H.B.S. Womersley.

Handbooks of the Flora and Fauna of South Australia, issued by the
British Science Guild (South Australian Branch) and published by
favour of the Honourable the Premier (Hon. R. L. Butler, M.P.)

TOADSTOOLS AND MUSHROOMS

AND OTHER

Larger Fungi of South Australia.

By JOHN BURTON CLELAND, M.D.

Part I.

CONTAINING

GENERAL INTRODUCTION

AND THE

TOADSTOOLS and MUSHROOMS.

WITH ILLUSTRATIONS.

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EDITORIAL PREFACE.

Handbooks of the Flora and Fauna of South Australia, issued by the
British Science Guild (South Australian Branch).

Recognising the need for a wider diffusion of accurate knowledge of our Flora and Fauna, the Guild has undertaken the issue of a series of handbooks.

There is an admitted lack of inexpensive but accurate books dealing with the plants and animals of South Australia, and it is felt that the absence of such has been a real handicap to young Australia, and so to the progress of Australian Science. These volumes, which have been planned to meet the want, are being prepared gratuitously by South Australian biologists and geologists; they will be printed and published by the State Government, and will be available for schools and the public generally.

AUTHOR'S PREFACE.

An effort has been made in this Handbook to combine features of interest to the general naturalist with more detailed technical descriptions of the various species of larger fungi at present known for this State. Though the latter aspect appeals chiefly to the systematic mycologist, whose numbers in Australia are few, others who feel an interest in this branch of botany will not find it difficult to master the terms employed in the descriptive part of this work. Such interest, once stimulated, may lead on to a more complete study of these fascinating and often evanescent plants. Moreover the serious student is entitled to consideration and the work he does in systematic mycology often has important practical bearings. The present study, imperfect as it necessarily is, represents arduous work spread over many years. The field experience thus gained will, it is hoped, help others to acquire more quickly a working knowledge of our larger fungi.

The author has borrowed freely from the generic descriptions in Rea's "British Basidiomycetes," most of which have been adopted *in toto*, and he is indebted to this work in many other ways. Much of the glossary is copied from C. H. Kauffmann's "The Agaricaceae of Michigan," from which has also been obtained most of the information on poisonous fungi. The author would like to express his indebtedness to Dr. G. H. Cunningham of New Zealand, who has critically examined much South Australian material and from whose writings nearly all the section dealing with the Gasteromycetales (Puff-balls, etc.) has been taken. Miss E. M. Wakefield of the Royal Botanic Gardens, Kew, England, has gone out of her way to aid in the identification of Australian specimens sent to her; Mr. L. Rodway, C.M.G., of Hobart, has collaborated with the author in various papers and assisted him in many ways; Mr. Edwin Cheel, Keeper of the Herbarium, Botanic Gardens, Sydney, was a co-worker for many years and has contributed his share to our present knowledge of the subject.

No financial provision has been made in this series of Handbooks for the publication of coloured illustrations. Those appearing in Part I. of this Handbook are due to the generosity of the Government Printer of New South Wales (Mr. A. J. Kent, I.S.O.) and to a private benefaction, and take the place of an equivalent number of uncoloured illustrations. The four plates II. to V. were prepared as far back as 1916 from watercolour drawings chiefly by Miss Phyllis Clarke (now Mrs. North), for publication in *The Agricultural Gazette of New South Wales* as part of a series of articles by Mr. Edwin Cheel and myself appearing therein. The stress of the years of the Great War necessitated the cessation of this series. The four blocks, which had already been prepared, were then put aside by the Government Printer of New South Wales, who has now with characteristic courtesy lent them free of charge to the Government Printer of South Australia for publication in this Handbook. To Mr. Cheel I would like to express my thanks for permission to use these plates, intended to illustrate our joint article. It is necessary to add that the fungi figured from this source have not as yet all been found in South Australia, though probably most of them do occur. Descriptions, from the specimens figured, of those not yet recorded are included in the text in square brackets []. The cost of the blocks for the coloured illustrations in Plates I. and VI. has been paid for out of a small fund at the disposal of the South Australian Branch of the British Science Guild. The watercolours from which they were taken were the work of Miss Phyllis Clarke (Mrs. North) and the reproductions indicate the delicacy and excellence of her technique.

AUTHOR'S PREFACE—*continued.*

Many of the half-tone illustrations in the text have been taken from a large number of further water-colour drawings by Miss Clarke, as well as from drawings by the late Miss R. Fiveash, Miss J. Buxton, and others, all prepared for the author as records in colour of Australian fungi. He is also much indebted to those who have assisted him by taking the photographs (Mr. S. Tee in particular) and in preparing the line drawings.

In the systematic portion of the work, the use of capital letters commencing the names of colours, followed by Roman numerals (thus "Pinkish Cinnamon, XXIX."), means that such colour has been matched with the one so named on the plate of that number in Ridgway's "Color Standards and Color Nomenclature," 1912.

Unless otherwise indicated, the descriptions of the fungi are based on Australian specimens, mostly collected by the author. Thus, where the species is one which had been originally described from some other part of the world, the description given is to be taken as referring to Australian plants believed to belong to the same species. If later it is found that the two are really specifically distinct though closely related, the description will then apply to the Australian species and not to the exotic one. The records of fungi for the other States of Australia are purely incidental, and no attempt has been made to make these complete.

J. B. CLELAND.

The University, Adelaide.

[Watercolour by Miss P. Clarke.

PLATE I.

Amanita ochrophylla (Cke. et Mass.) (No. 5). Chatswood, Sydney. Reduced by $\frac{1}{3}$

GENERAL INTRODUCTION.

The fungi comprise a very large section of the vegetable kingdom. Being destitute of chlorophyll, and thus differing from the green plants, they are unable to utilise the carbon present in the atmosphere as carbon dioxide. They are thus compelled to live a saprophytic, or in some cases a parasitic, existence, deriving their supplies of carbon and also other necessary substances from organic material which has been formed directly or indirectly from chlorophyll-containing plants. In the course of obtaining their food from these various sources, they disintegrate the material and break down the complex chemical compounds composing it into substances of simpler nature, preparatory to building these up again into other forms as part of their own substance. Even the parasitic members obtain their nourishment in the same way. Mechanical as well as biochemical factors participate in the disintegration. We sometimes see bracket fungi growing on telegraph posts, or the rails of a fence, or on the prostrate trunk of a forest tree. These are the fruiting bodies of fungi whose mycelial threads permeate the adjacent wood where their presence can be recognised by the altered appearance and texture. The affected portion is easily broken down and readily crumbles. Part of the air-spaces that were present in the dead wood have become filled by the fungous threads, so that the wood now smoulders on the fire instead of burning freely. With access of moisture, the mycelial threads become turgid and so tend to rend asunder the wood fibres in their neighbourhood, and in addition ferments are secreted by the growing mycelium which lead to chemical disintegration as well. When in the forest the trunk of a tree falls to the ground and wet weather supervenes, fungi of various kinds and bacteria invade the dead material, gradually permeate it, and in the ways mentioned lead eventually to its complete disintegration, being aided in the process by other lowly forms of life, and by insects and related animals. With warmth, the process is hurried up, if sufficient moisture be present so as to give a humid atmosphere; with cold it is retarded, and in the relative absence of moisture it is arrested or nearly so. In the arid interior of Australia, unless attacked by termites, the destruction of timber is exceedingly slow, whilst in a tropical jungle a great tree that has fallen may disappear entirely in a surprisingly short time. Were it not for this beneficent disintegration by fungi and bacteria, the forest floor would soon become deeply littered with fallen boughs and leaves and a rich humus would fail to develop. Seedling plants would not find room to grow, and in the course of time the forest itself would necessarily cease to exist. Fungi, aided by bacteria, are then the great scavengers of the forest and of effete plant material as a whole, just as bacteria aided by insects are, under natural conditions, the chief means of removing animal carcasses. The forest tree is like Imperial Caesar, and the "clay" to which each is turned serves an ever-useful purpose and is again built up to form forest-trees and Caesars of a younger generation.

It is not the purpose of this Handbook to deal with the great group of fungi as a whole. This would be a stupendous task, even dealing with the South Australian members alone. There are so many branches, and the work in each is so specialised, that the various divisions would require to be dealt with by separate workers. It is advisable, however, to indicate briefly what these different divisions are, so that we may appreciate more clearly the relationship borne by our special subject to its allies in mycology. The bacteria are closely related to the fungi and pass by almost imperceptible gradations from unquestioned bacteria to quite obvious fungi. To the bacteriologist dealing with human, animal, or plant diseases, or with the bacteriology of the soil, or the maturing of tobacco, or the making of butter, or the tanning of leather, or even the manufacture of white lead, we leave the bacteria. To one of his tribe we leave also the study of such true fungus diseases of man as ringworm and thrush, as well as the yeasts, also true fungi, that make our bread rise or brew our beer. This Handbook will not deal either with the many kinds of moulds that grow on damp bread, that cover our boots in the tropics, or cause patches and decay on tarpaulins, or sometimes disfigure the carcasses of meat in cold storage. These fungal organisms and their allies are many, most are minute and require microscopic study to appreciate them at all, their structure as fungi

is relatively simple, and they form no large and obvious fruiting bodies. Moreover, we will not consider the microscopic fungi that play such a part in injuring plants of economic importance to man. This group falls to the lot of the plant pathologist. The majority of these fungi are microscopic in themselves, though the reactions in the host-plant's tissues to which they give rise may be quite large and striking in appearance. The rusty galls on many of our acacias due to species of *Uromyces* are an example in point. In some cases, indeed, the fungus itself may form a body obvious to the naked eye and of a definite shape, as is the case with the sclerotium of ergot found on one at least of our native grasses. However, as a rule there does not occur amongst these plant pests any fungous forms that suggest at all closely a "toadstool," a mushroom, a bracket fungus, a coral-or jelly-fungus, or a puffball. The majority of the diseases of plants, shown by wilting, spots on leaves, pustules, die-backs, warty or distorted growths and galls, when not due to insects or mites, are caused by fungi not closely related to the larger forms with which we are concerned. Occasionally such a disease, as for instance silver-leaf of plums, is due to the mycelium of one of these larger forms, though the fruiting of the fungus is rarely seen. However, such fungi as the rusts, though more or less microscopic, are not so distantly related to the toadstools as one might think. Moreover, we find that many of the fungi studied by the plant pathologist have their spores contained in special sacs called *asci* and these correspond with similar structures found in some large fleshy, and in some cases edible, fungi (such as *Morchella*) with which we shall deal.

The fungi which live in intimate association with the roots of epiphytic orchids in tropical forests also do not come within the purview of this Handbook. These fungi, living thus in symbiosis with the cells of these higher plants, are probably of material service to the orchids and would seem to be essential for the development of their seeds.

The lichens constitute a curious class of plants inasmuch as each species is of composite origin, being the result of the intimate living together of a species of alga with a fungus species, the result being a structure entirely different in appearance from what would be seen were the alga and the fungus each leading an independent existence. The lichens also are outside our scope.

With what then do we propose to deal? It is with a large group that in the fruiting condition exhibit obvious fleshy, leathery, woody, or jelly-like structures of a form and coloring peculiar to each particular species. Nearly all these forms are classifiable under one division of the fungi known as the *Basidiomycetes*, the structure of which indicates that the plants concerned are amongst the most highly developed or complex of the fungi taken as a whole. In addition, we shall include also a few genera that show somewhat similar conspicuous more or less fleshy fruiting bodies, but which have their spores contained in sacs (*asci*), each sac possessing eight spores. This latter great division of the fungi is, in consequence, known as the *Ascomycetes*, and it is to be noted, as already stated, that some of the microscopic species of this division play a prominent part in the causation of plant diseases. We will not deal with these small forms or with a number of more or less saucer-shaped species amongst the *Discomycetes*, which also have their spores in *asci*. These latter, varying in size from less than a threepenny piece to that of half-a-crown or more, might quite well be included in our category, but no thorough attempt has as yet been made to work out the South Australian species.

From the point of view of this Handbook, then, the "larger fungi" embrace all the *Basidiomycetes*, even though some may be not much larger than a pin's head, together with a few of the most highly developed *Ascomycetes* that have prominent fleshy fruiting bodies. As already stated, the *Ascomycetes* are characterised by having the spores—or at least certain spores—contained at one time within definite little sacs. In the *Basidiomycetes*, the spores are not developed in sacs, but are borne at the end of certain fungous hyphae, known as basidia, usually projecting from the basidium on the ends of delicate processes known as sterigmata. Each basidium usually supports four spores. The gills of a common mushroom possess numerous basidia with their free ends projecting from amongst the other hyphae, and on each basidium will be seen four sterigmata capped each with a spore. In this way the spores are raised from the surface on which they have developed so that when mature they can fall free from the gills and be distributed around by currents of air.

When a fungus spore finds a suitable medium in which to grow and begins to develop, it becomes transformed into a mycelial or fungous thread, both the spore and the thread being of microscopic size. This, as nourishment is absorbed, becomes longer and longer, transverse septa appear and branching takes place. The food supply becomes permeated by these strands. For days or weeks, or perhaps for years, the young fungus plant continues growing in this way when conditions, such as warmth and moisture, are favorable. Eventually a large portion of the food supply may in the end be converted into the fungous mycelium which may form a considerable mass of tissue, though not necessarily a compact mass. During this active growth surplus material is stored up to be made use of, when the favourable time comes, for the rapid production of a definite fruiting structure in or on which multitudes of fresh spores will be formed. To take the common mushroom as an example, for many months the fungus plant labours at producing an abundant 'spawn,' in which is stored up material that can be rapidly transferred to produce the mushrooms themselves. The spawn may live for several or many years, annually under suitable weather conditions producing a crop of mushrooms. These, though they may 'come up in a night,' do not really represent the result of a single night's work on the part of the fungus plant. The materials of which the mushroom is composed have taken a long time to elaborate. They have been stored up ready to be rapidly transferred to those points where, on the mass of fungous hyphae, the buds of the future mushrooms have been laid down. When the auspicious time comes, the transfer is rapidly made and in a single night, or at least in a short space of time, the mushroom itself emerges from the ground, in the words of Milton rising 'like an exhalation,' raises itself aloft, expands its cap and exposes its gills. We sometimes hear of a house being built in a day—more correctly speaking we should say erected in a day. Much labour over many days has been spent in making the doors and fashioning the rafters and collecting the materials. The mushroom may be erected in a day, but the materials used in building it up have required weeks of constant incessant toil unseen.

It is with these finished products, the fruiting bodies of the fungi concerned, that this Handbook deals. The more or less hidden mycelial strands of the various kinds of the higher fungi differ not so very much from each other, and are rarely compacted into definite masses or possess any special architecture. With the fruiting bodies, however, it is different, and by the arrangements of the parts, the colours, sizes, and shapes of the structures, the characteristics of the spores and other features, the various species can be readily recognised and described and their relationships with each other ascertained or conjectured. Though individual variations may be considerable, the factors in common render the recognition of species possible to the mycologist who takes the pains to ascertain and define them.

WHY STUDY THE HIGHER FUNGI?

A question that one must be prepared to answer is, what is the use of the study of these higher fungi? One may make the stereotyped reply that a full consideration of the life history and the appearance and behaviour of any living being is in itself well worth while, as helping us to know ourselves more fully, and to appreciate our surroundings more clearly, as well as constituting a part of the pursuit of knowledge, which in itself is deemed a sufficient justification. Further, we may say that this is a harmless and engrossing hobby, fully capable of keeping idle hands from mischief, and if you feel inclined that way, we are here to guide you so that you may rapidly pass through the prentice stage in which discouragement may arise. Apart, however, from the intrinsic interest presented by these organisms, there are not a few aspects of practical importance connected with them; the pursuit of specimens is a healthy exercise, and many species are objects of high artistic value both as regards form and colour. Under the headings that follow, it will be seen that such a study can be made to serve a number of useful purposes.

THE USES OF THE HIGHER FUNGI.

The eating of the Common Mushroom (*Psalliota campestris*) is the only general way in which in Australia any member of the higher fungi is put to practical use. There are a number of other known edible species in Australia, but these have been sampled only by the initiated or by immigrants from Continental Europe, who recognised, or thought they recognised, species eaten in the home land. The edible fungi will be dealt with under a separate heading.

In other parts of the world, and even in Australia, several species have been found of service to man. Thus rotten wood, permeated by the mycelium of a fungus, has been used for polishing the fine parts of the highest grade of Swiss and French watches, though this has now been largely supplanted by other methods. At one time "the best quality, which is soft and spongy and yellowish-white in colour, cost a dollar a pound, and four thousand dollar's worth was used annually in Switzerland."

The ripe spores and short capillitium threads of the Giant Puffball (*Calvatia gigantea*), a species that has been recorded for Australia, have been used as a haemostatic for stopping the flow of blood from wounds. The statement has been made that even spurting arteries may have the issuing blood rapidly clotted by the application of this soft powder. Recently, in Adelaide, the similar structures of *Calvatia candida* found growing at Kinchina, near Murray Bridge, were employed to try to stop the persistent oozing of blood from the nose, all other methods of control being found of little value. No definite success could, however, be attributed to this procedure.

For mounting such delicate insects as flies and mosquitoes for entomological collections, pith is often employed, into which the delicate silver entomological pin impaling the insect is inserted. The substance of a large thick milk-white bracket fungus (*Trametes lactinea*), common in New South Wales on dead trees, has been found to be an excellent substitute. This material is pure white, soft, but of close texture, and can be readily cut to suitable sizes by means of a razor.

Amadou, which seems to have been *Fomes fomentarius* and probably other species, was in years gone by in common use as tinder. Dry specimens of some of our bracket fungi, such as *Polyporus eucalyptorum*, will readily catch fire from a small spark and smoulder away slowly. Razor strops have also been made by cutting certain dried polypores into thin strips, fastening them to a piece of wood and dusting the spore-bearing surface with siliceous earth. Quite recently the Forestry Department in Queensland sent me some specimens of bracket fungi, which proved to belong to two different species, *Ganoderma applanatum* and *Fomes hemitephrus*, which were being used for making razor strops.

Polyporus australiensis, which has been found growing in New South Wales, Flinders Island in Bass Straits, and South Australia, is when fresh rather juicy, the juice being of a rich saffron-yellow colour and staining the fingers and any other objects with which it comes in contact. On Flinders Island some years ago use was made of this property for staining raffia fibre, with great success.

The spores of many of the puff-balls are spherical in shape and in the neighbourhood of $1/5,000$ of an inch in diameter. Some are perfectly smooth, others rough. It sometimes happens that smooth spherical bodies of about this size are required for some purpose and such fungi suggest a source that may serve this end. Such small bodies offer much resistance to the downward pull of gravity, and consequently fall relatively slowly. Buller has shown that the spores, usually elliptical, of some agarics resembling the common mushroom fall about an inch a minute in a perfectly still atmosphere. Any little disturbances in the air, such as convection currents, blow the spores about in all directions, so that in the air of an ordinary room spores may remain suspended probably for hours, and some, instead of falling to the floor, may be found to have settled on pictures or the ventilators near the ceiling. During the great influenza epidemic it was desired to know to what extent very minute dry particles might be inhaled into the lungs, particles represented by droplets of saliva or sputum coughed into his surroundings by a patient suffering from the pneumonic form of influenza. Such particles, containing perhaps the living virus of the disease, would soon lose their moisture and, being very small, would like tobacco smoke be wafted hither and thither by currents of air. Though the spores of puff-balls were many times larger than these minute dried droplets of influenza spray, the spores being easily recognisable were chosen to ascertain with what rapidity minute particles could reach the deepest recesses in the lungs, the little terminal spaces or alveoli where the work of oxygenating the blood is carried out. It is held by many that the air in the utmost recesses is changed but slowly, and consequently small particles are not likely to reach them by inhalation, becoming glued to the mucus on the narrow passages leading to them. A monkey had a puffball pinched in front of its nose and was killed within a minute of this procedure. Even in this short space of time, a few spores had reached the alveoli where they were microscopically recognised.

The spores of mushrooms have served detective purposes for public health ends. Some years ago in Sydney, burnt almonds were exposed for sale in a shop window in which mushrooms were also displayed. Specks on the sweets were believed to be due to the excreta of cockroaches, which abounded. Mushroom spores were recognised in the specks by their colour, shape, and size, and were also found in the alimentary canal of the cockroaches. In consequence of this undesirable deterioration of the food, the burnt almonds were seized and destroyed, even though their consumption would not have been likely to injure health, unless these same cockroaches had had access also, as they might have had, to other definitely deleterious materials.

The size, shape, and colour of the spores of any particular species are so constant, uniform, and characteristic that it has been suggested that they might be incorporated in an ink as a further protection against forgery as in the *Coprius* "ink" used by Bulliard and recommended by Boudier for this purpose. It is also possible that they may be of use for police purposes. If a constable, attempting to arrest several resisting men in a melee, could mark these persons by discharging an "ink pistol" at them, the likelihood of their being captured, when reinforcements arrived or before they could slink off to their haunts and get rid of the clothes and wash themselves, would be increased. If the Indian or other special ink employed was impregnated with particular fungus spores, from different species for each police officer, then not only could the stain in the clothing be recognised as a police stain, but the constable who had caused it could be ascertained.

PINE SEEDLINGS AND FUNGUS GROWTH.

It is known that some plants, such as epiphytial orchids, are dependent, during part of their development at least, on the association in their roots of fungus hyphae with the orchid tissues. The fungi concerned in this process rarely belong to the division with which we are dealing.* Similar symbioses between vascular plants and fungus hyphae occur in other families, such as the true beeches, and have been described by the late Professor Lawson of Sydney in the prothalli of the Lycopodiaceous genera *Tmesipteris* and *Psilotum*. The nodules in the roots of so many species of legumes, many of them Australian, are

* The Japanese Kusano has found the hyphae of *Armillaria mellea* associated with the flowering tuber of the orchid *Gastrodia elata* Bl. A. mellea, the Honey-Fungus, a white-spored Agaric, is found in this and the other States. A species of *Gastrodia* occurs in New South Wales.

similarly due to the association of bacteria with the plant tissues, the bacteria fixing nitrogen from the air and so benefiting the plant. In our forests of exotic species of *Pinus*, several unrelated species of fungi, *Boletus luteus*, *Thelephora terrestris*, and *Rhizopogon luteolus*, for example, may be found growing, and only in such situations (under or near species of *Pinus*). These fungi are obviously introductions. They did not occur in Australia before Europeans introduced species of *Pinus*. Probably the spores came here associated with the seeds or on lumber or goods from overseas. Possibly they may have come directly by the air, having been blown up in dust by winds, and finally accidentally have descended in Australia in drops of rain and found awaiting them the host they required. In Western Australia difficulty was experienced at times in starting nurseries for pine seedlings in new situations. As the result of general observations from a wide angle, it was eventually thought that possibly one of these species of fungi, *Rhizopogon luteolus* was decided on, might be a help-meet to, if not a necessity for, the pine seedling in establishing itself. The hyphae of the fungus, it was thought, might aid in some way the growth of the rootlets of the plant and supply some food that was lacking. *Rhizopogon* is quite common in the loam of pine forests appearing as small irregularly spherical brown bodies, usually about an inch in diameter, with thread-like strands of hyphae stretching over the surface. They are usually found half-emerged from the ground. By taking the mycelium, mingled with the pine-needles, and the fruiting bodies from an old pine forest and distributing this material on the seed-beds, the difficulty in establishing the nurseries was successfully overcome. These results are suggestive that *Rhizopogon* is of use to the young pine-plant, but as yet it cannot be stated with certainty that such is the case. The fleshy pore-forming *Boletus luteus*, with a sticky cap like a yeast bun and old-gold colored pores underneath, has also been thought of as possibly playing a similar role.

FUNGI AS FOOD.

The actual food value of the higher fungi is probably practically negligible. It is doubtful whether the proteids and other substances of mushrooms and their edible allies can be broken down and assimilated to any appreciable extent by man or other mammals so as to be a source of energy to them. It should be remembered, however, that the yeasts used in making bread and beer, which yeasts are also fungi, are a fertile source of one of those accessory food substances, the vitamins, that though absorbed in only small quantities are nevertheless essential for proper development. The yeasts yield vitamin B in abundance. It has recently been shown that the appalling infant mortality in one of the phosphate-bearing Pacific islands was due to the lack of a sufficient intake of this vitamin. It had previously been supplied by the drinking of fermented cocoa-nut juice. In the interests of the natives, the authorities had suppressed the manufacture of this alcoholic beverage. Though offering manifest advantages in certain directions, as an indirect result it became almost impossible to rear children. When the cause of this was ascertained, the yeasts necessary for the babies were supplied by growing them in another way. It is possible that the small beer given to schoolboys several generations back may have supplied them with abundant vitamin B, which supplemented a diet possibly rather meagre in some directions. It is doubtful, however, whether mushrooms are likely to contain any appreciable amount of vitamin B.

This does not mean that mushrooms are probably without value as edible substances. They are remarkably sapid and tasty, and in consequence make a pleasant, appreciated, and withal innocuous change in the routine of meals, and serve as a vehicle for the ingestion of more useful though less relished food-substances. A tasty morsel stimulates salivary secretion by the sense of smell and its modification savouriness—taste, a different sense, being confined to such qualities as acidity, sweetness, bitterness, and saltiness. Stimulation of the mouth secretions leads secondarily to stimulation of gastric secretion to deal with the insalivated food. So good digestion truly waits on appetite, and appetite in turn on appreciated food suitably prepared and pleasantly served. Our mushroom then serves this purpose more particularly, a purpose by no means to be despised.

We possess probably a number of edible species besides the well-known Common Field Mushroom (*Psalliota campestris*) and its coarser larger relative the Horse Mushroom (*Psalliota arvensis*), both of which are eaten readily by us. Some of these other edible kinds are introduced species, known as being eatable in other parts of the world, and often highly esteemed. Some of these

the writer has eaten, though with much circumspection. It is very necessary to use great caution, as in some cases poisonous kinds may closely resemble edible ones. In a new country such as this, without an experience of many centuries of "mushroom" tasting behind us, we might easily mistake an indigenous and possibly poisonous species for a European innocuous kind, which it might possibly closely resemble. Our own peculiarly Australian species will doubtless be tested for edibility in the course of time. This testing will, however, not be without danger, and even the administration of them to animals, such as guinea-pigs, rabbits, or even pigs, without harm does not necessarily imply that man can consume them unhurt. The testing will therefore require great care, and should not be attempted without a full appreciation of the dangers and a good knowledge of local mycology. Here we would emphasise the great importance of no one eating any mushroom unless he is absolutely certain that it is the kind he thinks it is, that it in no way departs from typical members of this kind, and that it is not decayed, and has not been attacked by insects. For us this practically means that the ordinary gatherer of mushrooms should see that what he intends to eat consists of absolutely typical clean, fresh mushrooms. He should discard any of which he has the slightest doubt.

We may state here—and state emphatically—that there is no royal road for distinguishing edible from poisonous species. Other kinds besides the field mushroom have pellicles which can be peeled from the cap; others have a ring on the stem. The tarnishing of a silver coin may furnish well-grounded suspicion, but the lack of this does not necessarily connote innocuousness. A fungus whose flesh turns blue or green when sectioned would doubtless deter us from eating it, but does not in itself denote danger.

In Australia, the Common Field Mushroom (*Psalliota campestris*) is extensively eaten. It is characterised by growing in grassy places, and also in sandy soil, by its white cap, often beset with thin brownish fibrils or scales, a ring on the stem, and gills which are bright pink even when young, becoming purplish brown when old.

The larger, coarser Horse Mushroom (*Psalliota arvensis*) is also much eaten, and many of the large mushrooms sold in the shops appear to be this species. The gills when young are pallid whitish, and pass through a stage of a dingier pink to become purplish brown in the end. There is a ring on the stem. The mushrooms often grow in rings in fields or on hillsides. Unless the pink or purplish-brown hue of the gills is definite, or the collector possesses an extensive knowledge of our fungi, it is wise to discard any "mushrooms" which have very pale gills.

Mushrooms in which the flesh or cap turns yellow on bruising (*Psalliota xanthoderma*) are not uncommon, growing under trees or bushes. The gills, like those of the Horse Mushroom, are never a bright pink, but pass from whitish to dingy pink and then purplish-brown. I have eaten these, but the species is said to upset certain people.

Lepiota naucina is said to be an edible species. I am not aware of its having been tried in Australia. It resembles somewhat a mushroom in being white and having a ring on the stem and no cup or volva at the base of the stem, but the gills are white, and remain so.

The Parasol Mushroom or Agaric (*Lepiota procera*) grows amongst grass under trees in our National Park and elsewhere. I have eaten it and found it palatable. These Agarics have large caps, which are several inches across, convex with an elevation or umbo in the centre, whitish, and clothed with brownish scales, creamy white gills, not reaching the stem, a long rather thin stem with a ring, often movable, on it (hence the name Parasol Mushroom), and a soft texture.

Several of the *Coprini*, which have black or blackish spores and gills which deliquesce as they mature, are edible. The only one I have eaten, and found good, is *Coprinus comatus*. It has been found growing on a lawn in our Botanic Gardens. It has a fairly large cylindrical pileus, whitish and shaggy-scaly. The gills are close, ascending, whitish, then pinkish, and finally blackish and deliquescing. The long stem has a movable ring on it. These mushrooms must be eaten before the gills change colour and become dark.

In Sydney I have eaten a small apricot-orange coloured agaric (a small representative, apparently, of the edible European *Cantharellus cibarius*) and a similarly-coloured club-shaped *Clavaria*. *Cantharellus* is a genus characterised by thick, often forking, gills with obtuse edges. It is interesting that both of these had not only an apricot colour but also an apricot taste.

Under introduced pine-trees, and only under or near such, members of a large fleshy pore-bearing fungus (*Boletus luteus*) may be found after rain. The upper convex surface is brown and sticky when moist, the pores are yellow, becoming old gold in colour, and there is often, but not always, a marked ring on the stem. If not old, the soft flesh, after removal of the cuticle and the pore-bearing surface, is edible, but I have found it rather insipid.

The Puff-balls are said to be edible in the young stage when the substance is white and before there is any change to yellow. I have eaten with caution two kinds. These were cut into slices and both had a taste very like cheese fritters. One of these was the common *Lycoperdon depressum* which tends to grow in rings, is rather top-shaped in appearance, and on section shows a kind of diaphragm in the middle separating a cellular basal half from the upper portion, which turns yellow and becomes changed into the dust-like spores. The other was a large species, two or three inches in diameter, which at the time of eating I thought was a *Calvatia*, a large kind of Puffball which when mature disintegrates, and so lets the spores escape instead of these emerging through a definite aperture as in *Lycoperdon*. The *Calvatias* are said to be edible in the white stage. It turned out that the species I ate was the white young stage of *Mycenastrum corium*, a species in which the mature leathery peridium or outer covering splits irregularly to let the fuscous brown spores, etc., escape.

The Beefsteak Fungus (*Fistulina hepatica*) has been found twice in South Australia, growing on fallen logs at Mount Lofly. The name is derived from the appearance of the cut surface. The under surface consists of tubes which are separable from each other. It is said to be edible.

The Jew's Ear Fungus (*Hirniola* or *Auricularia auricula-Judae*) is abundant in New Zealand, whence many thousand pounds' worth of it have been exported into China for eating purposes, apparently on account of its mucilaginous characters. It grows on old trunks in New South Wales. In shape it somewhat resembles a very dark ear. When in Sydney I had some cooked for a long time, but found it in the end still tough and leathery.

Amongst the Ascomycetes, Morels (*Morchella*) are found occasionally in this State. I have eaten them on one occasion.

THE PREPARATION OF MUSHROOMS FOR FOOD.

Any decaying or insect-eaten mushrooms should be discarded, as well as any that are not typical. They should have been gathered as free from sand and soil as possible, the stems being cut through a little way below the cap. Peel the mushrooms and cut the stem off short. Then wash well in salt and water. The mushrooms may now be dealt with in various ways, either for eating directly or for making into ketchup. They may also be dried, and thus kept for later use in flavouring dishes, but if so do not wash them in the salt and water before drying—they should be exposed to the sun or dried in a draught on a stove or before a fire in such a way that the moisture in them is soon evaporated and they become neither sodden and partly cooked nor decomposed during the process. They should be stored in a dry place.

It is not proposed to give a series of recipes for preparing mushrooms for eating. For such Mrs. Beeton should be consulted, where some sixteen different ways of using them are given, from ketchup to mushroom patties, and for baking, boiling, stewing, pickling, or stuffing them. A simple method is to fry the mushrooms gently in a little butter for twenty minutes or till cooked. Then add a little milk, thicken with flour, bring to the boil, and serve on toast with bacon if liked.

POISONING BY TOADSTOOLS.

Owing to the fact that fungi, with the exception of the common well-known and fairly characteristic mushroom, are hardly consumed at all by Australians, instances of illness due to poisoning by some other species have been few and fatalities still fewer. The Australian of British origin does not readily depart from the tradition handed down to him—that most fungi are poisonous. On the continent of Europe many different kinds of toadstools and mushrooms are consumed and many are found to be delicious. The peoples of Central Europe know the edible kinds and avoid the injurious. Such persons coming out to Australia see in the autumn abundant mushroom-like fungi, some of which may be identical with those they knew in their homeland, and others, though really

different, may seem superficially to be kinds familiar to them. Such persons are probably apt to make mistakes and ingest fungi here which are poisonous, believing them to be the same as edible species in the country from which they came.

Mushrooms of various kinds, *Boleti* for instance, have been considered delicacies from Roman times. Sometimes deliberately, sometimes in error, poisonous species have been included in the dish and have led to fatal results. Pope Clement VII., two Emperors, King Charles VI. of France, one of the Czars of Russia, and the family of the great poet Euripides, are considered to have been victims of mushroom poisoning. In some countries of Europe the deaths have been estimated as high as 100 or more annually. Numbers of deaths have also been recorded in Japan and in the United States. It will thus be seen that where fungus-eating, or mycophagy, is prevalent, a considerable mortality may result through mistakes being made.

In considering poisoning by toadstools one has to consider several aspects. Some kinds may be looked upon as being more unwholesome than actually poisonous, or may be found unwholesome for one person and not for another. By "unwholesome" one means that they give rise to discomfort by proving indigestible, the discomfort being relieved by vomiting. Some persons can probably eat and enjoy certain kinds, whilst others are more sensitive and reject the food just as they might an indigestible morsel. The horse mushroom (*Pasalliota arvensis*) is said to be unwholesome for some people, though it is eaten with relish by others.

Another group of cases may possibly represent what is termed "sensitization." Some persons, for instance, cannot eat strawberries, or porridge, or oysters, or some other particular food without feeling discomfort and developing some areas of urticaria (nettle rash). Some people may develop attacks of asthma as the result of some particular food that has been ingested, or even as a result of inhaling dandruff from a horse in some cases, or material from feathers in feather pillows in other instances. So we may find a particular individual susceptibility to the common mushroom or to some other species edible to the majority. Persons showing this idiosyncrasy will probably show it to other substances as well and be liable to attacks of nettle-rash, asthma, or hay fever from such various causes.

Coming to true poisoning by mushroom-like toadstools, we find that in other parts of the world the majority of the cases have been due either to poisoning by *Amanita phalloides*, the "death-cup fungus," or "white amanita" or "the destroying angel," or to poisoning by *Amanita muscaria*, the "fly agaric," with its scarlet warty cap. The poisons of these two species are quite distinct and each is very characteristic. In addition there are a number of examples of miscellaneous kinds of poisoning due evidently to definite toxic substances of unknown nature found in particular species. Though no known instances of poisoning by *Amanita phalloides* have hitherto been recorded in Australia it is advisable that the symptoms should be detailed as the species probably occurs and cases may eventually arise. The fly agaric has been found in various parts of Australia though as yet no known instances of poisoning by it have occurred.

Poisoning by *Amanita phalloides*.*—*Amanita phalloides* is a large fungus measuring 2in. to 5in. across with an amber brown or smoky olive cap, free gills, an ample white ring in the upper part of the stem, and a tall sturdy stem with a loose volva or cup at its base. The ring and the volva with the white gills and white spores indicate that the fungus belongs to the genus *Amanita*. It is wise to avoid absolutely all species having such a volva or cup at their base. It is true that some species of *Amanita* are edible, but others, as this one, are very poisonous, and so far in Australia no one has as yet experimented with our *Amanitas*.

Very small quantities of *Amanita phalloides* may cause death. A child of ten died from eating raw a third of the top of a small plant, and two children after taking some of the juice soaked in bread. The mortality has been placed as high as 60 to 100 per cent. After ingestion there is usually a stage of from 6 to 15 hours, usually more than 10, in which little or no discomfort is felt. There is then sudden extreme abdominal pain, cramp-like in nature, with vomiting and with diarrhoea of undigested food with blood and mucous discharges soon

*The accounts which follow of poisoning by *Amanita phalloides* and by *A. muscaria* have been condensed from Dr. O. E. Fischer's article on "Mushroom Poisoning" in C. H. Kauffman's "The Agaricaceae of Michigan."

becoming like rice water. There is an intense thirst, the urine is suppressed, and there is perspiration and sleeplessness, with great nervous restlessness and weakness. Muscular spasms may cause severe pain. The urine does not become tinged with the colouring matter of the blood. Within a few days jaundice and blueness, and coldness of the extremities, are followed by profound unconsciousness and death. Towards the end there may be eye-symptoms, the pupils varying in size, and convulsions may occur, though rarely. Death may take place within 48 hours if large quantities have been eaten, or if they have not been thoroughly cooked. The usual course of the disease is from 4 to 6 days in children, and from 8 to 10 in adults. No antidote is known. Emetics, the stomach tube and purgations should be employed as soon as danger is suspected to get rid of as much of the unabsorbed fungus as possible. Milk (raw or boiled) should be given. Normal salt solution (about a teaspoonful of salt to a pint of water) may be given by the bowel to relieve the thirst. Strong coffee and hot dry applications, with digitalis and camphor subcutaneously, may all be of service. The pain may have to be relieved as well as the cramps. Cyanosis may call for oxygen inhalation. Transfusion of blood has been suggested.

The nature of the poisonous substance is uncertain. There would appear to be two constituents—one is a haemolytic agent and is capable of dissolving out the haemoglobin from the red cells of various mammals. This haemolytic agent, apparently a glucoside, is very sensitive to heat, to small traces of acid, and to the digestive ferment in the stomach, and therefore probably plays no part in the poisoning of man. The essential poison, the *Amanita* toxin, will resist heat, drying, and the digestive juices. It apparently is not a glucoside or an alkaloid.

Poisoning by *Amanita muscaria*.—Poisoning by the fly agaric is quite distinct from that due to *Amanita phalloides*. This toadstool has a bright scarlet cap covered with broad white warts, and cannot be readily mistaken for one of the edible kinds, and certainly in no way resembles the common mushroom. There is usually only a short interval, half to one hour, or perhaps a little longer, before the symptoms develop. If the specimens are small, five or six hours may elapse. There is excessive salivation and perspiration, a flow of tears, the throat feels constricted, and there are nausea, retching, vomiting, and watery diarrhoea. The pulse is usually slow and irregular, the pupils small. The patients become dyspnoeic, the bronchi being filled with mucus. There is usually some giddiness, with confusion of ideas, and occasionally hallucinations. Delirium, violent convulsions, and loss of consciousness may follow. When recovery takes place it does so rapidly in two or three days.

The active principle is known as *muscarin*. It is probably a complex ammonia derivative and not an alkaloid as was at first thought. In the symptoms it produces it is almost the direct antithesis of atropine and consequently this drug is an antidote. The treatment is to get rid of the peccant material as quickly as possible by means of emetics, or washing out the stomach; the vomiting and diarrhoea themselves, of course, readily aid this. In spite, however, of the vomiting and diarrhoea both emetics and purgatives should be given, as fragments of the fungus are often found in the alimentary canal even though there has been profuse vomiting. It is necessary to sustain the patient's strength as far as possible and supply warmth. Atropine is not medically indicated in every case.

Other Species.—There are a number of other instances of poisoning by various kinds of toadstools with a good deal of variation in the symptoms. In Australia very few records of cases exist. In 1869 a child is said to have been poisoned at Newcastle by a toadstool the size of a crown piece, but no details are furnished, and death may have been due to some other cause. Dr. F. M. Johnston (*Inter-colonial Medical Journal*, 1907, p. 399) has recorded a fatal case of "mushroom" poisoning. A boy aged six, together with four other members of the family, had eaten a number of mushrooms gathered in Albert Park, Melbourne, between 10 and 11 one morning. They were eaten at 9 o'clock the next morning. An hour and a half afterwards this boy began vomiting, which continued off and on during the day. Early next morning his relatives were roused by his noisy breathing. Dr. Johnston, when called in shortly afterwards, found him lying on his back, breathing noisily but not stertorously. He was comatose, the eyes were open, the pupils contracted, and the corneal conjunctiva was insensitive. There was no squint. The face was pallid and dusky; the lips blackish. Clonic convulsions occurred in the limbs; the arms were strongly adducted, the forearm supinated, the wrist flexed, and the lower limbs rigidly

extended. The patella reflex was obtained in the interval between the convulsions. The thorax was full of noisy rales. The abdomen was flat and soft, the extremities cool but not cold. There was no rigidity, nor was there any opisthotonos. Treatment was by a rectal injection of brandy and hot water, the injection of atropine, and the inhalation of nitrite of amyl, all of which proved ineffective. Dr. Johnston attributed death to paralysis of the respiratory centre and of the heart. Since other members of the family were unaffected, and this child had previously eaten mushrooms without experiencing any undue symptoms, he came to the conclusion that the patient had eaten the one poisonous fungus on the dish, probably an *Amanita*. He alternatively suggested that an *Agaricus campestris*, the common mushroom, growing on some foul medium and absorbing poison therefrom or being attacked itself by some parasite (Hutchinson) might be the cause. The mushrooms had not been kept long enough to undergo any fermentative process aiding in the production of some ptomaine.

During 1914 two instances were reported in the daily press of poisoning from fungi, believed at the time to be the common mushroom. At Pinkenba, near Brisbane, seven men were taken ill after having eaten steak and "mushrooms" for breakfast. Stomach pumps were used at the hospital, and all were well enough to leave in the afternoon. In May, two men lost their lives near Moora, on the Midland Railway, in Western Australia, through mistaking some poisonous agaric for the "mushroom." Their ages were 38 and 27. About 1 p.m. these two and a mate ate the "mushrooms." Shortly after all three complained of pains in the stomach. During the night one died, and the second succumbed about 9.30 next morning. The third recovered.

In May, 1922, near Mount Gambier, a little boy of three years became ill after eating mushrooms and died next day. The symptoms manifested have not been recorded. It is possible that some poisonous toadstool was incorporated amongst the mushrooms by mistake. From time to time reports have been furnished of persons becoming ill after eating mushrooms, usually ones found growing under trees in the Mount Gambier district. Those found in such situations are considered by some local residents to be distinctly unwholesome. A communication from Dr. Burnard, of Mount Gambier, elicited the following information:—The majority of the mushrooms in the district are big and coarse, and most of the trouble seems to be purely indigestion on account of this coarseness and toughness. These mushrooms grow in the open fields sometimes in the form of large rings. The various medical men in Mount Gambier knew of no cases of definite mushroom poisoning through these mushrooms, though Dr. Hawkins thought he had been poisoned by them with symptoms of an influenzal type. The trouble in every case seemed chiefly due to indigestion. The mushrooms found growing under pine trees, he says, are usually "wormy," that is, infested with the maggots of certain flies. It is possible that if such wormy mushrooms are eaten they may be more liable to give rise to trouble.

Some species of toadstool give rise to a kind of intoxication. A former colleague of mine told me how his parents ate once a dish of mushrooms, and as the meal progressed they gradually became more and more hilarious, the most simple remark giving rise to peals of laughter. The intoxication passed off without any unpleasant effects. Probably some poisonous kind had been included, possibly one of the drug-inhabiting species.

HIGHER FUNGI AS INJURIOUS AGENTS.

Apart from the poisoning of human beings through eating by mistake an injurious species of "mushroom" or toadstool, the higher fungi may lead in other ways to financial loss. The most important of these affect forestry and the timber trade. The mycelia of bracket fungi growing on living forest trees permeate the subjacent heart-wood perhaps for a considerable distance. This renders it necessarily unfit as timber. The forester, seeing such a bracket fungus, will recognise at once that the wood of the affected tree will be more or less damaged, depending on the species concerned. It may, in fact, be quite useless, and not only so but the tree with its fungus parasite may be a danger to other trees. When the bracket forms and its spores are liberated, some of these may effect an entrance into other neighbouring healthy trees. As fresh brackets are formed periodically, the forester notes the trees affected and has them cut down as a precautionary measure. In this State the common Australian punk, *Polyporus*

eucalyptorum, which often grows on Stringybark (*Eucalyptus obliqua*) is unquestionably destructive. *Fomes robustus* and *F. rimosus*, hard yellowish-brown bracket fungi, grow on a number of species of living Eucalypts and are also dangerous. *Ganoderma applanatum*, growing on trees near their butts, usually as a broad but rather thin horizontal plate, is by no means common, but probably can do some harm. *P. Schweinitzii* has been found once near Kuitpo Forest at the base of a tree, and elsewhere is recognised as a dangerous species.

Lumber gives a number of fungi an opportunity for establishing themselves as saprophytes. The logs may become infected by the spores or by direct extension of mycelium from near-by refuse or infected wood, and this may occur either in the forest or in the timber yards. Thus is emphasised the necessity for prophylactic sanitation in both situations—adequate destruction of litter and infected wood, proper storage, etc. The fungi will grow especially well in the sap-wood and bark and require, of course, dampness to enable them to flourish. A number of species probably play a minor role in this connection. Eucalyptus telegraph poles, erected with the sap-wood on, are especially liable to deteriorate from fungus invasion. Much of this is probably due to the lower fungi, but *Polystictus versicolor*, a species with thin brackets, velvety and zoned above with browns and greys and with cream-coloured pores on the under-surface, has been seen growing frequently on telephone poles in Sydney and once in South Australia. *Trametes ochroleucus*, a small hoof-shaped thick pale bracket-fungus, may help to disintegrate posts and rails. Occasionally the red *Trametes cinnabarina* and the effused *Irpea obliquus* may be found on neglected timber. The most serious results follow the infection of building timber, either as lumber or when *in situ*. The dangerous "dry-rot" fungus, *Merulius lacrymans*, forming an extensive mycelium and eventually a yellow-ferruginous spore-bearing surface, has been found once in this State on damp wood in a hot-house. Some of the Hydnaceae may probably act in a similar way. Fortunately our relatively dry climate does not favour the growth of these saprophytes in positions where they may do harm.

Armillaria mellea, the Honey Fungus, is quite common in our hills. Its hyphae form cords, rhizomorphs, which encircle the roots of trees and so stop the flow of sap. No definite losses have been traced to this species in South Australia, though doubtless some forest trees have suffered. In other States, such as Western Australia, fruit trees such as oranges and even garden plants (roses, for instance) have been stunted or killed by this fungus. The trouble has usually occurred in newly-cleared forest land or round the edge of a forest clearing. The danger of leaving stumps and roots behind to act as a nursery for the fungus is obvious.

Occasionally the red *Trametes cinnabarina* or *Polystictus versicolor* may be found growing on dead parts of fruit trees. Though not truly parasitic, they probably do some harm to the living part of the tree through the alternate swelling and shrinkage of their hyphae from the rain. *Stereum purpureum*, which causes "silver-leaf" of plums, has not yet been found with certainty in Australia.

FUNGI AND ART.

Anyone who has seen displayed the results of an autumn day's gathering of various species of fungi from our Mount Lofty Ranges will at once be struck by the beautiful shapes and the wonderful range and combinations of colours manifested amongst them. The sight is usually both new and surprising—new because it so frequently happens that we see on our rambles only what we are looking for, it may be a view, flowers, rocks, or butterflies, and also because we see the toadstools removed from their natural surroundings in which they are more or less "camouflaged"—surprising on account of the unusual elegance of some, the bold yet pleasing contrasts of colours in others. The artistic eye seizes on the opportunity thus presented. The subject lends itself to designs for painting on china, and some very beautiful work has been done in this way in Sydney by Miss Phyllis Clarke (now Mrs. North) from watercolours prepared from specimens in my collection. The colour combinations, so bold yet never clashing, suggest their use in the designing of ladies' dresses and perchance parasols.

THE LOCALITIES AFFECTED BY THE DIFFERENT SPECIES.

The larger fungi, and in fact the more microscopic forms as well, are often strictly confined to a particular habitat. We all know this practically when gathering the common field mushroom for the table. As its name implies, we find it in the open fields or in open sandy places. If we find a plant resembling it but growing under bushes or amongst trees in a forest, we usually discard it through being doubtful as to its nature. Not only does such a mushroom differ slightly from the field one in general architecture, but we may note that the gills do not go through a vivid pink stage or that the flesh when broken may show yellowish stains. In other words, these plants belong to closely allied species of *Psalliota*, species which are it is true in most cases edible also, though liable to upset certain people.

Fields and Grassy Places.—The fungi that grow in fields and grassy places in South Australia are not numerous, though more or less distinctive to such situations. If we walk through our parklands in autumn soon after the first rains we may find the common mushroom, one delicate *Lepiota*, a *Tubaria*, and a few others. On the grassy hillsides, we may find in addition some larger species. Thus there is *Collybia radicata*, a very beautiful fungus, with a rounded to plane, shining, dark chocolate-brown cap, contrasting when picked with the snow-white, widely separated gills, supported on an unusually long whitish striate stem which, as is implied by the name, passes deeply into the ground by a long rooting portion. A large fleshy *Collybia* (*C. abatyraea*), with a cap several inches in diameter, with a smoky brown to amber cap and smoky brown stem may be found amongst grass. Growing in compacted groups, with their irregular caps barely raised from the ground owing to the shortness of the stem, is a tawny brown *Clitocybe* (*C. flaccida* var. *lobata*). Several pale buff species of this genus, some of which become whitish when dry, also occur in fields, and a greyish species (*C. paradiptora*) has a strong smell of wattle blossom.

The Forests of the Mount Lofty Ranges.—One of the places that yields the greatest abundance of species is the quartzite formation of the upper parts of the Mount Lofty Ranges, with its forest trees, fallen timber, undergrowth, and sandy loam. Here we have a variety of habitats—the living trees, their bases, the fallen trunks, the rotting twigs and fallen leaves wrapped often in a very moist environment under bushes, and the soil itself. On the living Eucalypt trees we may find bracket fungi belonging to the polypores as well as a few agarics. It will be noted that, to enable the spores to fall vertically out of the tubes in the polypores or from the gill plates in the agarics, the fruiting bodies are either laterally attached without any stem at all, or have a short quite lateral stem, or a larger curved stem eccentrically attached to the cap so as to allow of the latter assuming a horizontal position. However, in the case of species of *Corticium* and similar fungi, with a smooth spore-bearing surface, and some kinds of *Poria* with very shallow tubes, the fungi are merely as it were plastered on the side of the tree, as the spores can so easily fall out and be blown away.

The Fungi on Living Forest Trees.—After the first heavy autumnal rains high up and usually quite out of reach and growing from a decayed area or the sear of a dead branch, may be seen a large whitish-looking mass. This is *Polyporus eucalyptorum*. It may reach a foot or more in width and is several inches thick. When fresh it is heavy, moist, and fleshy-tough. The upper surface has a pallid crust with a brownish tinge, the substance is thick and pure white, and the short tubes form a thin hymenial surface of a beautiful yellow colour. The bracket is rapidly attacked by the larvae of beetles, whose food supply it constitutes. These riddle it through and through so that when it has dried, it appears like a white sponge-work from which a powdery substance escapes when handled, the separated remains of the beetles' food. Its detachment from the trunk has probably by now taken place, so that the mass is found near the base of the tree. It is the familiar substance we call "punk" in Australia, and smoulders like tinder when a match is applied, the burning being very slow if not insect-eaten, more rapid if an open sponge-work. This, like other large bracket fungi found on living trees, tells a tale. The tree, as a yielder of timber, is valueless. Its dry heart-wood is permeated, perhaps for many feet, by the mycelial threads of the fungus, causing rotting. Many years ago, from a fungus bracket on another tree, a spore had alighted on the sear of a dead branch or in a cleft or at an injured spot. This later had germinated, and its threads had

penetrated gradually into the old heart-wood, and once established there spread up and down, causing decay. The fungus fed on the old wood and gradually stored up a reserve stock of food material in its threads, preparatory to pushing out from some area, where it had reached the surface, a dense mass of hyphae compacted to form the bracket. From this develop spores in millions, one of which may perchance lodge in a suitable environment and reproduce the species. Once the fungus has grown sufficiently in the interior of the tree to produce a bracket, it will keep on doing so under suitable weather conditions probably annually. Some species may form several brackets, bursting out of different parts of the trunk. Others, like *Polyporus eucalyptorum*, seem to exhaust themselves after the first heavy rains in one supreme effort, and no more fruit bodies will appear till the next autumn. Meanwhile the mycelium is at work, laying up the food material necessary for the next year's fruit.

On stringy-bark trunks, in the Mount Lofty Ranges, a rather soft bracket-fungus, *Polyporus atrohispidus*, with a brown hairy upper surface and pale tubes, turning brownish when bruised, is not uncommon. Several of our Eucalypts and the Sheoak (*Casuarina stricta* Ait.) may bear, a few feet up the trunk, hard woody hoof-shaped gillous-brown brackets of *Fomes robustus* and *P. rimosus*. As already mentioned, the hoof-shaped or plate-like large brown *Ganoderma applanatum* and the stalked *Polyporus Schweinitzii* have been occasionally found at or near the bases of living trees.

The agaric *Mycena subgalericulata*, with conical olive-brown caps and long whitish stems, grows in dense caespitose clusters from interstices between the bark on the trunks of stringy-bark Eucalypts at Mount Lofty. There are other agarics and polypores of less common occurrence on some of our living trees.

Sand Dunes.—Even such a seemingly inhospitable habitat as shifting sand, either along the coast-line or in the interior, may yield a few species not found elsewhere. A *Naucoria*, a *Psilocybe*, and a *Coprinus* have all been found growing in such a situation.

The Dung-Inhabiting Fungi.—Fungi, growing in cow or horse-dung and confined to such habitats, must, in the case of Australia, all belong to introduced species. The dejecta of our native animals are so unlike cow or horse-dung in texture, and probably composition, that it would be unlikely that a species, originally strictly confined to such material, would be able to develop on that of these introduced domestic animals. Moreover, few species have yet been collected on the dung of native animals. As, then, these dung-loving species have been imported, it almost necessarily follows that they have been observed and described from other parts of the world. Nevertheless, though it is easy to place most of these species, in the case of several we have been much puzzled to find descriptions that accord with the plants found here.

Stropharia semiglobata (*S. stercoraria*) is common. This species has a yellow-brown viscid cap, a long stem with a ring on it, and broad greenish-black gills. The cap in *S. semiglobata* is described as hemispherical, and remains so, whilst in *S. stercoraria* it expands later. We seem to have both of these, and, if so, there seems to be no real specific difference between them. *Stropharia merdaria* grows near dung, and sometimes on it; the colour is browner than that of *S. semiglobata*, the cap more expanded, the gills less deep, the stem not so long, and the ring usually indistinct. Two or three species of *Psilocybe* grow on dung; these are darker coloured and more delicate, with long slender stems. *Panaeolus retirugis* is very common; the cap is hemispherical-conical, the colour greyish, drying paler; there are anastomosing vein-like elevations on the cap, the gills are clouded grey, and the stem is long and slender. Several species of *Coprinus*, with their deliquescent gills, are found on dung only. *C. sterquilinus* is fairly large, with a small but definite cup or volva at the base of the stem. *C. niveus* is rather small and pure white (except the gills) and shaggy. A brown-gilled *Galera* also grows on dung and on matted straw a larger agaric, a species of *Bolbitis*, with a viscid cap and brown sub-deliquescent gills, is not uncommon.

FUNGI AND BUSH FIRES.

Certain species of our fungi are only found fruiting after the country has been burnt by bush-fires. This statement is probably not strictly correct. One should perhaps say that as yet they have only been found on recently-burnt country. It is probable that the fruiting bodies do occasionally develop without the aid given by a previous fire.

In sandy soil, often in mallee country, with the first rains after a fire, we may find the stone-building fungus, *Polyporus basilaris*, called *Laccoccephalum basilaris* by its original describers, the late J. G. O. Tepper, of Adelaide, and the late D. McAlpine, the veteran mycologist, of Melbourne. This has a large yellowish-brown firm cap, with raised lines, whitish pores, and a long stem passing below in the soil to a core of mycelium and sand, which, if traced down for several inches, will be found to arise from a firmer compact mass of mycelium, a sclerotium.

Another polypore, *Polyporus tumulosus*, also appears, with the first autumnal rains, in recently burnt sandy stringy-bark country, such as at Mount Lofty and near Kuitpo. This has a yellowish-brown smooth cap, with a very short stem above ground, so that the fruit-body is only slightly raised above the soil, and is often sand-besprinkled. On tracing the stem downwards, a larger portion is found to be buried, and this passes soon into a thick cord of compacted mycelium and sand, finally ending in a large ball of similar structure encased in a thin, brittle, darker layer. So far, this species has only been found after recent fires; it occurs in this State, in New South Wales, and in Tasmania.

In similar burnt sandy country, as near Kuitpo, scratchings made by rabbits and marsupials may be seen, and near these empty sand-impregnated husks the size of walnut shells. If we dig up the soil round the scratching with a trench-tool or trowel, we may find some unopened examples of the fungus from which these came. They are only a few inches under the soil, are rounded, the size of a marble to a walnut, rough and covered with sand grains. When cut in two, they are found to have an outer husk, separated from a firm compact pale central core the size of a pea by a mass of greyish powdery spores, a few firm strands passing between the husk and the core. This fungus is an underground puff-ball, a species of *Mesophellia*, *M. pachythrix*. When fresh, it has a very strong characteristic pungent-aromatic smell, and it is presumably this that has attracted animals to it. Apparently the core is eaten and the husk discarded, the spores being freely liberated in the process, and some doubtless swallowed, and perhaps still further distributed in the dung. The fungi do not naturally ever reach the surface, and it is probable that any increase in their distribution is dependent on their being grubbed up by animals. Once a spore has established itself and grown, the mycelium spreads in the soil and finally produces fruit-bodies at various points, and may do so over many years. Wallabies, bandicoots, and apparently rabbits all scratch for these fungi. It would be interesting to try the pig, so well known in Europe as a hunter for truffles, which are also underground fungi though not related to these Australian plants. Our native animals and rabbits do not seem particularly successful in their searching, as often though some have been eaten others are found intact in the soil quite close to the scratching. In Tasmania, with Mr. L. Rodway, we dug up numbers of *Mesophellia arenaria* and of the allied *Castoreum radicans* and *C. tasmanicum*, near bandicoot scratchings in burnt soil, and we found that quite often the animals had actually scratched up the puff-ball and yet had not noticed it, or at least had left it intact. The fleshy-firm central core I found rather tough and possessed of the strong pungent-aromatic taste.

Near the *Mesophellia* at Kuitpo, we have found *Castoreum eretaceum*. *Castoreum* resembles *Mesophellia* but has no central core. This peculiar species, as it matures, reaches the surface when the outer yellowish-brown covering splits to form a deep saucer-shaped receptacle, toothed along the rim, in which lies the mass of spores encased in a thin covering. The opened fungus looks like a little *Geaster* or earth-star.

THE LARGER FUNGI EATEN BY MAMMALS, INSECTS, AND OTHER ANIMALS.

The fungi, such as mushrooms, deliberately eaten by man as food, or perhaps more correctly as a food-relish, have already been considered. The present section deals with those eaten by grazing mammals, with those searched for and consumed on account of their possessing a smell attractive to certain animals, and with fungi visited by slugs, eaten by beetles and bugs, or forming a breeding ground for insect larvae or a suitable situation for the concealment or protection of minute forms of animal life.

Do Farm Animals eat Mushrooms or other Fungi?—To ascertain whether man's domesticated animals ever fed upon mushrooms or toadstools as found in our pastures, and if so with what after-effects (if any), an inquiry directed to farmers and others was instituted at my suggestion by the Agricultural Bureau of South Australia. A number of replies were received from various branches and, as might have been expected, the answers supplied were diverse. The questions asked were whether mushrooms or toadstools were eaten by cattle, horses, sheep, or swine, and if so, whether they sought them out and ate them with relish. Inquiry was also made as to any ill-effects attributed to such eating. In the majority of cases no information was available, from which it may be inferred that the eating by such animals of mushrooms or toadstools was at least not a common or usual event. Occasional animals had been seen to ingest them, apparently accidentally. Now and again certain cattle had been seen to eat them with relish and even to seek mushrooms out. In the case of a cow that used to eat mushrooms, the milk was said to be unfit for drinking. A dairyman at Woodside, after collecting a number of mushrooms, put them under a fence; during his absence collecting more, a cow ate the lot without ill-effects; he had often seen the remains of mushrooms that cows had been at. Sheep have been seen eating mushrooms. One observer had noted sheep eating both mushrooms and toadstools when small, and stated that when too many were eaten a "break" in the wool occurred. Large numbers of mushrooms have been gathered where sheep have been pastured, showing that the mushrooms are not usually eaten by sheep. Mushrooms when plentiful had in two cases been fed to pigs with other food, and eaten without ill-effects, though one observer said without relish. Other recorders say that pigs refuse to touch them. Fowls had also been seen eating mushrooms occasionally. An answer from the MacGillivray branch stated that wild (feral) pigs and kangaroos are very fond of toadstools and will root or scratch them up before they are through the ground. As MacGillivray is on Kangaroo Island, where an underground "puff-ball" (*Mesophellia*) is common, is highly scented, and is scratched for by small marsupials, the reference is probably to this species. In one instance only had a horse been seen eating mushrooms, which it did, apparently, with relish.

The following possible ill-effects were recorded. Between Naracoorte and Lucindale some 10 or 12 years ago, 40 or 50 sheep were lost in a paddock, in which were many toadstools. A dog was noticed in an adjacent paddock eating a toadstool. It died not very long afterwards. The sheep were moved to a paddock free from toadstools and no more deaths occurred.

In one instance five pigs ate toadstools and died. The Honorary Secretary of the Allendale East Branch had seen cattle eating toadstools and later found one of his best cows dead with her paunch distended and froth coming from her mouth, which result he attributed to such toadstools. These were the only examples of possible injurious results elicited by these inquiries.

From time to time unexpected deaths in horses and other animals have had to be investigated, and when such occurrences have taken place in autumn, the possibility of their being due to the accidental eating of some poisonous agaric has been suggested, but not seriously entertained. It might be thought that such species as *Stropharia semiglobata*, *Panacolus retirugis*, and members of the genera *Psilocybe* and *Coprinus*, that grow on cow-dung and horse-manure, would be frequently eaten accidentally by animals cropping the surrounding grass. I have not seen evidence of this, but it seems almost certain that the spores from such species, produced by the million, become deposited on the surrounding vegetation and so get ingested. They probably pass through the alimentary canal intact—it is quite likely that their germinating power may be increased during the passage—and so the dung is already seeded by the spores when it is passed.

This would account more satisfactorily for the facility with which manure develops a crop of fungi than by looking to chance distribution of the spores by air after deposition of the manure.

The true truffle, an underground edible fungus belonging to the Ascomycetes, may be found by means of pigs which, presumably attracted by the smell, search for it with their snouts and root it up. The truffle does not occur in Australia.

Other Mammals.—Under the section dealing with the fungi developing after fires, reference will be found to the rooting up and eating of underground fungi of the genera *Mesophellia* and *Castoreum*, belonging to the Gasteromycetales in the Basidiomycetes, by wallabies, bandicoots, and apparently rabbits. These fungi have a strong pungent aromatic smell which is doubtless the attraction. The discarded outer husks will often be seen near the scratchings.

Slugs and Snails.—It appears that slugs and snails find their food by means of the sense of smell, which sense in some ways at least is more acute than in man. Professor A. H. R. Buller* in an interesting article entitled "Slugs as Mycophagists," describes experiments he conducted in England, clearly showing that the slug *Limax maximus* L., which has been introduced into Australia, is attracted to fungi from a distance of 10ft. to 21ft. He says that it is probably attracted by a sense of smell, as Dr. Paul Bartsch of the Smithsonian Institution, Washington, found some years ago that it is extraordinarily sensitive to certain gases, as, for instance, the fumes from a furnace, responding by characteristic movements of its tentacles. When later the United States entered the Great War and a gas detector was required, Dr. Bartsch recalled these experiments and tried the species with mustard gas. This it could detect in a dilution of 1 in 10,000,000, whereas man reacts only to 1 in 4,000,000. Within two hours of this discovery, the allied forces were advised by cable that the slug might act as a gas detector! Some species of slugs are almost entirely fungus eaters, and other species rarely touch such food. Dr. W. T. Elliott† has shown that such species as *Amanita phalloides* and *A. muscaria*, poisonous to man, may be eaten by slugs.

In Australia mushrooms are often partly eaten by slugs, which may be found coiled up in the excavations they have made. A number of other species of our agarics and some *Boleti* have been noted as having been eaten by slugs. I have found an Australian snail, *Helicarion robustus* Gould, feeding on a *Russula* (near *R. azurea* Bres., or *R. cyanorantha* Schaef., Fr.), at Neutral Bay, Sydney, and on another species of *Russula* at Chatswood, both in February, 1918.

Fungi Attracting Insects.—It has been suggested, though I think without any foundation, that our large phosphorescent toadstool, *Pleurotus lampas* Berk., may attract night-flying insects by its luminescence, and that these may help in distributing the spores. I think that it is more likely that the luminescence has arisen quite accidentally as a mutation, and that, like the brilliant colours of many species of fungi and even the poisonous principles found in some, it serves no special purpose in the maintenance of the species. It can also be said contrariwise that the luminescence, bright colours and toxins probably do not handicap in any way the species possessing them.

Many members of the phalloids, related to the puff-balls, and including the stink-horns and the lattice-work fungus (*Clathrus*), have a strong offensive smell of carrion which may attract insects. In the Australian specimens I have collected, I have not noted, however, any definite attraction of flies. When visited by insects, these are believed to aid in the distribution of the spores, both by eating the offensive slime (gleba) in which the spores are entangled, and by getting their legs and mouth parts soiled.

Decaying agarics, including mushrooms, have a strong smell. This may account, in part at least, for the development in them of maggots from the eggs laid by flies. There are, however, certain species of flies which normally breed in fleshy fungi. Often one or more of these long-bodied flies may be seen perched on the cap of fresh agarics, presumably depositing eggs. Here no smell of decay seems the source of attraction. The various maggots, when mature or when the source of food-supply is exhausted, pupate in the ground below. They can be readily bred out by providing in a jar dry soil underneath a decaying fungus containing the larvae, and covering with mosquito-netting to catch the emerging flies. The following species of flies breeding in agarics in Australia have been

*Brit. Mycological Soc., Trans., 1920, VII., p. 270.

†Brit. Mycological Soc., Trans., 1922, VIII., p. 84.

recorded:—*Anestellorhina augur*, one of the two common brown Australian blowflies frequently responsible for blowing sheep and meat, has been grown from an agaric, *Pleurotus* sp., collected at Bulli Pass, New South Wales, in November, 1917, and left exposed in a laboratory in Sydney for two days (when doubtless it was "blown"). *Tapeigaster marginifrons* Bezzi is a long-bodied fly frequently seen sitting on agarics in South Australia. The species has been hatched out from maggots which have developed in the fungi.

Beetles.—Beetles are not often found on fleshy agarics, but I have noted the following occurrences in Australia:—On *Flammula purpurata* Bres., Dorrigo, New South Wales, January, 1918 (two species); on *Russula*, near *R. azurea* Bres. or *R. cyanoxantha* (Schaeff.) Fr., Neutral Bay, Sydney, February, 1918; on *Pleurotus* sp., Bulli Pass, New South Wales, November, 1917 (Staphylinidae); on *Parillus paradoxus* (Kalehr.) Quél., Neutral Bay, February, 1918 (perhaps accidental).

On the woody and corky polypores, beetles are often numerous, leading to the rapid destruction of the brackets. Many leave eventually merely a thin shell of the denser outer surface and the pore orifices. A small beetle (an undescribed Cid) is a pest in the herbarium. Many members of such families of beetles as the Erotylidae, Mycetophagidae and Cidae feed on fungi. Our large common punk, *Polyporus eucalyptorum* Fr., with the thin pore surface lemon yellow when fresh, soon falls from its lofty position on the trunk of a Eucalypt and will be found riddled and sponge-like from the excavations of beetle larvae.

The late Mr. A. M. Lea, Entomologist to the South Australian Museum, has kindly supplied the following information as to the principal fungus beetles, which are as follows:—

EROTYLIDAE.—These are commonly called fungus-beetles; some are small, round and blackish, but many are moderately elongated and average $\frac{1}{16}$ in. in length with sharply contrasted markings; they occur on soft bracket and sheet fungi, and occasionally on large puff-balls and the harder *Polypori*. On the northern rivers of New South Wales they occur in larger numbers than elsewhere in Australia. I have named one, an inch long, perhaps the largest in the world, from Queensland. They are all slow-moving.

ENDOMYCHIDAE.—Allied to the Erotylidae but much smaller; few are as big as a grain of wheat; they are all slow-moving, and usually occur in the same situation as the Erotylidae, but a few are to be taken in moss, etc.

SCAPHIDIDAE.—These are small and extremely active; smaller ones are mostly to be taken on sheet fungi under bark, the larger ones (about the size of a wheat-grain) on soft bracket fungi; the larger ones are blackish, with conspicuous reddish spots.

CIDAE.—The genus *Cis* is confined to the hard and dry bracket and sheet fungi; they are all small and slow-moving and may sometimes be taken in large numbers by breaking up the fungi; or if these are put away in glass-topped boxes and left for a few months or years sometimes hundreds can be obtained from a single fungus.

STAPHYLINIDAE.—This is an immense family of beetles (the rove-beetles), whole genera of which are to be taken on the *Polypori*, sometimes swarming in the tubes; they are very thin, and at first (owing to their short elytra) they do not look much like beetles. They also swarm in decaying vegetation, moss, carrion, seaweed, etc.

TRICHOPTERYGIDAE.—These are the smallest of all beetles; one species, about the size of a large full-stop, occurs in thousands on sheet fungi under bark in Tasmania, as at Mount Tambourine, and I took a similar, if not identical, species on Lord Howe Island. They can be told at once from the Poduridae (many of which are equally small and roughly similar in shape) by the way they run, never jumping; also if put in spirits they at once sink, but the Poduridae float for some time. I have taken a few specimens on toadstool fungi. Where they occur at all they generally occur in numbers.

TENEBRIONIDAE.—One sub-family is confined to fungi, usually the more or less hard brackets, and there are some weird-looking creatures amongst them, the male often armed with conspicuous spines. They are all snuff-coloured and often warty, and so closely resemble the fungi that it is usually only by specially looking

for them or breaking the fungus up that they are found. Their headquarters in Australia are the Illawarra district to South Queensland, but a few occur in Tasmania and Western Australia, always in heavily timbered districts.

In rotting fungi also a good many species are to be taken, but many of these are general carrion feeders. A few fliers feed on rusts and smuts in the larval stages, and one fairly large beetle, *Lagria grandis*, regularly in Tasmania eats the sort of black spot (but it also eats fruit, etc.).

On the whole I think I have myself material to record at least 200 species of fungus beetles."

Spring-tails (Collembola).—These are frequently found on the fleshy agarics. I have noted them on the following in New South Wales:—*Psalliotia arvensis* Schaeff., var. *fragrans* Cl. et Cheel, Blayney, December; *Psilocybe foeniculi* (Pers.) Fr., Sydney, December; *Lactarius scriflus* (DC.) Fr., Neutral Bay, November; *Cortinarius* sp., Neutral Bay, October (two species); *Pleurotus* sp., Dorrigo, January. In South Australia they have been seen on *Psalliotia campestris* (L.), the common mushroom, Encounter Bay, April, and *Hypoglyphus candidus* (Ke, et Mass., Encounter Bay, May. *Brachystomella parrula* Schiff. has been identified specifically from decaying mushrooms at Encounter Bay, May, 1929, and *Hypogastrura armata* Nic. from a small toadstool, Glen Osmond, July, 1929.

Earwig.—An earwig was found in cavities in the black Ascomycete, *Daldinia concentrica* Bolt., at Malangane, near Casino, New South Wales, August.

Ants.—One of the firm puff-balls, *Scleroderma flavidum*, which take some days to mature, harboured a little colony of ants at Kendall, New South Wales, in December. These, when examined by Mr. J. Clark, of Melbourne, turned out to be a new species near *Solenopsis belisarius* Forel.

Mites.—Minute mites, often very long-legged, may sometimes be seen running over the gills of agarics.

INTERESTING PHENOMENA MANIFESTED BY CERTAIN SPECIES.

LUMINESCENCE.

Luminescence, commonly called phosphorescence, is a well-known but not common phenomenon in both the animal and vegetable kingdoms. The fire-flies (really beetles) common in the tropics are to be seen in the Blue Mountains of New South Wales, glow-worms (the larvae of beetles) common with us in damp soil in the autumn, and the luminous organs of certain deep-sea fishes, are examples in the animal kingdom in which this phenomenon is manifested. A beautiful little luminescent crustacean was seen at Encounter Bay in 1929. Amongst plants some bacteria, which have gained access to fleshy food such as cleaned fish and are multiplying therein, may give rise to luminescence, and a similar appearance may be seen sometimes in the mycelium or even in the fruiting bodies of various fungi.

Amongst the higher fungi, several species of agarics are known from various parts of the world, such as Borneo, Brazil, and Australia, which show this phenomenon. The species with us, known as *Pleurotus lampas* Berk., is quite a common one and may be met with in all the southern Australian States where *Eucalyptus* forests occur. These agarics are very large, with a whitish cap sometimes tinted with brown, yellow brown, bronze or bluish black, with ample cream-coloured gills that are decurrent down the stem, and with the thick firm stem not usually centrally placed under the cap, but more or less to one side. They grow together in bunches at or near the bases of *Eucalypts* (gum-trees) and the bunch may weigh several pounds. Probably everyone who has any acquaintance with our gum-tree forests, and especially if they have walked through them at night, is acquainted with the species and has seen it glowing with its pale whitish light at the butts of trees, and has carried portions back and examined them later in a dark room. In the fresh state, the gills emit quite a strong white light, sufficient to read the time by on a watch. This light may be seen shining through the cap when this is thin, giving a weird and fairy-like appearance to the whole fungus. The glow, gradually fading, may be manifested for several nights. James Drummond, the botanist, writing from Swan River (now Perth), seems to have been the first to record this phenomenon in our

Australian species, and his account appears in Hooker's *Journal of Botany* for April, 1842. When shown to the natives, he said that "the poor creatures cried out 'Chinga,' their name for a spirit, and seemed much afraid of it."

The nature of the process in our agaric does not seem to have been investigated. The luminescence in other cases has been found to be due to a ferment luciferase acting on a compound protein luciferin. In the firefly, the light is 99.5 per cent. efficient, that is, the energy liberated is almost entirely converted into light, leaving only 0.5 per cent. to be accounted for by conversion into heat and other forms of energy.

Figure 1.—*Pleurotus lampus* Berk. (No. 89). Adelaide. Photographed by its own light. Twenty-four hours' exposure with superspeed film.

FAIRY RINGS.

Fairy rings are well-known in most parts of the world, and much romance has grown up around them. In South Australia two species of fungi at least—an edible mushroom and a puffball—manifest this feature, though often the ring is rather indistinct or broken. The large, rather coarse Horse Mushroom (*Psalliota arcensis* Schaeff.), with gills at first whitish and finally purplish brown, but never rich pink at any stage, often grows in large rings. In autumn the large caps appear arranged more or less in a circle, which geometrical figure can be readily seen at a distance, as the photograph (Figure 2) shows. After the crop of mushrooms is over, the site of the ring can often be recognised still by the ground being either bare, or with shorter grass than inside or outside the ring, and it is this bare ring that is the fairy ring of mythology. In Europe, the growth of the grass just outside and also within the ring is often more luxuriant than elsewhere, but this feature has not yet been noted in Australia. In the bare ring the soil is permeated with the mycelial threads of the fungus, and in these threads the food substances are stored up, which will later be made use of for the rapid growth of the mushrooms themselves. Now, materials (such as particles of soil or pieces of rotting wood), permeated with mycelium, will be found to be usually drier than similar adjacent material not so infiltrated. A lump of such permeated soil or wood placed in water will not as readily take up the water and become damp as similar lumps of the unpermeated material. A piece of rotten mycelial-infiltrated wood also will not burn so readily as an ordinary piece, and this is to be explained by much of the available empty space in the wood, the various tubes, etc., being plugged up with mycelium, so that air, with its content of oxygen, is not available for combustion in the interstices of the wood, and so the burning is confined merely to a peripheral portion where oxygen is obtained from the surrounding air. From these statements we may infer two factors that contribute to the formation of

the bare ring. One is drought, or relative dryness, for rain falling in the ring of fungus-infiltrated soil will not sink in as readily as elsewhere, but will tend to run off on either side, supplying those zones with additional water, or will lie on the surface rather than sink in by capillary attraction and so be evaporated. The other factor is clogging of the interstices with mycelial threads, which would lead to relative exclusion of the air with its oxygen, and this would tend to prevent the germination of seeds or the development of leaves from roots, processes which require the presence of oxygen for respiratory purposes. In addition, other factors may participate. Actual crowding of the area with mycelium may make it difficult for other plants to find space to grow in, just as an established community of one species of plant may prevent individuals of another species from growing in the same place. It is possible also that the nutriment necessary for the grasses is absorbed beforehand by the mycelium, and is no longer available for the former, and it may be, in addition, that definite toxic substances are produced by the mycelium which are deleterious to the grass.

