Fungimap Newsletter Issue 6 September 1997

Australian Fungi Mapping Scheme

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Are we successful?

In this edition

In this edition we are looking at a number of fungi which are commonly found at this time of the year. One of these, a morel, appears to be very popular. I am tempted to use the same words as David Arora in *Mushrooms Demystified* on Morels:

"As I am meticulously mapping their variation and distribution. I request you, generous reader. to deliver any and all morels you find to my doorstep. Then, while I am savouring the superb flavour (having first, of course, studied them thoroughly), you can bask in the altruistic satisfaction that comes from contributing to science." (p. 786)

I dont think our Scientific Advisory Committee would let me get away with it though. On a more serious note, however, all details of our records for specific locations are kept strictly confidential.

Tom May is on official leave of absence from Fungimap for about 8 weeks (more news in the next edition about this!) and hence his regular column does not appear in this edition. It is replaced by an article on earth stars Tom kindly did some months ago.

In the December edition we will be publishing 5 to 6 maps of material we have.

Records

Have you got in your 20 records? I haven't. I now have 16 records for the year so I've got 4 more to find before December. Old records with date and location (longitude and latitude) are needed. Pity I don't have any!

Have we achieved?

Thousands of Australian's are able to name many of our native flora and fauna. However, when it comes to fungi, most people go blank.

Not much is known about fungi in Australia. Currently, approximately 5000 species of Australian fungi are known. This represents only 5% of the expected population of Australian species. At current rates of research, it is estimated that it would take another 700 years before all Australian fungi are catalogued.

Even with the few known Australian fungi species, very little is known about their distribution, spread and associations. The Fungimap project is the first mapping scheme of fungi to occur in the southern hemisphere and aims to gather significant information about 100 selected species of fungi.

We now have the results of the 1996 pilot survey where we gained 500 records. What impact have these records had on the data base of the distribution and spread of Australian fungi? In essence, has the scheme achieved useful scientific benefits and made a difference in our knowledge?

We are able to compare the number of records available before the scheme began to see the impact that you, the volunteers, have had.

In terms of our knowledge of where selected project fungi are located, Table One shows the effect of the project on our knowledge base.

Dr. Tom May, the taxonomic mycologist with the National Herbarium of Victoria and Convenor of Fungimap's Scientific Advisory Committee states:

'For most species the Fungimap records far exceed both the number of collections at the National Herbarium, or the number of localities recorded in the literature. In a short time Fungimap has significantly added to knowledge of the distribution of the target species.

Table 1: **Fungimap Additions to Knowledge Base on the distribution of Selected Fungi.**

	Records in National Herbarium to 6/96	**Records of locations found in literature**	**Fungimap Records to 6/97**
Amanita xanthocephala	8	4	73
Amanita muscaria	7	26	165
Aseroe rubra	6	-	39
Battaraea stevenii	10	-	7
Dermocybe austroveneta	4	6	37
Mycena interrupta	1	14	73
Omphalina chromacea	5	5	49
Omphalotus nidiformis	15	24	63

Note: Information regarding literature records is for literature in Victoria. Blank gaps mean that literature results have not been collated yet. The Table is only for the 506 records received during the Pilot Scheme run in 1996 and does not include more than 1000 records received to date during l997.

Opinion

In my opinion we, as volunteers, have made a significant difference. It takes me, on average, about 4 hours of actual searching to find each target species and I live in a rich area for fungi. If we used the figure of 4 hours as a conservative estimate that means that it would have taken 2,000 hours to find the 500 records we achieved in l996. That is the equivalent to a full- time research scientist being out in the field full-time for one year. It does not include the back-up time that is required for checking and cataloguing.

This figure gives us the value of Fungimap to scientific and government bodies. To employ a full-time scientist with all of the associated costs and cover the geographic area that Fungimap does, would cost approximately $70,000 to $80,000 per year. This figure is now more due to the growth in the scheme. However, a lack of Commonwealth support means that we can really only limp along.

