MICROFUNGI ON MISCELLANEOUS SUBSTRATES

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An Identification Handbook

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Front cover photographs.

Top row left to right:

Morchella conica: © CABI Bioscience
Geoglossum cookeianum, asci and spores: © CABI Bioscience
Peziza petersii on bonfire site: © R. W. Ellis

Bottom row left to right:

Byssonectria fusispora: © CABI Bioscience
Geoglossum fallax: © Phyllis Ellis
Spinellus fusiger (on *Mycena pura*): © Martyn Ainsworth

FOREWORD

It is a pleasure for me to introduce this reprint of *Microfungi on Miscellaneous Substrates* by Martin and Pam Ellis. This book was first published in 1988 and followed on from the success of Microfungi on Land Plants issued in 1985. A new enlarged edition of that book was released by Richmond Publishing in 1997.

Microfungi on Miscellaneous Sustrates was the "first" and remains the only identification book for microfungi occurring on a diversity of natural and manufactured materials, and in addition covers those on bryophytes, fungi and slime moulds. The coverage of substrates is necessarily selective. The inclusion of fungi associated with food spoilage, insects and water would have made for a much longer work. Personally, I have found this book of especial value on field trips for the rapid identification of fungi on dung, on other fungi, on mosses, etc., and can commend it without hesitation. The numbers of fungi that can potentially be isolated from miscellaneous substrates is enormous. In this book the emphasis in the selection of species for inclusion has been an eminently practical one for field mycologists, i.e. those that can be detected with a hand-lens or dissecting microscope. Further, the authors have drawn on their immense personal experience of species encountered in the course of their own field studies in the UK. As many of the substrates and species have wide distributions, the work has considerable utility world-wide, and is particularly valuable for use in temperate regions.

Martin and Pam fully recognized that such a book could not be comprehensive, and included a short list of recommend books in the first edition. In this reprint, in order to assist those who wish to go further, a selected bibliography, arranged by substrates, has been incorporated. This bibliography also includes a section on the fungi which grow on lichens, the lichenicolous fungi, which were excluded from the book because of the existence of a then recent key I had written in 1983.

Users need to be aware that no updating of the names of the fungi covered has been undertaken for this reprint, primarily because only a small percentage have changed since 1988. This does not in any way detract from the value of the book for identification purposes, but does mean that where publication in particular is contemplated, arrangements to check that names are still current will be necessary. Finally, users need to be aware that Martin's far-sighted vision of using one-name for one fungus, even when they had morphologically different and independent stages, is used. This means, for example, that the mitotic (anamorph) *Chromelosporium ollare* is not mentioned by its species name but is fully described under the entry for the meiotic (teleomorph) stage *Peziza ostracoderma* (p. 90), and also illustrated along with that stage

(Fig. 266). Most names of anamorphs are cross-referenced to the teleomorph names in *The British Ascomycotina* (see under Some Recommended Books and Useful Addresses).

Salient biographical information about the remarkable couple who generated this book and its two companion volumes is included in the Foreword to the 1997 edition of *Microfungi on Land Plants* and so will not be repeated here. It is unfortunate that Martin did not live to see the reissue of this book, but I know he would have been pleased to share with Pam the satisfaction of seeing it being used more widely and to be giving so much pleasure to field mycologists delighting in the exploration of often passed-over niches of the microfungal world.

Professor David L. Hawksworth CBE

Hendon, London
20 January 1998

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INTRODUCTION

In *Microfungi on Land Plants*, published by Croom Helm, London/ Macmillan, New York (1985), species found on living and dead flowering plants, ferns, horsetails and clubmosses were described and illustrated. Fungi showing preference for particular plants were dealt with host by host. Straightforward keys were devised to simplify identification, and mycologists with relatively little experience of working with microfungi find that now, with the help of this book, they can name many species in diverse groups quickly and with confidence. Our aim in writing the book was to encourage more people to look at and learn about microscopic fungi, and this aim has been achieved to some extent. More, however, needs to be done. Microfungi which grow on substrates other than land plants are encountered frequently by both amateur and professional mycologists, and we have been encouraged to write another book about some of these.

Professor D.L. Hawksworth has published in recent years excellent keys to and descriptions of fungi growing on lichens. Other substrates have their own special fungi, many of which are quite difficult to identify through the more usual taxonomic channels but are much more easily tracked down when keyed out and described in small, specialised habitat groups.

In this companion volume, entitled *Microfungi on Miscellaneous Substrates*, fungi are placed under seven headings:

1. fungi growing on or with bryophytes (mosses and liverworts);
2. fungi on fungi;
3. fungi on myxomycetes (slime-moulds);
4. fungi on burnt ground and charcoal (bonfire sites);
5. fungi on soil;
6. fungi on dung;
7. fungi on bones, feathers, paper, cloth, etc.

A host index is given at the end of each of the first two sections. Simple keys to genera and species are provided throughout the book. Groups of fungi dealt with include discomycetes, some of which are quite large, other ascomycetes, hyphomycetes, coelomycetes, phycomycetes and, mainly on bryophytes and fungi, a few small basidiomycetes.