The more vigorous growth of grass just outside the ring has been attributed to chemical changes in the organic materials of the adjacent soil, due to the proximity of the mycelium, these changes favouring the plant growth. This is not necessarily contradictory to the view that the mycelium may manufacture toxic substances, as such toxic substances may be stimulant in nature when much diluted, as in the zone outside the ring, but destructive when more concentrated, as in the ring itself. The more luxuriant growth within the ring is explained by the old and exhausted mycelium in this situation undergoing decay and breaking down into materials that act as food stimulants to the grass coming up there. In places where the rainfall is low and precarious, both these zones may benefit by the additional "run off," when such occurs, of rain-water from the bare zone.

The fairy-ring has another aspect that deserves consideration. It will be noticed, if measurements are kept or marks made, that it increases in diameter by a few inches each year. Each season it grows larger. As a matter of fact, it began in the centre of the ring from a spore, or spores, which fell on suitable ground, germinated and produced a mycelium, and in due course a little crop of fruiting bodies, mushrooms in the case of this fungus. Then the oldest central part of the mycelium died and disintegrated, leaving a peripheral ring of living and active mycelium. Season after season the ring increased in size, the inner zone of spent mycelium dying after yielding its crop of fruiting bodies as a result of exhaustion of the food contents of the soil, an outer zone laying up food-stores to furnish the fruits of the next season. By measuring the average annual increase in size of the ring and its diameter, rough estimates can be made of the ages of rings. Some of these in America have been estimated to be 250, 420, and even 600 years old. As regards our own fungus rings, some of these must have been in existence long before Captain Cook sighted Australia, and probably were already established when Tasman named Van Diemen's Land. The annual increase of the rings of our Horse Mushroom (*Psalliota arvensis* Schaeff.) have not yet been ascertained. Rings have been measured, however, one on the Bluff at Encounter Bay being 33 feet in diameter in 1926, and another on the Millicent Road near Kalangadoo being 31 feet across in 1928. (Figure 2.) In those instances in which the mycelium has been developed from a single spore, we can look upon the mycelium of the whole ring as belonging to one plant, even though all the threads may no longer be in organic continuity with each other. We may, in fact, consider the ring as a fungus tree, buried in the soil, bearing annual autumnal crops of fruit in the shape of mushrooms. These we pluck, but without injuring the plant as a whole, just as the oranges or apples that we take off a fruit-tree to eat leave the tree itself unimpaired. It is even possible that our eating the mushrooms, provided we did not cook them, might be of advantage to the species, as the spores can probably pass through our alimentary tract uninjured, and so finally find a resting-place wherein they might develop to produce a fresh fungus ring.

There are only two species as yet known in South Australia which produce well-defined rings. Probably a number of other kinds do so also, but the situation in which they grow does not lend itself to the recognition of the ring form. The rings of the Horse Mushroom (*Psalliota arvensis* Schaeff.) have already been mentioned as occurring near Kalangadoo and on and near the neck of the Bluff at Encounter Bay—the bare ring of the latter, situated just above a small plantation of trees on the landward side of the Bluff, can often be seen from the beach near Yelki, at a distance of nearly a mile.

The other species that grows in ring formation is a white puffball, *Lycoperdon depressum* Bonorden. In this, the mycelium does not lead to a bare zone, but the many white puffballs growing from it amongst the grass have a very definite ring arrangement.

In New South Wales, the Champignon (*Morasmius oreades* Bott., Fr.) grows in ring formation, as it does in Europe and New Zealand. The caps are characterised by their reassuming their original shape after being dried if they are placed in water. This species has not yet been found in this State.

(Photograph by E. Lucas.)

Figure 2.—Ring formed by the Horse Mushroom, *Psalliota uccensis*, at Kalangadoo.

THE MECHANICAL FORCE EXERTED BY DEVELOPING FRUITING BODIES.

The mechanical force exerted by the cells of living organisms when they absorb water as a result of osmotic action may be very great. This force may be manifested under unexpected circumstances. It is dangerous to allow a horse to have access to wheat in grain, as the grains swallowed whole may absorb water in the stomach and lead to a fatal result. Wheat ships have been lost at sea through the bursting asunder of their planks or plates when sea-water has gained entrance to the hold and the millions of grains have swollen. Dried pens may be used for disarticulating the sutures of the skulls of young mammals. Professor R. W. Chapman, of the University of Adelaide, has recently shown that a block of *Pinus radiata* Don. (*P. insignis* Douglas) wood grown in this State, and measuring 3½ ins. x 3 ins. x 4 ins., placed under a tightening load of 600 lbs., and then surrounded as far as possible by water, imbibed this water to such an extent as to increase the load up to 1,520 lbs., an increase of 920 lbs. In the same way, the cells of growing delicate looking fleshy fungi may absorb water and exert in the mass a very great leverage, sufficient to raise large stones. Thus, in 1830, at Basing Stoke, in England, a large paving stone, measuring 22 by 21 in., and weighing 83 lbs., which had been cemented down, was raised an inch and a half by the growth of two fleshy agarics under it; and Cooke in "British Fungi" mentions a large hearthstone being forced up by a fungus growing under it. The only parallel instance I know of in Australia was the firm earth floor of a hut, which had been down for several years, being broken by the growth of one of our higher fungi, which had probably been stimulated to develop a fruiting body by the percolation of rain-water to the underlying soil.

THE COLLECTION AND PRESERVATION OF FUNGI FOR BOTANICAL PURPOSES.

No trouble will be experienced in dealing with the many kinds of relatively dry corky and woody species. It is only necessary to leave them exposed, preferably in a current of air, in as dry an atmosphere as possible until the moisture they have imbibed has evaporated. In a dry climate such as ours, no difficulty will be met with, even in the late autumn.

With the fleshy kinds, such as the agarics, the matter is far otherwise. In the case of small and especially deliquescent species, such as some of our *Coprinii*, the whole plant may alter profoundly in the course of an hour or so, or even less, and become hopelessly unrecognisable. In the others, the appearance of the dried specimen may be much changed and the essential features of the growing plant be lost. It will thus be seen that it is often necessary not only to take special measures to dry the specimens, but before doing so to make such notes as are required. With very delicate kinds it may even be desirable to make these observations in the field whilst the plants are still *in situ*. All this means labour, but if any one intends seriously to study mycology in the shape of the agarics, this extra trouble is necessary and will soon bring its own recompense. Let us take as an example of what to do, a fungus foray in autumn to our National Park or elsewhere in the Mount Lofty Ranges. The choice of a suitable day will enable a larger haul of species to be obtained. We have collected as many as fifty or sixty species of Basidiomycetes on such occasions. After a long dry summer, the first heavy rain will be followed three or four days later by the appearance of agarics. If this is followed a week or so later by more rain, and the interval has been somewhat mild, the crop of agarics and polypores will be assured. After the ground has been damped by the first rain, there follows an incubation period, during which the mycelium in the soil or wood is reviving from its long rest, and is mobilising its food-stores for the production of the fruit-bodies—the agarics, the polypores, etc., themselves. This takes a little time, so that the number that appear after the first showers is greatly increased when these are followed up by later showers. Moreover, whilst several days must elapse before they come up after the first rain, many will be seen a day or so after the later falls. When once the season has thus opened, dry weather, especially with easterly or northerly winds, means few fungi; bright still dewy mornings, many kinds. A little rain on sandy soil will bear more fruit than on stiff ground. Fungi may be found under fallen logs and litter, or in dense undergrowth nearby sheltered creeks, when they have ceased to appear in drier places. Some species, and even genera such as *Amanita*, prefer early autumn; others, such as *Cortinarius*, early winter, and only a few kinds characterise the spring, though some species may be found almost throughout the year if there has been sufficient rain. The fungus season ends to a great extent as winter merges into spring.

Having chosen our day, we set off, not minding a little rain. We are armed with plenty of boxes of various sizes, from matchboxes, or pillboxes, to tobacco tins, and on to bootboxes. We have also a few test-tubes and small wide-mouthed bottles. Small species that may soon shrivel up require to be placed at once in corked bottles or tins. A trench tool, or sheathknife, or failing these, a trowel, will be found useful for digging up fungi rooting in the soil, or certain underground species such as *Mesophellia*, whose presence may be suggested by animal scratchings. A tomahawk will also be of service for dislodging woody polypores from the trunks of trees. A satchel will be found a very convenient means of carrying the boxes and tools.

Having started collecting, my practice is to place the specimens in the boxes, small ones preferably apart in small boxes, with the gills usually uppermost, so that their spores will not fall on and contaminate those below. Any soil particles or sand falling on the gills can usually be readily shaken out later. Some recommend—and it is unquestionably better, though not essential—to wrap up together the members of each species in tissue paper or newspaper before placing them in the box.

Having returned home with our boxes filled, the specimens are placed out on a large tray, or the upturned cover of a large cardboard box. All of one kind are grouped together, and then the necessary notes are made about those species that will alter in drying. These notes will supplement any memoranda made when collecting, indicating the habit, etc., of the species. The first ones described will be those, such as very delicate species, which will change soonest. Such a trayful of specimens from our hills is often a very striking and, to

the novice, surprising object. The colours are most varied, the tints often vivid and beautiful, the combination of colours surprising in their harmony. The shapes are frequently graceful and artistic.

Having chosen our first species, we set about describing it fully in the same way as are described in the systematic portion of this work the various species with which it deals. The cap, stem and gills will be measured, preferably in the metric system; the shades of colour on these parts will be described, if possible, by comparison with some standard such as Ridgway's "Color Standards and Color Nomenclature"; the shapes of the cap, gills and stem; the appearance of the surface of the cap (glutinous, smooth, warty, scaly, velvety, etc.); the presence or not of a skin or cuticle on it; the attachment, depth, closeness or otherwise, of the gills; evenness, serration or thickness of the edges of the gills; the appearance of the surface of the stem (smooth, sticky, mealy, fibrillose), hollowness or solidity of the stem; nature of a ring or volva, if present; features of the flesh of the cap and stem (opaque, or translucent, changing in colour when cut, etc.); rooting or otherwise; general

Figure 3.—Print on black paper of the White Spores shed from the Gills of *Amanita muscaria*, showing the positions of the gills.

texture of the plant, smell, and even taste (with circumspection), and habitat should all be noted as succinctly and as exactly as possible. To get the colour of the spores in mass a spore print is very useful. To obtain this, place the cap over a sheet of white paper (unless the spores are white, when black paper will show them up better) in such a way that the gills, or part of them, hang downwards so that as the spores drop from their edges and descend between the blades they will fall on to the paper before being blown away. A good way is to make a small hole in a round piece of paper a little larger than the pileus, pull the stem through this, and support the agaric in its natural position in an empty vaseline jar, or some such receptacle. Spores will cease to be shed when the fungus is drying up, and so it may be necessary to shield the preparation from evaporation. The photograph (Figure 3) shows a typical print of white spores on a black background.

We are now in a position to dry our specimens. This must be done as rapidly as possible. The best means is by dry heat in a current of air. This may often be achieved merely by leaving them well exposed in a dry room, especially when the sunlight can reach them. Many of mine are dried in this way. Still better is it to put them on top of a gas stove used for heating purposes, if this top becomes warm and air can percolate past them. The interior of a dry incubator is often effective. If the interior is moist, as from the evaporation from fluid cultures of bacteria, the fungi may not dry, but get mushy. I often use the domestic hearth, the fungi being placed on sheets of cardboard close enough to

the fire to be dried quickly, but not so close as to get stewed in their own fluid. An electric fan may aid evaporation in some methods. If dried quickly, most kinds will retain their shape and colour to a considerable extent, though consisting, as they do, mostly of water, there will be much shrivelling. With rapid drying, good preparations may be made even of the deliquescent *Caprini*, the water being lost before the liquefying ferment can act.

Descriptions, especially colour notes and measurements, should be made of all other kinds that may alter in drying, such as the Coral Fuungi (*Clavariæ*) and the gelatinous species (*Tremella*, etc.). Though the latter, when dry, may almost disappear, when re-moistened they will more or less perfectly reassume their original appearance. When quite dry, the specimens are ready to be stowed away in botanical specimen boxes. As many in storage may be attacked by insects, they should be accompanied by an abundance of flake naphthalene, renewed from time to time as it evaporates. Still better, the specimens, especially the corky and woody kinds, may be more permanently protected by painting with, or sometimes rapidly immersing in, the preservative used at Kew for the botanical specimens there. The formula for this, which may be applied with a camel's hair brush, is as follows:—1oz. of carbolic acid crystals, 1oz. of corrosive sublimate, and 2 pints of methylated spirits. Shake well before using.

Figure 4.—Method of making a Folder for holding dried Botanical Specimens.

Unless bulky or of unusual shape, or delicate and liable to be broken, when boxes or paper bags, whichever seem most suitable, may be used, the specimens should be put in regulation folders and labelled on the outside. These folders are made as illustrated in the diagrams (Figure 4), using cartridge paper, botanical mounting paper, or moderately stiff brown paper. For economical purposes, used firm newspaper wrappers, or the large brown envelopes in which journals are sent, may be opened up and turned inside out and made to serve as very efficient holders of various sizes.

THE ESSENTIAL PARTS OF THE HIGHER FUNGI.

It may be said that the two really essential parts of one of the higher fungi consist of the mycelial or fungus threads that permeate the substratum for the purpose of obtaining and in part storing up food supplies, and the hymenium that bears the structures necessary for reproduction. The former constitutes the vegetative stage of the fungus and the elements composing it are often little evident to the naked eye. The latter represents the reproductive portion, making use of the food-supplies already stored up by the vegetative phase to erect a specialised fruiting-body, or sporophore, designed to facilitate the dispersal of the reproductive elements or spores. The fruiting-body has usually a very definite architecture which, as it were, hall-marks the species and enables it to be recognised. It will be well to take a simple and common, but composite, example and consider it in detail. From such, the various departures in form can readily be understood.

The accompanying diagram represents the main features to be seen in a large number of agarics, of which the common mushroom is the best-known example. It will be seen that a typical agaric consists of a pileus or cap, bearing on its under-side vertically descending thin lamellae or gills, supported by a stem which at its base is continuous with the mycelial threads traversing the substratum or source of food supply.

The essential feature here is the hymenium which is spread over the surface of the gills. It bears special cells, the *basidia*, which project slightly from the surface. Each basidium has usually four little projecting microscopic stalks,

Figure 5.

or *sterigmata*, each of which supports a *spore*. The spores are so placed and spaced that normally they do not touch each other or those of the opposite gill-surface, but project freely, so that when mature and separated from their little stalks, they fall slowly downwards until carried away by the breeze.

There are two minor features of importance that may be present, one or both. There may be a more or less evident sheath at the base of the stem, the *volva*, representing a universal sheath which enclosed the young sporophore. There may be a more or less distinct *ring* or *annulus* on the stem, representing the veil that passed from the edge of the cap to the stem and hid from view the gills at an earlier stage of development. The *volva* may be loosely sheathing, lax, or closely applied, evanescent or persistent, or reduced to adherent fragments, or may vary in other ways. The ring may be fixed or movable, distant from the apex of the stem when it is *inferior*, or near the apex when it is *superior*; it may be ample, dependent, double, fugacious, or evanescent, or present other characteristics.

The *pileus* or *hymenophore* (i.e., portion bearing the hymenium) may be many inches in diameter, or not much larger than a pin's head; it may be of various shapes from conical to convex, or plane, or funnel-shaped; it may be regular or irregular; it may be smooth, or have scales or warts, or be velvety, or slimy, viscid or glutinous; it may show striae, or be ribbed; the edge may be thin or rounded, intorned or straight, wrinkled or rugose or regular; there may be a cuticle or skin-like layer which may or may not peel; it may be coloured in various ways; it may change colour from loss of water in drying (*hygrophanous*). The gills may be narrow or broad; they may be crowded or close, or subdistant or distant; they may pass straight to the stem to be attached there along their whole length (*adnate*), or with a conical pileus they may have to ascend to do so (*ascending*); their attachment to the stem may be narrowed (*adnate* gills), or may show a bay (*emarginate* or *sinate*); they may fail to reach the stem at all when they are called *free*; they may be thick or thin, or the edge may be thinner (*acute*); they may show buttresses or folds, or even anastomose with their neighbours, especially near the stem; they may have a juice exuding when broken; their colour varies with the species but does not necessarily agree with the colour of the spores. The *flesh of the pileus* varies much in thickness and texture; it may be thin and membranous, or thick and fleshy; it may thin gradually and uniformly outwards, or do so abruptly; it may rapidly undergo colour changes, becoming red, brown, green, blue, or even blackish when exposed to the air or in drying. The *stem or stipes* may be attached to the centre of the cap (*central*), or to one side (*excentric* or *eccentric*), or be quite *lateral*; it may be absent altogether and the pileus be attached along one side (*sessile pileus*), or it may be attenuated into a stem-like base. The stem may be of equal diameter throughout, or attenuated or expanded above or below, or have a bulbous base; it may be smooth or viscid, or clad with scales or fibrils; it may be solid, or stuffed with a spongy pith, or hollow; in texture it may be fleshy, fibrous, brittle, cartilaginous, or tough; it may fit into a kind of socket in the pileus so as to be easily separated from the latter, as in the common mushroom (*hymenophore free*), or its flesh may be confluent with that of the pileus; if confluent, the substance may be similar in texture to the flesh of the pileus (as is usual when the stem is fleshy), or it may be of a different texture (as in cartilaginous stems). The stem may pass into a rooting base, which may extend deeply, as in *Collybia radicata*, or it may be connected with string-like fibrils (*rhizomorphs*) which derive nourishment from, and incidentally injure, the roots of adjacent trees or shrubs, as in *Armillaria mellea*. The vegetative mycelium may in the ground become compacted together with soil into a fairly definite mass (*false sclerotium*), or in the substratum it may form into a storage body, or *true sclerotium*, formed entirely of dense compacted fungus hyphae, which may be quite small, or as large as a child's head, and weigh many pounds. From such sclerotia, the fruiting bodies directly arise and are formed by the utilisation and transportation of the reserve food supplies contained in the sclerotium.

Such a general survey as that just given will include the more important features of most of the common fleshy agarics. There are some genera of gill-bearing fungi characterised by possessing other features of note. Thus in the *Coprin*i, some of which grow on dung, as the name implies, the gills liquefy from the edge as maturity is reached through the activity of an enzyme or ferment; in *Bolbitis* the gills liquefy or shrivel rapidly without exactly decaying immediately after they mature; in *Marasmius* and allied genera the dried fungi revive when moistened; in *Lentinus*, *Lenzites*, etc., the sporophores or fruiting bodies are tough, membranous, corky, or firm and so do not alter on drying.

Further a microscopic feature often of importance is the occurrence of special cells, known as *cystidia*, met with in certain species and usually found projecting from the surface of the gills between the basidia. The colour, shape, and size of the mature spores are, within limits, constant for each species.

In the case of the pore-bearing fungi, the description outlined above will require some modifications, but its general principles still apply. Here tubes take the place of gills and are lined by the hymenium bearing the spores. We have therefore to consider the size and depth of the tubes, to note whether some extend deeper than others or not, to see whether they form a layer readily separable from the rest of the hymenophore or seem merely imbedded in this, to ascertain whether there are layers or strata of tubes (representing periods of growth) or only one layer, to note the colour and so on. The size, shape, and colour of the orifices of the pores must be ascertained and the number of such orifices in one millimetre of surface. Some of the pore-bearing fungi are fleshy and readily decay, such as the *Boletii*. A large number, however, are leathery, corky, or woody. Some have a cap and stem, but many are laterally attached, forming brackets, or may even be spread out over the surface (as in *Poria*). It must be pointed out that in some genera we see transitional conditions between gills and pores. Thus cross-partitions or anastomoses may convert gills into chambers and in other species these pass into elongated pores. In some genera, such as *Merulius*, the hymenial surface is represented by wrinkles enclosing spaces which represent the pores.

In the Hydnaceae, spines, granules, knobs, or their representatives bear the hymenium. In the Thelephoraceae it is borne on a more or less smooth surface, in the Cyphellaceae in a cup-shaped receptacle and in the Clavariaceae on clubs or coral-shaped sporophores. The principles of description already outlined can be readily modified to meet the requirements of these various groups.

The Gasteromycetales include the various puff-balls as well as the remarkable phalloids, some of which latter are called "stink horns." Many of the fungi in the Auriculariales, Tremellales, Tulasnellales, and Calocerales are gelatinous or horny-gelatinous. The points of importance in the descriptions of these, as well as of the few genera of the larger fleshy Ascomycetes that will be considered, can be readily gathered from the systematic part of this work dealing with them and need not be considered here.

DEFINITIONS OF CERTAIN SPECIAL TERMS EMPLOYED.

(In preparing these definitions, free use has been made of the Glossary in C. H. Kauffman's "The Agaricaceae of Michigan").

- Adnate* (of the gills), attached throughout their breadth straight on to the stem; (of the pellicle of the pileus, scales, etc.), not readily separable but firmly attached.
- Adnixed* (of the gills), attached to the stem by only part of their breadth.
- Allantoid* (of spores), sausage-shaped. (Gr., *allas*, *allantos*, a sausage).
- Alveolate* (of the surface of the pileus, etc.), deeply pitted. (Latin, *alveolus*, a little trough, a socket).
- Amphigenous* (of the hymenium), borne on both sides of the receptacle. (Gr., *amphi*, on both sides; *genos*, kind, genus).
- Anastomosing* (of the gills, ridges on the pileus, etc.), connecting with each other obliquely or crosswise leaving spaces or pits between. (Gr., *anastomo-o*, to furnish with a mouth, applied anatomically to the inosculations between adjacent blood-vessels).
- Apiculus* (of a spore), the short projection at one end by which it was attached to the sterigma.
- Appendiculate* (of the margin of the pileus), hung with fragments of the veil.
- Applanate* (of the pileus), horizontally flattened out.
- Arachnoid* (of the veil), cobweb-like. (Gr., *arachne*, a spider).
- Arcuate* (of the gills or margin of the pileus), curved like a bow.
- Ascending* (of the gills), passing upwards in the case of a conical pileus.
- Attenuate* (of the stem), gradually narrowed.
- Basidia*, the special cells that bear the spores and form the essential structure of the hymenium in the Basidiomycetes.
- Bibulous* (of the surface of the pileus), capable of absorbing moisture.
- Bloom* (of the pileus, stem or gills), an appearance suggestive of the minute granules on the surface of certain plums giving them a greyish tint.
- Bulbous* (of the stem), swollen at the base.
- Byssoid* (of mycelium), fine filaments spreading out over the surface. (Gr., *bussos*, fine flax).
- Caespitose*, aggregated in dense clusters but not grown together.
- Campanulate* (of the pileus), bell-shaped. (L., *campana*, a bell).
- Capillary* (of the stem), hair-like.
- Carneous*, fleshy.
- Cartilaginous* (of the stem or cuticle), tough, brittle, breaking with a snap.
- Cinereous*, ashy-gray.
- Clavate*, club-shaped.
- Close* (of the gills), half-way between "crowded" and "sub-distant."
- Concolorous with*, of one colour with.
- Confluent* (of the flesh of the stem), continuous with and similar to the flesh of the pileus.
- Conidia*, secondary spores developed on the mycelium or hyphae distinct from the usual ones developing on the special cell, the basidium.
- Concurrent*, showing a gradual inward direction, convergent. (L., *converreo*, to wink).
- Context*, the trama or fleshy or firm supporting part of the pileus or gills.
- Continuous* (of the flesh of the stem), the same as confluent.
- Coriaceous*, of a leathery consistence.
- Cortex* (of the stem), the outer denser rind.
- Cortina*, the inner or partial veil in some genera of Agarics, the structure of which is cobwebby.
- Cruciate*, like a cross.
- Cystidia*, large sterile specially shaped cells mixed with the basidia and usually projecting beyond them.
- Decurrent* (of the gills), running down the stem.
- Dendroid*, branching like a tree. (Gr., *dendron*, a tree).
- Dimidiate* (of the fruit-body), semi-circular in outline.
- Disc* (of the pileus), the central portion of the surface.
- Dissepiments* (of the pores), the partitions between the pores. (L., *dis*, asunder; *sepio*, to part).
- Emarginate* (of the gills), notched near the stem.

- Epigean*, on the surface of the soil. (Gr., *epi*, on; *gē*, the earth).
Eruptent, bursting forth as out of the substratum. (L., *erumpo*, to burst forth).
Eccentric, *eccentric* (of the stem), not attached in the centre or to the side of the pileus but somewhere between these points.
Fasciculate, crowded in bundles.
Fastigiate, close, parallel and upright like the branches of a Lombardy poplar. (L., *fastigium*, a slope).
Floccose, provided with cottony substance on the surface.
Flocculose, finely floccose.
Free (of the gills), not attached to the stem at any time.
Furfuraceous, covered with bran-like particles, scurfy. (L., *furfur*, bran, scurf).
Fuscous, deep gray-brown. (L., *fuscus*).
Fusiform, spindle-shaped. (L., *fusus*, a spindle).
Gibbous (of the pileus), with an asymmetrical convexity or umbo, or with the convexity on one side. (L., *gibbus*, a hump or swelling on the back).
Glabrous, smooth.
Glaucous, covered with fine white bloom, easily rubbed off; grayish-blue.
Gleba, the chambered spore-bearing tissue within a sporophore of the Phalloideae, etc. (L., *gleba*, a clod, lump of earth).
Gregarious, growing in company, scattered closely over a small area.
Gutta, a globule or drop of liquid.
Gyrose, turned round like a crook, bent, as are the convolutions of the brain. (L., *gyrus*, a circle).
Heterogeneous, applied to a structure composed of unlike tissues.
Hispid, bristly. (L., *hispidus*).
Homogeneous, applied to a structure composed of a uniform tissue.
Hyaline, colourless, transparent. (Gr., *hyalos*, glass).
Hygrophanous (of the flesh or the surface of the pileus), watery in appearance, like the "water-core" of an apple, the moisture disappearing rapidly accompanied by change in colour, usually by fading. (Gr., *hygros*, moist; *phaino*, *phano*, to bring to light, disclose).
Hymenium, the spore-bearing layer, composed of basidia with or without cystidia or sterile cells. (Gr. and L., *Hymen*, the god of marriage).
Hymenophore, the portion of the fungus bearing the hymenium.
Hypogean, under the surface of the soil. (Gr., *hypo*, under; *gē*, the earth).
Imbricate, overlapping like the shingles on a roof.
Inferior (of the ring), below the middle of the stem.
Infundibuliform, funnel-shaped. (L., *infundibulum*, a funnel).
Lactiferous, *laticiferous* (of hyphae of the trama), bearing a milky juice or latex.
Lamellae, the gills or gill-like structures of a Basidiomycetous fungus. (L., *lamella*, a thin plate).
Latex, a juice usually of a milky colour.
Marginate (of the bulb at the base of a stem), with a circular ridge on the exterior upper angle where the universal veil was attached.
Matrix, the substance on or in which a fungus grows.
Mycorrhiza, the stunted rootlets of trees covered or permeated by the mycelium of fungi.
Navigular, boat-shaped.
Obtuse (of the pileus, cystidia, etc.), rounded or blunt.
Parenchyma, the essential soft cellular tissue of an organ in a plant or animal. (Gr., *parenchyma* from *pareucho*, to pour in).
Pellicle, a thin skin-like covering. (L., *pellicula*, dim. of *pellis*, skin).
Penicillate, supporting bundles of diverging hair-like structures. (L., *penicillus*, a painter's brush).
Peridium, the enveloping coat of a sporophore upon which the spores develop within a cavity. (Gr., *peridion*, a little pouch).
Peronate (of the stem), booted or sheathed by the volva or universal veil. (L., *pero*, a sort of high shoe).
Plane (of the pileus), with a flat surface.
Pruinose, as if finely powdered.
Pseudoparenchymatous, bearing a false resemblance to parenchyma. (Gr., *pseudos*, false).
Receptacle, a general term for the fruiting body. (L., *receptaculum*, a reservoir).
Reflexed (of the margin of the pileus), turned up or back.
Reniform, kidney-shaped. (L., *ren*, the kidney).

- Repand* (of the pileus), wavy on the margin and turned back or elevated.
- Resupinate* (of the fruit-body), with the upper surface applied to the substratum, the hymenium facing outwards.
- Resupinate-reflexed* (of the fruit body), partly resupinate, partly extending out like a shelf.
- Rhizomorphs*, visible strands or cords of compacted mycelium, often dark coloured, penetrating a soft substratum or between portions of it, as between bark and wood, etc.
- Rimose* (of the pileus), cracked. (L., *rima*, a rift or cleft).
- Rivulose* (of the pileus), marked with lines like a river-system on a map.
- Rugose*, coarsely wrinkled.
- Rugulose*, finely wrinkled.
- Suprophyte*, a plant which lives on dead vegetable or animal matter.
- Scabrous* (of the pileus), rough with short rigid projections.
- Scissile*, capable of being cut or divided smoothly by a sharp instrument. (L., *scindere*, to cut or split).
- Sclerotia*, resting bodies composed of a hardened mass of hyphae from which fruit bodies may develop.
- Secede* (of the gills), when at first attached to the stem, *i.e.*, adnate or adnexed, but separating from it later.
- Serrate* (of the gills), with a saw-tooth-like edge.
- Sessile* (of the pileus), without a stem.
- Setae*, bristles. (L., *seta*).
- Silky*, covered with shining, close-fitting fibrils.
- Sinuate* (of the gills), with a bay-like indentation of the edges near the stem.
- Sinuuous*, wavy, serpentine.
- Spathulate*, spatula-shaped; oblong with an attenuated base.
- Sporophore*, fruit-body.
- Squamose*, covered with scales.
- Stipe*, the stem (of mushroom-like fungi).
- Stipitate*, possessing a stem.
- Striate* (of the margin of the pileus), with radiating minute furrows or lines; (of the stem), with longitudinal furrows.
- Straight* (of the margin of the pileus), not incurved.
- Strigose*, with coarse or thick, long, rather stiff hairs.
- Stuffed* (of the stem), when the axis is filled with a differentiated pith which usually disappears in age leaving it hollow.
- Stupose*, composed of matted filaments. (L., *stupa*, tow).
- Subiculum*, a more or less dense felt of hyphae covering the substratum, from which the fruit-bodies arise.
- Substratum*, the substance in or on which the fungus grows, as soil, fallen leaves, dung, wood, etc.
- Subulate*, awl-shaped.
- Sulcate* (of the pileus or stem), grooved more than striate and less than plicate.
- Sulcus*, a deep furrow-like groove. (L., *sulcus*, a furrow).
- Terete*, round like a broom-handle.
- Tomentose*, densely covered with a matted woolliness or tomentum.
- Trama*, the fleshy or firm portion of the pileus or gills composed of hyphae.
- Tremelloid*, of a gelatinous consistency.
- Tuberculate*, bearing little knobs or protuberances. (L., *tuberculum*, dim. of *tuber*, a protuberance or knob).
- Turbinate*, top-shaped. (L., *turbo*, a whipping top, spindle).
- Umbilicate*, with a central navel-like depression.
- Umbo* (of the pileus), a raised conical or convex knob or mound on the centre.
- Unequal* (of the gills), of different lengths, some reaching the stem, others shorter.
- Vaginate* (of the stem), provided with a long volva or sheath at the base.
- Velutinate*, soft or velvety to the touch. (L., *vellus*, a fleece of wool.)
- Ventricose* (of the gills), with a projection in the middle of the free edge; (of the stem), swollen or enlarged in the middle.
- Verrucose*, warty.
- Villose*, covered with long, soft, weak hairs.
- Viscid*, sticky.
- Waxy* (of the gills), of a consistency that can be partially or wholly moulded or compressed into balls.

The Classification of the Higher Fungi.

The fungi dealt with in this Handbook are divided into two great groups depending on whether the spores are borne on the outside of a special cell called the *basidium* or are contained within a sac-like cell known as the *ascus*. The former constitute the **Basidiomycetae**, and in the majority of the species the number of spores attached to each basidium is four, and the attachment of each is by a delicate thread-like structure the *sterigma*. The latter form the **Ascomycetae**, and here the number of spores contained in each ascus is frequently eight. It is obvious that a microscopic examination is necessary to determine definitely whether a particular species belongs to the Basidiomycetae or the Ascomycetae. The outward form, however, is nearly always distinctive so that any one possessing a reasonable acquaintance with the genera can at once recognise to which of the two a particular species belongs. Thus most of the large fleshy fungi with a cap and a stem belong to the Basidiomycetae, and we can relegate them with certainty to this division if the spore-bearing surface consists of gills or pores or teeth. Very few of the Ascomycetes have what might be called a cap and a stem and these, for example *Morchella* and *Leotia*, having nothing resembling gills, pores, or teeth.

In the more recent classification adopted by Rea in his "British Basidiomycetae," this large group are primarily divided into two main divisions, the **Homobasidiae** and the **Heterobasidiae**. In the former the basidium is an undivided usually club-shaped body and the spores in germination give rise to a mycelium which reproduces the sporophore. In the Heterobasidiae the basidia are divided transversely, longitudinally or vertically or are sometimes continuous, but the spores in germinating give rise to secondary spores (sporidiola) and from these the fruit-bodies are developed.

The Homobasidiae are divided into the parasitic forms, the **Exobasidiineae**, and the saprophytic forms, the **Eu-Homobasidiineae**. The former, parasitic on living leaves, &c., and producing galls thereon, will not be dealt with in this Handbook—in fact, no species are recorded for the State. The latter are divided into three orders, the **Gasteromycetales**, the **Agaricales**, and the **Aphylllophorales**.

In the **Gasteromycetales**, the hymenium or spore-bearing part is enclosed at maturity in a peridium or covering which finally ruptures or disintegrates and only then can the spores escape. Well-known examples are the puff-balls (*Lycoperdon*) and earth-stars (*Geaster*). In the **Agaricales** the hymenium is at first protected by a veil, but at maturity it is fully exposed. This protection in the early stage is strikingly shown in the common mushroom (*Psalliota campestris*). In some agarics it may be necessary to examine the fruiting body in a very early stage of its development to see the veil-like covering of the gills which soon disappears. In the **Aphylllophorales**, the spore-bearing surface is exposed from the first. Examples of this Order are the woody bracket-fungi.

In the older classification, the Basidiomycetae were divided into the *Hymenomycetae*, in which the spores were freely exposed at maturity, and into the *Gasteromycetae* in which they were enclosed. The *Hymenomycetae* were then divided according as to whether the hymenium was spread over gills, or lined tubes, or covered spines, etc. All the genera in which the hymenium lined tubes were comprised in the *Polyporaceae*, including thus the soft fleshy *Boleti* and the woody or firm *Polypori* under one heading. The newer classification adopted by Rea places the *Boletineae* under the Agaricales and the other pore-bearing genera under Aphylllophorales, inferring that the resemblance, in the shape of pores, is an example of convergence and is not an indication of close kinship.

Again, in the old classification the agarics proper were divided primarily according to the colour of the spores into white, pinkish or salmon-coloured, green, brown, purplish or porphyry-tinted, and black or blackish spored genera, the last two colour-groups being often combined into one. Then the genera under each of these subdivisions were differentiated according as to whether the stem was readily separated, was "free," from the hymenophore or cap, or was continuous with it, and if the latter condition was present whether the flesh of the stem was or was not of the same texture with that of the cap. The presence or not of a sheath (volva) at the base of the stem or (and) ring (annulus) higher up on the stem, the method of attachment of the gills to the stem, the position of the stem as regards the cap (central, excentric, lateral, or even with the stem absent altogether) and other morphological features of importance all served the purpose

of dividing the large number of species into more or less smaller groups or genera whose members showed in common major characteristics suggesting that they were closely related phylogenetically, *i.e.*, during the course of evolution, to each other. It thus came about that a genus *Lepiota* characterised by white spores, a free hymenophore (the stem being readily "dislocated" from the cap), a ring on the stem and no volva was considered as having closer affinities with, as being more nearly related to, all the other genera with white spores than with the genus *Psalliota*, to which the common mushroom belongs, which differs only in having purplish-brown instead of white spores. As many species of these two genera are so like each other in general appearance, habitat, etc., that it is necessary to ascertain the colour of the spores before being able to decide to which one they belong, it seems more likely that in the course of evolution the change in colour of the spores was a later event than the possession of a volva or ring. Also, if the spore-colour changes were the first to appear, then one would have to consider the other features just considered (volva, ring, etc.) as having occurred (or perhaps rather as having disappeared) in several different lines of descent, spontaneously and almost simultaneously, by a process of convergent evolution, a phenomenon that does occur in nature but does so only rarely, and is very unlikely to do so along several different lines of descent. Rea has consequently placed close together, as showing intimate relationship, the genera with a free hymenophore, then those with a volva and ring, or a volva only, or a ring only and so on with the other characteristics, leaving the spore colour as a final means of separating what may be called sister genera. The old classification was an artificial though convenient one, but that adopted by Rea shows the relationship more truly. An ideal classification is one which will show clearly the true relationships between the various families, genera, etc., concerned—passing from the less differentiated and presumably more archaic forms to end with the most highly specialised—and at the same time be convenient. Though agreeing as to the correctness of the classification that Rea adopted in dealing with the agaries, we have decided as a matter of convenience to follow the older method of dividing the agaries primarily according to the colours of the spores.

We have also decided to follow the older classification in leaving the *Boleti* with the *Polypori* generally as a group characterised by a pore-bearing hymenium. We do this not only as a matter of expediency, but also because we think that they are closely related phylogenetically.

P. Claussen, in Engler and Prantl's "Die Natürlichen Pflanzenfamilien," 6 Band, 1928, gives the following main classification of the fungi.

DIVISION EUMYCES (FUNGI).

CLASS I.—PHYCOMYCETES. (Moulds, &c.)

CLASS II.—ASCOMYCETES. (Spores developed in small sacs or asci.)

CLASS III.—PROTOMYCETES.

CLASS IV.—BASIDIOMYCETES.

Sub-class 1. Hemibasidii (Smuts and Rusts).

Sub-class 2. Eubasidii (Mushrooms, Puff-balls, etc.).

In the present work we are concerned with Sub-class 2, Eubasidii, of Class IV. (Basidiomycetes). A few large and striking species of Class II. (Ascomycetes) will also be considered as coming under the heading of the larger fungi.

The Sub-class 2, Eubasidii, comprises a single Order, the Hymenomycetales, and this is subdivided by Claussen into seven Sub-orders. These seven Sub-orders may be placed in the two divisions employed by Rea, the Heterobasidiaceae comprising the Sub-order Tremellineae, and the Homobasidiaceae, including the rest of these Sub-orders. The Homobasidiaceae, following Rea in part, may be divided again into the Gasteromycetales, comprising his Sub-orders Phallineae, Nidularineae, Lycoperdineae, Hymenogastrineae, and Sclerodermatineae, in which the hymenium is enclosed with a covering or peridium at maturity, and into the Hymenomycetales, comprising his Sub-order Hymenomycetaceae, in which the hymenium is fully exposed at maturity though it may be enclosed in the young stage.

In this Handbook, it has been decided to combine some of the features of the classifications adopted by Rea and by Claussen. To the former's "British Basidiomycetales" we are indebted for most of the tabular arrangement and definitions above specific rank.

In the case of genera which are not defined by Rea because they do not occur in Britain, S. Killermann, in Engler and Prantl's "Die Natürlichen Pflanzenfamilien," 6 Band, 1928, has in the main been followed. The arrangement and definitions in the Gasteromycetales are those adopted by Dr. G. H. Cunningham.

BASIDIOMYCETAE.

1. Basidia simple; spores giving rise to a mycelium on germination	HOMOBASIDIAE.
2. Basidia longitudinally divided, transversely septate or simple; spores producing sporidiola on germination	HETEROBASIDIAE.

ASCOMYCETAE.

Only dealt with incidentally, a few of the larger and more conspicuous members being alone considered.

BASIDIOMYCETAE.**HOMOBASIDIAE.*****EU-HOMOBASIDIINEAE.****SAPROPHYTES.**

1. Hymenium at first covered by a universal or partial veil becoming fully exposed at maturity, or exposed from the first, spread over the surface of gills, pores, or teeth, or over a smooth or rough surface	HYMENOMYCETALES.
2. Hymenium enclosed within a peridium at maturity .	GASTEROMYCETALES.

****EXOBASIDIINEAE.****PARASITES.**

3. Hymenium effused, rarely consisting of basidia only. Parasitic on leaves, &c.	EXOBASIDIALES.
(Not dealt with in this Handbook.) |
|--|---|

HETEROBASIDIAE.

1. Basidia transversely septate, cylindrical, straight, or curved	AURICULARIALES.
2. Basidia longitudinally cruciately divided, subglobose .	TREMELLALES.
3. Basidia simple, subglobose, with 2-4 very thick, stout sterigmata. Spores producing sporidiola on germination	TULASNELLALES.
4. Basidia simple, cylindrical, with two long, pointed sterigmata. Spores always becoming septate on germination, and producing sporidiola	CALOCERALES.

HOMOBASIDIAE.**EU-HOMOBASIDIINEAE.****HYMENOMYCETALES.**

(Comprises the *Hymenomycetinae*, except the *Exobasidiaceae*, in Engler and Prantl.)

Hymenium spread over the surface of gills or gill-like folds	Agaricaceae.
Hymenium lining the inside of tubes, pores, or pore-like spaces	Polyporaceae.
Hymenium spread over the surface of spines, granules, warts, or other protuberances, the intervening spaces fertile. Receptacle fleshy, coriaceous, waxy, crustaceous, or floccose, rarely none	Hydnaceae.

- Hymenium spread over a smooth, rugose, or ribbed surface, either resting upon an intermediate layer of hyphae running longitudinally between it and the mycelium or seated directly upon the mycelium .. **Thelephoraceae.**
- Hymenium covering the whole of the interior of cup-shaped, urceolate, or cylindrical receptacles, smooth or veined **Cyphellaceae.**
- Receptacle erect, dendroid, coralloid, simple, or branched, never pileate; hymenium more or less amphigenous **Clavariaceae.**

AGARICACEAE.

1. Hymenium inseparable from the pileus, spread over the surface of broad gills acute at the margin.
1. Receptacle fleshy, trama not vesiculose and not traversed by laticiferous vessels, not membranaceous, not rapidly putrescent, not tough or woody.

A. Spores white.—LEUCOSPORAE.

- a. Pileus distinct from and easily separable from the fleshy stem.
 - With a ring on the stem and a volva at the base of the stem *Amanita.*
 - With a volva at the base of the stem but no ring. *Amanitopsis.*
 - With a ring on the stem but no volva. *Lepiota.*
 - With a fugacious ring, not manifest in the adult state, and no volva *Hiatula.*
 - Without a ring or volva *Schulzeria.*
- b. Pileus confluent and homogeneous with the central fleshy stem.
 - With a membranous ring on the stem *Armillaria.*
 - Without a ring.
 - Gills sinuate *Tricholoma.*
 - Gills decurrent or adnato-decurrent by a tooth.
 - Hymenium not waxy or pulverulent *Clitocybe.*
 - Hymenium pulverulent. *Laccaria.*
 - Hymenium waxy *Hygrophorus.*
- c. Pileus confluent with, but heterogeneous from, the central cartilaginous stem.
 - Gills adnate or sinuato-adnate.
 - Margin of pileus at first incurved or exceeding the gills *Collybia.*
 - Margin of pileus straight, at first adpressed to the stem *Mycena.*
 - Gills decurrent *Omphalia.*
- d. Pileus confluent with the excentric or lateral stem or dimidiate, sessile or resupinate *Pleurotus.*

B. Spores pink or salmon-coloured—RHODOSPORAE.

- a. Pileus distinct from and easily separable from the fleshy stem.
 - With a volva at the base of the stem but no ring .. *Volcaria.*
 - With a ring on the stem but no volva *Annularia.*
 - Without a ring or volva *Pluteus.*
- b. Pileus confluent and homogeneous with the fleshy stem.
 - Gills sinuate *Entoloma.*
 - Gills decurrent or adnato-decurrent by a tooth. *Clitopilus.*
- c. Pileus confluent with, but heterogeneous from, the cartilaginous stem.
 - Gills adnate or sinuato-adnate.
 - Margin of pileus at first incurved or exceeding the gills. *Leptonia.*
 - Margin of pileus straight, at first adpressed to the stem *Nolanea.*
 - Gills decurrent *Eccilia.*
- d. Pileus confluent with the excentric or lateral stem, or dimidiate, sessile or resupinate *Claudopus.*

F. Spores black or blackish.—MELANOSPORAE.

- a. Pileus distinct and easily separable from the fleshy stem.
With a ring on the stem but no volva *Annellaria*.
- b. Pileus confluent with, but heterogeneous from, the cartilaginous stem.
Margin of pileus at first incurved or exceeding the gills *Panaeolus*.
Margin of the pileus straight, at first adpressed to the stem *Psathyrella*.
2. Receptacle fleshy, trama vesiculose and traversed by latiferous vessels. Spores white or yellow.
Latex watery, uncoloured *Russula*.
Latex milk-white or coloured, rarely like serum *Lactarius*.
3. Receptacle membranous or fleshy membranous, fragile, rapidly putrescent or shrivelling up or drying rigid and friable.
Spores ochraceous or ferruginous, receptacle shrivelling up *Bolbitus*.
Spores black or blackish-fuscous. Gills auto-digested from below upwards *Coprinus*.
Spores black. With a volva, the stem expanding above to form a flat disc from whose edge the gills radiate without a covering cuticle, receptacle becoming rigid and friable.. *Montagnules*.
4. Receptacle membranaceous, tough, reviving with moisture, not putrescent. Spores white.
Pileus with a thin unspecialized cellular pellicle *Marasmius*.
Pileus with a thick cellular pellicle.
Cells of the pellicle upright, echinulate or verrucose ... *Androsaceus*
(*Marasmius* p.p.)
Cells of the pellicle decumbent, very long, fibrillose ... *Crinipellis*.
Pileus subgelatinous-leathery, stem horny *Helomyces*.
5. Receptacle coriaceous, fleshy coriaceous or woody. Spores white.
Gills with crisped folds *Trogia (Plicatura)*.
Gills with the edges longitudinally split *Schizophyllum*.
Gills black *Anthracyphyllum*.
Pileus fleshy coriaceous; gills somewhat soft *Panus*.
Pileus membranaceous coriaceous; gills coriaceous, branched, obtuse *Xerotus*.
Pileus coriaceous or woody, pliant; gills firm, often toothed *Lentinus*.
- II. Hymenium inseparable from the pileus, spread over the surface of narrow, obtuse gills or folds.
Spores white.
Receptacle fleshy, stipitate; gills simple. Parasitic on other Agarics *Nyctalis*.
Receptacle fleshy, stipitate; gills forked *Cantharellus*.
Receptacle fleshy, membranaceous, funnel-shaped or umbilicate. Hymenium veined or smooth *Craterellus*.
Receptacle membranaceous, spatulate or cup-shaped, pendent. Hymenium veined or smooth *Dictyolus*
(*Cantharellus* p.p.)
- Spores ochraceous.
Receptacle fleshy coriaceous, stipitate. Hymenium fold-like *Neurophyllum*.
- III. Hymenium soft, separable from the pileus.
Gills often anastomosing by veins to form irregular pores, especially near the apex of the stem. Spores white, ochraceous or ferruginous.
Without cystidia *Paxillus*.
With cystidia *Phylloporus*.

Systematic Description of the Species of Agaricaceae (Toadstools and Mushrooms and other Gilled Fungi).

BASIDIOMYCETAE.

Fungi reproduced by spores borne on basidia.

HOMOBASIDIAE.

Basidia simple; spores on germination giving rise to a mycelium.

EU-HOMOBASIDIINEAE.

Saprophytes.

HYMENOMYCETALES.

Hymenium at first covered by a universal or partial veil becoming fully exposed at maturity, or exposed from the first, spread over the surface of gills, pores or teeth, or over a smooth or rough surface.

AGARICACEAE.

“Hymenium spread over the surface of gills radiating from a stem or a central point. Receptacle fleshy, or membranaceous or coriaceous, fragile or firm or tough, putrescent or not putrescent, reviving with moisture or not, and sometimes containing laticiferous vessels; consisting of a pileus with or without a central or lateral stem, and sometimes with a volva or ring, and with broad gills acute at the margin or narrow obtuse gills or folds. Growing on the ground or on wood”—Rea.

I. Hymenium inseparable from the pileus, spread over the surface of broad gills acute at the margin.

1. Receptacle fleshy, trama not vesiculose and not traversed by laticiferous vessels, not membranaceous, not rapidly putrescent, not tough or woody.

A. SPORES WHITE. LEUCOSPORAE.

(*tt*) PILEUS DISTINCT FROM AND EASILY SEPARABLE FROM THE FLESHY STEM.

*With a ring on the stem and a volva at the base of the stem.

AMANITA (Pers.) Fr.

(Probably from Mount Amanus in Cilicia.)

“Pileus fleshy, regular. Stem central, fleshy. Ring membranaceous, adnate, persistent or rarely fugacious. Volva membranaceous, free or adnate, persistent or friable. Gills free or subadnate or decurrent by a tooth, intermediate gills cut squarely behind. Spores white rarely tinged greenish, globose or subglobose, or oval or elliptical, smooth or very rarely verrucose. Cystidia subglobose or cylindrical ventricose. Growing on the ground.”—Rea.

This is a very important genus on account of its containing several highly poisonous species, one of which at least, *A. muscaria*, has been found at Aldgate in this State. Its members may be recognised by the presence of both a ring and a volva (which may later almost disappear) and by the spores being white. The gills also are usually white or whitish, but may be tinted. In some species their colour may be a faint pink tint, and it is perhaps due to the mistaken inclusion, when gathering mushrooms, of young specimens showing such a colour or having a general resemblance to the common mushroom that has led to the few fatal cases of Agaric poisoning known in Australia.

KEY TO THE SPECIES.

Volva sheathing, ample. Ring definite.

Pileus whitish with a biscuity tint. Spores relatively narrow, 10 to 13 x 5.5 to 6 μ . . . 1. *Amanita angustispora*.

Pileus and ring drab-coloured. Spores 10.5 to 12 x 8 μ . . . 2. *A. cinerco-annulosa*.

Volva rarely sheathing, usually floccose, friable or evanescent.

Pileus scarlet or orange, covered with fragments of the volva . . . 3. *A. muscaria*.

Pileus reddish-brown or dingy reddish-brown with grey, white, or yellow mealy patches. Flesh turning reddish . . . 4. *A. rubescens*.

Pileus pinkish buff, pale fawn, biscuity or pale ochre. Gills becoming buff yellow. Spores 10 to 11.5 x 6 to 7 μ . . . 5. *A. ochrophylla*.

Pileus drab, hair brown, bistre or nearly chocolate-colour with often greyish or whitish fragments of the volva. Volva rarely sheathing, sometimes nearly absent. Ring marked or evanescent. Spores 11 to 15 x 9 to 13 μ . . . 6. *A. grisca*.

Pileus white or whitish.

Beset with prominent shaggy warts.

Pileus whitish with a silvery sheen. Sour smell. Spores 8.5 to 11 x 6.8 to 9 μ . . 7. *A. grossa*.

Beset with scattered often villose warty patches or surface dull in places.

Pileus whitish or slightly biscuity. No sour smell. With a prominent conical root. Spores 9 to 11 x 5.5 to 7 μ . . 8. *A. conico-bulbosa*.

Surface smooth or mealy.

Gills straw yellow. Pileus white . . . 9. *A. straminea*.

Gills white.

Pileus up to 5 in., white with tints of fawn or pearly grey, mealy. Stem very mealy . . . 10. *A. farinacea*.

Pileus under 2 in., pallid brownish to nearly white, mealy. Stem sub-mealy . . . 11. *A. subalbida*.

(a) MARGIN OF VOLVA FREE, PERSISTENT. PILEUS GENERALLY NAKED.

1. *Amanita angustispora* Clel. (L., *angustus*, narrow).—Pileus $\frac{3}{4}$ to 2 in. (1.8 to 5 cm.), irregularly convex, then nearly plane or with the centre depressed, viscid when moist, subfibrillose round the edge, whitish with a slightly biscuity-brown tint in the centre, or with a pale chocolate or greyish-brown tint. Gills just reaching the stem to adnexed or nearly adnate, moderately close, not ventricose, edges serrate in one collection, $\frac{1}{4}$ in. or more (7 mm.) deep, white with a slight cream tint. Stem $1\frac{1}{2}$ to $2\frac{1}{2}$ in (3.7 to 6.2 cm.), equal, moderately stout to moderately slender ($\frac{3}{8}$ in. to $\frac{1}{2}$ in., 10 to 12.5 cm. thick), mealy and gill-marked above the definite dependent white superior or nearly median ring, slightly fibrillose below, solid, base bulbous, 1 in. (2.5 cm.) long, $\frac{3}{8}$ in. (1.9 cm.) thick, rounded below or with a conical root. Volva usually sheathing, ample,

whitish. Smell slightly strong. Spores elliptical, narrow for the length, 9 to 13 x 5.5 to 6 μ . Deeply rooting in sandy soil. South Australia—Encounter Bay, Kinehina, National Park, near Mount Burr (South-East). May, July, August, September.

The species is characterised by the medium size, the whitish pileus with a biscuit-coloured tint, the ample sheathing volva, and microscopically by the relatively narrow spores.

2. *Amanita cinereo-annulosa* Clé. (L. *cinereus*, drab; *annulosus*, ringed).—Pileus 2 to 3½ in. (5 to 8.2 cm.), more or less plane, sometimes subumbonate or slightly depressed in the centre, polished, occasionally with thin membranous patches of the universal veil, Drab (XLVI.), but mostly paler. Gills just reaching the stem, moderately close, up to 1 cm. deep, white to creamy white. Stem 3½ to 5½ in. (8.7 to 13.7 cm.), stout (1.5 to 2 cm. thick), slightly attenuated upwards, slightly hollow, somewhat bulbous at the base, deeply rooting, with an ample sheathing volva, striate and usually tinted drab above the ring, whitish and fibrillose below. Ring ample, rather distant, Drab (XLVI.). Spores, elliptical, 10.5 to 12 x 8 μ . In sandy soil. South Australia—Encounter Bay. May.

Distinguished by the drab-coloured pileus and ring, deeply-rooting stem, and ample sheathing volva.

(b) VOLVA CIRCUMSCISSILE OR FUGACIOUS. PILEUS GENERALLY COVERED WITH FRAGMENTS OF THE VOLVA.

No South Australian species recorded.

(c) VOLVA FLOCCOSE OR FRIABLE. PILEUS FLOCCOSE OR VERRUCOSE WITH THE FRAGMENTS OF THE VOLVA, RARELY NAKED.

3. *Amanita muscaria* (L.) Fr. (L. *musca*, a fly).—“Pileus 4 to 5 in. (10 to 20 cm.), fleshy, viscid, globose, then convex and at length flattened, margin slightly striate when mature, scarlet or orange, covered with white or yellowish fragments of the volva. Gills free but reaching the stem, crowded, thick, broader in front, minutely denticulate, white, rarely becoming yellow. Stem 4 to 9 in. (10 to 22 cm.), firm, often torn into scales, apex striate, base bulbous, encircled by several concentric rings formed from the fragments of the volva, white or yellowish. Ring white, yellowish on the exterior, superior, very soft, torn, somewhat striate. Flesh white, yellow under the epidermis. Spores elliptical, apiculate, white, 8 to 10 x 6 to 7 μ . Taste mild. Very poisonous”.—Rea. South Australia.—Under exotic trees (oak and spruce). Aldgate. March.

This is a remarkably handsome and striking species, readily recognised, and almost certainly introduced.

4. *Amanita rubescens* (Pers.) Fr. (L. *rubescens*, becoming red).—Pileus 3½ to 4 in. (8 to 10 cm.), convex, sometimes umbonate, then plane, splitting, moist, margin slightly striate when old, reddish-brown covered with membranous-warty, paler patches of the volva. Gills up to ½ in. (1.2 cm.) deep, just reaching the stem with traces of decurrent teeth, moderately crowded, soft, white spotted with reddish-brown. Stem 3 to 4 in. (7.5 to 10 cm.), ½ in. (15 mm.) thick in the middle, slightly attenuated upwards, bulbous below (1 in., 2.5 cm., thick or more), squamulose, reddish-brown, darker below. Ring somewhat distant, lax, soft, membranaceous, whitish or reddish-white. Volva evanescent, often as only a raised rim, reddish-brown. Flesh turning reddish. Taste sweet. Spores subspherical to elliptical, 9.3 x 6.5 μ , 7.5 μ . Edible, but caution recommended. South Australia—Under chestnuts, Mount Lofty. Europe. March, April.

5. *Amanita ochrophylla* (Cke. et Mass.). (L. *ochra*, ochre; Gr. *phyllon*, a leaf—a hybrid combination).—Pileus up to 9½ in. (24.4 cm.), campanulate when young, then convex and expanded to nearly plane, sometimes slightly umbonate, when young with flakes or large adhering scales or coarse projecting warts (the remains of the volva), often with remains of the veil leaving a fretted margin at the edge of the pileus, pinkish buff, pale fawn, biscuit colour or pale ochre. Gills free or just adnexed, 1.5 cm. deep, crowded, white to cream, becoming ochraceous (buff yellow) when old (between Light Buff and Cinnamon Buff, xv.). Stem to 6 ins. (15 cm.) or more, stout, up to 1½ to 1½ in. (3.1 to 3.7 cm.) in

diameter above the bulbous base to $2\frac{1}{2}$ to $3\frac{1}{2}$ ins. (6.2 to 9.4 cm.) at the base, striate above, mealy above when young, conical downwards, solid, the colour of the pileus or light vinaceous cinnamon. Ring very prominent, about lin. (2.5 cm.) from the pileus, dependent, double, striate. Flesh thick, sometimes tinted with vinaceous russet. Indefinite remains of the volva, sometimes hardly recognisable, forming pinkish-buff scaly remnants or lines round the turbinate base of the stem. Smell strong. Spores white, nearly subspherical to elliptical, 10 to 11.5 x 9.5 μ , 9.5 to 13 μ . After heavy rain. South Australia—Greenhill Road, Mount Lofty, Knitpo, Square Waterhole, Willunga Hill, Waitpinga. Victoria—Specimens apparently of this species with the pileus near Apricot-Buff (xiv.), with the top of the stem similarly tinted, gills with a faint ochraceous tint, were found on Princes Highway at the South Australian border, near Kiora Forest Reserve, in March, 1931. New South Wales. March to June. (Plate 1.)

The very large size, marked ring, strong smell, and the colour make the recognition of the species easy.

6. *Amanita grisea* Mass. et Rodway. (*L. griseus*, grey).—Both in South Australia and New South Wales in the autumn and early winter species of *Amanita* are frequently met with which have as a common feature a more or less evident drab colour on the pileus. This colour may vary from only a slight greyish-brown tint on a whitish background, to an almost uniform dark greyish-brown colour, sometimes almost approaching chocolate, but without a purplish cast. In addition there are usually present also on the pileus adherent whitish or pallid fragments of the volva. The gills are cream-coloured, sometimes with a faint rosy tint. The ring in the adult state may be evident and ample, or indefinite and flimsy, or all vestiges of it may have disappeared. The volva is occasionally ample and rather sheathing, or may be fragmented, or may be fugacious and no longer recognisable. The spores are subspherical to elliptical, varying in size in different collections from 9 to 15 x 7.5 to 13 μ . As in some instances a definite ring may be present without an obvious volva, or a volva without any sign of a ring, or both may be present together, technically individual specimens might be placed under *Amanita*, *Amanitopsis*, or even *Lepiota*. The first two of these genera grade into each other, and some authors unite them as one under *Amanita*. The plants we are considering have the habit of an *Amanita*, being stouter than is usual amongst the species of *Lepiota*. They should all be placed therefore under the genus *Amanita*. But do they all belong to one species of *Amanita*? This point must at present remain undecided. In the same locality and on the same day, we may meet with specimens varying in the way indicated, though usually those plants growing near each other present similar features. Hitherto we have failed to detect any reliable criteria by which these plants can be separated specifically from each other. We consider them, then, as belonging to a rather variable species with a tendency to form local races. The more characteristic features of the species consist in the greyish-brown or drab colour of the pileus, the frequent but not invariable presence of patches of the volva on the pileus, and the large subspherical to elliptical spores.

What name should be attached to this continental species? In the *Kew Bulletin* for 1901 (p. 156) Massee and Rodway described *Amanita grisea* from Mount Knocklofty, Tasmania. Mr. Rodway's original notes from which the Latin description was made, are as follows:—Pileus convex, $1\frac{1}{2}$ in. to 2 in., surface smooth, dull, shining, pale grey brown, cuticle distinct, margin incurved, substance fleshy, hygrophanous. Stem $2\frac{1}{2}$ in., solid, denser than pileus, white. Ring very slight, arachnoid. Volva persistent round base. Gills bold, white, ventricose, adnexed. Spores white, spherical, smooth, 10 μ . A specimen collected at Brown's River, Tasmania, in January, 1928, in company with Mr. Rodway and referred by him to *A. grisea*, resembled forms of our continental species so closely that I considered it the same. The Tasmanian specimens seem to lack patches on the pileus and to have a definite volva.

As indicating the varied features of the species, we give the following composite description of collections from Beaumont Common (May, July), Myponga (May), Kangarilla (October), and Mount Compass (May):—Pileus at first globose, $2\frac{1}{2}$ in. (5.6 cm.), then convex, 3 in. to 6 in. (7.5 to 15 cm.), finally nearly plane or even a little depressed, slightly viscid, with scattered flimsy, adpressed, tomentose greyish-white fragments of the universal veil, edge not striate, later greyish and subfibrillose, shining when dry, greyish-brown to chocolate (near Bister, xxix.). Gills just adnexed, nearly free, no decurrent tooth, $\frac{1}{2}$ in. to $\frac{3}{4}$ in. (6 to 16 mm.) deep, slightly ventricose, definitely cream-colored. Stem up to

5 in. (12.5 cm.), stout, up to 1½ in. (3.1 cm.) thick, slightly attenuated upwards, base more or less bulbous (1½ in., 3.7 cm., thick), fibrillose, marked by gill-lines above the ring, solid, white, or with tints of the pileus. Veil rupturing to form an ample, membranous, median, often evanescent ring, or tending to cling to the stem, gill-marked above, white or rather dingy. Volva at first with a free edge, friable, evanescent. Spores subspherical to elliptical with an oblique apiculus, granular, 9 to 13 μ , 15 x 11 to 13 μ , 11 to 13 x 9 to 11 μ . Sometimes eaten by slugs.

The following is a description of specimens from the Glen Osmond hills, June, 1928:—At first turbinate with a large bulb (1½ in., 3.1 cm., thick) and smaller convex pale drab pileus with a mealy surface breaking up into warts on top, veil present and a marginate volva. Later with a large bulb without a marginate volva, the pileus drab with coarse whitish warts. When adult, pileus up to 3 in. (7.5 cm.), convex, the centre sometimes depressed, whitish, with more or less of a brownish or drab tint, rather shining, with scattered warts or mealy patches. Gills just adnexed or free, moderately close, deep, cream-coloured, sometimes with a flesh tint. Stem slender (¾ in., 9 mm.) or stout (¾ in., 18 mm.), mealy fibrillose, base usually bulbous. Usually with no ring when adult but sometimes it is ample, dependent, and superior. Spores subspherical, 9 to 11 x 7.5 μ .

Additional localities are:—Mount Lofty, National Park, Stirling West, Mylor, Coromandel Valley, Dashwood Gully, Kuitpo, Cleland's Gully, Inman Valley, Encounter Bay. March to August, October, November.

7. *Amanita grossa* Berk. (*L., grossus*, thick).—Pileus 4½ to 7 in. (11 to 17.5 cm.), globose, then convex, white sometimes with a silvery sheen, shining, covered with scattered warts which have a broad base of puckered membrane and a projecting ragged apex as if a piece of tissue paper had been twisted round with the fingers, with large soft ragged fragments of the veil attached to the edge. Gills just reaching the stem, moderately close, of a dirty creamy-white colour, drying to a darker tint. Stem up to 6 in. (15 cm.) high, up to 1½ in. (4.4 cm.) thick at the bulbous base and 1 in. (2.5 cm.) in the upper part, solid, mealy-white, above sometimes with narrow ragged irregular rings from the veil, sometimes with no ring, the upper part of the bulb smooth, the lower with concentric rings of small warts. Spores subspherical, 8.5 to 11 x 6.8 to 7.5 μ , 8 to 9 μ . A strong sour smell as of rancid butter. South Australia—Mount Lofty. New South Wales. March, June, July.

The prominent shaggy warts, whitish colour, and sour smell serve to distinguish this species.

8. *Amanita conico-bulbosa* Clé. (*L., conicus*, conical; *bulbosus*, bulbous).—When young 2 in. (5 cm.) in diameter, plano-convex with a deep rounded border and edge turned in, slightly viscid when moist, finely villose, greyish white; base of the stem very bulbous (1½ in., 3.7 cm. thick), the root conical and 2½ in. (5.6 cm.) deep. When adult, pileus 2 to 4 in. (5 to 10 cm.), slightly convex to a little upturned or convex with the centre depressed, slightly viscid when moist, in places smooth and shining, in others subvillose, with scattered warty patches often villose at the base, or the whole surface dull with no flakes, cuticle peels, white with a slight biscuity tint or chalky white, occasionally with a greyish-brown tint. Gills just reaching the stem, attenuated towards it, close, ½ to ¾ in. (6 to 12.5 mm.) deep, ventricose, short ones at the periphery, creamy white, when old with a buffy tint in some lights, when dry brownish. Stem up to 3 to 5 in. (7.5 to 12.5 cm.), ¾ in. (2.1 cm.) thick, slightly attenuated upwards, gill-marked above, fibrillose-sealy to matt below, solid, white or whitish, bulb 1½ to 1½ in. (3.1 to 3.7 cm.) thick, root up to 3 in. (7.5 cm.) long, conical downwards. Ring superior to median, ample, dependent, marked with gill-lines above, evanescent. No obvious volva, or volva as a mealy-evanescent rim when young. Flesh white, moderately thick (¾ in., 6 mm., or more), attenuated outwards. Smell sometimes slightly fragrant, when cut somewhat phosphorus-like. Spores elliptical, white, 9 to 11.5 x 5.5 to 7 μ . Partly buried in sand or in the ground. South Australia—Kinchana, Beaumont, Hindmarsh Valley. June to October.

This species is characterised by being greyish-white when young, later white with a slight bisenity or greyish-brown tint, and by having usually scattered villose warty patches, no strong smell, and a very long conical root.

9. *Amanita straminea* Clé. (*L., stramineus*, straw-coloured).—Pileus up to 2½ in. (5.6 cm.), convex, then nearly plane with the centre slightly irregularly depressed,

surface dull, mealy when young, becoming smooth, white. Gills adnexed, moderately close, alternate ones at the periphery short, up to $\frac{3}{4}$ in. deep, near Straw Yellow (xvi.). Stem up to $2\frac{1}{2}$ in. (5.8 cm.), rather slender ($\frac{3}{4}$ in., 1 cm., thick above), nearly equal, base somewhat bulbous, somewhat mealy, solid, white. Ring evident, dependent, membranous, subdistant, white. Volva not obvious, evidently friable. Flesh rather thin, white. Spores elliptical, with an oblique apiculus, definitely slightly coloured yellow, 11 to 13 x 7.5 μ . On the ground under shrubs. South Australia—Kinchina, Encounter Bay. June.

This species of *Amanita* is readily characterised by the straw-yellow gills contrasting with the white pileus, which is mealy when young. The volva is evanescent.

10. *Amanita farinacea* Cke. et. Mass. (L., *farinaceus*, mealy).—Pileus up to 5 in. (12.5 cm.), convex, obtusely umbonate, mealy, sometimes with scattered small conical warts, edge slightly turned in and often beset with fragments of the veil, becoming smooth and shining, white with a tinge of fawn round the edge to pearly grey, the warts slightly darker. Gills adnexed with lines down the stem to just free, moderately close, white to pale cream. Stem up to 7 in. (17.5 cm.), np to 1 in. (2.5 cm.) thick, bulbous and conical below, very mealy up to the gills, whose edges may also be mealy. Ring superior, fixed, sometimes absent. Remains of the free edge of the volva above the bulb or the volva absent in the adult. Spores elliptical, 9.2 to 12 x 5.2 to 9.5 μ . On the ground.

The above description is drawn up from New South Wales specimens. The spores in the original description are given as "globose, 10 μ ." Mount Compass specimens, May, were pure white, the pileus $1\frac{1}{4}$ in. (4.4 cm.), convex, a little mealy, shining; gills cream-coloured, just reaching the stem; stem mealy with a slightly bulbous base; ring definite; spores narrow elongated, with an oblique apiculus, 13 to 17 x 4.5 to 5.5 μ .

This species of *Amanita* is conspicuously mealy both on the pileus and stem, though the mealiness may disappear later from the pileus, leaving a smooth sometimes pearly-grey surface.

11. *Amanita subalbida* Ccl. (L., *subalbidus*, somewhat whitish).—Pileus $1\frac{1}{4}$ in. (4.4 cm.), irregularly convex, then nearly plane, with the centre somewhat depressed, mealy with the remains of the universal veil, pallid brownish to nearly white. Gills just adnexed, close, rather narrow, white. Stem 1 in. (2.5 cm.), elongating from the bulbous base to $1\frac{1}{4}$ in. (4.4 cm.), rather short, $\frac{3}{4}$ in. (10 mm.) thick, sub-mealy, nearly equal when expanded, solid, white. Ring superior, when young well-marked, membranous, marked above with gill-lines, tending to disappear. Volva disappearing, as a slight friable rim-like edge to the bulb. Spores obliquely elliptical, white, 9.5 x 5.5 to 7.5 μ . Half-buried in sandy soil. South Australia—Kinchina, Upper Hindmarsh Valley. June, September.

The species resembles *A. farinacea* but is much smaller, the pileus is pallid brownish to nearly white and the stem is less mealy.

*With a volva at the base of the stem.

AMANITOPSIS Roze.

(*Amanita*, the genus of this name; Gr., *opsis*, like.)

"Pileus fleshy, regular. Stem central, fleshy. Volva membranaceous, free, lax, sheathing. Gills free or aduate. Spores white, globose or subglobose or oblong elliptic, smooth, continuous. Growing on the ground"—Rea.

A genus readily recognised by the absence of a ring, the presence of a definite volva and the white spores (and usually white gills). The species grade into *Amanita*, in which genus specimens may be found lacking a ring which other members of the same species may possess. In consequence some authors combine the two under *Amanita*. We have one common and beautiful species of *Amanitopsis*, *A. pulchella*, usually rather small with a saffron-yellow to orange pileus covered in parts with reddish-orange and white patchy remains of the volva, a definite volva at the base of the stem and never any sign of a ring. The common, usually large, drab or chocolate-coloured *Amanita grisea* may often be found in the *Amanitopsis* form without a ring and with a definite volva. The edible mouse-grey *Amanitopsis vaginata* and its white ally, *A. nivalis*, with ample sheathing volvas and globose spores, occurring in Europe and in New South Wales and other Australian States, have not yet been found in South Australia.

KEY TO THE SPECIES.

- Pileus saffron-yellow or orange 12, *Amanitopsis pulchella*.
 Pileus pale buff. Spores $13 \times 7 \mu$ 13, *A. sublutea*.
 Pileus livid or mousey-grey with large white or grey
 fragments of the volva, edge striate. Spores globose,
 10 to 12μ 14, *A. vaginata*.
 Pileus drab-brown, bistre or chocolate. Spores 11 to
 15×9 to 13μ *Amanitopsis* forms of
Amanita grisea.

12. *Amanitopsis pulchella* Cke. et Mass (L., *pulchellus*, diminutive of beautiful).—Pileus 1 to 2 in. (2.5 to 5 cm.), convex, then expanded and nearly plane, centre sometimes depressed, the edge sometimes striate, saffron-yellow to orange, paling with age, with a few adherent reddish-orange and white warty or patchy remains of the volva. Gills almost free, crowded, white or cream. Stem $1\frac{1}{4}$ to $2\frac{1}{2}$ in. (3 to 6.2 cm.), expanding under the pileus where it may be streaked by the gill attachments, hollow, white or pale yellowish. Volva usually obvious, friable, adnate, marginate, the edge usually definite but irregular, frequently orange-tinted. Spores subglobose, thick-walled, 7 to 9 μ . On the ground, often under trees. South Australia—Mount Lofty Range, Baker's Gully (Clarendon), Mount Compass, Second Valley Forest Reserve, Encounter Bay, Mount Burr (S.E.), Kalangadoo. New South Wales. Victoria. May, June, August, October.

13. *Amanitopsis sublutea* Clel. (L., *subluteus*, somewhat yellow).—Pileus $1\frac{1}{4}$ to $1\frac{3}{4}$ in. (3 to 4.3 cm.) broad, convex, becoming depressed a little in the centre, sticky when moist, pale buff (a little deeper than Warm Buff, xv.) or white with tints of yolk-yellow. Gills just reaching the stem, moderately close, becoming slightly ventricose, white. Stem up to $1\frac{3}{4}$ in. (4.3 cm.), $\frac{3}{4}$ in. (10 mm.) thick, equal, mealy above, smooth below, white or a little buff-tinted below, bulb up to $\frac{3}{4}$ in. (19 mm.) thick, spherical, the colour of the pileus, edge just free. Flesh of pileus rather thin, white, attenuated outwards. Spores oblique, 11 to 13.5×5.5 to 7 μ . In sand. South Australia—Encounter Bay. May, August.

14. *Amanitopsis vaginata* (Bull.) Roze (L., *vagina*, a sheath), with pileus livid or mousey-grey covered with white or grey fugacious fragments of the volva, the margin striate; gills white or greyish, free; stem white or grey with a large, lax, often lobed, white or grey volva; and spores globose, 10 to 12 μ , has been recorded for Queensland, New South Wales, and Victoria, but has not yet been found in this State. It is edible.

***With a ring on the stem.

LEPIOTA (Pers.) Fr.

(Gr., *lepis*, a scale.)

"Pileus fleshy, regular. Stem central. Ring membranaceous, free or adnate, persistent or fugacious, always manifest in the adult stage. Gills free, adnate or sinuato-adnate, often attached to a collar. Spores white, rarely pinkish or ochraceous, oval, elliptical, pip-shaped, fusiform, subreniform, deltoid, or projectile-shaped; continuous or with a germ-pore. Cystidia rare. Growing on the ground, rarely on wood."—Rea.

Species of the genus *Lepiota* are usually readily recognisable by the white spores, a more or less obvious ring on the stem, the usually free gills, and the stem readily separable from the pileus (much as if fitting into a socket). The pileus is usually scaly, rarely smooth and still more rarely viscid. The ring may be ample and movable on the stem, or may be flimsy and soon disappear. Some of the species are quite large and moderately robust, others small, thin, and delicate.

Several species of *Lepiota* are common with us. *Lepiota procera*, the Parasol Agaric, is frequently to be found in the National Park and elsewhere and is edible—its large size, scaly cap and movable ring help in its recognition. A whitish species, *L. naucina*, is also common and may be mistaken for the common mushroom, but the gills are whitish. It is said to be an edible species but has not yet been knowingly eaten in Australia. *L. cristata* is a small rather delicate and elegant species with its cap variegated with reddish-brown scales. Several other delicate species are to be met with, though never common, in our forests.

KEY TO THE SPECIES.

Epidermis dry.

Pileus squamulose or becoming broken up into scales.

Ring more or less movable. Large stout plants, 3in. or more in diameter.

Pileus up to 5in., covered with dark-brown scales, umbonate.

Ring ample. Stem up to 7in., pale brownish. Spores 15 to 22.5 x 9.5

to 11 μ 15. *Lepiota procera*.

Ring fixed. Medium to small plants.

Not becoming red when bruised or cut.

Spores usually more than 9 μ long.

Pileus with dark-brown to blackish scales, umbonate. Ring imperfect. No bulb. Spores 8 to 11 x 3.5 to 4.5 μ 16. *L. Exocarpi*.

