

STUDIES ON SMALL VICTORIAN FUNGI BY H.J. SWART AND G. BEATON

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*Friends, Romans, countrymen, Lend me your ears
I come not to bury mycologists, but to praise them.
The work these men did was not buried with their bones
But preserved for us in scientific papers.*

Adapted from W. Shakespeare.

Harry Swart and Gordon Beaton, two mycologists, found, identified, classified, drew and described a large number of different and entirely new species of small fungi, which they collected from Victorian native forests. During the nineteenth century most newly observed fungi were sent overseas either for identification or for confirmation of their identification. The descriptions, drawings and publication were prepared overseas and many of the specimens remained there, mostly at the Herbarium of the Royal Botanic Gardens, Kew. Swart and Beaton completed their work in Australia, and their specimens are lodged in Australian herbaria, although the papers were published in British journals, because there were, and still remain, no Australian journals devoted solely to mycology.

Gordon Beaton

Gordon Beaton (1911–1988), left school at 12 years old and had no tertiary training. He owned and ran an engineering business in Camperdown, Western Victoria. He was a prominent rifle shooter, billiards player and was interested in photography. After retirement he and his wife settled at Eildon, 100 km. north of Melbourne, and began to study the fungi growing along the bush tracks. He bought a Wild microscope and text books. The photograph (Figure 1) shows Gordon in his study/laboratory. Altogether he discovered, described, classified and drew about 50 new species of fungi and published 36 papers.

At first Gordon sent his material to Kew. He collected and studied the small cup fungi, the Discomycetes, the Victorian species of which were largely unknown. Dr. R.W.G. Dennis, of what was then the Commonwealth Mycological Institute, at Kew, suggested that the specimens be studied by M.A. Rifai then at Sheffield. Dr. Rifai worked on Gordon's material at Kew, and published the results in a book 'The Australasian Pezizales in the Herbarium of the Royal Botanic Gardens, Kew' (1968). Rifai named one of Gordon's specimens after him. *Underwoodia beatonii* Rifai is a small conical Discomycete collected near the ocean foreshore where it was growing under *Melaleuca lanceolata*, a paperbark tree which belongs to the Myrtaceae.

From 1975 I helped Gordon to publish his own work, and we wrote 22 papers, although he continued to send to Kew collections of fungi which belonged to large groups and whose identification was beyond his means. Most of these papers were published in the *Transactions of the British Mycological Society*, although some appeared in the *Victorian Naturalist*. Most were studies of small inoperculate Discomycetes found on bark and rotting logs in the forest. These papers recorded Gordon's work. Gordon wrote the descriptions and prepared the drawings. I found the references, organised the Latin diagnosis, usually translated by Dr George Scott, and wrote the papers. *Cyathicula hyalina* Beaton is shown as an example (Beaton & Weste 1978). It is a small inoperculate Discomycete with a stalked apothecium about 2 mm. in diameter and with a toothed margin.

Mycologists from Britain, such as Dr Sheila Francis and Dr Brian Sutton from the then Commonwealth Mycological Institute and Dr Derek Reid from the Kew Herbarium came to Eildon to visit Gordon.

In 1987 Dr Spooner of the Kew Herbarium published 'The Heliotales of Australasia' which included many of Gordon's collections. Spooner wrote that these collections 'represented numerous taxa previously unknown in Australasia, and many undescribed species'.

Gordon then began to collect and study the subterranean truffles and puffballs, the gasteroid Basidiomycota belonging to orders such as the Russulales and Cortinariales. He collected 59 species of these hypogean or sub-epigeal indehiscent gasterocarps. Most (90 per cent) came from eucalypt forests, but some from forests of *Acacia* (wattles) and *Nothofagus* (Australian beech). Many belonged to orders known to form ectotrophic mycorrhiza. Some of the fungi were associated with a particular tree species. The gasterocarps were found in the top 10 cm. of soil and humus in the vicinity of the tree roots. The gasterocarps were simple structures with a loculate gleba enclosed by a thin periderm. The spores usually matured inside the closed fruiting body. The ornamentation of the basidiospores was