Even with a proven record of the efficiency and success of the scheme, we have not been provided with any financial assistance from the Commonwealth. I am starting to seriously ask the question: Is the Commonwealth only providing funds for populist research about issues that are either green or cuddly? Is this due to the bias of politicians, or is it due to advice from bureaucrats who tell politicians what they want to hear?

It is now time for the Commonwealth to fund Fungimap and without this funding our efforts will be seriously hampered in the future.

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Fungi Identification -- John Julian

Schizophyllum

One of the 50 species being searched for is *Schizophyllum commune*. This is a very cosmopolitan species which is an easy one for beginners to find. *Schizophyllum* is placed in its own family (Schizophyllaceae), apparently having few close relatives. While it looks like a 'bracket' fungus at first glance, it has characteristics of both the Agaricales and Aphyllophorales. *Schizophyllum commune* is the only known member of the family in Australia.

Defining characteristics

The major defininig characteristics are its shape, split gills, greyish velvet cap, habitat and the large numbers which are normally found in the one spot.

Cap: Fan shaped, dry, between 1 to 4cm across, tough like suede, reviving after drying with the addition of moisture, densely covered in fine hairs giving a velvet appearance and feel, off-white to grey in colour.

Gills: present, well spaced, radiating from attachment point and splitting lengthwise. **Ring:** absent. **Volva:** absent. **Cap attachment:** attached directly to wood. Stipe: absent or very rudimentary. **Spores:** White, occasionally pinkish. **Habitat:** Dead wood of deciduous trees, and cut timber, fence posts.

Name meaning: schiz = split; phyll = leaves or leaf (gills). Com = hair **Other characteristics** Usually a large number will be seen in the one location (i.e. on a fence post). Can be found all year round although in dry times it will fold baclc its gills to apparently conserve moisture and protect the spore bearing surface.

Note: Is reported to cause the disease basidioneuromycosis in humans.

Fungimap Species

Only one representative of the family is known in Australia and this is described above.

Morchella

One of the 50 species being searched for is , *Morchella elata/conica*. This striking and tasty genus is easily identifiable by most fungi hunters and is found commonly in spring. All records and specific site details will be treated confidentially.

Defining characteristics: The major defining characteristics are the honeycombed appearance of the conical cap.

Cap: ovoid to conical, honeycomb appearance with chambers formed by ridges crossing each other, can be up to 30cm tall in some species but these are rare in Australia, more often up to 5-10cm high and up to 5cm in diameter. **Gills:** not present (refer 'chambers') **Ring:** absent. **Volva:** absent. **Cap**

attachment: attached for whole length to stem except in one species where 1/3 to 2/3 is free (*M. semilibera).* **Stipe:** attached centrally to the cap, usually hollow in cross-section, tough. **Spores:** Yellowish-cream to white. **Habitat:** Open woodlands, scrub, wasteland and on chalky soil, after fire. Generally found in late spring or early summer in higher altitudes. **Name meaning:** Morchell = German for edible fungus or morel. Elat = raised or tall **Other characteristics:** Cap colour is variable, yellowish when younger becoming dark brown, olive with age and ridges darker with age.

Notes: Widely known as a very tasty, edible species. Allergic reactions to this morel however have been reported. It should also be noted that mild poisoning can occur in a wide variety of morels if they are eaten raw.

Fungimap Species *Morchella elata/conica* has a cap up to 10cm high and up to 5cm across. **Cap:** conical with strong honeycombed appearance due to the vertical ridges running from the top to bottom of the cap sectioned by irregular short horizontal ridges creating rectangular chambers. **Stipe:** attached to the full length of the cap. **Spore print:** white to yellowish-cream. **Habitat:** Open woodlands on slopes. Season: late spring.. **References:** Fuhrer (*Field Companion to Australian Fungi* 1993), page 151; Shepherd and Totterdell, p. 148.