Pileus with earthy-brown scales. Ring definite. Bulbous base to stem. Spores 9.3 to 10.5 x

5.5 to 7 μ 17. *L. bulbosa*.

Spores under 9 μ long.

Pileus with reddish-brown scales, massed on the disc, $\frac{1}{2}$ to 2 $\frac{1}{4}$ in.

Stem whitish or rufescent.

Spores 5 to 8.5 x 3 to 4 μ .

Not discoloured in drying 18. *L. cristata*.

Pileus with brown fibrillose scales like *L. cristata*. Stem with shaggy fibrils. Spores 5.5 x

3.7 μ 19. *L. subcristata*.

Pileus with dark reddish-brown scales, up to 2in. Stem whitish, pale brownish below. Spores 5

to 6 x 3.4 μ . Discoloured dark dingy in drying 20. *L. discolorata*.

Pileus with fawn, vinaceous fawn or mikado brown scales, up to 1 $\frac{1}{4}$ in. Stem whitish, fibrillose.

Spores 6.4 to 7 x 3.8 μ 21. *L. cervicolor*.

Pileus with dark grey scales, $\frac{1}{2}$ in.

Stem whitish. Spores 5.5 x

3.5 μ 22. *L. nigro-cinerea*.

Pileus with sooty-brown scales, nearly lim. Stem short, whitish.

Spores 5.5 x 3.5 μ 23. *L. fuliginosa*.

Pileus and stem pinkish cinnamon to tawny, subfloccose or with minute scales, ring indefinite, stem fibrillose. Spores

5.5 to 7 x 4 μ 24. *L. cinnamomea*.

Becoming red when bruised or cut.

Pileus with crimson-lake scales. Spores

5.5 to 7 x 3.5 to 4 μ 25. *L. haemorrhagica*

Pileus not or rarely squamulose, often granular, mealy or pruinose.

Large stout plants.

Pileus up to 3 $\frac{1}{4}$ in., soft, white often with traces of brown. Ring ample, fixed.

Gills creamy-white becoming brownish.

Stem 3in., swollen at the base. Spores

9 to 11 x 5.6 to 6.5 μ 26. *L. naucina*.

Pileus 2 in., white becoming brownish.
 Gills white becoming light buff. Stem
 3 in., equal, slender. Spores 9 to 10 x
 5.5 to 6 μ 27. *L. erminea*.

Small plants.

Altogether white or whitish.

Stem relatively long (1½ in.). Pileus
 ½ in., umbonate, smooth or slightly
 fibrillose. Spores 7 x 3.5 μ 28. *L. parvannulata*.

Stem about 1½ in. Pileus ½ in., with a
 broad umbo, pallid whitish. Spores
 5.5 x 3.5 μ 29. *L. umbonata*.

Stem under ½ in. Pileus ¼ in. White
 fibrils clothing pileus and stem . . 30. *L. albo-fibrillosa*.

Epidermis viscid.

No South Australian species as yet recorded.

A. Epidermis dry.

*Pileus squamulose or becoming broken up into scales.

(a) RING MOVABLE, DISTINCT FROM THE VOLVA; APEX OF THE STEM SURROUNDED BY A CARTILAGINOUS COLLAR.

15. *Lepiota procera* Scop. (*L. procerus*, tall).—Pileus up to 5 in. (12.5 cm.), at first conico-convex, then convex, umbonate, covered with dark brown fibrillose scales, the umbo uniformly dark brown. Gills free, close, white becoming discoloured. Stem up to 7½ in. (18.7 cm.), relatively slender, attenuated upwards, striate, hollow, pale brownish. Ring ample, median or median superior, fixed, then movable. Spores thick-walled, oval, 15 to 22.5 x 9.5 to 11 μ . On the ground amongst grass usually under trees. Edible. South Australia—National Park, hills near Mount Lofty, Kuitpo, Willunga Hill, Encounter Bay, Kinchina, Inman Valley, Mount Burr (S.E.) (in *Pinus insignis* Dougl. forest). Victoria—Ararat. April to August.

The Parasol Mushroom is readily recognised by its large size, relatively slender stem with a prominent usually movable ring on it, convex umbonate pileus with brownish scales, and whitish free gills. It is not uncommon in our National Park. Specimens from this locality have been eaten by the author and were found to be very palatable.

(b) RING FIXED, HOMOGENEOUS WITH THE UNIVERSAL VEIL WHICH CLOTHES THE STEM; APEX OF THE STEM WITHOUT A CARTILAGINOUS COLLAR; PILEUS TORN INTO SCALES OR FLOCCI.

16. *Lepiota Exocarpi* Clel. (*Exocarpus*, the generic name of the native cherry).—Pileus ¾ to 1½ in. (1.8 to 3.1 cm.), broadly conico-convex or convex, finally nearly plane, gibbous to umbonate, covered with very dark brown to blackish fibrous to warty scales (Warm Sepia, XXIX., to nearly black), the scales near the periphery disclosing the Orange Cinnamon (XXIX.) cuticle beneath. Gills just free, ventricose, moderately close, creamy white. Stem up to 1½ in. (3.1 cm.), slender to moderately stout, fibrously striate, slightly hollow, below clad with scattered scales as on the pileus, reddish brown. Ring imperfect, distant. Flesh of stem reddish brown, of pileus whitish under the umbo. Spores elliptical, oblique, narrow, ends pointed, not thick-walled, 8 to 11 x 3.5 to 4.5 μ . South Australia—Under *Exocarpus cupressiformis* Labill. (Native Cherry) in leaf mould, Mount Lofty; under trees, Adelaide Parklands. June, July. (Figure 6 B.)

A small species characterised by the dark brown scales of the pileus on an orange cinnamon background, reddish-brown stem somewhat sealy below and spores 8 to 11 x 3.5 to 4.5 μ .

17. *Lepiota bulbosa* Clel. (*L. bulbosus*, bulbous).—Pileus 1 in. (2.5 cm.), convex, pale earthy-brown with scattered villose scales. Gills barely reaching the stem, close, slightly ventricose, creamy white. Stem ¾ in. (18 mm.) with the bulb, slender, under ¼ in. (6 mm.) thick, bulb ½ in. (12.5 mm.) thick, white and striate from the gills above the median fixed definite membranous ring, slightly fibrillose and whitish with a brownish tint below, slightly hollow. Spores elliptical, oblique, not thick-walled, 9.3 to 10.5 x 5.5 to 7 μ . On the ground. South Australia—Inman Valley. September.

18. *Lepiota cristata* (A. et S.) Fr. (*L. cristatus*, crested).—Pileus $\frac{1}{2}$ to $1\frac{1}{2}$ in. (1.2 to 2.8 cm.), convex to deeply conico-convex, then more expanded, finally sometimes plane or even upturned, sometimes subumbonate, white densely clad with small dark reddish-brown (near Mars Brown, xv., or Chestnut Brown, xiv.) fibrillose scales, very dark on the disc, paler at the periphery. Gills just free, rather close, ventricose, creamy white sometimes later with a pale reddish-brown tinge. Stem $\frac{3}{4}$ to $1\frac{1}{2}$ in. (1.8 to 3.7 cm.), slender, equal, slightly fibrillose, slightly hollow, whitish above, tinged with reddish-brown below (Light Russet Vinaceous, xxxix.). Ring distant, membranous, evanescent, sometimes brownish. Flesh of stem white becoming reddish-brown when old. Spores obliquely elliptical with an apiculus, not thick-walled, 5 to 8.5 x 3 to 5 μ . On the ground amongst grass or under trees. South Australia—Adelaide Parklands, Beaumont, Waterfall Gully (amongst burnt bracken), Kinchinn, Back Valley off Inman Valley, Kalangadoo (pileus ochraceous tawny breaking into fine scales, stem up to 2 in., 5 cm., high, coloured like the pileus, paler above). Victoria. Tasmania. May, June. (Figure 6 A.)

A

B

[From watercolours by Miss R. C. Fireash.]

Figure 6.—A. *Lepiota cristata* (A. et S.) Fr. (No. 18). Adelaide Park Lands.
B. *Lepiota Exocarpi* Clé. (No. 16). Mount Lofty.

19. *Lepiota subcristata* Clé. (*L. sub*, near to: *cristatus*, crested—here, near to the species *L. cristata*).—Pileus 1 to $1\frac{1}{2}$ in. (2.5 to 3.7 cm.), at first conico-convex, then convex to nearly plane, with an obtuse umbo, densely covered with small brown fibrillose scales, darker and closer at the disc. Gills free, moderately close, white. Stem to $1\frac{1}{2}$ in. (4.4 cm.), rather slender, stuffed tending to be hollow, shaggy with fibrils up to the veil attachment, smooth above. No definite ring. Spores elliptical, not thick-walled, 5.5 x 3.7 μ . South Australia—In *Pinus radiata* Don. (*P. insignis* Douglas) forest, Mount Burr (S.E.). May.

Resembles *L. cristata* (A. and S.) Fr., but differs in the shaggy fibrillose stem without a definite ring. *L. cristata* grew in the same locality.

20. *Lepiota discolorata* Clé. (*L. discoloratus*, discoloured, from the change in colour in drying).—Pileus $1\frac{1}{2}$ to 2 in. (3 to 5 cm.), nearly plane, a little upturned, subumbonate, covered with dense very dark reddish-brown scales, fewer near the periphery, sometimes slightly striate at the periphery. Gills just free, close, white or cream-coloured. Stem $1\frac{1}{2}$ to $2\frac{1}{2}$ in. (3.1 to 6.2 cm.), slender, hollow, white above, pale brownish below or pallid with minute brownish flecks. Ring distant, membranaceous, evanescent. Flesh white stained reddish. Smell strong, radishy. The whole plant when dry Fuscous to Fuscous Black (xlvi.). Spores elliptical, oblique, not thick-walled, 5 to 6.5 x 3.5 μ , sometimes 7.5 to 9 x 4.5 μ . On the ground. South Australia—Mount Lofty; National Park; in *Pinus radiata* Don. (*P. insignis* Douglas) forest, Kalangadoo (S.E.). April to June.

A moderately small species recognised by the dark reddish-brown scales in the pileus and the discolouration of the whole plant on drying.

21. *Lepiota cervicolor* Clé. (L., *cervus*, a deer; *color*, colour).—Usually slender. Pileus up to 1½ in. (4 cm.), usually about 2 cm., becoming plane, subumbonate, with a fibrillose tomentum splitting into fibrillose or floccose scales, near Fawn (XL) to Vinaceous Fawn, or Mikado Brown (XXIX.) in the centre with Light Pinkish Cinnamon (XXIX.) scales at the periphery; occasional plants stout with a stout stem, irregularly convex, umbonate, clothed uniformly with a Vinaceous Fawn fibrillose tomentum. Gills free, creamy white. Stem slightly striate, fibrillose, whitish with a pink caste above the attachment of the flimsy veil to the middle of the stem, which connects the fibrillose tomentum of the pileus to similar coloured fibrils on the stem below. Spores elliptical, 6.4 to 7 x 3.8 μ . In garden. South Australia—Fullarton (Adelaide). May.

22. *Lepiota nigro-cinerea* Clé. (L., *niger*, black, dark; *cinereus*, of an ash colour).—Pileus ½ in. (1.2 cm.), convex, subumbonate, dark-grey from floccose scales. Gills barely reaching the stem, moderately close, cream-coloured. Stem ½ in. (16 mm.), slender, a little fibrillose below, whitish. Ring ? evanescent. Spores very oblique, sometimes nearly triangular, not thick-walled, 5.5 x 3.5 μ . On the ground. South Australia—Encounter Bay. May.

23. *Lepiota fuliginosa* Clé. (L., *fuliginosus*, sooty).—Pileus up to ¾ in. (2.2 cm.), slightly convex, then plane or a little upturned, in the centre sooty-brown from minute fibrous scales, almost villose, the scales scantier and paler round the periphery leaving a pallid slightly sooty zone ¼ in. (3 mm.) or more in diameter. Gills barely free, narrow, close, creamy white. Stem ½ to ¾ in. (3 to 19 mm.), short, equal, smooth, solid, pallid whitish. Ring distant, as a narrow membranaceous ring, evanescent. Spores oblique with an apiculus, 5.5 x 3.5 μ . On the ground. South Australia—Kinchina. June.

24. *Lepiota cinnamomea* Clé. (L., *cinnamomeus*, cinnamon-coloured).—Pileus ½ to 1 in. (1.2 to 2.5 cm.), at first almost campanulate-convex, then expanding to convex, often more or less broadly umbonate, slightly floccose to flecked with minute scales, Light Pinkish Cinnamon (XXIX.) to Cinnamon or near Tawny (XV.), sometimes when dry near Apricot Buff (XIV.). Gills just free or barely reaching the stem, rather close to moderately distant, rather narrow, ventricose, cream. Stem 1 in. (2.5 cm.), rarely 1½ in. (3.7 cm.), rather slender (5 mm. thick), slightly attenuated upwards, fibrillose to fibrillose-sealy up to the veil attachment which is superior, stuffed or slightly hollow, paler than the pileus to near Tawny, sometimes Cinnamon Rufous (XIV.). No definite ring. Flesh thin, whitish, in the stem with a cinnamon tint and white in the centre. Spores elliptical, slightly oblique, not thick-walled, 5.5 to 7.5 x 3.7 to 4 μ . South Australia—On the ground in a glade in stringy-bark forest, National Park; in *Pinus radiata* Don. (*P. insignis* Douglas) forest, Mount Burr (S.E.). May.

25. *Lepiota haemorrhagica* Clé. (L., *haemorrhagicus*, bleeding).—Pileus ¾ to 2 in. (1.8 to 5 cm.), convex to nearly plane, sometimes irregular, sometimes subumbonate, covered with reddish-brown (crimson-lake) fibrillose scales thicker and darker at the disc. Gills free, close, creamy-coloured turning reddish like a fresh blood-stain when bruised. Stem 2 in. (5 cm.), relatively rather stout, attenuated upwards, slightly hollow, clothed with reddish-brown fibrils even above the distant definite membranous pale to reddish ring. Flesh thin, white, turning a little reddish especially in the stem. Spores elliptical, slightly oblique, not thick-walled, microscopically slightly tinted, 5.5 to 7 x 3.5 to 4 μ . On the ground in *Eucalyptus* forest. South Australia—Mount Burr (S.E.), National Park. May, June.

**Pileus not or rarely squamulose, often granular, mealy or pruinose.

(a) RING SUPERIOR, FIXED, SUBPERSISTENT; UNIVERSAL VEIL ADNATE TO THE PILEUS. COLLAR WANTING OR SIMILAR IN TEXTURE TO THE FLESH OF THE PILEUS.

26. *Lepiota naucina* Fr. var. *leucothites* (Vitt.) Fr. (L., *nauci*, the shell of a nut; Gr., *leukos*, white).—Pileus up to 4 in. (10 cm.), globose, then deeply convex, then expanding, slightly umbonate or occasionally depressed in the centre, smooth, the cuticle (which peels) tending at times to separate into minute often punctate fibrillose scales, soft and easily indented, pure white with bisenity or smoky brown tints (near Buffy Brown, Natal Brown or Wood Brown, XL.) appearing near the centre. Gills just free, ventricose, close, up to ¾ in. (6 to 8 mm.) or more in depth, slightly attenuated both ways, white or creamy white, in some plants showing a Seashell Pink (XIV.) tint, becoming discoloured brownish. Stem up to

3½ in. (8 cm.), relatively rather slender (up to ¾ in., 9 mm.) and nearly equal above, occasionally much attenuated downwards, base bulbous (¾ in., 21 mm., diameter), somewhat striate, hollow, white becoming slightly dusky brownish below or throughout. Ring ample, nearly median or moderately superior, fixed or sometimes slightly movable, white. Flesh of pileus white, thick in the centre, very attenuated at the periphery. Smell pleasant. Spores elliptical or nearly subspherical, oblique, not thick-walled, under the microscope with a brownish tint, 6.5 to 9.3 x 3.5 to 5 μ , 9 x 7.5 μ , 11 x 6.5 μ . Edible. Eaten by slugs. Amongst grass after rain or on peaty soil. South Australia—Adelaide (on lawn at the University), Woodville, Beaumont, grassy hills near Adelaide, Buckland Park, Mount Compass, Encounter Bay, Kadina. February to July. (Figure 7.)

Our Australian plants agree with the descriptions and figures given of this species with the exception that, as judged from the illustrations, the stems are rather more slender. The species is an edible one but so far does not seem to have

[Photo. by E. J. Rogers.

Figure 7.—*Lepiota naucina* Fr. var. *leucothites* (Vittad.) Fr. (No. 26). Woodville.

been tasted in Australia. This should be done with circumspection in spite of the identification of our plants as *L. naucina*. The species is not uncommon, resembles in general appearance the common field mushroom but has white or only faintly pink or brownish gills, and can be readily recognised by its size, nearly pure white appearance, free gills, definite ring on the stem and the soft smooth often easily indented pileus.

27. *Lepiota erminea* Fr. (*L. ermineus*, white).—Pileus about 2 in. (5 cm.), convex, smooth, white becoming pallid brownish. Gills free, rather narrow, close, white becoming light buff (xv.). Stem 3 in. (7.5 cm.), slender, slightly attenuated upwards, striate, solid, white becoming pallid with a brownish tinge. Ring definite, subdistant. Spores oblique, elliptical, 9 to 10 x 5.5 to 6 μ . Under trees. South Australia—Mount Shank (S.E.). May.

There is doubt as to the identification of this species. This white *Lepiota* from the South-East has a much more slender stem than *L. naucina* and is clearly not this species.

- (b) UNIVERSAL VEIL SHEATHING THE STEM, AT FIRST EXTENDING CONTINUOUSLY FROM THE STEM TO THE PILEUS, AT LENGTH RUPTURED AND FORMING AN INFERIOR RING. PILEUS GRANULAR OR WARTED, CONSISTING CHIEFLY OF GLOBOSE CELLS.

No South Australian species yet recorded.

(c) SMALLER, SLENDER. PILEUS DRY, CUTICLE ENTIRE, NOT SCALY OR GRANULAR.

28. *Lepiota parvannulata* (Lasch) Fr. (L., *parvus*, small; *annulatus*, ringed).—Pure white all over or with a pale bisecuity tint appearing in the centre of the pileus. Pileus $\frac{1}{2}$ to $\frac{3}{4}$ in. (1.2 to 1.8 cm.), convex becoming nearly plane, sometimes with a smooth umbo, the rest of the pileus slightly striate, with adpressed silky fibrils at the periphery. Gills just free, close, narrow, edges denticulate, white to creamy-white. Stem $1\frac{1}{2}$ to $1\frac{3}{4}$ in. (3.7 to 4.4 cm.), slender, equal or a little swollen below, slightly fibrillose, hollow, silky white. Ring white, inferior. Spores oblique, ends rather pointed, one side flattened, 6.8 to 7.5×3.5 to 3.7μ . South Australia—Mount Lofty. June.

The species can be recognised by the small size, nearly pure white colour, slightly fibrillose pileus and distant white ring. Rea's description of the species in Britain gives the pileus as pruinose, then silky and the spores as 4 to $5 \times 3 \mu$.

29. *Lepiota umbonata* Clel. (L., *umbonatus*, possessing a boss or umbo).—Pileus $\frac{1}{2}$ in. (1.2 cm.) in diameter, slightly convex with a broad obtuse umbo, pallid whitish with a buffy tint. Gills just free, moderately close, pallid flesh-coloured. Stem $1\frac{1}{4}$ in. (3.1 cm.) high, slender, flesh-coloured. Ring distant. Whole plant when dry brownish. Spores not thick-walled, $5.5 \times 3.5 \mu$. South Australia—In *Pinus radiata* Don. (*P. insignis* Douglas) forest, Kalangadoo. May.

A small species with a whitish umbonate pileus and slender moderately long stem.

30. *Lepiota albo-fibrillosa* Clel. (L., *albus*, white; *fibrillosus*, with fibrils).—Pure white. Pileus $\frac{1}{2}$ in. (3.5 mm.) in diameter, convex, subumbonate, mealy, dotted with white fibrils continuous with the veil and clothing the stem below the attachment of the veil, no definite ring. Gills free, many short, edges rather thick, white. Stem $\frac{3}{4}$ in. (10 mm.) high, slender, base a little swollen. Spores elliptical, 6.2 to $7.5 \times 3.75 \mu$. On the ground. South Australia—Mount Lofty, under a rock. May.

A minute white delicate short-stemmed species with white fibrils on the pileus and clothing the stem without a well-defined ring.

B. Epidermis viscid.

No South Australian species recorded.

HIATULA Fr.

(L., *hio*, 1 gape.)

“Pileus slightly fleshy at the disc, campanulate. Stem central. Ring very fugacious, not manifest in the adult stage. Gills free or adnate. Spores white, subglobose, smooth, with a germ-pore. Growing on wood.”—Rea.

No South Australian species recorded.

****Without a ring or a volva.

SCHULZERIA Bres.

(After Stephan Schulzer.)

“Pileus fleshy, regular; margin at first incurved. Stem central. Gills free from the stem. Spores white, oval or clavate, wall continuous. Growing on the ground.”—Rea.

No South Australian species recorded.

(b) Pileus confluent and homogeneous with the fleshy stem.

*With a membranaceous ring on the stem.

ARMILLARIA Fr.

(L., *armilla*, a ring.)

“Pileus fleshy, regular. Stem central, fleshy. Ring membranaceous or subarachnoid, adnate, persistent or fugacious. Gills sinuato-adnexed, decurrent or adnate. Spores white, elliptical or oval or globose, smooth. Growing on the ground and on wood, sometimes caespitose.”—Rea.

The genus *Armillaria* is characterised by having a definite ring on the stem, white spores and the substance of the stem similar to that of the cap and not readily separated from it as in *Lepiota*. The notorious root-parasite, *Armillaria mellea*, is common in Australia, and in some parts, Western Australia for instance, has been responsible for serious economic loss by killing orange trees, rose bushes, &c. We have three other species, the large *A. colossa* var. *australis*, a small species growing amongst moss, *A. muscicola*, and the beautiful orange-coloured warty *A. asprata* on wood.

KEY TO THE SPECIES.

Pileus relatively smooth.

Gills sinuato-adnexed.

Large. Pileus brownish. Gills light pinkish cinnamon becoming spotted. Spores sub-spherical. 7 to 9 μ 31. *Armillaria colossa* var. *australis*.

Gills adnato-decurrent.

Variable, moderately large. Ochraceous yellow, tawny, reddish or yellowish cinnamon, honey-coloured, &c., with brownish fibrils or warts. Ring apical, usually marked . . . 32. *A. mellea*.

Pileus frosted with granules.

Small. Amongst moss. Pileus yellow ochre to ochraceous tawny 33. *A. muscicola*.

Pileus densely covered with conical warts.

Pileus pale yellow covered with orange-coloured warts. On dead wood 34. *A. asprata*.

31. *Armillaria colossa* Fr. var. *australis* Clel. (L., *colossus*, gigantic; *australis*, southern, but here used for *australiensis*, Australian).—Pileus 3in. (7.5 cm.) or more, at first irregularly convex, then expanding to irregularly plane or up-turned, surface fibrillose-matt with some more superficial fibrils, Clay Colour (XXIX.) to Sayal Brown (XXIX.) towards the centre, sometimes much darker. Gills sinuate, nearly free, moderately close, $\frac{1}{2}$ in. (6 mm.) deep, ventricose, short ones interposed at the periphery. Light Pinkish Cinnamon (XXIX.), when old spotted with reddish brown. Stem 2in. (5 cm.) high, $\frac{1}{2}$ in. (1.2 cm.) or more

[From a watercolour by Miss R. C. Fivensh.

Figure 8.—*Armillaria colossa* Fr. var. *australis* Clel. (No. 31). Mount Lofty. Reduced to $\frac{2}{3}$.

thick, usually attenuated downwards, fibrillose striate, marked with gill lines above, solid, at first pallid with rusty stains, then tinted with Ochraceous Tawny (xv.). Ring marked when young, median, pallid then brownish. Flesh white, a little reddish under the cuticle, when old becoming brownish, especially in the stem. Flesh of stem continuous with that of the pileus. Spores subspherical, smooth, 7 to 7.5 μ , 9 x 7.5 μ . Subcaespitose, sometimes in imperfect rings at or near the bases of Eucalyptus trunks. South Australia—Mount Lofty, near Clarendon, Encounter Bay. May, July. (Figure 8.)

This species may be recognised by the large size, stout build, the colour of the pileus, the sinuate light pinkish cinnamon gills becoming spotted and the evidence of a ring. The species is often placed under *Tricholoma* as *T. colossa*, as the ring is often absent in the adult condition. The Australian *T. coarctata* is probably the ringless form of the Australian variety of *A. colossa*.

32. *Armillaria mellea* (Vahl.) Fr. (L., *mel*, honey).—Pileus 2 to 5 in. (5 to 8.7 cm.), irregularly convex, often becoming upturned at the edge, sometimes

[Drawing by E. R. C.]

Figure 9.—*Armillaria mellea* (Vahl.) Fr. (No. 32). Waitpinga.
Reduced to $\frac{1}{2}$.

repand, rim sometimes lacerated, subumbonate to umbonate, surface dull usually beset with scattered minute black papillae or dark fibrils or punctate with darker squamules, edge striate when moist, slightly hygrophanous, Buckthorn Brown to Dresden Brown (xv.), when dry Cinnamon Buff to Clay Colour (xxix.), sometimes Honey Colour (xxx.). Gills adnate-decurrent, sometimes with a slight sinuation, 3/16 to $\frac{1}{2}$ in. (4.5 to 10 mm.) deep, moderately close, white or pallid fleshy to pallid yellowish cinnamon. Stem $2\frac{1}{2}$ to 5 in. (6 to 20 cm.) high, slender to stout ($\frac{1}{4}$ to 1 in., 6 to 25 mm.), equal or attenuated downwards, fibrillose, usually mealy fibrillose above the ring, stuffed or with a tendency to be slightly hollow, pallid, sometimes with a sage-coloured mondy appearance below. Ring usually definite, becoming fragmentary, narrow, some distance (about $\frac{1}{2}$ in., 1.2 cm.) from the pileus. Flesh whitish, rather thin, attenuated outwards, that of the fleshy tough stem continuous with the flesh of the pileus. Spores elliptical, oblique, 8 to 11 x 5.5 to 8 μ . Single to densely caespitose at or near the bases of trees, shrubs and stumps to which the fruiting bodies are attached by mycelial

strands and whose roots are surrounded and strangled by cord-like dark rhizomorphs. South Australia—At the base of *Acacia pycnantha* Benth. at National Park, Mount Lofty, Kuitpo, Willunga Hill, Encounter Bay, at the bases of swamp plants at Willow Creek (Waitpinga), Upper Tunkalilla Creek. New South Wales. Queensland. Victoria. Western Australia. April to June, August.

Specimens vary much in colour and appearance but all have in common the more or less evident ring, the adnate-decurrent gills and usually the minute almost punctate scattered dark fibrils, fibrillose-scales or warts on the pileus. The pileus may be almost mustard colour to yellowish olive or brownish olive and when young may be densely beset with minute furfuraceous scales. The edge may be slightly rugose. There may be no sinuations of the gills. The superior ring may stand out as a broad collar. The flesh of the stem is continuous with that of the pileus, this being one of the features of the genus distinguishing it from *Lepiota*. (Figure 9.)

The species is of considerable economic importance, and losses have occurred in Western Australia from its attacks on orange trees and rose bushes. The fungus gains its nourishment from mycelial strands which extend through the soil to the roots of the host trees. The roots become surrounded by dark-cord-like strands of mycelium which are known as rhizomorphs. These interfere with the passage of sap and so strangle the roots. The strands extend along the roots and spread to others until finally the general nutrition of the tree or shrub suffers and death may result. The fungus is not uncommon in Eucalypt forests in this State, New South Wales, and Western Australia, evidently parasitic on the roots of the forest trees. When such virgin country is cleared as for orchards, the fungus, which in the Old Country is often known as the Honey Fungus from its colour, still survives in the soil for considerable periods, especially when many roots and stumps have been left. This may give it time to attach itself to the roots of the nursery fruit-trees that are planted with frequently fatal results.

33. *Armillaria muscicola* Clel. (L., *muscus*, moss; *colo.* to inhabit, dwell in).—Pileus up to 1 in. (2.5 cm.), broadly conico-convex to convex, umbonate, frosted with granules of fine warts and slightly rugose, Yellow Ochre to Ochraceous Tawny (xv.). Gills adnate to adnexed or sinuately adnexed, moderately close, creamy to pure white. Stem up to 1½ in. (3.7 cm.), covered with yellowish buff granules up to a little way below the gills, forming here a more or less definite

[From a watercolour by Miss J. Buxton.

Figure 10.—*Armillaria muscicola* Clel. (No. 33). Greenhill Road.

ring, browner than Tawny to Buckthorn Brown (xv.). Spores elliptical, oblique, not thick-walled, 5.5 to 6.5 x 3.2 to 4 μ . Amongst moss on shady banks. South Australia—Greenhill Road, Mount Lofty, National Park. June to August. (Figure 10.)

An albino plant was found near a normal specimen on the Greenhill Road in August, 1922. The pileus was white with a faint tinge only of buff, and the stem white, smooth and slightly striate above the superior ring, mealy white below.

34. *Armillaria asprata* Berk. (L., *aspratus*, rough).—When young a little knob covered with orange warts. When expanded pileus 1½ to 2 in. (3.5 to 5 cm.) in diameter, almost plane, depressed in the centre, margin incurved, pale yellow covered with orange-red conical warts which are large and close-set in the centre and diminish in size towards the margin, margin slightly floccose. Gills broadly adnate with a small decurrent tooth or shortly decurrent, rather distant, broad (up to 6 mm.), white. Stem 1½ to 2 in. (3.5 to 5.5 cm.), 4 mm. in diameter, equal, expanding into the pileus, usually curved at the base, covered with floccose down up to the apex, stuffed then hollow, orange below becoming pale yellow above. Veil more or less arachnoid, disappearing. Flesh white, somewhat spongy. Spores subglobose, white, 7 to 8 x 5 to 6 μ . On dead wood. (Description by T. Petch of Ceylon specimens.) South Australia—Mount Lofty, June, minute very immature specimens, only a few mm. in diameter but with the characteristic orange-yellow warts composed of fasciculated twisted fibrils, giving a hedge-hog appearance. New South Wales—Typical expanded specimens have been found at Mosman in April and May.

**Gills sinuate.

TRICHOLOMA Fr.

(Gr., *thrix*, *trichos*, a hair; *loma*, a fringe.)

“Pileus fleshy, regular, margin incurved. Stem central, fleshy. Gills sinuate, sinuato-adenate or decurrent by a tooth. Spores white, rarely pinkish or yellowish in the mass; elliptical, oval, pip-shaped, globose, subglobose or oblong; smooth, punctate, verrucose or echinulate; continuous. Cystidia present or absent. Growing on the ground, very rarely on wood, sometimes forming large rings.”—Rea.

The species are nearly all terrestrial “mushrooms,” fleshy, firm, and sometimes large, characterised by the white spores, the fleshy central stem continuous with and similar to the substance of the pileus, and the gills not passing straight to the stem but more or less definitely bayed (sinuate, emarginate) at their attachment. *Pleurotus* differs in the stem, if present, not being central. In *Clitocybe* the gills pass straight to the stem, and it is often a difficult matter to determine whether this is the case or whether baying is really present but obscure. An examination of several specimens from a collection may be necessary before the true attachment of the gills can be ascertained, as individual plants may fail to show this clearly. In some species the pileus is viscid; its colour is usually not vivid, though some species have lilac or purplish tints. The gills in some cases become spotted. Some have a pleasant smell and some are edible.

Doubtless a number of species of *Tricholoma* occur in this State, but as yet few have been recognised. In any case the individual members are few.

KEY TO THE SPECIES.

Pileus viscid or subviscid, fibrillose, scaly or pubescent.

Gills changing colour, generally with reddish spots.

Pileus variegated with tints of vinaceous

brown. Gills adnexed, near avellaneous,

stem stout. Often caespitose, pressed

together and deformed 35. *Tricholoma coarctata*.

Pileus not viscid, torn into scales or fibrillose.

Gills not changing colour.

Pileus 2 to 3 in., ochraceous tawny, strigose

with vinaceous brown fibrils. Gills warm

buff to antimony yellow. Stem densely

velvety fibrillose, russet to dark vinaceous

brown. Spores 7 x 5.6 μ 36. *T. ratians*.

Pileus compact, smooth, moist, not hygrophanous.

Gills discoloured.

Pileus lilac to pallid. Gills sinuately adnexed,
cinnamon drab to vinaceous drab. Stem
light cinnamon drab 37. *T. nudum*.

Pileus thin, subumbonate, hygrophanous.

Gills becoming violet, grey, or fuliginous.

Whole plant with lilac tint when moist. Gills
adnate with decurrent tooth 38. *T. sublilacinum*.

A. Pileus viscid, fibrillose, scaly, or pubescent.

(a) GILLS NOT CHANGING COLOUR.

No South Australian species recorded.

(b) GILLS CHANGING COLOUR, GENERALLY WITH REDDISH SPOTS.

35. *Tricholoma coarctata* Cke. et Mass. (L., *coarctatus*, pressed together).—Pileus 2 to 5½ in. (5 to 13.7 cm.), very irregular, convex, repand, subfibrillose, sometimes with adpressed fibrils rimosely cracking into adherent scales, splitting, somewhat viscid when moist, sometimes becoming shiny, sometimes a little up-turned at the edge, edge a little involute when young, a little more vinaceous than Wood Brown (XL) and often paler or near Pecan Brown (XXVII), becoming darker near Auburn (II), or near Mikado Brown to Verona Brown (XXIX), or sometimes pallid with vinaceous brown tints. Gills adnexed or slightly sinuate, tending to fall short of the stem, slightly ventricose, ¼ to ¾ in. (6 to 9 mm.) deep, moderately close, cream-coloured to near Avellaneous (XL), later spotted with reddish to vinaceous brown. Stem 1 to 3 in. (2.5 to 7.5 cm.), stout (up to 1½ in., 3.7 cm.), swollen in the middle or nearly equal, conical downwards, with some fine fibrils, pallid with tints of the pileus. Sometimes with slight evidence of a ring just below the gills. Flesh to nearly ¾ in. (1.8 cm.) thick, attenuated outwards, white. Smell slight. Spores obliquely elliptical to subspherical, 5.6 to 8 x 3.5 to 5 μ , 8.5 x 7.5 μ . More or less caespitose under Eucalypts, often pressed together and deformed and partly buried by soil. South Australia—Burnside, Greenhill Road, Mount Lofty, near Ashbourne, Mount Compass, Back Valley off Inman Valley, Second Valley, Kinchina, MacDonnell Bay (S.E.). New South Wales—Sydney, Newcastle. March to July. (Plate III. Central figure.)

This is probably the ring-less form of *Armillaria colossa* var. *australis*. It is a common rather large stout species found under Eucalypts, the pileus somewhat variegated with tints of brown, the gills becoming spotted reddish-brown. It is often partly covered by soil.

B. Pileus never viscid; torn into scales or fibrillose.

(a) GILLS NOT CHANGING COLOUR.

36. *Tricholoma rutilans* (Schaeff.) Fr. (L., *rutilans*, becoming reddish).—Pileus 2 to 3 in. (5 to 7.5 cm.), convex, subumbonate, densely strigose with the fibrils twisted into fascicles, Ochraceous Tawny (XV), the fibrillose scales more Russet (XV) to Cinnamon Brown (XV) and tinted with Vinaceous Brown (XXXIX). Gills just reaching the stem, moderately close, up to 5 mm. deep, ventricose, in three tiers, edges rather thick and finely serrate, Warm Buff (XV) to Antimony Yellow (XV). Stem 1½ in. (3.7 cm.), slightly excentric, moderately stout (1 to 1.5 cm. thick), densely velvety fibrillose, slightly curved, tough, solid, Russet to Dark Vinaceous Brown (XXXIX). Flesh yellowish, continuous with that of the stem, thick over the disc, attenuated outwards. Spores subspherical to oval, 7 x 5.6 μ , 6.5 μ . South Australia—On a bank at the bases of *Leptospermum scoparium* Forst. et f. and a sedge. Encounter Bay. May.

(b) GILLS RUFESCENT OR BECOMING CINEROUS, EDGE OFTEN SPOTTED RED OR BLACK.

No South Australian species recorded.

C. Cuticle of the pileus rigid, punctato-granulate or broken up into glabrous squamules when dry.

(a) GILLS WHITE OR PALLID, NOT SPOTTED.

No South Australian species recorded.

(b) GILLS BECOMING REDDISH OR CINEROUS OR SPOTTED.
No South Australian species recorded.

D. Pileus at first slightly silky, soon becoming smooth, very dry.

(a) GILLS BROAD, RATHER THICK, DISTANT.
No South Australian species recorded.

(b) GILLS THIN, CROWDED, NARROW. SMALL, INODOROUS.
No South Australian species recorded.

E. Pileus fleshy, soft, fragile, spotted or rivulose. Vernal.

(a) GILLS WHITISH.
No South Australian species recorded.

(b) GILLS DISCOLOURED, RUFESCENT OR SMOKY.
No South Australian species recorded.

F. Pileus compact, then spongy, obtuse, even, smooth, moist, not hygrophanous.

(a) GILLS NOT DISCOLOURED.
No South Australian species recorded.

(b) GILLS DISCOLOURED.

37. *Tricholoma nudum* (Bull.) Fr. (L., *nudus*, naked).—Pileus 2½ in. (5.6 cm.), convex, slightly umbonate, fibrillose-tomentose, smoother round the edge, lilac-tinted to pallid (becoming Drab Gray, XLVI.). Gills sinuately adnexed, moderately close, rather narrow, Light Cinnamon Drab (XLVI.), Eerie Drab (XLVI.) to Pale Vinaceous Drab (XLV.). Stem 1½ to 2½ in. (3.7 to 5.6 cm.), rather slender to stout (½ to ¾ in., 8 to 12 mm., thick), fibrillose, stuffed, near Light Cinnamon Drab (XLVI.), with whitish mycelium at the base. Flesh of the stem similar to that of the pileus. Spores obliquely elliptical, 7.5 to 9 x 4 to 5 µ. South Australia—Under *Pinus*, on the ground and on dung, Thornton Park Reservoir, near Adelaide; Enfield. July, August.

G. Pileus thin, subumbonate, hygrophanous.

(a) GILLS WHITISH, UNSPOTTED.
No South Australian species recorded.

(b) GILLS BECOMING VIOLET, GREY OR FULGINOUS.

38. *Tricholoma subilacinum* Clel. (L., *subilacinus*, somewhat lilac-tinted).—The whole plant when moist with a distinct lilac tint. Pileus up to 1½ in. (4.3 cm.), irregularly plane, repand or slightly upturned, subumbonate, edge inturned when young, smooth, hygrophanous, when moist near Benzo Brown (XLVI.), drying through Light Drab (XLVI.) to drab whitish. Gills adnate, usually with a decurrent tooth, moderately close, alternate ones reaching about half way with shorter ones reaching quarter-way interposed, near Pale Brownish Drab (XLV.). Stem up to 1½ in. (3.1 cm.), slender, ¾ in. (6 mm.) or less in diameter, often curved, somewhat striate, tinted with pallid drab. Flesh of stem continuous with and homogeneous with that of the pileus. Mushroomy smell. Spores obliquely elliptical, 6 to 7 x 3.5 µ. South Australia—Mylor. May.

***Gills decurrent or adnate-decurrent by a tooth.
Hymenium not waxy or pulverulent.

CLITOCYBE Fr.

(Gr., *klitos*, a slope; *kybe*, a head.)

“Pileus fleshy, regular or irregular; margin incurved. Stem central, externally fibrinous. Gills decurrent, rarely adnate, with an acute edge. Spores white, rarely yellowish or greenish; elliptical, pip-shaped, globose, subglobose or oblong; smooth, punctate, verrucose or echinulate; continuous. Growing on the ground, rarely on wood, solitary or caespitose or forming rings.”—Rea.

[By courtesy of Government Printer, N.S.W.]

PLATE II.

Clitocybe infundibuliformis (Schaeff.) Fr.? (No. 44B). (Central figure.)

Clitocybe paraditopa Clel. et Cheel. (No. 45). (Right and left figures.)

The species are characterised by the white spores, the central stem whose flesh is continuous with and similar to that of the pileus, the more or less decurrent gills not emarginate near their attachment, and the edge of the pileus inturned when young. The species are mostly medium to large in size, fleshy, growing on the ground or amongst decaying leaves or fallen bark, rarely on wood. The colour of the pileus is usually whitish, greyish or brownish, rarely brightly coloured, and in many species the colour changes markedly on drying, *i.e.*, the pileus is hygrophanous. It may be thin and the centre may become depressed, umbilicate or deeply funnel-shaped. The gills are usually white, in some cases greyish or pallid-brownish, and more or less decurrent, rarely adnate and always without any baying at their attachment. The stem is sometimes very hollow, and in some specimens of a collection may not be quite centrally placed though central in others, and the spores are mostly small.

As yet in this State not many species have been differentiated. Some of those known are, however, common. Thus usually amongst grass a drab-coloured species (*C. paraditopa*), becoming pallid when dry, may be readily recognised by its strong smell of wattle-blossom. Another thinner drab-coloured species (*C. brunneo-ceracea*), also hygrophanous, occurs under pines. A whitish species, drying rather biscuit-coloured (*C. semiocculta*), is often numerous partly hidden (hence its name) under fallen *Eucalyptus* bark. Other species grow under trees or in groups on grassy hills.

KEY TO THE SPECIES.

Pileus more or less fleshy, not truly hygrophanous.

Large. Pileus to 6in., fleshy, drab. Gills moderately decurrent, creamy. Stem stout, long, pallid, drab. Spores 5.5 to 6.5 x 4.5 μ 39. *Clitocybe cucalyp-torum*.

Densely caespitose. Pileus 1½in., smoky yellowish-brown with fibrils, semitranslucent. Gills straw-coloured 40. *C. straminea*.

Merismatic. Pilei drab. Stems flecked with greyish scales 41. *C. peraggregata*.

Pileus up to 4in., pinkish cinnamon to Mikado brown. Gills pinkish cinnamon. Stem stout. Spores slightly tinted, 6.5 to 8.5 x 4 to 6 μ . . 103. *Clitopilus subframentaceus*.

Pileus up to 2in., tanny brown, squamose-villous. Stem short, brownish. In grass 42. *Clitocybe flaccida* var. *lobata*.

Pileus up to 1in., whitish drying biscuit-colour. Stem often excentric. Attached to fluffy white mycelium under bark 43. *C. semiocculta*.

Pileus up to 1in., pallid buff with darker tints of wood brown as if below the surface. Gills avellaneous. Stem short. In grassy places . . 44. *C. campestris*.

Pileus fleshy membranaceous, truly hygrophanous. Gills becoming cinereous. Pileus dingy. Stem often compressed.

Scent of wattle. Pileus pallid stone-grey to brownish, drying pallid. Gills adnate to somewhat decurrent 45. *C. paraditopa*.

Without wattle scent. Pileus semitranslucent buffy brown, drying pallid. Gills moderately decurrent 45. *C. brunneo-ceracea*.

Gills near pinkish buff.

Spores about 7 x 3.7 μ .

Pileus 1½in., Sudan brown to Brussels brown, drying opaque whitish. Stem short, similarly coloured 47. *C. pascua*.

Spores about 5 x 3 μ .

Pileus moderately large, up to 4in., pinkish buff to vinaceous cinnamon, drying pallid. Gills adnate to slightly decurrent. Stem 2 to 3in., stout . . . 48. *C. australiana*.

A. Pileus fleshy, often pale and silky when dry, not hygrophanous.

39. *Clitocybe eucalyptorum* Clel. (L., *eucalyptorum*, of Eucalypts).—Pileus 6in. (15 cm.) or more, irregularly convex with the edge turned in when young, then expanding, the centre finally more or less depressed, repand, minutely fibrillose to subtomentose with occasionally small circular patches of thickened cuticle, the edge slightly sulcate, Drab (XLVI.) when young to browner than Tawny Olive (XXIX.). Gills moderately decurrent, moderately close, up to $\frac{3}{4}$ in. (10 mm.) deep, attenuated at the periphery, cream-coloured, assuming a slight fleshy tint, becoming yellowish round the edge when old. Stem $\frac{1}{2}$ in. (10 cm.), stout, up to 1in. (2.5 cm.) thick, swollen below when young, marked above with lines of the gills, subfibrillose below, pallid with tints as on the pileus, with white mycelium mixed with earth at the base. Shed spores subspherical, pear-shaped, slightly irregular, hyaline, 5.5 to 6.5 x 4.5 μ . On the ground amongst leaves, etc., under *Eucalyptus*. South Australia—National Park. July.

40. *Clitocybe straminea* Clel. (L., *stramineus*, straw-colour).—Pileus 1 to 1 $\frac{1}{2}$ in. (2.5 to 3.7 cm.), irregularly convex, centre usually depressed, thin, nearly semi-translucent, pilose in the centre, fibrillose peripherally, slightly striate, edge radiately splitting, centre blackish-brown, the remainder smoky yellowish-brown, the smokiness due to fine fibrils. Gills slightly but definitely decurrent, moderately close, straw-coloured to pale egg-yellowish. Stem 1 $\frac{1}{2}$ to 2in. (3.7 to 5 cm.), equal, slender, somewhat flexuous, twisted, slightly striate, mealy fibrillose above, less so below, hollow, the colour of the gills. Spores subspherical, 4 to 5 μ . Densely caespitose at the base of stumps. South Australia—Mount Lofty. New South Wales. March, April. (Plate IV. Lower central figure.)

The specific name has reference to the straw colour of the gills and stem.

41. *Clitocybe peraggregata* Clel. (L., *peraggregatus*, very much heaped together).—Sometimes merismatic, the upper surfaces irregularly infundibuliform with wavy and irregular edges showing lobes, villous, excentrically or almost laterally attached to a stout common branching stem from which the rather fan-shaped pilei spread out. Pileus 1 to 2in. (2.5 to 5 cm.) in diameter, irregularly convex, often distorted, edge a little turned in, punctate pruinose and breaking up on the surface into minute furfuraceous granules or wart-like prominences, the granules darker coloured, the surface appearing as if partly dusted with soot, Drab (XLVI.) or lighter, paler round the periphery. Gills decurrent to nearly adnate, moderately close, edges a little thick, sometimes forked, whitish with a buffy tint or livid greyish. Stem short, $\frac{3}{4}$ to 1in. (1.9 to 2.5 cm.), moderately stout, up to 1in. (2.5 cm.) thick at the base, often distorted, whitish flecked with minute greyish furfuraceous scales. Spores obliquely elliptical, probably faintly tinted microscopically, 6.5 to 7.8 x 4.8 to 5.5 μ . Cystidia not seen. Flesh slightly greyish, that of the stem confluent and homogenous with that of the pileus. Smell slightly mealy. Densely caespitose, growing on the clay floor of a motor shed, probably from rotten wood or buried chips. South Australia—Fullarton near Adelaide. June, September.

Apparently related to *C. aggregata* (Schaeff.) Fr., but differing more particularly in the pruinose-furfuraceous pileus and the short stem.

42. *Clitocybe flaccida* (Sow.) Fr. var. *lobata* (Sow.) Cke. (L., *flaccidus*, flabby; *lobatus*, lobed).—Pileus up to 2in. (5 cm.) or more, when young convex and with the edge turned in, when half grown sometimes convex and broadly umbonate with a depression in the umbo, finally irregular and wavy, sometimes irregularly upturned and with the centre usually a little depressed, when young dark-brown and villous-matt, later light tan to dark tawny brown, finely squamulose-villous, cracking. Gills when very young adnate and slightly decurrent, then definitely but very moderately decurrent, rather close, then more distant, sometimes forking and sometimes irregularly connected by veins, pallid with a slight brown tint, the latter becoming a little more marked. Stem short, up to a little over 1in. (2.5 cm.), stout, slightly streaky, solid, base slightly swollen and with a little mycelium, pale brownish and somewhat the colour of the pileus. Flesh white, outer layer of stem pale horn-coloured. No special smell. Spores elongated pear-shaped, 8 to 10.8 x 4.2 to 5 μ . Usually caespitose. South Australia—On clay soil amongst grass in a paddock, Beaumont near Adelaide. April.

43. *Clitocybe semiocculta* Clel. (L., *semi*, half; *occultus*, hidden).—Pileus $\frac{1}{2}$ to 1in., sometimes up to 2 $\frac{1}{2}$ in. (1.2 to 6.2 cm.), at first slightly convex with intruded edge, then sometimes expanded and upturned, often depressed over the attachment of the stem, wavy, irregular and more or less lobed at the margin, when

found growing usually whitish to dingy whitish or pale buffy white (Cartridge Buff, xxx.) or creamy white and opaque, smooth, a little translucent when very moist, when gathered becoming Ochraceous Buff (xv.) round the edge and even browner in the centre, herbarium specimens drying a dingy biscuit colour. Gills adnate to sometimes slightly decurrent, close, narrow, whitish, then creamy-white. Stem short, $\frac{1}{2}$ to 1 in. (1.2 to 2.5 cm.), central to excentric or occasionally almost lateral from the position in which it may have grown, similarly often bent, slender or rather stout, equal or slightly attenuated downwards, pruinose, tough, hollow above, the colour of the pileus. Flesh thin, equally attenuated outwards. Spores nearly subspherical, 3.5 to 4×2.5 to 2.8μ , 4μ . Sometimes caespitose. Attached by fluffy-white mycelium to the undersides of thick sheets of fallen or stripped bark and fallen wood on the ground beneath Eucalypts, or round the base of stumps, the pilei often emerging with difficulty or only found after removing superjacent litter. South Australia—Mount Lofty, National Park, Baker's Gully near Clarendon, Encounter Bay. New South Wales. May to August. The specific name has reference to the frequency with which the pileus is often more or less hidden under bark and debris.

44. *Clitocybe campestris* Clel. (L., *campestris*, of fields).—Pileus up to 1 in. (2.5 cm.) in diameter, slightly convex, irregular with a depressed centre, slightly shiny, the edge turned in when young, pallid stone colour and slightly mottled, faintly obscured by a minute white pile (near Avellaneous, XL.; Light Buff, xv.). Gills adnate, close, rather thick, rarely forking or with buttresses, pallid brownish white (Avellaneous, XL.; near Vinaceous Buff, XL.). Stem up to $\frac{3}{4}$ in. (1.8 cm.) high, stout, sometimes flattened, slightly fibrous, tough, hollow, mealy, pallid or the colour of the pileus. Flesh white. Smell strong. Spores 4.5 to 4.8×2.2 to 3.2μ . In grassy places. South Australia—Beaumont Common, Eagle-on-the-Hill, Noarlunga Hill. May, June. (Figure 14 B.)

A small species, somewhat resembling small specimens of *Hebeloma hiemale* Bres., characterised by its pallid buff pileus with darker tints of avellaneous and wood brown appearing as if under the surface, the avellaneous gills, short stem and occurrence in grassy places.

[44A. *Clitocybe dealbatus* (Sow.) Fr. var. *minor* Cke. (L., *dealbatus*, white-washed; *minor*, smaller).—The specimens figured and referred to this species were found on Milson Island, Hawkesbury River, New South Wales, in November. They were pure white with occasionally a yellowish tinge, convex, rather irregular, with the gills moderately distant. In some specimens, the plant appeared as if truncate above, descending obconically with deeply decurrent gills. Spores 5.5 to $6.6 \times 3.4 \mu$. On the ground or attached to fern or grass roots. New South Wales—Milson Island. (Plate III. Middle right figure.)]

[44B. *Clitocybe infundibuliformis* (Schaeff.) Fr.? (L., *infundibuliformis*, funnel-shaped).—Pileus 1 to 2 in. (2.5 to 5 cm.) or more, smooth but finely fibrillose under a lens, moderately umbilicate, edge incurved, when dry shining and creamy-white, on moistening reviving and becoming a rich waxy-yellow in pileus and stem. Gills decurrent, close, creamy white. Stem $2\frac{1}{2}$ in. (6.2 cm.), rather fibrillose, markedly hollow, creamy-white, when moist waxy yellow. Mushroomy smell. Sometimes subcaespitose, amongst leaves, attached by much white mycelium. Spores $4.2 \times 2.5 \mu$. New South Wales—Lisarow, The Oaks. May, June. (Plate II. Central figure.)

This New South Wales species resembles closely Cooke's Illustration of *C. infundibuliformis*, but differs more particularly in the markedly hollow stem and the smaller spores.]

B. Pileus fleshy-membranaceous, truly hygrophanous.

45. *Clitocybe paraditopa* Clel. et Cheel.—Pileus $1\frac{1}{2}$ to $2\frac{1}{2}$ in. (3.7 to 6.2 cm.), slightly convex and irregular, the centre sometimes slightly depressed or almost infundibuliform, sometimes obscurely gibbous, smooth, edge incurved when young, when moist a shining moist-looking pallid stone-grey to brownish, drying from the centre which becomes pallid fawn and finally pallid whitish and shining, sometimes when dry dingy greyish-white. Gills adnate, sometimes somewhat decurrent, moderately crowded to moderately distant, rather thick, narrow, French grey, dark grey or violet grey, becoming dark greyish-brown. Stem $1\frac{1}{2}$ to 2 in. (3.7 to 5 cm.), moderately stout or slender, often compressed and deformed, slightly fibrously streaked. South Australia—Adelaide suburbs, Glen Osmond, Mount Lofty, Kinchina, Kalangadoo (S.E.). New South Wales. Victoria—Ararat. May, June. (Plate II. Right and left figures.)

The drab colour, greyish gills and especially the strong smell of wattle-blossom characterise this species.

46. *Clitocybe brunneo-ceracea* Clcl. (L., *brunneus*, brown; *ceraceus*, waxy).—Pileus $\frac{1}{2}$ to 2½ in. (1.2 to 6.2 cm.) in diameter, thin, the edge turned in when young, irregularly convex with an umbilicus, then moderately depressed, sometimes gibbous in the depressed centre, the edge faintly striate, innately silky-fibrillose, when moist near Buffy Brown (XL) or Drab (XLVI.) and moist looking, waxy-semitranslucent, markedly hygrophanous, drying to pallid or dingy whitish with a buffy tint, the drying commencing from near the centre, the centre sometimes remaining for a while buffy brown shading to dark brown. Gills adnate to moderately decurrent, close, narrow, many short, edges rather thick, sometimes with venose buttresses between the gills, pallid greyish-brown, much paler than Drab (XLVII.). Stem up to 1½ in. (3.7 cm.) high, usually slender, sometimes flattened, fibrillose, extensively hollow, coloured like the pileus but paler. Flesh under the pileus moist-looking brown, in the centre of the pileus white, in the stem pale brown. Spores narrow, 5.5 to 6 x 2.2 to 2.8 μ . Cystidia not seen. Slight phosphorus-like smell. Amongst dead leaves and sticks, sometimes under *Pinus radiata* or other pines. South Australia—National Park, Beaumont (near Adelaide), Lowan Forest (Kalangadoo, S.E.), Mount Gambier, MacDonnell Bay. May, July.

Resembles *C. paradiitopa* Clcl. et Cheel., but lacks the strong wattle scent and is less robust. The specific name refers to the semitranslucent waxy (or soapy) appearance of the brownish pileus when moist. Previous collections from Beaumont and National Park in South Australia and Ararat in Victoria we have referred to *C. pinophila* Peck.

47. *Clitocybe pascua* Clcl. (L., *pascuus*, of pasture).—Pileus 1 to 1½ in. (2.5 to 3.7 cm.), rarely 2 in. (5 cm.) in diameter, irregularly convex, soon becoming depressed in the centre and sometimes infundibuliform, edge often irregular and wavy or slightly lobed, sometimes lacerated, smooth, when moist between Sudan Brown and Brussels Brown (m.) and semitranslucent, when dry opaque whitish or buffy whitish. Gills slightly decurrent, rather close, moderately narrow, many short, greyer than Pinkish Buff (XXIX.). Stem short, $\frac{1}{2}$ to 1 in. (1.2 to 2.5 cm.) high, slender, equal or sometimes attenuated downwards, fibrillose, hollow, brownish when moist, pallid when dry. Flesh watery brownish when moist, whitish when dry. Smell a little strong. Spores obliquely elliptical, 7 x 3.7 μ . Gregarious on grassy hills. South Australia—Near Noarlunga. June.

The characteristic features are the Sudan brown to Brussels brown pileus becoming whitish when dry, the gills greyer than pinkish buff, the brownish stem, the spores 7 x 3.7 μ , and the habitat amongst grass.

48. *Clitocybe australiana* Clcl. (L., *Australianus*, Australian).—Pileus up to 1½ to 4 in. (3.1 to 10 cm.), irregular, somewhat convex, centre depressed, edge rather irregular and broken up, dull, smooth, pale biscuit colour (near Pinkish Buff, XXIX.) or paler than Mikado Brown (XXIX.) and near Vinaceous Cinnamon (XXIX.), soapy-looking when moist, near Sayal Brown (XXIX.) when dry. Gills adnate-decurrent to decurrent, narrow, moderately close, near Pinkish Buff. Stem up to 1½ in. (3.7 cm.), slender to stout, up to 2 in. (5 mm.) thick, slightly attenuated downwards, dull surface, solid or slightly hollow, with fluffy mycelium at the base, white. Flesh white, thick over the stem, attenuated outwards. Spores 3.2 to 5.6 x 1.6 to 3.2 μ . Single or two or three together or subcaespitose in sandy soil under trees. South Australia—Kinchina and Monarto South, Enfield. New South Wales—Bumbarry and Manildra. July to October.

[48A. *Clitocybe cyathiformis* Bull. var. *cinerascens* Fr.? (Gr., *cyathos*, a cup; L., *forma*, shape; L., *cinerascens*, becoming ash-coloured).—Pileus up to 1½ in. (3.7 cm.), umbilicate to infundibuliform, very thin, striate, sometimes somewhat rugose, translucent, pale greyish brown. Gills deeply decurrent, branching and anastomosing, moderately crowded, cinereous white. Stem up to 2½ in. (6.2 cm.), tubular, the hollow centre sometimes apparently communicating with the funnel-shaped pileus, base slightly bulbous, concolorous with the pileus but browner below. Spores pear-shaped with a large gutta, 7 to 8.5 x 4.2 to 5 μ . Under trees, sometimes on rotten wood. New South Wales—Mosman near Sydney, Lisarow. March, May, June. (Plate III. Top right figure.)

The New South Wales plants referred to the above species also resemble in some points *C. obbata* Fr. They may be distinct from each of these species, differing for instance in the hollow stem.]

[By courtesy of Government Printer, N.S.W.]

PLATE III.

<i>Cantharellus imperatae</i> Clel. et Cheel
(No. 271).	<i>Clitocybe cyathiformis</i> Bull. var. <i>cinerascens</i>
Fr.? (No. 48A).
<i>Cantharellus cibarius</i> Fr. var. <i>australiensis</i>
Clel. Crimson form (No. 268A).	<i>Clitocybe dealbatus</i> (Sow.) Fr. var. <i>minor</i>
Cke. (No. 44A).
<i>Hygrophorus niveus</i> (Scop.) Fr.? (No. 51A).	<i>Cantharellus cibarius</i> Fr. var. <i>australiensis</i>
Clel. Usual colour (No. 268A).
<i>Tricholoma coarctata</i> Cke. et Mass. (No. 35).	

Hymenium pulverulent.

LACCARIA B. and Br.

(Lac, a resinous secretion left by the lac insect.)

"Pileus fleshy, regular or irregular. Stem central, externally fibrous. Gills adnate with a decurrent tooth, pulverulent. Spores white, globose or elliptical, echinulate or verrucose. Growing on the ground or on wood."—Rea.

This genus is included by many in *Clitocybe*. The gills are decurrent and acutely adnate and coloured reddish, violet or yellow. The spores are white and warty; clinging to the surface of the gills they give these a glaucous appearance with the ground colour showing through. *Laccaria laccata* is one of our commonest fungi.

49. *Laccaria laccata* (Scop.) B. et Br. (Italian *lacca*, the reddish resinous lac exudate).—Pileus usually $\frac{1}{2}$ to 1 in. (1.2 to 5 cm.), convex or irregularly convex, sometimes depressed in the centre, edge usually striate when moist, surface dull, smooth, sometimes slightly mealy, innately fibrillose to subscaly when dry, (Cinnamon Rufous to Hazel (xiv.) when moist, Light Ochraceous Buff (xv.) or Light Pinkish Cinnamon to Cinnamon Buff (xxix.) when dry. Gills adnate with a decurrent tooth, tending to be distant, with short ones interspersed, slightly ventricose, rather broad, thickish, a little paler than Vinaceous Russet, near Buff Pink, or Vinaceous Pink to Japan Rose (xxviii.), becoming pruinose with the spores. Stem 1 to 2½ in. (2.5 to 6.2 cm.), slender (¼ in., 3 mm. thick), equal, often rather flexuous, fibrillose, base not white or villous, solid or slightly hollow, concolorous with the pileus. Spores subspherical, warty, 7 μ , 7.5 x 5.5 μ , 8.5 x 6 μ . Single, gregarious or subcaespitose, usually on sandy loam. South Australia—Mount Lofty Range, National Park, Willunga Hill, Mount Remarkable, Mount Burr (S.E.). New South Wales. Victoria. May to August. (Plate IV. Upper right figure.)

Australian plants differ from Rea's description of British ones in being smaller, in the frequent striation of the periphery of the pileus and in the absence, in some specimens at least, of a white villous base to the stem.

This is a very common and rather variable species, relatively small, of a general rufous-flesh colour when moist, more pallid when dry. The best way to recognise it in the field is by noting the whitish pruinose appearance of the gills due to the white warty spores. From the colour of the gills, beginners are apt to look for the species amongst the genera with coloured spores. The edibility of the Australian form has not yet been tested.

Hymenium waxy.

HYGROPHOROUS Fr.

(Gr., *hygros*, moist; *phero*, I bear.)

"Pileus fleshy, regular, viscid or dry. Stem central, fleshy. Gills decurrent or adnato-decurrent. Spores white, very rarely slightly coloured; elliptical, oval, globose, clavate, pip-shaped or oblong-elliptical; smooth or continuous. Cystidia present or absent. Growing on the ground, very rarely on wood."—Rea.

The genus *Hygrophorus* is characterised by the waxy consistency of the hymenium which covers the gills, so that when mature this becomes soft and can easily be rubbed off the trama or main support of the gills. The gills are also usually distant or subdistant and whilst the edge is acute they become thicker towards the attachment so as to be rather triangular in section. The pileus is often white or brightly coloured red, orange or green. It is often viscid. The flesh is somewhat waxy or watery. Many species are edible.

Several species are known for Australia. Not uncommon on our foothills is the white exceedingly glutinous *Hygrophorus candidus*. *H. conicus*, red, orange-yellow or yellowish-green, turning black in drying, may be found on one of the lawns in the Botanic Gardens in May and June. *H. coccineus* is a beautiful scarlet species with conico-convex cap.

KEY TO THE SPECIES.

Pileus and stem very glutinous.

Pileus pure white with slight brownish tint in centre. Gills adnate or adnexed. Spores approaching subspherical, 4.5 to 6.5 x 3 to 4 μ . . 50. *Hygrophorus candidus*.

Pileus firm, opaque.

Pileus finely squamulose, dark sooty brown. Gills adnate-arcuate to adnexed. Stem white with greyish tint. Spores 7.5 to 9.5 x 4.5 to 5 μ . . 51. *H. fuligineo-squamosus*.

Pileus thin, watery, fragile.

Pileus conico-expanded, variously coloured (red, orange yellow, yellowish-green), drying black. Gills just free, rosy-yellowish or yellowish . . . 52. *H. conicus*.

Pileus conico-convex, scarlet. Gills adnate, rosy with the margins yellowish. Stem scarlet above, yellowish below, base whitish 53. *H. coccineus*.

1. Subgenus *Limacium*. (L., *limax*, a snail or slug.) "Universal veil viscid, with occasionally a floccose, partial one which is annular or marginal. Stem clothed with scales or more frequently rough with dots above. Gills adnato-decurrent."—Rea.

50. *Hygrophorus candidus* Cke. et Mass. (L., *candidus*, shining white).—Pileus and stem glutinous, with a glutinous cobweb-like veil when young, fragile. Pileus up to 2½ in. (6.2 cm.), conico-convex to convex, then expanding and nearly plane, umbonate, edge turned in and thin, sometimes striate or with reticulated ribs, pure white with brownish bisecuity tints approaching Tawny Olive (XXXIX.) round the centre. Gills adnate or adnexed, close, slightly ventricose, narrow triangular on section, creamy white, becoming discoloured. Stem up to 2½ in. (6.2 cm.), rather flexuous, moderately slender (up to ½ in., 15 mm. thick above), attenuated downwards, stuffed or slightly hollow, root conical, white, sometimes becoming slightly brownish. Spores elliptical to subspherical, sometimes a little irregular or slightly warty, 4.5 to 6.5 x 3 to 4 μ , 3.7 to 5.5 μ . On the ground often under Eucalypts. South Australia—Beaumont (near Adelaide), Greenhill Road, Morialta, Mount Lofty, National Park, Kinchina, Encounter Bay, Bangham, Mount Schank (S.E.). Victoria. April, May, July.

Readily recognised by its pure white appearance with tints of brown on the cap and the very glutinous pileus and stem.

II. Subgenus *Camarophyllus*. (Gr., *kamara*, a vault; *phylon*, a leaf).—"Veil none. Stem even, smooth or fibrillose, not rough with dots. Pileus firm, opaque, moist in rainy weather, not viscid. Gills distant, arcuate."—Rea.

51. *Hygrophorus fuligineo-squamosus* Clé. (L., *fuliginus*, sooty; *squamosus*, scaly).—Pileus 1½ to 2½ in. (3.1 to 6.8 cm.), irregularly convex to plane or finally upturned, finely squamulose or fibrillo-floccose, dark sooty brown, near Clove Brown (XL.) or Drab (XLVI.), the scales darker. Gills adnate-arcuate, adnexed or usually slightly sinuate, moderately close, alternately short, narrow triangular in cross section, rather thick, sometimes ventricose, ½ in. (6 mm.) deep, glaucous grey (lighter than Mouse Grey, LI.). Stem up to 2 in. (5 cm.), equal above but attenuated at the base into the conical root, fibrillose or fibrillose-squamulose with often in addition a few superficial fine dark spiderweb-like fibrils, solid, whitish with a greyish tint, often speckled sooty-brown from the fibrils. Flesh of the stem and pileus continuous, white with a slight grey tint. Whole plant rather moist-looking. Slight mealy smell. Spores elliptical, oblique, 7.5 to 9 x 4.5 to 5.5 μ . On the ground. South Australia—Mount Lofty (in *Eucalyptus* forest), Kinchina, MacDonnell Bay (S.E.). May to July.

[51A. *Hygrophorus niveus* (Scop.) Fr.? (L., *niveus*, snow-white).—Whole plant pure white. Pileus nearly $\frac{1}{2}$ in. (1.2 cm.), convex, subgibbous, translucent and slightly striate when moist. Gills decurrent, rather distant, edges a little thick. Stem $1\frac{1}{2}$ in. (3.7 cm.), slender, slightly hollow, silky. Spores elliptical, white, 7 to 8.2 x 5.2 to 6 μ . On the ground. New South Wales—In forest, Mount Wilson, June. (Plate III. Bottom left figure. The gills are shown as rather too distant.)

H. niveus grows in heaths and pastures and the plants described above in forests in the Blue Mountains. There is considerable doubt as to the identification and this Australian species may perhaps not be an *Hygrophorus* but a *Chilocybe*.]

III. Subgenus *Hygrocybe*. (Gr., *hygros*, moist; *kybe*, a head).—"Veil none. Whole fungus thin, watery, succulent, fragile. Pileus viscid when moist, shining when dry, rarely floccosely squamose. Stem hollow, soft, not punctate. Gills soft. Most of the species brightly coloured and shining."—Rea.

52. *Hygrophorus conicus* (Scop.) Fr. (L., *conicus*, conical).—Pileus 1 in. (2.5 cm.) or more, conical with an acute umbo, then expanding, fibrillosely streaked, Brazil Red (L.), often with light orange-yellow at the periphery, sometimes yellowish-green or dark greyish-brown, turning black with black fibrils. Gills just free or attenuately adnexed, ventricose, rosy-yellowish or yellowish, becoming grey or dark grey. Stem $2\frac{1}{2}$ to $3\frac{1}{2}$ in. (3.7 to 8.7 cm.), tense, rather fibrillose and twisted, the fibres later becoming blackish, hollow, of the red colour of the pileus above and orange-yellow below and often beneath the gills, or pallid brownish or yellowish-green with scattered black cobweb-like lines. Spores elliptical, microscopically almost colourless or with a dark wash, 9 to 10.4 x 6 to 7 μ . South Australia—Lawn in the Botanic Gardens at Adelaide. New South Wales. May, June. (Figure 11 A.)

The caps of European specimens are described as "scarlet, yellow, tawny, sulphur-greenish, livid or fuliginous light yellow, becoming black."

The species is recognised by its usually being found in grassy places, its fragile watery texture, its conical pileus variously and strikingly coloured with red, orange-yellow and green, the tendency to turn black when old and the coloured often twisted stem.

53. *Hygrophorus coccineus* (Schaeff.) Fr. (L., *coccineus*, scarlet).—Pileus $\frac{1}{2}$ to $1\frac{1}{2}$ in. (1.2 to 3.1 cm.), $\frac{3}{4}$ in. (1.8 cm.) high, convex to conico-convex, sometimes umbilicate or irregular or upturned, sometimes slightly rugose, sometimes fibrillose striate or subsquamulose, viscid, Scarlet, Scarlet Red or Carmine (L.), when young with yellowish or yellowish-green shades, sometimes orangey-crimson, reddish orange or pinkish scarlet. Gills adnate or with a tendency to decurrence, distant, rather narrow, edges thick, rosy with the edges yellowish, sometimes whitish becoming yellowish. Stem $1\frac{1}{2}$ to 3 in. (3.1 to 7.5 cm.), slender, attenuated upwards or at the base or equal, sometimes dilated upwards, usually twisted, sometimes with a furrow, often flattened, subfibrillose, usually very hollow but sometimes solid, reddish or scarlet above passing into yellow below, whitish at the base. Flesh reddish. Spores obliquely elliptical, 7 to 10.4 x 4.5 to 6.8 μ . On the ground, sometimes amongst moss. South Australia—Greenhill Road, Myponga, Mount Burr Forest (S.E.). May to July, October.

Some of our plants show white at the base of the stem, a feature which does not occur in European specimens. They are also smaller. The general scarlet colour, slight viscosity and adnate gills help in recognising the species.

[53A. *Hygrophorus miniatus* Fr. (L., *miniatus*, vermilion).—Pileus up to $\frac{1}{2}$ in. (1.2 cm.), convex, not definitely viscid, pinkish scarlet becoming paler. Gills adnate with a trace of a decurrent tooth, very distant, waxy yellow. Stem $1\frac{1}{2}$ in. (3.1 cm.), solid, concolorous with the pileus, not yellow below, extreme base whitish and fluffy. Spores elliptical, granular, 8.5 to 10.4 x 6 to 7 μ . New South Wales—Under shrubs, Lisarow. May. (Plate IV. Top left figure.)

H. miniatus differs from *H. coccineus* in being smaller and never viscid. The pileus may be yellow, the gills orange red or the stem orange-red to yellow. The South Australian plants we refer to *H. coccineus* approach the New South Wales one figured above but differ in being viscid.]

(c) PILEUS CONFLUENT WITH, BUT HETEROGENEOUS FROM, THE CARTILAGINOUS STEM.

*Gills adnate or sinuato-adnate.

†Margin of pileus at first incurved, or exceeding the gills.

COLLYBIA Fr.

(Gr., *kollybos*, a small coin.)

"Pileus fleshy, membranaceous, regular; margin incurved. Stem central, cartilaginous. Gills adnate, adnexed or free. Spores white, rarely yellowish, greenish or brownish-red; elliptical, globose, oblong or pip-shaped; smooth, verrucose, punctate or echinulate; continuous. Cystidia present or absent. Growing on the ground or on wood; solitary or caespitose."—Rea.

Not many species of *Collybia* have so far been recognised in South Australia. They are said mostly to be thin-capped mushrooms growing on decayed wood, buried sticks, etc., and differing from species of *Marasmius* in not reviving after being dried. It would seem as though there were bridging species between these two genera and particular species have been placed now in the one, now in the other, according to the opinion of the individual mycologist. *Collybia* differs from *Mycena* in the margin of the pileus when young being incurved and exceeding the gills and in the pileus expanding, which is uncommon in *Mycena*. It may be difficult to place plants if specimens in the young stage are not available. Some species are relatively large and grow on the ground. Amongst these is *Collybia radicata*, a European species not uncommon with us, with dark olive brown cap, contrasting with the white gills, and a long stem with a very long root.

KEY TO THE SPECIES.

Gills white or brightly coloured, not cinereous.

Stem stout, sulcate or fibrillose striate.

Gills broad, subdistant.

With a long tapering root.

Pileus dark-brown, gills white, spores

large 54. *Collybia radicata*.

Not rooting.

Pileus blackish-brown becoming

lacerated, stem twisted, whitish . . 55. *C. tortipes*.

Gills narrow, crowded.

Large. Pileus and stem smoky-brown.

Spores $9 \times 5.5 \mu$. In grassy places . . 56. *C. abutyracca*.

Stem thin, velvety, floccose or pruinose.

Gills broad, subdistant.

Tawny to ochraceous. Stem densely vel-

vety, ochraceous to brown. Caespitose,

on wood 57. *C. velutipes*.

Gills very narrow, crowded.

Pileus colour of dead grass to Verona

brown, radiately rugose, thin. Stem

whitish to brownish velutinate. Caes-

pitose with mycelial strands. Spores 8

to 13×4 to 5.5μ 58. *C. ingrata*.

Pileus Rood's brown drying like the gills

and stem light pinkish cinnamon. Stem

villose with pale hairs. Not caespitose,

with mycelial strands amongst pine

needles 59. *C. pinicolens*.

Pileus brown, resting close to ground.

Stem densely velutinate, near rust-

coloured, root penetrating deeply . . . 60. *C. penetrans*.

PLATE IV.

Hygrophorus minutus Fr. (No. 53A).

Lactarius serpius (DC.) Fr. (No. 239).

Clitocybe straminea Clf. (No. 40).

[By courtesy of Government Printer, N.S.W.]

Laccaria laccata (Scop.) B. and Br. (No. 49).

Russula fragilis Fr. (No. 232A).

Stem thin, glabrous.

Gills broad, rather distant.

No South Australian species recorded.

Gills narrow, crowded.

At base of stumps.

Pileus ochraceous buff. Stem reddish-brown. Spores $5 \times 3.5 \mu$. Caespitose 61. *C. eucalyptorum*.

On the ground.

Pileus pinkish buff to brownish. Stem hollow, near Verona brown.

Single 62. *C. subdryophila*.

Pileus russet to tawny. Gills sinuato-
adnexed, tinted with pale ochraceous
buff. Stem very hollow, Sayal
brown to russet 63. *C. percava*.

Pileus rich salmony buff, hygro-
phanous. Stem short, pallid with
slight tints of the pileus . . . 64. *C. alutacea*.

Pileus and stem (except apex) cinna-
mon-rufous, pileus about lin. Gills
creamy-white, adnato-adnexed . . 65. *C. elegans*.

Gills becoming cinereous.

Pileus fuscous or becoming cinereous.

Gills crowded, rather narrow.

Pileus smoky-brown to scorched-brown,
not viscid. Stem brownish. Spores
sometimes slightly rough, 7.5 to 9×5
to 6μ 66. *C. densata*.

Pileus fuscous, subviscid. Stem tinted
with fuscous. Spores 7 to 9×4 to
 5.5μ 67. *C. fusca*.

Gills broad, rather distant.

No South Australian species recorded.

A. Gills white or brightly coloured, not cinereous. Flesh often white.

(a) STEM STOUT, SULCATE OR FIBRILLOSELY STRIATE.

*Gills broad, subdistant.

54. *Collybia radicata* (Rehk.) Berk. (L., *radicatus*, rooted).—Pileus up to 3in. (7.5 cm.), nearly plane, sometimes depressed in the centre with the edge upturned, smooth, somewhat viscid when moist, sometimes wrinkled, pale yellowish-brown to olive-brown. Gills adnate, sometimes with decurrent lines on the stem, moderately close, alternate ones short, rather thick, white to pale fawn. Stem up to 8in. (20 cm.) long, slender, slightly attenuated upwards, base thickened, with a tapering root $2\frac{1}{2}$ to 3in. (6.2 to 7.5 cm.) long, hollow, cartilaginous, creamy white to brownish. Spores oval, 12 to 15.5×10.5 to 12μ . South Australia—Botanic Gardens (Adelaide), National Park, Happy Valley, Encounter Bay, Blanche State Forest (S.E.), Kalangadoo (S.E.). New South Wales, Victoria. April to July. (Figure 11 C.)