As in all taxonomic works, some unfamiliar terms will be encountered but these are all explained in the Glossary. Measurements, except where stated otherwise, are always in thousandths of a millimetre (microns) and much space has been saved by not constantly repeating the μm sign.

The fungi in this book can all be named without recourse to special culture or other techniques. A microscope with a calibrated micrometer eyepiece for measuring is essential; also slides, coverslips, Melzer's iodine solution, a scalpel, mounted needles, a pair of fine forceps and some safety-razor blades.

When rabbit droppings and other kinds of dung are placed on damp blotting paper or filter paper in containers with glass lids, many tiny fungi appear in succession and can be picked off. Feather, fur and bone species are found when owl pellets are similarly treated. Damp wallpaper, sacking and cloth all provide fungi to look at, and the amateur mycologist can find something of interest throughout the year, even in the depths of winter.

The illustrations at the back of the book follow the same pattern as the text so that you can see together, for example, all the *Peziza* species found on bonfire sites or all the *Ascobolus* species on dung.

We have not included a bibliography, which would have run to many pages and been comprised mainly of references to journals not readily available to amateur mycologists. Instead we list some readily obtainable books which between them contain all these references and can be consulted if the necessity arises.

Although we have collected in the field or incubated from dung and owl pellets many of the specimens needed in the preparation of this book, others have been loaned to us by the C.A.B. International Mycological Institute and Royal Botanic Gardens, Kew, and we are very grateful to the directors and staff of these establishments. We are deeply indebted once again to our friends Malcolm and Marjorie Clark and Douglas Graddon who have supplied us with fresh material of many uncommon and beautiful discomycetes.

FUNGI GROWING ON OR WITH BRYOPHYTES

DISCOMYCETES

KEY TO GENERA

Apothecia black, up to 2 cm diam. ..... *Pseudoplectania*
Apothecia with olivaceous convex discs 1–2 cm diam. and long thick pinkish stalks ..... *Sarcoleotia*
Apothecia green or blue-green 1
Apothecia other colours 2
1. Apothecia upright, clavate ..... *Microglossum*
Apothecia prostrate, flat or hemispherical ..... *Mniaecia*
2. Asci operculate 3
Asci inoperculate 14
3. Ascospores spherical 4
Ascospores not spherical, mostly ellipsoid 8
4. Well-defined excipular hairs present 5
Excipular hairs absent 6
5. Discs bright red or reddish orange ..... *Scutellinia*
Discs reddish brown ..... *Sphaerosporella*
6. Discs clay-coloured ..... *Marcelleina*
Discs brightly coloured, orange, red, yellow or violet 7
7. Apothecia pulvinate, spores filled with small guttules ..... *Pulvinula*
Apothecia not pulvinate, spores with one or a few large guttules ..... *Lamprospora*
(see also *Octospora wrightii* with subglobose spores)
8. Well-defined excipular hairs present 9
Excipular hairs absent or hypha-like 12
9. Discs whitish or pale grey, brown hairs long and pointed ... *Trichophaea*
Discs red or orange, if white, hairs hyaline 10
10. Hairs pale golden brown, often lobed at base or forked ..... *Cheilymenia*
Hairs hyaline, not forked or lobed 11
11. Hairs thick-walled, stiff, forming a white fringe around the red or white disc ..... *Leucoscypha*
Excipulum downy with straight or flexuous hairs ..... *Neottiella*
12. Apothecia pulvinate without a denticulate margin ..... *Ascophanus*
Apothecia doliiform or ovoid with small disc ..... *Octosporella*
Apothecia not pulvinate, doliiform or ovoid, usually saucer-shaped

with flat disc and pale denticulate margin 13
13. Asci 4-spored ..... *Byssonectria*
Asci 8-spored ..... *Octospora*
14. Apothecia gelatinous ..... *Pezoloma*
Apothecia not gelatinous 15
15. Ascospores not more than 12 × 3 ..... *Pezizella*
Ascospores more than 12 × 3 16
16. Apothecia not more than 1 mm diam. ..... *Helotium*
Apothecia more than 1 mm diam. 17
17. On *Sphagnum* ..... *Hymenoscyphus*
On other mosses and liverworts ..... *Bryoscyphus*

Ascophanus globosopulvinatus (Crossl.) Boud. ex Ramsb.
Apothecia red or reddish orange, pulvinate. Ascospores hyaline, about 12 × 8. Among mosses.

Bryoscyphus
Apothecia usually with short thick stalks, or almost sessile, disc becoming brown or brownish, margin whitish and fimbriate. Ascospores hyaline, smooth, somewhat fusoid, some with one or more septa. Cells of excipulum subglobose or angular, thin-walled, smaller towards the margin where rows curve upwards and in some species terminate in short, septate hairs.

KEY

Ascospores 12–15 × 6–7, on *Reboulia* ..... *marchantiae*
Ascospores 16–20 × 4–5.5, on *Conocephalum* ..... *conocephali*
Ascospores 17–24 × 7–9, on *Ceratodon* ..... *dicrani*

Bryoscyphus conocephali (Boyd) Spooner (Fig. 1)
Apothecia erumpent, scattered or in groups, cupulate with very short fat stalks, pale orange brown or reddish brown, up to 1.5 mm diam. Ascospores often inequilateral and occasionally 1-septate. On living and dying plants of *Conocephalum conicum*, Apr.–May, fairly common.