An introduction to earth stars

by Tom May

There are about a dozen species of earth-stars *(Geastrum)* recorded from Australia. One species *(Geastrum indicum*, also known as *G. triplex)* is on the Fungimap target list. How do you tell this species from the rest?

First, a quick introduction to the structure of an earth-star. The 'puff-ball' part of the earth-star, the part containing the powdery spores, is contained within the **endoperidium.** The opening of the endoperidium is the stoma, and this is surrounded by the peristome. The peristome can be fibrillose (like silk), or distinctly pleated/plicate. The outer surface of the endoperidium may be smooth (sometimes initially covered by a powdery or mealy layer) or coarse (like sandpaper). The outer layer of the earth-star, the part which opens out to form the 'star' is the **exoperidium,** and this is split into a number of **rays.**

The endoperidium can sit directly on the exoperidium (sessile), or can have a stalk at the base. In some species the rays expand but then close up over the endoperidium as they dry out -- when this happens the rays are described as 'hygroscopic'.

The outer surface of the exoperidium (the underside of the whole fruit body) is called the mycelial layer; it is sometimes covered with a brown felty layer. This outer mycelial layer can be mixed with debris (soil, leaf litter) or not. In some species the outer mycelial layer eventually peels off.

The inner surface of the exoperidium is the pseudoparenchymatous layer. In some species part of this layer breaks away to form a saucer under the endoperidium.

In *Geastrum fornicatum* the rays of the exoperidium arch so that the endoperidium is raised above the ground, the tips of the rays are connected to a cup shaped structure which is the remains of the outer mycelial layer of the exoperidium -- this is a **fornicate** exoperidium. In one species *(G. schweinitzii)* fruit bodies sit on a **subiculum --** a felt like mass of hyphae which covers rotting wood.

So, what are the characters of *Geastrum indicum?* Firstly any *Geastrum* which has one or more of the following characters is *not G. indicum:*

- Endoperidium surface rough like sandpaper
- Endoperidium with stalk
- Peristome plicate
- Subiculum present
- Outer mycelial layer of exoperidium mixed with soil or leaf litter.
- Outer mycelial layer of exoperidium covered with brown felty layer
- Exoperidium fornicate (arched and connected to mycelial cup)

This leaves us with two species which are distinguished as follows:

	Geastrum saccatum	*Geastrum indicum*
Outer mycelial layer of exoperidium	Persists or peels off	Usually persists
Endoperidium diameter	4-24 mm	11-35 (up to 54) mm
Pseudoparenchymatous layer forms saucer	Rarely	Usually

The best field characters to separate *G. indicum* (=*G. triplex*) and *G. saccatum* are the combination of size and the presence or absence of the saucer formed by the pseudoparenchymatous layer. In young fruit bodies the saucer may not be developed, and this is so in the photos of *G. indicum* in Macdonald & Westerman, *Field Guide to Fungi of South-eastern Australia;* Fuhrer & Robinson. *Rainforest Fungi of Tasmania;* and Fuhrer, *Field Companion to Australian Fungi.* The saucer can be seen in the illustrations of *G. indicum* in Phillips, *Mushrooms and other Fungi of Great Britain and Europe;* Phillips, *Mushrooms of North America (where G. saccatum* is also illustrated): *Fungi of Switzerland* vol. 2: Arora, *Mushrooms Demystified* (also has G. *saccatum):* and Shepherd & Totterdell. *Mushrooms and Toadstools of Australia* (saucer is not very distinctive).