This is a not uncommon species, sometimes found growing in untilled fields in our suburbs. It is readily recognised by the nearly plane, usually dark olivaceous, pileus contrasting with the white gills and by the long stem which passes below into a tail-like fusiform root.

55. *Collybia tortipes* Clel. (L., *tortus*, twisted; *pes*, a foot).—Pileus $\frac{1}{2}$ to $1\frac{1}{2}$ in. (1.2 to 3.7 cm.), convex, more or less depressed in the centre, fibrillosely splitting,

edge slightly inturned when young, dark blackish-brown, Buffy Brown to Clove Brown (XL.), sometimes when old dark bronzy brown. Gills sinuate, ventricose, a little distant, white, when old with a yellowish-brown tint. Stem $1\frac{1}{4}$ to $1\frac{3}{4}$ in. (3.1 to 4.4 cm.), rather slender, twisted, not rooting, rather polished to sub-fibrillose, slightly hollow, cartilaginous, whitish. Spores narrow, approaching *Boletus*-shape, white, 8 to 11 x 4 to 4.5 μ . In sandy soil, sometimes under leaves or half-buried, sometimes subcaespitose. South Australia—Willunga Hill, near Summertown. April, May. (Figure 11 B.)

Characterised by the dark blackish-brown pileus becoming lacerated, the white gills and the whitish twisted non-rooting stem. It resembles illustrations of *C. lacerata* (Laseh.) Berk., but does not grow on stumps, is not caespitose and has not subglobose spores.

[Drawings by E.R.C.]

Figure 11.—A. *Hygrophorus conicus* (Scop.) Fr. (No. 52). Botanic Gardens, Adelaide. Enlarged by $\frac{1}{3}$.

B. *Collybia tortipes* Clel. (No. 55). Willunga Hill.

C. *Collybia radicata* (Relk.) Berk. (No. 54). Botanic Gardens, Adelaide.

**Gills narrow, crowded.

56. *Collybia abutyracea* Clcl. (From the supposed relationship to *C. butyracea* Bull.).—Pileus up to $4\frac{1}{2}$ in. (11.8 cm.), at first convex with the edge turned in, then expanding, irregular and repand and more or less subumbonate, at first slightly velutinate, finally somewhat shining and subfibrillose, when young pallid or Cream Buff (xxx.) with a smoky-brown tinge, then pallid biscuit-coloured, sometimes with a smoky or scorched tinge, sometimes with the umbo approaching Saccardo's Umber (xxxix.). Gills slightly sinuate to adnate, close, rather dingy creamy white, becoming more biscuit-coloured. Stem up to $1\frac{1}{2}$ in. (3.7 cm.), rather slender to moderately stout, $\frac{3}{4}$ to $\frac{1}{2}$ in. (10 to 12.5 mm.) thick, coarsely fibrillose, equal, not rooting, tough and cartilaginous but with the flesh not very clearly distinct from that of the pileus, solid, not stuffed, breaking up into tough fibrils, dark smoky-brown to pallid brownish, base whitish when young. Spores elliptical, 7.5 to 9 x 5 to 5.5 μ . No special smell. Amongst grass. South Australia—Beaumont Common, Pinnaroo, Belair. June to August.

A large species growing in colonies in grassy places with a subumbonate smoky-brown cap, rather close creamy-white gills, and fairly stout, fibrillose, brownish stem.

(b) STEM THIN, VELVETY, FLOCCOSE OR PRUINOSE.

*Gills broad, subdistant.

57. *Collybia velutipes* (Curt.) Fr. (L., *vellus*, a fleece; *pes*, a foot).—Pileus $\frac{3}{4}$ to 4 in. (2 to 10 cm.), fleshy, convex, soon becoming plane, often excentric, irregular and repand, smooth, viscid, ochraceous buff to ochraceous orange, sometimes browner. Gills adnexed, rounded behind, subdistant, Ochraceous Buff (xv.) becoming Warm Buff (xv.). Stem up to $2\frac{1}{2}$ in. (6.2 cm.) or more, twisted, tough, velutinate, Cinnamon Brown (xv.), Ochraceous Brown (xv.) above. Spores narrow, 7.5 to occasionally 9 x 3.5 μ . Caespitose on old wood. South Australia—Mount Gambier. New South Wales. May.

Readily recognised by the caespitose habit on dead wood, the tawny cap, ochraceous buff gills, and especially by the densely velvety cinnamon brown to ochraceous brown stem.

**Gills very narrow, crowded.

58. *Collybia ingrata* (Schum.) Fr. (*Syn. Marasmius ingratus*). (L., *ingratus*, unpleasant).—Pileus $\frac{3}{4}$ to 2 in. (1.8 to 5 cm.), irregularly convex, then plane or more often with the centre depressed and more or less repand, on the disc often with a slight umbo dimpled in its centre, radiately rugose-striate, surface dull, hygrophanous, very thin, near Light Pinkish Cinnamon (xxix.) and paler, approaching the colour of dead grass, or paler than Wood Brown (xl.) or near Verona Brown (xxix.), when dry near Pinkish Buff (xxix.). Gills adnate-adnexed, tending to be attached to a collar, moderately close, narrow, edges slightly serrate, in three tiers, Verona Brown to Vinaceous Buff (xl.), near Avellaneous (xl.), or greyer than Pinkish Buff (xxix.), near Sayal Brown (xxix.) when old. Stem $1\frac{1}{2}$ to 2 in. (3.1 to 5 cm.), slender (2 mm. diameter), tough, striate, cartilaginous, flesh differing in texture from that of the pileus, hollow, velutinate with a pallid brownish to whitish fur, Snuff Brown (xxix.) or paler. Spores obliquely flask-shaped, one end more pointed, sometimes curved, white, 8 to 13 x 4 to 5.5 μ . Approaching *Marasmius* in texture. Caespitose with whitish mycelial threads amongst fallen leaves and sticks on the ground. South Australia—Under a peach tree, Beaumont; amongst Spanish reeds (*Arundo*), North Terrace; National Park. February, April, June, August.

Characterised by the rather tough, thin, radiately rugose light pinkish cinnamon pileus; the close creamy-white adnate-adnexed gills; the whitish velutinate slender stem; and the caespitose habit.

59. *Collybia pinicolens* Clcl. (L., *pinus*, a pine-tree; *colens*, inhabiting).—Pileus $\frac{3}{4}$ to 1 in. (1.8 to 2.5 cm.), plane or slightly convex, umbilicate, edge striate rugose, very thin, rather tough, hygrophanous, when moist near Rood's Brown (xxviii.), drying near Light Pinkish Cinnamon (xxix.). Gills adnate, moderately close, narrow, Light Pinkish Cinnamon when drying. Stem $2\frac{1}{2}$ in. (6.2 cm.), slender, equal, tough, cartilaginous, stuffed, densely villous with pale hairs, Light Pinkish Cinnamon when dry, with spreading fibrils at the base passing into mycelial strands amongst pine needles, some of the strands apparently entering

the masses of fallen pollen grains. Single or at least not densely caespitose. Spores oblique, one end rather pointed, $8.5 \times 4 \mu$. South Australia—In *Pinus radiata* Don. (*P. insignis* Dougl.) forest, Mount Burr (S.E.). May.

Characterised by the thin, rather tough, coarsely striate, earthy brown pileus drying to light pinkish cinnamon, and adnate gills of the same colour as is the villous tough slender stem.

60. *Collybia penetrans* Clel. (L., *penetrans*, penetrating, in reference to the deeply descending root).—Pileus 1 to 1½ in. (2.5 to 3.1 cm.), convex to irregularly plane or even upturned, sometimes repand, occasionally subumbonate or umbilicate, innately fibrillose, sometimes slightly radiately rugose, Russet (xv.) round the periphery to Mars Brown (xv.) in the centre (the two zones contrasting). Ochraceous Tawny (xv.), near Sanford's Brown and Auburn (ii.), Mikado Brown and Orange Cinnamon (xxix.). Gills slightly sinuately adnexed, moderately close, Cinnamon Buff (xxix.) becoming Ochraceous Tawny (xv.) or with tints of Rood's Brown (xxviii.), with a tendency to a bloom. Stem ¾ to 1½ in. (1.8 to 3.1 cm.) above ground, slender (4 mm. thick), hollow, densely velutinate, near Argus Brown (iii.) and Sudan Brown (iii.), passing into a long root (2 to 3 in., 5 to 7.5 cm., long), swollen at the ground level to 7 mm., attenuated downwards, slightly irregular, whole stem rather tough, fibrillo-cartilaginous differing in texture from the flesh of the pileus, attached to deeply buried rootlets. Flesh of pileus and stem near Antimony Yellow (xv.). Spores oblique, narrow pear-shaped, 7.5 to 8×4 to 4.5μ . South Australia—In sandy loam and in burnt *Eucalyptus cosmophylla* scrub, Hall's Creek near Encounter Bay. May.

Characterised by the brown pileus, resting close to the ground, the ochraceous tawny gills (at first suggesting a brown-spored species) and the densely velutinate almost rusty brown stem, short above ground but descending deeply to be attached to rootlets.

(1. Stem thin, glabrous.

*Gills broad, rather distant.

No South Australian species recorded.

**Gills narrow, crowded.

61. *Collybia eucalyptorum* Clel. (*Eucalyptorum*, of Eucalypt trees).—Pileus ¾ to 1½ in. (1.6 to 3.7 cm.), broadly conico-campulate to nearly plane, then slightly upturned, smooth, with the surface dull from innate fibrils, edge slightly striate, Pale Pinkish Buff becoming Cinnamon Buff (xxix.), or Ochraceous Buff (xv.) and darker in the centre, becoming pallid towards the periphery. Gills adnexed, close, narrow, with short ones at the periphery, creamy-white or approaching Warm Buff (xv.). Stem 1 to 2½ in. (2.5 to 6.2 cm.) high, relatively slender (¼ in., 3.5 mm., or more thick), flexuous, smooth or subfibrillose, barely striate, hollow, cartilaginous, differing from the flesh of the pileus, reddish brown (between Tawny, xv., and Russet, xv.; Mikado Brown, xxix.). Flesh thin, slightly brownish. Smell moderately strong. Spores pear-shaped, hyaline, 5 to $5.5 \times 3.5 \mu$. Caespitose at the bases of old trunks of *Eucalyptus* or stumps. South Australia—Mount Lofty Summit. June.

62. *Collybia subdryophila* Clel. (*Subdryophila*, here, near to the species *C. dryophila* Bull., Fr.).—Pileus up to 1½ in. (3.1 cm.), slightly convex, sometimes eventually a little upturned at the edge, irregular, matt, near Pinkish Buff (xxix.). Gills adnate to adnexed (once apparently sinuate), close, narrow, creamy white. Stem up to 1½ in. (3.7 cm.), rather slender, sometimes flattened, sometimes slightly attenuated upwards, smooth or matt, hollow, flesh confluent with but heterogeneous from that of the pileus, reddish brown (near Verona Brown, xxix.). Shed spores with one end more pointed, 4 to $4.2 \times 2 \mu$. South Australia—Mount Lofty, National Park, near Happy Valley, Hope Valley, Mount Compass, Kinchima. April, May, July, September, October.

63. *Collybia percaua* Clel. (L., *percaeus*, very hollow).—Pileus 1½ to 2 in. (3.7 to 5 cm.), deeply convex at first, then expanding to convex often with the centre depressed, finally expanded and rather irregular, sometimes umbonate, sometimes with edge upturned, when young Mars Brown (xv.) drying at the apex through Russet (xv.) to darker than Tawny (xv.). Gills sinuately adnexed, narrow (up to 5 mm. deep), moderately close, edge lacerated when large, with a tint of Pale Ochraceous Buff (xv.). Stem up to 2 in. (5 cm.), swollen below especially when young, attenuated upwards (up to 1 cm. thick below and 6 mm. above), polished, very hollow near Sayal Brown (xxix.) or base browner than

Russet (xv.) paling upwards to become pallid with the same tint. Spore mass slightly tinted, spores pear-shaped, $5 \times 3.7 \mu$. On the ground. South Australia—National Park. May.

64. *Collybia alutacea* Clel. (L., *aluta*, tanned leather).—Pileus $\frac{3}{4}$ to $1\frac{1}{2}$ in. (1.8 to 3.7 cm.), more or less plane becoming upturned-repand, sometimes sub-umbonate, smooth, rich salmony-buff and moist-looking, sometimes reddish-brown at the periphery, drying opaque matt and a paler pinkish-buff. Gills adnexed, narrow, close, creamy white. Stem $\frac{3}{4}$ to 1 in. (1.8 to 2.5 cm.), rather short, somewhat slender, sometimes flattened, equal, smooth, slightly hollow, pallid with a slight or definite tint of the pileus. Flesh of the stem cartilaginous, differing from the thin white flesh of the pileus, which is attenuated outwards. Spores (?) $5 \times 2.5 \mu$. On the ground. South Australia—Back Valley off Inman Valley. May, 1929.

Characterised by the rich salmony-buff pileus becoming pinkish-buff, contrasting with the close white gills and short pallid stem slightly tinted like the pileus.

65. *Collybia elegans* Clel. (L., *elegans*, elegant).—Pileus $\frac{3}{4}$ to over 1 in. (1.8 to 3 cm.), at first campanulate-convex with edge inturned, then deeply convex and obtusely umbonate, finally nearly plane with obtuse umbo and edge occasionally upturned, slightly rivulose, surface moist-looking matt, Cinnamon Rufous (xiv.), Tawny (xv.), or near Orange Buff (iii.) when fresh and yellower than Burnt Sienna (ii.) when drying. Gills adnate-adnexed to adnate, close, narrow, cream-coloured. Stem $1\frac{1}{2}$ to 2 $\frac{1}{2}$ in. (3.7 to 6.5 cm.), very slender (2 to 5 mm.), equal, polished, cartilaginous, tough, solid, sometimes slightly swollen at the base, tinted like the pileus or Pale Orange Yellow (iii.) or Russet (xv.) below, then Tawny (xv.), pallid to whitish above. Smell strong. Spores narrow, one end pointed, 9 to 11×4.5 to 5.5μ . On the ground with much pallid mycelium in mould or covering fallen leaves or invading rotten wood. South Australia—National Park, Mount Lofty. May to July.

The cinnamon-rufous pileus and stem, the latter pallid below the cap and slender, with creamy-white adnate-adnexed or adnate gills and general elegant appearance characterise the species, which approaches *Marasmius* in texture.

B. Gills becoming cinereous.

*Gills crowded, rather narrow.

66. *Collybia deusta* Clel. (L., *deustus*, burnt up, scorched).—Pileus 2 to 3 in. (5 to 7.5 cm.), irregularly plane to slightly depressed with a trace of umbonation, edge somewhat undulatory, surface matt to submentose, smoky brownish to scorched brown. Gills adnate-adnexed with occasionally a decurrent tooth, close, narrow ($\frac{1}{2}$ in., 6.5 mm. deep), pallid dingy greyish to pallid dingy buff. Stem $1\frac{1}{2}$ to 2 in. (3.7 to 5 cm.), rather slender ($\frac{1}{4}$ to $\frac{1}{2}$ in., 6 to 9 mm., thick), fibrillose, tough, solid, base slightly swollen into a knob ending abruptly, dark smoky brown. Flesh of stem cartilaginous, differing in texture from the flesh of the pileus, which is white and thin. Spores elliptical, $8.5 \times 5.2 \mu$. No obvious smell. South Australia—in sand under *Melaleuca halmaturorum* F.v.M., Inman River, Victor Harbour. May.

Kinchina specimens (May to August), which seem to be this species, though differing in minor details and showing, sometimes at least, slightly rough spores, are here described in case further investigation shows them to be specifically distinct.—Pileus 3 in. (7.5 cm.) in diameter, at first deeply convex with an acute umbo, then convex and subumbonate, finally nearly plane or a little depressed, smooth, shining, edge inturned when young, between Smutt Brown (xxix.) and Buff Brown (xl.). Gills adnate to sinuate-adnate, close, narrow, to $\frac{1}{2}$ in. (6 mm.) deep, pallid with a greyish-brown tint. Stem $1\frac{1}{2}$ to $2\frac{1}{2}$ in. (3.7 to 6.2 cm.), slender, fibrously striate, externally fibro-cartilaginous, internally stuffed, flesh heterogeneous from that of the pileus, brownish like the pileus but paler, pallid above. Spores elliptical, sometimes slightly warty, 7.5 to 9×5 to 6.5μ . Other South Australian localities—Enfield, Blackwood, Belair, Baker's Gully near Clarendon, south of Noarlunga, Encounter Bay. May to August.

67. *Collybia fusca* Clel. (L., *fuscus*, dusky).—Pileus $1\frac{1}{2}$ to $3\frac{1}{2}$ in. (3.1 to 9.3 cm.), convex, slightly umbonate, edge inturned, surface dull, apparently slightly viscid when moist, lighter than Fuscous to Fuscous or Fuscous Black (xlvi.). Gills slightly to deeply sinuate, or sometimes adnate, up to 1 cm. deep, moderately

close, considerably paler than Light Drab (XLVI). Stem $1\frac{1}{2}$ to $3\frac{1}{2}$ in. (3.1 to 9.3 cm.), 5 to 8 mm. thick, mealy above, slightly fibrillose below, equal, stuffed, cartilaginous, pallid tinted with drab or fuscous becoming darker below. Mealy smell. Spores oval, slightly irregular, 7 to 9 x 4 to 5.5 μ . In grassy land or under trees. South Australia—Eagle-on-the-Hill, National Park. June.

The species resembles superficially *Collybia radicata* but has a shorter stem, which is not rooting, moderately close, drab-tinted gills and much smaller spores. Its characteristics are the dark fuscous cap which is slightly viscid, the close gills becoming greyish and the fuscous tinted stem.

**Gills rather distant, broad.

None of our species seem referable to this section.

††Margin of pileus straight, at first adpressed to the stem.

MYCENA Fr.

(Gr., *mykes*, a fungus.)

"Pileus fleshy or submembranaceous, regular; margin straight, never incurved. Stem central, cartilaginous. Gills adnate or sinuato-adsnate with a decurrent tooth. Spores white; elliptical, oval, globose or oblong elliptical; smooth, punctate or verrucose; continuous. Cystidia present, very rarely absent. Growing on the ground or on wood; solitary or caespitose."—Rea.

The species of *Mycena* are characterised by the white spores, the thin pileus whose margin is not incurved, the stem differing in texture from the flesh of the pileus and the gills adnate or sinuato-adsnate with a decurrent tooth but not truly decurrent. The plants are relatively small, in some cases minute, the thin pileus usually broadly conical, campanulate or deeply convex and not tending to expand, though the edge may become upturned when old. Often there is a more or less prominent umbo or boss. The colour is usually clear, is frequently brown or white, sometimes bright red or yellowish. The pileus may be ribbed or striate and in some species viscid or glutinous, a condition which may affect the stem also. The gills in some cases show a decurrent tooth on the stem; they may be white, or have a cinereous tint, or become spotted, or the edge may be red and sometimes serrate. The stem may arise from a little bulb at its insertion and, especially in caespitose species, may have abundant strigose hairs at its base. It may exude a coloured juice when cut. The species grow on dead leaves, dead wood, or on the ground, and may be single or densely caespitose.

Members of the genus are quite common in South Australia. Several brown species occur on stumps and between the interstices of the rough bark of some of our Eucalypts as dense caespitose masses with conico-campanulate caps and often long clustered stems much covered with hairs at their bases. A delicate whitish species may be found after heavy rains growing on the trunks of the elms on North Terrace. Other species occur on the ground, usually single and amongst grass or fallen leaves and sometimes growing from the latter. Thus *Mycena sanguinolenta*, fleshy-brownish, rather bell-shaped, with a dark red edge to the gills and exuding a prune-coloured juice when the stem is injured, is often found in little groups amongst grass, as at National Park.

KEY TO THE SPECIES.

Stem juiceless, not viscid, not filiform or fragile and without a disc at the base. Densely caespitose, growing on or near wood.

Pileus brown without a lilac or vinaceous tint.

Gills white becoming greyish or flesh-tinted, adnate, sometimes with a decurrent tooth.

Pileus rarely up to 1 in., dark smoky brown. Stem whitish, brownish below.

Spores 9 to 13 x 5.5 μ 68. *Mycena subgalericulata*.

Gills white, adnate.

Pileus $\frac{1}{2}$ in., buffy brown to clove brown.

Stem whitish above, buffy brown below.

Spores 8.5 to 11 x 6. to 7.5 μ 69. *M. australiana*.

- Gills grey, adnate with a decurrent tooth
 Pileus $\frac{3}{4}$ to lin., very dark. Stem dark above, pale below. Spores $9 \times 5.5 \mu$. . . 70. *M. subnigra*.
- Gills grey, not decurrent.
 Pileus lin., dark brown. Stem pallid above and dark below. Spores $9 \times 5.5 \mu$. 71. *M. eucalyptorum*.
- Gills becoming pale vinaceous buff, adnate.
 Pileus to nearly 2in., avellaneous, dark in centre. Stem Verona brown below. Spores 8 to $8.5 \times 5.5 \mu$ 72. *M. Cunninghamiana*.
- Gills white or greyish, becoming spotted brown, adnexed.
 Pileus to $1\frac{1}{2}$ in., buffy brown toummy brown. Stem becoming dark-brown, base strigose. Spores 7.5 to $9 \times 5.5 \mu$. . . 73. *M. maculata*.
- Pileus with lilac or vinaceous tints.
 Whole plant vinaceous. Gills adnate or slightly sinuate with a decurrent tooth. Stems villose below 74. *M. vinacea*.
- Stem fragile, not filiform, not viscid and without a coloured juice. Pileus hygrophaneous. Mostly solitary and terrestrial.
 Pileus conico-campanulate, umbonate, hygrophaneous, drab to fuscous. Gills adnate, greyish white . 75. *M. fusca*.
- Pileus convex, umbonate, dark brown. Gills adnate, pure white. Stem $2\frac{1}{2}$ in., brown. Subcaespitose amongst fallen leaves 76. *M. pullata*.
- Stem exuding a coloured juice when broken.
 Pileus pale brown to reddish-brown. Gills with dark-red serrate edges. Stem 3in., pale to reddish-brown, juice dark reddish 77. *M. sanguinolenta*.
- Stem juiceless, viscid.
 Stem yellow. Pileus viscid, sulphine yellow to dark olive buff 78. *M. epipterygia*.
- Stem and whole plant deep red 79. *M. austro-eruenta*.
- Stem brown below, pallid above. Pileus fuscous . 80. *M. subvulgaris*.
- Stem filiform, with a disc, attached to trunks, etc. Small.
 Pileus $\frac{1}{2}$ in., mealy, whitish. Gills 12 to 14, adnate to a collar. Stem $\frac{3}{4}$ in. Spores 9 to 11μ . On living trunks 81. *M. subalbida*.
- Pileus $\frac{1}{2}$ in. or more, broadly campanulate, apex flattened, frosted with granules, white or whitish. Gills adnexed, no collar. Stem $\frac{3}{4}$ in., with minute hairs 82. *M. tenerima*.
- Stem filiform, without a disc, inserted on fallen twigs, etc.
 Pileus to $\frac{1}{2}$ in., white to pallid brownish, apex dimpled, striate. Gills adnate, rather few and distant. Stem lin., white with a few hairs . . 83. *M. subcapillaris*.
- Pileus $\frac{3}{4}$ in., convex-hemispherical, fuscous brown, apex whitish. Gills adnate with a decurrent tooth, slightly greyish. Stem 2in., brown. Spores $8 \times 5.5 \mu$ 84. *M. albidofusca*.
- I. Stem juiceless, base not dilated into a disc. Edge of gills darker, denticulate.
 No South Australian species recorded.
- II. Stem juiceless, base not dilated into a disc. Gills unicolorous, not changing colour. Pileus pure coloured, bright, not becoming fuscous or cinereous.
 No South Australian species recorded.

111. Stem firm, rigid, somewhat tough, juiceless, somewhat strigose and rooted at the base. Gills changing colour, white, then grey or reddish, commonly at length connected by veins. Pileus not hygrophanous. Generally lignicolous and caespitose.

In the Mount Lofly Ranges, dense clumps of species of *Mycena*, dark-brown in colour, conico-campanulate in shape and with strigose hairs at the bases of the stems, may frequently be found on the trunks of stringy-bark Eucalypts, on stumps, on fallen logs, and on fence posts, often emerging from fissures in the wood. Their size doubtless depends to some extent on the weather and food conditions. These fungi vary a good deal in appearance, and probably several species are concerned. An attempt has therefore been made to disentangle these supposed species, and the main points of difference have been set out in the Key just given. The first four species, namely *M. subgalericulata*, *M. australiana*, *M. subnigra*, and *M. eucalyptorum* seem to be the Australian representatives of *M. galericulata* (Scop.) Fr. It is possible that, instead of being true species, they may merely show the variations that occur in a single unstable species, and if so the first name should apply to all. In any case, the descriptions indicate the range and nature of the variations in a closely related group of fungi. The next two species, *M. vinaceo-lutea* and *M. maculata*, present greater differences, though the latter may also be a member of the first-mentioned group showing a phase, the spotting of the gills, not always present.

68. *Mycena subgalericulata* Clel. (L., *subgalericulatus*, (in this case) close to the species *M. galericulata*).—Pileus $\frac{1}{2}$ to 1 in. (1.2 to 2.5 cm.), $\frac{1}{4}$ to $\frac{3}{4}$ in. (0.8 to 1.8 cm.) high, conico-campanulate, somewhat expanding, umbonate, dry, smooth, submembranaceous, somewhat striate to the umbo, near Olive Brown (XL), occasionally paler (Buffy Brown, XL), sometimes Mummy Brown (XV), during drying becoming paler from above from Olive Brown to Buffy Brown, when young with a pallid peripheral ring. Gills adnate, sometimes with a slight decurrent tooth, sometimes connected by veins, whitish, sometimes flesh-tinted or greyish when old. Stem $\frac{1}{2}$ to 2 in. (1.8 to 5 cm.), often curved, smooth, polished, somewhat fragile to rather tough, base somewhat strigose, whitish to pallid, sometimes brownish, especially below. Shed spores elliptical, oblique, 9 to 13 x 5.5 to 8.5 μ . No cystidia seen. No smell. Caespitose on trunks. South Australia—On trunks of *Eucalyptus obliqua* L'Herit, Mount Lofly; National Park. April to August.

This is evidently a variable species. It differs from Rea's description of *Mycena galericulata* (Scop.) Fr. in being of smaller size, with the cap apparently darker, in the gills sometimes becoming greyish when old and in the stem often being nearly pure white. The characteristics of the species are the caespitose habit on trunks or stumps, the dark fuscous brown to pale smoky brown umbonate pileus, the gills adnate sometimes with a decurrent tooth and whitish becoming flesh-coloured or greyish and the whitish or pallid stem sometimes brownish below.

69. *Mycena australiana* Clel. (L., *Australianus*, Australian).—Pileus $\frac{1}{2}$ in. (1.2 cm.) high, $\frac{3}{4}$ in. (1.8 cm.) broad, broadly conico-campanulate, slightly striate, Buffy Brown to Olive Brown (XL) or Wood Brown (XL), apex darker. Gills adnate, with no decurrent tooth, moderately close, pure white becoming creamy. Stem about 3.7 cm., slender, polished, a little mealy at the base but without strigose hairs, apex whitish, Buffy Brown towards the base. Spores 8.5 to 11 x 6 to 7.5 μ . Gregarious or caespitose on fallen logs. South Australia—National Park, Mount Lofly. May to July.

70. *Mycena subnigra* Clel. (L., *subniger*, blackish).—Pileus up to $\frac{3}{4}$ in. (1.8 cm.) high and broad, campanulate to conico-campanulate, smooth, faintly striate, nearly black to Mummy Brown (XV) at edge. Gills adnate or sinuato-adnate with a decurrent tooth, moderately close, ventricose, greyish. Stem 2 in. (5 cm.) or more, slightly attenuated upwards, concolorous with the pileus above, pallid and densely strigose below. Spores 7.5 to 9 x 4.5 to 5.5 μ . Densely caespitose on stumps. South Australia—Mount Lofly, Caroline State Forest (S.E.). May, June.

71. *Mycena eucalyptorum* Clel. (L., here of *Eucalyptus* trees).—Pileus 1 to 1½ in. (2.5 to 3.1 cm.), broadly conical or conico-convex, expanding to convex, with a prominent obtuse umbo, smooth, periphery substrate, dark brownish grey (near chocolate colour), edge pallid. Gills sinuately adnexed sometimes to a collar, moderately close, narrow, greyish. Stem up to 2½ in. (6.2 cm.), slender, hollow,

with a few strigose hairs at the base, pallid above, then pale brownish, dark brownish-grey near the base. Spores $9.3 \times 5.5 \mu$. Densely caespitose on fallen trunks. South Australia—Second Valley Forest Reserve, Mount Lofty, National Park, Baker's Gully near Clarendon. May, June, August.

This caespitose species growing on fallen trunks, etc., is characterised by the very dark brownish-grey cap with an umbo, sinuate grey gills attached to a collar and without a decurrent tooth, and a stem pallid above and dark below.

72. *Mycena Cunninghamiana* Clel. (After Dr. G. H. Cunningham, the New Zealand mycologist).—Pileus up to 1½ in. (4.3 cm.), convex, subumbonate, sometimes with a slight depression round the umbo, irregularly rugose, a little yellower than Avellaneous (XL) becoming browner towards the summit and very dark at the apex. Gills adnate, fairly close, rather narrow, becoming pale Vinaceous Buff (XL). Stem 3 in. (7.5 cm.), smooth above, base densely strigose, hollow, near Verona Brown (XXIX.) at the base, paler above. Spores $8 \text{ to } 8.5 \times 5.5 \mu$. Densely caespitose on stumps. South Australia—Mount Lofty. July. (Figure 12.)

[From watercolour by Miss A. Rennie.]

Figure 12.—*Mycena Cunninghamiana* Clel. (No. 72). National Park.

73. *Mycena maculata* Clel (L., *maculatus*, spotted).—Pileus broadly conical, up to ¾ in. (1.8 cm.), then expanding and finally nearly plane and up to 1½ in. (3.7 cm.), usually broadly subumbonate and sometimes with an irregular hole-like depression in the broad umbo, slightly rugose at the periphery, finally striate in the centre, sometimes slightly zoned and ridged, when young Buffy Brown (XL) or Mummy Brown (XV) to paler than Olive Brown (XL), or becoming very dark brown at the umbo (Clove Brown, XL, sometimes Verona Brown, XXIX., or paler than Snuff Brown, XXIX.), with the periphery paler, when old near Warm Sepia (XXIX.) with the periphery pallid near Avellaneous (XL). Gills adnexed or sinuate-adnexed, ventricose, moderately close, when young nearly pure white or in some collections very decidedly greyish, when old becoming reddish-brown and spotted with Chestnut Brown (XIV). Stem 2 to 3 in. (5 to 7.5 cm.), shining, smooth, sometimes flattened, with strigose hairs in some collections passing 2 in. up the stem, hollow, at first brown below and pallid above, finally dark brown (Warm Sepia, XXIX.) throughout or Verona Brown (XXIX.) higher up. Shed

spores obliquely elliptical, 7.5 to $9 \times 5.5 \mu$. No cystidia seen. Caespitose, with strigose hairs at the base, at the butts of dead trunks of Eucalypts. South Australia—Mount Lofty. June. (Figure 13.)

This is one of the larger caespitose brown species of *Mycena*, characterised by the white or greyish gills becoming spotted reddish brown (hence the specific name).

[Photo. by S. Tee.]

Figure 13.—*Mycena maculata* Clel. (No. 73).
Tweedvale.

74. *Mycena vinacea* Clel. (L., *vinaceus*, here wine-coloured).—Pileus $\frac{3}{4}$ to $1\frac{1}{2}$ in. (1.8 to 3.7 cm.), conico-hemispherical or broadly conical to convex, then expanded, sometimes with an acute or obtuse umbo, matt or smooth, slightly shining, striate at the periphery when moist, edge slightly incurved when young, Pale Vinaceous Drab to Vinaceous Drab (XLV.), Light Cinnamon Drab (XLVI.), near Sorghum Brown (XXXIX.), or yellower than Vinaceous Brown (XL.), sometimes Fuscous (XLVI.) when old, drying to near Pinkish Buff (XXIX.), paler than Avellaneous (XL.) or between Avellaneous and Olive Buff (XL.). Gills adnate or slightly sinuate with a decurrent tooth, moderately close, ventricose, many short, edges tending to be frayed, Pale Vinaceous Drab, Pale Brownish Drab (XLV.), Pale Greyish Vinaceous, or Vinaceous Fawn to Fawn Colour (XL.). Stem 1 to 2 $\frac{3}{4}$ in. (2.5 to 6.8 cm.), slender to a little stout, equal or slightly attenuated upwards or downwards, smooth, hollow, base pallid and tending to be villose, Dark Vinaceous Drab (XLV.) when young, Light Greyish Vinaceous (XXXIX.), near Pale Brownish Drab or Wood Brown (XL.). The pallid brownish flesh of the cartilaginous stem heterogeneous from the white flesh of the pileus. Spores obliquely elliptical, 7.5 to 13×4 to 8.5μ . Caespitose or subcaespitose on fallen

wood on the ground at the base of stumps, or amongst fallen leaves and grass or pine needles. South Australia—Mount Lofty, National Park, Baker's Gully near Clarendon, Kuitpo, Kinchua, Kalangadoo (under *Pinus*), Caroline State Forest (near Mount Gambier, under *Pinus*). New South Wales—Cambewarra Mount. May to August. (Figure 14 A.)

Readily recognised by the lilacy or vinaceous tint of the whole plant and the caespitose habit.

IV. Stem fragile, dry, juiceless, fibrillose at the base, scarcely rooting but not dilated or inserted. Pileus hygrophanous. Gills changing colour, at length somewhat connected by veins. Usually strong-scented. Solitary and terrestrial, a few caespitose and ligniculous.

75. *Mycena fusca* Clel. (L., *fuscus*, dusky).—Pileus up to $\frac{1}{2}$ in. or $\frac{3}{4}$ in. (1.2 to 1.8 cm.) or more, conico-campanulate to broadly conical or convex, then convex or nearly plane with a subacute umbo, striate, periphery Drab (XLVI.) or near

A

B

C

[From watercolours by Miss Buxton, Miss Fireash, and Miss P. Clarke respectively.]

Figure 14.—A. *Mycena vinacea* Clel. (No. 74). Under *Pinus*, Kuitpo.

B. *Clitocybe campestris* Clel. (No. 44). Eagle-on-the-Hill.

C. *Mycena sanguinolenta* (A. et S.) Fr. (No. 77). Narrabeen, New South Wales.

Light Cinnamon Drab (XLVI.) or Wood Brown (XL.) grading into Fuscous and Fuscous Black (XLVI.), or Bone Brown (XL.), hygrophanous, becoming pallid brown and striate. Gills adnate with a trace of a decurrent tooth, moderately close, alternate ones short, greyish-white. Stem $1\frac{1}{2}$ in. to 2 in. (3.7 to 5 cm.), slender, rather fragile, smooth, twisting on bisecting, hollow, below paler than Olive Brown (XL.) or Vinaceous Buff (XL.) to Bone Brown (XL.), pallid above, rather strigose or with a little mycelium at the base. Definite slight nitrous smell. Spores 7.5 to 11 x 3.5 to 5 μ . Single, on damp soil or on fallen leaves, twigs, etc. South Australia—Waterfall Gully, National Park. April, May.

Characterised by the habitat (on the ground), the nitrous smell, the drab-coloured cap darker (fuscous) in the centre, adnate greyish-white gills and slender brownish stem.

76. *Mycena pullata* Berk. et Cke. (L., *pullus*, dark coloured).—Pileus $\frac{3}{4}$ in. (1.8 cm.), convex, umbonate, edge slightly striate, the umbo a very dark brown, the rest of the pileus smoky brown. Gills adnate, close, pure white. Stem $2\frac{1}{2}$ in. (6.2 cm.), slender, shining, hollow, dark brown below becoming pallid under the gills, a few white fibrils at the base. Spores elliptical, 9 to 11.2 x 5.5 to 6 μ . Cystidia fusiform, 90 x 15 μ . Smell slightly nitrous. Subcaespitose amongst fallen leaves, bark and earth mould. South Australia—Mount Lofty. April.

Our plants resemble closely Cooke's Illustration of *M. pullata* differing only in being pallid below the gills. The brown pileus and stem contrast markedly with the pure white gills.

V. Stem filiform, scarcely a line thick (and not more), flaccid, somewhat tough, rooting, dry, juiceless, commonly very long in proportion to the pileus. Gills paler at the edge and changing colour. Very slender, tense and straight, terrestrial and amongst moss, inodorous, solitary. Pileus usually fuscous, becoming somewhat pale, not hygrophaneous.

No South Australian species recorded.

VI. Stem and gills exuding a milky, usually coloured juice when broken. Stem dry, rooting.

77. *Mycena sanguinolenta* (A. et S.) Fr. (L., *sanguinolentus*, bloody).—Pileus up to $\frac{3}{4}$ in. (1.5 cm.), rarely $\frac{1}{2}$ in. (2.1 cm.), broad and $\frac{1}{2}$ in. (1.2 cm.) high, submembranaceous, conico-campanulate or rarely conical, sometimes finally irregularly upturned, sometimes umbonate, striate, the edge very finely toothed, pale brown to reddish-brown (paler than Snuff Brown, XXIX., near Mikado Brown, XXIX.), drying paler. Gills adnate, arched, moderately close, sometimes irregular with connecting veins, whitish with a faint pink tinge or pallid, edges dark-red or dark-purple and finely toothed. Stem up to $\frac{1}{2}$ in. (7.5 cm.), slender, shining, slightly attenuated upwards, hollow, pale to reddish-brown. A prune-coloured dark-red watery juice exudes on section of the stem or from the broken gills. Spores elongated, 7 to 9 or even 12 x 5 to 7 μ . Amongst leaves under trees, grass, etc., gregarious or even subcaespitose. South Australia—National Park, Mount Lofty. New South Wales. May, June, July. (Figure 14 C.)

Recognisable readily by the pale-brown or reddish-brown pileus, the dark edges to the gills and the coloured juice.

VII. Stem juiceless, glutinous or viscid. Gills at length decurrent by a tooth.

78. *Mycena epipterygia* Scop. (Gr., *epi*, on; *pterygion*, a little wing).—Pileus up to $\frac{1}{2}$ in. (1.2 cm.) broad and high, at first conical, then conico-campanulate, subumbonate, rugose, glutinous, near Sulphine Yellow (IV.) when young, later near Dark Olive-Buff (XL.), apex darker than periphery. Gills ascending, adnate, moderately close, rather ventricose, white. Stem up to $\frac{1}{2}$ in. (7.5 cm.), slender, hollow, a little strigose below, Sulphine Yellow. Spores 8 x 4.8 μ . No cystidia seen. Attached to buried sticks, grass, etc. South Australia—Mount Lofty, Mylor. June.

The glutinous yellow pileus and stem distinguish this *Mycena* from our other species.

79. *Mycena viscido-cruenta* Clel. et Cheel (*M. coccinea* Clel. et Cheel, non Sow.), (L., *viscidus*, viscid; *cruentus*, red like blood).—Pileus $\frac{1}{2}$ in. (10 mm.), hemispherical to convex, occasionally dimpled or with a slight obtuse umbilic, faintly striate, viscid when moist, old-blood-red to dull carmine-lake. Gills adnate, then slightly decurrent, rather thick, moderately close, rose colour or slightly paler than the pileus, edges very slightly darker and finely denticulate. Stem $\frac{1}{2}$ in. (2.5 cm.), glutinous when moist, slender, hollow, usually attached by a small fluffy base, the colour of the pileus. On bruising the gills or stem, a little dark-red moisture appears. Spores elongated, one end more pointed, 7 to 8.5 x 2.5 to 3.5 μ . Attached to small sticks and leaves in damp shady places. South Australia—Waterfall Gully, Mount Lofty, Inman Valley. New South Wales. May, June.

A very beautiful and elegant species characterised by its blood-red colour and glutinous pileus and stem.

80. *Mycena subvulgaris* Clel. (Near to the species *M. vulgaris*).—Pileus $\frac{3}{4}$ to $\frac{1}{2}$ in. (10 to 21 mm.), convex, umbilicate, striate, margin at first straight, near Fuscous (XLVI.), young plants between Buffy Brown and Olive Brown (XL.). Gills adnate to adnato-decurrent, in four tiers, the second tier reaching nearly half-way to the stem, the third tier very short, whitish, then with a light greyish tint. Stem $1\frac{1}{2}$ to 2 in. (3.7 to 5 cm.), slender, very glutinous, slightly strigose at the base, hollow, lower portion paler than the pileus (near Drab, XLVI.), whitish above. Flesh of pileus very thin, dark-coloured like the surface, a triangular cavity below the umbilicus. Gregarious to subcaespitose, amongst leaves and small sticks on the ground. South Australia—National Park. May.

This is apparently the Australian representative of *Mycena vulgaris* (Pers.) Fr., but tends to be larger and darker in colour, is without a definite papilla and the pileus is not definitely viscid. Cooke's Illustrations of British Fungi (Pl. 191) are not very like our plants.

Recognised by the glutinous pallid brownish (drab) stem and the convex umbilicated brown pileus.

VIII. Stem dry, rootless, the base naked and dilated into a disc or stigose and swollen into a little bulb. Tender, solitary, becoming flaccid.

81. *Mycena subalbida* Clel. (L., *subalbidus*, whitish).—Pileus up to $\frac{1}{2}$ in. (6.2 mm.), usually less, conico-campanulate to convex, sometimes dimpled, sometimes gibbous or umbonate, ribbed, mealy or scurfy to glabrous, white with a greyish-brown or creamy tint. Gills adnate, attached to a collar, ascending, slightly ventricose, rather narrow, about 12 to 14 in number with shorter ones interposed, pallid greyish white. Stem $\frac{3}{16}$ to $\frac{1}{2}$ in. (4.5 to 10 mm.), curved, very slender, mealy to smooth, white to pallid, sometimes slightly brownish below, attached by a minute slightly strigose disc. Spores subspherical, 9 to 11 μ , 10 x 8.4 μ , 9.5 x 6.5 μ ; the cells on the edges of the gills bristling with minute processes; cystidia, 25 μ long, with tapering apices and ventricose bases seen in one batch of specimens. South Australia—On mossy bark of elms (*Ulmus campestris* L.), North Terrace, Adelaide; on bark of *Schinus Molle* L., Fullarton; on trunk, National Park. June, July. The species seems to be related to *M. corticola* Fr. and *M. hiemalis* (Osb.) Fr. but differs and belongs to this section (Basipedes) by having a definite though small disc. (Figure 15 A.)

82. *Mycena tenerrima* Berk. (L., *tenerrimus*, very thin).—At first a minute knob with frosted granules. Pileus $\frac{1}{2}$ in. or a little more (3 mm.), broadly campanulate or conico-convex, the centre slightly flat on top or depressed, striate, frosted with granules, pure white or with a greyish tinge. Gills adnexed or just free, no collar, slightly ventricose. Stem $\frac{1}{2}$ in. (10 mm.), very slender, with white granules or minute hairs, attached to wood by a minute mealy bulb. Microscopically the cell-like hyphae of the pileus are covered with granules. South Australia—On the base of a *Eucalyptus* trunk, Greenhill Road, National Park specimens have very mealy caps, the gills adnate to an indefinite collar and moderately close, disc mealy; in dense trunks on the bark of a fallen tree. May, June.

IX. Stem very thin, inserted (*i.e.*, growing on other plants without a root or tubercle or flocci at the base), dry. Gills adnate, uncinuate with a small decurrent tooth. Very tender, becoming flaccid as soon as the sun touches them.

83. *Mycena subcapillaris* Clel. (Near to the species *M. capillaris*).—Pileus $\frac{1}{2}$ to $\frac{3}{4}$ in. (3 to 5 mm.), 2.5 mm. high, disc dimpled, sulcate, white to pallid brownish. Gills adnate, rather distant, relatively few (about 14), bristling with cystidia (?), white. Stem 1 to $1\frac{1}{2}$ in. (2.5 to 3 cm.), very slender, slightly translucent becoming whitish, with a few scattered hairs often with drops of water on them on the stem, abruptly entering the matrix. Spores rather narrow, 7.5 x 3.7 μ . On twigs, dead fallen fern fronds, etc. South Australia—Mount Lofty. May.

Characterised by the white or slightly brownish dimpled sulcate pileus, rather distant and few gills, and relatively tall white stem with a few hairs on it. Differs from *M. capillaris* (Schum.) Fr. in being distinctly larger and in the pileus being often brownish.

84. *Mycena albidofusca* Clel. (L., *albidus*, whitish; *fuscus*, dark).—Pileus $\frac{3}{4}$ in. (10 mm.), convex-hemispherical, umbonate, slightly striate, umbo whitish, rest of surface rather fuscous brown. Gills adnate with a decurrent tooth, rather distant, slightly greyish. Stem 2 in. (5 cm.) high, very slender, with a few fibrils at the base, brown below, pallid above. Spores elliptical, 8 x 5.5 μ . On the ground attached to fallen pine needles (?). South Australia—Mount Lofty. June.

Characterised by a whitish disc, brown nearly hemispherical pileus, brown stem and solitary habit.

**Gills decurrent.

OMPHALIA (Pers.) Fr.

(Gr., *omphalos*, the navel.)

“Pileus fleshy or submembranaceous, often umbilicate. Stem central, cartilaginous. Gills decurrent. Spores white, rarely yellowish; elliptical, reniform, pip-shaped, boat-shaped, subglobose or oblong elliptical; smooth, punctate, verrucose, or echinulate; continuous. Cystidia present or absent. Growing on the ground or on wood; solitary, caespitose, subcaespitose or fasciculate.”—Rea.

The species are mostly small and often delicate, characterised by the white spores, the cartilaginous stem differing in texture from the flesh of the pileus and the decurrent or adnate-decurrent gills. In *Clitocybe*, also with decurrent gills, the fleshy stem is similar in texture to the substance of the pileus, and the plants are usually large. When the pileus is at first incurved, a relationship to *Collybia* is seen, and when its edge is straight with *Myceena*, but *Omphalia* differs from both in its decurrent gills.

Our beautiful little orange-coloured *Omphalia chromacea* is common on bare soil in the Mount Lofty Ranges after rain. Otherwise species are rare with us.

KEY TO THE SPECIES.

Yellow plants.

Whole plant yellow ochre to deep chrome. Stem up to $\frac{3}{4}$ in. Frequent on bare soil 85. *Omphalia chromacea*.

Pileus and stem yellow ochre to ochraceous tawny.

Gills white. Stem $\frac{3}{4}$ to $1\frac{1}{2}$ in. Often amongst moss 86. *Omphalia fibula*.

Whitish plants.

Pileus and stem pale brownish white. Gills distant, few, white. In a bog 87. *Omphalia paludicola*.

Pure white or with creamy tint. Pileus about $\frac{1}{2}$ in.

Stem $1\frac{1}{2}$ in. At bases of olives 88. *Omphalia olivaris*.

Brownish or drab-coloured plants.

Whole plant near pinkish buff. Edges of gills thick, often forked 272. *Cantharellus brunneus*.

85. *Omphalia chromacea* Clel. (Gr., *chroma*, colour).—Whole plant near Deep Chrome (III.) or a little yellower when moist, or Yellow Ochre (xv.), drying to an opaque pale Orange Yellow (III.) to Light Orange Yellow (III.), the gills and stem remaining nearer deep chrome. Pileus up to $\frac{3}{4}$ in. (1.8 cm.), rarely reaching 1 in. (2.5 cm.), convex, then sometimes plane, slightly umbilicate, irregularly rugose. Gills decurrent, edges rather thick, a few short ones interposed, distant, sometimes forked or anastomosing or with buttressing folds. Stem up to $\frac{3}{4}$ in. (1.8 cm.), slender, equal or slightly attenuated upwards, tough, surface dull, solid, flesh yellow, spores narrow, pear-shaped, oblique, 6 to 9.5 $\times$ 3 to 5 μ . Cystidia not seen. Gregarious on bare sandy loam or amongst low moss. South Australia—Adelaide, Mount Lofty, Waterfall Gully, National Park, Kuitpo. New South Wales. April to September. (Figure 15 B.)

86. *Omphalia fibula* (Bull.) Fr. (L., *fibula*, a pin).—Pileus $\frac{1}{2}$ to nearly $\frac{3}{4}$ in. (6 to 11 mm.), convex with a prominent umbilicus, sometimes when young conico-convex and umbonate, smooth, slightly striate, between Yellow Ochre and Ochraceous Tawny (xv.). Gills deeply decurrent, rather thick, rather distant, rarely forking, whitish. Stem $\frac{3}{4}$ to $1\frac{1}{2}$ in. (18 to 37 mm.), slender, pruinose when young, then smooth, cartilaginous, equal, solid, colour of the pileus. Amongst moss on shady banks. Spores 4.8 to 6.5 $\times$ 2 to 2.5 μ . South Australia—Near Coromandel Valley, Mount Lofty. June.

Distinguished by the colour of the pileus approaching yellow ochre, the white gills, slender appearance and association with moss (with us). *Omphalia chromacea* is more chrome-coloured, the gills are not whitish and it prefers growing on bare ground.

87. *Omphalia paludicola* Clel. (L., *palus*, a marsh; *colo*, to inhabit).—Pileus up to $\frac{3}{4}$ in. (10 mm.), campanulate, then convex, slightly dimpled on top, rugose-striate, pale brownish white, dingier than Pinkish Buff (xxix.). Gills deeply decurrent, distant, few with short ones at the periphery, white. Stem $\frac{3}{4}$ in. (19 mm.), slender, colour of the pileus. Spores not seen. Amongst vegetable fibres in a bog. South Australia—Mount Lofty. June.

88. *Omphalia olearis* Clel. (L., *olearis*, of an olive tree).—Pure white or with a tinge of cream on the pileus. At first convex-convex, then convex with sometimes a trace of an umbo, up to $\frac{5}{16}$ in. (8 mm.), smooth, edge turned in when young. Gills moderately decurrent, close, with short ones interspersed at the periphery. Stem up to $1\frac{1}{2}$ in. (3 cm.), a little wavy, smooth, cartilaginous. South Australia—In hollows of the wood at the bases of cultivated olive-trees, Beaumont, near Adelaide. June.

A

B

C

[From watercolours by Miss Fircush.]

Figure 15.—A. *Mycena subalbida* Clel. (No. 81). National Park.

B. *Omphalia chromacea* Clel. (No. 85). Mount Lofty.

C. *Cantharellus brunneus* Clel. (No. 272). Mount Lofty.

(d) PILEUS CONFLUENT WITH THE EXCENTRIC OR LATERAL STEM, DIMIDIATE, SESSILE OR RESUPINATE. GILL EDGE ENTIRE.

PLEUROTUS Fr.

(Gr., *pleuron*, a side; *ous*, an ear.)

“Pileus fleshy or submembranaceous; excentric, dimidiate or resupinate. Stem excentric, lateral or wanting; with or without a ring. Gills sinuate, adnate, decurrent or radiating from a central point. Spores white, rarely pink, yellowish, lilac or dingy; elliptical, globose, subglobose, pip-shaped, oblong elliptical, cylindrical or reniform; smooth, granular, verrucose or echinulate; continuous. Cystidia present or absent. Growing on wood, more rarely on the ground or on dung.”—Rea.

The species are characterised by the white spores, rarely slightly coloured, and a stem which is excentric, lateral or may even be absent and which is fleshy and continuous with the pileus. The gills vary but are often decurrent; in some of the very small species they may radiate from a central point. Some of the species are amongst the largest of our agarics and others are only a few millimetres in diameter. *Pleurotus lampas*, our largest one, is luminescent and is quite common at the bases of Eucalypts. The colour of the larger species is usually whitish with tints of brown, sometimes in the case of *P. lampas* with shades of lilac, grey and yellow brown. Many of the smaller species are greyish. In some, the upper layer of the pileus is subgelatinous. They nearly all grow

on or near wood. Some revive to some extent when moistened, so that some authors may place a species in the genus *Panus* and others place it under *Pleurotus*. A ring is present in some foreign species and may thus give a resemblance to *Armillaria* but the stem is not central. When the stem is only slightly excentric and the gills decurrent or not sinuate, difficulty will be found in separation from the genus *Clitocybe*. Other species may resemble *Tricholoma*, but the species in this genus nearly all grow on the ground.

Two large species and several small ones have been recognised as South Australian. Quite common is the large and beautiful *P. lampas* already mentioned. Another large whitish species, a form of *P. ostreatus*, has only been found in one locality, the Bluff at Encounter Bay, where it grows on the trunks of a *Myoporum* exposed to the strong salt-laden sea-breezes. Several minute greyish species are not uncommon on bark and fallen twigs. *P. hepatotrichus*, a species that revives in part on moistening and is of a firmish texture and hence has been placed in the genus *Panus*, is often to be found on fallen bark or on the rough stems of Eucalypts—it is greyish-brown, may reach $\frac{1}{2}$ in. in size, is laterally contracted, has a hoary pileus and gills which with a hand lens may be seen to be bristling with cystidia.

KEY TO THE SPECIES.

- Stem excentric. Plants large. Gills decurrent.
 Luminescent. Often very large. Pileus variable, pallid, yellowish-brown to fuscous. At base of Eucalypts 89. *Pleurotus lampas*.
 Medium large. Pileus yellow-brown to dark-brown. Stem stout, with gill reticulations above. On trunks 90. *P. ostreatus*.
 Medium size. Pileus and gills cinnamon buff. At bases of stumps 91. *P. mallecanus*.
 Laterally attached by a stem-like base.
 Dark-brown to blackish, up to 3.7 x 3 cm., pruinose, cortex subgelatinous. Gills drying rusty-brown, bristling with cystidia 92. *P. hepatotrichus*.
 Dark-brown, up to 9 x 5 cm., smooth, viscid when moist, cortex subgelatinous. Gills with cystidia 93. *P. viscidulus*.
 Gills radiating from an excentric point. Small.
 Pileus pallid grey, tomentose. Gills grey with a fawny tint. Upper layer of flesh dark, gelatinous. Spores spherical, 6 to 7 μ 94. *P. subapplanatus*.
 Pileus dark greyish-black, hoary, clothed with cells and processes with wart-like projections. Gills rather close, grey. Flesh dark, subgelatinous. Spores 6 x 3.5 μ 95. *P. cinerascens*.

89. *Pleurotus lampas* Berk. (*L. lampas*, a torch). (Probable synonyms, *P. candescens* Müll.; *P. phosphoreus* Berk.; and doubtful, *P. nidiformis* Berk.).—Large, strongly “phosphorescent” (luminescent), usually densely caespitose and often with several irregular pilei. Up to 7 in. (18 cm.) or more high and broad, stem more or less excentric, sometimes nearly central (especially when growing from buried wood), sometimes nearly lateral, pileus very irregular, sometimes flabelliform especially when young and against a trunk, often lobed and even sublobed and undulated, convex altogether or in places and depressed in others, surface matt when young, smooth when old, edge turned in when young, cuticle peels and tends to split more or less radially, colour mostly Cream (xvi.) but especially in specimens of firmer texture and exposed to light the older portions or nearly the whole pileus may assume colours, often rich in tint, of brown, bronzy brown, or purplish black, such as Buckthorn Brown (xv.), Cinnamon Brown (xv.), Mummy Brown (xv.), Kaiser Brown (xiv.). Light Buff (xv.), browner than Mars Yellow (iii.), dark chocolate brown, greyer than Parma violet, etc. Gills deeply decurrent, when young close and narrow, later moderately close and up to 1 cm. deep, attenuated at both ends, decurrent on the thick stem where they appear as raised lines which may anastomose or fork, cream-coloured.

Stem up to 2 to 3 in. (5 to 7.5 cm.), very stout (up to 1½ in., 3.7 cm., thick) to moderately slender (2 cm. above, 1 cm. below), smoky punctate or slightly fibrillose or with the cuticle splitting, whitish or with tints of Mars Yellow, Light Payne's Grey (XLIX.) or brown. Flesh thick, white, tough in the stem; in shaded places, the pilei may be almost translucent, in exposed situations quite opaque and tough. Spores elliptical, with a large globule, 7 to 9 x 5 to 6 μ . Near the bases of Eucalypts, living and dead. South Australia—Mount Lofty Ranges, Mount Barker, Clarendon district, Knitpo, Encounter Bay. Queensland, New South Wales, Victoria, Tasmania, Western Australia. April to November, but chiefly in autumn and winter.

This, our common large "phosphorescent" species, is readily recognised by its large size, crowded habit and situation at the bases of Eucalyptus trunks and stumps.

90. *Pleurotus ostreatus* (Jacq.) Fr. (L., *ostrea*, an oyster).—Pileus up to 5½ in. (13.7 cm.), convex round the edge, concave in the centre, surface dull, in places with some imbricate fibrils, edge inturned when young, slightly so when expanded, Tawny Olive (XXIX.), more umber in places, becoming ochraceous tawny or darker in the centre (yellowish brown with a bronze tint, dark-brown in the centre). Gills deeply decurrent, moderately close, very narrow (under ½ in., 6 mm.), dingy cream-coloured becoming slightly brownish. Stem excentric to nearly lateral, sometimes with several pilei, 4 in. (10 cm.), stout (up to 1½ to 2 in., 3.1 to 5 cm. thick), marked with gill-lines above sometimes ending in brown thread-like reticulations, attenuated at the base, very tough, pallid becoming tinted brownish, sometimes with ligulate scales with brownish tips pointing upwards. Flesh very thick, 1½ in. (3.1 cm.). Spores narrow pear-shaped, 9.5 to 15 x 4.5 to 5.5 μ . South Australia—On stem and branches of living *Myoporum insulare* R. Br., the Bluff, Encounter Bay. May, August.

These specimens differ from typical *P. ostreatus* in the longer stem which tends to become brownish and is sometimes scaly. The species can be readily recognised by its large size, excentric stem, the brownish tints on the pileus, the deeply decurrent gills, and the absence of luminescence.

91. *Pleurotus malleeanus* Clel. (A coined Latinized word referring to the habitat).—Pileus up to 4½ in. (11.2 cm.), convex, edge a little turned in, smooth to very knobby and irregular in places, moist-looking, near Cinnamon Buff (XXIX.). Gills decurrent, close, ½ in. (6 mm.) deep, near Pinkish Buff (XXIX.). Stem 1½ to 4 in. (3.1 to 10 cm.), central, excentric or lateral, 1 in. (2.5 cm.) thick above, equal or markedly attenuated downwards, tough, solid, white, mostly buried. Flesh very thick or reduced to ½ in. (1.2 cm.). Spores elongated, 8 to 10 x 4 μ . At the bases of old stumps of mallee (*Eucalyptus* sp.) in sand. South Australia—Monarto South. May.

92. *Pleurotus hepatotrichus* (Berk.) Clel. (*Lentinus hepatotrichus* Berk. Probably also *Pleurotus chaetophyllus* Sacc.). (Gr., *hepar*, *hepatos*, the liver; *thrix*, *trichos*, a hair).—Laterally contracted to a floccose stem-like base. Pileus up to 1½ in. (3.7 cm.) laterally, 1½ in. (3.1 cm.) long, usually less, convex to plane or even depressed or fan-shaped, the edge sometimes slightly sinuate, pallid brownish to dark-brown or blackish, the edge often paler (lighter than Sayal Brown, XXIX.), greyish pruinose from a velvety matt of white hairs, rarely becoming polished. Gills decurrent to the attachment, close, narrow, cream-coloured acquiring a rusty or dirty buffy tint, crenulate and rusty brown when dry, bristling with cystidia. Flesh whitish, thin, attenuated outwards, not gelatinous, but the thick cuticle black and gelatinous-looking. Spores slightly curved, hyaline, 7.5 to 9 x 3.5 to 4.2 μ . Cystidia fusiform, acuminate, sometimes bent at an angle near the base, thick walled, slightly yellowish, 57 to 90 x 11 to 15 μ . On the underside of fallen *Eucalyptus* bark or on rough trunks of living Eucalypts. South Australia—Mount Lofty, National Park, Encounter Bay. May, July.

This is a common species on fallen Eucalyptus bark, etc., and is characterised by the hairy brownish pileus and the cream-coloured to dirty buff-tinted gills bristling with cystidia as seen with a lens and decurrent to a lateral stem-like base. The plants are rather tough and consequently may be placed by some in the genus *Lentinus*.

93. *Pleurotus viscidulus* (Berk. et Br.) Clel. (*Panus viscidulus* Berk. et Br.). (L., *viscum*, mistletoe, bird-lime).—Pileus up to 3½ in. (9 cm.) laterally, 2 in. (5 cm.) long, flabelliform, somewhat convex, depressed towards the lateral attachment, shining, smooth, viscid when moist, sometimes finely striate, edge wavy and

more or less lobed irregularly and a little inrolled, dark-brown (Cinnamon Brown, xv., Warm Sepia, xxix.), becoming pallid. Gills decurrent on to the lateral almost obsolete stem, narrow, many short ones interposed, sometimes anastomosing on the stem, cream-coloured to pallid brownish. Stem lateral, short and stout, up to 1 in. x 1 in. (2.5 x 2.5 cm.), or slender, pallid to dark-brown, flesh with a thick glutinous outer layer succeeded by a narrow pallid layer, then by a thicker pale waxy layer. Spores elliptical, oblique, slightly curved, white, 8 to 10 x 4 to 6.5 μ . Cystidia varying in shape, ventricose or more or less club-shaped with rough apices and constricted bases, thick walled, 54 to 112 x 9.3 to 18 μ . Sometimes caespitose and imbricate. On the ground at the bases of or under trees or stumps. South Australia—On the ground beneath *Eucalyptus* and *Pinus* attached apparently to superficial roots, Botanic Gardens, Adelaide; at the base of *Eucalyptus rostrata* Schl., Buruside; National Park; Mount Lofty; Mylor; Encounter Bay. May, June, August. (Figure 16.)

[From watercolour by Miss Fivush.]

Figure 16.—*Pleurotus viscidulus* (Berk. et Br.) Clcl. (No. 93). Mount Lofty.
Reduced by $\frac{1}{3}$.

The species is characterised by the smooth, viscid dark-brown flabelliform pileus laterally contracted to a short stem, the decurrent gills, the habitat and microscopically the cystidia.

94. *Pleurotus subapplicatus* Clcl. (*Subapplicatus*, near to the species *P. applicatus* Batsch., Berk.).—Pileus $\frac{1}{2}$ to $\frac{3}{4}$ in. (3.5 to 16 mm.), convex, becoming depressed towards the attachment, at first inverted saucer-shaped, finally rather fan-shaped, a little repand, sometimes almost lobed, tomentose, strigose near the attachment when large, pallid grey or greyish-brown. Gills moderately close, radiating from a lateral to excentric point of attachment, many short ones, grey with a fawny tint. No definite stem. Flexible, the flesh of the pileus with an upper dark gelatinous layer. Shed spores spherical, 5 to 7, 5.5 x 3.5 μ . South Australia—On an upright piece of rotting wood in a glass-house, Blackwood; on dead part of pepper-tree (*Schinus Molle* L.), Fullarton (Adelaide); Mount Lofty. April to July.

A small grey gregarious species growing on wood, saucer-shaped to fan-shaped, the grey gills radiating from the point of attachment.

Pleurotus subapplicatus Clcl. Laschia form.—Pileus $\frac{1}{4}$ in. (6 mm.) laterally, convex, smooth to somewhat rugulose, subgelatinous, upper surface nearly black (the colour of burnt wood). Gills radiating from a nearly lateral point, many short, moderately close, dark grey, the gills replaced in most of the plants by several distant thick-edged plates, from which cross branches pass from one to another with anastomoses so that irregular pores result. Flesh subgelatinous. Spores spherical, 6 μ . South Australia—On fallen trunk, National Park. August.

95. *Pleurotus cinerascens* Clel. (L., *cinerascens*, becoming ash-coloured or grey).—Laterally attached at the apex. Pileus up to $\frac{1}{2}$ in. (1.2 cm.), convex to cupulate, dark greyish-black, hoary round the edge, whitish and densely hoary when young. Gills radiating from an excentric point, moderately close and numerous, many short ones at the periphery, sometimes showing slight venose buttresses, grey. Flesh dark coloured, subgelatinous. Spores $6 \times 3.5 \mu$; pileus clothed with cells and processes covered with lateral wart-like projections. South Australia—National Park, August, 1927, on trunk of living *Eucalyptus viminalis* Lab.

A species evidently closely related to *P. applicatus* and *P. subapplicatus*, but characterised more particularly by the cells on the pileus, a feature not apparently recorded in *P. applicatus*, from which it also differs in the gills being moderately close and grey and in the slightly smaller spores. The shape of the spores also separates it from *P. subapplicatus*.

B. SPORES PINK OR SALMON-COLOURED. RHODOSPORAE.

(a) PILEUS DISTINCT AND EASILY SEPARABLE FROM THE FLESHY STEM.

*With a volva at the base of the stem.

VOLVARIA Fr.

(L., *volvarius*, having a volva or sheath.)

“Pileus fleshy, regular. Stem central. Volva membranaceous, free, sheathing. Gills free. Spores pink, elliptical or subglobose, smooth, continuous. Growing on the ground or on wood.”—Rea.

[Drawing by E.R.C.]

Figure 17.—*Volvaria gloiocephala*
(DC.) Fr. (No. 96). In a paddock.
Slightly reduced.

Volvaria corresponds with *Amanitopsis* in the white-spored group. Three species at least are quite large, the caps being 2 to 4 in. across, but others seem to be small and rare. The volva at the base of the stem is definite, there is no ring and the stem is readily separable from the cap. The only member of the genus we possess, *V. gloiocephala*, is not uncommon on waste land. It is said

to be very poisonous. In New South Wales another species, *V. speciosa*, also poisonous, is occasionally found and may occur in this State; it has a large whitish or grey-tinted cap, flesh-coloured or rosy gills, a large volva (cup) at the base of the stem and no ring. It is possible for both these species to be mistaken for field mushrooms, and their poisonous nature is to be noted.

96. *Volvaria gloiocephala* (DC.) Fr. (Gr., *gloios*, sticky; *kephale*, a head).—Pileus at first rather globose, then conico-convex and umbonate, finally nearly plane with a broad obtuse umbo, up to 3½ in. (8 cm.), viscid, when dry shining and finely matt at the apex, becoming finely fibrillose outwards, occasionally with white patches of the volva remaining, Light Greyish Olive (XLVI.) to Greyish Olive to Pale Smoky Grey, sometimes Clove Brown (XL). Gills close, just reaching the stem, more than ½ in. (7 mm.) deep, whitish, then light brownish vinaceous. Stem up to 6 in. (15 cm.), very slightly fibrously striate, nearly ½ in. (1 cm.) in diameter in the middle, rather expanded above, base bulbous, solid, whitish becoming faintly tinged greyish or brownish. Flesh of the pileus watery whitish-grey, of the stem white with whitish-grey at the periphery. Volva ample, free, white. Spores elliptical, 13 to 18 x 8 to 10.5 μ . Amongst dead herbage (thistles, "Salvation Jane"), etc. Reported as very poisonous. South Australia—Suburbs of Adelaide, Waterfall Gully, Happy Valley, Encounter Bay. May to July. (Figure 17.)

This species is readily recognised by its large umbonate, viscid greyish olive to clove brown cap, the gills becoming light brownish vinaceous, the long stem, the presence of a volva and the absence of a ring.

**With a ring on the stem.

ANNULARIA Schulz.

(L., *annularius*, pertaining to a signet ring.)

**Pileus fleshy, regular. Stem central. Ring large, free or adnate. Gills free. Spores pink, globose or oval, smooth, continuous. Cystidia ventricose. Growing on the ground or on wood."—Rea.

No South Australian species recorded.

***Without a ring or volva.

PLUTEUS Fr.

(L., *pluteus*, a movable pent-house.)

**Pileus fleshy, regular. Stem central. Gills free from the stem, rounded behind. Spores pink, rarely pale yellowish; globose, subglobose or elliptical; wall continuous. Cystidia on edge of gills pear-shaped or inflated clavate; on the sides of the gills fusiform or bottle-shaped and hooked at the apex. Growing on wood, more rarely on the ground."—Rea.

The species are characterised by the stem being readily separable from the pileus and by the absence of both a volva and a ring. They are soft in texture, mostly small and grow usually on wood. We have two species, one of which, *P. cervinus*, is rather large for the genus.

KEY TO THE SPECIES.

Growing on wood.

Pileus up to 3½ in., verona brown to warm sepia, with minute wart-like elevations. Stem usually curved, whitish. Spores quadrangular, 6.5 to 8 x 5 μ 97. *Pluteus cervinus*.

Pileus up to 1½ in., brown. Stem yellow. Spores 5 to 6.5 μ 98. *P. nanus* var. *lutescens*.

97. *Pluteus cervinus* (Schaeff.) Fr. (L., *cervinus*, pertaining to deer).—Pileus up to 3½ in. (8.7 cm.), convex, gibbous, sometimes with minute wart-like elevations, viscid when moist, Verona Brown to Warm Sepia (XXIX.). Gills free from the stem, moderately close, deep, Sea-shell Pink (XIV.) to Pale Pinkish Buff (XXIX.). Stem up to 2½ in. (6.2 cm.), rather stout, often curved, solid, white with a few scattered brownish fibrils. Spores in the shed mass Vinaceous (Cinnamon to Mikado Brown (XXIX.)), microscopically rather quadrilateral, pale-tinted, 6.5 to

8 x 4.8 to 5.2 μ . Cystidia prominent on the gills, ventricose, flat-topped with prongs. On stumps. South Australia—National Park, Greenhill Road. New South Wales. April, June, July.

This species growing on stumps and logs can be recognised by the brown expanded pileus, usually with minute wart-like elevations, the pinkish-buff gills, usually slightly curved stem and microscopically the slightly tinted spores and prominent cystidia. It is not very common and is reported as edible.

98. *Pluteus nanus* (Pers.) Fr. var. *lutescens* Fr. (L., *nanus*, a dwarf; *lutescens*, becoming yellow).—Pileus 1½ to 1¾ in. (3.1 to 4.4 cm.), slightly convex, then nearly plane, obscurely subumbonate, surface matt, slightly rivulose, faintly striate, near Prout's Brown, Buckthorn Brown to Cinnamon Brown (xv.). Gills just free or sometimes adnexed, moderately close, many short, ventricose, edges slightly fringed, near Warm Buff (xv.). Stem ¾ to 2 in. (1.8 to 5 cm.), slender, slightly thickened below, slightly striate, solid, fibro-cartilaginous, near Pinard Yellow (iv.) to Amber Yellow (xvi.). Flesh of pileus thin, semitranslucent greyish-brown, that of the stem yellow and separable from the pileus. Spores subspherical, slightly irregular, slightly tinted, 5 to 6.5 μ . Cystidia not seen. On rotting wood. South Australia—National Park, Kinchina. July.

(b) PILEUS CONFLUENT AND HOMOGENEOUS WITH THE FLESHY STEM.

*Gills sinuate.

ENTOLOMA Fr.

(Gr., *entos*, within; *loma*, a fringe.)

"Pileus fleshy, regular or irregular. Stem central, fibrous or fleshy. Gills sinuate, sinuato-acute or adnexed. Spores pink; angular, globose, elliptical or verrucose. Cystidia rarely present. Growing on the ground, very rarely on wood; solitary, gregarious or caespitose."—Rea.

The genus corresponds with *Trichotoma*. The spores are usually angular. A number of species in other parts of the world are known to be poisonous. As the gills tend to become rosy or salmon-coloured from the mature spores, some species might possibly be mistaken by the careless for field mushrooms. We have several species, but the plants are usually uncommon and rarely more than a few individuals are found together.

KEY TO THE SPECIES.

Pileus drab with darker crack-like reticulations. Stem with a pale smoke-grey bloom. Spores subspherical, 4.5 to 5.5 μ	99. <i>Entoloma reticulata</i> .
Pileus buffy brown, subumbonate. Stem greyish horn. Spores 8 to 9.5 x 6.5 μ	100. <i>E. muscorum</i> .
Pileus and stem white with buffy tints. Gills dingy brownish flesh-coloured, edges serrate. Spores 10 to 11 x 5 μ	101. <i>E. serrata</i> .
Pileus blackish violaceous, conico-convex. Gills pallid greyish-buff. Stem steel grey. Spores angular, 8 x 5 μ	102. <i>E. Blowamii</i> var. <i>angulata</i> .

99. *Entoloma reticulata* Clel. (L., *reticulatus*, netted).—Pileus 1 to 2 in. (2.5 to 5 cm.), convex, depressed in the centre, surface slightly shining to dull, reticulate with darker lines more or less concentrically arranged looking like cracks and passing into depressions in some specimens presenting a rimose appearance, in some specimens near the periphery numerous little irregular raised darker patches separated by paler cracks, near Drab (xlvi.), the cracks darker. Gills slightly sinuate with a tendency to a decurrent tooth, close, narrow, greyer than Pinkish Buff (xxix.). Stem ¾ in. (1.8 cm.), rather slender, striate below, stuffed or sometimes hollow above, with a greyish-brown bloom (Pale Smoke Grey, xlv.), dark brown beneath. Flesh thin, whitish. Spores subspherical pear-shaped, rather angular, slightly coloured, 4.5 to 5.5 μ . On the ground. South Australia—Mount Lofty. April.

This species may perhaps be better placed under *Clitopilus*.

100. *Entoloma muscorum* Clel. (L., *muscus*, moss).—Pileus up to 1½ in. (3.1 cm.), irregularly convex, subumbonate, matt, near Buffy Brown (XL). Gills deeply sinuately adnexed, nearly free, moderately close, ventricose, near Avel-laneous (XL). Stem 1½ in. (3.7 cm.), moderately slender, twisted, hollow, greyish-horn. Flesh greyish-horn. Spores irregularly elliptical, faintly tinted, 8 to 8.5 x 6.5 μ . No smell. Amongst moss. South Australia—Greenhill Road. August.

101. *Entoloma serrata* Clel. (L., *serratus*, toothed like a saw).—Pileus 1 in. (2.5 cm.), deeply convex, irregular, smooth, white with buffy tints above. Gills adnexed with a slight tooth, almost free, rather ascending, close, narrow, edge serrate, dingy brownish flesh-coloured. Stem 1½ in. (3.1 cm.), ¼ in. (6 mm.) thick, equal, slightly striate, solid, white with buff tints. Flesh of the stem continuous with that of the pileus. Smell quite strong. Spores oblique, one end pointed, microscopically pale yellowish, 10 to 11 x 5 μ . In swampy soil. South Australia—Mount Compass. April.

102. *Entoloma Bloxamii* Berk. var. *angulata* Clel. (After Rev. A. Bloxam, a British mycologist; L., *angulatus*, angled).—Pileus 1½ in. (4.4 cm.), broadly conico-convex with a tendency to umbonation, surface matt, blackish with a violet tint, edge pale. Gills adnexed, moderately close, 8 mm. deep, edges slightly jagged, pallid greyish buff. Stem 2½ in. (6.2 cm.), stout (1 cm. above, 1.3 cm. below), somewhat attenuated upwards, fibrillose, slightly hollow, steely grey. Flesh white, thin except over the disc, flesh of stem similar in texture to that of the pileus. Spores angular, faintly tinted, 8 x 5 μ . On bare sandy soil in heathy scrub. South Australia—Mount Burr (S.E.). May.

The Australian plant resembles in stature the species as illustrated by Cooke. The spores are, however, definitely angular and more elongated than subglobose.

**Gills decurrent or adnato-decurrent by a tooth.

CLITOPILUS Fr.

(Gr., *klitos*, a slope; *pilos*, a cap.)

“Pileus fleshy, regular or irregular. Stem central, fleshy. Gills decurrent. Spores pink; elliptical, fusiform, globose or oblong; angular, smooth or verrucose; continuous. Growing on the ground.”—Rea.

The species are terrestrial and resemble *Clitocybe* in the white-spored group; when the tint of the spores is slight, it may be difficult to decide in which genus of the two to place the species concerned. The gills when not decurrent are broadly adnate and then do not become bayed with age. We have several species, one of which, *C. subfrumentaceus*, is sometimes abundant; it is a fleshy species whose spores are definitely but not deeply tinted and so may easily be looked for in the genus *Clitocybe*.

KEY TO THE SPECIES.

Moderately large and stout.

Pileus 1½ to 4 in., pinkish cinnamon. Gills adnate to adnato-decurrent, light pinkish cinnamon. Stem to 2½ in., pallid fawn. Spores pyriform, slightly irregular, tinted, 6.5 to 9 x 4.2 to 6 μ 103. *Clitopilus sub-*

frumentaceus.