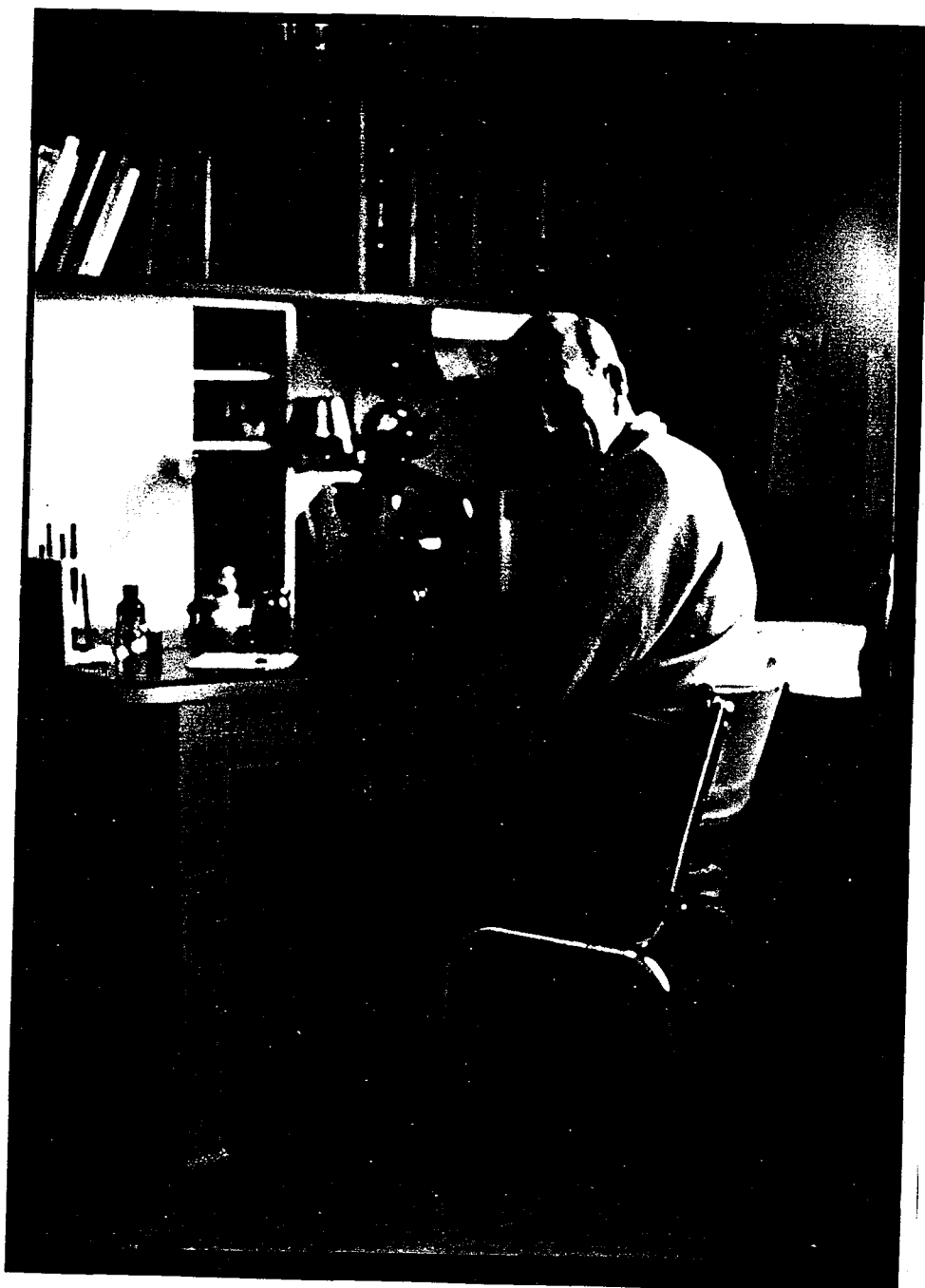


Figure 1: Gordon Beaton in his study/laboratory.

important for identification and classification. An unpublished drawing of a *Mesophellia* sp., prepared by Gordon Beaton is illustrated (Figure 2).