Bryoscyphus dicrani (Ade & Höhnel) Spooner (Fig. 2)
Apothecia solitary or in groups, with flat discs and short fat stalks, 1–3 mm diam., at first creamy, becoming purplish and finally brown. Ascospores irregularly rhomboidal and pointed at the ends, often with 1–3 septa. Parasitic on plants of *Ceratodon purpureus*, which become killed, Jan.–Feb.

Bryoscyphus marchantiae (Berk.) Spooner (Fig. 3)
Apothecia scattered, short-stalked, brown or yellowish brown, up to 1.5 mm diam. On *Reboulia hemispherica*, May.

Byssonectria tetraspora (Berk.) Rogerson & Korf (Fig. 4)
Apothecia scattered, 1–2 mm diam. becoming flat to slightly convex, orange

with off-white toothed margin. Ascospores ellipsoid, hyaline, smooth, with 1–4 guttules, about 24 × 12. In cushions of *Bryum argenteum*, Jan.–Apr.

Cheilymenia crucipila, described under 'Fungi on Soil', is found sometimes, but not always, with mosses. Ascospores 15–20 × 9–12.

Helotium fulvum Boud. (Fig. 5)
Apothecia solitary, up to 1 mm diam., brown, with thick cylindrical stalks. Ascospores ellipsoid, hyaline, with a number of large guttules, 17–21 × 6–9. Paraphyses 3 wide. Parasitic on *Dicranella heteromalla* and other small mosses.

Helotium phascoides (Fr.) Fr.
Apothecia solitary, up to 0.5 mm diam., reddish brown, with rather short stalks swollen at the base. Ascospores ellipsoid-fusiform, 12–15 × 3–4. Paraphyses 2 wide. On living leaves of species of *Phascum* and other mosses.

Hymenoscyphus vasaensis (P. Karsten) Dennis (Fig. 6)
Apothecia solitary, 1–2 mm diam. short-stalked, off-white at first, turning brown. Some excipular cells up to 20 diam. thin-walled. Ascospores hyaline, 13–17 × 3–4. Paraphyses swollen to 3–4 towards the apex, sometimes with brownish contents. On leaves of *Sphagnum*, including *S. fimbriatum*, Apr.–Sept.

Lamprospora
Apothecia not more than 10 mm diam. and usually much smaller, sessile, shallow cup-shaped, without true hairs but often dentate or fimbriate at the margin. Asci operculate, J−, 8-spored, protruding. Ascospores spherical, variously ornamented or smooth. When old asci collapse, discs often appear pitted.

KEY

Apothecia purplish ..... *amethystina*
Apothecia pale yellow ..... *campylopodis*
Apothecia pale or bright orange 1
1. Ascospores with 2 rings of thickening on the surface ..... *annulata*
Ascospores without such rings 2
2. Ascospores with quite smooth walls 3
Ascospores with finely to coarsely reticulate walls 4
3. Ascospores 14–16 diam. ..... *astroidea*
Ascospores 15–18 diam. ..... *carbonicola*
4. Ascospores 10–13 diam., mesh 1 across ..... *polytrichi*
Ascospores 12–15 diam., mesh 2–3 across ..... *dictydiola*
Ascospores 17–20 diam., mesh 4–6 across ..... *crouanii*

Lamprospora amethystina (Quélet) Seaver
Apothecia gregarious, up to 2 mm diam., purplish with whitish fringe-like

margin and pale purple outer surface. Ascospores 10–12 diam., at first smooth then verruculose. Growing among mosses, Sept.

Lamprospora annulata Seaver (Fig. 7)
Apothecia gregarious, pale orange, 0.5–1 mm diam. Ascospores hyaline, 16–18 diam. each with one large guttule; wall at first smooth, then verruculose and finally with two, often parallel, rings of thickening. Growing among mosses including *Pleuridium subulatum*, Dec.–Feb.

Lamprospora astroidea (Hazsl.) Boud.
Apothecia up to 4 mm diam. with orange disc and pale dentate margin. Ascospores smooth, 14–16 diam. Among mosses, usually on burnt ground.

Lamprospora campylopodis Buckley
Apothecia solitary or gregarious, pale yellow with dentate margin. Ascospores regularly and finely reticulate, 15–18 diam. Paraphyses slender, greatly exceeding the asci. Growing with the moss *Campylopus fragilis*, May.

Lamprospora carbonicola Boud.
Apothecia gregarious, 1–4 mm diam., pale orange with wavy margin. Ascospores smooth, 15–18 diam. each with one large guttule. Paraphyses exceeding asci, strongly curved 3–4 wide at apex. Among mosses on burnt ground.

Lamprospora crouanii (Cooke) Seaver (Fig. 8)
Apothecia 1–5 mm diam., bright orange with whitish dentate or fimbriate margin. Ascospores 17–20 diam. with one large guttule; walls coarsely reticulate, the meshes often forming hexagons, 4–6 across. Paraphyses swollen at the tip and containing orange granules. With *Pleuridium* spp., *Tortula intermedia*, *T. ruralis* ssp. *ruraliformis* and other mosses, Nov.–Apr.