Smaller, about 1 in.

Pileus colour of dead grass. Gills decurrent, pallid salmon. Stem short, pileus appearing nearly prostrate on the ground. Spores 9.5 to 10.5 x 7.5 μ 104. *C. prostratus*.

Pileus pale brown. Gills subdecurrent, pale brownish. Stem 1 in., fibrillose, pallid. Spores 6.5 to 7 x 5.5 μ 105. *C. australiana*.

103. *Clitopilus subfrumentaceus* Clel. (*Subfrumentaceus*, in this case, resembling the species *Tricholoma frumentaceum* Bull., Fr.).—Pileus 1½ to 4 in. (3 to 10 cm.) in diameter, irregularly convex, then more expanded or with the centre depressed, often distorted, sometimes with a small umbo, subfibrillose, edge turned in when young, not shining, somewhat hygrophanous, Pinkish Cinnamon, Cinnamon, Sayal

Brown, or Mikado Brown (XXIX.) becoming paler. Gills adnate to adnato-decurrent, narrow, moderately close, edges sometimes irregularly serrate, rarely forking or anastomosing near the stem to form long narrow cells, Light Pinkish Cinnamon (XXIX.). Stem $1\frac{1}{2}$ to $2\frac{1}{2}$ in. (3.7 to 6.2 cm.) high, stout (up to $\frac{3}{4}$ in., 2.2 cm. thick), base swollen (lin., 2.5 cm., thick), sometimes a little excentric, somewhat mealy or fibrillose, solid, pale fawny or biscuity whitish or white. Flesh watery semi-translucent becoming whitish. Slight smell of radishes. Spores obliquely pear-shaped, rather irregular, definitely tinted, 6.5 to 9×4.2 to 6μ . Densely caespitose under trees or amongst grass. South Australia—Mount Lofty Range, National Park. Victoria—Ararat. April to August.

104. *Clitopilus prostratus* Clel. (*L. prostratus*, lying flat).—Pileus $\frac{3}{4}$ to 1 in. (1.8 to 2.5 cm.) in diameter, very irregular, more or less convex with the centre depressed, somewhat rugose, somewhat fibrillose, edge sometimes crinkled, colour of dead grass. Gills decurrent, moderately close, relatively deep, pallid salmon-coloured. Stem short (1 cm.), central to excentric, slender, surface matt, whitish. Spores angular with a central yellowish gutta, tinted, 9.5 to $10.5 \times 7.5 \mu$. South Australia—Nearly prostrate on bare sandy soil in heathy scrub near Mount Burr (S.E.), Encounter Bay district, Kinehina. May, June.

In Encounter Bay specimens, the flesh of the stem is noted as being cartilaginous and differing in texture from the pallid flesh of the pileus. If this is confirmed, the species should be transferred to *Eccilia*.

A small short-stemmed drab-coloured species resembling the common *Cantharellus brunneus*, but the gills are a dingy salmon colour and do not tend to fork.

105. *Clitopilus australiana* Clel. (*L. Australianus*, Australian).—Pileus $1\frac{1}{2}$ in. (3 cm.), convex, centre dimpled, pale brown. Gills slightly decurrent, close, pale brownish. Stem 1 in. (2.5 cm.), fibrillose, pallid. Spores pear-shaped, slightly angular, faintly tinted, 6.5 to $7 \times 5.5 \mu$. South Australia—National Park. July.

(c) PILEUS CONFLUENT WITH BUT HETEROGENOUS FROM THE CARTILAGINOUS STEM.

*Gills sinuate or sinuato-adenate.

Margin of pileus at first incurved or exceeding the gills.

LEPTONIA Fr.

(Gr., *leptos*, thin.)

"Pileus slightly fleshy, regular, margin incurved. Stem central, cartilaginous. Gills adnate, sinuato-adenate or adnexed. Spores pink; angular, elliptical, subglobose or oblong; continuous. Cystidia rarely present. Growing on the ground or on wood."—Rea.

The plants are usually small and slender-stemmed with an umbilicate pileus when mature and the edge of the pileus in-turned when young. The gills are adnate or adnexed, seceding when old, and their original colour in the young state becomes obscured by the salmon-tint of the spores as they mature. Our ten or more species are in no instances numerous, being found as scattered individuals in sandy soil or damp places, all on the ground. The pileus and stem are in many of our species drab, brown or blackish; in two the blackish stem has a steel-blue or violet tint giving a beautiful effect. Another elegant species is the green *L. viride-marginata*.

KEY TO THE SPECIES.

(Spores angular in all.)

Pileus not hygrophanous.

Pileus and stem green.

Pileus striate. Gills yellow becoming pinkish cinnamon, edges green. Spores 10 to 11.5

$\times 7.5 \mu$ 106. *Leptonia*
viride-marginata.

Pileus dark honey-coloured. Stem paler.

Gills "light-yellow-pallid" becoming pallid pinkish buff. Spores $10 \times 6 \mu$ 107. *L. formosa*.

Pileus dull white.

Stem brown, paler above. Gills whitish.

Spores $6.5 \times 3.2 \mu$ 108. *L. albida*.

- Pileus pallid brown tinted with pink.
 Stem whitish. Gills pallid salmon with pink.
 Spores 11 to 16 x 8 μ 109. *L. macrospora*.
- Pileus snuff brown.
 Stem dark-brown. Gills greyer than pinkish
 cinnamon. Spores 6.5 μ 110. *L. tabacina*.
- Pileus darker and greyer than drab.
 Stem pale drab, rooting. Gills salmony drab.
 Spores 7.5 x 5.5 μ 111. *L. radicata*.
- Pileus dark brown to fuscous.
 Stem dusky drab. Gills vinaceous buff.
 Spores 11 to 13 x 7.5 μ 112. *L. fusca*.
- Pileus blackish. Stem blackish with steel blue tints.
 Gills whitish cinereous, edges not dark. Spores
 9 to 10 x 5.5 μ 113. *L. lampropus*.
- Gills mouse grey, edges dark. Spores 11 x
 7.5 μ 114. *L. fusco-marginata*.
- Pileus hygrophanous.
 Pileus colour of dead grass.
 Stem dingy greyish green. Gills pallid
 salmon. Spores 8 to 9 x 5.5 to 7.5 μ . . 115. *L. asprella* ?

*Not truly hygrophanous or markedly striate.

106. **Leptonia viride-marginata** Clel. (*L. viridis*, green; *marginatus*, edged).—Pileus $\frac{1}{2}$ in. (18 mm.), slightly convex with the centre dimpled, clad with small fibrillose scales, edge slightly sulcate, dark green (near Dusky Olive Green, xli.). Gills slightly sinuate with a decurrent tooth, moderately distant, alternate ones short, of a Light Pinkish Cinnamon (xli.) tint passing into dark green which edges the gills. Stem $2\frac{1}{2}$ in. (6.2 cm.), slender, flexuous, twisted, shining, finely punctate above, rather tough, flesh heterogenous from that of the pileus, hollow, dark green. Shed spores of salmony tint, microscopically angular pear-shaped, 11 to 11.5 x 7.5 μ , cystidia not seen. On the ground. South Australia—Mount Lofty. June.

Specimens, apparently of this species but lacking the green edge to the gills which were serrulate, have been found in sandy soil in *Eucalyptus cosmophylla* scrub at Hall's Creek, Encounter Bay, in May. The pileus was $\frac{1}{2}$ to $\frac{3}{4}$ in. (1.2 to 1.8 cm.), umbilicate, striate, velutinate when young, becoming finely fibrillose, Yellowish Oil Green (v.), Roman Green (xvi.), near Olive Lake and Dull Citrine (xvi.), or Olive Ochre (xxx.). Gills adnate or slightly sinuate with a tendency to a decurrent tooth, moderately close, relatively rather deep (up to 5 mm.), near Naphthalene Yellow (xvi.) to paler than Maize Yellow (iv.). Stem 1 in. (2.5 cm.) or less, equal or slightly attenuated downwards, polished. Flesh of the pileus very thin. Spores angular, with a large gutta, slightly tinted, 10 x 7.5 μ .

107. **Leptonia formosa** Fr. (*L. formosus*, beautiful).—Pileus $\frac{1}{2}$ to $\frac{3}{4}$ in. (1.2 to 1.8 cm.), convex to nearly plane, umbilicate, fibrillose, sometimes scaly in the centre, dark yellow-brown (dark honey-coloured). Gills adnate or with a decurrent tooth, moderately close, pallid pinkish buff. Stem 1 in. (2.5 cm.), slender, polished, brittle, with cartilaginous cortex and pith similar to the flesh of the pileus, colour more pallid than that of the pileus. Spores angular, tinted, 10 x 6 μ . Single or several together, in sandy soil or heath. South Australia—Near Mount Burr (S.E.). May.

The species is characterised by the "yellow cast to the whole plant and the striate and squamulose pileus" (Kauffmann). The gills in the early stage are "light-yellow-pallid" (Rea). Striation of the pileus and the yellow tinge of the gills were not noted in the specimens we refer to this species.

108. **Leptonia albida** Clel. (*L. albidus*, whitish).—Pileus up to $\frac{3}{4}$ in. (1.8 cm.), slightly irregularly convex, then plane and a little depressed, subumbonate, dull white. Gills adnate or very slightly sinuate, moderately close, whitish. Stem $\frac{3}{4}$ in. (1.8 cm.), slender, slightly attenuated downwards, stuffed tending to be hollow, cartilaginous, brown below tending to become dark, whitish just below the gills. Spores subspherical, angular, slightly tinted, 6.5 x 3.2 μ , 4.8 μ . Cystidia not seen. South Australia—On the ground amongst dead sticks, Kinchina. July.

109. *Leptonia macrospora* Clel. (Gr., *makros*, long; *spora*, seed).—Pileus up to 1 in. (2.5 cm.), convex, dimpled, then becoming irregular and umbilicate, surface rather dull, somewhat matt, edge rather crenate and turned in when young, pallid brownish with a pink tinge. Gills adnate to adnato-decurrent, moderately close, rather triangular, pallid salmony pink. Stem up to 1 in. (2.5 cm.), slender to rather stout, rather silky, sometimes twisted, rather cartilaginous, slightly hollow, whitish with fluffy mycelium at the base. Spore mass pinkish, spores angular, microscopically slightly coloured, 11 to 16 x 8 μ . Cystidia not seen. Amongst moss. South Australia—Port Lincoln. May.

110. *Leptonia tabacina* Clel. (*Tabacinus*, snuff-coloured).—Pileus $\frac{3}{4}$ to 1 in. (1.8 to 2.5 cm.), convex, umbilicate, somewhat fibrillose, edge substriate, Snuff Brown (XXIX.), paler or darker in the centre. Gills adnexed, nearly free, moderately close, ventricose, greyer than Light Pinkish Cinnamon (XXIX.) becoming dingier and browner. Stem 1½ in. (3.7 cm.), slender, slightly attenuated upwards, polished, cartilaginous, with pith and slightly hollow, dark brown (Bister, XXIX.) or Buffy Brown (XL.), paler below the pileus. Flesh of the stem heterogeneous from that of the pileus. Spores angular, slightly tinted, 6.5 μ , 7.5 to 8 x 5.5 μ . No cystidia seen. On the ground. South Australia—Stirling West, Mount Lofty, Eagle-on-the-Hill. June, July.

111. *Leptonia radicata* Clel. (L., *radicatus*, rooting).—Pileus up to 1 in. (2.5 cm.), irregularly convex, centre deeply umbilicated, subfibrillose, edge sometimes infolded, darker and greyer than Drab (XLVI.). Gills slightly decurrent, edges a little thick, many short ones at the periphery, drab with a salmon-coloured shade. Stem ¾ in. (1.8 cm.), moderately slender, fibrillose, mealy above, solid, a little paler and greyer than the pileus, with a long tapering root (¾ in., 1.8 cm., long). Flesh of pileus pallid, of the stem browner, peripheral flesh of the stem more cartilaginous than the flesh of the pileus. Spores pear-shaped, very slightly irregular, very faintly tinted, 7.5 to 8 x 5 to 5.5 μ . On the ground. South Australia—Kinchina. August.

112. *Leptonia fusca* Clel. (L., *fuscus*, dusky brown).—Pileus $\frac{3}{4}$ to 1½ in. (1.8 to 3.2 cm.), convex, umbilicate, radiately fibrillose, between Natal Brown and Bone Brown (XL.), near Fuscous (XLVI.). Gills sinuately adnexed, moderately close, up to 5 mm. deep, edges not dark, near Vinaceous Buff (XL.) or Wood Brown (XL.). Stem 1½ in. (3.1 cm.), slender, sometimes flattened, polished, brittle, hollow, cartilaginous, near Dusky Drab (XLV.) and Deep Quaker Drab (LL.), base whitish. Flesh very thin. Spores angular, tinted, 11 to 13 x 7.5 μ , occasionally to 15 x 8.5 μ . Single or subcaespitose, on the ground. South Australia—Encounter Bay, Kuitpo, MacDonnell Bay (S.E.), near Mount Burr (S.E.). May, June.

Characterised by the dark dusky brown pileus and stem, whitish base to the stem, vinaceous buff gills and rather large angular spores.

113. *Leptonia lampropus* Fr. (Gr., *lampros*, bright; *pous*, a foot).—Pileus under ½ in. to 1 in. (1 to 2.5 cm.), convex, umbilicate, very finely fibrillose, edge slightly inturned, dark brown nearly black. Gills adnate to sinuately adnexed, moderately close, greyish-flesh, near Light Pinkish Grey (LIII.) or Vinaceous Buff (XL.) becoming darker. Stem 1 to 2 in. (2.5 to 5 cm.), slender, slightly attenuated upwards, hollow, cartilaginous, steel-blue-violaceous (near Purplish Gray, LIII., Pale Neutral Gray, LIII.) with white mycelium at the base. Spores elliptical, angular, slightly tinted, 9 to 12.5 x 5.5 to 7.5 μ . On the ground. South Australia—National Park, Kuitpo, Encounter Bay, near Mount Burr (S.E.). May, June.

114. *Leptonia fusco-marginata* Clel. (L., *fuscus*, dusky; *marginatus*, edged).—Pileus 1 to 1½ in. (2.5 to 3.7 cm.), slightly convex to nearly plane, umbilicate in the centre, sometimes slightly infundibuliform, somewhat fibrillose, striate-rugose, edge sometimes crenulate, near Blackish Brown (XLV.). Gills sinuately adnexed, narrow, moderately close, near Light Cinnamon Drab (XLVI.), edges dark. Stem 1½ in. (3.7 cm.), slender, polished, base a little swollen and with a trace of white, blackish brown with a violet or steel-blue tint. Flesh very thin. Spores angular, tinted, 9.5 x 7 μ . On the ground. South Australia—Back Valley near Encounter Bay. May.

Characterised by the nearly black cap, the dark edge to the gills and the blackish stem with a violet tint.

**Pileus hygrophanous, margin striate when fresh and moist.

115. *Leptonia asprella* Fr.? (L., *asprellus*, somewhat rough).—Pileus 1in. (2.5 cm.), convex, depressed in the centre, slightly fibrillose, silky shining and livid grey or the colour of dead grass when dry. Gills adnexed or sinuate, then seceding, ventricose, pallid salmon. Stem $1\frac{1}{2}$ to $3\frac{1}{2}$ in. (3.7 to 8.7 cm.), polished, subfibrillose or slightly striate, hollow. Drab (XLVI.) or pallid dingy greyish-green. Flesh very thin. Spores pear-shaped, polygonal, slightly tinted, 8 to 9 x 5.5 to 7.5 μ . On the ground in debris. South Australia—Mount Lofty. April, June.

The description of our plants does not agree closely with that of the British species given by Rea. As our plants appear to be hygrophanous, though this is not specially mentioned in the notes, and Kauffmann refers to the variability of *L. asprella* and described a variety resembling our species, we place them provisionally under this name.

Margin of pileus straight, at first adpressed to the stem.

NOLANEA Fr.

(L., *nola*, a bell.)

"Pileus fleshy or submembranaceous, regular; margin straight, at first adpressed to the stem. Stem central, cartilaginous. Gills adnate, adnexed or sinuato-adnate. Spores pink; angular, elliptical or globose; smooth or rough; continuous. Growing on the ground, rarely on wood; solitary or gregarious."—Rea.

The species are small and slender with a bell-shaped or conico-campanulate pileus which does not expand, the edge not being in-turned when young but the margin straight on the stem. Only one species has been recognised in this State but several others probably occur, though rarely.

116. *Nolanea pascua* (Pers.) Fr. (L., *pascuus*, of pasture).—Pileus 1in. (2.5 cm.), conico-campanulate, papillate, hygrophanous, when dry silky smoky grey. Gills adnexed, ascending, dirty rosy grey. Stem 2in. (5 cm.), slender, slightly striate, hollow, cartilaginous, greyish-brown, whitish at the base. Spores angular, slightly tinted, 9.5 x 6.5 to 8 μ . No cystidia seen. On the ground. South Australia—Kinchina. July.

**Gills decurrent.

ECCILIA Fr.

(Gr., *enkolilos*, hollowed out.)

"Pileus fleshy or submembranaceous, umbilicate; margin incurved. Stem central, cartilaginous. Gills decurrent. Spores pink, angular, continuous. Cystidia rarely present. Growing on the ground, rarely on wood."—Rea.

The plants of this genus are small and slender and correspond to *Omphalia* in the white-spored species. The gills are decurrent and the flesh of the cartilaginous stem differs in texture from that of the cap. No species have been recognised as yet with us, though *Clitopilus prostratus* should perhaps be transferred to *Eccilia*.

(d) PILEUS CONFLUENT WITH THE EXCENTRIC OR LATERAL STEM OR DIMIDIATE, SESSILE OR RESUPINATE.

CLAUDOPUS W. G. Sm.

(L., *claudus*, lame; Gr., *pous*, a foot.)

"Pileus fleshy, excentric, lateral or resupinate. Stem lateral or none. Gills radiating from a central point or decurrent. Spores pink; elliptical, globose or oblong; smooth, angular or verrucose; continuous. Cystidia present. Growing on wood or on the ground."—Rea.

The genus can be recognised by the pink spores and by the stem when present being excentric or lateral or by the pileus being resupinate with the gills radiating from an excentric or lateral point. The variety of *C. variabilis* is not uncommon with us, attached to sticks, etc., or even growing on the scanty soil attached to the exposed surfaces of loose stones.

117. *Claudopus variabilis* (Pers.) W. G. Sm. var. *sphaerosporus* Pat. (L., *variabilis*, variable. Gr., *sphaîra*, a ball; *spora*, seed).—Pileus up to $\frac{1}{2}$ in. (1.2 cm.), convex to nearly plane, sometimes irregular, more or less flabelliform, matt or somewhat villous to floccose, edge slightly incurved, whitish, sometimes with tinges of yellow-brown. Gills moderately close, many short, adnate or slightly decurrent, radiating from a slightly fluffy lateral attachment, whitish with a faint salmon tint or pale cream, becoming pale brownish (near Sayal Brown, XXIX.). Sometimes with a nearly lateral, very short and hardly existent, whitish stem. Spores microscopically pale-tinted to pallid brownish, elliptical, oblique, 6.8 to 8 x 4.2 to 5.2 μ . On logs, fallen sticks, inside a burnt hollow stump, etc. South Australia—Mount Lofly, in one case attached round a stone; Mount Compass; Port Lincoln. New South Wales. Victoria. May, June.

C. SPORES GREEN. CHLOROSPORAE.

No green-spored agarics have yet been recorded for Australia.

(a) PILEUS DISTINCT FROM AND EASILY SEPARABLE FROM THE FLESHY STEM.

*With a ring on the stem but no volva.

CHLOROPHYLLUM Mass.

(Gr., *chloros*, pale green; *phylon*, a leaf.)

Like *Lepiota* and *Psalliota* with a ring and no volva, but with the spores blue-green.

No Australian species recorded.

**Without a ring or volva.

GLAUCOSPORA Rea.

(*Chlorospora* Mass.)

(Gr., *glaukos*, pale green, bluish-green; *spora*, a seed.)

“Pileus fleshy, regular; margin at first incurved. Gills free from the stem. Spores bluish-green, elliptical, wall continuous. Growing on the ground.”—Rea.

No Australian species recorded.

D. SPORES BROWN. OCHROSPORAE.

(a) PILEUS DISTINCT FROM AND EASILY SEPARABLE FROM THE FLESHY STEM.

*With a volva at the base of the stem but no ring.

LOCELLINIA Gill (ACETABULARIA Berk.).

(L., *locellus*, a casket.)

“Pileus fleshy, regular. Stem central, thin. Volva membranaceous, sheathing. Gills free or adnate. Spores ochraceous or somewhat fuscous, oval or oblong, smooth, continuous. Cystidia ventricose, pointed. Growing on the ground.”—Rea.

No South Australian species recorded.

**Without a ring or a volva.

PLUTEOLUS Fr.

(L., *pluteolus*, a little pent-house.)

“Pileus fleshy, very thin, viscid; margin at first straight, adpressed to the stem. Stem central, subcartilaginous. Gills free, rounded behind. Spores ochraceous, ferruginous or ochraceous brown; elliptical, smooth. Cystidia obpyriform or ventricose. Usually growing on wood.”—Rea.

These are thin-capped putrescent fungi with free gills, viscid pileus and separable stem, differing from *Bolbitius* in that the gills do not tend to soften and dissolve in wet weather but nevertheless sometimes united with *Bolbitius*. In *Galera*, the stem is not truly separable, the cap is not viscid and the gills are attached. Only one species has been recognised in South Australia and that, from its habitat, is probably an introduced one.

118. *Pluteolus coprophilus* Peck. (Gr., *kopros*, dung; *philos*, loving).—Pileus 1 in. (2.5 cm.) or more in diameter, at first ovate, then conico-campanulate, finally upturned, striate, whitish, with a slight pale pinkish-buff or yellowish tint. Gills just free, ascending, moderately close, pallid watery brown. Stem 1½ in. (4.4 cm.), moderately slender, slightly attenuated upwards, fibrillose then mealy, hollow, whitish. Flesh with a trace of yellow. Spores elliptical, yellow brown, 10.5 to 13 x 8 μ . Subcaespitose on manure. South Australia—Mental Hospital, Parkside, July.

(b) PILEUS CONFLUENT AND HOMOGENEOUS WITH THE FLESHY STEM.

*With a membranaceous ring on the stem.

Spores ferruginous; general veil persistent.

ROZITES Karst.

(After E. Roze, a French mycologist.)

"Pileus fleshy, regular, clad with a thin general veil. Stem central, fleshy. Ring membranaceous. Gills adnate. Spores ferruginous. Growing on the ground."—Rea.

119. *Rozites australiensis* Clel. et Cheel. (L., *Australiensis*, Australian).—When young subglobose or pear-shaped, 3 to 7 in. (7.5 to 17.5 cm.) with a thick stem clad with ragged fragments of the universal veil and with a conical root, a secondary veil present, viscid when moist, pure white or with a slight brownish tint. Pileus when adult up to 11 in. (27.5 cm.) in diameter, sometimes only 2 or 3 in. (5 to 7.5 cm.), expanding to convex and then nearly plane and usually broadly subumbonate, sometimes with a depression in the umbo, smooth, sometimes cracking, with fragments of the veil at the edge, white with a slight brownish tint. Gills when young pale straw colour and adnate, finally slightly sinuate and nearly or seemingly free or seemingly decurrent on the stem, moderately close, rather narrow (up to 8 mm.), pale salmony-brown becoming more cinnamon, finally rich rusty brown (Ochraceous Tawny, xv.). Stem when adult up to 6 in. (15 cm.), 1½ to 2½ in. (3.7 to 6.2 cm.) thick, often much less than these measurements, becoming bulbous below and then contracting into a conical root, slightly fibrillose, solid, white with large ragged fragments of a rather superior or sub-distant ring or with a marked membranous ring more than ½ in. (1.2 cm.) deep, and below this often the remains of the universal veil. Flesh thick, tough, white. No smell. Spores in the mass rich ferruginous brown, microscopically yellow-brown, oblique with pointed ends, 8.5 to 12.8 x 5 to 7.2 μ . Attached to white mycelial threads traversing the ground and forming indefinite masses. South Australia—Mount Lofty, National Park, Kuitpo, Ashton near Norton's Summit. New South Wales. April, May, July.

Spores ochraceous or ferruginous, generally smooth; general veil none or fugacious.

PHOLIOTA Fr.

(Gr., *pholis*, a scale; *ous*, *otos*, the ear.)

"Pileus fleshy, regular. Stem central. Ring membranaceous, persistent or fugacious, superior or inferior. Gills adnate or decurrent with a tooth. Spores ochraceous or ferruginous, rarely fuscous; elliptical, oval, obovate, subreniform or oblong elliptical; generally smooth, continuous or with a germ-spore. Growing on the ground or on wood, often caespitose."—Rea.

The genus is characterised by the brown spores, by the possession of a ring derived from the partial veil, by the stem being continuous with the pileus, the absence of a volva and the attached gills. Some grow on the ground, some on wood or even on the trunks of growing trees. In size, the species vary from rather small to large.

Only a few species have been recorded for this State. *Pholiota praecox*, a species eaten in the United States, grows on lawns and may not be recognised at first as belonging to this genus on account of the ring soon becoming indefinite. *Pholiota adiposa*, a handsome large species with a scaly pileus grows on the trunks of timber trees and is a destructive species; it has not been recorded from South Australia, but occurs in the Blue Mountains in New South Wales.

KEY TO THE SPECIES.

Growing on the ground, not adnate to mosses, rarely caespitose..

Pileus viscid when moist.

On lawns and grassy places.

In early autumn. Pileus 1 to 1½ in., cream to warm buff. Gills at first pallid. Ring evanescent. Spores 9 to 15 x 7 to 9 μ 120. *Pholiota praecox*.

In forest.

Pileus ¾ in., striate, yellow-brown. Gills adnate, rusty cinnamon. Stem fibrillose. Ring superior, slightly coloured. Spores 8 to 8.5 x 5.5 μ 121. *Ph. subtogularis*.

Pileus not viscid, hygrophanous.

Edge of pileus striate.

Gills finely serrate.

Ring pallid, superior. Pileus to 1¾ in., convex, sometimes subumbonate, verona brown to tawny, drying buff. Gills adnate. Spores 6.5 to 9.5 x 4 to 6 μ 122. *Ph. serrulata*.

Gills not serrate.

Ring marked, yellowish-brown. Pileus to ¾ in., mineral brown. Gills adnexed to adnate, yellowish-cinnamon. Spores 9 to 13.8 x 6 to 7 μ . 123. *Ph. recondens*.

Edge of pileus not or rarely striate.

Knug evident.

Amongst grass. Pileus ½ to ¾ in., convex. Gills adnate with decurrent tooth, ferruginous. Stem pallid brown, striate, base swollen, with whitish mycelium. Spores 6.5 to 8 x 4 to 5 μ 124. *Ph. graminum*.

In open forest or scrub. Pileus to 1½ in., maroon when moist to russet or tawny when dry. Gills adnate. Stem Kaiser brown. Ring pallid. Spores 7.5 to 10.5 x 4.5 to 5.5 μ . 125. *Ph. rufo-flava*.

Ring often indefinite, pallid. On bare ground or under trees.

Pileus usually subumbonate, yellowish-brown drying pallid. Gills adnate, reddish brown. Stem pallid to reddish brown. Spores 7.5 to 9.5 x 4.5 to 5 μ 126. *Ph. imperfecta*.

Growing on or near wood.

Densely caespitose near stumps.

Pileus to 3 in., raw sienna to empire yellow. Gills umber. Stem shaggy, deep colonial buff. Spores 7.5 x 4 to 4.5 μ 127. *Ph. squarrosipes*.

Single or few together on logs, chips, etc.

Hygrophanous.

Pileus 1½ in., reddish-brown drying cinnamon buff. Gills adnate becoming rusty. Stem pallid brown with white mycelial base. Spores 8.5 x 4.8 μ 128. *Ph. eriogetus*.

Pileus $\frac{3}{4}$ in., edge striate, convex to nearly plane, antique brown to cinnamon brown.

Gills adnate to adnexed, tawny. Spores 7

to 9.5×4.8 to 5μ 129. *Ph. marginata*.

Growing amongst mosses.

Pileus $\frac{1}{2}$ to 1 in., hygrophanous, Sudan brown

drying tawny olive. Gills adnate to subdecurrent,

watery brown. Ring subdistant, whitish. Stem

pallid. Spores 7.5 to 9.5×5.5 to 7μ . . . 130. *Ph. subpumila*.

1. Growing on the ground, not adnate to mosses, rarely caespitose.

120. *Pholiota praecox* (Pers.) Fr. (L., *praeceox*, early).—Pileus 1 to $1\frac{1}{2}$ in. (2.5 to 3.7 cm.), at first nearly hemispherical, then convex, sometimes a little irregular, sticky when moist, smooth, edge at first inturned, then with appendiculate remains of the veil, when young near Tawny Olive (xxix.), when adult Cream Colour (xvi.), Cream Buff (xxx.) to near Naples Yellow (xvi.), when old near Warm Buff (xv.). Gills sinuately adnexed, moderately close, narrow, edges finely serrate, at first whitish, then pallid greyish brown, then Drab (xixvi.) to Saccardo's Umber (xxix.), finally browner than Buffy Brown (xl.) or Warm Sepia (xxix.) or Brussell's Brown (iii.). Stem $1\frac{1}{4}$ to $1\frac{1}{2}$ in. (3.1 to 4.3 cm.), sometimes excentric or deformed, equal or slightly attenuated downwards, striate, slightly hollow, whitish. Spore mass near Argus Brown (iii.), spores obliquely elliptical, fuscous brown or olive brown, 9 to 15×7 to 9μ . Smell a little strong. South Australia—Lawn at the University. February, April.

121. *Pholiota subtogularis* Clel. (*Subtogularis*, here close to the species *Ph. togularis* Bull., Fr.).—Pileus $\frac{3}{4}$ in. (1.5 cm.), convex, sometimes slightly umbonate, edge striate, viscid when moist, when dry between Ochraceous Buff and Antimony Yellow (xv.). Gills adnate, moderately close, pallid yellowish brown becoming rusty cinnamon. Stem $1\frac{1}{4}$ to $1\frac{1}{2}$ in. (3 to 4 cm.), slender, slightly flexuous, fibrillose up to the superior slightly yellowish brown ring, slightly hollow, pale brownish. Flesh thin, brownish. Spores elliptical, one end more pointed, yellow-brown, 8 to $8.5 \times 5.5 \mu$. On the ground. South Australia—Amongst pine needles in *Pinus radiata* Don. forest, Mount Burr (S.E.).

The species is characterised by its ground habit, the yellow brown, viscid, striate pileus, the superior slightly coloured ring and the fibrillose stem.

122. *Pholiota serrulata* Clel. (L., *serrulatus*, toothed like a little saw).—Pileus $\frac{3}{4}$ to $1\frac{1}{2}$ in. (1.8 to 4.3 cm.), conico-convex to convex, sometimes dimpled, sometimes umbonate, markedly hygrophanous, edge striate when moist, surface mealy-looking when dry, when young near Vandyke Brown (xxviii.), when adult and moist near Verona Brown (xxix.), near Argus Brown (iii.) or between Tawny and Ochraceous Tawny (xv.), when dry Pinkish Buff, Pale Pinkish Buff, Ochraceous Buff or Light Ochraceous Buff (xv.). Gills adnate or with a tendency to decurrence, rather close, narrow (3 mm.), edges finely serrate, more tawny than Hazel (xiv.) to more tawny than Auburn (ii.), near Kaiser Brown (xiv.), Ochraceous Tawny (xv.) or near Argus Brown (iii.). Stem $\frac{3}{4}$ to $1\frac{1}{2}$ in. (1.8 to 3.7 cm.), slender (up to 3.5 mm. thick), nearly equal, solid, whitish fibrillose below the superior subdistant flimsy whitish ring, tinted like the gills beneath the whitish fibrils, whitish at the base. Flesh of the pileus thin and whitish, of the stem concolorous. Spores elliptical, with one side flattened, yellowish-brown, 6.5 to 9.5×4 to 6μ . On the ground, usually in sandy loam. South Australia—In stringy bark (*Eucalyptus obliqua* L'Herit.) forest, National Park; Mount Lofty, Mylor, Encounter Bay, Port Lincoln. April, May.

123. *Pholiota recedens* Cke. et Mass. (L., *recedens*, retiring).—Pileus $\frac{1}{2}$ to $\frac{3}{4}$ in. (1.2 to 2.1 cm.), convex and slightly conical or hemispherical, when young with fine pale yellowish-brown furfuraceous scales from the veil, slightly hygrophanous, when moist very dark brown (mineral brown) and the edge slightly striate, paler brown when dry. Gills adnexed or adnate, moderately distant, pallid brown, then pale yellowish-cinnamon to hazel. Stem $1\frac{1}{4}$ to 2 in. (3.1 to 5 cm.), striate, hollow, brownish. Ring marked, reflexed, striate above, moderately distant, yellowish-buff. Flesh brownish. Spores oblique, with pointed ends, 9 to 13.8×6 to 7μ . On the ground. South Australia—Mount Lofty. New South Wales. May, June, August.

124. *Pholiota graminum* Clel. (*L. graminum*, of grasses).—Pileus $\frac{1}{2}$ to $\frac{3}{4}$ in. (1.2 to 1.8 cm.), convex or nearly hemispherical to nearly plane, not striate, sometimes subumbonate, hygrophanous, reddish-brown becoming pallid, when young sometimes with a white edging from the veil. Gills adnate or with a decurrent tooth, close, falling short of the edge, ferruginous, at first paler. Stem $1\frac{1}{2}$ to $1\frac{3}{4}$ in. (3.7 to 4.3 cm.), striate, slightly swollen below, hollow, pallid brownish, whitish from mycelial threads at the base. Ring subsuperior, membranaceous, evident or rather evanescent. Amongst or attached to grass with whitish mycelium, sometimes subcaespitose. Spores oblique, brown, 6.5 to 8 x 4 to 5 μ . South Australia—Kinchina, Adelaide. July, September.

The habitat (amongst grass), the reddish-brown pileus becoming pale, the usually evident ring, and the whitish mycelium round the base are the chief characteristics of the species.

125. *Pholiota rufo-fulva* Clel. (*L. rufus*, reddish-yellow; *fulvus*, deep yellow, tawny).—Pileus up to $1\frac{1}{2}$ in. (3.7 cm.), at first conico-convex, then convex or irregularly convexo-plane, minutely fibrillose becoming subfloccose to velvety, usually not striate, edge a little turned in when young, darker than Pecan Brown (XXVII.) to Russet (xv.), Liver Brown (xiv.), when old becoming Tawny (xv.), when moist very dark maroon-brown. Gills adnate, close or a little distant, deep (up to $\frac{1}{2}$ in., 8 mm.), somewhat ventricose, with short ones at the periphery, of the colour of the pileus becoming more cinnamon, Argus Brown (iii.) or near Chestnut Brown (ii.). Stem up to $1\frac{1}{4}$ in. (3.4 cm.), moderately slender, fibrillose, solid, when moist Kaiser Brown to Carob (xiv.), or near Vinaceous Fawn (xl.), drying pallid with tints of the pileus, sometimes with white mycelium at the base. Veil white, definite when young, rupturing to leave a decided whitish or pallid superior ring. Flesh brownish. Single or subcaespitose, often on sandy soil, the type at the base of Eucalypts. Spores yellow-brown, obliquely elliptical, 7.5 to 10.5 x 4 to 5.5 μ , hyphae of subhymenial layer large. South Australia—Burnside, Mount Lofty, National Park, Happy Valley, Kinchina, Encounter Bay, Mount Remarkable. April to September.

Plants of this species are characterised by the dark maroon-brown cap becoming russet to tawny when dry, the gills at first like the cap becoming brownish cinnamon, the brown stem and whitish ring.

126. *Pholiota imperfecta* Clel. (*L. imperfectus*, imperfect, in reference to the ring).—Pileus $\frac{1}{2}$ to $\frac{3}{4}$ in. (1.2 to 1.8 cm.), convex, then nearly plane, usually subumbonate, sometimes with the edge substriate, hygrophanous, waxy dull yellowish-brown drying to pallid brownish (near Sayal Brown, xxix.) from the centre. Gills adnate, moderately close, many short, reddish-brown to ferruginous cinnamon. Stem 1 in. (2.5 cm.), slender, solid or hollow, fibrillose, pallid to reddish-brown. Ring superior to rather distant, imperfect, whitish. Spores oblique, rather narrow, with one end acute, 7.5 to 9.5 x 4.5 to 5 μ . On the ground, often on bare ground, near trees, etc. South Australia—Second Valley Forest Reserve, Beaumont Common, MacLaren Vale. May, June.

II. Growing on wood, frequently caespitose.

127. *Pholiota squarrosipes* Clel. (*L. squarrosus*, seamy; *pes*, a foot).—Densely caespitose or sometimes solitary on the ground near *Eucalyptus* stumps. Pilei $\frac{3}{4}$ to 3 in. (1.8 to 7.5 cm.) in diameter, deeply to irregularly convex, depressed in places, sometimes subumbonate or broadly umbonate, viscid when moist, nearly smooth, sometimes fibrillose, shining when dry, Raw Sienna (iii.), Ochraceous Tawny or Tawny (xv.) in the centre, Empire Yellow (iv.) or near Antimony Yellow (xv.) round the edge, where injured with reddish marks. Gills at first closed with the veil, adnate or with a decurrent tooth, moderately close, rather narrow, near Saccardo's Umber (xxix.), Yellow Ochre becoming Buckthorn Brown (xv.), in some lights Honey Yellow to Isabella Color (xxx.). Stems $1\frac{1}{2}$ to $3\frac{1}{4}$ in. (3.7 to 8 cm.), slender to moderately stout (5 to 12 mm. thick), slightly attenuated downwards, shaggy with fibrillose scales from the veil to just below the gills, then slightly fibrillose, solid, near Deep Colonial Buff (xxx.) or Antimony Yellow (xv.). Ring present only when young. Flesh of pilei whitish, of stems pale yellowish. White mycelium in the ground around. No taste, smell slight. Spore mass near Saccardo's Umber (xxix.), spores elliptical, oblique, microscopically pale fuscous brown, 6.5 to 8 x 4 to 4.5 μ . South Australia—Encounter Bay, Upper Tunkatilla Creek. May, June.

128. *Pholiota eriogena* Fr. (Gr., *erion*, wool; *genos*, descent, offspring—evidently in reference to the woolly base of the stem).—Pileus 1½ in. (3.1 cm.), deeply convex, smooth, hygrophanous, reddish-brown when moist, Cinnamon Buff (XXIX.) when dry. Gills adnate, attenuated outwards, 8 mm. deep, Sayal Brown (XXIX.) becoming rusty. Stem 1½ in. (3.7 cm.), rather slender, equal, fibrillose-striate, slightly excavated, pallid brownish with white mycelium at the base. Ring moderately superior, brownish. Spores obliquely elliptical, yellowish-brown, 8.5 x 4.8 μ . On wood. South Australia—Mount Burr Forest (S.E.). Western Australia. May.

These South Australian plants we refer to this species described by Fries in "Plantae Preissianae in Australasia coll." In Cooke's "Handbook of Australian Fungi," the pileus is given as ferruginous, the stem as fistulose and girt at the base with a densely woolly mycelium, and the gills as cinnamon. There is obviously doubt as to whether this determination is correct. The white mycelium at the base is hardly "densely woolly" in the South Australian specimens.

129. *Pholiota marginata* (Batsch) Fr. (L., *marginatus*, furnished with a border).—Pileus ¾ in. (1.8 cm.), convex to nearly plane, edge slightly striate, hygrophanous, when moist Antique Brown (III.) to near Cinnamon Brown (XV.), becoming pallid. Gills adnate to adnexed, moderately close, slightly ventricose, many short ones, near Tawny Olive (XXIX.) to Ochraceous Tawny (XV.). Stem 1¼ to 1½ in. (3.1 to 3.7 cm.), fibrillose, fluffy at the base, mealy above, slightly hollow, pallid streaked with brown above, pallid whitish below. Ring superior to median, marked, membranous, rather flimsy, pallid brownish. Spores oblique, yellowish-brown, 7 to 9.5 x 4.8 to 5 μ . On the ground attached to buried chips, etc. South Australia—Mount Lofty. June, August.

III. Growing amongst mosses. Hygrophanous.

130. *Pholiota subpumila* Clé. (L., *pumilus*, dwarf; *sub*, in this sense, somewhat like *P. pumila* Fr.).—Pileus ¾ to 1½ in. (15 to 28 mm.), convex then becoming flattened or a little depressed, umbonate when young, sometimes a little wavy, hygrophanous, shining waxy-looking, near Sudan Brown (III.), drying to Tawny Olive (XXIX.). Gills adnate or slightly decurrent, rather triangular, rather close, watery brown. Stem 1½ to 3 in. (3.7 to 7.5 cm.), equal or slightly attenuated upwards, fibrillose, white or with a slight tinge of the colour of the pileus. Ring subdistant, whitish, sometimes not marked. Spore mass fuscous brown, spores microscopically oval, oblique, yellow-brown, 7.5 to 9.5 x 5.5 to 7 μ . Growing amongst moss. South Australia—Greenhill Road, Eagle-on-the-Hill, Waterfall Gully, Coromandel Valley, near Clarendon. June.

Closely related to *Ph. pumila* Fr., but larger, stem paler, gills browner and spores a little larger.

**With an arachnoid or filamentous general veil.

1. Veil forming an arachnoid, fugacious ring on the stem.

CORTINARIUS Fr.

(L., *cortina*, a veil.)

"Pileus fleshy, regular. Veil arachnoid, distinct from the pellicle of the pileus, viscid or dry. Stem central. Gills adnate, sinuate, sinuato-adenate, or decurrent, pulverulent with the spores at maturity. Spores ochraceous, citron-yellow, golden, clay colour, cinnamon, ferruginous, tawny or fuscous; oval, elliptical, pip-shaped, oblong elliptical, almond-shaped or fusiform; smooth, verrucose, granular, aculeolate or echinulate, continuous. Cystidia rarely on the surface of the gills or on the edge. Growing on the ground, solitary, caespitose or subcaespitose."—Rea.

The genus is characterised by the cinnamon or rusty-brown spores and the spider-web-like or arachnoid veil or cortina, distinct from the pellicle of the pileus. The fleshy stem is continuous with the pileus and the species grow on the ground, mostly under trees. The gills become powdery with the spores at maturity. The genus is a very natural one, and once their characteristic habit is recognised there is usually little difficulty in recognising members in the field. The pileus is sometimes brightly coloured in purple, violet, green, or yellow-brown, and the gills may show similar bright tints and vary in colour as they mature,

ending in cinnamon or rusty-brown from the powdery spores. In the subgenera *Phlegmacium* and *Myxanicium*, the pileus is viscid, thus resembling *Hebeloma*, but in the latter the spores are paler and less vivid in tints and the veil is not cob-webby but fibrillose or absent. The subgenera *Inoloma* and *Dermocybe* resemble *Inocybe* and *Astrosporina* in the pileus being innately silky or scaly dry, but the latter have paler spores, lack a cob-web veil though they possess a scanty fibrillose cortina concrete with the epidermis of the cap, often have cystidia and in the case of the last-named have angular spores. The stem is sometimes bulbous and the bulb may have a definite margin, constituting for some authors the subgenus *Bulbopodium*, with viscid pileus, separated from *Phlegmacium*.

The species are very numerous in parts of the world, Rea in his "British Basidiomycetæ" describing 239, and Kauffman in "The Agaricaceae of Michigan" 154. About 26 have been so far recognised in this State but probably another 20 have been collected but not yet differentiated. The plants are common in our late autumn and winter and often grow in dense caespitose masses. Some are very large, five to seven or more inches in diameter, and others are quite small but make a readily recognisable object by being densely massed together. Such viscid violet species as *C. Areheri* and *C. subareheri* and the green *C. subvenetus* are frequently found.

SUBGENUS: 1. PHLEGMACIUM Fr.

(Gr., *phlegma*, phlegm.)

"Veil viscid on the pileus, arachnoid, dry on the stem."—Rea.

In *Phlegmacium* the pileus is viscid but the stem is dry.

KEY TO THE SPECIES.

Shades of blue or violet present.

Lavender tints (sometimes absent) on stem only, base usually bulbous but not definitely marginate.

Large, up to 3in. Pileus whitish or pallid with pinkish-buff tints. Gills becoming buff or ochraceous-tawny. Spores 7.5 to 12 x 4.5 to 6.5 μ 131. *C. (Ph.) lavendulensis*.

Greenish-blue tints more or less evident on the pileus and stem.

Yellowish or yellowish-brown tints predominating in the pileus. Spores subspherical, 8 x 6, 6.5 x 5.2, 7 to 9 μ 132. *C. (Ph.) rotundisporus*.

Faint violet tint in gills when young. Stem whitish in Australian plants (tinted with violaceous in British).

Very large, up to 9in. Pileus becoming dark scorched brown. Gills pallid brownish-white, tinted with violet, finally dark-brown. Spores 10.4 to 12 x 5 μ 133. *C. (Ph.) largus*.

Stem ochraceous tawny with lilac above, flesh slightly lilac.

Pileus 2½ to 3½in., clay colour to yellow ochre. Gills tawny olive. Spores 11 x 5.5 to 7.5 μ 134. *C. (Ph.) lilacino-fulvus*.

Gills vinaceous drab.

Pileus about 2in., cinnamon buff to Sayal brown. Stem bulbous, pallid with brownish tints. Spores 9 to 11 x 4.5 to 5 μ 135. *C. (Ph.) vinaceo-lamellatus*.

Plants brown or yellow-brown, no blue.

Medium sized, 1½ to 3in. Pileus dark brown. Gills near raw sienna. Stem yellowish and brownish tinted. Spores 8.5 to 10.4 x 5.5 to 7 μ 136. *C. (Ph.) castanco-fulvus*.

- Medium sized, 2 to 2½ in. Pileus tawny olive to snuff brown. Gills tawny olive. Stem brownish. Spores 9 x 5 μ 137. *C. (Ph.) ochraceo-fulvus*.
- Medium sized, 1 to 2½ in. Pileus ochraceous tawny. Gills pinkish buff to tawny olive. Stem ochraceous tawny, fragile. Spores 11 to 12 x 7 μ 138. *C. (Ph.) fragilipes*.
- Large, up to 4½ in. Pileus, gills, and stem ochraceous-tawny. Spores 9 x 5.5 μ 139. *C. (Ph.) sublargus*.
- Large, up to 3½ in. Pileus whitish. Gills at first whitish then cinnamon. Stem short above ground with long conical root. Spores 9 to 10 x 5.5 μ 140. *C. (Ph.) radicans*.

131. *Cortinarius (Phlegmacium) lavendulensis* Clel. (Medieval L., *lavendula*, lavender, in reference to the colour of the stem).—Pileus 1½ to 3½ in. (3 to 8.7 cm.), glutinous, irregularly convex, finally somewhat upturned, pallid with brownish tints or pure white with tints of Pinkish Buff (xxix.) becoming darker. Gills slightly sinuate, moderately close, up to ¾ in. (10 mm.) deep, when young very pale buff or paler than Wood Brown (xi.) with a slight violet tint, then Sayal Brown (xxix.), Pinkish Buff to Cinnamon Buff (xxix.) and Ochraceous Buff (xv.) or Ochraceous Tawny (xv.) or near Antique Brown (iii.). Stem 2 to 3 in. (5 to 7.5 cm.), moderately slender to stout (½ to ¾ in., 1.2 to 1.8 cm., thick), base usually bulbous (up to 1 to 1½ in., 2.5 to 3.7 cm.), fibrillose, solid, or occasionally hollow, whitish with tints of Pale Bluish Lavender (xxxvi.), pallid below, with a broad subcentral zone of brownish fibrils from the veil. Veil at first whitish. Flesh slightly lilac tinted in the stem or whitish or faintly buff-tinted. Smell slight. Spores oblique, one end more pointed, yellow-brown, 11 to 13 x 6 to 7.5 μ , occasionally 7.5 to 9 x 4.5 to 5 μ . Under bushes. South Australia—Mount Lofty, National Park, Kuitpo. April, June, July.

Dried specimens have a pallid or scorched-looking pileus with bright ochraceous tawny gills.

132. *Cortinarius (Phlegmacium) rotundisporus* Clel. et Cheel. (L., *rotundus*, round; Gr., *spora*, seed).—Pileus 1 to 2½ in. (2.5 to 6.2 cm.), convex with a trace of an umbilic or even depressed in the centre, slightly viscid when moist, surface dull, near Honey Yellow (xxx.), Cream Buff (xxx.), Mustard Yellow (xvi.), Buff Yellow (iv.), Deep Colonial Buff (xxx.) or Isabella Colour (xxx.), streaked or tinted with Burn Blue (xxxiv.), Greenish Glaucon Blue (xlii.), Ramier Blue (xlii.) or near Gnaphalium Green (xlvi.). Gills adnate, slightly or deeply sinuate, or emarginately adnexed, moderately close, ventricose, pallid or sometimes with a slight violet tint when young, becoming Isabella Colour (xxx.), Tawny Olive (xxix.), Sayal Brown (xxix.) or Snuff Brown (xxix.). Stem 2 to 3 in. (5 to 7.5 cm.), slender to rather stout, attenuated upwards, slightly striate, hollow, rather bulbous below, white or yellowish tinged with the colour of the pileus, with remains of a superior cobweb veil. Veil bluish when young. Flesh yellowish, sometimes with lilac or violet tints. Spores pear-shaped subspherical, smooth or slightly rough, 6.5 to 9 or rarely 10.5 x 5.5 to 6.5 μ , 6 to 9 μ . South Australia—Mount Lofty, National Park, Kuitpo. New South Wales. March to August.

133. *Cortinarius (Phlegmacium) largus* Fr. (L., *largus*, very large).—Pileus up to 9 in. (22.5 cm.), convex, then irregular, then irregularly upturned, viscid when moist, dark tan, finally becoming scorched brown, very slightly fibrillose when young, then smooth. Gills deeply sinuately adnexed, close, pallid brownish-white with a faint violet tinge, soon losing the violet to become pale brown, then more cinnamon, finally dark reddish-brown. Stem 3½ in. (8.7 cm.), 1½ in. (3.7 cm.), broad above, at first very stout with non-marginate bulb of 2 in. (5 cm.), when adult the bulb not noticeable, root conical, solid, white tinged with the brown spores. Tough. Flesh white, 1½ in. (3.7 cm.) thick. No smell. Spores oblique, one end pointed, yellow-brown, 10.4 to 12 x 5 μ . Caespitose on the ground. South Australia—Mount Lofty. April.

134. *Cortinarius (Phlegmacium ?) lilacino-fulvus* Clel. (L., *lilacinus*, lilac coloured; *fulvus*, tawny—in reference to the tawny coloured stem with traces of lilac).—Pileus 2½ to 3½ in. (6.2 to 8.7 cm.), irregularly convex, centre sometimes depressed and sometimes a depression round the edge, finally somewhat upturned,

very viscid when moist, subfibrillose, Clay Colour (xxix.), paler in places and dark brown in others, occasionally near Yellow Ochre (xv.), often paler round the edge. Gills adnate or sinuate, moderately close, somewhat ventricose, pallid brown then dark brown, near Tawny Olive (xxix.). Stem 2 to 2½ in. (5 to 6.2 cm.), slender or stout, up to ¾ in. (1.8 cm.) thick, equal or slightly attenuated upwards or downwards, fibrillose, sometimes slightly hollow, base a little bulbous, near Ochraceous Tawny (xv.), with a trace of lilac above. Flesh thickish over the disc, thin externally, slightly brown with a slight lilac tint, becoming semi-translucent. Spores oblique, the ends not pointed, 9 to 11 x 5.5 to 7.5 μ . Under trees. South Australia—Stirling West, Mount Lofty. July.

This species may perhaps belong to the subgenus *Myxomicium*.

135. *Cortinarius* (*Phlegmacium*) *vinaceo-lamellatus* Clel. (L., *vinaceus*, wine coloured; *lamellatus*, possessing thin plates, here the gills).—Pileus about 2 in. (5 cm.), at first deeply convex (almost conico-convex), then convex and usually with an umbo, finally somewhat irregularly convex, slightly viscid, edge inturned when young, matt-fibrillose continuous with the marked almost membranous pallid whitish cob-web veil which breaks to form an obvious very superior ring, Cinnamon Buff to Sayal Brown (xxix.). Gills sinuate with a decurrent tooth, moderately close, 5 mm. deep, Vinaceous Drab (xiv.). Stem up to 3 in. (7.5 cm.), stout (1 to 1.5 cm.), base bulbous (1 to 1½ in., 2.5 to 3.2 cm.), attenuated upwards, not viscid, silky-fibrillose with more superficial darker cobweb fibrils of the veil, solid, with white rooting mycelial threads at the base, pallid with brownish tints. Flesh pallid with a slight violaceous tint in the stem and yellowish at its base. Spores very oblique, rather dull brown, 9 to 11 x 4.5 to 5 μ . Under bushes. South Australia—Mount Lofty. June.

The plants have a superficial resemblance to a mushroom.

136. *Cortinarius* (*Phlegmacium*) *castaneo-fulvus* Clel. (L., *castaneus*, pertaining to a chestnut, here in reference to the colour; *fulvus*, deep yellow, tawny).—Pileus 1½ to 3 in. (3.7 to 7.5 cm.), convex, sometimes deeply and irregularly convex with a large boss, or gibbous or repand, innately silky fibrillose or minutely tomentose, substrate, the edge sometimes furrowed or lacerated, dark brown near Argus Brown (iii.), Chestnut Brown (xiv.), Mars Brown (xv.), Cinnamon Brown (xv.) or Russet (xv.). Gills adnate or slightly sinuate, moderately close, usually finely serrulate or sometimes crenulate, near Raw Sienna (iii.), Cinnamon Brown (xv.), or Ochraceous Tawny (xv.), near Mummy Brown (xv.) when dry. Stem 1½ to 3 in. (3.7 to 7.5 cm.), moderately slender to moderately stout, sometimes flattened above and attenuated below, fibrillose, hollow, tinted with yellow and brown, with brownish threads of the veil. Flesh thin, attenuated outwards, yellowish to pale reddish-brown. Spores elliptical to subspherical, often appearing slightly rough, yellow brown, 7.5 to 10 x 5.5 to 7 μ . South Australia—Mount Lofty, Stirling West, Belair. June to August.

In dried specimens, the very dark nearly black pileus and stem contrast with the Sudan Brown or Brussels Brown (iii.) gills.

137. *Cortinarius* (*Phlegmacium*) *ochraceo-fulvus* Clel. (L., *ochraceus*, ochre coloured; *fulvus*, tawny—in reference to the colour when dry).—Pileus 1½ to 2½ in. (4.3 to 6.2 cm.), slightly convex, irregular, subumbonate, finely fibrillose from the veil giving the surface a hoary appearance, Tawny Olive (xxix.), Suff Brown (xv.), or Russet and Tawny (xv.) and darker, in places Ochraceous Tawny (xv.). Gills slightly sinuate, moderately close, slightly ventricose, Tawny Olive (xxix.). Stem 2½ in. (6.2 cm.), nearly equal, ½ to ¾ in. (6 to 10 mm.) thick, base a little swollen, fibrillose, stuffed, brownish. Flesh pallid brownish. Spores oblique, yellow brown, 9 to 11 x 5 to 6.5 μ . South Australia—Stirling West. July.

When dry, the gills are near Ochraceous Tawny (xv.) and Sayal Brown (xxix.), the cap darker.

138. *Cortinarius* (*Phlegmacium*) *fragilipes* Clel. (L., *fragilis*, fragile; *pes*, a foot).—Pileus 1 to 3½ in. (2.5 to 8.7 cm.), at first convex, finally slightly convex, irregularly plane or even upturned, usually subumbonate, radiately fibrillose, slightly sticky when moist, Ochraceous Tawny, Tawny or Russet (xv.) to nearly Auburn (ii.) in the centre. Gills adnate with a decurrent tooth, moderately close, up to 1 cm. deep, passing from Pinkish Buff (xxix.) to Tawny Olive (xxix.). Stem 3 to 4 in. (7.5 to 10 cm.), relatively slender, often flexuous, equal, brittle, readily compressed, silky fibrillose and marked with dark brown lines from the veil, slightly hollow, concolorous with the pileus. Veil cob-webby, pallid

becoming brownish. Flesh thin, attenuated outwards, slightly tinted. Spores very oblique with pointed ends, yellow-brown, 9.3 to 13, sometimes to 15.5 x 6 to 7 μ . Subcaespitose. Amongst litter under trees. South Australia—National Park, Mount Lofty, Kuitpo, Second Valley Forest Reserve. March, June to August.

The whole plant when dried is a rich Tawny (xv.) to Amber Brown (iii.). Characterised by the ochraceous tawny to ochraceous brown pileus, adnate gills sometimes with a decurrent tooth, long fragile concolorous stem and large spores.

139. *Cortinarius (Phlegmacium) sublargus* Clel. (L., *sublargus*, here near to the species *C. largus*).—Pileus 3 to 6 in. (7.5 to 15 cm.), slightly convex to nearly plane or with the centre depressed, slightly sticky, subfibrillose, near Ochraceous Tawny (xv.), Clay Colour (xxix.), Verona Brown (xxix.) in the centre, Warm Sepia and Bister (xxix.), Sudan Brown (iii.) or Amber Brown (iii.). Gills slightly sinuate or adnate-adnexed, moderately close, up to $\frac{1}{2}$ in. (1.2 cm.) deep, near Ochraceous Tawny, Yellow Ochre (xv.) deepening to Argus Brown (iii.), Buckthorn Brown (xv.), Clay Colour, edges becoming Cinnamon Brown (xv.). Stem up to 2 $\frac{1}{2}$ to 3 $\frac{1}{2}$ in. (5.6 to 8.7 cm.), stout (up to 1 $\frac{1}{2}$ in., 3.1 cm. thick), fibrillose, solid, bulbous with a conical root, more or less ochraceous tawny or yellowish. Flesh up to $\frac{3}{4}$ in. (2.1 cm.) thick, attenuated outwards, pallid to yellowish or brownish. Brownish cob-web veil. Spores oblique, yellow brown, 9 x 4.5 to 5.5 μ , occasionally in large specimens 11 to 15 x 5.5 to 6.5 μ . South Australia—Mount Lofty, Eagle-on-the-Hill, Mylor, Second Valley Forest Reserve, Bingham (S.E.). May, June.

140. *Cortinarius (Phlegmacium) radicans* Clel. (L., *radicans*, rooting).—Pileus up to 3 $\frac{1}{2}$ in. (8.7 cm.), irregularly convex, usually somewhat gibbous, expanding with an irregular surface, sometimes depressed in the centre, viscid when moist, slightly fibrillose-striate near the edge, edge intumed when young, whitish becoming tinted with yellowish cinnamon, when old more yellowish cinnamon and becoming scorched-brown. Gills adnate to almost adnate-decurrent, up to $\frac{1}{2}$ in. (6 mm.) deep, rather close, not ventricose, at first white, becoming cinnamon. Stem $\frac{1}{2}$ to sometimes 1 $\frac{1}{2}$ in. (1.2 to 3.7 cm.) above the ground, bulbous towards the base, passing into a deeply buried conical root 2 in. (5 cm.) long, stem stout, $\frac{1}{2}$ to nearly 1 in. (1.2 to 2.3 cm.) thick, solid, whitish, when old sometimes with a suspicion of lilac. Flesh white with sometimes a suspicion of a lilac tint, attenuated outwards. Veil whitish with an indefinite arachnoid ring. No smell. Spores obliquely elliptical, yellow brown, 9 to 13 x 5.5 to 7 μ . Half-buried in sand often in recently burnt country. South Australia—Willunga Hill, Upper Willow Creek (Waipinga), Mount Compass, Mount Lofty, Kinchinn. May to August.

Characterised by the shortness of the stem above ground, the deep conical root, the whitish pileus, and the gills at first white becoming cinnamon.

SUBGENUS: 2. MYXAMICIUM Fr.

(Gr., *myxa*, mucus.)

“General veil glutinous. Stem viscid. Pileus slightly fleshy.”—Rea.

In *Myxamicium* both the pileus and stem are viscid.

KEY TO THE SPECIES.

Plants red.

Pileus and stem dragon's blood-red becoming rufous. Gills tawny olive. Spores 9.5 x 6.5 μ . . . 141. *Cortinarius (Myxamicium) ruber*.

Plants yellow-brown.

Pileus ochraceous-tawny. Gills pallid cinnamon becoming tawny olive. Stem stout, spores 13 to 15 x 7.5 μ 142. *C. (M.) subarvinaceus*.

Pileus yellow ochre. Gills sudan brown. Stem somewhat bulbous. Spores 8.5 x 4 μ 143. *C. (M.) ochraceus*.

Pileus mustard yellow round the edge. Gills buckthorn brown. Stem sub-bulbous, yellowish. Spores 7.5 x 4 μ 144. *C. (M.) sinapicolor*.

Plants with violet or lilac tints.

Pileus large up to 5in., violet becoming brown.

Gills earthy with a violet tint becoming brown.

Stem pallid with a violet tint. Spores 12 to 14.5 x 7 to 7.5 μ 145. *C. (M.) Archeri*.

Pileus large up to 3½in., violet becoming brownish.

Gills pinkish cinnamon and violet tinted. Stem

violet. Spores 9 to 10 x 4.5 to 5.5 μ 146. *C. (M.) subarcheri*.

Pileus usually under 2in., violet brown. Gills sub-

sinuate to adnexed, violet brown. Stem pallid

to pale violet. Spores nearly subspherical, 5.5

to 8.4 x 4.5 to 5 μ 147. *C. (M.) microarcheri*.

Pileus to 2½in., whitish to light buff. Gills sinuate

adnexed, ochraceous buff. Stem white with trace

of violet. Spores 9.5 to 11 x 6 μ 148. *C. (M.) albidus*.

141. **Cortinarius (Myxamiciium) ruber** Clel. (L., *ruber*, red).—Pileus and stem viscid. Pileus up to 2in. (5 cm.), convex, then irregularly wavy and convex, subgibbous, near Dragon's Blood Red (XIII.) passing into Rufous (XIV.). Gills slightly sinuate adnexed, moderately close, a little ventricose, Tawny Olive (XXIX.). Stem up to 1½in. (3.7 cm.), viscid, rather short and stout, bulbous, up to ¾in. (17 mm.) thick below and ½in. (1.25 cm.) above, solid or somewhat hollow, the colour of the pileus below the remains of the veil, above this whitish and slightly striate, with some yellowish mycelium at the base and whitish rooting mycelial strands below. Cob-webby veil yellowish-red or red, glutinous. Flesh of the pileus white, moderately thick over the stem, thinning outwards, flesh of the stem discoloured. Spores 9.5 x 6.5 μ . South Australia—Kinchina, Belair, July. (Figure 18.)

[From watercolour by Miss J. Buxton.]

Figure 18.—*Cortinarius (Myxamiciium) ruber* Clel. (No. 141). Kinchina. Reduced ¾.

142. *Cortinarius (Myxamiciium) subarvinaceus* Clcl. (*Subarvinaceus*, here near to the species *C. (M.) arvinaceus* Fr.).—Pileus and stem viscid. Pileus $1\frac{1}{2}$ to $3\frac{1}{2}$ in. (4.6 to 8.7 cm.), convex, sometimes repand, finally irregularly upturned, edge a little turned in, sometimes substriate round the edge, very viscid. Ochraceous Tawny (xv.) becoming much darker and shining in the centre. Gills adnate or subsinuate, moderately close, slightly ventricose, pallid greyish cinnamon then Tawny Olive (xxix.) and darker. Stem $1\frac{1}{2}$ to 3 in. (3.7 to 7.5 cm.), stout, up to $\frac{3}{4}$ in. (17 mm.) thick, equal, mealy, fibrillose, base viscid, pallid whitish becoming brownish. Flesh slightly brownish, when old becoming semi-translucent, thick over the disc, thin externally, cuticle thick and dark brown. Spore mass near Tawny Olive (xxix.), spores oblique with pointed ends, 13 to $15 \times 7.5 \mu$. Under trees. South Australia—Stirling West. July.

143. *Cortinarius (Myxamiciium) ochraceus* Clcl. (L., *ochraceus*, ochre coloured).—Pileus and stem very viscid. Pileus up to 2 in. (5 cm.), convex, repand, finally irregularly upturned, Yellow Ochre (xv.), centre darker. Gills adnate, close,

[From watercolour by Miss R. C. Fireash.]

Figure 19.—*Cortinarius (Myxamiciium) ochraceus* Clcl. (No. 143).
Mount Lofty.

$\frac{1}{2}$ in. (6 mm.) deep, near Sudan Brown (iii.). Stem 2 in. (5 cm.), $\frac{3}{4}$ in. (10 mm.) thick, somewhat bulbous below, then equal, striate above, pallid becoming yellowish brown. Flesh soapy-looking, thick over the disc, rapidly attenuated outwards. Spores yellow brown, $8.5 \times 4 \mu$. On the ground amongst leaves under trees. South Australia—Mount Lofty. July. (Figure 19.)

144. *Cortinarius (Myxamiciium) sinapicolor* Clcl. (L., *sinape*, mustard seed; *color*, colour).—Pileus 2 to 3 in. (5 to 7.5 cm.), slightly convex, subumbonate, edge sometimes wavy, very glutinous, Mustard Yellow (xvi.) round the edge passing into Amber Brown (iii.) in the centre. Gills sinuately adnexed, moderately close, over $\frac{1}{4}$ in. (7 mm.) deep, near Buckthorn Brown (xv.). Stem $2\frac{1}{2}$ in. (6.2 cm.), moderately stout (nearly $\frac{1}{2}$ in., 1 cm.), fibrillose above, tinted yellow, base a little bulbous with white mycelial threads. Veil pale yellowish. Flesh attenuated outwards, turning slightly watery-yellowish in the stem. Spores elliptical, oblique, slightly rough, $7.5 \times 4 \mu$. South Australia—National Park. June.

145. *Cortinarius (Myxamiciium) Archeri* Berk. (After William Archer, 1820-1874, the botanist, Secretary of the Royal Society of Tasmania, to whom with Gunn Hooker dedicated his "Flora of Tasmania").—Pileus 3 to 3½ in. (7.5 to 8.7 cm.), deeply convex, then convex, finally often with upturned edges and irregular or with deep depressions and bosses, very viscid, deep violet becoming brown (Verona Brown, XXIX, to Bistre, XXIX., with a violet tint). Gills slightly sinuate to adnate, moderately close, up to 1 cm. deep, sometimes with reticulated ridges on the sides, Snuff Brown (XXIX.) with a violet cast especially on the edges. Stem 2½ to 3½ in. (6.2 to 8.7 cm.), stout (¾ to 1 in., 1.8 to 2.5 cm., or more), bulbous at first below, usually slightly attenuated in the middle, sometimes flattened, striate above, hollow below, Deep Dull Bluish Violet (XXIV.) below the glutinous subdistant ring, paler lilac above. Flesh thin except over the disc. Spores oblique, rather dark brown, 11.5 to 13 x 6.5 to 8 μ . On the ground. South Australia—National Park, Mount Lofty. New South Wales. May to July. (Figure 20.)

[From watercolour by D.L.C.]

Figure 20.—*Cortinarius (Myxamiciium) Archeri* (Berk.)
(No. 145). Sydney. Veil rupturing and powdered
with the brown spores. Pileus expanding.

146. *Cortinarius (Myxamiciium) subarcheri* Clé. (*Subarcheri*, here near to the species *C. (M.) Archeri*).—Pileus 2 to 3½ in. (5 to 8.7 cm.), convex, sometimes irregular, viscid, violet becoming pale brownish above or brownish violet to brown or pallid lavender or pinkish lilac. Gills sinuate, slightly toothed, moderately close, Pinkish Cinnamon (XXIX.) tinged with violet or violet becoming Vinaceous Fawn (XL.) or Apricot Buff (XIV.). Stem 1½ in. (3.7 cm.), becoming more elongated, at first thick (up to 1½ in., 3.7 cm.), downy fibrillose, violet tinted or Pale Lobelia Violet (XXXVIII.), mycelial mass at the base. Flesh with violet-lilac tints. Spores yellow-brown, obliquely elliptical, 8.5 to 10.5 x 4.5 to 6.5 μ . South Australia—Bundaleer State Forest; in *Eucalyptus Baxteri* forest, Mount Burr Forest Reserve, S.E.; Mount Lofty; Kinchina; Willunga Hill; near Clarendon; Warooka. March to July.

147. *Cortinarius (Myxamiciium) microarcheri* Clel. (Gr., *mikros*, small; *archeri*, in reference to its resemblance to *C. Archeri*).—Pileus $\frac{3}{4}$ to 2½ in. (1.8 to 6.2 cm.), convex to nearly plane, edge sometimes striate, glutinous, deep violet or violet-brown drying from the centre to earthy brown or light brown (Amber Brown, XL.). Gills slightly sinuate to adnexed, moderately close, pallid violet to violet brown (Buffy Brown, XL. with violaceous tints), then earthy brown (Saff Brown, XXIX.). Stem 1½ to 2 in. (3.1 to 5 cm.), rather slender, base a little thickened, fibrillose, slightly hollow or solid, pallid or pale violet. Flesh violet-tinted or whitish in the pileus. Spores oblique, smooth, approaching subspherical, 5.5 to 8.4 x 4.5 to 5 μ . South Australia—Mount Lofty, Eagle-on-the-Hill. June.

148. *Cortinarius (Myxamiciium) albidus* Clel. (L., *albidus*, whitish).—Pileus 1½ to 2½ in. (3.7 to 6.2 cm.), convex becoming plane, subumbonate, glutinous, smooth, edge subfibrillose when old, white with occasional tints of Light Buff (XV.), when old near Light Buff. Gills sinuately adnexed, ventricose, 9 mm. deep, moderately close, Light Ochraceous Buff (XV.) to near Ochraceous Buff (XV.). Stem 2½ in. (6.2 cm.), moderately stout (½ in., 1.2 cm., thick), equal or slightly bulbous below, sticky, fibrillose, white with a very faint tint of violet. Flesh thin, attenuated outwards, white with a very faint tint of violet. Veil brownish. Smell of curry powder when dry. Spores oblique, yellow brown, 9.5 to 13, usually 11 x 6 μ . South Australia—National Park. June.

SUBGENUS: 3. *INOLOMA* Fr.

(Gr., *is*, *inos*, a fibre; *loma*, a fringe.)

“Pileus equally fleshy, dry, at first floccose, fibrillose, velvety, pubescent, or silky, then becoming somewhat smooth. Veil simple.”—Rea.

The pileus and stem are neither viscid nor hygrophanous, the flesh is rather thick, the stem is stout with an enlarged base and tapering upwards, and the universal veil may be present or lacking. In some the universal veil persists on the stem as an adnate sheath or amulus. Kauffman points out that this subgenus grades into *Dermocybe*, a stout clavate stem and scaly pileus indicating at one end an *Inoloma*, and small size with thin flesh and a more slender and equal stem a *Dermocybe*.

149. *Cortinarius (Inoloma) areolato-imbricatus* Clel. (L., *areola*, a small open space; *imbricatus*, overlapping).—Pileus 3 to 6 in. (7.5 to 15 cm.) or more, rather deeply convex, slightly irregular, centre occasionally depressed, sometimes somewhat deformed from mutual pressure, dry, tending to break up into pallid rather fibrillose scales, rather areolate in the centre and becoming imbricate towards the periphery, Ochraceous Buff (XV.) to Cinnamon Buff (XXIX.), the scales paler near Pinkish Buff (XXIX.) to pallid. Gills adnate to adnexed, almost sinuate in some large specimens, rather close, up to 1 cm. deep, slightly attenuated both ways, Ochraceous Buff (XV.) to Cinnamon Buff (XXXIX.) and Ochraceous Tawny (XV.). Stem 2¼ to 2½ in. (5.6 to 6.2 cm.), thick (¾ to 1½ in., 1.8 to 3.7 cm.), nearly equal or slightly swollen in the middle, attenuated at the base, fibrillose, paler than Warm Buff (XV.), browner below. Flesh firm, up to 1 in. (2.5 cm.) thick in the centre, attenuated outwards, white. Veil cob-webby, whitish. Spores oblique, one end more pointed, yellowish-brown, 9 x 4.5 μ . Densely caespitose in a large imperfect ring. South Australia—Willunga Hill. May.

There is doubt as to whether this species is correctly placed in the subgenus *Inoloma*, in which the stem should be attenuated upwards not towards the base.

SUBGENUS: 4. *DERMOCYBE* Fr.

(Gr., *derma*, skin; *kybe*, the head.)

“Pileus thinly and equally fleshy, dry, not hygrophanous, at first silky with subinnate villose down, then smooth. Veil simple.”—Rea.

The pileus and stem are neither viscid nor hygrophanous and the flesh is thin. The plants are small to medium-sized with rather slender stems and lack distinct scales on the pileus.

KEY TO THE SPECIES.

Whole plant near dark blood red, medium sized.

Spores 6.5 to 9.5 x 4.8 to 7.2 μ 150. *Cortinarius* (*Dermocybe*) *sanguineus*.

Pileus large, dark green. Gills yellow at first. Stem

yellowish. Spores 8 to 13 x 5 to 6.5 μ 151. *C. (D.) austro-venetus*.

Pileus large, dark brown. Gills when young yellowish

becoming buckthorn brown. Stem yellowish. Spores

9 to 11 x 5 to 7.5 μ 152. *C. (D.) subcinnamoneus*.

150. *Cortinarius* (*Dermocybe*) *sanguineus* (Walf.) Fr. (L., *sanguineus*, bloody).—Pileus up to 1½ in. (3 cm.) or more, broadly conical to conico-convex, then convex, obtuse or gibbous, innately fibrillose, the edge sometimes slightly sulcate, or silky shining to coarsely rugose, dark blood red (browner than Morocco Red, I.; near Morocco Red with the centre Claret Brown, I.; or near Brazil Red, I.). Gills adnate to adnato-adnexed, or slightly sinuate, moderately close to crowded, dark red becoming rusty red (near Burnt Sienna, II., becoming Sanford's Brown, II., or near Morocco Red or Brazil Red). Stem 2 to 3½ in. (5 to 8.7 cm.), moderately stout to rather slender, swollen below or nearly equal, fibrillose, slightly hollow, blood red (near Burnt Sienna, tinged with Morocco Red), paler above. Veil fugacious, arachnoid, reddish. Flesh thickish below the umbo, thin externally, pallid reddish or slightly yellowish red, not exuding a juice when pressed. Spores elliptical, pear-shaped or rather rotund, oblique, sometimes slightly rough, yellow brown, 6.5 to 9.5 x 4.8 to 7.2 μ . South Australia—Mount Lofty, National Park. June to August.

Our plants seem to differ from British ones in the pileus not being shaggy or squamulose, in the base being sometimes rather swollen and in having no appreciable juice.

151. *Cortinarius* (*Dermocybe*) *austro-venetus* Clel. (L., *auster*, the south part of the world, but here in reference to Australia; *venetus*, sea-coloured).—Pileus up to 3 in. (7.5 cm.), convex, then nearly plane, more or less gibbous, with subnate villous down, dark green (near Olive Citrine, XVI., near Yellow Ochre, XV.), darker in the centre (Light Brownish Olive, XXX.). Gills adnate to slightly sinuate, moderately close, Olive Ochre (XXX.), near Yellow Ochre (XV.). Stem up to 3 in. (7.5 cm.), rather stout (up to ½ in., 1.2 cm., below) to slender, slightly attenuated upwards, fibrillose, hollow, pallid tinged with the colour of the gills. Flesh thick over the disc, very attenuated towards the edge. Veil fugacious. Spores oblique, dull brown, 9.5 to 13 x 5.5 to 6.5, sometimes 8 x 5 μ . South Australia—Mount Lofty, National Park, Kuitpo. June to August.

152. *Cortinarius* (*Dermocybe*) *subcinnamoneus* Clel. (*Subcinnamoneus*, here near to the species *C. cinnamoneus* (L.) Fr.).—Pileus up to 2½ in. (6.2 cm.), convex, gibbous, then expanding, sometimes slightly upturned and wavy, sometimes irregularly plane, minutely fibrillose or subsquamulose, near Snuff Brown (XXIX.) passing into Bister (XXIX.) in the centre, near Sudan Brown (III.), Argus Brown (III.) or Hazel (XIV.), later Burnt Umber (XXVIII.) becoming nearly black in the centre, Saccardo's Umber (XXIX.) when young. Gills sinuate to adnexed, moderately close, ¾ in. (10 mm.) deep, when young Mustard (XVI.) becoming near Buckthorn Brown (XV.), or Sulphine Yellow (IV.) in single lamellae to Aniline Yellow (IV.) in masses, or Olive Ochre (XXX.). Stem up to 3 in. (7.5 cm.), slender or stout (½ to ¾ in., 6 to 18 mm.), slightly bulbous or slightly attenuated downwards, somewhat fibrillose and striate, markedly hollow, with tints of Naples Yellow (XVI.) or pallid with brown tints. Flesh yellowish, heaped up under the umbo, gradually attenuated outwards. Cobweb veil pale yellowish. Spores irregularly elliptical or oblique, with one end more pointed, slightly rough, yellowish brown, 9 to 11 x 5 to 7.5 μ . Gregarious. South Australia—Mount Lofty. June.