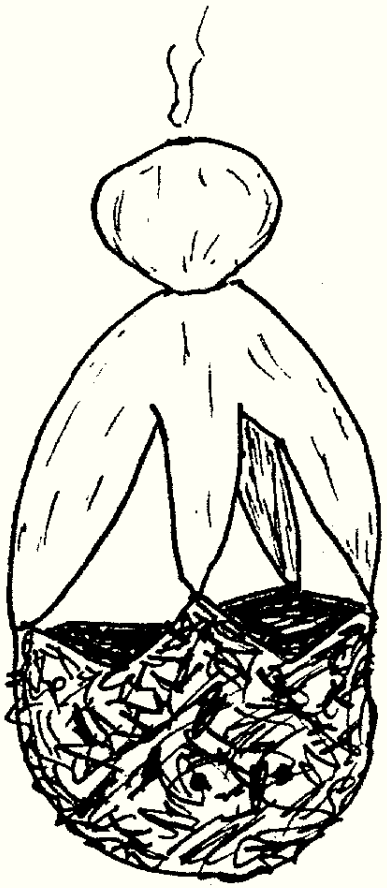
Taxonomic Note The correct name for *G. indicum* (as used by many authors) is *G. triplex,* and this is the name used by Grgurinovic (1997). We continue to use *G. indicum* for the moment, since that is the name under which the species is included in many Australian field guides. G. *australe* (see Grgurinovic, 1997) is very similar to G. *saccatum* and G. *triplex.* differing in the larger spores. For the purposes of recording species for Fungimap we are including *G. australe* under *'G. indicum'.*

Further Reading Cunningham, G.H. (1942) *The Gasteromycetes of Australia and New Zealand.* Published by the author: Dunedin. [Many names and species concepts have changed since this work, but well-illustrated and with a key.]

Grgurinovic, C. (1997). *Larger fungi of South Australia.* Botanic Gardens of Adelaide and State Herbarium: Adelaide.

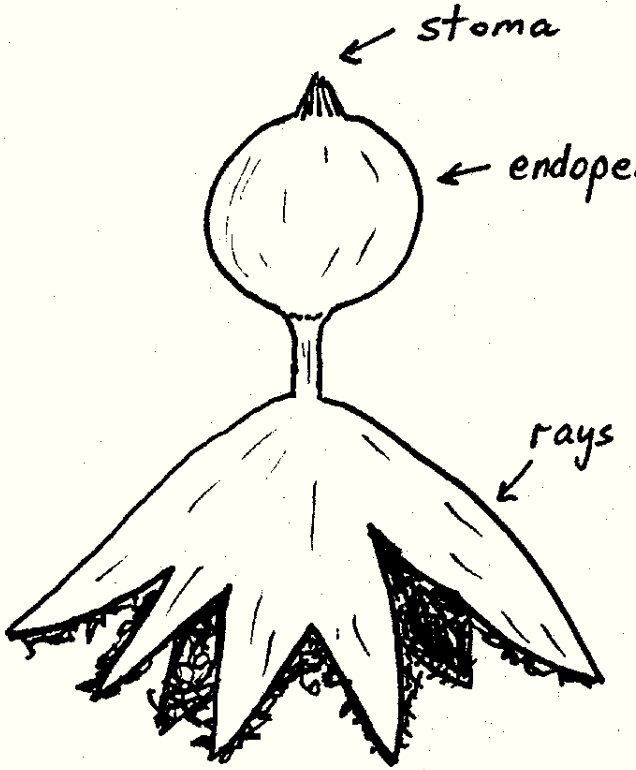
Sunhede, S. (1989). *Geastraceae (Basidiomycotina).* Fungiflora: Oslo. [A comprehensive treatment of the European species of *Geastrum,* with copious black and white illustrations.]

Willis. J.H. (1931). The Geastrae or "earth-stars" of Victoria, *Victorian Naturalist* 51: 115-124. [Note that many names have changed.]



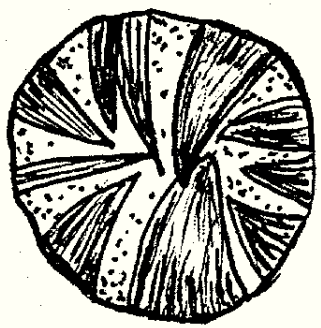
G. quadrifidum

with fornicate rays, and debris attached to mycelial cup.