In 1983 Dr David Pegler from Kew Herbarium, England, came to Melbourne for the 4th International Conference of Plant Pathology and afterwards I drove him to Eildon to visit Gordon, and from this association came 7 major papers on the Gasteroid Basidiomycota from Victoria, published in the Kew Bulletin by Beaton, Pegler & Young between 1984 and 1986. The papers included related species and scanning electron micrographs of the basidiospores

In his last study Gordon described the gasteroid fungi which formed 85 per cent of the diet of some rare and endangered marsupials, the long-footed potoroo, *P. longipes*, and a Tasmanian bettong.

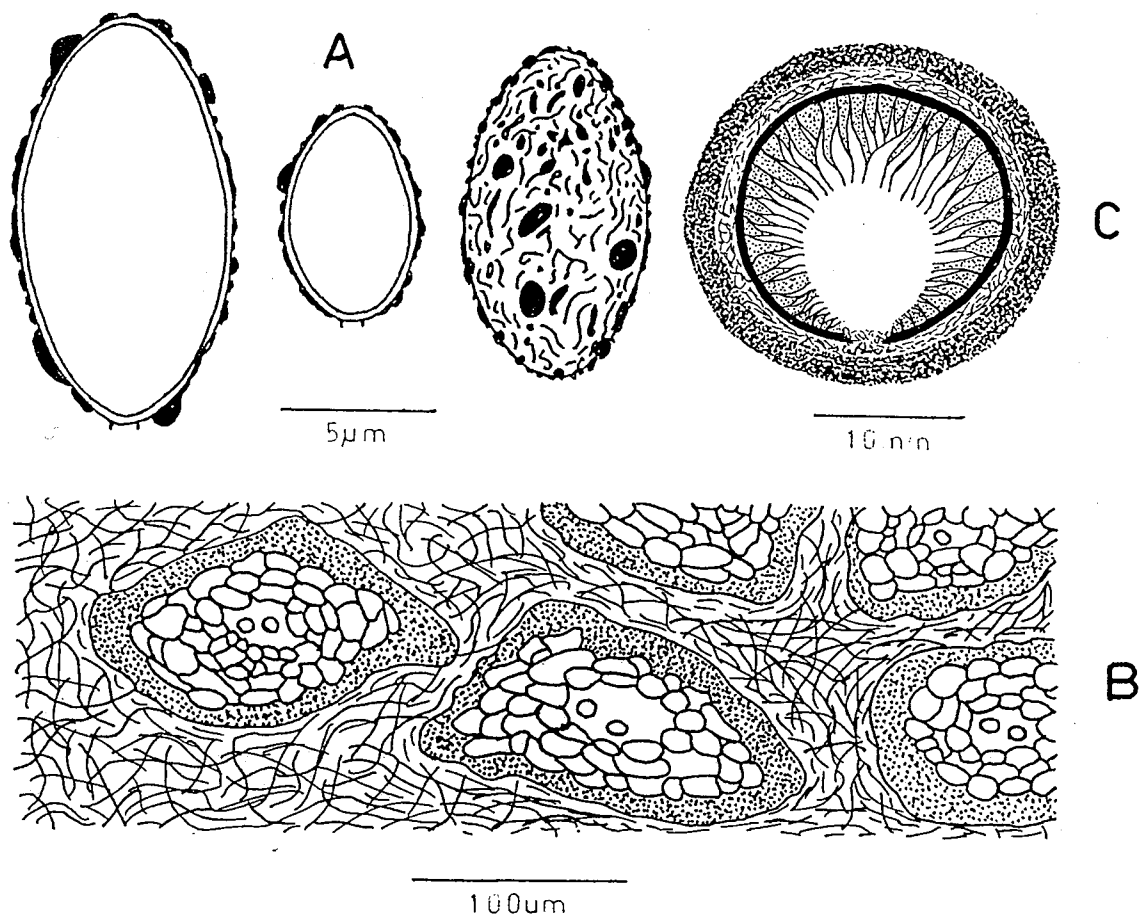


Figure 2. A, Three spores, the left two in optical section; B, Section of mesoperidium with transverse sections of invading rootlets, hyphae diagrammatic; C, Transverse section of gasterocarp: mottled outer area—exoperidium containing charcoal particles, irregularly lined area—mesoperidium with rootlet mesh, solid black line—endoperidium, white area—core and trabeculae, dotted area—spore mass surrounding trabeculae and core.

