own way and eventually gained a Bachelor of Science in Zoology. During his three month summer holidays, he worked for the U.S.A. Fish and Wildlife Service in Alaska and combined these summer jobs with collecting data on salmon life cycles that would later be used in his research papers. It was during these student days at university that he met his future wife and he and Virginia were married on June 15, 1946, two days after the graduation ceremony. Bob and Ginna celebrated their 50th wedding anniversary in 1996.

After graduating, Bob worked for the University of Washington which was followed by a fisheries biologist position with the Washington State Fisheries Department in Seattle. Later Bob resigned and in February of 1950 went to Juneau, Alaska to help set up the Alaska State Fish and Game Department. Numerous occasions found Bob spending nights up in trees while an angry bear patrolled below!

In September 1956, Bob, Ginna and their three children moved to Vancouver, British Columbia, Canada. Bob returned to university and by 1959 had achieved a Masters degree and a Doctor of Philosophy degree in Zoology. Typically, Bob was back on the high seas at the time of the graduation ceremony, completing work for the Alaska Fish and Game Department. One can only sit back in admiration at the completion of Bob’s PhD. In 1959, a bachelor degree carried enormous prestige and further qualifications were usually unnecessary. It is a measure of Bob’s character to realise that the underlying reasons for his further studies were purely for the love of science and the pleasure of research.

Instead of returning to Juneau, Bob and his family now moved to Kodiak Island in the Gulf of Alaska where Bob ran a research program on the North Pacific salmon. Bob, together with several other helpers, built the initial structure of the research station. This was a very common thing in those last pioneering days in Alaska. Most men had to be (and were) jack’s-of-all-trades, scientists or not.

In August of 1960, Bob and his family moved yet again and travelled southwards to Nanaimo on Vancouver Island. There, Bob took a position at the West Coast Biological Station as a fisheries biologist. He was to remain there 14 years, during which time he did research on ocean salmon populations, spawning salmon and a classic piece of research on the effects of pulp mill toxins on the bio-systems of a local coastal inlet. His last child, Dan, was born there in 1961, but as usual Bob was off dealing with fish that were hatching. While in Nanaimo he became interested in Scouting and became Scout Master for a small troop. Never one to stop, Bob went on to earn his Gillwell stripes and finally become Regional Commissioner for Scouting on Vancouver Island.

In 1974, Bob accepted a request from CSIRO Division of Fisheries and Oceanography in Sydney to come to Australia to study the Port Hacking estuary. Bob and his family were on their way ‘down under’! Bob was to work with the CSIRO until 1981 when he retired. He had always wanted to own a farm so he and Ginna bought

the property at Dorrroughby in northern New South Wales in late December 1978. Bob commuted to Sydney for 2 1/2 years on holidays and flexi-time until his ultimate retirement when he and Ginna moved to the farm permanently in August of 1981. Here he raised Angus cattle (forming the Nightcap Angus stud) for a number of years. He took a welding course and also obtained a powder man class 3 certificate for agricultural blasting, which allowed him to blast away at unwanted stumps on the farm. In addition, he and Ginna became involved with a local astronomy group and what was then known as the Richmond Valley Naturalist Club. He was active in the beef cattle section of the Lismore Show and helped to set up the Stud Breeders Association. In his 'spare moments', he completely renovated the lovely old turn-of-the-century house on the property, mostly by himself.

After his second retirement-this time from farming-he began an in-depth study of local fungi, photographing them, writing them up and eventually culminating in what was hoped to be the first of many research style papers in both the *Australasian Mycologist* and other journals. Sadly it was not to be, and on September 5, 1999, he died in his sleep at home, on the farm he loved, at the age of 78.

Bob's work will not be forgotten. The generosity of his wife Ginna has led to the most extraordinary gift of his excellent Olympus microscope and associated drawing tube and digital camera, together with his field notes, specimens and hundreds of photographs of the fungi of the Nightcap Range/Whian Whian State Forest area to the Brisbane Herbarium. There are also mycological books and off-prints still to be sorted for presentation. These gifts will add enormously to the knowledge of the macrofungi of the region as the specimens come from the southern rim of the Mt Warning caldera; the Lamington National Park forms the northern rim and it is very fitting that Bob's collection should be lodged in the same location where the collections from the northern crater rim are housed. In addition, the microscope will allow further intensive studies of the macrofungi at Brisbane Herbarium for many years to come and the digital camera ensures that the accompanying micro-studies will be superbly illustrated. I know Bob would be delighted that his research material will have such a great future impact because his whole life has been dedicated to the pursuit of knowledge.