Lamprospora dictydiola Boud. (Fig. 9)
Apothecia solitary or gregarious, up to 1 mm diam., orange, with fimbriate margin. Ascospores 12–15 diam., each with one large guttule; walls reticulate with mesh 2–3 across. Paraphyses almost straight, 5 wide at tip. Among mosses, often on burnt ground, June–Jan.

Lamprospora polytrichi (Schumacher) Le Gal (Fig. 10)
Apothecia gregarious, 5–10 mm diam., disc orange, margin white, uneven. Ascospores 10–13 diam., with one or several guttules; walls very finely reticulate with mesh 1 across. Paraphyses straight or slightly curved. Most commonly found with *Polytrichum* and has been recorded among mosses on old bonfire sites, Mar.–May.

Leucoscypha erminea and *L. leucotricha*, described under 'Fungi on Soil', are sometimes found with *Sphagnum* and other mosses.

Leucoscypha ricciae (Crouan & H. Crouan) Dennis (Fig. 11)
Apothecia 0.5 mm diam., sessile, each with a vermilion disc surrounded by

tapered, septate, thick-walled, hyaline hairs up to 220 × 10–15. Asci operculate, 8-spored, with walls J−. Ascospores hyaline with fairly thick walls and one large guttule, 20–24 × 13–14. On living plants of *Riccia sorocarpa* growing among barley stubble, Nov.

Marcelleina rickii (Rehm) Graddon (Fig. 12)
Apothecia 3–5 mm diam., sessile, flat, solitary or in small groups, clay-coloured or yellowish clay. Asci cylindrical, 8-spored, walls J−. Ascospores spherical, hyaline, 8–9 diam., walls with an imperfect reticulum formed of short, low, forked ridges. On mossy ground, July–Oct.

Microglossum viride, described under 'Fungi on Soil', is found occasionally among mosses.

Mniaecia jungermanniae (Nees ex Fr.) Bound. (Fig. 13)
Apothecia up to 2 mm diam., hemispherical or flattened, blue-green, soft fleshed. Asci clavate, thick-walled especially at the apex, 8-spored. Ascospores ellipsoid or pyriform, hyaline or greenish, smooth-walled, 15–20 × 8–10, with many tiny guttules. On leafy liverworts, Feb.–Apr.; recorded on *Calypogeia*, *Diplophyllum* and *Jungermannia*.

Neottiella
Apothecia up to 1.5 cm diam., usually sessile or subsessile, orange or reddish orange; excipulum downy with hyaline, straight or flexuous hairs. Asci operculate, walls J−. Ascospores ellipsoid, hyaline, with guttules, walls smooth, reticulate or verrucose.

KEY

	Ascospores with reticulate walls	*rutilans*
	Ascospores with smooth walls	1
	Ascospores with verrucose or verruculose walls	2
1.	Ascospores 25–35 × 10–15	*crozalsiana*
	Ascospores 14–17 × 8–9	*hetieri*
2.	Ascospores 15–20 × 8–11	*ithacaensis*
	Ascospores 20–25 × 12–14	*vivida*

Neottiella crozalsiana Grelet (Fig. 14)
Apothecia sessile, becoming conical or urceolate, 0.25–0.5 mm diam., pale orange; hairs on excipulum hyaline, up to 300 × 6–8, swollen at base. Asci somewhat fusiform, 8-spored. Ascospores hyaline, smooth, mostly with one large guttule and two smaller ones, 25–35 × 10–15, with wall thickened at each end. Hypophyllous on the leafy liverwort *Plagiochila asplenioides*.

Neottiella hetieri Boud. (Fig. 15)
Apothecia solitary or in groups, sessile, 1–3 mm diam., disc bright orange, margin upturned, notched, underparts and margin white, bearing tapered,

rather thick walled, hyaline 0- to 3-septate hairs up to 200 long, 15 thick near base. Ascospores ellipsoid, smooth-walled, with one large guttule, 14–17 × 8–9. Paraphyses containing orange sap, up to 7 thick at apex. Among *Funaria* on burnt soil and with *Tortula muralis* and *Ceratodon purpurascens*, Feb.–Oct.

Neottiella ithacaensis (Rehm) Schweers (Fig. 16)
Apothecia scattered, sessile, at first deep cup-shaped, then flattening, 0.5–1 mm diam., disc pale to bright orange or even reddish, attached to liverwort thallus by white hyphae. Paraphyses septate, with orange sap, swollen to 6 at apex. Ascospores 15–20 × 8–11, walls finely verruculose. Hairs up to 180 × 3–5. On living *Marchantia polymorpha.*

Neottiella rutilans (Fr.) Dennis (Fig. 17)
Apothecia sessile or short stalked, up to 1.5 cm diam., disc reddish orange, excipulum whitish, downy, with septate, flexuous, thin-walled, hyaline hairs. Ascospores ellipsoid, 21–25 × 14–15, with one or two large guttules and reticulate walls. Paraphyses with orange sap. Among *Polytrichum* on sandy soil, Oct.–Jan.