The whole plant becomes a very dark brown when dried. The species seems closely allied to the European *C. cinnamoneus* (L.) Fr., differing in a darker pileus, in the gills being usually definitely though often slightly sinuate and in the decidedly larger spores (*C. cinnamoneus* in Rea's British Basidiomycetes, 6 to 8 x 4 to 5 μ).

SUBGENUS: 5. **TELAMONIA** Fr.(Gr., *telamon*, a broad linen bandage.)

"Pileus thinly fleshy or abruptly thin at the margin, moist, hygrophanous, smooth or sprinkled with superficial whitish fibres of the veil. Stem cortinate and annulate and hence the veil is somewhat double."—Rea.

The pileus is hygrophanous, changing in colour as its moisture is lost, thus differing from *Inoloma* and *Dermocybe*. The universal thin slightly membranous veil extends in the young plant from the base of the stem over the marginal part of the pileus and, on rupturing, may leave portion adhering as a sheath on the stem (stem peronate), or remnants may remain on the stem, or fragments may be left on the margin of the pileus.

KEY TO THE SPECIES.

Pileus reddish brown, reddish cinnamon, russet, etc., when moist; submembranaceous.

Stem attenuated downwards.

Edge of pileus striate when moist. Edges of gills whitish and finely serrate. Spores 7.5

x 4 μ 153. *Cortinarius* (*Telamonia*) *striatulus*.

Pileus not striate. Edges of gills not whitish and not serrate. Stem white. Spores 7.5

to 8.5 x 4.2 μ 154. *C. (T.) russeo-cinnamomeus*.

Stem not attenuated downwards.

Pileus more or less hoary from whitish fibrils.

Gills ochraceous tawny. Stem whitish.

Caespitose. Spores 9 x 4.5 μ 155. *C. (T.) fibrillosus*.

Vinaceous or purplish tints present.

Pileus vinaceous drab brown. Gills and stem

purplish brown. Spores 9 x 7.5, 7.5 x 6 μ 156. *C. (T.) vinaceo-cinereus*.

153. *Cortinarius* (*Telamonia*) *striatulus* Clel. (L., *striatulus*, diminutive of striate).—Pileus up to 1 in. (2.5 cm.), somewhat convex to nearly plane, more or less gibbous, wavy on the margin, sometimes slightly repand, very finely fibrillose, submembranaceous, when moist striate at the periphery and between Russet and Cinnamon Brown (xv.) with a pale ring round the edge, when dry paler than Cinnamon Buff (xxix.). Gills sinuate, moderately close, slightly ventricose, near Sayal Brown (xxix.) with narrow finely serrate whitish edges. Stem 2 in. (5 cm.), moderately slender, a little flexuous, sometimes flattened, attenuated at the base and sometimes at the apex as well, fibrillose, markedly hollow, pallid with a brownish tint above. Flesh pallid with a slight reddish-brown tint. Spores yellow-brown, oblique, 7.5 x 4 μ . Subcaespitose amongst shrubs under Eucalypts. South Australia—Mount Lofty. July.

154. *Cortinarius* (*Telamonia*) *russeo-cinnamomeus* Clel. (L., *russeus*, of a flesh or carnation colour, russet; *cinnamomeus*, cinnamon coloured).—Pileus $\frac{3}{4}$ to 1 $\frac{1}{2}$ in. (1.8 to 3.7 cm.), irregularly convex, then more expanded, edge wavy, sometimes repand, more or less gibbous, very finely fibrillose, submembranaceous, edge slightly inturned when young, when moist Russet (xv.) or Mikado Brown (xxix.), drying to Cinnamon Buff or Clay Colour (xxix.). Gills adnate-sinuate with a slight decurrent tooth, moderately close, ventricose, tawny cinnamon, edges not pallid or serrate. Stem 1 $\frac{1}{2}$ to 2 $\frac{1}{2}$ in. (3.7 to 6.2 cm.), moderately slender, attenuated at the base, sometimes flexuous, finely silky-fibrillose, solid then hollow, white. Flesh of stem pallid reddish-brown. Veil when very young as delicate white fibrils covering the globose pileus and descending to clothe the stem. Spores yellowish brown, 7.5 to 8.5 x 4.2 μ . Subcaespitose under Eucalypts. South Australia—Belair. July.

155. *Cortinarius* (*Telamonia*) *fibrillosus* Clel. (L., *fibrillosus*, possessing fibrils).—Pileus $\frac{1}{2}$ to 1 $\frac{1}{2}$ in. (1.2 to 3.7 cm.), convex becoming irregularly plane, usually gibbous, sometimes slightly dimpled, hoary from whitish mealy fibrils sometimes forming a white edge to the pileus, moist-looking, more or less hygrophanous, near Chestnut Brown (xiv.) and Vandyke Brown (xxviii.), near Tawny (xv.)

to Russet (xv.), darker than Hazel (xiv.), drying between Cinnamon and Cinnamon Buff or darker than Ochraceous Tawny (xv.). Gills aduate to adnexed with a slight decurrent tooth, moderately close, slightly ventricose, edges sometimes whitish, Ochraceous Tawny (xv.) to Cinnamon Brown (xv.), near Hazel (xiv.). Stem 1 to 1½ in. (2.5 to 4.3 cm.), rather slender, fibrillose, solid or slightly hollow, whitish from remains of the veil, pallid brownish beneath. Veil whitish clothing the lower part of the stem and sometimes leaving a white edge round the pileus. Flesh thin, slightly brownish. Spores rather narrow, oblique, yellowish brown, 8 to 10 x 3.5 to 5.2 μ . Caespitose to gregarious, on rather bare sandy loam or amongst moss. South Australia—Mount Lofty, Stirling West, Belair. April. June to August.

This is a small gregarious to caespitose species with a somewhat hygrophanous chestnut brown to tawny or russet pileus, sometimes showing fibrillae or a bloom from remains of the whitish veil, with aduate to adnexed ochraceous tawny to cinnamon gills, and with a stem which is whitish from remains of the veil. The spores are rather narrow.

The following seems to be a larger form of this species. Its description indicates the variability in many species of *Agaricus*.—Pileus up to 1½ in. (4.3 cm.), convex, usually broadly gibbous with a slight depression round the umbo, rather moist-looking, slightly hygrophanous, slightly silky-fibrillose, near Dresden Brown (xv.) becoming browner than Buffy Citrine (xvi.), near Tawny Olive (xxix.). Gills slightly sinuate, moderately close, ½ in. (6 mm.) deep, near Dresden Brown (xv.), browner than Sudan Brown (iii.). Stem 2 in. (5 cm.), rather slender, equal, fibrillose, hollow, pallid with a slight tinge of Dresden brown to whitish. Veil whitish. Flesh very thin, attenuated outwards. Spores elliptical, oblique, yellow-brown, 7.5 to 11 x 5.5 μ . Caespitose. South Australia—Mount Compass. May.

When dry the pileus is near Fuscous (xlvi.), the gills near Brussels Brown (iii.) and the stem pale brownish.

156. *Cortinarius (Telamonia) vinaceo-cinereus* (Clel. (L., *vinaceus*, wine coloured; *cinereus*, gray).—Pileus 1 in. (2.5 cm.), at first globose, then irregularly convex, minutely fibrillose, slightly rugose, vinaceous drab brown with a paler rim, drying pallid brownish. Gills adnate, slightly ventricose, moderately close, Purple Drab (xlv.) becoming Bay (ii.). Stem up to 1 in. (2.5 cm.), slightly flexuous, moderately slender, fibrillose, colour of the gills then pallid. Universal veil with outer fibres brownish and covering the pileus when young with fine fibres, inner fibres pallid. Spores dull-brown, nearly subspherical with one end rounded, the other more acute, 9 x 7.5, 7.5 x 6 μ . Single. Belair. July.

SUBGENUS: 6. *HYGROCYBE* Fr.

(Gr., *hygros*, moist; *kybe*, a head.)

“Pileus thinly fleshy, rarely compact, moist, hygrophanous, smooth or covered only with white superficial fibrils. Stem not sheathed, cortina rarely forming an arachnoid ring.”—Rea.

The flesh is quite thin. The absence of a universal veil separates the subgenus from *Telamonia*. In one section with thicker caps, the margin of the pileus is incurved; in the other the species are smaller and more slender with a straight submembranaceous pileus as in *Galera*.

No South Australian species yet recorded.

2. Veil concrete with the epidermis of the pileus.

Spores ochraceous or ferruginous, elliptical, smooth.

INOCYBE Fr.

(Gr., *is*, a fibre; *kybe*, the head.)

“Pileus fleshy, regular. Veil marginal, fugacious. Stem fleshy, central. Gills adnate, sinuate-adnate or adnexed. Spores ochraceous, ferruginous, olivaceous or fuscous; elliptical, elliptic-oblong, pip-shaped or subreniform; smooth. Cystidia present or absent; ventricose, clavate, fusiform or cylindrical. Growing on the ground.”—Rea.

The chief features of the genus consist in the pileus, at first conical or campanulate, being innately silky, fibrillose or fibrillose-sealy, the cuticle continuous to the stem as a more or less evanescent fibrillose cortina, the gills and spores pallid dull brown, the smooth spores and the frequent presence of cystidia on the gills. The fungi are relatively small and terrestrial. Only a few species of *Inocybe* and of the allied *Astrosporina* with angular spores are known from South Australia. Though never abundant, individuals are not uncommon on the Mount Lofty Ranges.

KEY TO THE SPECIES.

Cystidia present.

Stem pallid brownish.

Edges of gills serrate.

Pileus fibrillose, Verona brown to colour of dead grass. Gills snuff brown to wood brown. Stem mealy 157. *Inocybe serrata*.

Edges of gills not serrate.

Pileus convex, fibrillose, tawny olive.

Gills near umber. Stem granular,

rosy above 158. *I. fulvo-olivacea*.

Stem bister with whitish granules.

Pileus umbonate, fibrillose, snuff brown to

bister. Gills adnate, snuff brown 159. *I. granulosipes*.

Stem snuff brown to avellaneous, fibrillose to mealy.

Pileus umbonate, fibrillose to fibrous-sealy,

blackthorn brown to dresden brown. Gills

snuff brown 160. *I. Murrayana*.

Cystidia absent.

No South Australian species recorded.

I. CYSTIDIA PRESENT.

*Stem pallid.

157. *Inocybe serrata* Clel. (L., *serratus*, toothed like a saw).—Pileus $\frac{1}{2}$ in. (1.2 cm.), convex, fibrillose, near Verona Brown (XXIX.), pallid brown or colour of dead grass. Gills adnate, edges serrate and sometimes paler, near Snuff Brown (XXIX.) or Wood Brown (XL.). Stem $\frac{3}{4}$ to $1\frac{1}{4}$ in. (1.8 to 3 cm.), slender, mealy, pallid brownish. Spores smooth, oblique, pale yellow-brown, 7.5 to occasionally 9 x 4.5 to 5 μ . Cystidia fusiform or flask-shaped, 27 to 56 x 11 to 13 μ . The plants are deep brown when dry. Gregarious to subcaespitose with villous bases. South Australia—Mount Lofty, Upper Tunkalilla Creek. April, June.

The species seems closely related to *I. flocculosa* Berk. but differs in the serrate gills.

158. *Inocybe fulvo-olivacea* Clel. (L., *fulvus*, tawny; *olivaceus*, olive-coloured).—Pileus $\frac{1}{2}$ in. (1.2 cm.), more or less deeply convex, finely fibrillose, Tawny Olive (XXIX.). Gills adnate, ascending, moderately close, lighter than Saccardo's Umber (XXIX.). Stem 1 in. (2.5 cm.), slender, granular, slightly hollow, pallid brownish, often a little rosy above. Spores almost triangular, very oblique, 6.5 to 7 x 4 μ . Cystidia slightly ventricose, 45 x 15 μ , 65 x 17 μ . South Australia—Belair. August.

**Stem coloured.

159. *Inocybe granulosipes* Clel. (L., *granulosus*, granular; *pes*, a foot).—Pileus $\frac{1}{2}$ to $\frac{3}{4}$ in. (1.2 to 1.8 cm.), convex, umbonate, fibrillose, Snuff Brown to Bister (XXIX.). Gills adnate, moderately close, barely ventricose, Snuff Brown. Stem $\frac{3}{4}$ to 1 in. (1.8 to 2.5 cm.), rather slender, stuffed tending to be hollow, equal, the buried base slightly bulbous, Bister with abundant whitish mealy to fibrillose granules giving a greyish cast. Flesh very thin. Spores oblique with a central gutta, 8.5 x 5 μ . Cystidia inflated to narrow fusiform, 45 x 19 μ , 50 x 9 μ . Gregarious. South Australia—Stirling West, Mount Lofty. April, July.

160. *Inocybe Murrayana* Clel. (*Murrayana*, in reference to its occurrence on the Murray lands near Murray Bridge).—Pileus to $\frac{3}{4}$ in. (1.6 cm.), conical, then

expanded, more or less umbonate, finely fibrillose or fibrous scaly, silky-shining, near Cinnamon Brown (xv.), paler than Buckthorn Brown to near Dresden Brown (xv.), or near Russet (xv.). Gills adnate to adnexed, moderately close, edges slightly serrate, Snuff Brown (xxix.) or near Avellaneous (xv.), becoming browner. Stem lin. (2.5 cm.), equal, finely striate or fibrillose to mealy, solid, near Snuff Brown to pallid with brownish tints. Spores oblique, pallid brown, 9 to 11, occasionally 13 x 5.2 to 5.5 μ . Cystidia acuminate and swollen at the bases to ventricose, 8.5 x 11 μ . South Australia—Kinchina. June to August.

II. NO CYSTIDIA.

No South Australian species recorded.

Spores ochraceous or ferruginous, irregular, angular, echinulate or verrucose.

ASTROSPORINA Schreet.

(Gr., *aster*, a star; *spora*, seed.)

“Pileus fleshy, regular. Veil marginal, fugacious. Stem fleshy, central. Gills adnate, sinuato-adnate or adnexed. Spores ochraceous, ferruginous, olivaceous or fuscous; angular, nodose, verrucose, echinulate or irregular in shape. Cystidia present or absent; fusiform, ventricose, cylindrical or clavate. Growing on the ground, rarely caespitose.”—Rea.

Species of this genus resemble *Inocybe*, in which they are included by most authors, save in the spores being angular or warty. They are rather small plants growing on the ground, gregarious or single.

KEY TO THE SPECIES.

Cystidia present.

Stem whitish or pallid.

Pileus up to 1½ in., broadly conical, nearly smooth, pallid biscuit-coloured. Stem rather stout 161. *Astrosporina emergens*.

Pileus up to ½ in., convex to campanulate, cinnamon brown. Stem ½ in. 162. *A. exigua*.

Stem coloured.

Pileus 1½ in., convex, umbonate, fibrillose. Gills cinnamon brown. Stem striate . . . 163. *A. asterospora*.

Cystidia absent.

Stem whitish.

Pileus 1 in., umbonate, fibrillose, earthy brown. Gills just free, earthy brown. Spores 9 x 6 μ 164. *A. discissa*.

Stem pallid brownish.

Pileus ½ in., convex, shaggy, dark earthy brown. Stem pallid brownish 165. *A. imbricata*.

I. CYSTIDIA PRESENT.

*Stem whitish or pallid.

161. *Astrosporina emergens* Clel. (L., *emergens*, emerging).—Pileus up to 1½ in. (3 cm.), up to ½ in. (1.5 cm.) high, irregularly broadly conical, moderately fibrillose to nearly smooth, pallid biscuit-coloured. Gills adnate to adnexed, close, pale brownish. Stem up to 1 in. (2.5 cm.), moderately stout, base a little bulbous, pure white, then with a slight brownish tint. No special smell. Spores angular, pallid brown, 7.5 x 4 μ . Cystidia flask-shaped with rough apices, 25 to 37 x 13 μ . Emerging covered with soil. South Australia—Kinchina. June.

162. *Astrosporina exigua* Clel. (L., *exiguus*, little).—Pileus up to ½ in. (1.2 cm.), convex to campanulate, dull, slightly fibrillose, near Cinnamon Brown (xv.). Gills adnate, moderately close, watery cinnamon. Stem ½ in. (1.2 cm.), slightly fibrously streaked, whitish. Spores knobby, 8 to 8.5 x 5 μ . A few flask-shaped cystidia with smooth apices. South Australia—On sandy soil, Hope Valley, near Adelaide. September.

**Stem coloured.

163. *Astrosporina asterospora* (Quel.) Rea (G., *aster*, a star; *spora*, seed).—Pileus 1½ in. (3.1 cm.), convex with a large conical umbo, fibrillose, somewhat golden brown. Gills adnexed, nearly free, moderately close, cinnamon brown. Stem 1½ in. (3.1 cm.), moderately stout, slightly attenuated upwards, striate, fibrous, solid, pallid-brown. Spores irregularly nodular, 7 μ , 8.5 x 7 μ . Cystidia 40 x 12 to 14 μ . South Australia—Mount Lofty, National Park. April.

British plants from Rea's description are larger; the gills whitish bistre, then cinnamon, emarginate and ventricose, the stem reddish, streaked with brown fibrils, pubescent, with the base marginately bulbous, and the spores 9 to 12 μ .

II. NO CYSTIDIA.

164. *Astrosporina discissa* Clel. (L., *discindo*, *discissum*, to split).—Pileus 1 in. (2.5 cm.), convex, umbonate, markedly fibrillose, splitting, earthy brown. Gills apparently just free, ventricose, earthy brown. Stem 1 in. (2.5 cm.), rather slender, slightly pruinose above when young, then smooth, equal, base slightly swollen, whitish or pallid brownish. Seminal smell. Spores knobby, brown, 9 x 6 μ . South Australia—Upper Tunkalilla Creek. June.

165. *Astrosporina imbricata* Clel. (L., *imbricatus*, laid one under another like tiles).—Pileus up to ¾ in. (16 mm.), convex or slightly conico-campanulate, shaggy from imbricate adpressed fibrils, dark earthy brown. Gills adnate, then seceding, moderately close, slightly ventricose, dark brown. Stem ¾ in. (16 mm.), moderately slender, equal, stuffed, fibrillose, pallid brownish. Flesh of pileus pallid, of stem brownish. Spores angular, 9 to 11 x 5.5 μ . Large inflated jointed hyphae present. On ground. South Australia—Kinchina. June.

***Gills sinuate.

HEBELOMA Fr.

(Gr., *hēbē*, youth; *lōma*, a fringe.)

"Pileus fleshy, regular, margin incurved. Stem central, fibrous or fleshy. Gills sinuate, sinuato-adnexed or adnexed. Spores ochraceous, ferruginous or fuscous; elliptical, pip-shaped, pruiniform, almond-shaped, elliptic oblong or fusiform; smooth, continuous. Cystidia present or absent. Growing on the ground; solitary, caespitose or subcaespitose."—Rea.

The genus is characterised by the brown spores (alutaceous, rarely ferruginous), the flesh of the stem continuous with and similar to that of the pileus and the baying of the gills at their attachment. *Flammula* differs in the gills being adnate or subdecurrent and the spores ochraceous or ferruginous. In *Cortinarius* there is a spider-web-like general veil, and in *Trucybe* and *Astrosporina* a general veil leaves a silky-fibrillose covering on the pileus.

The genus does not seem common in South Australia and few species have been recognised. For 40 years, however, an evidently introduced species, *H. hiemale*, has occurred in troupes under *Pinus* and other exotic trees.

KEY TO THE SPECIES.

Cortina present when young.

Pileus 1 to 2½ in., conical when young, edge pale buff, disc date brown. Gills pallid, then sayal brown. Spores 9 to 10 x 5 μ 166. *Hebeloma*

mesophacum.

Similar but smaller, pileus to 1 in. Spores 8 to 11 x 4.8 to 6.5 μ 167. *H. mesophacum* var.

minus.

Cortina absent.

Pileus 2 to 3 in., not umbonate, periphery pale buff to whitish, disc sayal brown, cinnamon buff, etc., intermediate zone as if seen through a whitish film. Gills pallid becoming buckthorn brown. Stem white. Spores 10 to 13 x 5.5 to 7 μ . . . 168. *H. hiemale*.

Pileus to 3½ in., fibrillose-matt, yellowish brown.

Gills adnate with a slight suleus, close, yellowish-brown. Stem stout, whitish. Spores $9 \times 4.5 \mu$.

In sand 169. *H. lamelliconfertum*.

1. "Furnished with a cortina from the manifest veil, by which the pileus is often superficially silky round the margin."—Rea.

166. *Hebeloma mesophaeum* Fr. (Gr., *mesos*, middle; *phaion*, dusky).—Pileus 1 to 1½ in. (2.5 to 3.7 cm.), slightly convex, subumbonate, surface matt to sub-fibrillose, when moist slightly sticky, near Sayal Brown (XXIX.), when dry Cinnamon Buff (XXIX.), edge pale buff, when young with a thin upturned paler rim and fibrillose remains of the veil. Gills almost adnate to sinuately adnexed, sometimes with a decurrent tooth, moderately close, slightly ventricose, edges minutely serrate, at first pallid greyish buff or pallid cinnamon buff, becoming near Sayal Brown (XXIX.) and Snuff Brown (XXIX.). Stem 1½ in. (3.7 cm.).

[From watercolour by Miss J. Buxton.]

Figure 21.—*Hebeloma mesophaeum* Fr. (No. 166). Under *Pinus*, Caroline State Forest, Mount Gambier.

slender to moderately stout, equal or attenuated downwards, fibrillose, brittle, slightly hollow, flesh like that of the pileus or slightly different, pallid with a buffy brownish tint. Spores obliquely elliptical, dull brown, 9 to 10×5 to 5.5μ . On the ground under *Pinus radiata* Don. (*P. insignis* Dougl.). South Australia—Mount Burr and Caroline State Forests (S.E.). May. (Figure 21.)

167. *Hebeloma mesophaeum* Fr. var. *minus* Cke. (L., *minus*, smaller).—Pileus up to 1 in. (2.5 cm.), convex, umbonate, then nearly plane, somewhat subconical when young with the edge turned in and sometimes with a distinct flimsy veil or a few cobweb-like fibrils on the stem, viscid when moist, surface matt, round the edge near Drab (XLVI.), paler still at the periphery, in the centre darker near Hair Brown (XLVI.) or in old specimens very dark near Chaetura Brown (XLVI.). Gills sinuate, moderately close, pallid and nearly white, then dingy pale watery brownish. Stem 1½ to 2 in. (3.1 to 5 cm.), moderately slender, slightly mealy or fibrillose, slightly hollow, whitish. No appreciable taste or smell. Spores oblique, dull brown, 8 to 11×4.8 to 6.5μ . No cystidia seen. On the ground under *Pinus*. South Australia—Hindmarsh Square (Adelaide), Mount Lofty. June to August. New South Wales—Mount Wilson.

11. "Pileus smooth, at the first with no cortina."—Rea.

168. *Hebeloma hiemale* Bres. (L., *hiemalis*, of winter).—Pileus 2 to 3 in. (5 to 7.5 cm.), irregular, convex, then nearly plane, not umbonate, often much lobed, edge inturned when young, often upturned when old, viscid when moist, often shiny when dry, Sayal Brown, Tawny Olive, paler than Cinnamon, Light Pinkish Cinnamon, Cinnamon Buff (all xxix.), or Light Ochraceous Buff (xv.) in the centre, passing through a stage where the tints appear as if seen through a whitish film to Pinkish Buff (xxix.), Light Buff (xv.), Pale Ochraceous Buff (xv.), or whitish at the periphery. Gills slightly sinuately adnexed to adnate, moderately close, edges finely serrate, pallid then near Pinkish Buff (xxix.), pale Smuff Brown (xxix.), Buckthorn Brown (xv.) or near Sayal Brown (xxix.). Stem $1\frac{1}{2}$ to $2\frac{1}{2}$ in. (3.7 to 6.2 cm.), usually stout, sometimes slender, somewhat fibrillose, mealy above, with pith or hollow, white. Without a cortina. Flesh watery white. No appreciable taste or smell. Spores microscopically dull brown, very oblique, one end finely pointed, granular, 10 to 12.8, occasionally 13 to 15 x 5.5 to 7 μ . Subeaspidose in large clumps under *Pinus radiata* Don. (*P. insignis* Dougl.) and other species of *Pinus*, English oak, chestnut, and other introduced trees. South Australia—Parkside, Glen Osmond, Beaumont, National Park, Mount Burr State Forest, Mount Gaubier. Victoria—Craigie (near Ararat). April to August.

This is a common species in the National Park and near Adelaide where introduced trees, especially species of *Pinus*, have been planted. The gills in the young State are very pale and as the cap has a superficial resemblance to some forms of edible mushrooms, specimens have been gathered by the inexperienced in mistake for the latter. The species closely resembles *H. mesophaeum*, from which it differs in the complete absence of a partial veil.

169. *Hebeloma lamelliconfertum* Clel. (L., *lamellae*, here the gills; *confertus*, crowded).—Pileus up to $3\frac{1}{2}$ in. (8.7 cm.), convex, then expanding to nearly plane or upturned, sometimes a little repand, fibrillose-matt, edge inturned when young, yellowish-brown. Gills adnate, later leaving a slight sulcus round the stem, close, pale yellowish-brown, then yellowish-brown. Stem $2\frac{1}{2}$ in. (6.2 cm.), stout ($\frac{3}{4}$ in., 2.2 cm.), nearly equal or a little attenuated in the middle, slightly fibrillose, whitish. Flesh white. No signs of a veil. Spores rather narrow, rather pale dingy brown, not ferruginous, 9 x 4.5 μ . In sand. South Australia—Near Ashbourne, May.

Characterised by the rather large size, stout build, close gills, general dull ferruginous brown colour when dry and narrow spores.

****Gills decurrent or adnato-decurrent by a tooth.

FLAMMULA Fr.

(L., *flamimula*, a little flame.)

"Pileus fleshy, regular, viscid or dry. Stem central, fleshy or fibrous. Gills decurrent or adnate with a decurrent tooth. Spores ochraceous, ferruginous or fuscous; elliptical, oblong elliptical, globose or navicular; smooth, punctate or verrucose; continuous or with a germ-pore. Cystidia present, rarely none. Growing on the ground or on wood; solitary, gregarious, fasciculate or caespitose."—Rea.

The species of *Flammula* usually grow on or near wood, though some are purely terrestrial. The spores are dark brown, rusty brown, or rusty yellow, thus distinguishing the species from *Hebeloma* in which Kauffman says the spores are alutaceous and never ferruginous. The non-membranous inner veil differentiates them from *Pholiota*, the fleshy-fibrous stem from *Naucoria* and the usual habitat on wood from *Cortinarius*. The pileus is often viscid and tinged yellow, olivaceous or fuscous. Kauffman points out that the gills are not always adnato-decurrent but are often adnate or slightly rounded behind and may become emarginate in age. The spores may be slightly rough when examined with an oil-immersion lens. Cystidia are often abundant. We probably have a dozen or more species, the individuals of some of which (e.g., *F. californica* var. *communis*) are often very numerous.

KEY TO THE SPECIES.

Pileus more or less viscid when moist.

Pileus up to 2in. or more.

On bases of trunks of Eucalpts and amongst fallen wood. Gills at first with greenish-yellow tints, later buckthorn brown to dresden brown. Pileus and stem fibrillose-sealy. Veil when young. Spores fuscous ferruginous. Cystidia present. Common . 171. *Flammula californica*
var. *communis*.

On the ground.

Pileus becoming lemon-yellow. Gills pallid becoming earthy brown. Spores 11 to 16.5 x 7.5 to 9 μ 172. *F. limonia*.

Pileus under 2in.

Amongst charcoal on the ground.

Pileus sudan-brown. Gills pallid brown then dark brown. Spores 9 x 5.5 μ . Cystidia present 173. *F. carbonaria*.

On the ground.

Pileus reddish tawny brown. Gills pallid cinnamon, becoming dingy cinnamon. Stem punctate with dark fibrillose scales 174. *F. punctata*.

On fallen bark and rotting wood on the ground.

Pileus waxy-looking brown, hygrophanous, white mealy rim. Gills pallid cinnamon becoming darker. Stem white, mealy . 175. *F. cineta*.

Pileus dry.

Gills becoming bright tawny.

On fallen logs, etc.

Usually large. Pileus becoming tawny brown (cinnamon rufous, etc.). Gills at first yellow, finally rich tawny. Spores 7.5 to 9.5 x 4 to 6.5 μ 176. *F. excentrica*.

Similar but usually about 2in. Spores larger, 9.5 to 15 x 5.5 to 7.5 μ . . 177. *F. excentrica* var. *macrospora*.

Like small *F. excentrica* with purplish brown tints on the pileus. Spores 6.5 to 8.5 x 4.5 to 5.2 μ 178. *F. purpurata*.

Pileus usually $\frac{1}{2}$ to 1in., villous-fibrillose, buckthorn brown to tawny. Gills sinuately adnexed, yellow ochre to tawny. Stem mealy above, fibrillose below, pallid to ochraceous buff. Spores 7 to 9 x 4.5 to 6 μ 179. *F. eucalyptorum*.

On the ground.

Pileus 2 to 2 $\frac{1}{2}$ in., pileus and gills tawny. Stem short. Spores 9 to 11.5 x 5.5 to 7.5 μ 180. *F. brevipes*.

On the edge of swamps.

Pileus $\frac{3}{4}$ to 1 $\frac{1}{4}$ in., matt to tomentose, yellowish-brown at periphery, darker in centre. Gills yellowish-brown, sub-tawny. Stem short, yellowish-brown. Spores 9.5 to 11 x 6 to 7.5 μ 170. *F. paludosa*.

Gills isabella colour.

Pileus to 1 $\frac{1}{2}$ in., villous-fibrillose breaking into small scales, ochraceous buff to tawny. Stem ochraceous tawny with sand-encrusted bulb. Spores 8.5 to 5.6 μ 181. *F. arenario-bulbosa*.

I. "Veil none; pileus dry, most frequently squamulose. Spores usually ferruginous."—Rea.

170. *Flammula paludosa* Clel. (*L., paludosus*, marshy).—Pileus $\frac{3}{4}$ to 1 $\frac{1}{2}$ in. (1.8 to 3.1 cm.), convex, then nearly plane or a little irregularly depressed or deeply upturned, edge intumed when young, matt to tomentose, yellowish-brown at the periphery, darker brown in the centre, or reddish-tan. Gills adnate or slightly sinuate, moderately close, ventricose, many short, yellowish-brown becoming almost tawny. Stem short, $\frac{1}{2}$ to $\frac{3}{4}$ in. (1.2 to 1.8 cm.), rather slender to moderately stout, sometimes flattened, equal or attenuated downwards, mealy to fibrillose, solid or slightly hollow, yellowish-brown becoming much darker below. No sign of a veil. Spores obliquely pear-shaped, slightly rough, yellowish-brown, 9.5 to 11 x 6 to 7.5 μ . On the edge of bogs or on the walls of pockets of water in swamps. South Australia—Mount Compass. May.

II. "Pileus covered with a continuous, somewhat separable, smooth viscid cuticle; cortina manifest, fibrillose. Spores ferruginous or fuscous ferruginous, not tawny. Gregarious, growing on the ground, rarely on wood."—Rea.

171. *Flammula californica* Earle var. *communis* Clel. et Cheel. (*Californicus*, of California; *L., communis*, common).—When young convex, near Auburn (II.) with the periphery somewhat yellowish, sometimes with remnants of the universal pale yellow fibrillose veil. When adult, pileus $1\frac{1}{2}$ to 2 in. (1.8 to 5 cm.), convex, then flattened or upturned, gibbous, viscid when moist, sometimes slightly fibrillose or with a few widely separated scales, near Chestnut (II.) or Auburn (II.), round the periphery Dresden Brown (XV.), Ochraceous Tawny (XV.) or paler or darker than Antimony Yellow (XV.). Gills adnate or slightly sinuate with a slight decurrent tooth, moderately close, at first greenish yellow (near Old Gold, XVI.) becoming Buckthorn Brown to Dresden Brown (XV.). Stem 1 to 2 in. (2.5 to 5 cm.), slender, slightly attenuated upwards, base a little bulbous, slightly hollow, fibrous, apex not mealy, clad below with brownish fibrillose scales probably remains of the cortina, which sometimes forms an imperfect superior ring, with whitish mycelium at the base or when growing on stringy bark trunks with numerous coarse, irregular, brownish to whitish rhizomorph strands, near Russet (XV.), yellowish-brown above. Spores elliptical, microscopically rather a dull brown, 7.5 to 9.3 x 4.2 to 6.3 μ . Cystidia usually numerous, ventricose or flask-shaped with acuminate apices, 32 to 56 x 10.5 to 13.8 μ . No taste. Gregarious. On the ground, usually amongst leaves or fallen pieces of bark and usually at or near the bases of living or dead Eucalypts (*Eucalyptus obliqua* L'Herit. and *E. leucorylon* F. v. M.), occasionally ascending the trunks for a few feet. South Australia—Mount Lofty, National Park, Kuitpo, Back Valley off Inman Valley. Bingham (S.E.), Kalangadoo (S.E.). New South Wales. April to July.

172. *Flammula limonia* Cke. et Mass. (Modern *L., limonius*, lemon-coloured).—Pileus up to 4 in. (10 cm.), hemispherical, then gradually expanded, finally with the edge upturned, viscid when moist, edge sometimes obscurely striate, when young brownish-yellow, then a pale lemon yellow. Gills adnate, rather crowded, pallid white becoming greyish with a brown tint, finally when old dark greyish or earthy brown. Stem up to 3 in. (7.5 cm.), attenuated slightly downwards, sometimes shaggy-scaly towards the base, fibrously rooting below, stuffed or hollow, whitish or pale yellow. Occasionally with fragments of the veil on the edge of the pileus. Spores elliptical, rather elongated, light brown, 11 to 16.5 x 6.5 to 9 μ . In gardens, lawns, etc. South Australia—Adelaide district. June, July, September, November.

173. *Flammula carbonaria* Fr. (*L., carbonarius*, pertaining to charcoal).—Pileus $\frac{1}{2}$ to 1 in. (1.2 to 2.5 cm.), at first convex, then expanding, sometimes subgibbous, slightly viscid when moist, Sudan Brown (III.), often darker at the disc. Gills adnate, then seceding, moderately close, not ventricose, Brunsell's Brown (III.), pallid brownish when young. Stem 1 to 1 $\frac{1}{2}$ in. (2.5 to 3.1 cm.), slender, a little flexuous, slightly hollow, pallid flecked with projecting minute brownish fibrillose scales. Spores elliptical, yellow-brown, 6.5 to 9 x 4 to 5.5 μ . Cystidia flask-shaped, 37 x 17 μ . Gregarious. On the ground amongst charcoal from burnt *Eucalyptus* logs. South Australia—Mount Lofty, Encounter Bay, Mount Burr (S.E.). New South Wales. May, June.

This Australian form is much smaller than the British species. It can be readily recognised by its habitat amongst charcoal.

174. *Flammula punctata* Clel. (L., *punctatus*, dotted).—Pileus $\frac{3}{4}$ in. (20 mm.), convex, sometimes subumbonate, viscid when moist, reddish tawny brown. Gills adnate or emarginato-adnate, rather close, watery cinnamon becoming dingy cinnamon. Stem $\frac{3}{4}$ to 1 in. (1.8 to 2.5 cm.), slender, solid, pallid flecked with dark brown scaly fibrils, flesh somewhat cartilaginous differing slightly from that of the pileus. Spores obliquely elliptical, pale yellow-brown, $7.5 \times 4 \mu$. Cystidia not seen. On the ground. South Australia—Back Valley off Inman Valley. May.

This is a small species resembling the larger *F. californica* but with the gills less yellow when young and the stem punctate (hence the specific name) with dark brown scaly fibrils. In the characters of the flesh of the stem it approaches the genus *Naucoria*.

III. "Cuticle of the pileus continuous, not distinct or separable, smooth (here and there with a superficial covering), moist or a little viscid in wet weather. Cortina manifest, appendiculate. Spores not tawny or ochraceous. Caespitose, growing on wood."—Rea.

175. *Flammula cincta* Clel. (L., *cinctus*, girdled).—Pileus $\frac{1}{2}$ to $1\frac{1}{4}$ in. (1.2 to 3.1 cm.), convex, then plane, finally more or less upturned, viscid when moist and shining waxy-looking brown, hygrophanous, drying a deep pinkish buff, when young with the edge inturned and covered with a white meal from the universal veil which later appears as a white rim to the waxy-brown pileus. Gills adnate to adnato-decurrent, rather close, rather narrow, minutely serrate when young, pallid cinnamon becoming brownish-cinnamon. Stem 1 to $1\frac{1}{4}$ in. (2.5 to 3.1 cm.), rather slender, equal or attenuated downwards, base a little bulbous, somewhat mealy fibrillose, slightly hollow, whitish becoming tinted brown especially below. When young clothed with a whitish mealy universal veil, giving to the stem a white mealy appearance. Spores elliptical, rather pale dull brown, 8 to 8.5×4.5 to 5μ . No cystidia seen. On fallen bark and rotting wood on the ground with white mycelium at the base agglutinating bark, leaves, etc. South Australia—Back Valley off Inman Valley. May.

Characterised by the hygrophanous waxy-looking brown pileus, when young covered with mealy fragments leaving for a while a mealy rim round the edge of the pileus, the pallid cinnamon gills becoming darker, the whitish mealy stem and the habitat amongst fallen wood. The specific name applies to the whitish ring round the edge of the pileus, very noticeable at one stage.

IV. "Pileus scarcely pelliculose, flesh seissile or torn above into scales, not viscid, at first somewhat hoary. Veil fibrillosely adpressed to the stem, not furnished with an appendiculate cortina, almost none or forming an annular zone on the stem. Gills light yellow or yellow, then tawny. Spores ochraceous or tawny. Subcaespitose, always on conifers or on the ground amongst conifer branches" (in Enrope).—Rea.

176. *Flammula excentrica* Clel. et Cheel. (L., *excentricus*, excentric, in reference to the stem).—Pileus 1 to $3\frac{1}{2}$ in. (2.5 to 8.7 cm.), irregularly convex to slightly convex, nearly plane or slightly depressed in the centre, nearly smooth to fibrillosely scaly, villous or flecked with small fibrillose scales, sometimes tending to crack, sometimes soft and spongy, edge inturned when young, yellowish to reddish or brownish tawny or dark ferruginous brown (Mustard Yellow, XVI.; near Ochraceous Tawny, XV.; near Auburn or Chestnut, II.; Kaiser Brown, XIV.; Hazel, XIV.; Chestnut Brown, XIV.; or Cinnamon Rufus, XIV.), sometimes with traces of purple or greenish-yellow. Gills slightly sinuate to adnate or adnato-decurrent, moderately close, $\frac{1}{2}$ in. (6 mm.) or more deep, sometimes slightly ventricose, Buff Yellow (IV.), Antimony Yellow (XV.) to near Ochraceous Buff (XV.), Ochraceous Orange (XV.), Buckthorn Brown (XV.) or Amber Brown (III.) when dry. Stem $\frac{1}{2}$ to $2\frac{3}{4}$ in. (1.2 to 6.8 cm.), moderately stout (to $\frac{3}{4}$ in., 10 mm.) to moderately slender, often somewhat excentric, attenuated downwards to nearly equal, fibrillose sometimes with whitish bloom at the base, solid or slightly hollow, tough, pallid yellowish-brown above to dark tawny-brown below (darker than Light Orange Yellow, III.; Tawny, XV.), occasionally whitish, sometimes with slight indications of a superior ring when young. Flesh yellowish-brown, paler to yellow in the pileus. Spores obliquely elliptical, slightly rough to smooth, yellowish-brown (tawny), 7.5 to 9.5×4 to 6.5μ . On fallen wood, the undersides of wet logs, rarely on the trunks of living *Eucalyptus obliqua* L'Herit. or the

stem of the grass-tree (*Xanthorrhoea*), occasionally amongst fallen chips on the ground or on the ground probably near buried wood. South Australia—National Park, Mount Lofty, Eagle-on-the-Hill, Miteham, Upper Tunkalilla Creek, Second Valley Forest Reserve, Baugham, Mount Gambier. New South Wales. May to August.

This is a common, rather variable species, recognised by its habitat (nearly always on fallen logs), by its usually moderate size and in general tawny colour, the pileus being often fibrillose scaly and the stem fibrillose. It is probably closely related to *F. sapinea* Fr. and *F. purpurata* Cke. et Massee.

177. *Flammula excentrica* var. *macrospora* Clel. (G., *makros*, long; *spora*, a seed).—Differs from the typical form in the larger spores, 9.5 to 15 x 5.5 to 7.5 μ . Pileus about 2 in. (5 cm.), convex, smooth or tending to be scaly fibrous, soft, tawny reddish brown. Gills adnate, same colour. Stem excentric, short, striate-fibrillose, reddish-brown. On dead wood. South Australia—Upper Tunkalilla Creek, Kinchina, Mount Burr (S.E.). May to July.

178. *Flammula purpurata* Cke. et Mass. (L., *purpuratus*, clad in purple).—Pileus up to 2 in. (5 cm.), convex, covered with adpressed somewhat warty fibrils or matt-fibrillose, the edge inturned, reddish-purplish-brown or purplish-red with tints of green and yellow. Gills slightly sinuate, deep, moderately close, waxy-yellow, becoming brownish-cinnamon-yellow. Stem up to 1½ in. (3.7 cm.), rather stout, a little attenuated upwards, somewhat striate or fibrillose, tough, pallid yellowish-brown above with tints of the pileus below. Spores oblique, yellowish-brown, 6.5 to 8.5 x 4.5 to 5.2 μ . Cystidia not seen. On fallen trunks and wood. South Australia—Port Lincoln and Big Swamp, E.P. May.

Closely related to *F. sapinea* Fr. Recognisable by the purplish tints on the pileus and often on the stem.

179. *Flammula eucalyptorum* Clel. (L., *eucalyptorum*, of Eucalypts).—Pileus ½ to 1½ in. (1.2 to 3 cm.), deeply convex, then more expanded, villous-fibrillose or somewhat strigose, edge at first inturned, near Buckthorn Brown (xv.), Tawny (xv.) with often Ochraceous Buff (xv.) round the edge, or Amber Brown (iii.). Gills sinuately adnexed, moderately close, narrow, slightly ventricose, between Yellow Ochre (xv.) and Ochraceous Tawny (xv.), Ochraceous Buff (xv.), or between Amber Brown and Sudan Brown (iii.) with a tinge of Raw Sienna. Stem ½ to 1½ in. (1.2 to 3.7 cm.), often curved, subfibrillose below, mealy above, solid or slightly hollow, apparently fleshy or in some collections cartilaginous, pallid above to yellowish-brown, brownish or Ochraceous Buff (xv.) below. Flesh yellowish. Spores obliquely elliptical, often slightly rough, yellowish-brown, 7 to 9 x 4.5 to 6 μ . Cystidia not seen. On fallen rotting Eucalypt logs or on the adjacent ground. South Australia—Kuitpo, Eagle-on-the-Hill, Mount Lofty, National Park. May to July. (Figure 22 A.)

[Drawings by E.R.C.]

Figure 22.—A. *Flammula eucalyptorum* Clel. (No. 179). Mount Lofty.

B. *Galera tenera* (Schaeff.) Fr. (No. 187). On horse-dung, Kangarilla.

Characterised by the small size, slender shape, tawny brown pileus, yellow ochre to ochraceous tawny gills, and pallid to ochraceous buff stem. In the National Park specimens the stem seemed cartilaginous, which would place the species under *Naucoria*, but the tawny gills and general resemblance to small forms of *F. excentrica* seem to show its relationship to this species. It is possible it may have to be transferred to *Naucoria*.

180. *Flammula brevipes* Clel. (L., *brevis*, short; *pes*, a foot).—Pileus 2 to 2½ in. (5 to 6.7 cm.), irregularly convex, edge repand, surface dull, Ochraceous Tawny to Tawny (xv.). Gills adnate, moderately close, ventricose, up to ¾ in. (10 mm.) deep, Ochraceous Tawny to Tawny. Stem very short, ¼ in. (18 mm.), striate, with brownish fibrils of the veil, pallid yellowish. Spores oblique, probably finely rough, yellow-brown, 9 x 5.5 μ , occasionally 11.5 x 7.5 μ . On the ground. South Australia—In dry swamp, Lowan Forest near Kalangadoo (S.E.). May.

A species characterised by the rich tawny colour of the pileus and gills with a stem that appears unduly short for the size of the pileus. It grows on the ground.

V. "Furnished with a cortium. Cuticle of the pileus slightly silky, dry or at first viscid."—Rea.

181. *Flammula arenario-bulbosa* Clel. (L., *arenarius*, sandy; *bulbosus*, possessing a bulb).—Pileus up to 1½ in. (3.7 cm.) or more, convex, villous-fibrillose, tending to break into small scales and crack to expose the yellowish flesh, Ochraceous Buff to Tawny (xv.). Gills sinuate or slightly so, moderately close, ventricose, rather deep, Isabella Colour (xxv.). Stem short, 1 in. (2.5 cm.), 4 mm. thick, fibrillose, slightly hollow, with a sand-encrusted bulb at the base, Ochraceous Buff and darker. Veil yellowish, clothing the stem and breaking to form a definite ring when young. Flesh of the stem yellowish, apparently of the same texture as that of the pileus which is less yellow. Spores elliptical, yellowish-brown, 8.5 x 5.6 μ . South Australia—In sandy soil, Hall's Creek, Encounter Bay. May.

(c) PILEUS CONFLUENT WITH, BUT HETEROGENEOUS FROM, THE CARTILAGINOUS STEM.

*Gills adnate or sinuato-adnate.

†Margin of pileus at first incurved or exceeding the gills.

NAUCORIA Fr.

(L., *naucum*, a flock of wool.)

"Pileus fleshy, regular; margin at first incurved. Stem central, cartilaginous. Gills adnate, sinuato-adnate or adnexed. Spores ochraceous, ferruginous or fuscous; elliptical, pip-shaped, almond-shaped or oblong elliptical; smooth, punctate or verrucose; continuous or with a germ-pore. Cystidia present. Growing on the ground, more rarely on wood; solitary, gregarious or caespitose."—Rea.

This genus corresponds with *Collybia* in the white-spored section, the stem being subcartilaginous and the margin of the pileus incurved when young. The species grow on the ground or on wood and are mostly small. Only a few species have been recognised in South Australia, one of which, *N. horizontalis*, grows on wood and is quite small, the others occurring on the ground.

KEY TO THE SPECIES.

On fallen logs, etc.

Pileus ¼ to ½ in., watery cinnamon. Gills nearly free. Stem incurved. Spores 7 to 9 x 5 to 6.5 μ	182. <i>Naucoria</i>
Pileus ½ to 1 in., villous-fibrillose, buckthorn brown to tawny. Gills sinuately adnexed, yellow ochre to tawny. Stem mealy above, fibrillose below, pallid to ochraceous buff. Spores 7 to 9 x 4.5 to 6 μ	<i>horizontalis</i> .
	179. <i>Flammula</i>
	<i>eucalyptorum</i> .

Growing in fields, lawns, etc.

Pileus $\frac{1}{2}$ to 1½ in., convex, then expanding, buff to ochraceous buff. Gills pallid becoming buffy brown. Stem straight, buff to ochraceous buff. Spores 11 to 15 x 7.5 to 11 μ . On sandy soil or dung 183. *Naucoria*

semiorbicularis.

Growing in sand.

Pileus 1 to 1½ in., sayal brown. Gills sinuate, snuff brown. Stem moderately stout, pallid.

Spores elongated, pallid brown, 9.5 to 13 x 4 μ . 184. *N. arenacoleus*.

In uncultivated open or forest country.

Pileus about ½ in., convex, often dimpled, dark tawny brown drying ochraceous tawny. Gills snuff brown to tawny olive. Stem short, pallid.

Spores 8.5 to 11 x 4.5 to 5.5 μ 185. *N. subfulva*.

Pileus about ½ in., convex, subumbonate, Verona brown. Gills sinuate, Verona brown, edges finely serrate. Stem pallid brownish. Spores 8.2 x 4 μ . 186. *N. veronabrunneus*.

I. "Pileus smooth, veil none. Spores ferruginous, not becoming fuscous ferruginous."—Rea.

*Gills free or slightly adnexed.

182. *Naucoria horizontalis* (Bull.) Fr. (L., *horizontalis*, horizontal).—Pileus $\frac{1}{2}$ to ½ in. (6 to 8 mm.), occasionally up to ¾ in. (1.8 mm.), convex, sometimes flabelliform or kidney-shaped, later more flattened, faintly striate, villous-looking (smooth in British descriptions), pale brownish-straw to orangey-brown. Gills adnexed, almost free, moderately distant, crenulate, colour of the pileus. Stem $\frac{1}{4}$ to ½ in. (6 to 12 mm.), slender, central or a little excentric or sometimes nearly lateral, incurved, attenuated downwards, slightly brownish, sometimes with whitish mycelium at the base. Spores yellow-brown microscopically, elliptical, 7 to 9 x 5 to 6.5 μ . On fallen logs and the bark of dying Eucalypts. South Australia—Mount Lofty (record doubtful). New South Wales. March to July.

These little brown agarics, growing often in numbers on bark, are apt to be looked for under the genus *Crepidotus*. It will be noted, however, that the short slender incurved stem is usually more or less centrally placed, the incurving of the stem being responsible for the apparently somewhat lateral attachment of the pileus.

**Gills adnate, pileus convexo-plane.

No South Australian species recorded.

***Gills adnate, pileus campanulate, then expanded.

No South Australian species recorded.

II. "Pileus naked. Gills and spores fuscous ferruginous. Veil potential, rarely manifest."—Rea.

*Growing in fields and plains.

183. *Naucoria semiorbicularis* (Bull.) Fr. (L., *semi*, half; *orbicularis*, round).—Pileus $\frac{1}{2}$ to 1½ in. (1.2 to 3.1 cm.), deeply hemispherical, then convex, expanding when old and sometimes a little upturned, smooth, slightly sticky when moist, edge a little turned in when young and with a slight fringe from the veil, Warm Buff (xv.) round the edge, near Ochraceous Buff (xv.) in the centre, paler when old. Gills broadly adnexed or slightly sinuate to nearly adnate, moderately close, slightly ventricose, finally to ½ in. (6 mm.) deep, in three tiers, one reaching half-way with very short ones on each side, paler than Buffy Brown (xl.), then Buffy Brown. Stem 1½ in. (3.1 cm.), slender (6 mm. thick), nearly equal, slightly mealy or fibrillose, somewhat cartilaginous, the flesh separated from that of the pileus by a semitranslucent zone, stuffed or becoming hollow, warm buff above, ochraceous buff below. Flesh of the pileus pallid. Spores elliptical, rather dingy yellowish-brown to fuscous, 11 to 17 x 7.5 to 11 μ . On sandy soil or on dung. South Australia—Mount Lofty, Mount Compass, Encounter Bay. April, May.

**Growing in sand.

184. *Naucoria arenacolens* Clcl. (L., *arena*, sand; *colens*, inhabiting).—Pileus 1 to 1½ in. (2.5 to 4.4 cm.), convex becoming more expanded, a little irregular, innately fibrillose, edge inturned when young, near Sayal Brown (XXIX.). Gills sinuate, moderately close, deeply ventricose, 3 to 5 mm. deep, edges paler and minutely serrulate, near Snuff Brown (XXIX.). Stem 1 to 1½ in. (2.5 to 3.7 cm.), moderately stout (8 to 10 mm. thick), equal, fibrillose, solid, pallid with tints of Pinkish Buff (XXIX.). Flesh tinted like the stem, that of the stem more fibrous than the flesh of the pileus. Spores elongated mummy-shaped, pallid brown. 9.5 to 13 x 4 μ . Single or several together, emerging from sandy soil. South Australia—Waitpinga Road, Encounter Bay. May.

The rather cinnamon brown pileus, snuff brown gills with pale finely serrated edges, the solid fibrillose pinkish buff stem and the habitat in sandy soil characterise the species.

***Growing in moist, uncultivated, wooded places.

185. *Naucoria subfulva* Clcl. (L., *subfulvus*, somewhat tawny).—Pileus ½ in. (16 mm.), convex, sometimes slightly dimpled, tomentose, edge turned in when young, dark tawny or cinnamon brown, when drying darker than Ochraceous Tawny (xv.) to Tawny Olive (XXIX.). Gills adnate to sinuato-adnate, slightly ventricose, moderately close, a little crisped, near Snuff Brown (XXIX.) to Tawny Olive (XXIX.). Stem short, ½ in. (1.2 cm.), slender, fibrillose to shaggy fibrillose, slightly hollow, pallid with tints as on the pileus. Veil present when very small. Spores oblique, pallid brown, varying in size, 8.5 to 11 x 4.5 to 5.5 μ . On the ground in the open. South Australia—Myponga. October.

186. *Naucoria veronabrunneus* Clcl. (L., *veronabrunneus*, Verona brown).—Pileus ½ to ¾ in. (1.2 to 1.6 cm.), deeply convex with a slight umbo, fibrillose, hygrophanous, near Verona Brown (XXIX.) drying pallid. Gills sinuate, moderately close, ventricose, near Verona Brown (XXIX.), the edges paler and finely serrate. Stem 2 in. (5 cm.), equal, flexuous, mealy above, fibrillose below, solid, apparently cartilaginous and differing in texture from the flesh of the pileus, pallid with a brownish tint. Spores rather narrow, oblique, rather dull brown, 8.2 x 4 μ . On the ground. South Australia—Mount Loffy. July.

III. "Pileus flocculose or squamulose. Veil manifest. Spores ferruginous."—Rea.

No South Australian species recorded.

††Margin of pileus straight, at first adpressed to the stem.

GALERA Fr.

(L., *galerus*, a cap.)

"Pileus fleshy or submembranaceous; margin straight, at first adpressed to the stem. Stem central, cartilaginous. Gills adnate or adnexed. Spores ochraceous, cinnamon or ferruginous; elliptical, pruiniform or almond-shaped; smooth; with a germ-pore, rarely continuous. Cystidia generally present. Growing on the ground."—Rea.

The species of *Galera* are small fungi growing on dung or amongst grass or moss. The genus corresponds with *Mycena* amongst the white-spored group. The pileus is thin and membranaceous, mostly conical or deeply convex, often somewhat striate round the margin when moist, of an ochraceous or yellowish-brown colour, hygrophanous, becoming paler when dry when the surface often appears atomate or covered with minute whitish particles. The gills are mostly ascending and narrow, rarely broad, and in colour yellowish-brown to cinnamon. The stem is slender and hollow.

Four species have been recognised in this State, two species appearing on dung, one frequently on buffalo grass lawns and one amongst moss in shady places in our hills.

KEY TO THE SPECIES.

On dung or amongst grass.

Spores large, 11 to 18 x 7.5 to 9 μ .

Pileus conico-campanulate, yellowish-brown, hygrophanous, atomate when dry. Gills ascending. Stem brownish. On dung (with us) 187. *Galera tenera*.

Pileus broadly conical, dingy ferruginous, hygrophanous, atomate when dry. Gills ascending, crenulate. Stem whitish. Amongst buffalo grass 188. *G. crispa*.

Spores smaller, 9 x 4.8 μ .

Pileus campanulato-convex, dark brown, hygrophanous. Gills ascending, cinnamon brown. Stem pallid. On dung 189. *G. teneroides*.

Amongst moss.

Pileus campanulate, striate, watery cinnamon.

Gills tawny cinnamon. Stem brownish cinnamon. Spores 11 to 12.8 x 7.5 μ 190. *G. hypnorum*.

*** Pileus conico-campanulate, hygrophanous, rather even, when dry dotted with soft particles. Stem tense and straight. Gills ascending, inserted at the top of the cone, rather crowded. Veil none.'—Rea.

187. *Galera tenera* (Schaeff.) Fr. (L., *tener*, tender).—Pileus up to $\frac{1}{2}$ to $\frac{3}{4}$ in. (12 to 18 mm.), $\frac{3}{4}$ in. (10 mm.) high, conico-campanulate to hemispherical, submembranaceous, striate when moist, hygrophanous, somewhat atomate, yellowish-brown near Argus Brown (III.) when moist, drying Pinkish Buff (XXIX.). Gills ascending, adnate, narrow, somewhat crowded, cinnamon (near Sayal Brown, XXIX., or Brussels Brown, III.). Stem $1\frac{1}{4}$ to $2\frac{1}{2}$ in. (3 to 6.2 cm.) (British specimens, 3 to 4 in., 7.5 to 10 cm.), slender, fragile, equal or slightly swollen at the base, straight and tense, shining, brownish to pallid brownish (colour of the pileus), sometimes nearly whitish. Flesh of the stem distinct from that of the pileus. Spores elliptical, yellow-brown, 13 to 19 x 7.5 to 10.5 μ . On dung (in Australian specimens so far found). South Australia—Beaumont (Adelaide), Kangarilla (on horse dung), Mount Compass, Encounter Bay, Kinchina, Middleton, Mount Gambier. April, May, August, October. (Figure 22 B.)

Found with us on dung and recognisable by the conico-campanulate yellowish-brown pileus, ascending cinnamon-coloured gills, long brownish stem and large spores.

188. *Galera crispa* Longyear. (L., *crispus*, curled).—Pileus $\frac{1}{2}$ to $1\frac{3}{4}$ in. (1.2 to 3.5 cm.), $\frac{1}{4}$ to $1\frac{3}{4}$ in. (0.8 to 3.5 cm.) high, at first a mere rounded conical knob, becoming conico-campanulate, then expanding to become broadly conical, sometimes with an acute nubo, when moist substrate, finely atomate, the edge sometimes splitting, when moist dingy ferruginous (paler than Buffy Brown, XL.), pallid ferruginous or pale isabelline or dull whitish with a biscuity tint when dry, sometimes darker brown round the apex. Gills ascending, adnate, close, broad linear, a little crenulate, slightly ventricose, in three tiers, the second tier reaching half to three-quarter-way to the stem, the third tier very short, Cinnamon Brown (XV.) to rusty ferruginous. Stem up to $1\frac{1}{4}$ to 2 in. (4.4 to 5 cm.), slender, slightly flexuous, faintly striate and pulverulent, brittle, slightly hollow, base slightly bulbous, whitish to pallid with a brownish tint. Spores obliquely elliptical, yellow-brown, 11 to 17 x 7.5 to 9.5 μ , inflated cells round the edges of the gills about 19 μ long with bases 7.5 μ , ventricose, apices constricted with a rounded knob about 4 μ in diameter on top. Soon shrivelling and collapsing. On buffalo grass lawns usually. South Australia—University and other lawns in Adelaide after heavy rain, Mount Gambier (in grass). February to June. (Figure 23.)

A delicate species found commonly in buffalo grass lawns after the first autumnal rains, readily recognised by the shape, the dingy ferruginous pileus, ascending gills, whitish stem and large spores. The crisping of the gills is not marked in our plants.

[Photo. by S. Tee.

Figure 23.—*Galera crispa* Longyear (No. 188). On lawn, Adelaide.

189. *Galera teneroides* Peck. (L., *tener*, tender; Gr., *gios*, like—here presumably implying a resemblance to *G. tenera* Schaeff., Fr.)—Pileus $\frac{1}{2}$ in. (1.2 cm.), $\frac{3}{4}$ in. (10 mm.) high, campanulate-convex, striate, hygrophanous, dark brown (near Bistre, XL.) when moist, drying pale (near Tawny Olive, XL.). Gills ascending, adnate, moderately close, ventricose, near Cinnamon Brown (XV.). Stem $2\frac{1}{2}$ in. (6.2 cm.), slender, pallid with a brownish tint. Spores oblique, one end broader, pallid dingy brown, $9 \times 4.8 \mu$. On dung. South Australia—Mylor. May.

This species seems referable to the American *G. teneroides* Peck, though in the American plant the gills are described as narrow, not as ventricose. It can be recognised by its habitat (dung) and spores smaller than those of *G. tenera*.

*** Pileus membranaceous, campanulate, striate, smooth, hygrophanous, even when dry, opaque, slightly silky. Stem thin, lax, flexible. Gills broadly and planely adnate, broad, somewhat denticulate. Cortina very fugacious. Slender, growing amongst moss."—Rea.

190. *Galera hypnorum* (Schrank.) Fr. (L., *hypnum*, a moss).—Pileus up to $\frac{1}{2}$ in. (6 mm.), campanulate, umbonate, striate, watery cinnamon, paler when dry. Gills adnate, tending to be distant, tawny cinnamon. Stem up to 1 in. (2.5 cm.), slender, brownish cinnamon. Spores oblique, yellow-brown, 11 to occasionally $12.8 \times 7.5 \mu$. Amongst moss. South Australia—Greenhill Road. June.

A species recognisable by its habitat (amongst moss), campanulate, striate, watery cinnamon pileus, adnate tawny cinnamon gills and brown stem.

**** Pileus submembranaceous. Veil manifest, superficial, separating, at the first (chiefly round the margin) silky, and squamulose."—Rea.

No South Australian species recorded.

**Gills decurrent.

TUBARIA W.G.Sm.

(*L., tuba*, a trumpet.)

"Pileus fleshy or membranaceous; margin incurved. Stem central, cartilaginous. Gills decurrent or broadly adnate. Spores ochraceous, ferruginous or rarely fuscous; elliptical, pip-shaped or almond-shaped; smooth, continuous. Cystidia present. Growing on the ground or on wood."—Rea.

The species are characterised by the brown spores, central cartilaginous stem, decurrent gills and incurved margin. The number of species is small, and in South Australia only one or two have been recognised, small brown plants growing amongst grass or moss.

191. *Tubaria furfuracea* (Pers.) W.G.Sm. (*L., furfuraceus*, scurfy).—Pileus $\frac{1}{4}$ to $\frac{1}{2}$ in. (6 to 12 mm.), convex, usually imbricate, sometimes striate when moist, faintly sulcate round the edge, fibrillose-matt to velvety, markedly hygrophanous, Sayal Brown to Snuff Brown (XXIX.), pallid brownish when dry. Gills adnate to decurrent, moderately distant, deep Snuff Brown. Stem up to 1 in. (2.5 cm.), slender, mealy-fibrillose, rather shaggy below, cartilaginous, tough, slightly hollow, colour of the pileus. Spores oblique, dull brown, 7.5 to 9 x 4.2 to 5.2 μ . Single on the ground or amongst moss or grass. South Australia—Stouyfell (near Adelaide); Mount Lofty; amongst moss, etc., Mount Wedge, 20 miles north of Elliston, E.P.; Pinnaroo; MacDonnell Bay (S.E.). April, May, June, August.

192. *Tubaria furfuracea* (Pers.) W.G.Sm. var. *trigonophylla* (Laseh.) Fr. (Gr., *trigonos*, triangular; *phyllon*, a leaf).—Pileus and decurrent gills forming a double cone, in small plants $\frac{1}{2}$ in. (6 mm.) broad and a little more high. Pileus $\frac{1}{2}$ in. to 1 in. (6 to 25 mm.), convex, sometimes blunt at the apex, then nearly plane, usually becoming umbilicate, edge striate and rugose and inturred when young, surface dull to tomentose, hygrophanous, near Warm Sepia (XXIX.), near Hazel (XV.) or tawny brown, drying near Sayal Brown (XXIX.) or pallid, edge sometimes scorched-looking. Gills triangular, slightly to very deeply decurrent, moderately close to rather distant, near Sayal Brown (XXIX.), paler than the pileus. Stem 1 to $1\frac{1}{2}$ in. (2.5 to 4.3 cm.), slender, finely flocculose, fibrillose tomentose or striate, sometimes twisted, hollow, rather cartilaginous, near Sayal Brown (XXIX.) or near Hazel (XV.), slightly whitish at the base. Spores obliquely elliptical, pale or dull brown, 8 to 9.5 x 4.5 to 6 μ . Amongst grass or moss in sandy soil. South Australia—Monarto South, Encounter Bay. Pinnaroo. May, July, August.

d. Pileus confluent with the excentric or lateral stem, dimidiate, sessile or resupinate.

CREPIDOTUS Fr.

(Gr., *krepsis*, a man's boot; *ous*, an ear.)

"Pileus fleshy, excentric, lateral or resupinate. Stem lateral or none. Gills more or less decurrent or radiating from a central point. Spores ochraceous, ferruginous or fuscous; elliptical, subglobose, oval or fusiform; smooth, granular, verrucose or echinulate; continuous. Cystidia present. Growing on wood, rarely on the ground."—Rea.

The species of *Crepidotus* are characterised by the brown spores and by the stem being excentric, lateral or absent. They grow on wood, frequently in shelf-form and sometimes over-lapping (imbricate) when the support is upright. The shelf form is naturally most pronounced when the stem is absent or is lateral and very short. Two of our species are common in the Mount Lofty Ranges growing on the old outer bark of species of living *Eucalyptus* trees. One of these is often found also on fallen wood and strips of stringy-bark and has even been found on rotting bagging. One species (*C. globigerus*), occurring on dead trunks, is when fresh almost altogether whitish and may be mistaken for *Pleurotus* unless it is noticed that the gills have a faint brownish tint; a spores print on white paper or a microscopic examination at once however shows the brown colour of the spores. Four species have so far been found in this State. They appear to be of no economic importance.

KEY TO THE SPECIES.

On trunks (often of living trees), etc.

Stem definite but short.

Pileus pale brown to liver brown becoming shiny. Stem curved with a mealy white

bloom 193. *Crepidotus subhaustellaris*.

Laterally contracted, stem absent.

Pileus yellowish brown, fibro-villose to scaly.

Spores 7 to 10 x 5 to 6 μ 194. *C. eucalyptorum*.

Pileus dingy whitish drying brown. Spores

globose, 6 to 7.5 μ 195. *C. globigerus*.

At base of stumps or on the ground.

Pileus 1½ to 2½ in., furfuraceo-scaly, ochraceous

tawny to yellow ochre. Gills deeply decurrent,

sometimes anastomosing, buckthorn brown to

snuff brown. Stem ½ to ¾ in., nearly central to

almost lateral, pallid. Spores 8 to 9.5 x 4.8 to

5.5 μ 196. *C. prostratus*.

193. *Crepidotus subhaustellaris* Clel. (L., *sub*, here near to the species *C. haustellaris* Fr.).—Pileus at first a little pubescent knob on a pubescent base. When adult, pileus ½ in. (1.2 cm.) up to occasionally 1 in. (2.5 cm.) broad, ¾ to 1 in. (9 to 18 mm.) from before backwards, convex or irregularly convex, or almost flabelliform, often wavy and upturned, surface dull and matt becoming shiny, the edge turned in when young, near Light Pinkish Cinnamon (XXIX.) to near Wood Brown (XL), drying to Pale Alutaceous Buff (XV.), near Liver Brown (XIV.) towards the attachment. Gills adnate, close, many short, near Cinnamon Brown (XV.). Stem excentric or nearly lateral, short or very short, 1/16 to ¼ in. (1.5 to 3 mm.), curved, swollen below the gills, with a mealy white bloom, brownish beneath, and a fluffy base. Spore mass near Mummy Brown (XV.), spores microscopically pale dingy brown to dull vinous brown, elliptical, oblique, one side a little flattened and one end more pointed, 6.5 to 7.5 x 4 to 5 μ . On trunks of living Eucalypts (*E. capitellata* Sm., etc.), on old bagging and on a dead *Xanthorrhoea* scape. South Australia—Mount Lofty, National Park, Kuitpo. March to June, August to October.

194. *Crepidotus eucalyptorum* Clel. (*Eucalyptorum*, of Eucalypts).—Pileus ½ to 2½ in. (1.2 to 3.1 cm.) laterally, ½ to 1½ in. (6 mm. to 3.7 cm.) from before backwards, convex, sometimes flabelliform, sometimes a little gibbous, surface matt to fibro-villose, sometimes becoming fibrillose scaly, edge a little turned in, watery brown to yellowish brown, near Old Gold (XVI.), the villous projections Buff Yellow (IV.) to browner or a little paler than Saccardo's Umber (XXIX.), drying paler or sometimes to a dark biscuit brown. Gills moderately close to rather distant, pallid brownish, pallid dingy yellowish, pale yellowish brown or rather brown—paler than Saccardo's Umber (XXIX.), a little browner than Avellaneous (XI.). Flabelliform, laterally attached by a constricted base, no definite stem. Flesh thick at the centre (up to ¾ in., 10 mm.), white or pellucid soapy-looking. Spore mass near Raw Umber (III.), spores microscopically dull pale brown, oblique, 7.2 to 11 x 5.2 to 7.5 μ , occasionally 13 x 9 μ . On trunks of living Eucalypts (*Eucalyptus odorata* Behr et Schl., *E. leucosylon* F.v.M., etc.). South Australia—Botanic Gardens, National Park, Mount Lofty. May, June, July, August. Victoria. New South Wales.

195. *Crepidotus globigerus* Berk. (L., *globus*, a globe or ball; *gero*, to bear, in reference to the spores).—Pileus 1½ to 2½ in. (3 to 6.2 cm.) horizontally, to 1½ in. (3.7 cm.) antero-posteriorly, flabelliform, sometimes nearly plane, sub-villose or nearly smooth, finally villous, edge turned in when young, dingy whitish or Cinnamon Brown (XV.) becoming pallid brown or sometimes yellowish-brown. Gills laterally attached by a fluffy base which is 2 or 3 mm. long, moderately close, greyish white at first, when dry yellowish brown. Flesh white, not pellucid. Spores globose, dull brown, 6 to 7.5 μ . On fallen trunks, etc. South Australia—Mylor, National Park. New South Wales. May to August.

196. **Crepidotus prostratus** Clel. (L., *prostratus*, prostrate, in reference to its habit).—Pileus $1\frac{1}{4}$ to $2\frac{1}{2}$ in. (3 to 6.2 cm.) laterally, $1\frac{1}{4}$ to 2 in. (3 to 5 cm.) antero-posteriorly, smaller or larger, irregular, more or less convex with the centre depressed, furfuraceous-sealy or finely matt, splitting, edge intumed and sometimes substrate, hygrophanous, Ochraceous Tawny (xv.) to near Yellow Ochre (xv.) or Prout's Brown (xv.) drying near Tawny Olive (xxix.). Gills moderately close, $3/16$ in. (4.5 mm.) deep, pallid brown, then near Buckthorn Brown (xv.) or Snuff Brown (xxix.) or near Cinnamon Brown (xv.), deeply decurrent and sometimes anastomosing on the nearly central, excentric or almost lateral, short ($\frac{1}{2}$ to $\frac{3}{4}$ in., 1.2 to 1.8 cm.), rather broad (7 mm.), solid white or pallid stem. Spores elliptical, yellowish brown or dull brown, 8 to 9.5 x 4.8 to 5.5 μ . Caespitose and overlapping at the base of stumps, etc., or attached to buried wood in sandy soil or flattened on the ground. South Australia—Monarto South, Kinchina, and Coonalpyn. New South Wales—Bumberry. May, September.

E. SPORES PURPLE, FUSCOUS OR PORPHYRY COLOURED.
PORPHYROSPORAE.

(a) PILEUS DISTINCT FROM AND EASILY SEPARABLE FROM THE FLESHY STEM.

*With a ring on the stem and a volva at the base of the stem.

CHITONIELLA P. Henn.

(Diminutive of Gr., *chiton*, a coat of mail.)

At first covered with a universal veil which ruptures to form a volva. Pileus free from the stem. Gills free. Stem with a ring. Spores purple-brown.

No Australian species so far known.

**With a volva at the base of the stem but no ring.

CLARKEINDA O. Kuntze.

(After C. B. Clarke, an English botanist, and Gr., *Indos*, pertaining to India, where he worked.)

(= *CHITONIA* Fr.)

"Pileus fleshy, regular. Stem central, thin. Volva membranaceous, sheathing. Gills free. Spores brownish purple, elliptical, smooth, with an apical germ-pore. Growing on the ground."—Rea.

No Australian species so far known.

***With a ring on the stem but no volva.

PSALLIOTA (PSALIOTA) Fr.

(Gr., *psallon*, a ring.)

"Pileus more or less fleshy, regular. Stem central. Ring membranaceous, adnate, persistent, rarely fugacious. Gills free. Spores fuscous purple, reddish purple, blackish purple, or fuscous; elliptical, oval, globose, or obovate; with an apical germ-pore. Cystidia present or absent. Growing on the ground."—Rea.

Under *Psalliota* are placed the common field mushroom (*Ps. campestris*) and allied species. In Australia, *Ps. campestris* and its varieties and perhaps *Ps. arvensis*, the horse-mushroom, are the only agaries generally eaten and sold for food.

KEY TO THE SPECIES.

Gills bright pink even when young 197. *Psalliota campestris*.
 Gills for long pallid, never bright pink.

In fields, roadsides, etc.

Very large and stout, often in rings, cap

whitish, in fields 198. *Ps. arvensis*.

Relatively small, whitish, fragrant 199. *Ps. arvensis* var. *fragrans*.

Under bushes and trees.

White with buff-yellow stains 200. *Ps. xanthoderma*.

Amongst debris under Eucalypts.

Moderately large. Pileus cinnamon drab to

vinaceous fawn. Gills vinaceous fawn . . 201. *Ps. vinacea*.

197. *Psalliota campestris* (L.) Fr. (L., *campestris*, belonging to a plain). The Common Field Mushroom.—Pileus 2 to 4½ in. (5 to 11.2 cm.), white or rufescent, fleshy, convex, then expanded, obtuse, dry, silky-even or squamulose. Gills vivid fleshy-pink almost from their first recognition, at length purplish-brown (umber-fuscous), free, close, ventricose, equally attenuated both ways. Stem 1½ to 3 in. (3.7 to 7.5 cm.), white, firm, bulbous when young, then somewhat equal, even or squamulose. Ring white, membranaceous, median, spreading or reflexed, torn, often fugacious. Flesh white, becoming slightly reddish or fuscous, thick, soft. Spores brownish purple, broadly elliptical, 6 to 7 x 5 to 5.5 μ . Smell and taste pleasant. South Australia—In suitable places probably throughout the State except portions of the arid interior. All the other Australian States. Europe, America, etc. April, May.

The Common Field Mushroom is abundant, probably throughout the State, under suitable weather conditions, and especially after the first heavy autumnal rains. It is characterised by the gills being bright pink even in early stages, by the white or whitish cap sometimes scaly, by the veil which ruptures to form an evident ring and by the absence of a volva or cup at the base of the stem. The form found in fields amongst grass is usually rather small and has a smooth white pileus. Large specimens, often growing in more sandy soils, tend to be more squamulose.

198. *Psalliota arvensis* (Schaeff.) Fr. (L., *arvensis*, belonging to cultivated fields). The Horse-Mushroom—Very large, forming rings up to 33 ft. in diameter. Pileus 2½ to 7 in. (6.2 to 17.5 cm.), at first irregularly subspherical or quadrilateral-hemispherical, then deeply convex, stout, white becoming a little brownish (brownier than Avellaneous, XL) or with tints of yellow, with scattered adpressed ligulate sometimes brown scales. Gills free, close, for long pallid whitish or Light Buff (XV.), then dull pinkish, finally purplish brown. Stem up to 3 in. (7.5 cm.), at first short, very stout, up to 1½ in. (3.7 cm.) thick, equal, sometimes slightly bulbous below, silky white, sometimes with yellow tints, sometimes floccose below. Ring ample, distant, with floccose fragments below. Flesh white usually without any yellow tint, brownish where insect-eaten. Spores elliptical, brownish purple, 6 to 9 x 3.5 to 5.5 μ . Often in rings. Edible. South Australia—Flats near Kulangadoo—rings 31 ft. in diameter; Encounter Bay—a ring on the Bluff had a diameter of 33 ft. in 1926; Kinchina; Mount Lofty; Adelaide; and probably in suitable localities throughout the southern portion of the State. April to June, August.

This is a large and coarser species of mushroom characterised by the gills being at first whitish, passing through a pink stage which is less vivid than in *Ps. campestris* to the final purplish-brown. The ring is typically double and the plants sometimes grow in large "fairy rings." It is edible and probably many of the mushrooms sold in the Adelaide shops belong to this species rather than to *Ps. campestris*. It is possible that it may disagree with some people who are unable to digest it. It is certainly less delicate, and coarser (hence the name "horse")—also applying to its size—similarly used in horse-chestnut), than the Field Mushroom. An Adelaide University student on one occasion ate some mushrooms which from the rather coarse appearance and a slight smell of iodoform seem to be this species or one of its varieties; the spores measured 7 x 5 μ ; he vomited slightly after twenty minutes and was violently sick two hours later; his hands, fingers, and feet felt cold and he passed three motions; there were no further ill effects.