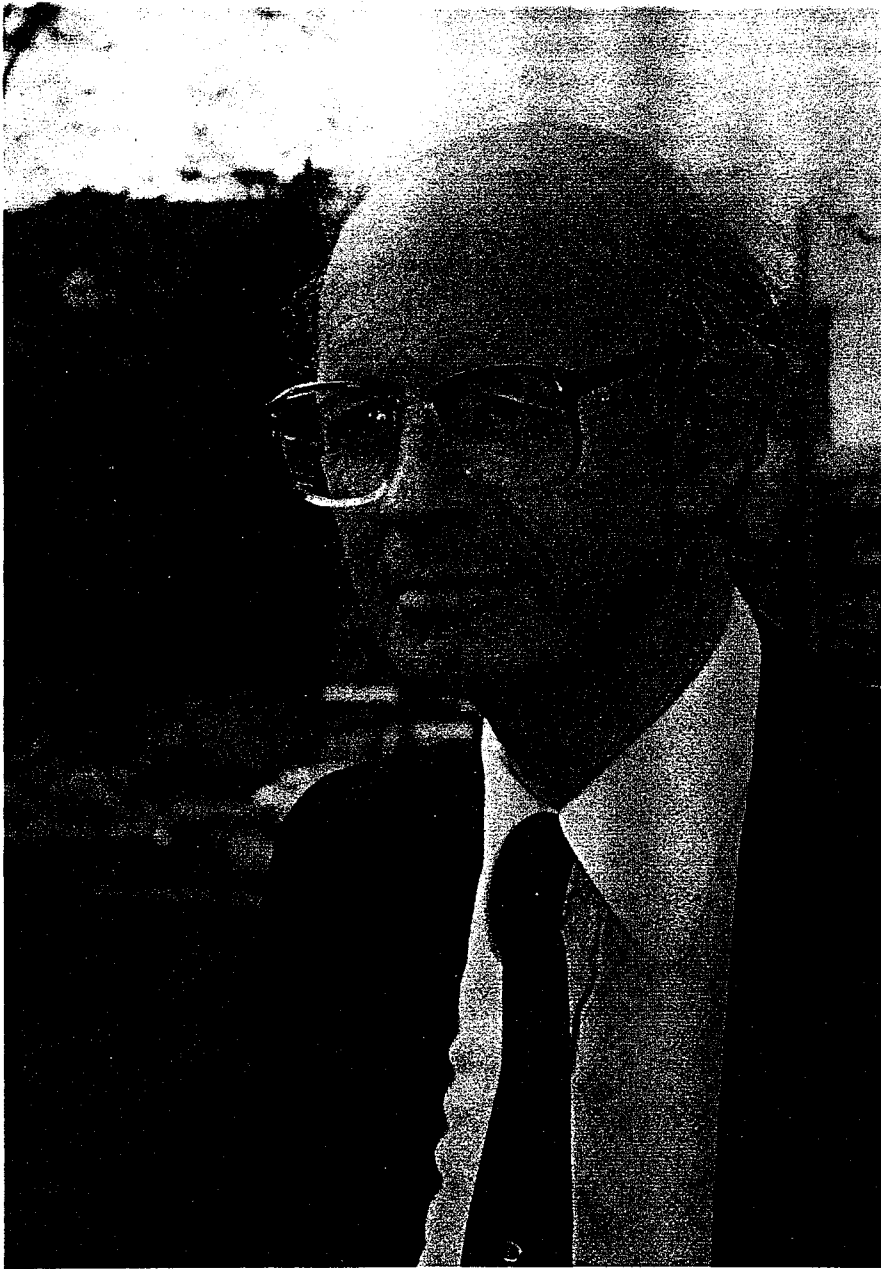


Figure 3. Harry Swart.