Neottiella vivida (Nyl.) Dennis
Similar to *N. rutilans* but with verrucose ascospores 20–25 × 12–14.

Octospora
Apothecia 1–10 mm diam., most commonly with orange or reddish orange disc, frequently dentate or torn at the margin, and a paler, slightly downy excipulum. Asci operculate, walls J−, with spores in one or more rows. Ascospores hyaline, ellipsoid, oblong-ellipsoid, fusoid or in one species subglobose, with smooth, verrucose or verruculose walls.

KEY

Ascospore walls rough 1
Ascospore walls smooth 3
1. Ascospores subglobose 13–16 × 11–14 ..... *wrightii*
Ascospores ellipsoid 2
2. Ascospore walls finely verruculose ..... *alpestris*
Ascospore walls coarsely verrucose ..... *melina*
3. Ascospores fusoid 23–35 × 8–11 ..... *coccinea*
Ascospores ellipsoid or oblong-ellipsoid, never more than 30 long ... 4
4. Ascospores often more than 20 long 5
Ascospores not more than 20 long 8
5. Disc red or reddish orange, on *Grimmia* ..... *musci-muralis*
Disc not red or reddish, not on *Grimmia* 6
6. Apothecia flesh-ochraceous, ascospores with two guttules .... *convexula*
Apothecia orange, ascospores with 1–2 large guttules and several smaller ones 7
7. Apothecia 5–10 mm diam., paraphyses curved ..... *humosa*
Apothecia 1–3 mm diam., paraphyses almost straight ..... *leucoloma*
8. Ascospores broadly ellipsoid 13–15 wide ..... *roxheimii*
Ascospores ellipsoid or oblong-ellipsoid, not more than 12 wide 9
9. Associated with *Barbula* ..... *leucoloma* var. *crosslandii*
Associated with *Ceratodon* 10
10. Paraphyses 8–9 wide at tip, ascospores 16–18 long ..... *rubens*
Paraphyses 7 wide at tip, ascospores 13–16 long ..... *rustica*

Octospora alpestris (Sommerf.) Dennis & Itzerott (Fig. 18)
Apothecia up to 1 mm diam., pale orange, with a toothed margin. Asci at first 8-spored but usually only the upper 4 develop. Ascospores ellipsoid 13–20 × 8–10, hyaline, with one or sometimes two guttules, wall thin, finely verruculose. Paraphyses curved and 4 thick at tip. In leaf axils of *Tetraplodon mnioides*, July–Aug.

Octospora coccinea (Crouan) v. Brummelen (Fig. 19)
Apothecia solitary or gregarious, 2–3 mm diam., orange, with a ragged margin. Asci 8-spored. Ascospores fusoid, with 2–4 guttules, smooth-walled, 23–35 × 8–11. Paraphyses swollen to 6–10 at tip. Among mosses such as *Bryum*, *Ceratodon* and *Pottia* on sandy soil.

Octospora convexula (Pers.) L. Batra (Fig. 20)
Apothecia about 2 mm diam., flesh-ochraceous, often with an indented margin. Asci 8-spored. Ascospores ellipsoid, smooth, with two guttules, hyaline, 22–24 × 11–12. Overgrowing moss protonemata.

Octospora humosa (Fr.) Dennis (Fig. 21)
Apothecia 5–10 mm diam., with a bright orange disc and whitish excipulum. Ascospores smooth with one large guttule and several smaller ones, 20–23 × 11–13. Paraphyses curved and swollen to 9 at tip. Among *Polytrichum* on sandy soil, Aug.–Feb.

Octospora leucoloma Hedw. (Fig. 22)
Apothecia 1–3 mm diam. disc orange, margin toothed, excipulum pale ochraceous, downy, with white anchoring hyphae. Ascospores smooth, with one or two large guttules and several smaller ones, 18–24 × 11–12.5. Paraphyses almost straight, 5–6 wide at tip. In cushions of *Bryum argenteum*, Dec.–May.

Octospora leucoloma var. *crosslandii* Dennis & Itzerott
Apothecia up to 2 mm diam., fleshy ochraceous, with narrow margin, excipulum whitish, with white anchoring hyphae. Ascospores smooth with one large guttule, 17–20 × 10–11. Paraphyses straight, swollen to 6–8 at tip. Associated with *Barbula recurvirostrata*, Oct.

Octospora melina (Velen.) Dennis & Itzerott (Fig. 23)
Apothecia up to 2 mm diam., orange. Ascospores ellipsoid with one guttule, 15–20 × 11–12; walls coarsely verrucose. Paraphyses curved and 5–6 wide at tip. Associated with *Ceratodon*, *Dicranella*, *Pottia*, etc., Oct.–Apr.

Octospora musci-muralis Graddon (Fig. 24)
Apothecia 3–4 mm diam., red or reddish orange with a pale toothed margin, attached by rooting hyphae. Ascospores oblong-ellipsoid, smooth, mostly with two guttules, 20–28 × 8–10. On cushions of *Grimmia pulvinata*, Dec.–Jan.

Octospora roxheimii Dennis & Itzerott
Apothecia 1–3 mm diam., orange-yellow. Ascospores broadly ellipsoid, smooth, with a large central guttule, 17–20 × 13–15. Growing on and among *Funaria hygrometrica*, Mar.–Apr.