G. pectinatum

with plicate stoma, stalked endoperidium, and debris attached to outer mycelial layer of exoperidium.



G. floriforme

Hygroscopic rays enclosing dried fruit body.

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Updated target species list

The Fungimap target species are the eight original species, along with a further 42 species, taking the list of target species to 50. We have chosen species which are illustrated in Bruce Fuhrer's **Field Companion to Australian Fungi** so that there is a ready source of high quality illustrations for all species. Asecond update of 50 species will be produced when further illustrations become available. The list will eventually be expanded to also cover some rare species.

Records, recent or old, of all 50 target species from all parts of Australia are requested. Some of the additional species are not so distinctive as the original eight species and some recorders may wish to limit themselves to the more obvious species. Remember to indicate if you are in any doubt about the identification of a record, and in such cases it is best to send a photo.

Numbers in brackets are page numbers in Bruce Fuhrer's ***Field Companion to Australian*** *Fungi* (published by FNCV).

ORIGINAL EIGHT (illustrated in Fungimap colour brochure -- in addition, all species except *Amanita muscaria* and *Battarraea stevenii* are illustrated in *Field Comp*.)

Amanita muscaria

Amanita xanthocephala (21)

Aseroe rubra (102)

Battarraea stevenii

Dermocybe austroveneta (31)

Mycena interrupta (59)

Omphalina chromacea (62)

Omphalotus nidiformis (70)

ADDITIONS MARCH 1997 For this first updated list, all species are illustrated in Bruce Fuhrer's *Field Companion to Australian Fungi*, published by the FNCV.

Agaricus xanthodermus (15)

Amauroderma rude (113)

Anthurus archeri (102)

Armillaria luteobubalina (22)

Ascocoryne sarcoides (144)

Banksiamyces macrocarpa (146)

Boletellus obscurecoccineus (80)

Calostoma fuscum (94)

Cordyceps gunnii (154)

Cordyceps hawkesii (155)

Cortinarius austroalbidus (in Field Comp. as C. albidus) (29)

Cortinarius radicatus (34)

Cortinarius rotundisporus (36)

Cyttaria gunnii (147)

Fistulina hepatica (116)

Gymnopilus pampeanus (45)

Hericium clathroides (108)

Hygrophorus lewellinae (48)

Ileodictyon gracile/cibarium (in Field Comp. as Clathrus cibarius) (101/104)

Leotia lubrica (150)

Lepista nuda (52)

Macrotyphula juncea (in Field Comp. as Clavaria delphus) (85)

Marasmius oreades (55)

Microporus xanthopus (118)

Morchella elata/conica (in Field Comp. as Morchella sp.) (151)

Mucronella pendula (in Field Comp. as Myxomycidium pendulum) (90)

Mycena austrororida (57)

Mycoacia subceracea (109)

Neolentinus dactyloides (in Field Comp. as Lentinus terrestris) (52)

Oudemansiella radicata (67)

Panus fasciatus (in Field Comp. as Lentinus fasciatus) (51)

Piptoporus australiensis (119)

Piptoporus maculatissimus (121)

Podaxis pistillaris (100)

Podoserpula pusio (132)

Poronia ericii (in Field Comp. as P. punctata) (158)

Pseudohydnum gelatinosum (142)

Schizophyllum commune (76)

Tremella fuciformis (138)

Tremella mesenterica (140)

Vibrissea bicolor (154)

Volvariella speciosa (77)

Big thankyou to dung collectors

In April of this year a request was launched tor collectors of dried herbivore dung *(Fungimap Newsletter* April 1997 pp. 56). Since then Tom May and Pat Grey have received over 100 collections, the most commonly collected dung being from Wallaby and Kangaroo. At present these samples are being kept air-dry ready for shipment to me here in New Zealand.