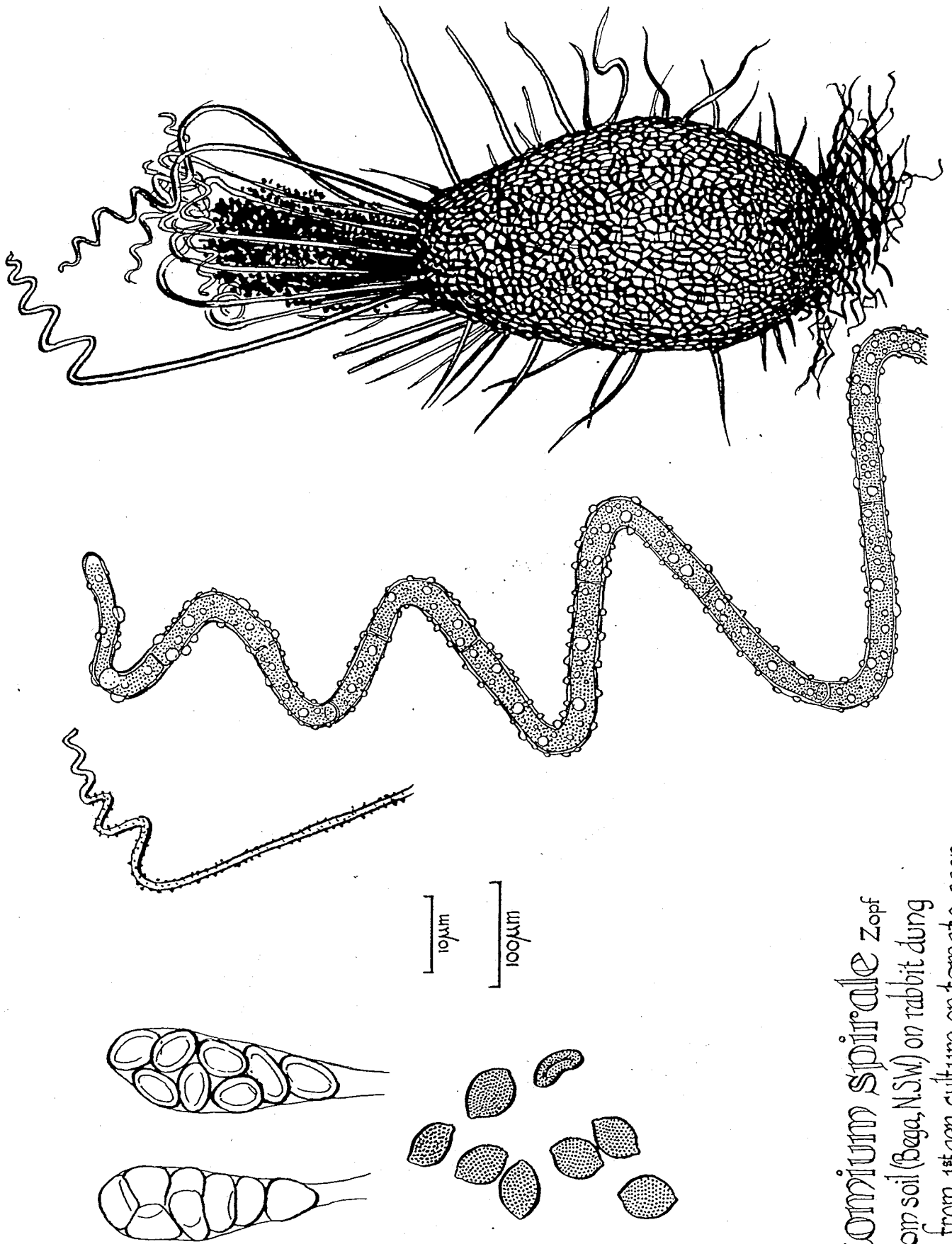


Figure 4. Drawings of *Chaetomium spirale* from a collection from Bega, New South Wales.

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Chaetomium spirale Zopf
isolated from soil (Bega, NSW) on rabbit dung
illustrated from 1st gen. culture on tomato agar

Harry Swart

Harry Swart (1922–1993) (Figure 3), was born and educated in the Netherlands. He studied at the University of Utrecht, but this was interrupted by two years of forced labour in Germany under the Nazis. He completed his degree, specialising in mycology and in 1952 was appointed as a lecturer at the University of Witwatersrand, Johannesburg. While there he completed his doctorate of science and his thesis was a study of the mycoflora of a mangrove swamp on the island of Inhaca, then part of Portuguese East Africa. He published 18 papers on South African mycology.