Bob was a dear friend and lived life to the fullest. Although largely unknown to many of the current generation of mycologists, mycology in Australia does owe a considerable debt to this enthusiastic and dedicated man. 'Vale Robert.'

'To lose a friend is the greatest of all evils, but endeavour rather to rejoice that you possessed him than to mourn his loss.'

Seneca, *Epistulae ad Lucilium*, AD 63.

Acknowledgements

I am very grateful to Mrs Virginia (Ginna) Parker for access to Bob's eulogy and several photographs. I would also like to offer her my personal and very deepest thanks with regard to her generous gifts to Australian mycology.

Bob's Publication on Australian Macrofungi

Parker, Robert R. (1999) *Cymatoderma elegans* var. *lamellatum*. *Australasian Mycologist* **18**, 10–11.

INAUGURAL FUNGIMAP AUSTRALIA CONFERENCE JUNE 2001

FUNGIMAP is an Australia-wide network of volunteer recorders who collect data on the distribution and ecology of target species of fungi (currently 100 species). See: <http://calcite.apana.org.au/fungimap/>

The Inaugural National Fungimap Conference will be held in Denmark, Western Australia from 22–26 June 2001. The Conference provides an opportunity to present and share information for those interested in fungi at all levels. The Conference will include a day of speakers, as well as workshops and excursions. Field trips are planned to surrounding areas, including ancient eucalypt forest and coastal woodland. Speakers and workshop leaders include Neale Bougher (CSIRO Perth), Teresa Lebel and Tom May (Royal Botanic Gardens Melbourne) and Katrina Syme (Fungimap Coordinator, WA).

The Conference is being organised by the Denmark Environment Centre. For further information and registration details please go to <http://www.wt.com.au/~environ/> or contact:

Fungimap Conference, Denmark Environment Centre
P.O. Box 142, Denmark
Western Australia 6333
Email: fungidenmarkwa@wn.com.au

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CORRECTION

A.M. Young, N.L. Bougher & R.M. Robinson (2000). Hygrophoraceae of Western Australia II. Further taxa. *Australasian Mycologist* **19**, 41–48, 77.

The photograph on the back cover of issue 19 (2): 77 (Plate 4) was *Hygrophorus involutus* not *Hygrocybe involutus*.

REFEREES FOR 2000

The managing editors would like to thank the following for refereeing articles for the *Australasian Mycologist*, Volume 19: Ross Beever, Ann Bell, Eva Czernis-Ryl, Sally Fryar, Cheryl Grgurinovic, Egon Horak, Tom May, Michael Priest, Richard Milner, Ting-Kui Qin, Bettye Rees, Michael Reid, Geoff Ridley, Roger Shivas, Jack Simpson, Jim Trappe and John Walker.

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Both members and non-members of the Society are eligible to publish in the *Australasian Mycologist*. All manuscripts for publication in the journal should be submitted as hard copy, and where possible as electronic copy. The editors request that authors adhere to the *Australasian Mycologist* style. Headings are bold 10 pt Ariel; centred upper case for the paper's title, centred upper and lower case for the second level headings and left aligned for third level headings. The remainder of the text is 10 pt Times New Roman. The authors' names and addresses are centred and italicised. Abbreviations follow Brummitt, R.K. & Powell, C.E. (1992). *Authors of Plant Names*. Royal Botanic Gardens, Kew. Please note that *journal and book titles are given in full in the references*. References are given in alphabetical order, not date order, if more than one reference is cited in one place in the text.

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Plate 4. (upper). Royal Worcester plate, [*Agaricus* sp.] 8D, by W. Hart (after P. Clarke). © Powerhouse Museum.

Plate 5. (lower). Royal Worcester plate, [*Macrolepiota dolichaula* (Berk. & Broome) Pegler & R.W. Rayner], by R. Austin (after P. Clarke). © Powerhouse Museum.