In Sydney there is a tall-stemmed variety (*Ps. arvensis* var. *iodoformis* Clel. et Cheel) which has an unusually strong smell like iodoform. Not only is this noticed in the field, but in an instance when these mushrooms were being cooked the whole house smelt strongly of iodoform which was noticeable at the front door and led to inquiries as to sickness. Though I have tasted this variety, the iodoform smell prevented my doing more. However, some ladies on the North Shore line in Sydney ate some and felt seriously ill afterwards.

199. *Psalliota arvensis* (Schaeff.) Fr. var. *fragrans* Clel. et Cheel. (L., *fragrans*, fragrant).—Pileus up to 3½ in. (8.7 cm.), usually much less, at first hemispherical, then convex, sometimes conical with a depressed centre, sometimes gibbous, smooth, shining, pure white, sometimes with faint rusty or yellowish stains, when bruised turning yellowish. Gills free or just reaching the stem, close, whitish for long, then pallid greyish or pale creamy pink, finally purplish brown or paler than purple-black. Stem 3½ in. (8.7 cm.) or less, sometimes up to ½ in. (1.2 cm.) thick, slender or stout, slightly hollow or solid, with a pointed root, white, sometimes later with a reddish tint. Texture sometimes tougher than that of *Ps. campestris*, the Field Mushroom. Spores 5.2 to 8.5 x 3.4 to 5.2 μ . Slight but definite fragrant smell. South Australia—Under *Pinus* and amongst grass by the wayside, Glen Osmond (Adelaide). April to July.

This is a small form of the Horse Mushroom characterised by a definite fragrant smell.

200. *Psalliota xanthoderma* Genev. (Gr., *xanthos*, yellow; *derma*, skin).—Pileus up to 3 in. (7.5 cm.), subglobose, then convex, nearly smooth but with a tendency to thin fibrillose scales, pure white with stains of Buff Yellow (iv.) appearing especially when bruised but also naturally. Gills free, rather narrow, pallid drab when young, then cinereous near Light Drab (XLVI.). Stem up to 2 in. (5 cm.), rather stout (up to ¾ in., 1.8 cm.), equal, smooth, sometimes slightly bulbous at the base, slightly hollow, white with buff-yellow stains. Ring rather distant, distinct, narrow, double with the lower part narrow and adpressed to the stem, stained buff-yellow. Flesh thickish. Smell faint. Spores dull vinous, 5.2 to 6.5 x 3.7 to 4.8 μ . Often under trees. South Australia—Fullarton, Glen Osmond, Adelaide Hospital grounds. June, July.

This mushroom is readily recognised by the stains of buff yellow appearing on the pileus and stem, especially when injured, and by the gills not passing through a bright pink stage but presenting a cinereous tinge. It usually grows under trees or shrubs. The writer has eaten it but found it less palatable than the Field Mushroom. It is said to be "poisonous" to some persons, which probably means that it may upset them but not that it can cause a fatal issue.

201. *Psalliota vinacea* Clel. (L., *vinaceus*, wine-coloured).—Pileus up to 4 in. (10 cm.), at first conico-hemispherical, then convex, finally expanding, covered with adpressed fibrils or fibrillose-squames, Cinnamon Drab (XLVI.) to a vinaceous brown. Gills free, rather close, when young pallid (Tilleul Buff, XL.), later Light Vinaceous Fawn (XL.), tints of pink never so vivid as in the Common Field Mushroom. Stem 3 to 3½ in. (7.5 to 8.7 cm.), stout (¾ in., 1.2 cm., or more in diameter), clad with floccose fibrils below the ring, sometimes a little bulbous at the base, rather rooting, solid or with a trace of hollowness, whitish. Veil white, underside rather floccose, ring ample, rather distant. Flesh of the stem turning slightly brownish towards the periphery. Spores purplish brown, 5.5 x 3.5 μ . Amongst fallen sticks, etc., under Eucalypts. South Australia—National Park. June.

Characterised by being a large species of mushroom growing amongst the debris of sticks and chips under Eucalypts in hilly forest country, by the vinaceous brown colour of the pileus due to abundant adpressed fibrils, by the gills at first pallid and never as rich a pink as in the Common Field Mushroom, though on the other hand not dingy, by the floccose appearance of the underside of the white veil, and by the floccose fibrils on the stem below the ring.

****Without a ring or a volva.

PILOSACE Fr.

(Gr., *pilos*, a cap; *sakos*, a shield.)

“Pileus fleshy, regular. Stem central, stout. Gills free from the stem. Spores bay purple, globose, smooth, with a germ-pore. Growing on the ground.”—Rea.

No Australian species so far known.

(b) PILEUS CONFLUENT WITH AND HOMOGENEOUS WITH THE FLESHY STEM.

*With a membranous ring on the stem.

STROPHARIA Fr.

(Gr., *strophos*, a belt.)

“Pileus fleshy, regular. Stem central. Ring membranaceous, adnate, persistent or fugacious. Gills more or less adnate. Spores purple or fuscous, rarely blackish, elliptical, elliptic-oblong or pip-shaped, smooth with an apical germ-pore. Growing on the ground, on dung, or on wood, sometimes caespitose, sub-caespitose or fasciculate.”—Rea.

The genus is readily recognised by the more or less evident ring on the stem, the latter not being readily separable from the pileus, and by the purple or fuscous spores, a colour which is recognisable in the tint of the mature gills. Only four (or five) species have hitherto been found in the State, one of which grows in lawns and gardens and the others on dung. In the case of *S. merdaria*, the incompleteness or absence of the ring leads to the placing of the species by some authors under *Psilocybe*.

KEY TO THE SPECIES.

Not growing on dung. Medium sized 202. *Stropharia obturata*.
Growing on dung or manured soil.

Ring obvious.

Pileus persistently hemispherical 203. *S. semiglobata*.

Pileus hemispherical, then expanding 204. *S. stercorearia*.

Pileus with a more or less acute umbo. Smell

musty 205. *S. umbonatuscens*.

Ring incomplete, often not recognisable 206. *S. merdaria*.

A. Pellicle of the pileus even or scaly, usually viscid.

*Not growing on dung.

202. *Stropharia obturata* Fr. (L., *obturatus*, stopped up).—Pileus up to 1½ in. (3.7 cm.), light yellow (Buff Yellow, iv.) becoming slightly browner, convex, then plane or a little upturned, obsoletely viscid, commonly dry, smooth, tending to crack rimosely. Gills very slightly sinuate or adnexed (adnate in British plants), crowded, pallid whitish, then dingy greyish (near Deep Quaker Drab, li.). Stem 1 to 2 in. (2.5 to 5 cm.), slightly attenuated downwards, firm, often a little flexuous, solid, somewhat mealy above the ring, silky-shining and slightly fibrillose below. Veil white, appendiculate to the margin of the pileus when young. Ring superior or subdistant, white, reflexed, sometimes disappearing in old plants. Spores obliquely elliptical, purplish-vinaceous to purplish-brown, 5.5 to 8 x 3.5 to 5.6 μ . On the ground in lawns and amongst grass in gardens, etc. South Australia—University lawns, Beaumont Common, Hallett's Cove, Encounter Bay. New South Wales. February, April to June, after rain.

This species is not uncommon in lawns and amongst grass or in gardens. The pileus is buff-yellow, the gills have a dingy greyish appearance, the superior ring is usually well marked and the stem is rather short.

**Growing on dung.

203. *Stropharia stercorearia* Fr. (L., *stercorearius*, of dung).—Pileus 1 in. (2.5 cm.), more or less hemispherical, then expanded, obtuse, viscid, often exceedingly so, yellow. Gills adnate, very broad, whitish, then umber fuscous or olivaceous fuscous (or clouded with black). Stem $2\frac{1}{2}$ to 4 in. (3.7 to 10 cm.), rather slender, equal, stuffed with a separable fibrous pith (or hollow), smooth, smeared with the glutinous veil, yellowish. Ring viscid, distant, thin, usually obvious. Flesh pallid, thin. Spores fuscous purple, elliptical, 14 to 24 x 7 to 12 μ , usually 16 to 19 x 9 to 10 μ . On dung (horse and cow), common after rain. South Australia—Adelaide district and probably throughout the State, Kalangadoo. May.

S. stercorearia and *S. semiglobata* (Batsch) Fr. are very closely allied species, if not forms of one species. The features of *S. semiglobata* are said to be the persistently hemispherical cap, in some descriptions hollowness of the stem, the gills clouded with black, and the spores slightly smaller. Australian plants have caps which frequently expand, stems which are sometimes hollow, gills which are clouded with black, and spores which may exceed in both directions the limits given for the two species. We prefer to place them all under *S. stercorearia*.

The species is recognisable without difficulty by its habitat, the yellow, very viscid hemispherical cap tending to expand, and the large fuscous purple spores.

204. *Stropharia umbonatescens* Peck. (L., *umbonatescens*, growing an umbo).—Pileus $\frac{1}{2}$ to 1 in. (1.2 to 3.1 cm.), at first acutely conical, then convex with an acute often papillate umbo, finally expanding and becoming nearly plane, viscid, yellowish-brown, darker in the centre. Gills adnate, moderately distant, dark grey then sooty brown. Stem 3 to $4\frac{1}{2}$ in. (7.5 to 11.2 cm.), slender, fibrillose squamulose below, hollow, pallid with a slight brown tint. Ring superior or moderately distant, as a blackish ring, evanescent. Decided mouldy smell. Spores elliptical, purplish, 15.5 to 20.5 x 8.5 to 12 μ . On dung. South Australia—Near Beaumont, Encounter Bay. New South Wales. United States of America. April, May.

This species is dung-inhabiting and readily recognisable by its long slender stem, yellowish-brown sticky cap with an acute umbo, the decided musty smell, and the large purplish spores.

205. *Stropharia merdaria* Fr. (*Psilocybe merdaria* Fr., Rick.) (L., *merdarius*, of dung).—Pileus usually $\frac{1}{2}$ to 1 in. (1.2 to 2.5 cm.), convex, subviscid to viscid when moist, the edge inturned when young and with whitish fragments of the flimsy veil, when moist sometimes dark brown and the edge slightly striate, when drier light tan-coloured, yellowish brown, dirty pale chestnut or dark brown (Sayer Brown, xxix., more ochraceous than Cinnamon Butt, xxix., near Ochraceous Tawny, xv.). Gills adnate with a trace of decurrence, close to moderately distant, rather triangular, at first pallid (near Isabella Colour, xxx.), finally fuscous or clouded greyish-brown, edges usually whitish and finely serrate. Stem up to 1 in. (2.5 cm.) or more (up to 3 in., 7.5 cm., in British specimens), apex striate, mealy fibrous, downy at the base, moderately slender, sometimes hollow, pallid to pallid brownish. Ring rarely evident, distant. Flesh white. Spore mass dark fuscous brown; spores microscopically dull brown with a porphyry tint to purplish brown, elongated oval, 12 to 18.7 x 6.5 to 9.5 μ . On or near dung. South Australia—Adelaide district, Mount Lofty, Mount Compass, Encounter Bay. May, July, August, October.

B. Pileus without a pellicle but innato-fibrillose, not viscid.

No South Australian species recorded.

**Gills sinuate.

HYPHOLOMA Fr.

(Gr., *huphē*, a web; *lōma*, a fringe.)

“Pileus fleshy, regular, firm or fragile. Stem central, fibrous or fleshy. Gills sinuate, sinuato-adenate or adnexed. Spores purple, fuscous or cinereous purple; elliptical, subglobose, pip-shaped or reniform; smooth, rarely verrucose; with an

apical germ-pore. Cystidia present or absent. Growing on wood, more rarely on the ground, often densely caespitose or fasciculate.'—Rea.

The species grow on decaying wood, often forming dense caespitose masses at the bases of stumps, or on the ground. The veil of the young state does not leave any ring on the stem but may remain as a fringe on the edge of the pileus. The species are divided into two sections, one with the pileus compact and firm and the other with it thin and fragile.

KEY TO THE SPECIES.

Pileus firm, compact, not hygrophanous, dull reddish, orange or yellow, caespitose.

Pileus yellowish-green. Gills sulphur-yellow becoming green 206. *Hypholoma fasciculare*.

Pileus tawny to ochraceous orange (brick-red in European specimens). Gills dull citrine. Stem shaggy 207. *H. sublateritium*.

Pileus rather fragile, often hygrophanous, rarely red or yellow.

Pileus becoming pinkish buff, cinnamon buff or clay-colour. Gills whitish becoming dingy pallid, finally fuscous. Stems white. Usually caespitose round stumps 208. *H. incertum*.

*Colour of the tough, smooth, dry pileus bright, not hygrophanous.

206. *Hypholoma fasciculare* (Huds.) Fr. (L., *fascicularis*, in little bundles).—Pileus $\frac{3}{4}$ to 2 in. (1.8 to 5 cm.), fleshy, convex, then flattened, obtuse, smooth, dry, ochraceous tawny, cinnamon rufous or hazel with yellowish green tints round the periphery, sometimes with fragments of the veil round the edge, the veil rarely leaving a definite ring round the stem. Gills sulphur yellow, then serpentine green, crowded, adnate, linear. Stem 2 in. (5 cm.) or more, the colour of the pileus, equal, base attenuated, incurved or flexuose, fibrillose. Flesh yellow, thin. Spores porphyry-coloured, 6.5 to 8 x 3.5 to 5 μ . Australian plants are only slightly bitter (European very bitter). Densely caespitose at the bases of stumps. South Australia—Kuitpo, Mount Lofty, National Park, Caroline State Forest (S.E.) (bitter). May to August. (Figure 24 A.)

[Drawings by E.R.C.]

Figure 24.—A. *Hypholoma fasciculare* (Huds.) Fr. (No. 206). National Park.

B and C. *Psilocybe echinata* Clel. (No. 218). Mount Lofty.

This species is common, often forming dense caespitose masses round the bases of old stumps. It can be readily recognised by the yellowish-green edges to the cap and the same colour in the gills when young and in the flesh. The bitter taste is slight.

207. *Hypholoma sublateralium* (Schaeff.) Fr. (L., *sub*, somewhat; *lateralium*, brick-coloured).—Pileus 1½ in. (3.7 cm.), convex, matt, sometimes with a few minute, white, twisted groups of fibrils from the veil, edge turned in when young, near Tawny (XV.) in the centre to near Ochraceous Orange (XV.) at the periphery. Gills adnate, moderately close, Dull Citrine (xvi.). Stem 2 in. (5 cm.), moderately stout (1 cm. or more thick), attenuated downwards and sometimes upwards as well, intensely shaggy-fibrillose from the veil up to a fairly definite ring, smooth above, very hollow, pallid with brownish tints below, citrine above. Flesh yellowish, reddish in places in the pileus. Taste slightly bitter. Spores oblique, porphyry-coloured, 7.5 x 3.7 μ . Densely caespitose at the base of stumps. South Australia—Mount Lofly. June.

There is doubt as to the identification of these Australian plants which may be merely a colour form of *H. fasciculare*. The colour of the pileus of British plants is given by Rea as "tawny-brick-red," paler round the margin.

**Pileus smooth, hygrophanous, margin appendiculate with the veil.

208. *Hypholoma incertum* Peck (L., *incertus*, uncertain).—Pileus ¾ to 1½ in. (1.8 to 3.2 cm.), irregularly convex becoming plano-convex or nearly plane, mealy when young and closed by a fibrillose white veil which ruptures to leave appendiculate fragments, Pinkish Buff (XXIX.) round the edge, Cinnamon Buff to sometimes Clay Colour (XXIX.) in the centre. Gills adnate-adnexed, rather close, narrow, pallid becoming greyish then Fuscous (XLVI.). Stem 1½ in. (3.7 cm.), moderately slender, equal, fibrillose, apex striate, slightly hollow, white. Flesh of pileus and stem white, homogeneous. Spore mass fuscous, spores microscopically bronze coloured, 7.5 to 9 x 4.5 to 5 μ . On the ground often near stumps. South Australia—Encounter Bay, Adelaide (in a clump of "bamboos"—Spanish reeds). May, October.

Specimens, single or in clusters in a recently cleared field containing old stumps at Willunga Hill in May, 1931, had the pileus when moist between Drab and Hair Brown (XLVI.), surface matt, somewhat rivulose, edge turned in when young with appendiculate remains of the veil; gills adnate, becoming near Benzo Brown (XLVI.); stem up to 2 in. (5 cm.), slightly fibrillose, sometimes slightly mealy above; flesh of the stem brittle, seeming to differ from that of the pileus with a sharp line of demarcation.

There seems to be considerable difficulty in distinguishing *H. Candolleianum* Fr. from *H. appendiculatum* (Bull.) Fr. Rea ("British Basidiomycetes") describes the former as having the veil white, at length fuscous; apex of the stem striate; and the gills violaceous, then fuscous cinnamon, edge at first whitish, rounded-adnexed, then separating. *H. appendiculatum* has a white, fugacious veil, the apex of the stem pruinose and the gills white, then flesh-colour, at length fuscous, subadnate. Both species are hygrophanous.

Kauffman ("The Agaricaceae of Michigan") records *H. incertum* Peck., which he considers to be the American form of *H. Candolleianum* Fr. Peck gave the American plant a name because it did not agree with Fries' description of "gills at first violaceous." Ricken however, Kauffman points out, described European plants as having "gills at first white, then sordid-rosy or violaceous." Of *H. incertum*, Kauffman says that the margin of the pileus is "at first hung with loose shreds of the veil, in age often violaceous, lilae towards margin"; gills adnate-seceding, at first white, then pale dingy lilae or rosy-brown, finally purplish or darker, edge minutely white fimbriate; stem flocculose or mealy above; gregarious, subcaespitose or scattered, on lawns, roadsides, fields, or rarely in woods amongst sticks and debris, nearly always around old stumps or buried remains of stumps, roots, or decayed wood. A variety *sylvestris* occurs in woods; it is mostly solitary and long-stemmed, occurring amongst decayed sticks or leaves and has spores "perhaps slightly longer and slightly variable in shape."

In the Australian plants collected, I have never seen what might be termed a "flesh-colour" in the gills. They are at first whitish and pass through a dingy lilae tint to fuscous. It seems best to assign them to *H. incertum* Peck, with the description of which they agree well.

(c) PILEUS CONFLUENT WITH, BUT HETEROGENEOUS FROM, THE CARTILAGINOUS STEM.

*Gills adnate or sinuato-adnate.

†Margin of pileus at first incurved, or exceeding the gills.

PSILOCYBE Fr.

(Gr., *psilos*, naked; *kybe*, a head.)

“Pileus fleshy, regular; margin at first incurved. Stem central, cartilaginous. Gills adnate, sinuato-adnate or adnexed. Spores purple, fuscous or rarely pinkish fuscous; elliptical, pip-shaped, almond-shaped or oblong elliptical; smooth or verrucose; with an apical germ-pore. Cystidia present. Growing on the ground or on wood, solitary, gregarious, caespitose or subcaespitose.”—Rea.

The species of *Psilocybe* grow on the ground, on decayed wood or round stumps. The veil is scarcely noticeable or absent entirely—hence the name—and there is in consequence no ring nor fragments of it appendiculate to the margin. The genus corresponds to *Collybia* amongst the white-spored species. The margin of the pileus is incurved when young. We possess several species, some of moderate size, amongst these being *Ps. sarcocephala* which somewhat resembles the common mushroom, *Ps. Ceres* of a beautiful Morocco or tomato red, and the tall-stemmed *Ps. subaeruginosa* with its cap often blotched with bluish green. One species grows in sand, two are common on dung, another is found amongst moss, and others on rotting logs or stumps.

KEY TO THE SPECIES.

Large, 1 to 3in.

Pileus fleshy, pinkish brown to brownish tan. Gills near mushroom pink. Spores dull vinous-brown, 8.5 to 9 x 4 to 5.5 μ 209. *Ps. sarcocephala*.

Pileus brightly coloured with Morocco red, tomato red, vinaceous rufous, etc. Gills greyish brown becoming purplish brown. Spores purplish brown, 10 to 12 x 5.6 to 7 μ 210. *Ps. Ceres*.

Pileus brownish, more or less evidently blotched with bluish-green. Stem tall (2 to 5in.), slender, similarly blotched. Spores purplish fuscous, 11 to 14 x 6.4 to 9 μ 211. *Ps. subaeruginosa*.

Pileus 3in., brownish, shaggy from fibrils. Stem 6in., shaggy. Spores rough, becoming black, 8.5 to 12 x 7 μ . Densely caespitose in old stump . . 212. *Ps. asperospora*.

Smaller, rarely more than 1in.

Growing on very sandy soil.

Pileus semimembranaceous, hygrophanous, dark brown becoming cinnamon buff. Stem long, the buried half sand-encrusted. Spores fuscous, 11 to 13 x 5.5 to 6 μ 213. *Ps. subammophila*.

Growing on dung, hygrophanous.

Gills adnate, passing straight to the stem, rather triangular, sometimes with a decurrent tooth. Spores large.

Pileus cinnamon to yellow and ochraceous, convex, hygrophanous, slightly viscid. Ring often evanescent. Stem usually about 1in., pallid 205. *Stropharia merdaria* (*Psilocybe merdaria*).

Pileus isabelline to ochraceous, c lato-convex or hemispherical, subviscid. Stem tall, usually 3in. 214. *Psilocybe subuda*.

Gills adnate, typically subtriangular. Spores 6.5 x 5 μ .

Pileus tawny, russet or cinnamon brown. Stem dark brown 215. *Ps. subviscida*

Gills ascending.

Pileus dark brown, drying pale brownish, edge striate when moist. Gills fuscous. Stem 2 in., slender. Spores dark purplish brown to porphyry, 12 to 14.5 x 7 to 8 μ 217. *Ps. stereicola*.

Amongst moss.

Pileus about $\frac{1}{2}$ in., umbonate. Stem pallid brownish. Spores porphyry-coloured, 7.5 to 10.5 x 5 to 6 μ 216. *Ps. musci*.

At the base of rotting stumps.

Densely echinulate when young. Pileus dark fuscous, drying paler. Spores bronzy brown, 7 to 7.5 x 4 μ . Subcaespitose . . 218. *P. echinata*.

Amongst grass, on lawns, etc.

Pileus campanulato-convex, dingy brown. Gills adnate, fuscous, edges white. Stem to $\frac{1}{2}$ in., slender, rufescent. Spores brownish-black, 11.2 to 13 x 7.5 μ 219. *Ps. foenicescens*.

I. Veil accidental, rarely conspicuous. Stem thick-skinned, flexible, most frequently coloured. Pileus pelliculose, most frequently slightly viscid in wet weather, becoming somewhat pale. Colour of pileus bright.

*Gills ventricose, not decurrent.

209. *Psilocybe sarcocephala* Fr. (Gr., *sarr.*, flesh; *kephale*, a head).—Pileus 2 to 3 in. (5 to 7.5 cm.), at first almost hemispherical, when adult convex and a little irregular or slightly dimpled, finally sometimes with the edge upturned, sometimes slightly gibbous, when young Cinnamon Buff (XXIX.) with Russet (XXIX.) tints, then Sayal Brown (XXIX.) or Mikado Brown (XXIX.) or Orange Cinnamon (XXIX.) in the centre, paler and fleshy white towards the periphery, sometimes pallid with a brownish tint all over, slightly viscid when moist, smooth to slightly fibrillose. Occasionally a fibrous or arachnoid veil is seen when young, leaving fibres or a slight ring on the stem. Gills slightly but definitely sinuate, broadly adnexed, occasionally adnate, moderately close, ventricose, at first nearly white, then pallid salmon-coloured, then almost a mushroom tint but not so vivid (Buff Pink, XXVIII.), finally brownish-salmon. Stem $1\frac{3}{4}$ to 3 in. (4.3 to 7.5 cm.), $\frac{1}{4}$ to $\frac{1}{2}$ in. (6 to 12 mm.) thick, stout to slender, mealy above, slightly fibrillose, base a little thickened, solid or somewhat hollow, white, sometimes stained fuscous brown below. Flesh white, moist looking. Slight smell like mushrooms. Caespitose or gregarious. Spores in the mass dull vinous brown, microscopically dull brown with a vinous tint, oblique, one end more pointed, 8.5 to 11 x 4 to 5.5 μ , occasionally 13.5 x 5.5 μ . Under trees and bushes. South Australia—Mount Lofty, Mylor, McLaren Vale, Mount Burr State Forest (S.E.). New South Wales. May to July.

The above description is from Australian specimens referred to this species. *P. sarcocephala* is edible but Australian plants have not been eaten. The task of thus testing them should be undertaken with the utmost circumspection. The species resembles somewhat the common mushroom but does not grow in the same situations; the tints of the cap are however not quite the same, the gills are not so vividly pink, and there is no well-marked ring on the stem. The species is anomalous in the purple-spored group, as the spores are only slightly vinous. It is apt to be looked for amongst the brown or even the pink-spored species.

210. *Psilocybe Ceres* Cke. et Mass. (L., *Ceres*, the Goddess of Corn).—Pileus up to $1\frac{1}{2}$ in. (3.7 cm.), convex, then expanded and slightly umbonate, smooth, the veil separating early and remaining slightly attached to the edge of the pileus, colour various tints of reddish brown (morocco red, apricot orange, vinaceous rufous, brick red or in places near the colour of tomatoes). Gills sinuato-adnexed, moderately crowded, greyish-brown becoming purplish-brown (Prout's Brown, XV., Sacardo's Olive, XVI.). Stem up to 4 in. (10 cm.), wavy, slender, shining, faintly striate, firm and cartilaginous, the base slightly swollen and attenuated upwards, strigose at the base, solid, later hollow, reddish brown below and pale above or the colour of the pileus but paler. Spores elliptical,

purplish brown, thick-walled, 10 to 12.5 x 5.6 to 7 μ . Occasionally caespitose. On rich soil, sometimes under trees, rarely on dung. South Australia—Waterfall Gully, Glen Osmond, National Park. April, May, August, September.

A handsome medium-sized species recognised by the vivid colours of the cap and the purplish brown gills.

211. *Psilocybe subaeruginosa* Clel. (L., *aeruginosa*, full of copper rust; *sub*, here near to the species *Stropharia aeruginosa* (Curt.) Fr.).—Pileus $\frac{3}{4}$ to 2 in. (1.8 to 5 cm.), when young conical to conico-convex, then convex and usually a little upturned, subumbonate or sometimes with a small acute umbo, smooth, periphery a little striate, edge inturned when young, hygrophanous, Buffy Olive (xxx.), often with bluish-green blotches, drying pallid biscuit brownish (Tawny

[Drawing by E.R.C.]

Figure 25.—*Psilocybe subaeruginosa* Clel. (No. 211).
Mount Lofty.

Olive, xxix., or yellower than Warm Buff, xv., when dry; Dresden Brown, xv.; Dusky Green-blue, xx., when dry near Cinnamon Buff, xxix., or paler; Saccardo's Umber to Bister, xxix., when dry near Cream Colour, xvi., or Chamois, xxx.). Gills adnate to broadly adnexed sometimes with lines running down the stem, $\frac{1}{4}$ in. (6 mm.) deep, moderately close, slightly ventricose, in three series, the middle one reaching half-way to the stem, pallid smoky brown becoming brownish-fuscous (near Natal Brown, xl., when old; Snuff Brown, xxix.; near Buffy Olive, becoming dingier; Fuscous, xlvi.). Stem tall, 2 to 5 in. (5 to 12.5 cm.), equal or slightly attenuated upwards, rather slender, finely striate, mealy above, fine fibrils sometimes adherent below, base a little swollen passing sometimes

into a broad mass of white mycelium, stuffed with white, sometimes hollow, cartilaginous, flesh heterogeneous from that of the pileus, pallid whitish streaked with dark greyish-brown and often blotched with greenish-blue (Prussian Green, XIX., or a little paler; Dusky Blue Green, XX.). Closed with a cobwebby whitish veil when young, occasionally leaving indefinite traces of a somewhat superior ring. Flesh of pileus whitish, of stem becoming brownish. No smell. Spores in the mass purplish fuscous, microscopically rather elliptical, one side flattened, dark brown to dull purplish brown, 11 to 14 x 5.5 to 9 μ . Single or gregarious, amongst grass, once on horse-dung. South Australia—National Park, Mount Lofty, Morialta, Waterfall Gully. New South Wales. Victoria. April to August. (Figure 25.)

*Gills plane, very broad behind, somewhat decurrent (Genus *DECONICA* W.G.Sm.).

212. *Psilocybe asperospora* Clel. (L., *asper*, rough; Gr., *spora*, seed).—Pileus 3 in. (7.5 cm.), conico-convex, slightly gibbous, brownish and shaggy with fascicles of fibres, these leaving later dark brown, almost black, threads on the pileus. Gills adnate, often with a slight decurrent tooth, moderately close, dark brown, blotchy as seen with a hand lens. Stem up to 6 in. (15 cm.), rather stout, a little wavy, much fibrillose and shaggy below from the universal veil, many fibrillae being thread-like and dark, the upper $1\frac{1}{2}$ or 2 in. (3.7 to 5 cm.) finely pruinose with minute punctate dark dots, slightly hollow, pallid with brownish and smoky patches. In young specimens the veil may be seen rupturing; there is no definite ring but the shaggy part of the stem indicates where the veil was. Spores rough, mulberry-like, oval, oblique, one end a little truncate, dark bronze or black, 8.5 to 12 x 7 μ . Densely caespitose in the hollow of an old stump. South Australia—National Park. April.

This rather remarkable species seems to be probably a *Psilocybe*. The shaggy pileus, caespitose habit, tall stem and rough spores which become black make it readily recognisable. Specimens were last obtained in 1917 near the upper end of Long Gully in National Park but, though the site where they occurred has been frequently inspected since, they have not again been found. The gills, though showing a trace of decurrence, are not very broad behind and the species hardly belongs to *Deconica*.

213. *Psilocybe subammophila* Clel. (L., *sub*, somewhat; Gr., *ammos*, sand; *philos*, loving).—Pileus 1 in. (2.5 cm.), convex, subgibbous, sometimes slightly striate when moist and a little rugulose and shining when dry, edge a little turned in when young, hygrophanous, dark brown when moist becoming near Cinnamon Buff (XXIX.). Gills adnate, slightly ventricose, moderately close, becoming near Warm Sepia (XXIX.). Stem long, up to 3 in. (7.5 cm.), slightly attenuated upwards, slender, fibrillose, solid, the lower half buried, thickened and sand-encrusted, pallid with a brownish tint. Spores fuscous, elliptical, oblique, 11 to 13 x 5.5 to 6 μ , no cystidia seen. In sandy soil. South Australia—Near Kinchina, Henley Beach. April, May.

214. *Psilocybe subuda* Clel. (L., *uda*, moist; *subuda*, here near to the species *Ps. uda* (Pers.) Fr.).—Pileus $\frac{3}{4}$ to 1 in. (1 to 2.5 cm.), $\frac{3}{4}$ to 9/16 in. (10 to 13 mm.) high, campanulate-convex or hemispherical, not umbonate, viscid or slightly so, not or rarely striate, near Isabella Colour (XXX.) or Ochraceous Tawny (XV.) in the centre and Olive Ochre (XXX.) near the edge. Gills adnate, triangular, passing straight to the stem, up to 1 cm. deep, moderately close, at first yellowish-green then clouded dark grey (Chaetura Drab, XLVI.), edges whitish. Stem usually $2\frac{1}{4}$ to 3 in. (6.8 to 7.5 cm.), slender, equal, shining, sometimes slightly striate, slightly hollow, pale brownish to yellowish brown (the colour of the pileus or paler). No smell. Spores elliptical, dark porphyry-coloured (like the spores of *S. stereoraria*) or purplish-brown, 13 to 19 x 8.5 to 10 μ . On horse-dung and rabbit's dung. South Australia—Mount Compass, Myponga, National Park, Waterfall Gully. May, July, October.

This is evidently the dung-inhabiting species placed, more or less provisionally, under *Ps. uda* (Fr.) Battaille by Kauffman in his "Agaricaceae of Michigan." As the latter species grow on sphagnum, it seems better to treat the dung-inhabiting species as distinct.

215. *Psilocybe subviscida* Peck.? (L., *subviscidus*, somewhat viscid).—Pileus $\frac{3}{4}$ in. (15 mm.), convex, then nearly plane or a little irregular, sometimes upturned, moist-looking, rather shiny, near Tawny to near Russet or Cinnamon Brown (XV.). Gills adnate or very slightly sinuate, rather close, narrow, Cinnamon Brown (XV.).

Stem $\frac{3}{4}$ to 1 in. (1.8 to 2.5 cm.), slightly striate, firm, rather fibrous, hollow, very dark brown, nearly black, below an obscure diffuse whitish superior ring, a little paler above. When young with a well-marked whitish veil, also clothing the stem. Spores oblique with the ends a little pointed, dark dull brown, $6.5 \times 4.8 \mu$. South Australia—On horse dung, Mount Lofty. August.

The South Australian plants differ from Kauffman's description of *Ps. subviscida* in the absence of an umbo, in the gills not being subtriangular and subdistant and in other minor particulars. From *Ps. bullacea* (Bull.) Fr. they differ in the gills not being livid whitish then fuscous purple and somewhat triangular, in the stem being darker and in the spores not being purple. Our species from the habitat is evidently introduced and for the present we place it provisionally under *Ps. subviscida* Peck.

216. *Psilocybe musci* Clel. et Cheel. (L., *muscus*, moss).—Pileus at first $\frac{3}{4}$ in. (6 mm.) high and broad, conical or convex with a marked obtuse umbo, becoming nearly plane and $\frac{3}{4}$ in. (10 mm.) across, hygrophanous, umbo a waxy yellow-brown, the rest dark brownish and striate or rugose, drying from the apex to a pallid brownish-white or tan, slightly viscid when moist, edge turned in when very young and closed with a veil, which occasionally leaves a slight ring on the stem in older specimens. Gills rather distant, broad, greyish-brown to dingy dark brown, adnate to slightly decurrent. Stem up to 1 $\frac{1}{4}$ in. (3.1 cm.), slender, pallid brownish, somewhat silky striate, hollow. Plant rather tough, not fragile. Spores porphyry tinted, 7.5 to 9 and occasionally 10.5×5 to occasionally 6μ . Gregarious amongst moss on rocks in shady places. New South Wales. South Australia—A purple-spored species growing amongst moss on the Greenhill Road in July may be this species. June to August.

***Gills somewhat linear, ascending.

217. *Psilocybe stercicola* Clel. (L., *stercus*, dung; *colo*, to dwell in).—Pileus $\frac{3}{16}$ to (rarely) $\frac{1}{4}$ in. (4.5 to 31 mm.), convex, subgibbous or with a small or acute umbo, then expanding, somewhat sticky when moist, edge often striate when moist, hygrophanous, when moist dark brown (near Prout's Brown, xv.; Bistre, xxix.; or Sepia, xxix.), when dry pale brownish (Clay Colour, xxix.; Antimony Yellow, xv.; Pinkish Buff, xxix.; or Cinnamon Buff, xxix.). Gills ascending, adnate, moderately close, slightly ventricose, fuscous (xlvi.), edges sometimes paler. Stem up to 2 in. (5 cm.) high, slender, slightly flexuose, slightly striate, slightly mealy, sometimes with woolly mycelium at the base, usually hollow, sometimes stuffed, pallid with a slight brownish tint to brownish. Spores elliptical, dark purplish brown to porphyry, 12 to 14.5×7 to 8μ . Always on dung (cow or horse). South Australia—National Park, Mount Lofty, Kuitpo. New South Wales. May, July, August.

218. *Psilocybe echinata* Clel. (L., *echinatus*, covered with prickles).—When young, the pileus is nearly globular and both it and the stem are shaggy or echinulate from projecting fibrils which are twisted into bundles on the pileus to form prominent granules like grains of brown sugar. Later the granules begin to disappear but the gills are hidden by a cobwebby veil which later also disappears. When adult, pileus about $\frac{3}{4}$ in. (18 mm.), hemispherical then convex to nearly plane with a small umbo, slightly fibrillose when the granules disappear, edge turned when young, dark fuscous brown drying pale brown. Gills adnexed, close, narrow, reddish-brown becoming fuscous brown. Stem 1 to 1 $\frac{1}{4}$ in. (2.5 to 3.1 cm.), equal, at first clad with fibrils, then smooth, with some fluffy mycelium at the base, somewhat hollow, pallid becoming slightly brownish. Spores elliptical, oblique, bronze brown, 7 to $7.5 \times 4 \mu$. Gregarious to subcaespitose at the base of rotten stumps and adjacent ground. South Australia—Mount Lofty. June. (Figure 24 B and C.)

The shagginess disappears when the plants become adult, and this may lead to failure to recognise the species. The gills are hardly ascending as required in this subsection.

11. No veil. Stem rigid. Pileus scarcely with a pellicle, but the flesh most frequently scissile, hygrophanous. Gills adnexed, very rarely adnate.

219. *Psilocybe foenicisii* (Pers.) Fr. (L., *foenicisecia*, hay-harvest).—Pileus $\frac{1}{2}$ to 1 $\frac{1}{4}$ in. (1.2 to 3 cm.), campanulate-convex, obtuse, smooth, sometimes slightly rugose-striate, tending to crack when dry, dingy brown (near Snuff Brown to

Bistre, XXIX.). Gills adnate, moderately close, slightly ventricose, livid brown (near Fuscous, XLVI.), edges white. Stem $1\frac{1}{4}$ to $1\frac{1}{2}$ in. (3.1 to 3.7 cm.), slender, equal, fragile, at first pallid and white pulverulent, then rufescent, shining. Spores ventricose, one end more pointed, dark brownish-black microscopically, 9.5 to 13×5.5 to 7.5μ (British specimens 12 to 15×7 to 9μ). At the free edge of the gill is a row of small ventricose or flask-shaped cystidia, $28 \times 9 \mu$. Smell moderately strong. South Australia—In buffalo grass lawn, University, Adelaide; abundant in pastures, Port Lincoln. New South Wales. February, May.

††Margin of pileus straight, at first adpressed to the stem.

PSATHYRA Fr.

(Gr., *psathyros*, fragile.)

“Pileus fleshy or submembranaceous, regular; margin straight, at first adpressed to the stem. Stem central, cartilaginous. Gills adnate adnexed or free. Spores purple, fuscous or cinereous purple; elliptical, oval or oblong elliptical; smooth with an apical germ-pore. Cystidia present. Growing on the ground or on wood, solitary or caespitose.”—Rea.

These are delicate, fragile fungi growing on the ground or on decayed wood with purple-brown spores, and correspond to *Mycena* amongst the white-spored genera. The margin of the pileus is when young straight and adpressed to the stem, thus differing from some species of *Psilocybe* which otherwise may resemble members of this genus. Very few species of *Psathyra* occur in this State, only two so far having been recognised.

220. *Psathyra Sonderiana* Berk. (After W. O. Sonder, the Hamburg botanist, author of the first volumes of the “Flora Capensis”).—Pileus $\frac{1}{2}$ to $1\frac{1}{2}$ in. (1.2 to 3.7 cm.), $\frac{1}{4}$ to $\frac{3}{4}$ in. (6 to 18 mm.) high, conico-convex or conico-campanulate or broadly conical, then conico-expanded, rarely purely convex, usually subgibbous or even umbonate, rugose-striate or slightly striate at the periphery when moist, slightly atomate when dry, smooth, tending to fray at the edge, edge not turned in when young, markedly hygrophanous, Verona Brown (XXIX.), Olive Brown (XL.) or near Bister (XXIX.), drying first at the umbo through Saccardo’s Umber (XXIX.) to opaque whitish with a biscuity tint (near Cartridge Buff (XXX.), or Pinkish Buff (XXIX.)), the colour when moist sometimes obscured by delicate interlacing whitish fibrils. Gills adnate, moderately close, rather ascending and narrow, reaching the edge of the pileus, near Drab (XLIII.), paler and greyer than Snuff Brown (XXIX.), darker than Bister (XXIX.) or near Mummy Brown (XV.), becoming dark purplish brown (near the colour of the gills of ripe mushrooms or more vinaceous than Verona Brown, XXIX.), edges sometimes slightly paler and serrate. Stem 1 to 4 in. (2.5 to 10 cm.), slender, equal or attenuated upwards, sometimes flattened, a little wavy, slightly striate or fibrillose, brittle, hollow, silky-white, flesh heterogeneous from that of the pileus. Spores dark bronze to bronzy brown, oblique, narrow, one side more flattened, 7.5 to 11×4 to 5.5μ , no cystidia seen. Sometimes caespitose. On the ground, usually amongst grass, sometimes under trees. South Australia—National Park, Encounter Bay. April, May, July, August. Plants obtained amongst grass at Mount Gambier in May, though presumably the same species, are smaller (up to $\frac{3}{4}$ in., 1.8 cm.), low convex, the pileus dark brown and striate when moist, pallid whitish when dry, spores dark bronze, one end broader, 7.5 to occasionally 9×4 to 5μ .

F. SPORES BLACK OR BLACKISH-FUSCOUS. MELANOSPORAE.

(a) PILEUS DISTINCT FROM AND EASILY SEPARABLE FROM THE FLESHY STEM.

*With a ring on the stem.

ANELLARIA Karst.

(L., *anellus*, a little ring.)

“Pileus fleshy, campanulate. Stem central. Ring membranaceous, persistent or fugacious. Gills adnate or often almost free. Spores black or blackish-fuscous, pip-shaped or elliptical, smooth, with an apical germ-pore. Growing on dung or on the ground.”—Rea.

No species of this genus has been so far recognised with certainty in this State. *Anellaria fimiputris* (Bull.) Karst., more usually known as *Panacolus fimiputris* (Bull.) Fr., is common in Britain on dung, in gardens, by roadsides, etc. Amongst the specimens—so common with us on dung—that we attribute to *Panacolus retirugis* there is much variation depending partly on weather conditions. In some the stem is readily separable from the pileus, there is a tendency for the pileus to be viscid and there is a definite fugacious ring above the middle of the stem. These approach very closely to *Anellaria fimiputris*, but as we seem able to trace all gradations from them to typical *P. retirugis* and as the colour of the stem is vinaceous brown rather than pallid, we attribute them to the latter.

(b) PILEUS CONFLUENT AND HOMOGENEOUS WITH THE FLESHY STEM.

*Gills decurrent, mucilaginous. Spores greenish-fuscous or blackish.

GOMPHIDIUS Fr.

(Gr., *gomphos*, a large wedge-shaped nail.)

“Pileus fleshy, regular, viscid. Stem central, fleshy. Gills decurrent, mucilaginous. Spores fuscous, olivaceous or blackish; fusiform or oblong, smooth, continuous. Cystidia cylindrical, projecting. Growing on the ground.”—Rea.

No species yet recorded in Australia.

(c) PILEUS CONFLUENT WITH, BUT HETEROGENEOUS FROM, THE CARTILAGINOUS STEM.

*Gills adnate or sinuato-adnate.

†Margin of pileus at first incurved or exceeding the gills.

PANAEOLUS Fr.

(Gr., *panaiolos*, all variegated.)

“Pileus slightly fleshy, regular, viscid or dry, margin exceeding the gills. Gills adnate or adnexed, variegated with the dark spores. Spores black or fuscous black; elliptical, oblong ovate, boat shaped or almond shaped; with an apical germ-pore. Cystidia present. Growing on dung and rich soil, solitary or caespitose.”—Rea.

The species of *Panacolus* are not numerous. Only four have been recognised in this State, but one of these is exceedingly common on dung. The species are mostly dung-inhabiting and have more or less conico-campanulate or deeply convex caps, ascending clouded gills, slender stems and black spores usually with the ends constricted. Species of *Panacolus*, gathered in mistake for mushrooms, are said to have given rise to symptoms of poisoning in other countries.

KEY TO THE SPECIES.

Pileus and stem white or whitish, large. On dung .. 221. *Panacolus ovatus*.

Pileus hemispherical to conico-convex, smoky brown to pale grey, usually with reticulations and often with veil fragments round the edge. Stem striate, rather mealy, pallid vinaceous brownish. On dung 222. *P. retirugis*.

Pileus broadly conical with a dark zone near the edge when moist, light buff when dry. Gills adnate. Stem fuscous. Spores 14 to 15 x 8 to 9 μ 223. *P. acuminatus*.

Pileus conico-hemispherical, expanding, umber brown drying paler with a dark zone. Gills adnexed. Stem dark brown below. Spores 10 to 11 x 7.5 μ . In swampy soil 224. *P. paludosus*.

*Pileus viscid, shining when dry.

221. *Panaeolus ovatus* Cke. et Mass. (L., *ovatus*, egg-shaped).—Pileus up to 3½ in. (8.7 cm.), convex, subgibbous, opaque, rimosely cracking when dry, with the edge inturned, viscid when moist, white becoming slightly tinted with brown. Gills adnate, close, up to ¾ in. (9 mm.) deep, clouded grey, the edges white and finely serrated. Stem 4½ in. (11.2 cm.), ¾ in. (9 mm.) or more thick, equal, base a little bulbous, striate, solid, white with a tendency to brown staining. Spores black, lemon-shaped with pointed ends, 13 to 19 x 8.5 to 12 μ . On dung or manured soil. South Australia—Adelaide, McLaren Vale. New South Wales. Victoria. February, April.

Readily recognised by its pure white cap, later with brownish tints, grey clouded gills which do not deliquesce, the black spores and its habitat on dung.

**Pileus moist, opaque, bibulous, subflocculose when dry.

222. *Panaeolus retirugis* Fr. (L., *rete*, a net; *ruga*, a wrinkle).—Pileus ½ to 2 in. (1.2 to 5 cm.), ¾ to 1 in. (1.8 to 2.5 cm.) high, globose, then hemispherical or conico-convex or conico-campanulate, fleshy, usually more or less reticulate with raised ribs, sometimes with torn fragments of the veil round the edge, flesh tan colour, smoky brown, near Buff Brown (XL.) or pale grey, sometimes pallid. Gills adnate, ascending, clouded dark grey with white edges. Stem up to 2 in. (5 cm.), sometimes more (up to 5 in., 12.5 cm.), slender, pruinose, striate above, sometimes slightly hollow, vinaceous brown to brown with a purplish tint (Wood Brown to Army Brown, XL.). Flesh thin. Spores lemon-shaped with indrawn ends, black, 14 to occasionally 19 x 8.5 to 11 μ . On dung. South Australia—Adelaide district, Encounter Bay, Port Elliot, Port Lincoln. New South Wales. April to October. (Figure 26.)

[Drawing by E.R.C.]

Figure 26.—*Panaeolus retirugis* Fr. (No. 222). On dung, paddock near Adelaide.

This is a very common species on dung, characterised by the greyish-brown, conico-campanulate pileus, often reticulated with lines and with appendiculate remains of the veil round the edge, the ascending grey clouded gills with black spores and the non-deliqescence of the gills. Considerable variation is met with, partly due to weather conditions such as moisture. Some specimens show the pileus readily separable from the stem, a tendency for the pileus to be sticky and a fugacious ring above the middle of the stem. These approach *Anellaria fimiputris* in these characters.

***Pileus dry, smooth, slightly shining, not zoned.

No species yet recorded for South Australia.

****Pileus dry, smooth, zoned round the margin.

223. *Panaeolus acuminatus* Fr. (L., *acuminatus*, pointed).—Pileus 1½ in. (3.5 cm.), ¾ in. (10 mm.) high, broadly conical, not definitely acuminate (in our specimens), slightly rivulose, opaque, when dry near Light Buff (xv.), when moist with a broad darker band near the margin, margin slightly incurved. Gills adnate, slightly ascending, rather close, many short, narrow (about 3 mm.), blackish with whitish margins. Stem 2½ in. (5.6 cm.), slender, substriate, pallid and slightly mealy above, fuscous brown below, base slightly thickened, slightly hollow, flesh brownish. Flesh of pileus thin, pale brownish. Spore mass black, spores microscopically black or blackish, lemon-shaped, 14 to 15 x 8.5 to 9 μ . In garden. South Australia—Adelaide Hospital grounds. October.

The Australian plant seems to differ from the British ones in the pileus though broadly conical not being definitely acuminate and in the margin of the pileus not being at first crenulate.

The species can be recognised by the broadly conical cap, broader than that of *P. retirugis* and not approaching a hemispherical shape, by the black gills and the dark zone near the edge when moist.

224. *Panaeolus paludosus* Clé. (L., *paludosus*, belonging to a swamp).—Pileus 1½ in. (4.3 cm.), conico-hemispherical, then more expanded to convex, often with an obtuse umbo, smooth, surface dull, slightly rivulose, edge turned in when young, dark amber brown drying paler and warmer from the centre so that a dark peripheral ring may be present. Gills adnexed, moderately close, deeply ventricose, clouded grey. Stem up to 4½ in. (11.2 cm.), slender, a little flexuous, somewhat pruinose, slightly fibrillose, slightly hollow, dark brown below, paler above, slightly pruinose white at the base. Cartilaginous flesh of the stem different in texture from that of the pileus. Spore mass black, spores microscopically blackish, the ends constricted (lemon-shaped), 10 to 13 x 7.5 to 9 μ . In swampy soil. South Australia—Mount Compass, Upper Tunkalilla Creek, near Mount Burr (S.E.). April to June.

††Margin of the pileus straight, at first adpressed to the stem.

PSATHYRELLA Fr.

(Diminutive of *Psathyra*.)

“Pileus fleshy or submembranaceous, regular; margin straight, at first adpressed to the stem. Stem central, confluent with the pileus. Gills adnate or free. Spores black or fuscous black, elliptical or oval, smooth, with an apical germ-pore. Cystidia present. Growing on the ground or on wood; solitary or caespitose.”—Rea.

The species of *Psathyrella* are small, rather delicate, thin-capped mushrooms, often suggesting *Coprinus* in appearance but with the gills not deliquescent. Features which distinguish them from *Panaeolus* are the striate pileus, the non-variegated gills and the margin of the pileus not exceeding the gills. Two species have been recognised in South Australia. One of these, *Ps. disseminata*, is not uncommon in dense masses on the ground usually near decaying wood. The other is found in grassy places.

KEY TO THE SPECIES.

Single or subcaespitose.

Drying opaque whitish, with anastomosing striae.

Stem white. Spores large, $15 \times 8 \mu$ 225. *Psathyrella*

Densely gregarious and caespitose.

subprona.

Pallid or yellowish becoming greyish brown.

ribbed, with a disc. Stem white. Spores bronzy-brown microscopically, 7×4 to 5μ 226. *Ps. disseminata*.

225. *Psathyrella subprona* Clé. (L., *pronus*, bending downwards; *subpronus*, here close to the species *Ps. prona* Fr.).—Pileus $\frac{3}{4}$ to 1 in. (1 to 2.5 cm.), $\frac{3}{4}$ to $\frac{1}{2}$ in. (1 to 1.2 cm.) high, conico-campauulate with an acute apex, broadly conical, or sometimes conico-convex or almost campanulate, usually rather gibbous, expanding a little, with fine anastomosing striae or slightly venosely rugulose, hygrophanous, darker than Olive Brown (XL), drying near Cartridge Buff (XXX.), Gills ascending (apparently sometimes almost triangular), adnate, moderately close, narrow, fuscous (XLVI.) or greyish fuscous, edges pale. Stem 1 to 2 in. (2.5 to 5 cm.), slender, equal, slightly mealy, then polished, slightly hollow, somewhat brittle, white. Flesh thin, pallid, that of the stem different in texture from the flesh of the pileus. Spores elongated, rather narrow, very dark fuscous or bronze approaching blackish, 11.5 to 15×6 to 8μ . Cystidia not seen. Single or gregarious, on the ground, amongst grass or sometimes attached to buried grass stems or sticks, or on rich manured soil. South Australia—Encounter Bay, Beaumont, Fullarton, Horrocks Pass near Wilmington, Port Lincoln, Mount Gambier. May to September.

226. *Psathyrella disseminata* (Pers.) Fr. (L., *disseminatus*, spread abroad).—Pileus up to $\frac{1}{2}$ in. (1.2 cm.), membranaceous, conico-campauulate, oval or convex, ribbed near the apex which is flattened and pallid white, the rest of the pileus

[Drawing by E.R.C.]

Figure 27.—*Psathyrella disseminata* (Pers.) Fr. (No. 226).
National Park.

at first pallid or yellowish becoming greyish brown, covered with a few shining scurfy particles. Gills adnate, moderately distant, linear, whitish then dark brown with a purplish tint. Stem 1 in. (2.5 cm.) or a little more, slender, silky shining, pure white, hollow. Spore mass a dark neutral tint, not pure black; spores microscopically a dark bronzy-brown, one end truncate, 5.5 to 7 to (occasionally) 10.7×3.5 to 5.3μ . Densely gregarious or caespitose on the ground often near old stumps. South Australia—At the base of *Eucalyptus rostrata* Schl., Botanic Gardens, Adelaide; Waterfall Gully; National Park; Encounter Bay; Caroline and Blanche Forests (S.E.). New South Wales. Britain, etc. April to June. (Figure 27.)

This species is readily recognised by its densely crowded habit on the ground, the colour of the pilei and gills and the fragile stems. It is only likely to be mistaken for the larger *Coprinus micaceus*, also densely caespitose and always found near decaying posts, stumps, etc.

2. Receptacle fleshy, trama vesiculose and traversed by laticiferous vessels. Spores white or yellow.

A. Latex watery, uncoloured.

RUSSULA Fr.

(L., *russulus*, reddish.)

"Pileus fleshy, regular. Stem central, fleshy. Gills adnate, sinuato-adnate, adnexed, free or decurrent; rigid, fragile, edges acute. Spores white or yellow, rarely greenish; globose, subglobose or elliptical; echinulate, verrucose, subreticulate or with anastomosing ridges and spines; continuous. Cystidia present or absent. Growing on the ground, rarely on wood."—Rea.

In the genera *Russula* and *Lactarius*, the trama or fleshy substance of the pileus is found microscopically to be composed mostly of large vesiculose or bladder-like cells. As a consequence of their architecture, the plants are more or less rigid but brittle, a point that is helpful in distinguishing them in the field from other agarics. *Lactarius* exudes from its rigid gills and substance a milky or coloured juice when broken, whereas there is no such juice in *Russula*. The spores in both genera are spherical or approach this shape, are in most cases definitely rough or warted, and are white or yellowish. In *Russula*, brilliant colours are often present, some of our most beautiful species showing shades of purple, crimson, rosy pink, green, blue or yellow; others are whitish or brownish and some of the white species are characterised by turning blackish as they dry. In some species the cap is viscid when moist, and often the cuticle can be readily peeled off. Striations, which may be tuberculate, may be present near the edge of the pileus. The rigid gills may be forked and the interspaces may be veined; they may nearly all be of the same length or alternately long and short; their shape at the two ends may be characteristic of species. The stem is usually whitish, rigid and stout. The taste may vary from intensely acrid to mild.

Species of *Russula* are relatively common in the Mount Lofty Ranges, *R. Mariae* having a beautiful crimson to purplish pileus and a rosy stem with whitish gills, and *R. purpureo-flava* being similarly tinted but with yellow gills. Whitish and brown species are less common. Many species of *Russula* are edible but so far the Australian species have not been tested. All our South Australian forms are mild in taste but doubtless acrid ones will later be found.

KEY TO THE SPECIES.

- Pileus milk white with rusty stains 227. *Russula delicata*.
 Pileus opaque white then pale smoky brown. Gills adnate, very close. Stem white. Flesh drying black 229. *R. adusta*.
 Pileus white or slightly brownish, large. Gills adnate to subdecurrent, creamy white becoming rufescent. Emerging from the soil 227A. *R. erumpens*.
 Pileus buff-coloured.
 Pileus pinkish fawn, reddish-orange or buff-orange. Stem reddish-brown to pinkish buff . . 228. *R. flocktoniae*.
 Pileus warm buff. Stem white 231. *R. cherlii*.
 Pileus pallid brownish-white with greyish-green blotches. . 230. *R. cyanozantha*.
 Pileus yellowish-brown, edge tubercular-striate. Stem white. Taste becoming slightly peppery 232. *R. pectinatoides*.
 Pileus pallid blotched with brownish-vermilion . . . 233. *R. serampelina*.
 Pileus purplish to crimson. Taste mild.
 Stem rosy.
 Gills white or cream 234. *R. Mariae*.
 Gills yellow 236. *R. purpureo-flava*.
 Stem white 235. *R. persanguinea*.
 Pileus with greenish tints 237. *R. viridis*.

- I. Pileus fleshy throughout, margin more or less involute, pellicle slightly developed, dry, adnate. Flesh compact, firm. Gills unequal, alternate. Spores white in the mass.

*Flesh not changing colour, gills narrow, decurrent.

227. *Russula delicata* Fr. (L., *delicus*, weaned).—Pileus 2 to 3 in. (5 to 7.5 cm.), usually irregular, more or less convex, with the centre depressed, surface dull, milk white with rusty stains appearing or diffusely blotched with Sayal Brown (XXIX.) or tinted with Cinnamon Buff (XXIX.). Gills adnate or adnate-decurrent, moderately close, occasionally forking near the stem and with short gills or buttresses near the periphery, narrow, cream-coloured with a slight buffy tint. Stem short, $\frac{3}{4}$ to $1\frac{1}{4}$ in. (1.8 to 3.1 cm.), $\frac{5}{8}$ to 1 in. (16 to 25 mm.) thick, nearly equal, surface dull, pure white tending to become brownish or Sayal Brown below. Flesh white, brownish where insect-eaten, attenuated outwards in the pileus. Taste slightly acid. Spores in the mass with a faint cream tint, microscopically warty, $7.5 \times 5.5 \mu$, $9 \times 7.5 \mu$. No cystidia detected on the pileus. South Australia—Mount Lofty (sometimes under trees), Second Valley Forest Reserve, Encounter Bay, Kalangadoo (S.E.). March to July.

The species may be recognised by the dull milk-white pileus which does not become dark in colour on drying but often shows rusty stains.

227A. *Russula erumpens* Clé. et Cheel. (L., *erumpens*, bursting out).—Pileus up to 3 in. (7.5 cm.), depressed to infundibuliform, surface dull, pure white or with a dirty brown tint. Gills adnate, from depression of the pileus with rather a decurrent tooth, crowded, creamy white, rufescent when old. Stem $1\frac{1}{4}$ to 2 in. (3.1 to 5 cm.), $\frac{1}{2}$ to $\frac{3}{4}$ in. (1.2 to 1.8 cm.) thick, sometimes a little excentric, stout, equal, dull not polished, solid, white or slightly brown tinted below. Flesh white, taste mild. Spores spherical or slightly oval, verrucose, pale rust coloured, 7μ , $8.5 \times 7 \mu$. Emerging covered with soil. New South Wales—Neutral Bay, Milson Island. South Australia—Eagle-on-the-Hill. April, October, November. (Plate V. Top figure.)

This species may perhaps belong to section II.

228. *Russula Flocktonae* Clé. et Cheel. (After Miss Margaret L. Flockton, Artist, Botanic Gardens, Sydney).—Pileus up to 4 in. (10 cm.), irregularly convex, then depressed, pale pinkish-fawn, pale yellowish-brown, dull reddish orange or vivid velvety buff-orange. Gills adnate, moderately to widely separate, occasionally bifurcating, interspersed with short ones, pure white becoming darker and pruinose from the spores. Stem 1 to $1\frac{1}{4}$ in. (2.5 to 3.7 cm.), stout, sometimes attenuated downwards, solid, reddish-brown to pinkish-buff. Substance white. Taste mild, occasionally slightly peppery. Spores elliptical, occasionally more spherical, warty, 8.5 to 10.8×7 to 8.5μ . New South Wales. April to June. (Plate V. Bottom figure.)

Specimens, apparently of this species, have been collected at Mount Lofty in April. The pileus was near Cinnamon Buff (XXIX.), sometimes Auburn (II.) in the centre, the stem becoming brownish below or Light Pinkish Cinnamon (XXIX.), microscopically with fine hairs on the pileus, spores warty, 7.5 to 9μ . The species seems to belong to this section.

**Flesh becoming black.

229. *Russula adusta* Fr. (L., *adustus*, scorched).—Pileus up to 3 in. (7.5 cm.), convex with the centre depressed, finally concave, pellicle slightly separable, surface dull, edge turned in when young, pure opaque white becoming pale smoky brown or scorched-looking. Gills adnate to subdecurrent, very close and narrow, sometimes forked, shorter ones interspersed at the periphery, creamy-coloured with later a dingy tint. Stem 1 to $2\frac{1}{2}$ in. (2.5 to 6.2 cm.), moderately slender to stout (to more than 1 in., 2.5 cm., thick), nearly equal, subfibrillose, pure white (like whitewash) becoming smoky tinted. Flesh firm, whitish with a dingy tint, drying dark, attenuated outwards in the pileus. Taste mild. Spores spherical, white, slightly warty, 5.5 to 8μ . No cystidia detected on the pileus. South Australia—Under trees, Mount Lofty. March, June.

[By courtesy of Government Printer, N.S.W.]

PLATE V.

Russula erumpens Clel. et Cheel (No. 227A).

Russula Mariae Peck. (No. 234).

Russula purpureo-flava Clel. (No. 236).

Russula Flocktonae Clel. et Cheel (No. 228).

There are several European and American species which resemble each other in becoming dark when drying. In *R. nigricans* Fr. the gills are distant to subdistant and the white flesh turns reddish when bruised and then blackish. In *R. densifolia* Secr., the gills are adnate to subdecurrent and close and the greyish-white flesh as well as the whitish stem become reddish when bruised and then blackish. *R. sordida* Peck has whitish flesh which becomes blackish without a reddish stage, a whitish stem becoming black when handled, and close adnate to subdecurrent gills. *R. adusta* Fr. has flesh which does not change on bruising, close adnate to subdecurrent gills and a white stem becoming sooty-grey. The Australian plant seems best referred to the latter.

- II. Pellicle of the pileus dry, adnate, rarely possessing cystidia, usually breaking up into flocci, granules or areolae. Margin rounded, rarely striate, not involute. Gills with a very broad, rounded apex. Spores whitish cream-colour in mass.

No South Australian species recorded.

- III. Pellicle of the pileus viscid, separable at the margin and possessing cystidia. Margin subacute, rarely striate in old age. Flesh firm. Taste mild. Gills attenuated in front, often forked and unequal. Spores verrucose, small, white in the mass.

230. *Russula cyanozantha* (Schaeff.) Fr.? (Gr., *kyanos*, blue; *xanthos*, yellow).—Pileus 2½ in. (5.6 cm.), upturned, pallid brownish-white with dull greyish-green blotches. Gills adnate, moderately close, cream. Stem 1 in. (2.5 cm.), stout, attenuated downwards, slightly rough, white. Taste mild. Spores subspherical, slightly warty, 6 to 7 μ . On the ground. South Australia—Mount Lofty. April.

There is doubt as to whether this Australian plant is rightly referred to this species.

231. *Russula Cheelii* Clel. (After Edwin Cheel, Curator of the Herbarium, Botanic Gardens, Sydney).—Pileus 3 in. (7.5 cm.), convex with a central depression, then upturned, viscid when moist, edge slightly rugose, Warm Buff (xv.). Gills adnate, close, often forked near the stem, with occasional short ones at the periphery, narrow, attenuated both ways, cream-coloured becoming a little spotted. Stem 2½ in. (6.2 cm.), ¾ in. (2.1 cm.) thick above, nearly equal or slightly attenuated downwards, surface matt, slightly striate, stuffed, white. Taste mild. Spores pear-shaped, warty, 8.5 x 6.5 μ . South Australia—Kuitpo. May.

This species probably belongs to this section though cystidia have not been recorded on the pileus.

- IV. Pellicle of the pileus viscid, more or less separable, possessing cystidia, yellowish, ochraceous or brownish, sometimes olivaceous brown, never red or violet. Margin straight, more or less striate, subacute. Taste aerid. Spores pure white or cream.

232. *Russula pectinatoides* Peck (L., *pecten*, a comb; Gr., *eidōs*, like).—Pileus 2 in. (5 cm.), concave, surface dull, edge tubercular striate, yellowish-brown. Gills tapering off towards the stem and barely reaching it, moderately close, 5 mm. deep externally, pallid becoming dingy buff. Stem 1½ in. (2.8 cm.), stout (½ in., 1.2 cm., thick), equal, subfibrillose, white. Flesh attenuated outwards. Taste mild becoming slightly peppery. Spores angular and rough, 9 μ , 11 x 8.5 μ . South Australia—Mount Lofty. New South Wales. United States of America. July.

It should be noted that the taste is only slightly peppery, whereas in this section it should be aerid.

- V. Pellicle of the pileus viscid, more or less separable, possessing numerous cystidia, purplish. Margin straight, acute, somewhat striate. Gills more or less unequal and forked, generally narrow and acutely attenuated in front, often adnate. Flesh firm. Taste aerid. Spores white cream or ochraceous yellow in mass.

No South Australian species recorded.

- VI. Pellicle of the pileus viscid, generally separable, possessing numerous cystidia, red or purple. Margin rounded, generally striate. Flesh fragile. Taste acrid. Gills generally equal, fragile, rounded in front, free. Spores pure white, rarely cream-white in mass.

[232A. *Russula fragilis* Fr. (L., *fragilis*, fragile).—Pileus 1in. (2.5 cm.), depressed in the centre, edge slightly striate, deep crimson. Gills adnate, close, white. Stem 1½in. (3.7 cm.), ¼in. (6 mm.) thick, slightly fibrously striate, solid, white. Flesh reddish under the cuticle. Taste acrid. Spores spherical to oval, warty, 9 to 10 μ . New South Wales—Sydney. June, July. (Plate IV. Bottom right figure.)

This species resembles *R. persanguinea* Clé., but is usually smaller and is definitely acrid.]

- VII. Pellicle of the pileus viscid, separable, possessing cystidia, variously coloured. Margin rounded, generally striate. Flesh fragile. Gills equal, fragile, rounded in front, free or somewhat free. Spores cream ochraceous or yellow ochraceous in mass (rarely whitish yellow in mass, but then the taste is mild or only slightly acrid when young and the pileus is never red).

*Flesh becoming black, taste mild or slightly acrid when young.

No South Australian species recorded.

**Flesh not becoming black, taste mild or somewhat acrid when young.

233. *Russula xerampelina* (Schaeff.) Fr. (Gr., *xerampelinos*, of the colour of withered vine-leaves).—Pileus up to 3½in. (8.7 cm.), irregular, rather depressed in the centre, splitting and cracking, pallid whitish, blotched with bright brownish-vermilion. Gills adnate, moderately close, sometimes forking, occasionally in deformed specimens forming irregular pores near the stem, pale buffy white. Stem 2½in. (6.2 cm.), 1½in. (3.7 cm.) thick above, stout, attenuated downwards, root rather conical, fibrously striate, white with tinges of pink. Flesh solid, white, rather rigid. Slight smell. Taste mild. Spores warty, pale ochraceous tinted microscopically, 8.5 to 10.5 μ . Partly buried under soil. South Australia—Mount Lofty. April.

234. *Russula Mariae* Peck. (Named by Dr. Charles H. Peck, New York State Botanist, after his wife Mary).—Pileus usually up to 2in. (5 cm.), sometimes to 4½in. (11.2 cm.), nearly plane, the centre depressed, edge striate, slightly viscid, the cuticle peeling leaving tints of red beneath, purplish to crimson (Vinous Purple, Slate Purple to Vinaceous Lake, XLIV.; Dark Purple Drab, XLV.; near Diamine Brown, XIII.; Dark Vinaceous Grey, L.; Garnet Brown, I.; in the centre surrounded by Nepal Red, I.) usually somewhat irregularly distributed, paler in places and towards the periphery. Gills adnate, moderately close, sometimes forked at their junction with the stem, narrowed internally, equal, pure white to creamy white, edges rarely finely serrate and with pink tints. Stem up to 2½in. (6.2 cm.), slender to stout, slightly striate, solid or tending to be excavated in the centre, more or less extensively tinted or punctate with Light Corinthian Red (XXVII.), near Old Rose (XIII.), Deep Purplish Vinaceous (XLIV.), or Flesh Pink to Coral Pink (XIII.) or sometimes pure white (?). Flesh narrowed outwards. Taste mild. Spores subspherical, warty, nearly white, 7.5 to 9.5 μ , 9.2 to 10.4 x 7.8 to 8.5 μ . South Australia—Mount Lofty, National Park, Upper Tunkalilla Creek, Kuitpo. New South Wales. United States of America. March, April, June, July. (Plate V. Left figure.)

In the description given by C. H. Peck, in New York State Museum, Bulletin 116, Botany 10, 1907, the pileus is described as pruinose or minutely pulverulent. Peck gives coloured illustrations of his *R. Mariae* in Bulletin 75, Botany 7, 1904.

235. *Russula persanguinea* Clé. (L., *persanguineus*, very blood-red).—Pileus 1½ to 4in. (3 to 10 cm.), slightly convex with the centre depressed, finally sometimes slightly upturned, usually slightly striate to tuberculo-rugose at the periphery, edge rather rounded, pellicle peels, viscid when moist, Garnet Brown (I.), Nepal Red (I.), Claret Brown (I.), Dragon's Blood Red (XIII.), Brick Red (XIII.) or Pompeian Red (XIII.), i.e., tints near blood red. Gills adnexed,

attenuated towards the stem, equal, rarely forked, sometimes showing venose cross-connections, rather narrow ($\frac{1}{4}$ in., 6 mm., deep), close, pure white, later with a creamy tint. Stem $1\frac{1}{2}$ to 2 in. (3.7 to 5 cm.), stout, smooth to slightly striate or rugose, slightly attenuated upwards or downwards or equal, sometimes flattened, solid or sometimes hollow, pure white. Flesh thin, slightly coloured under the cuticle, fragile. Taste mild or with a very slight peppery taste. Spores warty, white, 7.5 to 11 μ , 9 x 7.5 μ . Cystidia on the pileus sometimes numerous, acuminate with broad bases, 19 to 38 x 7.5 μ . South Australia—Mount Lofty, Morialta. March to July.

***Flesh not becoming black, taste distinctly acid.

No South Australian species recorded.

VIII. Pellicle of the pileus viscid, separable, destitute of cystidia. Margin rounded, generally striate. Flesh fragile. Taste mild, rarely acid. Gills equal or subequal, rounded in front, somewhat free. Spores whitish cream to yellow ochre, rarely pure white.

[From watercolour by Miss Baxton.]

Figure 28.—*Russula purpureo-flava* Clel. (No. 236). Mount Lofty. Reduced by $\frac{1}{2}$.

236. *Russula purpureo-flava* Clel. (L., *purpureus*, purple; *flavus*, light yellow. In reference to the colours of the pileus and the gills).—Pileus up to 2½ in. (5.8 cm.), somewhat irregular and slightly depressed, slightly sticky, cuticle peeling, Jasper Red (xiii.) to purplish-red and very dark purplish-brown (Pompeian Red, xiii.; near Mars Violet, xxxvii.; in parts sometimes near Dark Vinaceous Purple, xxxviii.; occasionally with yellowish-brown paler areas). Gills adnate, moderately close, rather narrow, attenuated both ways, near Naples Yellow to Mustard Yellow (xvi.) or Maize Yellow to Buff Yellow (iv.). Stem $1\frac{1}{2}$ in. (3.7 cm.), $\frac{3}{8}$ in. (10 mm.) thick above, equal or attenuated downwards, surface a little rough, pithy, pale yellowish with rosy tints to rosy (Coral Pink, xiii.), yellowish towards the base. Flesh white with yellow tinges, thin, attenuated outwards. Taste mild. Spores microscopically slightly tinted to yellowish, subspherical pear-shaped, 7.5 to 10 μ , 8 to 8.5 x 6.5 to 7 μ . No cystidia detected on the pileus. South Australia—Mount Lofty, Stirling West, Kuntpo, Tweedvale, Kalangadoo (S.E.). New South Wales—Ryde near Sydney. March to July. (Plate V. Right figure.) (Figure 28.)

237. *Russula viridis* Clcl. (L., *viridis*, green).—Pileus up to 2 to 2½ in. (5 to 6.2 cm.), convex, slightly depressed in the centre, surface dull, edge not striate, margin nearly straight, pellicle separable, probably slightly sticky when moist, tints of Grape Green in the centre becoming Lincoln Green (XL.), at the periphery passing into pallid greyish-green and nearly white or near Vetiver Green (XLVII.) and paler or darker in places. Gills equal, fading off somewhat as the swollen apex of the stem is reached, moderately close, narrow, sometimes forked near the stem, creamy white. Stem 1½ to 1¾ in. (3.7 to 4.4 cm.), ⅝ in. (16 mm.) thick, slightly rugose, swollen below and attenuated upwards or equal, solid, white. Flesh fragile, white. Taste mild. No smell. Spores spherical pear-shaped, finely warty, nearly pure white but slightly tinted cream, 7.5 to 9 x 5.5 to 6.5 μ . Apparently no cystidia on the pileus. On the ground. South Australia—Mount Lofty. March, June.

Russula Mariae Peck, in its Australian form, perhaps belongs more properly to this section.

B. Latex milk-white or coloured, rarely like serum.

LACTARIUS Fr.

(L., *lac*, milk.)

“Pileus fleshy, regular. Stem central, rarely excentric, fleshy. Gills adnate or decurrent, somewhat rigid, milky, acute at the edge. Spores white or yellowish, rarely pinkish in the mass; globose, subglobose, or elliptical; echinulate, verrucose, punctate or reticulate; continuous. Cystidia present or absent. Growing on the ground, more rarely on wood: solitary or caespitose.”—Rea.

I. Stem central. Gills unchangeable, naked, not changing colour and not pruinose. Milk at the first white, (commonly) acid.

No South Australian species recorded.

II. Stem central. Gills naked. Milk always deeply coloured.

No South Australian species recorded.

III. Stem central. Gills pallid, then changing colour, afterwards darker, glancing when turned to the light, at length white pruinose. Milk at the first white, mild, or mild becoming acid.

238. *Lactarius Clarkei* Clcl. (After Miss Phyllis Clarke, now Mrs. North, who painted many admirable watercolours of New South Wales fungi).—Pileus 2 to 5 in. (5 to 12.5 cm.), convex, then with the centre depressed or sometimes becoming infundibuliform, a little wavy or sometimes coarsely rugose, surface dull and finely felted, edge inturned when young, Ochraceous Buff to Light Ochraceous Buff (xv.), between Ochraceous Buff and Ochraceous Salmon (xv.), or near Cinnamon or Cinnamon Buff (xxix.). Gills adnate, moderately close to somewhat distant, narrow (5 mm. deep), rather thick, sometimes forking near the stem or forking and anastomosing at the periphery, whitish or buffy cream becoming spotted and discoloured brown. Stem short, ¾ to 1½ in. (1.8 to 4.3 cm.), stout (½ to 1 in., 1.2 to 2.5 cm.), equal or sometimes attenuated downwards, surface matt, solid, equal, often excentric, Ochraceous Buff (xv.), sometimes whitish. Flesh white, ⅝ in. (10 mm.) thick near the stem, attenuated outwards, becoming brownish when old. Taste mild. Milk white. Spores warty or slightly angular, oval to subspherical, 9 x 7.5 μ , 6.5 to 8 μ . No cystidia seen. South Australia—Mount Lofty, Greenhill Road, National Park. New South Wales—Bradley’s Head. March, April, June, July. (Plate VI.)

The species in general appearance resembles *Russula Flocktonae* Clcl. et Checl. differing in the possession of a milk.

239. *Lactarius seriffuus* (DC.) Fr. (L., *serum*, lymph; *fluus*, flowing).—Pileus up to 1½ in. (3.7 cm.), at first convex with a small acute umbo, then slightly infundibuliform, occasionally a little zonate, edge incurved when young, moist-looking, rather dark reddish-brown. Gills adnate, moderately close, at first pallid with a faint biscuit-coloured tint, finally reddish-brown and a little more tawny

[Watercolour by Miss P. Clarke.]

PLATE VI.

Lactarius Clarkei Clel. (No. 238). Bradley's Head, Sydney.

than the pileus. Stem 2 in. (5 cm.), moderately stout, slightly attenuated upwards, solid, the colour of the pileus. Spores subspherical, warty, apparently faintly tinted, 7.5 to 8.5 μ . South Australia—Mount Lofty. New South Wales. June. (Plate IV. Left lower figure.)

IV. Stem excentric or lateral. Growing on trunks.

No South Australian species recorded.

3. Receptacle membranaceous or fleshy membranaceous, fragile, rapidly putrescent or shrivelling up or drying rigid and friable.

A. Spores ochraceous or ferruginous.

BOLBITIUS Fr.

(Gr., *bolbiton*, dung, especially cow-dung.)