In 1966 he was appointed senior lecturer in the School of Botany, University of Melbourne. He taught mycology and one of his teaching drawings depicting *Chaetomium spirale* Zopf. illustrates the careful accuracy of his work (Figure 4). In Melbourne he concentrated his research on the microfungi inhabiting the leaves of Australian native plants, such as *Eucalyptus*, *Melaleuca* and *Leptospermum* of the Myrtaceae and on *Acacia* spp. He opened our eyes to the world of leaf inhabitants. While at Melbourne he published 59 papers, describing more than 100 species of fungi. These included many new species as well as redescribing and recording new information about these little known microfungi. In all his papers the accuracy and detail of his drawings were outstanding. He prepared, and drew from carefully prepared hand sections mounted in lactic acid. From these he was able to draw and interpret clearly the relationship of each fungus to its host and the method of spore formation. His ability to observe and to provide a logical interpretation of his observations was remarkable.

For example he observed and drew the callosities produced in the walls of the conidiophores of fungi such as *Mucor* and *Aspergillus* by the invading mycoparasites *Fusarium* and *Verticillium*. These callosities resembled those sometimes induced in the roots of higher plants. In fact *V. dahliae* produces callosities in both *Aspergillus* and in *Dahlia*.

Harry Swart and Gordon Beaton published a joint paper in 1983 on two new inoperculate discomycetes growing on a reed, an Australian species of *Juncus*.

Harry Swart also worked with Dr D.A. Griffiths, then at Latrobe University, Melbourne. This work included fine structure studies of both conidial walls and of conidium ontogeny.



Figure 5. The Gazebo in the System Garden of the Botany School, University of Melbourne.