Meanwhile I have been doing my best to organise the alterations of part of our laboratory facilities here to accommodate a new quarantine room in which to do this work. Due to the passing of the Biosecurities Act 1993, conditions under which people can import biological material for research purposes has tightened up. Firstly it was necessary to discuss with the MAF (Ministry of Agriculture ...) officers what level of containment would be needed for this type of work. After some discussion it was decided that our quarantine room should meet physical containment level 2 as described in the handbook: 'Australian/New Zealand standard: part 3: microbiology, 1995'. It takes an inordinately long time to set all these bureaucratic wheels in motion! The first hurdle to negotiate was that of getting a decision upon whether or not we were going to be moved to a different part within the School ... it was only after that was made that I could start to plan for where the quarantine room was going to be located. However, the changes to meet MAF's requirements should be completed by the end of September.

I am not the first person to study the dung fungi of Australia. Major Harry Dade retired from his job as Assistant Director of the (then) Imperial Mycological Institute at Kew in 1960 and emigrated to Victoria to be near his son (and family). During his retirement years he collected dung fungi and made copious meticulous notes on many of them. Unfortunately he died in July 1978 before he could publish any of this work. I had the pleasure of reading his notes and studying many of his slides for 2 months in 1982 when they were housed at the Rydalmere Herbarium (New South Wales, Department of Agriculture). Harry was an excellent illustrator and very careful observer and his notes are a model to us all. I plan to devote the first chapter in this publication to him amd his work. Although I have some data about him from such publications as: 'Brief Biographies of British Mycologists', by Geoffrey Ainsworth (1996), and his obituary note in the *Bulletin of the British Mycological Society* (Vol 13, 1979), I am seeking further information about Harry. His relatives must still be living in Australia (still in Victoria?), and I need to get their views on my writing about their relative. I would also like some good pictures of him. Having worked closely with his diaries I feel that I know him (although I never met him). Besides a love of dung fungi we had another interest in common, he too was a beekeeper. If anyone can provide me with any information on Harry or the addresses of his relatives I would be delighted to hear from them. Below is a reproduction of a drawing of a most interesting fungus which he illustrated. He sent a sample of it to Prof. R.F. Cain thinking that it might be *Sordaria* brevicollis. He wrote that it:

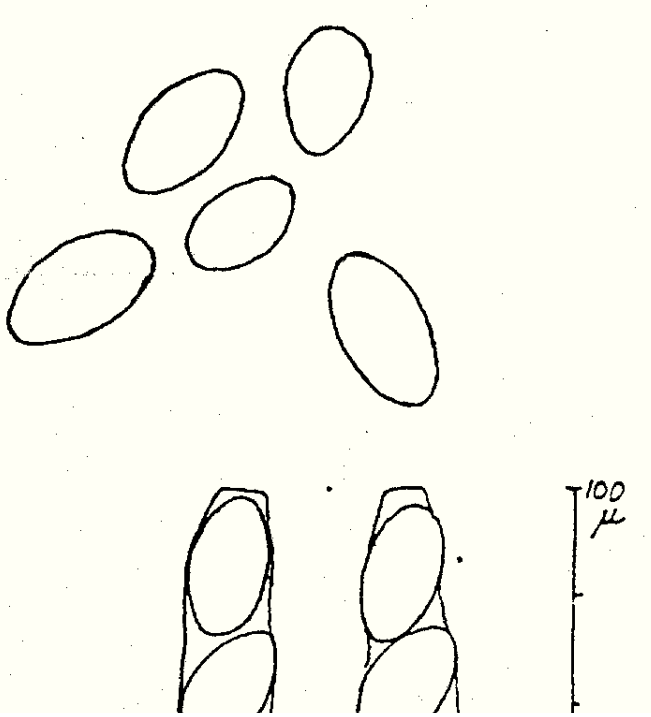
'is another fairly common species, as yet found only on opossum dung. It seems to fit the description of S. *brevicaulis,* and you may be able to confirm or reject my determination from the scanty material now submitted.'