Octospora rubens (Boud.) Moser
Apothecia 1–3 mm diam., with orange or reddish disc, excipulum paler. Ascospores smooth-walled, ellipsoid or ovoid, with one large guttule, 16–18 × 10–12. Paraphyses 8–9 wide at tip, simple or branched. Often associated with *Ceratodon*.

Octospora rustica (Velen.) Moravec (Fig. 25)
Apothecia 1–3 mm diam., pinkish orange. Ascospores ellipsoid, smooth, 13–16 × 9–11, with one guttule. Paraphyses 7 wide at tip, slightly curved. With *Ceratodon*, Jan.–Apr.

Octospora wrightii (Berk. & Curtis) Moravec (Fig. 26)
Apothecia 1–2 mm diam., yellowish to tangerine, with fringed border. Ascospores subglobose, verruculose, 13–16 × 11–14. Paraphyses 5–6 wide at tip. Mostly on or associated with *Amblystegium serpens*, Jan.–Mar.

Octosporella
Apothecia up to 0.5 × 0.4 mm, barrel-shaped or ovoid with small opening to disc, orange or yellowish, excipulum smooth or with some hypha-like hairs. Asci operculate, walls J−. Ascospores ellipsoid, hyaline, with guttules, walls smooth or minutely verruculose. Paraphyses thread-like, occasionally branched and with orange droplets.

KEY

Ascospores 20–40 × 9–14 ..... *jungermanniarum*
Ascospores 25–30 × 7–9.5 ..... *suboperculata*

Octosporella jungermanniarum (Crouan & H. Crouan) Döbbeler
Parasitic on *Plagiochila* and other foliose liverworts.

Octosporella suboperculata (Döbbeler & P. James) Döbbeler
On *Frullania tamarisci*.

Pezizella
Apothecia small, stalked or sessile, rather pale, flesh not tough. Paraphyses slender, sometimes swollen towards the tip and never lanceolate. Ascospores small.

KEY

Apothecia stalked, ascospores 5–6 × 2–3 ..... *muscicola*
Apothecia sessile, ascospores 8–12 × 1.5–2 ..... *polytrichi*

Pezizella muscicola Graddon (Fig. 27)
Apothecia stalked, up to 0.4 mm diam., white. Asci 8-spored, pore J-, up to 50 × 5. Ascospores hyaline, ellipsoid, 5–6 × 2–3, with a guttule at each end. On leaves of *Brachythecium rutabulum* and *Pseudoscleropodium purum*, Mar.–Nov.

Pezizella polytrichi Dennis (Fig. 28)
Apothecia up to 0.35 mm diam., sessile, with whitish disc and brownish excipulum. Asci 8-spored, about 50 × 7. Ascospores hyaline, 8–12 × 1.5–2. On leaves of *Polytrichum juniperinum* and *Amblystegium riparium*, Apr.–Oct.

Pezoloma
Apothecia sessile or subsessile, gelatinous, usually watery white or buff, turning brownish, somewhat translucent, up to 4 mm diam. Medullary excipulum composed of large, thin-walled cells, ectal excipulum of rather slender hyphae embedded in gel. Asci 8-spored. Paraphyses filiform, 1–2.5 thick. Ascospores hyaline.

KEY

Ascospores fusiform-clavate, 10–11 × 3–4 ..... *obstricta*
Ascospores ellipsoid, 10–15 × 3.5–4.5 ..... *ciliifera*
Ascospores cylindric-fusiform, 16–20 × 4.5–6.5 ..... *iodocyanescens*

Pezoloma ciliifera (P. Karsten) Korf (Fig. 29)
Apothecia up to 4 mm diam., watery white, with slender pointed teeth up to 0.5 mm long around the edge. Grows among *Sphagnum*.

Pezoloma iodocyanescens (Dennis & Korf) Korf (Fig. 30)
Apothecia up to 3.5 mm diam., buff turning brownish, not toothed around the edge. Ascus pore and gel layer J+. Ascospores often more pointed towards the base and somewhat curved. Found on wet leaves and other debris among *Sphagnum*.

Pezoloma obstricta (P. Karsten) Korf (Fig. 31)
Apothecia 2–4 mm diam. watery white drying brownish. Ascus pore J−. Found among moss and *Salix* roots.

Pseudoplectania sphagnophila (Pers.) Kreisel (Fig. 32)
Apothecia gregarious, cup-shaped, up to 2cm diam., short stalked, black; excipulum covered with flexuous hairs. Asci operculate, walls J−. Ascospores uniseriate, spherical, smooth, hyaline, 11–12 diam. Pharaphyses brown, forked. Grows among *Sphagnum.*

Pulvinula convexella, described under 'Fungi on Burnt Ground and Charcoal', is often associated with mosses, but not always.