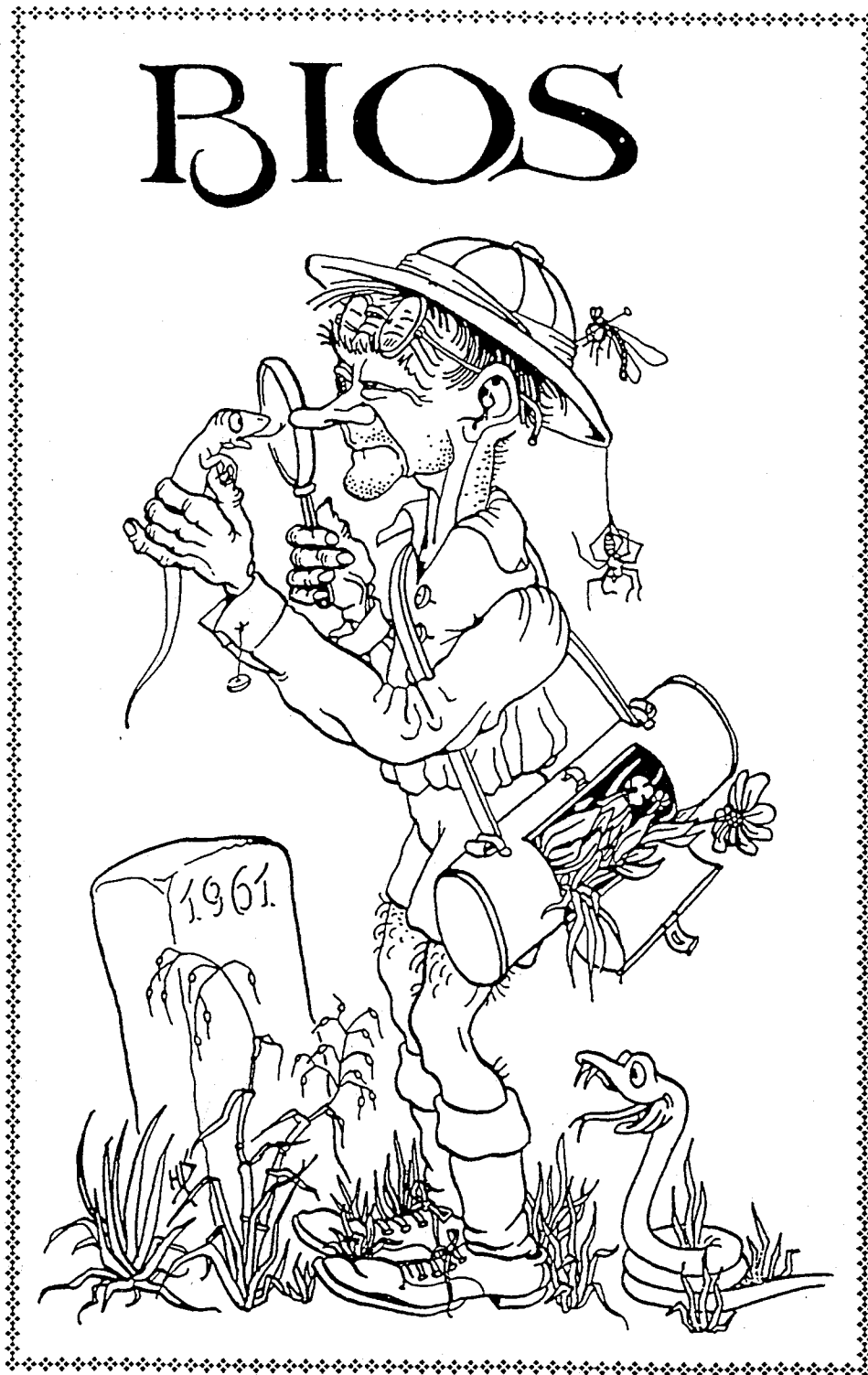


Figure 6. Self portrait prepared for the South African Botanical Society's Newsletter *Bios*.

Harry Swart's taxonomic descriptions and drawings of leaf inhabiting fungi will endure and be appreciated for many years to come, because of his accuracy and because of his skill as a mycological artist. His great contributions to mycology may be listed as

1. The description, classification and drawings of new species of leaf-inhabiting fungi.
2. The production of more accurate descriptions and illustrations of some previously described fungi, resulting in their reclassification in line with modern taxonomic concepts
3. The sorting out of nomenclature confusions. As an example his paper on *Microthyrium*-like fungi on *Eucalyptus* leaves, where he made new combinations for six different genera and species, by means of careful observations and logical interpretations. Each fungus has been carefully sectioned and drawn for the paper. *M. eucalypticola* Speg. produces leaf spots, often with a red margin, on living *Eucalyptus* leaves. The drawings show the ascocarp, the asci, the immature ascospores and the disintegrating paraphyses as they occur on the leaf, and provide detail of the of hyphae within the leaf cells, all prepared from the type material and therefore available to all mycologists. Harry also sorted out the confusion of Coelomycetes growing on *Acacia* phyllodes, involving nine different genera. Cypress canker had been described as caused by six different genera, and Harry solved that problem!

In all the drawings the relationship between the fungus and its host is accurately portrayed. Most of Harry's drawings show both the path and limits of leaf invasion, the mode of spore formation, and the anatomy of the leaf, and are therefore valuable both to mycologists and to plant pathologists. These results were achieved despite the fact that Harry was almost blind in one eye. He used an old fashioned monocular microscope, described graphically as a brass bedstead microscope, a camera lucida and a watchmaker's eyeglass, for freehand sketching of the detail.

Harry was a spare-time artist and made many superb pen drawings. He was fascinated by fine architecture. He produced fruit wines and designed their labels. As colleagues we read each other's papers, and each year he drew me a personalised Christmas card. He also designed cards for the Botany School. The card shown (Figure 5), depicts the Gazebo in the System Garden of the Botany School, University of Melbourne. He prepared illustrations for textbooks and practical manuals. Thus he was in great demand.

Harry Swart had a subtle, clever and often puckish sense of humour. Many a boring meeting was alleviated by Harry's clever cartoons. Lunchtime serviettes were similarly decorated. We called them 'swartoons'. The drawings were pithy and very witty but never malicious. Figure 6 shows Harry lampooning himself on a mycology foray.

Harry Swart and Gordon Beaton may have died but if you listen very carefully you may hear them softly call 'Find me a leaf spot; Find me a puff ball or else we'll haunt you all.'

I owe much of this information to Dr Parbery's (1994) excellent obituary on Harry Swart. An annotated list of the fungi and their hosts from the papers has appeared recently (Simpson & Grgurinovic 1996). I also thank Katrine Beaton (Eildon), Susan Swart (Melbourne), and Dr Anna Williamson (Queensland) for their help.

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