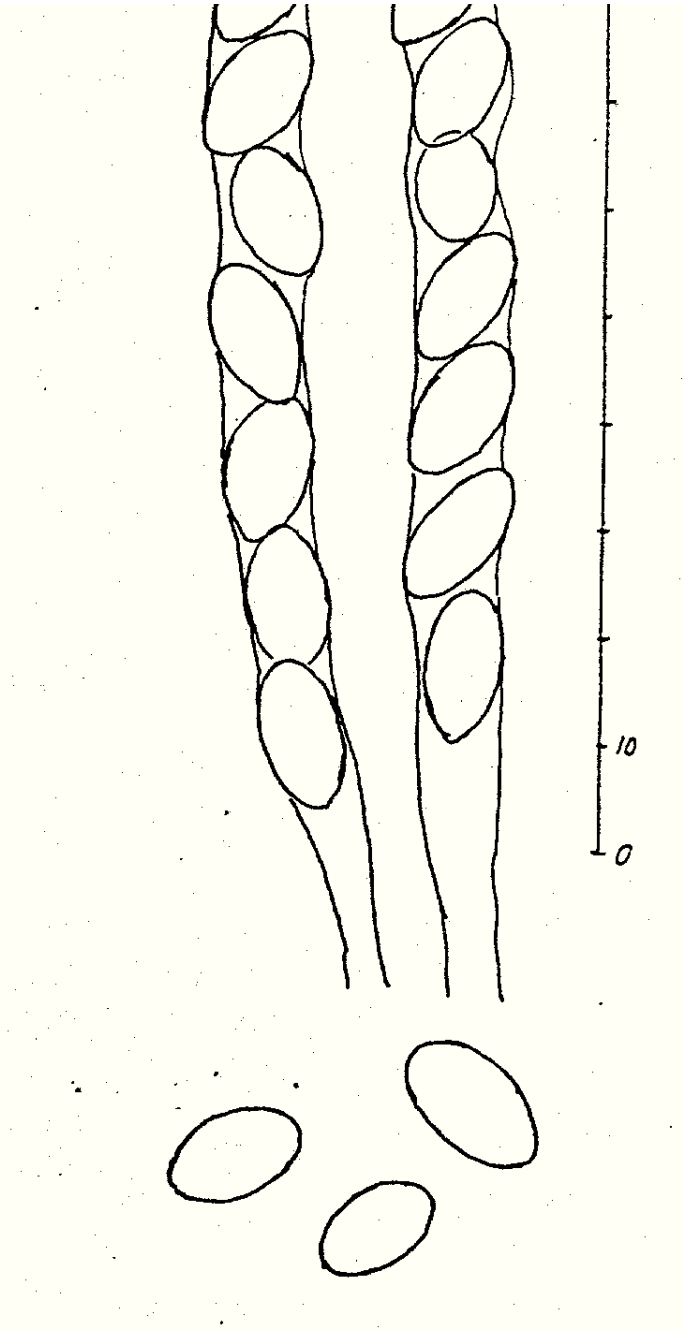
Under these typed notes he wrote:

'Determination confirmed by Cain, July 1968, but in his letter he spells it *brevicollis* which must be an error.'

We have found this fungus too in New Zealand, also on opossum [i.e. Brushtail possum] dung (since the opossum was introduced into New Zealand as a basis for a fur trade). We have isolated and grown the fungus and find that it is not *Sordaria brevicollis* (Harry was wrong about the spelling), but it is a new species which we are naming: *Sordaria trichosura.* Although it is hardly distinguishable from *Sordaria brevicollis,* it will not cross with S. *brevicollis,* (nor with *S. tomenta-alba*, a morphologically similar species). It is necessary to grow these fungi and perform crossing experiments in order to ascertain their identity. This is just one small anecdote to illustrate the importance of Harry Dade's pioneer work on these fungi. I will quote other parts of his work in future editions of this newsletter.