Sarcoleotia turficola (Boud.) Dennis (Fig. 33)
Apothecia 1–2cm diam., disc convex, olivaceous, stalk long, tapered downwards, pinkish or wine-coloured. Flesh soft but not gelatinous. Ascospores ellipsoid, hyaline, smooth 12–18 × 4–6.5. In bogs among *Sphagnum.*

Scutellinia trechispora (Berk. & Br.) Lambotte (Fig. 34)
Apothecia up to 1cm diam., disc red, excipulum reddish brown, covered with thick-walled, sharply pointed, septate, brown hairs up to 800 × 20–40, some forked at the base. Among the long hairs are shorter, 1-septate ones and protruding cells. Ascospores spherical, verrucose, 18–22 diam. (22–26 in var. *paludicola* (Boud.) Moravec). Paraphyses 8–10 thick at apex. Mostly found among mosses, but also on bare patches of soil between plants of *Carex flacca*, Apr.–July.

Sphacrosporella brunnea, described under 'Fungi on Burnt Ground and Charcoal', is often associated with mosses.

Trichophaea hemisphaerioides, described under 'Fungi on Burnt Ground and Charcoal', is found mostly with *Funaria.*

OTHER ASCOMYCETES

KEY TO GENERA

Ascomata (perithecia) pale orange, ascospores without septa .. *Nectriella*
Ascomata black, ascospores dark with transverse and longitudinal septa ..... *Teichospora*
Ascomata brown or black, ascospores 1-septate 1
1. Ascospores hyaline 2
Ascospores brown or brownish 3
2. Ascomata more or less immersed, smooth ..... *Bryochiton*
Ascomata superficial, hairy ..... *Epibryon*
3. Ascomata on brown subiculum within antheridial cups of *Polytrichum* ..... *Lizonia*
Ascomata not so 4
4. Ascospores 15–21 × 6–8 ..... *Bryomyces*
Ascospores 7.5–10 × 3.5–5 ..... *Hypobryon*

Bryochiton microscopicum Döbbeler & Poelt (Fig. 35)
Ascomata more or less immersed in the leaf tissue, 35–55 diam., blackish brown to black, smooth, with a circular ostiole and no prominent neck. Asci subcylindrical, bitunicate, some with a short stalk. Ascospores hyaline, narrowly ellipsoid to commonly fusiform, 1-septate, mostly 10–13 × 2.5–3.5. On the lower leaves of *Gymnomitrion.*

Bryochiton perpusillus Döbbeler (Fig. 36)
Ascomata 20–60 diam. Asci 14–30 × 11–15. Ascospores hyaline, 1-septate, ellipsoid, 8–12 × 3–4.5. Embedded in leaves of *Polytrichum.*

Bryomyces microcarpus Döbbeler
Ascomata 30–120 diam., roughly hemispherical. Asci 30–50 × 15–20. Ascospores greyish brown, 1-septate, 15–21 × 6–8. In leaves of various mosses; recorded in Britain on *Schistidium.*

Epibryon byrophilum (Fuckel) Döbbeler
Ascomata solitary, superficial, spherical, 100–150 diam., the upper part bearing brown, straight or slightly bent, 0- to 1-septate hairs 20–30 × 2. Asci 8-spored. Ascospores ellipsoid-oblong, hyaline, 1-septate with a guttule in each cell, 15–18 × 6.5–7.5. On living and dying plants of *Aulacomnium, Diphyscium, Jungermannia, Polytrichum*, etc.

Epibryon casaresii (Bubák & Fragoso) Döbbeler
Ascomata superficial, round or with a flattened base, black, 75–100 diam. Hairs dark brown, 0- to 1-septate, 20–40 × 2. Ascospores oblong, hyaline, 1-septate, cells sometimes unequal, 7–10 × 3–3.5. On living plants of *Mnium, Scapania*, etc.

Hypobryon validum Döbbeler (Fig. 37)
Ascomata subglobose, 50–80 diam., immersed. Asci bitunicate, 8-spored. Ascospores broadly ellipsoid to ovoid, 7.5–10 × 3.5–5, brown, smooth, 1-septate. On *Plagiochila.*

Lizonia emperigonia (Ces. & de Not.) de Not. (Fig. 38)
Ascomata superficial, black, about 250 diam., with short conical neck, gregarious on a mat of narrow brown hyphae. Asci 8-spored. Ascospores elliptic-fusiform, 30–40 × 12–14, 1-septate, upper cell broader than lower one, golden brown. In antheridial cups of *Polytrichum*, Mar.–May.

Nectriella lophocoleae Massal. (Fig. 39)
Perithecia superficial on a pale hyphal subiculum, ovoid, pale orange, up to 150 diam., setose. Setae thick-walled 50–80 × 8–10. Asci 8-spored. Ascospores ellipsoid, hyaline, without septa but with several guttules, 20–30 × 10–14. On living leaves of *Lophocolea cuspidata.*

Teichospora jungermannicola (Massal.) Sacc. & Syd.
Perithecia superficial, spherical, black, 100–200 diam., with dark brown

septate hyphae below. Asci 8-spored. Ascspores ellipsoid-fusiform, 18–28 × 8–10, dark olivaceous brown, with 4–6 transverse septa, end cells pointed, without longitudinal septa, intermediate cells with one longitudinal or oblique septum. On living plants of *Jungermannia* and other liverworts.