"Pileus membranaceous, regular. Stem central, not confluent with the pileus. Gills free or slightly adnate, acute at the edge. Spores ochraceous, ferruginous, fuscous or salmon colour; elliptical, elliptic oblong or almond-shaped; smooth; with an apical germ-pore. Cystidia present or absent. Growing on dung or on rich soil."—Rea.

The species are delicate, putrescent fungi with ochraceous or rusty spores and gills which tend to deliquesce in wet weather and rapidly shrivel up in dry. They resemble species of *Galera* in appearance, differing in the tendency for the gills to deliquesce, in which feature they approach *Coprinus*. The genus *Pluteolus* is also closely related differing in the gills being free and the stem being readily separable from the pileus. The pileus in *Bolbitius* is thin, the stem elongated and hollow. The species grow on dung or rich soil.

KEY TO THE SPECIES OF BOLBITIUS AND PLUTEOLUS.

Pileus more or less bright yellow. Gills deliquescent or rapidly shrivelling.

Pileus large (1½ to 3 in.), lemon-chrome to mustard yellow, fleshy. Gills yellowish, then watery brown. Stem yellowish. Spores 13 to 17 x 7.5 to 10 μ 240. *Bolbitius Boltoni*.

Pileus 1 to 2 in., egg-yellow, submembranaceous, sulcate-striate, obtuse umbo. Gills ochraceous, then ferruginous. Stem white or slightly yellow. Spores 12 to 14 x 7 to 8 μ **B. vitellinus*.

Pileus 1 to 2 in., pale yellow, disc elevated, margin striate. Gills white, then yellow, then dusky brown. Stem yellow. Spores 10 x 6 μ **B. flavidus*.

Pileus smaller, up to 1 in., light yellow, umbo deeper, submembranaceous, edge striate. Gills yellow, then pale cinnamon. Stem yellow. Spores 11 to 13 x 6 to 7 μ 241. *B. fragilis*.

Pileus pale pinkish buff. Gills not deliquescent or rapidly shrivelling.

Gills free. Stem whitish. Spores 10.5 to 13 x 8 μ 118. *Pluteolus*

coprophilus.

**Bolbitius vitellinus* (Pers.) Fr. and *B. flavidus* (Bolt.) Massee have not yet been recognised in this State.

240. *Bolbitius Boltoni* (Pers.) Fr. (After James Bolton, the English Mycologist).—Pileus 1½ to 3 in. (3.8 to 7.5 cm.), conico-campanulate or hemispherical, then convex, finally expanded and nearly plane, very viscid, smooth or

with some innate fibrils, edge sometimes striate, flesh thin, near Lemon Chrome (iv.), or Mustard Yellow (xvi.) to Primuline Yellow (xvi.), when old becoming near Yellow Ochre (xv.), or Light Cadmium in the centre with the periphery paler, or Empire Yellow (iv.) becoming browner near Pinkish Buff (xxix.), or approaching egg-yellow or yellow with a brownish tinge. Gills just reaching the stem or nearly free, short ones at the periphery, close, narrow ($\frac{1}{2}$ to $\frac{1}{2}$ in., 6 to 12 mm., deep), pallid or pale yellowish, then dingy salmon or watery brown, soon near Sudan Brown (iii.) becoming near Argus Brown (iii.), or near Cinnamon Brown (xv.). Stem 1 to $3\frac{1}{2}$ in. (2.5 to 8 cm.), slender to moderately stout (up to $\frac{1}{2}$ in., 1.2 cm., thick), rather fragile, equal or attenuated upwards, slightly fibrillose to markedly fibrillose-flocculose to pruinose or mealy, hollow, whitish usually with faint tinges of yellow above, the flesh usually slightly yellowish. Flesh of pileus up to $3/16$ in. (4.5 mm.) thick over the disc, attenuated outwards. Stem free from the pileus. Spores in the mass near Cinnamon Brown (xv.), microscopically yellow-brown, elliptical, usually 13 to 17×7.5 to 10μ , occasionally smaller, 11.2 to $12.8 \times 8 \mu$. On horse dung, manured soil, spent chaff or occasionally lawns. South Australia—Glen Osmond; Beaumont; Fullarton; Grange; in buffalo grass lawn, North Terrace; Kinchina; National Park; Encounter Bay; Inman Valley; Kalangadoo (S.E.). May to August.

This quite common species on dung-heaps, especially when there is straw, differs from *B. vitellinus* in the brighter yellow pileus and in the gills being pale yellow when young, but agrees in the cream-coloured stem and fleshy disc. The spores are often a little larger than in *B. vitellinus* and *B. Boltoni* and still more so than in *B. flavidus*. The stem often has a trace of yellow and *B. Boltoni* has a yellowish stem and also flocci on it. Both have gills slightly adnate and light yellow when young, but the flesh of *B. Boltoni* is very thin (Rea) and our species is not attenuated at the base but often the reverse, as in *B. flavidus*. It does not really deliquesce like *B. flavidus*. The pileus is sometimes considerably larger than the sizes mentioned by Rea for any of the three species. On the whole it seems best to consider it as *B. Boltoni*.

241. *Bolbitius fragilis* (L.) Fr. (L., *fragilis*, fragile).—Pileus $\frac{1}{2}$ to $1\frac{3}{4}$ in. (2.1 to 4.3 cm.), at first ovate, then broadly conical, $\frac{1}{2}$ to $\frac{3}{4}$ in. (1.2 to 1.8 cm.) high, then expanding, submembranaceous, subgibbous, edge striate and fraying, viscid, edge near Straw Yellow (xvi.), apex near Light Cadmium (iv.) or near Pinard Yellow (iv.), or Apricot Yellow (iv.), paler and greyer towards the margin. Gills adnate or adnexed, ascending, narrow, short ones present, whitish or yellowish then lighter than Dresden Brown (xv.) or Buckthorn Brown (xv.) or a Watery Russet (xv.). Stem $1\frac{1}{2}$ to 4 in. (4.4 to 10 cm.), slender, fragile, slightly attenuated upwards, mealy above, sometimes finely striate, hollow, tinted with yellow or paler than Straw Yellow (xvi.) (in one collection white). Flesh thin, yellowish. Spore mass near Buckthorn Brown (xv.), spores yellow brown, 10.5 to 15×7 to 8μ . Amongst grass and mould or on or near dung. South Australia—National Park; Greenhill Road; Baker's Gully, near Clarendon; Port Lincoln, on rabbits' dung. April to June.

B. Spores black or blackish fuscous. Gills auto-digested from below upwards.

COPRINUS (Pers.) Fr.

(Gr., *kopros*, dung.)

"Pileus fleshy or membranaceous, regular. Stem central, confluent with or distinct from the pileus, with or without a ring or volva. Gills free, adnate or attached to a collar, very thin, parallel-sided or sub-parallel-sided, auto-digested from below upwards. Spores black, violet black, chocolate or fuscous; oval, elliptical, subglobose, angularly subglobose, pip-shaped, almond-shaped or cordiform; smooth, very rarely echinulate; with an apical germ-pore. Cystidia usually large, rarely absent. Growing on the ground, on dung or on wood. Solitary or caespitose."—Rea.

The species of *Coprinus* are characterised by their black or blackish spores and the deliquescent gills. The last-named liquefy from the free edge upwards, thus giving the later-maturing spores near the attachment of the gills a better opportunity of falling free from the gill-plates when discharged. As a result of the deliquescence, the plants rapidly become an inky mass when mature. Some

are very ephemeral, lasting only a few hours, deliquescent when the sun is up. Others may persist for a day or more. As their name indicates, a common habitat is dung. As several of our species grow on cow-dung and horse-dung, and there were no ruminants or equines in Australia before its colonization, these species are evidently introductions from elsewhere.

KEY TO THE SPECIES.

With a ring or volva.

Ring obvious, usually movable on the stem. Pileus large, white, at first cylindrical. Spores 10 to 17 x 6.5 to 11 μ 242. *Coprinus comatus*.

Volva-like ring usually obvious at the base of the stem.

Stem not rooting. White with white fibrils or scales. Spores 11 to 15 x 6.5 to 9.5 μ .

On dung 243. *C. sterquilinus*.

Stem with a long stout tapering root. Whitish, less fibrillose. Spores 15 to 21 x 9 to 13 μ .

In grassy fields 244. *C. sterquilinus* var. *radicatus*.

Ring basal, very fugacious.

Usually connected with buried wood, caespitose. Pileus 2 to 3 in., lurid fuliginous.

Spores 9 to 11 x 5 to 7.5 μ 245. *C. atramentarius*.

Ring sometimes present below the middle.

In sand. Pileus 1½ in., becoming convex,

striate, pale brownish. Stem 1½ to 6 in., stout, whitish. Spores 13 to 17 x 7.5 μ . . . 246. *C. arenacoloris*.

Without obvious ring or volva.

Plants medium-sized. Pileus fleshy or subfleshy.

Densely caespitose at the bases of posts, trees, or near buried wood. Pileus with micaceous particles becoming date-brown-fuscous. Spores dark bronze-brown, 7.5 to 9 x 5.5 to 7 μ . . . 247. *C. micaceus*.

Plants small. Pileus thin, plicate.

On dung.

Medium sized, pure white, mealy. Spores

black, 11 to 18 x 8 to 13 μ 248. *C. niveus*.

Minute. Conico-cylindrical becoming conico-expanded, double-ribbed. Stem white. Spores black, 8.5 to 14.5 x 6.4 to 8 μ 249. *C. ephemerus*.

On bare ground, amongst grass, etc.

Up to nearly ½ in. Pileus conico-cylindrical, finally convex with a pale depressed disc and plicate periphery. Stem white. Spores dark brown to black, 12.5 to 16 x 7 to 10 μ 250. *C. plicatilis*.

Attached to rotting twigs.

Up to 1 in. Brown disc slightly rounded.

Gills narrow, purplish brown. Slight bulb at base of stem. Spores dark fuscous, 7.5 to 11 x 4 to 5 μ 251. *C. virgulicoloris*.

1. Gills covered above with a fleshy or membranaceous cuticle, hence the pileus does not open into furrows along the gills but becomes torn and revolute.

*Furnished with a ring arising from the volva; the cuticle torn into scales.

242. *Coprinus comatus* (Fr. Dan.) Fr. (L., *comatus*, hairy).—‘Pileus 1½ to 2½ in. (4 to 6 cm.), 2 to 6 in. (5 to 15 cm.) high, fleshy, cylindrical, then campanulate, the continuous cuticle soon separating into adpressed, shaggy scales.

the scales becoming ochraceous at their apices, disc deep ochraceous remaining persistently entire, at length striate, margin often torn and unequal, white becoming pinkish at the margin and finally black. Gills free, separate from the stem, linear, white then pink at length black and deliquescent. Stem up to $4\frac{1}{2}$ to 10 in. (12 to 25 cm.), 1 to 2 cm. thick, attenuated upwards from the bulbous rooting base, fibrillose, silky, shining, white, then dingy or lilac white. Ring white, membranaceous, thin, torn, movable, fugacious. Spores black, elliptical,

[Drawing by E.R.C.]

Figure 29.—*Coprinus comatus* (Fl. Dan.)
Fr. (No. 242). Unexpanded. Adelaide.

11 to 13 x 6 to 7 μ (Australian specimens 9.5 to 17.3 x 6 to 11 μ). Cystidia vesiculose, 50 to 65 x 20 to 30 μ . Taste mild.'—Rea. Edible before the gills begin to turn black. South Australia—In lawn, Botanic Gardens; Beaumont; MacDonnell Bay (S.E.). New South Wales. Victoria. Europe, etc. (Figure 29.)

A species easily recognised amongst our deliquescent *Coprini* by its large size, white shaggy pileus in the early stages and the movable ring and absence of a volva.

243. *Coprinus sterquilinus* Fr. (L., *sterquilinum*, a dung-pit).—At first cylindrical, covered with shaggy white fibrils or long white hairs as part of the

universal veil, stem short. Then conico-cylindrical to conico-convex and finally plane with edge upturned and inrolled. Pileus when expanded 1 to 2 in. (2.5 to 5 cm.), striate to the rounded disc, covered densely with white fibrils or scurfy granules, lead-grey underneath, turning pallid brown at the apex. Gills just free or just reaching the stem, narrow, rather close, blackish. Ring like a slight or definite volva at the base of the stem. Stem $2\frac{1}{4}$ to 4 in. (5.6 to 10 cm.), rather stout, attenuated upwards, base at first bulbous, shaggy with upward-directed scales or fibrils, very hollow, with rooting mycelial threads at the base, white. Spores obliquely elliptical, black, 11 to 15 x 6.5 to 9.5 μ , sometimes 17.8 to 21 x 12.5 μ . Solitary or subcaespitose on dung or manured soil. South Australia—Parkside Mental Hospital; Fullarton, on horse-dung; Beaumont; Waterfall Gully; Kalangadoo (S.E.); Kingoonya (East-West Line). April to July, September, October.

A medium-sized species growing on dung or manured soil with a ring like a small volva at the base of the stem, the whole plant white at first with prominent fibrils on the pileus and stem.

244. *Coprinus sterquilinus* Fr. var. *radicatus* Clé. (*L., radicatus*, rooted).—When young ovate, then cylindrical with rounded apex, $1\frac{1}{4}$ in. (3.1 cm.) high and 1 in. (2.5 cm.) broad, then expanding and becoming plane, sulcate, the periphery splitting, clothed with narrow fibrous adherent scales, whitish becoming grey. At first with the edge turned in and closed by a white veil which ruptures to leave at the base of the stem a free edge and a more or less complete loose ring, sometimes adherent to the edge of the pileus. Gills free, narrow (3.5 mm.), not ventricose, purplish brown to dark grey becoming black, edges white. Stem $1\frac{1}{4}$ to $2\frac{1}{2}$ in. (3.1 to 6.2 cm.), slightly fibrillose, attenuated upwards, hollow, below passing into a long tapering root, $\frac{1}{2}$ to $1\frac{1}{2}$ in. (1.2 to 3.7 cm.) in length. Flesh thin. Spores elliptical, black, 15 to 21 x 9 to 13 μ . Amongst grass on the ground. South Australia—Kinchina, Encounter Bay, Beaumont. May, June, August, September.

**Somewhat ringed, but not with a volva. Pileus dotted, or spotted with minute, innate squamules.

245. *Coprinus atramentarius* (Bull.) Fr.? (*L., atramentarius*, inky).—Pileus up to $2\frac{1}{2}$ in. (6.2 cm.), at first conical, expanding to be finally upturned with a central umbo, dark grey with whitish furfuraceous fibrils. Gills adnate, close, very narrow, becoming black, at first with a white edge. Stem 4 in. (10 cm.), slightly attenuated upwards, fibrillose, striate above, hollow, white. Spores elliptical, with one side more prominent, to almost triangular, black, 9.5 to 11 x 7.5 μ . Caespitose. South Australia—On dead grass-tree (*Xanthorrhoea*), heath near Mount Burr (S.E.). May.

The above differs from the description given by Rea of British specimens in the gills not being free, in the pileus not being noted as deeply sulcate, in the stem not being fusiform and in no basal ring being observed. Specimens collected near the Torrens Lake, Adelaide, in June approach nearer to British specimens, the pileus being ovate at first, finally expanding somewhat to 4 in. (10 cm.), somewhat sulcate and hoary, pale brownish especially towards the disc; gills free, ventricose, whitish then brownish black; stem to $4\frac{1}{2}$ in. (11 cm.), equal or attenuated downwards, furrowed, fibrillose, slightly hollow, whitish; no ring recognised; spores oblique, bronze-coloured (probably immature), 8 to 9.3 x 4.8 μ . Specimens from the Botanic Gardens, Sydney, October, resemble these.

246. *Coprinus arenacoleus* Clé. (*L., arena*, sand; *colens*, inhabiting).—Pileus up to $1\frac{1}{2}$ in. (4.4 cm.), nearly hemispherical, then convex, striate, pale brownish. Gills ascending, just reaching the stem, broad, grey. Stem $1\frac{1}{2}$ to 6 in. (3.7 to 15 cm.), stout, attenuated upwards, a little striate, fibrous, not hollow, with a rough raised ring at the junction of the lower and middle thirds, shining, whitish becoming slightly straw-coloured. Flesh thin, watery. Spores elliptical, black, 13 to 17 x 7.5 μ . South Australia—In pure sand on a sand dune, Davenport Creek (E.P.). August.

Specimens, apparently of this species, found at Henley Beach, April, were densely caespitose, attached to dead wood in sand on a sand-dune; the stem hollow; no apparent ring; spores 11.2 to 13 x 7.5 μ .

***Universal veil floccose, at first continuous, then broken up into superficial scales which form patches on the pileus.

No South Australian species recorded.

****Pileus at first clothed with distinct flocci, or lax villous down, which fall off and disappear. Ring none.

247. *Coprinus niveus* (Pers.) Fr. (L., *niveus*, snow-white).—Snow-white, medium sized. When young ovate, covered with a shaggy white veil, then conico-hemispherical, finally conico-convex, pileus up to 1½ in. (3.7 cm.) broad and high but usually smaller, apex acute, edge curling up, covered with a white meal. Gills adnate, ascending, narrow, close, clouded. Stem up to 2 in. (5 cm.), slightly attenuated upwards, mealy, hollow, white. No strong smell. Spores subspherical to elliptical, sometimes with the ends drawn in, nearly black, 12.8 x 11 μ , 11 to 18.5 x 8 to 13 μ . On dung. South Australia—Adelaide, Burridge, National Park, Encounter Bay, Port Elliot, on horse-dung Ernabella (Musgrave Ranges). April, June, August.

A rather small snow-white species without obvious smell found growing on dung. The pileus and stem are covered with a white meal.

*****Pileus covered with small micaceous scales or granules which fall off and disappear.

248. *Coprinus micaceus* (Bull.) Fr. (L., *micaceus*, glittering).—Pileus 1½ to 2½ in. (3 to 6 cm.), ¾ in. (1.8 cm.) high, submembranaceous, conical, becoming broadly conico-convex, undulato-lobed, rimosely split, striate, at first covered with glistening micaceous particles, soon naked and becoming striate-rugose to

[Photo. by S. Tee.]

Figure 30.—*Coprinus micaceus* (Bull.) Fr. (No. 248).
Botanic Gardens, Adelaide.

the disc, disc even, Pinkish Buff (XXIX.), Cinnamon Buff (XXIX.) at the disc, at length date-brown fuscous, ferruginous ochraceous when dry. Gills ascending, just reaching the stem, narrow (4 mm.), close, white or isabelline, then brown or livid at the edge and finally fuscous blackish. Stem $1\frac{1}{4}$ to 8 in. (3 to 20 cm.), equal, or slightly attenuated upwards, silky, often curved, fibrillose, becoming smooth, hollow, white or whitish. Flesh pallid, thin at the disc. Spores dark bronze brown, pip-shaped or elliptical with a long apiculus, 7.5 to 9.3×5.5 to 7μ . Cystidia cylindric-oblong, apices rounded, 85 to 140×48 to 75μ (Rea). Edible (Australian plants have not yet been tried). Densely caespitose. A common species coming up abundantly near the bases of trees, old stumps, posts, and telephone poles and over buried wood, sometimes for some while after the removal of the wood. South Australia—Adelaide district. New South Wales, Victoria. April, June, September. (Figure 30.)

The situation (near old wood), densely caespitose habit, micaceous granules on the yellowish brown pileus, white stem and absence of a ring make this subdeliquescent species of *Coprinus* easily recognisable. The smaller *Psathyrella disseminata* resembles it.

*****Pileus smooth, without floccose or micaceous squamules. Veil none.

No South Australian species recorded.

II. Pileus very thin, without a pellicle, at length opening into furrows along the back of the gills and becoming plicato-sulcate. Stem thin, fistulose, Gills melting away into very thin lines.

*Stem annulate, or volvate.

No South Australian species recorded.

**Pileus clothed with superficial separating floccules. Gills free. Ringless.

No South Australian species recorded.

***Pileus micaceous or furfuraceous. Gills commonly adnate to the apex of the stem, which in some species is dilated into a ring or collar. Ringless.

249. *Coprinus ephemerus* (Bull.) Fr. (Gr., *ephemerus*, lasting but a day).—At first a minute yellowish-brown button. Pileus then conico-cylindrical, striate and yellowish brown, becoming more conical to conico-expanded and eventually upturned, the disc brownish and not definitely raised or depressed, the rest of the pileus greyish and finely double ribbed. Gills just reaching the stem, close, narrow, blackish. Stem up to 2½ in. (5.6 cm.), slightly attenuated upwards, silky with a slight mealiness, hollow, white. Spores elliptical, black, 8.5 to 14.5×4.8 to 8μ . On dung. South Australia—Adelaide. September.

Rea, in "British Basidiomycetae," states that the disc of *C. ephemerus* is elevated and often umbonate and that the spores measure 8 to 10×5.5 to 8μ . Our species may be *C. curtus* Kalcib. (= *C. plicatilis* Bull.).

250. *Coprinus plicatilis* (Curt.) Fr. (L., *plicatilis*, folded).—Pileus $5/16$ in. (7.5 mm.), $7/16$ in. (11 mm.) high, conico-cylindrical, then conico-campanulate, then convex and up to 1 in. (2.5 cm.) broad, the centre finally dimpled, darkish brown in the centre, succeeded by a pallid biscuit-coloured disc, the rest of the pileus plicate and greyish biscuit-coloured or colour of dead grass, a few glistening particles present, membranaceous. Gills ascending, just reaching the stem and attached to a collar, close, narrow, greyish, edges white. Stem $1\frac{1}{2}$ to $3\frac{1}{2}$ in. (3.7 to 8.7 cm.), slender, slightly attenuated upwards, hollow, white. Spores rather triangular to somewhat oval, dark brown to black, 12.5 to 17×7 to 11μ , 13 to 15μ . On the bare ground or amongst grass or garden plants. South Australia—Adelaide, Beaumont, Glen Osmond, Burnside, Mount Lofty, near Mount Compass. April to June, August, September.

A sterile form was found at Beaumont in May at the same time as fertile specimens and at first suggested a *Galera*; the pileus and gills were yellowish brown from the absence of spores.

Rea gives the spore measurements as 10 to 12 x 8 to 9 μ and describes the stem as pallid.

251. *Coprinus virgolicolens* Clel. (L., *virgula*, a little twig; *colens*, dwelling).—At first cylindrical with a rounded summit, mealy granulose in the centre, finely striate with a few glistening particles, biscuity-coloured. Then cylindrical-conical to broadly conical, finally expanding, $\frac{1}{2}$ to 1 in. (1.2 to 2.5 cm.) in diameter and up to $\frac{5}{8}$ in. (16 mm.) high, membranous, with a smooth slightly rounded fuscous brown disc at first pallid, the periphery closely striate-plicate with scattered pallid scurfy granules, dark livid or greyish brown. Gills just reaching the stem to adnate, ascending at first, close, narrow, whitish, finally dark purplish brown. Stem $1\frac{1}{2}$ to $2\frac{1}{2}$ in. (3.7 to 6.2 cm.), at first mealy and striate, then smooth, hollow, with a small bulb at the base and some radiating fibrils, white. Flesh very thin, brownish. Spores oblique, one end truncate, dark bronzy or fuscous brown, 7.5 to 9, occasionally 11 x 4 to 5 μ . On the ground amongst leaf mould attached to rotting twigs. South Australia—Mount Lofty. May, June.

Characterised by a membranaceous plicate pileus with some scurfy granules and a slightly raised brown disc, purplish-brown narrow gills, a white stem with a small bulb, spores which are dark fuscous brown, and the attachment to rotting twigs (to which the specific name refers).

****Pileus always smooth. Ringless.

No South Australian species recorded.

C. Spores black. With a volva, the stem expanding above to form a flat disc from whose edge the gills radiate without a covering cuticle, receptacle becoming rigid and friable.

MONTAGNITES Fr.

(After Montagne, the French Mycologist.)

Universal veil forming a volva, persistent. Stem dilated at the apex into an orbicular disc, smooth on both sides, to whose margin the free gills are attached. Gills radiating, sickle-shaped, persistent, with obtuse edges, without a covering cuticle. Trama cellular. Spores oblong, smooth, black-fuscous, basidia tetrasporous.

252. *Montagnites Candollei* Fr. (Probably after Alphonse de Candolle, the Swiss Botanist).—Pileus, formed by the expanded disc-like apex of the stem and the gills radiating from its periphery, $\frac{1}{2}$ to 1 in. (1.2 to 2.5 cm.), occasionally more, irregularly globose, or flattened on top with convex sides, or convex with an umbonate disc, at first deeply inturned below towards the stem, as though tucked in, leaving a space 2 or 3 mm. wide between the inturned edge and the stem, covered by the greyish to dirty whitish universal veil through which shows the ribbing of the gills. Gills to 3 mm. wide, very close like the leaves of a book, attached along the periphery of the disc and at first covered by the delicate universal veil, surfaces slightly wrinkled, carbonaceous; on old plants, the gills tend to expand outwards and become ragged. Stem 1 to $2\frac{1}{2}$ in. (2.5 to 7.6 cm.), 3 to 7 mm. thick, equal or attenuated upwards or slightly so downwards, deeply rugose tending to break into broad rugose scales, ascending to the summit of the pileus and there expanding into a thin disc up to 8 mm. wide, to whose periphery the gills are attached, fleshy firm, hollow, white, flesh white, base bulbous with a marked sheathing volva, sometimes supplemented internally by upwardly-directed broad scales from the base of the stem. Emerging from the soil, not subterranean. Spores elliptical, irregularly elliptical or sometimes obovate, black, 15 to 24 x 9.5 to 13 μ . Ernabella in the Musgrave Ranges and near Echo Hill. August.

In one specimen from near Echo Hill, with a stem about 6 cm. high and an umbonate convex pileus 2 cm. in diameter, the rather stout stem expands gradually upwards and the universal veil is seen almost intact. The veil covers the whole of the pileus, both disc and gills, and descends on to the stem, a little below the level of the lowest portion of the gills, as a greyish to dirty whitish friable rugose membrane, which has ruptured in half its circumference to form a spreading upwardly directed superior ring 5 mm. deep. On the stem below at intervals are further broad fragments of the universal veil and at the base which is not definitely bulbous are volva-like fragments. Where the veil leaves the outer convex surface of the gills, these turn in horizontally for 3 mm., forming a horizontal rim of uncovered gill plates so closely set as to resemble

Figure 31.—*Montagnites Candollei* Fr. (No. 252). South Australia.

Spores 9 to 9.5 x 4.5 to 5.5 μ .

the leaves of a book. The sides of the gills facing the stem then ascend almost at right angles but with a slight concavity towards the stem to the disc leaving an ample space between them and the stem, which latter is here coarsely striate. Spores of this specimen spherical to irregularly spherical, dark-fuscus, 5.5 to 7 μ . In another specimen the veil has left imperfect rings on a delicate stem. The attachment of the gills to the disc is very narrow: the gills, however, soon assume their average diameter and may do so abruptly, thus leaving a free edge internally facing the stem and another free edge externally where the veil leaves the sides of the gills, or may be somewhat narrowed internally and externally: sometimes they may be perhaps attached to a slight extent to the under aspect of the edge of the disc. The above description has been drawn up from fresh specimens collected in the Musgrave Ranges or their vicinity. At first sight it may seem, from the great differences in spore measurements and shapes, that we may be dealing with two species, especially as the Echo Hill specimen is distinctly more robust than the others (which are numerous). It is in fact matched to some extent by two other coarse specimens, one from Miller Creek near Mount Eba,

South Australia, and another without specific locality; the stems are $3\frac{1}{2}$ to 4 in. (8.7 to 10 cm.), attenuated upwards or in both directions, $\frac{3}{8}$ to $\frac{1}{2}$ in. (10 to 12.5 mm.) thick in the middle, covered with coarse downwardly directed scales, and coarsely striate above; the disc (lin., 2.5 cm.) is convex in one and convex with a very prominent obtuse umbo in the other; and both have dark fuscous, smooth, spherical or irregularly spherical spores, 5 to 6.5 μ in size, but in one there are also a few large spores 15.5 x 9.5 to 11 μ as well. On the other hand, a typical slender form (stem 3 in., 7.5 cm., long but only 2 mm. thick) from a sandhill at Waitpinga, Encounter Bay, also has small spores, 7.5 x 5.5 μ , which are elliptical to irregular or almost triangular. It thus seems, as has been suggested by others, that we are dealing with a single species, highly variable as regards its size and robustness and the size and shape of the spores.

Other specimens comprise the following:—South Australia—Miller Creek near Mount Eba (spores 19 to 24 x 11 to 12.8 μ (rarely 27 x 21 μ); Ooldea (spores irregularly elliptical to ovate, 7.5 to 11 x 5.5 to 7 μ ; another collection from Ooldea, spores 15 to 17.5 x 9.5 μ , rarely 27 x 21 μ to nearly spherical, 16 μ); north-west of Port Augusta (spores obliquely elliptical, often irregular, sometimes swollen in the centre, blackish, 9 x 5.5 μ , rarely 13 x 9 μ); Flinders Range near Orraparinna (spores obliquely elliptical, dark fuscous, 13 to 16 x 7.5 μ). Central Australia—North of Charlotte Waters (spores elliptical, blackish, 18 x 11 μ , occasionally 25 x 13 μ); Deep Well (spores irregularly elliptical to ovate, black, 7.5 to 11 x 5.5 to 7 μ); Woodforde Creek (spores dark brown to blackish, elliptical, sometimes rather irregular, 15 to 26 x 9 to 15 μ). Western Australia—Kurrawang. New South Wales—Forbes (spores black, 20.8 x 14 μ , 14 x 10.4 μ). January, May, August, November, December. (Figure 31.)

4. Receptacle membranaceous, tough, reviving with moisture, not putrescent.
Spores white.

*Pileus with a thin, unspecialized cellular pellicle.

MARASMIUS Fr.

(Gr., *maraino*, I die away.)

“Pileus membranaceous or coriaceous, regular or resupinate. Stem central or wanting, cartilaginous or horny. Gills adnate, adnexed, decurrent or free, pliant, rather tough. Spores white; elliptical, pip-shaped, oblong elliptical, almond-shaped, tear-drop-shaped, globose or subglobose; smooth, punctate or echinulate; continuous. Cystidia present or absent. Growing on the ground or on wood; solitary, gregarious, caespitose or fasciculate.”—Rea.

The species of *Marasmius* grow on the ground or on wood or attached to fallen leaves or arising from the bases of stems of grass and are characterised by the membranaceous pileus which is tough and revives perfectly when moistened. The genus is related to *Collybia* and *Mycena*, differing in the tough reviving pileus, and is divided into two sections corresponding to these genera, the one with the margin of the pileus at first incurved, the other with it straight. Since in some cases the fungi are only moderately tough and partly revive when moistened, it is not surprising that a species may be placed in *Collybia* or *Mycena* by one author and in *Marasmius* by another. The plants are usually small, some minute. *Marasmius oreades*, which has been found in New South Wales but not yet in this State, is one of the larger terrestrial species, an inch or even two inches in diameter, growing in “fairy rings” and making, it is said, a delicious addition to gravy or soups. Some of the species have a smell of garlic. The minute *M. equicrinis*, common in the Mount Lofly Range, has long threads of mycelium like horse hair entangling and attached to fallen leaves and debris.

KEY TO THE SPECIES OF MARASMIUS, ANDROSEACEUS, AND
CRINIPELLIS.

On the ground.

Gills nearly free.

Pileus 1 to 2 in. In rings 253. *Marasmius oreades*.

Gills adnate.

Pileus $\frac{1}{2}$ to 1 in., dark brown, when dry colour
of dead grass. Gills pinkish buff. Stem

about 1½ in., villous, dark brown 255. *M. villosipes*.

On wood, fallen sticks, etc.

Pileus $\frac{1}{2}$ in. or more.

Stem velvety, blackish, $\frac{1}{2}$ in.

Pileus about 1 in., burnt umber, drying to walnut brown. Gills adnate to sub-decurrent, light cinnamon drab. Smell

foetid 256. *M. foetidus*.

Stem densely villose or short hairy, greyish brown.

Pileus about $\frac{3}{4}$ in., sayal brown. Gills adnate, glaucous brown 257. *M. australiensis*.

Pileus usually $\frac{1}{4}$ to $\frac{1}{2}$ in.

Stem smooth or slightly velutinate, Vandyke brown to blackish, paler above, usually about $\frac{1}{2}$ in.

Pileus up to $\frac{1}{2}$ in., pinkish cinnamon to ochraceous salmon. Gills adnate, creamy white. On trunks 254. *M. cinnamomeus*.

Stem pruinose to granular, whole plant light pinkish cinnamon to colour of dead grass.

Pileus $\frac{1}{2}$ to $\frac{3}{4}$ in., umbilicate. Stem $\frac{1}{2}$ to $\frac{3}{4}$ in. On fallen sticks, etc. 258. *M. ramealis*.

Pileus minute, up to $\frac{1}{8}$ in.

Pileus umbilicate with a knob in the centre, biscuit-coloured.

Gills 8 to 11, attached to a collar. Stem several inches long, brown, hair-like.

Sterile mycelium like horse-hair 259. *M. equierinis*.

Pileus alveolar, honey-coloured.

Gills 6 to 10, adnate. Stem short, dark brown below 260. *Androsaccus*

alveolaris.

Attached to buried grass stems.

Pileus $\frac{1}{2}$ in., with adpressed fibrils, colour of dead grass. Stem densely pilose, concolorous 261. *Crinipellis*

caulicinalis.

A. MARGIN OF PILEUS INCURVED AT FIRST. STEM CARTILAGINOUS. MYCELIUM FLOCCOSE.

a. Stem externally villose or pruinose. Gills separating, free.

*Stem woolly or strigose at the base.

No South Australian species recorded.

*Stem naked at the base.

253. **Marasmius oreades** (Bolt.) Fr. (Gr., *oreias*, belonging to mountains).—Pileus 1½ in. (3.7 cm.) or larger, pliant, convex, irregular, subumbonate, then rather upturned, surface matt, biscuit-coloured. Gills just free, broad, moderately distant, creamy white. Stem up to 3 in. (7.5 cm.), slender, equal, rather wavy, somewhat pruinose ("covered with a villose-woven cuticle"), whitish. Spores elliptical, white, 8.5 x 4.2 to 5 μ . Forming imperfect rings. Edible. New South Wales—Moore Park. December.

The above description of the edible "Fairy Ring Champignon" is from Sydney specimens. It has not yet been recorded from this State but doubtless does occur. Its pliant texture, distant free gills and arrangement in rings make it readily recognisable.

b. Stem rooting, distinctly cartilaginous. Gills separating-free.

*Stem woolly downwards, smooth upwards.

No South Australian species recorded.

**Stem, at least when dry, everywhere pruinose velvety.

No South Australian species recorded.

**Stem smooth.

No South Australian species recorded.

c. Stem abrupt, often furnished with a floecose tubercle at the base. Gills adnate or subdecurrent.

*Stem very smooth and shining upwards, base simple.

254. *Marasmius cinnamomeus* Clel. (L., *cinnamomeus*, cinnamon-coloured).—Pileus up to $\frac{1}{2}$ in. (1.2 cm.), usually less, irregularly convex, then nearly plane, surface dull and slightly villose or minutely frosted, subrugose, substriate sometimes at the edge, when young with the edge a little inturned, Light Pinkish Cinnamon to Pinkish Buff (XXIX.), Light Vinaceous Cinnamon (XXIX.) or Light Ochraceous Salmon (XV.), darker in the centre. Gills adnate, then seceding, moderately close to somewhat distant, slightly ventricose, edges sometimes slightly serrate, creamy white. Stem up to $\frac{1}{2}$ in. (1.2 cm.), sometimes to 1 in. (2.5 cm.), slender, slightly velutinate or smooth, near Hessian Brown or Vandyke Brown (XXVIII.) or lighter, paler above, darker sometimes nearly black below, abruptly entering the matrix. No smell. Spores subspherical to pear-shaped, with an oblique apiculus, hyaline, 7.5 to 6 μ , 7.5 to 9 x 4 μ . On thick bark at the bases of living Eucalypts. South Australia—National Park, Mount Lofty, Willunga Hill, Inman Valley. April, May, July.

The distinguishing features are the pinkish buff to cinnamon pileus, the creamy white and adnate gills and dark reddish brown short subvelutinate stem.

**Stem velvety or pruinose, base subtuberculose.

255. *Marasmius villosipes* Clel. (L., *villosus*, villous, shaggy; *pes*, a foot).—Pileus $\frac{1}{2}$ to 1+ in. (1.2 to 2.7 cm.), irregularly convex, sometimes dimpled and upturned, sometimes irregularly rugose, edge lacerated, dark brown when moist, when dry the colour of dead grass. Gills adnate, moderately close to rather distant, pallid pinkish buff (near Avellaneous, XL.). Stem $1\frac{1}{4}$ to $1\frac{1}{2}$ in. (3.1 to 3.7 cm.), slender, tough, very villous, dark brown (darker than Buffy Brown, XL.). Spores (apparently) pear-shaped, 5.5 x 3.5 μ . Under *Pinus radiata* Don. (*P. insignis* Douglas) and in grass. South Australia—Caroline State Forest, Mount Gambier; Lowan State Forest, Kalagadoo. May.

256. *Marasmius foetidus* (Sow.) Fr. (L., *foetidus*, stinking).—Pileus up to $\frac{3}{4}$ in. (2.1 cm.), irregular, convex then nearly plane, plicate, near Burnt Umbec (XXVII.) when moist, drying to near Walnut Brown (XXVII.). Gills thick, adnate to slightly decurrent, pruinose, near Light Cinnamon Drab (XLVI.). Stem $\frac{1}{2}$ in. (1.2 cm.), sometimes attenuated downwards, sometimes flattened, velvety, blackish. Spores 9 x 5.5 μ . Smell distinctly foetid. South Australia—On the bark several feet up the trunk of living *Eucalyptus obliqua* L'Heret., Mount Lofty Summit. April, July.

257. *Marasmius australiensis* Clel. (L., *australiensis*, here Australian).—Pileus $\frac{3}{4}$ in. (15 mm.), convex and dimpled or slightly irregularly upturned or plane, slightly irregularly rugose, innately fibrillose, near Sayal Brown (XXIX.). Gills adnate, moderately close, many short, sides slightly venose, glaucous brown. Stem up to $\frac{3}{4}$ in. (18 mm.), slightly attenuated downwards, densely villous or short hairy, greyish brown. Spores 7.5 x 3.5 μ . No cystidia seen. On wood. South Australia—National Park. July.

258. *Marasmius ramealis* (Bull.) Fr. (L., *ramus*, a branch).—Pileus $\frac{1}{2}$ to $\frac{1}{4}$ in. (4 to 7 mm.), convex, umbilicated, finally sometimes upturned and the edges lacerated, edge inturned when young, surface dull, light pinkish cinnamon to near the colour of dead grass. Gills adnate, moderately distant, many short, a little paler than the pileus. Stem $\frac{1}{2}$ to $\frac{1}{4}$ in. (4 to 7 mm.), slender, slightly attenuated downwards, pruinose to granular, abruptly entering the matrix, concolorous. Gregarious on fallen twigs and bark and dead grass stems, often partly buried in the sandy soil. South Australia—Encounter Bay. May.

Our plants differ from the description given by Rea in being smaller, and in being uniformly of one colour, near that of dead grass. The spores in the British plant are given as 8 to 10 x 3.4 μ , minutely punctate.

B. MARGIN OF PILEUS STRAIGHT AND ADRESSED TO THE STEM AT FIRST. STEM CARTILAGINOUS. MYCELIUM RHIZOMORPHOID, CORTICATE.

259. *Marasmius equicrinis* F.v.M. (L., *equus*, a horse; *crinis*, hair).—Pileus 1/16 to 1/4 in. (1.5 to 3 mm.), convex or hemispherical, with about 8 coarse rugae, umbilicate with a minute dark knob in the centre of the dimple, near Tawny Olive (XXIX.). Gills adnate, attached to a collar, 8 to 11 in number, distant, pallid. Stem 1 to 5 in. (2.5 to 12.5 cm.), often less, smooth, hair-like, abruptly piercing the matrix or arising at right angles from the mycelium, dark brown or black, pallid below the pileus. Sterile mycelium tough like horse-hair, brown, tangled amongst fallen leaves, etc. Spores elongated, elliptical, 7.5 to 9 x 4.5 to 5.5 μ . South Australia—Mount Lofty, Greenhill Road, National Park. New South Wales. March to July.

The Horse-hair Fungus is not uncommon amongst the debris of fallen leaves in shaded forests. The sterile mycelium is often abundant and careful search may show the minute caps on long hair-like stems.

*Pileus with a thick cellular pellicle.

†Cells of the pellicle upright, echinulate or verrucose.

ANDROSACEUS (Pers.) Pat. (MARASMIUS Fr., in part).

(Gr., *androsakes*, an unidentified sea-plant.)

“Pileus membranaceous, thin, regular, cells of pellicle echinulate or tuberculose. Stem central, horny. Gills adnate, emarginate, decurrent or attached to a collar. Spores white, elliptical, pip-shaped, oblong elliptical, subglobose or club-shaped; smooth; continuous. Cystidia present or absent. Growing on wood, fallen leaves, etc.”—Rea.

260. *Androsaceus alveolaris* Clcl. (L., *alveolaris*, alveolar, having little troughs or depressions).—Pileus 1/4 in. (3 mm.) or less, rarely more, the surface alveolar from raised ribs rimosely arranged, leaving a polygonal cell in the centre, dark honey-coloured (near Snuff Brown, XXIX.), the ribs darker. Gills adnate, distant, 6 to 10 in number, with some venose elevations at the periphery forming abortive gills and buttressing folds, edges thick, pallid honey-coloured. Stem short, up to 1/4 in. (6 mm.), rarely more (3/4 in., 15 mm.), slightly pruinose, whitish above, very dark brown below, abruptly entering the matrix. Spores white, narrow, oblique, with the ends drawn out and acute, 10 to 13 x 5.5 μ , 9 to 10 x 3.7 μ . Hairs on the pileus and stem colourless, straight with knobby or irregular swollen apices, 38 to 76 x 7.5 μ , forming a villous coat, a few present also on the edges of the gills. On bark. South Australia—National Park, Encounter Bay. May, July.

This little fungus, described as *Marasmius alveolaris*, seems better placed under *Androsaceus*.

††Cells of the pellicle decumbent, very long, fibrillose.

CRINIPELLIS Pat.

(L., *crinis*, hair; *pellis*, skin.)

“Pileus membranaceous, regular, cells of pellicle long, thick, tough. Stem central, firm. Gills adnate or free. Spores white, pip-shaped, smooth or punctate, continuous. Growing on wood, twigs, etc.”—Rea.

261. *Crinipellis caulicinalis* (Bull.) Rea (Gr., *kaulos*, a stalk).—Pileus 1/4 in. (1.2 cm.), irregularly convex, covered with intricate adpressed fibrils, edge sometimes slightly rugose, pallid brownish drying to a pale greyish brown or dead grass colour. Gills apparently adnate or adnexed or attached to an indefinite collar, then seceding, moderately close, concolorous. Stem up to 1 in. (2.5 cm.), slender, usually attenuated downwards, densely pilose, solid, concolorous or sometimes browner. Spores elongated pear-shaped, one end pointed, 10.5 x 5 μ . Caespitose on the ground, often attached to buried grass stems. South Australia—Hill near Beaumont (Adelaide). April.

Specimens, apparently this species, from Neutral Bay, Sydney, March, have a tinge of purple on the pileus and stem and spores 7 to 8.5 x 4.4 to 5 μ . The representation of *C. caulicinalis* in Bresadola's *Iconographia Mycologica*, Tab. 496, 2, does not give a good impression of the Australian plant that we refer to this species.

***Pileus sub-gelatinous leathery, stem horny.

HELIOMYCES Lev.

(Gr., *helios*, the sun; *mykes*, a fungus.)

"Flesh tremelloid, subcoriaceous, reviving in moist weather. Pileus rugose, sulcate or reticulate-ridged. Stem central, confluent with the pileus, tough. No veil. Gills with an acute edge."—Kaufman.

No Australian species as yet recorded.

5. Receptacle coriaceous, fleshy coriaceous or woody. Spores white.

*Gills with crisped folds.

TROGIA Fr. (PLICATURA Peck.)

(Trog, a Swiss Mycologist.) (L., *plicatus*, folded; Gr., *oura*, a tail.)

"Pileus spongy coriaceous, soft, flaccid, dimidiate, sessile or substipitate. Hymenium covering obtuse veins, gill-like in front, crisped and branched behind, fertile on the edge. Spores white, oblong or cylindrical, smooth. Cystidia none. Growing on wood."—Rea.

No South Australian species known.

**Gills with the edges longitudinally split.

SCHIZOPHYLLUM Fr.

(Gr., *schizo*, 1 split; *phyllon*, a leaf.)

"Pileus coriaceous, resupinate. Stem lateral or none. Gills radiating from a central point, becoming longitudinally split and revolute at the edges. Spores white, cylindrical, smooth, continuous. Cystidia none. Growing on wood."—Rea.

262. *Schizophyllum commune* Fr. (L., *communis*, common).—Pilei single or often caespitose or sometimes densely umbriate, up to 3in. (7.5 cm.) laterally and 1½in. (3.7 cm.) long but often much smaller, more or less fan-shaped or

[Photo. by S. Tee.

Figure 32.—*Schizophyllum commune* Fr. (No. 262). Multifid form from Darwin, North Australia.

reniform and lobed, the edges of the lobes sometimes cristately indented, irregularly plane, convex or concave, radiately rugose, covered with dingy greyish to whitish downy hairs becoming strigose, often pendulous, usually contracted to a stem-like base, tough, near Wood Brown (XL.) when moist, drying pallid greyish-white. Gills splitting and when moist revolute at the edges, narrow, close, radiating, near Vinaceous Buff (XL.) sometimes with a livid cinnamon tint or Avellaneous (XL.). Flesh pallid, tough. Spores in the mass white with a very faint salmon tint, microscopically narrow, slightly curved, $7.5 \times 2.7 \mu$. On fallen trunks, stumps, dead branches, and sometimes on old timber. South Australia—On stumps of *Pinus* and willow and on wood of *Araucaria Bidwilli* Hook., Beaumont; Waterfall Gully. All the Australian States. Probably nearly world-wide. Autumn and winter. (Figure 32.)

A not uncommon species on dead wood and stumps, readily recognised by its toughness, its split revolute gills and its greyish-white downy-strigose upper surface. It is found sometimes in dense overlapping masses. It undoubtedly aids in the disintegration of dead wood and stumps.

***Gills black.

ANTHRACOPHYLLUM.

(Gr., *anthrax*, coal; *phyllon*, a leaf.)

Pileus semi-circular, almost sessile, leathery, tough, thin, wrinkled. Gills leathery-coriaceous, unequal, with sharp undivided edges, black. Spores white.

No Australian species recorded.

****Pileus fleshy coriaceous, gills somewhat soft.

PANUS Fr.

(Gr., *pan*, all; *ous*, an ear.)

“Pileus fleshy-coriaceous, excentric, dimidiate or resupinate, sessile or stipitate. Stem when present lateral, confluent with the pileus. Gills soft, then coriaceous, decurrent or arising from a central point. Spores white, cylindrical or elliptical, smooth, continuous. Cystidia present or absent. Growing on wood, often caespitose.”—Rea.

These fungi are non-putrescent, tough, and grow on wood. The pileus is excentric, lateral or at first resupinate. The flesh varies in texture from tough to somewhat fleshy, so that some species approach *Pleurotus*. Some authorities consequently may place a species in *Panus* which others consider should come under *Pleurotus*. The gills have an entire edge which distinguishes them from those of *Lentinus*, in which the edges are thin and lacerated or serrated.

Stem definitely lateral.

263. *Panus stipticus* (Bull.) Fr. “Pileus $\frac{1}{2}$ to $2\frac{1}{2}$ in. (1.2 to 6.7 cm.), thin, elastic, reniform, sometimes infundibuliform and lobed, pruinose, the cuticle breaking up into furfuraceous scales, cinnamon, becoming pale. Stem $\frac{1}{3}$ to $\frac{1}{2}$ in. (5 to 20 mm.), $\frac{1}{12}$ to $\frac{1}{4}$ in. (2 to 3 mm.) thick, coriaceous, dilated at the apex, ascending, pruinose, coriaceous. Gills ending determinately, thin, very narrow, crowded, connected by veins, ochraceous or cinnamon. Flesh concolorous. Spores white, elliptical, 4 to 5×2 to 2.5μ . Cystidia on the edge of the gills lanceolate, at first clavate. Taste very astringent. Poisonous. On dead stumps and fallen branches.”—Rea.

****Pileus membranaceous-coriaceous, gills coriaceous, branched, obtuse.

XEROTUS Fr.

(Gr., *xeros*, dry; *ous*, an ear.)

“Pileus membranaceous-coriaceous, regular. Stem central, confluent with the pileus. Gills coriaceous, broadly pliciform, dichotomous, edges entire, obtuse. Spores white, elliptical, irregular.”—Rea.

Species of this genus have not so far been collected in South Australia. The pretty *X. fuliginosus* B. et C. is not uncommon on sticks in the coastal part of New South Wales.

*****Pileus coriaceous or woody, pliant; gills firm, often toothed.

LENTINUS Fr.

(*L.*, *lentus*, pliant or tough.)

"Pileus coriaceous, pliant, more or less irregular, stipitate or sessile. Stem when present central, excentric or lateral, confluent with the pileus. Gills tough, adnate or decurrent, often toothed at the edge. Spores white; elliptical, pip-shaped, oblong cylindrical or globose; smooth or echinulate; continuous. Cystidia present or absent. Growing on wood, rarely on the ground, solitary or caespitose."—Rea.

The species of *Lentinus* are tough fungi, more or less pliant when moist, becoming more rigid when dry, reviving with moisture. They approach *Pleurotus* on the one hand and *Lenzites* on the other. The edge of the gills is thin and typically should become lacerated or toothed, thus distinguishing the genus from *Panus*. This serrated edge is often poorly developed. We possess two species at least. One of these, *Lentinus lepideus*, very large, up to 10½ in. across, with the pileus remarkably resembling a leopard's skin in colour and pattern, has been found in our Mallee country. The other species are smaller, strigose fungi, with the centre of the pileus usually deeply umbilicated and with narrow decurrent gills, found attached to fallen wood.

KEY TO THE SPECIES.

Pileus nearly entire. Stem distinct.

Pileus scaly.

Large, stout, reticulated and variegated with

spot-like scales 264. *Lentinus lepideus*.

Pileus strigose or villose, thin, more or less infundibuliform.

Gills with a violet tint, decurrent.

Pileus becoming whitish 265. *L. decalbatus*
(vide *L. fasciatus*).

Gills pallid or wood-colour, decurrent.

Pileus reddish-fawn, depressed, strigosely hairy. Gills pallid *L. strigosus*.*

Pileus pale ochre, fasciculately hispid, the hairs longer and coarser than in the preceding. Gills pale wood colour 265. *L. fasciatus*.

Pileus dark reddish-brown, infundibuliform, densely hispid. Gills greyish brown 265. *L. terrestris*
(vide *L. fasciatus*).

Pileus dimidiate or sessile.

No species yet recorded for the State.

*Cooke records *L. strigosus* Fr. for Queensland. It has not been recorded for South Australia.

I. Pileus nearly entire. Stem distinct.

*Pileus scaly, more or less manifestly veiled.

264. *Lentinus lepideus* Fr. (Gr., *lepis*, a scale).—Pileus 10½ in. (26.2 cm.), convex with centre depressed and edge undulating, firm, presenting a leopard-like appearance from fine reticulations separating scale-like areas of ¼ to ½ in. (6 to 12 mm.); the centre of each spot is pallid and outside this is a dark brown ring and beyond this again pallid ochraceous anastomosing lines in the centres of which run the reticulations between the scales; in the central part, the areas are more plates; at the periphery they are more scale-like; general colour near Tawny Olive (xxix.), the centres of the spots paler; the young plant is more scaly and not spot-like, near Light Ochraceous Buff (xv.). Gills decurrent, anastomosing near the stem as reticulations, rather broad, close, not transversely striate, edges mostly entire, Light Ochraceous Buff (xv.), becoming darker. Stem short, 1 in. (2.5 cm.), stout (2 in., 5 cm.). South Australia—Gurrai (Peebinga Railway). July.

*Pileus villose or pulverulent.

265. *Lentinus fasciatus* Fr. (Probable synonyms, *L. dealbatus* Fr., *L. fasciatus* Kalkh., and *L. terrestris* Lloyd.) [*L. fasciatus*, arranged in bundles].—Pileus up to 2 in. 5 cm., thin, coriaceous, infundibuliform, margin involute, densely fasciculately hispid, more or less regular, Tawny Olive (XXIX.) becoming bleached-looking. Gills deeply decurrent, moderately close, rather narrow, entire, pale wood-colour becoming glaucous (near Light Mouse Gray, LL.). Stem 1 in. (2.5 cm.), sometimes much more, slender or stout, densely hispid like the pileus, deeper brown than Tawny Olive. On rotting wood.

The above description has been drawn up from plants from Enoggera, Queensland, determined by the late Dr. C. G. Lloyd as *L. fasciatus*. Small specimens from Poldia, 20 miles north-east of Elliston (Eyre Peninsula), August, differ in the gills being purplish brown when fresh. Kinchina plants (July, August) have gills varying from pale wood-colour to violet or purplish tinted becoming pale with the pileus from Tawny Olive (XXIX.) to near Saccardo's Umber (XXIX.). spores 6 to 7.5 x 3 to 3.75 μ . Immature plants from Clare, August, also have purple tints. It seems probable that the purplish brown or violet tint is present in the young state of *L. fasciatus* and that *L. dealbatus* Fr., with gills "somewhat violet" and *L. fuscopurpureus* Kalkh. with "pileus purple-brown" and gills "paler than the pileus" are really stages or forms of *L. fasciatus*. The type of *L. terrestris* Lloyd was also gathered at Kinchina (September) where the above plants, some with violet or purplish gills, were found. We consider that *L. terrestris* is probably also merely a form of *L. fasciatus*, but append a description drawn up from the so-types in our possession. This is as follows:—Pileus 1 to 2 in. (2.5 to 5 cm.), irregular, somewhat infundibuliform, densely hispid with short fasciculate hairs, approaching Sauff Brown (XXIX.). Gills equal, close, moderately decurrent, greyish-brown, darker when young. Stem $\frac{3}{4}$ in. (1.8 cm.), central or slightly excentric, rather slender, velutinate, the colour of the pileus, white within, surrounded at the base by a ball of dirt adhering in a mycelial mass and connected to buried decaying wood. Spores 6.5 to 8 x 3.2 to 4 μ .

II. Hymenium inseparable from the pileus, spread over the surface of narrow, obtuse veins, gills or folds or quite smooth.

*Spores white.

Receptacle fleshy, stipitate: gills simple. Parasitic on other Agarics.

NYCTALIS Fr.

(Gr., *nyx*, night.)

No species yet recorded for Australia.

Receptacle fleshy, stipitate: gills forked.

CANTHARELLUS Adans.

(Gr., *kantharos*, a drinking cup.)

"Pileus fleshy: regular, excentric or lobed. Stem central, confluent with the pileus. Gills decurrent, thick, branched. Spores white, rarely pale ochraceous in the mass, elliptical, oval or pip-shaped, smooth: basidia with 4-8 sterigmata. Cystidia present or absent. Growing on the ground."—Rea.

KEY TO THE SPECIES.

Pileus and solid stem fleshy.

Pinkish-lilac tints on the pileus and stem 266. *Cantharellus*

Pileus 1 to 1 1/2 in., ochraceous tawny to cinnamon. 267. *C. ochraceus*.

Gills and stem ochraceous buff 267. *C. ochraceus*.

Pileus to 1 in., cineraceous buff or paler. Gills white, tinted with pinkish cream. Stem 2 in., attenuated downwards 268. *C. attenuatus*.

Pileus submembranaceus.

Pileus usually over lin.

Pileus rugose, brown. Gills adnate, vinaceous brown. Stem villous, drying buff brown .. 269. *C. rugosus*.

Pileus smoky brown from punctate granules. Gills subdecurrent. Stem short, with granules .. 270. *C. granulatus*.

Pileus under lin.

White, attached to roots of grasses .. 271. *C. imperatae*.

Smuff brown or lighter. Gills deeply decurrent.

Amongst moss or on bare soil .. 272. *C. brunneus*.

Chrome-coloured .. 85. *Omphalia chromacea*.

**Pileus* and solid stem fleshy.

266. *Cantharellus lilacinus* Clel. et Cheel. (L., *lilacinus*, lilac-coloured).—*Pileus* up to lin. (2.5 cm.), convex and edge turned in when young, then slightly convex or even depressed, often deformed, surface matt or almost floccose, of a brilliant artificial-looking pinky-lilac. Gills markedly decurrent from the first, very distant, often branching, many short, edges rather thick, white or with a lilac tint. Stem up to 1½ in. (3.7 cm.), 3/16 in. (4.5 mm.) thick, moderately stout, equal, lilac above, a pale dull yellow below. Flesh thick, lilac above, white in the stem. Spores pear-shaped, 7 to 8.5 x 4.5 to 5.5 μ . South Australia—Mount Lofly. New South Wales. June, July.

The lilac colour and thick, often branching, gills distinguish the species.

267. *Cantharellus ochraceus* Clel. (L., *ochraceus*, ochre-coloured).—*Pileus* 1 to 1½ in. (2.5 to 3.7 cm.), convex, somewhat irregular, surface dull, edge turned in when young, near Ochraceous Tawny (xv.) and Cinnamon (xxix.). Gills slightly arcuately decurrent, rather distant, only occasionally forking at the extreme periphery, rarely elsewhere, short ones interspersed at the periphery, up to 7 mm. deep, bases thick tapering to a blunt or usually somewhat acute edge, Light Ochraceous Buff (xv.). Stem 1½ to 1¾ in. (3 to 3.7 cm.), 8 to 10 mm. thick, rather irregular, attenuated downwards or irregularly thickened below, slightly fibrillose, Ochraceous Buff (xv.). Flesh Light Ochraceous Buff, in the stem continuous with and similar to that of the *pileus*. Spores white, pear-shaped, 6.5 x 4 μ . South Australia—On the ground in a clump of *Hibbertia acicularis* (Labill.) F.v.M., National Park. July.

This species seems close to *C. Friestii* Quel.

268. *Cantharellus attenuatus* Clel. (L., *attenuatus*, attenuated, in reference to the stem).—*Pileus* ¾ to lin. (1.8 to 2.5 cm.) or more, campanulate or convex with a slight umbo and gills arcuately and deeply decurrent, to slightly infundibuliform and gills deeply decurrent, slightly fibrillose silky, near Vinaceous Buff (xl.) and paler. Gills deeply decurrent, rather distant, narrow, edges rather thick, sometimes branching or with slight venose connections, white with a pinkish cream tint. Stem 2 to 2½ in. (5 to 6.2 cm.), slender, markedly attenuated downwards, matt to subfibrillose, solid, white with a tinge of vinaceous buff. Flesh white, thin externally. Spores pear-shaped, 5 x 2.5 μ . Several together on the ground, rooting rather deeply. South Australia—National Park, Mount Lofly. June.

[268A. *Cantharellus cibarius* Fr. var. *australiensis* Clel. (L., *cibarius*, pertaining to food; *australiensis*, here Australian).—*Pileus* up to 1½ in. (3.7 cm.), irregular, usually dimpled or umbilicate, sometimes gibbous, rather mealy, dry or slightly viscid, brilliant orange, often pinkish orange, or the colour of a denderipe apricot, rarely salmon orange or salmon crimson. Gills decurrent, moderately distant, thick, rounded, often forked several times, paler or deeper orange than the *pileus*. Stem up to over lin. (2.5 cm.), attenuated upwards or downwards, often flattened, solid or slightly hollow in the centre, colour of the *pileus*. Flesh paler. Faint sweet apricot smell and flavour. Spores oval, white, 6.3 to 9 x 5 to 7 μ . Edible. On the ground. New South Wales—Lower Hawkesbury R. (Milton Island and mainland); Ryde. Victoria. May, July, November. (Plate III. Right hand bottom figure usual colour, left hand middle figure rarer form approaching crimson.)

This small variety of *C. cibarius* has not yet been found in South Australia. It is readily recognised by its colour and apricot smell. I have eaten it and found it to have a delicate apricot flavour.]

**Pileus submembranaceous; stem tubular, polished.

269. *Cantharellus rugosus* Clel. (L., *rugosus*, wrinkled).—Pileus up to 1½ in. (4.8 cm.), submembranaceous, irregularly convex with the centre depressed, finally often upturned, coarsely and irregularly radiately rugose, dark brown near Natal Brown (XL) drying paler near Wood Brown (XL). Gills adnate, rather narrow, often very irregular with buttresses and sometimes anastomosing folds between, when dry more vinaceous than Army Brown (XL) with a more purplish cast when moist. Stem up to 2 in. (5 cm.), slender, attenuated downwards, villous, hollow, when dry near Buff Brown (XL), when moist dark brown nearly black. Flesh very thin. Spores 7 to 9 x 3 µ. Cystidia not seen. Suggestive of *Marasmius* but not reviving when moistened. At the base of a stump. South Australia—Mylor. June.

270. *Cantharellus granulatus* Clel. (L., *granulosus*, granular).—Pileus 2 in. (5 cm.), irregularly convex to plane, sometimes upturned irregularly, repand, edge irregular, thin, smoky brown from minute dark-coloured granules or warts. Gills sub-decurrent, moderately close, narrow, edges rather thin, often forking towards the periphery, sometimes crinkled and with irregular veins between, creamy in colour with rusty stains where injured. Stem short, ½ in. (1.2 cm.), subexcentric, slender, stuffed, tough, dark smoky brown from minute granules. Flesh of stem continuous with that of the pileus. Spores subspherical to elliptical, 9.5 x 7.5 µ, 7.5 µ. South Australia—On the ground in a swamp, Back Valley near Encounter Bay. May.

271. *Cantharellus imperatae* Clel. et Cheel. (After the grass *Imperata arundinacea* (L.) Beauv., on which the species was first found).—Pileus up to ½ in. (15 mm.) or more, convex, subgibbous, then plane or a little depressed, somewhat irregular, edge turned in especially when young, surface matt, pale fawny-white in the centre with the periphery paler or nearly pure white, later with a brownish tint. Gills adnate, then decurrent, edges rather thick and entire, moderately distant, sometimes branching and connected by irregular cross-veins, white with an orange tint when dry. Stem up to 1½ in. (4.3 cm.), markedly attenuated downwards, slightly hollow, white and somewhat mealy above, mouldy greenish-grey and mealy below. Spores obliquely pear-shaped or flask-shaped, one end acute, with a central globule, 9 to 13.8 x 5.2 to 7 µ. South Australia—Morialta, Encounter Bay. New South Wales. February, March, May, August.

272. *Cantharellus brunneus* Clel. (L., *brunneus*, brown).—Pileus about ¾ to ½ in. (10 to 12.5 mm.), submembranaceous, convex, the centre umbilicate to infundibuliform, striate to rugose-striate, edge slightly incurved when young, semitranslucent sometimes when moist, near Sayal Brown, Snuff Brown or Pinkish Buff (XXIX.), becoming pale wood-brown and drying pallid with a brownish tint (near Light Buff, XV., paler than Pinkish Buff), opaque and dull. Gills deeply decurrent, rather distant, edges thick, alternate gills short, often forked, especially in larger specimens, with narrow irregular gills at the periphery, sometimes venose on the sides, sometimes the branching leading to irregular cells at the periphery, slightly paler than the pileus (paler than Pinkish Buff or Cinnamon Buff). Stem ½ to 1 in. (1.2 to 2.5 cm.), slender, equal or slightly attenuated upwards, smooth above, sometimes slightly pruinose below, usually solid, sometimes hollow, colour of the pileus. Flesh of the stem continuous with that of the pileus, pallid brown when moist, whiter when dry, cortex of the stem more cartilaginous. Spores subspherical to pear-shaped elliptical, 5.5 µ, usually 7.5 x 4.5 to 5.5 µ, rarely 6 to 9 x 3.7 to 5.5 µ. Amongst moss or short grass or on bare soil. South Australia—Greenhill Road, Mount Lofty, Black Hill, Morialta, Mylor, Baker's Gully, Kinchina, MacDonnell Bay (S.E.). May to August. (Figure 15 C.)

This common little brown species is perhaps better placed under *Omphalia*.

Receptacle fleshy, membranaceous, funnel-shaped or umbilicate. Hymenium veined or smooth.

CRATERELLUS Fr.

(Gr., *kratēr*, a large bowl.)

**Pileus fleshy or membranaceous, funnel-shaped or umbilicate. Stem central, confluent with the pileus. Hymenium smooth, becoming wrinkled. Spores white, rarely pale ochraceous in the mass; elliptical, ovoid, or oblong elliptical; smooth or punctate; basidia with 2 to 4 sterigmata. Cystidia none. Growing on the ground."—Rea.

273. *Craterellus multiplex* Cke. et Massee. (L., *multiplex*, with many folds).—Stem slender, erect, 1½ to 2 in. (3.1 to 5 cm.) high. Pilei reniform or obovate, attached by their bases to the stem in a series of 2 to 5 or 6 superimposed, 1 cm. broad, depressed behind, smooth, margin a little incurved, thin, Light Pinkish Cinnamon (XXIX.) becoming Light Ochraceous Buff (xv.) to Sayal Brown (XXIX.) when dry. Hymenium of narrow thick radiating folds, sometimes forking or connecting by veins, Vinaceous Pink (XXVIII.), when dry Light Ochraceous Salmon (xv.) nearly to Zinc Orange (xv.) (type from Tasmania described as flesh-colour). "Spores globose, hyaline, 3.5 μ" (type). South Australia—At the base of a dead stump, Mount Lofty. Tasmania. June.

Receptacle membranaceous, spatulate or cup-shaped pendent. Hymenium veined or smooth.

DICTYOLUS QuéL. (= *CANTHARELLUS* p.p.).

(Gr., *diktýon*, a network.)

"Pileus membranaceous, spatulate, or cup-shaped and pendent. Hymenium consisting of vein-like gills, anastomosing in a reticulate manner or almost smooth. Spores white, elliptical or pip-shaped, smooth. Cystidia none. Growing on wood or on mosses."—Rea.

KEY TO THE SPECIES.

Whole plant buff brown. Stem ½ in. 274. *Dictyolus australis*.

Pileus orange cinnamon to cinnamon buff. Gills near cinnamon. Stem to ½ in., pallid 275. *D. cinnamomeus*.

274. *Dictyolus (Cantharellus) australis* Clel. (L., *australis*, southern).—Whole plant browner than Buff Brown (XL.) and moist looking. Pileus spatulate or flabelliform, a little more than ½ in. (6 mm.) broad and long, smooth, sometimes faintly sulcate. Gills decurrent, moderately distant, forking or branching, edges thick. Stem under ½ in. (6 mm.), quite lateral, slightly attenuated downwards, smooth. On mossy ground. South Australia—Kinchina. August.

275. *Dictyolus (Cantharellus) cinnamomeus* Clel. (L., *cinnamomeus*, cinnamon-coloured).—Pileus up to ¾ in. (1.8 cm.) laterally, ½ in. (1.2 cm.) from before backwards, quite lateral, flabelliform, slightly convex to concave, usually somewhat lobed or lacerated, sometimes with several pilei on a branching stem, surface dull, Orange Cinnamon (XXIX.) to Cinnamon Buff (XXIX.). Gills decurrent, narrow, edges a little thick, sometimes forking and occasionally venose at the periphery, more rusty than Cinnamon (XXIX.). Stem lateral, ¾ to ½ in. (10 to 12 mm.), nearly equal, slightly mealy, pallid but with tints of the pileus. Spores narrow, pointed at one end, white, 7.5 x 2.5 to 3.5 μ. South Australia—On the ground near a dead stump, Mount Lofty. June.

**Spores ochraceous.

Receptacle fleshy coriaceous, stipitate. Hymenium fold-like.

NEUROPHYLLUM Pat.

(Gr., *neuron*, a sinew; *phyllon*, a leaf.)

"Pileus fleshy, coriaceous, irregular. Stem central, confluent with the pileus. Hymenium fold-like, thick, decurrent. Spores ochraceous, elliptical or fusiform, smooth. Cystidia none. Growing on the ground."—Rea.

On wood, fallen sticks, etc.

Pileus $\frac{1}{2}$ in. or more.

Stem velvety, blackish, $\frac{1}{2}$ in.

Pileus about 1 in., burnt umber, drying to walnut brown. Gills adnate to sub-decurrent, light cinnamon drab. Smell foetid 256. *M. foetidus*.

Stem densely villose or short hairy, greyish brown.

Pileus about $\frac{3}{8}$ in., sayal brown. Gills adnate, glaucous brown 257. *M. australiensis*.

Pileus usually $\frac{1}{4}$ to $\frac{1}{2}$ in.

Stem smooth or slightly velutinate, Vandyke brown to blackish, paler above, usually about $\frac{1}{2}$ in.

Pileus up to $\frac{1}{2}$ in., pinkish cinnamon to ochraceous salmon. Gills adnate, creamy white. On trunks 254. *M. cinnamomeus*.

Stem pruinose to granular, whole plant light pinkish cinnamon to colour of dead grass.

Pileus $\frac{1}{8}$ to $\frac{1}{4}$ in., umbilicate. Stem $\frac{1}{8}$ to $\frac{1}{2}$ in. On fallen sticks, etc. 258. *M. ramealis*.

Pileus minute, up to $\frac{1}{4}$ in.

Pileus umbilicate with a knob in the centre, biscuit-coloured.

Gills 8 to 11, attached to a collar. Stem several inches long, brown, hair-like.

Sterile mycelium like horse-hair . . . 259. *M. equicrinis*.

Pileus alveolar, honey-coloured.

Gills 6 to 10, adnate. Stem short, dark brown below 260. *Androsaceus*

alveolaris.

Attached to buried grass stems.

Pileus $\frac{1}{2}$ in., with adpressed fibrils, colour of dead

grass. Stem densely pilose, concolorous . . . 261. *Crinipellis*
caulicinalis.

A. MARGIN OF PILEUS INCURVED AT FIRST. STEM CARTILAGINOUS. MYCELIUM FLOCCOSE.

a. Stem externally villose or pruinose. Gills separating, free.

*Stem woolly or strigose at the base.

No South Australian species recorded.

**Stem naked at the base.

253. *Marasmius oreades* (Bolt.) Fr. (Gr., *oreias*, belonging to mountains).—Pileus $1\frac{1}{2}$ in. (3.7 cm.) or larger, pliant, convex, irregular, subumbonate, then rather upturned, surface matt, biscuit-coloured. Gills just free, broad, moderately distant, creamy white. Stem up to 3 in. (7.5 cm.), slender, equal, rather wavy, somewhat pruinose ("covered with a villose-woven cuticle"), whitish. Spores elliptical, white, 8.5 x 4.2 to 5 μ . Forming imperfect rings. Edible. New South Wales—Moore Park. December.

The above description of the edible "Fairy Ring Champignon" is from Sydney specimens. It has not yet been recorded from this State but doubtless does occur. Its pliant texture, distant free gills and arrangement in rings make it readily recognisable.

b. Stem rooting, distinctly cartilaginous. Gills separating-free.

*Stem woolly downwards, smooth upwards.

No South Australian species recorded.

near Yellow Ochre (xv.) and Deep Chrome (iii.), near Antimony Yellow (xv.), Light Cadmium (iv.) or under the scales when present near Honey Yellow (xxx.). Gills decurrent, often deeply so, often forking several times from near the stem, moderately close, edges a little thick, when young near Aniline Yellow (iv.) or Honey Yellow (xxx.), becoming Sudan Brown (iii.), Dresden Brown (xv.), Buckthorn Brown (xv.), Ochraceous Tawny (xv.) or Clay Colour (xxix.) and later still darker (e.g., Antique Brown, iii.), sometimes becoming spotted with brown. Stem $1\frac{1}{2}$ to 2 in. (3.7 to 5 cm.), $\frac{3}{8}$ to $\frac{5}{8}$ in. (1 to 2 cm.) thick, relatively slender to stoutish, attenuated downwards, swollen under the pileus, villous or somewhat mealy or even fibrillose scaly, stuffed or hollow, central or sometimes excentric, pallid to the colour of the gills (base Mars Brown, xv.), sometimes with a few slightly raised brown lines. Flesh pallid or turning reddish brown when cut, then darker. Spores minny-shaped, elongated, yellow-brown to greenish-yellow, usually 11 to 16, occasionally 21 x 4 to 7 μ . Cystidia not seen. On the ground. South Australia—Kuitpo (May); Greenhill Road; Mount Compass; Noarlunga hills; in *Eucalyptus obliqua* L'Her. forest, Willunga Hill; Mount Lofty; Kinchina; Back Valley, Inman Valley; Kalangadoo (S.E.). April to July. (Figure 33.)

[Photo. by S. Tee.]

Figure 33.—*Paxillus infundibuliformis* Clel. (No. 276).
Willunga Hill.

This large and handsome species is common. It is readily recognised by its tawny yellowish colour, usually more or less funnel shape, deeply decurrent often forking gills and the large elongated spores.

277. *Paxillus involutus* (Batsch) Fr., (L., *involutus*, rolled in).—Pileus $2\frac{1}{2}$ to 5 in. (6 to 20 cm.), fleshy, irregularly convex, then expanding, the edge becoming thin, or irregularly plane and slightly depressed, sticky when moist, the surface with adpressed fibrils, markedly involute when young, cinnamon to Mikado brown. Gills near the stem anastomosing to form irregular pores, moderately decurrent, close, edges moderately thick, cinnamon buff to clay colour, becoming yellowish,

turning brown when bruised or old. Stem $\frac{3}{4}$ to 2 in. (1.8 to 5 cm.) or more, $\frac{1}{4}$ to $\frac{5}{8}$ in. (6 to 15 mm.) or more thick, usually central, stout to slender, pallid becoming brownish like the pileus, sometimes with fine punctate spots. Flesh thick, pallid turning yellowish brown. Spores elliptical, slightly oblique, dull brown to yellowish-brown, 7.5 to 11 x 4.5 to 5.8 μ . South Australia—Under larch and other introduced trees, National Park. April, May, July.

Abnormal specimens are occasionally found, one in the National Park showing, in the concavity of the cap, definite gills tending to anastomose. This is probably an introduced species as shown by its association with exotic trees. It is common in parts of the National Park and can be recognised by its large brown pileus with the edge deeply turned in when young, the moderately decurrent gills becoming yellow and then brown and the spore shape.

278. *Paxillus psammiphila* Clel. (Gr., *psammos*, sand, *philos*, loving).—Pileus $3\frac{1}{2}$ in. (8.7 cm.), flabelliform-dimidiata, somewhat fibrillose, becoming cracked, brown. Gills decurrent, close, anastomosing reticulately near the stem, watery brown. Stem short (about 1 in., 2.5 cm.), nearly lateral, slender, passing into a long narrow root surrounded by mycelial threads. Spores abundant, mummy-shaped, white, 13 to 13.5 x 4 μ . In sand. South Australia—Elliston (E.P.). August.

[From watercolour by Miss P. Clarke.]

Figure 34.—*Phylloporus paradoxus* (Kalch.) Bres. (No. 279). Sydney.
Reduced by $\frac{1}{2}$.

PHYLLOPORUS.

(Gr., *phyllon*, a leaf.)Similar characters to *Parillus* but with cystidia.

279. *Phylloporus paradoxus* (Kalehr.) Bres. (Gr., *paradoxos*, strange.) (Syn. *Paxillus paradoxus* (Kalehr.) Quel. and *Phylloporus rhodozanthus* (Sch.) Bres.)—Pileus 3 to 5½ in. (7.5 to 13.7 cm.), irregular, often a little depressed in the centre, tending to crack, dark fawn, near snuff brown, deep bistre or

[From watercolour by Miss, P. Clarke.]

Figure 35.—*Phylloporus paradoxus* (Kalch.) Bres.
(No. 279). Sydney. Reduced by nearly ½.

Sepia (XXIX.) or yellowish brown. Gills decurrent or with only a tendency to decurrence, moderately thick and broad, sometimes forking or slightly anastomosing near the stem, yellowish gold with a tendency to a greenish shade, near lemon yellow or near Aniline Yellow (IV.), turning brownish. Stem 2 in. (5 cm.), stout above (up to 1 in., 2.5 cm.), attenuated downwards, usually somewhat excentric, solid, brownish or whitish, finely punctate with minute darker dots. Flesh thick, whitish tending to become brownish with greenish tints below the gills. Spores mummy-shaped to obliquely elliptical, pale yellow or greenish, 11.5 to 13.5 x 5.5 to 8 μ . Cystidia usually present, 47 x 16 μ . On the ground usually under trees. South Australia—Mount Lofty (no cystidia seen), Morialta, Morphett Vale. New South Wales. March, July, September. (Figures 34 and 35.)

ROYAL BOTANIC GARDENS MELBOURNE

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