Ann Bell (Victoria University of Wellington, New Zealand)





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Mushroom Dung Beetles by Ian Faithfull

Some mycetophiles are now collecting the dung of native animnls for investigations ot the mycoflora as well as examining mushrooms to add to the Fungimap database. Dung beetles are found in both these microhabitats.

Australia has over 200 species of true dung beetles (Scarabaeinae), approximately 10% of which are found in association with mushrooms (Matthews 1972). *Onthophagus dunningi* is the best known of these mycetophagous scarabs. Adults burrow up the stalk, consume the flesh of the mushroom and use it to provision underground nests in which eggs are laid. The larvae are obligate mycetophages but the adults feed on dung as well as fungi. O. *dunningi* is reported to prefer *Amanita verna* (Bull) Fr. and *A. ochrophylla* Clel. to other species of mushrooms although it has been found in a wide range of fungi including *Agaricus silvaticus*, *Boletellus acranas* and *Boletus* sp. (Bornemissza 1971).

Not much is known about the mycetophagous dung beetles. Their host range is poorly defined. Adult dung beetles in general are highly vagile insects auld they may play some role in dispersal of fungal spores, but of course restrict the reproduction of their hosts by destroying the sporophore.

Surprisingly, not much is known about the 'host' range of the native coprophagous dung beetles either. Records of identified *Onthophagus* species from the dung of grey and red kangaroos, which constitutes a large proportion of the available native animal dung resources, are very nearly absent from the published literature.

Keen mycologists and coprophiles are thus well positioned to add to entomological knowledge. Beetles encountered need to be collected to allow an expert to determine their identity and at least the basic data elements are required for specimens to be scientifically valuable.

Ian Faithfull

16 Nabilla Avenue

Seaford 319S

References

Bornemissza, G.F., 1971. Mycetophagous breeding in the Australian dung beetle, *Onthophagus dunningi. Pedobiologia* 11: 133-142.

Matthews, E.G., 1972. A revision of the scarabaeine dung beetles of Australia I. Tribe Onthophagini. *Australian Journal of Zoology Supplementary Series* No. 9: 1-330.

Ian has been asked to provide a brief article on what records he requires as well as how to preserve a beetle for our next newsletter. In the meantime, please send any records or dead beetlesyou may have to him.

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From Pat Grey's Desk: Significant records and important news

Significant records

We received the 100th record of *Amanita xanthocephala* from David Ratkowsky, Hobart Tasmania.

The first record of *Panus fasciatus* from NSW has been sent in from Heino Lepp with the list from the CSIRO collection which is being incorporated into the main national collection.

A big thankyou

Gordon Trace from the Melways reference section sent us a computer utility program to convert suburban Melway references to lat/long. This has been extremely useful and we would like to thank him very much.

Grid references

However, we also have another program to convert the Australian Map Grid into lat/long, but when using these numbers (found on most non-suburban maps) please include the small numbers that are placed before some of the numbers on the actual lines e.g. 298 easting/5800 northing. These large squares can then be divided into 10 equal parts to produce a more accurate reference e.g. 2986 easting/58004 northing. An example of the AMG is shown at the beginning of the Melways directory with the key. The zone numbers referred to are 54 or 55 for Victoria. 54 is approximately west of Lorne, 55 is east to the east coast.

I would like to thank those recorders who have been able to send in the actual lat/longs, this has made the data entry a lot quicker.

We have now received more than 1,000 records during 1997, giving us more than 1,500 records in total!

Thank you,

Pat Grey

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Fungimap

National Herbarium of Victoria,

Birdwood Avenue,

South Yarra, 3141

All administrative and general enquiries to:

John Julian,

PO Box 178, Bright, Victoria 3741.

Telephone (03) 5750 1796.

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Last modified on 7 August 2003

Putting Australian fungi on the map