DEUTEROMYCETES

Phoma muscicola A.L. Smith
Pycnidia brown, 120–150 diam. Conidia hyaline, 5 × 2. On *Tortula subulata* and capsules of *Bryum* and *Hypnum.*

MYXOMYCETES

Badhamia lilacina (Fr.) Rostaf. has been found a number of times on *Sphagnum*; *Craterium muscorum* Ing has been recorded from Yorkshire on moss-covered rocks; *Physarum virescens* Ditm. and *Fuligo muscorum* Alb. & Schw. seem to favour terrestrial mosses.

BASIDIOMYCETES

Chromocyphella muscicola (Fr.) Donk
Fruit body up to 3 mm diam., cup- or shell-shaped, sessile or short-stalked, with smooth or wrinkled hymenium lining the inside; outer surface finely silky or downy with short, irregular, cystidium-like hairs. With clamps. At first white but becoming reddish brown from the spores when these mature. Basidia 4-spored, 20–25 long. Spores in mass reddish brown, spherical or subspherical, 7–10 diam., with verruculose walls. On mosses, especially those which grow on bark.

Cyphellostereum laeve (Fr.) Reid (Fig.40)
Fruit body stalked, usually not more than 1 cm diam. shallow cup-shaped or fan-shaped, with inturned margin, white, cream or slightly brownish, wrinkled and downy on the outside, hymenium lining cup smooth or very slightly furrowed. Stem short, broadening out into and concolorous with the cap. Basidia narrowly clavate, 12–22 × 3–5. Cystidia up to 40 × 5, projecting above basidia. Spores white in mass, ellipsoid, obliquely attenuated to a point at the base, with a guttule, J−, 3.5–4.5 × 2–2.5. Growing among mosses, especially *Polytrichum*, on sandy soil.

Leptoglossum
Fruit body cup-, spatula- or mussel-shaped, often lobed, soft, putrescent, grey, whitish or horn-coloured, attached laterally or by the back; hymenium on upper or lower surface covering radiating gills, veins or folds which frequently anastomose, outer surface smooth. Stem short and lateral as a rule or none. Spores white in mass, smooth, J−. Cystidia absent.

KEY

Hymenium covering surface of gills ..... *tremulum*
Hymenium covering surface of folds or veins or smooth 1
1. Fruitbody an inverted shallow cup ..... *retirugum*
Fruitbody mussel- or spatula-shaped 2
2. Cap up to 5 cm diam., spores 9–11 × 6–7 ..... *lobatum*
Cap 1–2 cm diam., spores 6–9 × 3.5–5 ..... *muscigenum*

Leptoglossum lobatum (Pers. ex Fr.) Ricken
Cap lobed, greyish brown, hymenium with veins anastomosing to form a network towards the margin. On and among mosses by sides of streams and in other wet places.

Leptoglossum muscigenum (Bull. ex Fr.) Karst.
Cap hygrophanous, sometimes with concentric furrows, pale greyish brown, stem lateral, off-white, hairy, 1–4 mm long. On various mosses.

Leptoglossum retirugum (Bull. ex Fr.) Ricken
Cap off-white or pale greyish, 0.5–1 cm diam. Spores subspherical, up to 10 diam. Attached to various mosses.

Leptoglossum tremulum (Schff. ex Fr.) Sing. (Fig. 41)
Cap greyish brown, margin sulcate when fresh, 1–2 cm across, stem grey, up to 4 mm long. Spores 7–8 × 5–7. On *Dicranum* and other large mosses.

BRYOPHYTES (MOSSES AND LIVERWORTS): HOST INDEX

Amblystegium
Octospora wrightii, *Pezizella polytrichi*
Aulacomnium
Epibryon bryophilum
Barbula
Octospora leucoloma var. *crosslandii*
Brachythecium
Pezizella muscicola
Bryum
Byssonectria tetraspora, *Octospora coccinea*, *O. leucoloma*, *Phoma muscicola*
Calypogeia
Mniaecia jungermanniae
Campylopus
Lamprospora campylopodis
Ceratodon
Bryoscyphus dicrani, *Neottiella hetieri*, *Octospora coccinea*, *O. melina*, *O. rubens*, *O. rustica*
Conocephalum
Bryoscyphus conocephali
Dicranella
Helotium fulvum, *Octospora melina*
Dicranum
Leptoglossum tremulum
Diphyscium
Epibryon bryophilum
Diplophyllum
Mniaecia jungermanniae
Frullania
Octosporella suboperculata
Funaria
Neottiella hetieri, *Octospora roxheimii*, *Trichophaea hemisphaerioides*
Grimmia
Octospora musci-muralis
Gymnomitrion
Bryochiton microscopicum
Hypnum
Phoma muscicola

Jungermannia
Epibryon bryophilum, *Mniaccia jungermanniae*, *Teichospora jungermannicola*
Lophocolea
Nectriella lophocoleae
Marchantia
Neottiella ithacaensis
Mnium
Epibryon casaresii
Phascum
Helotium phascoides
Plagiochila
Hypobryon validum, *Neottiella crozalsiana*, *Octosporella jungermanniarum*
Pleuridium
Lamprospora annulata, *L. crouanii*
Polytrichum
Bryochiton perpusillum, *Cyphellostereum laeve*, *Epibryon bryophyllum*, *Lamprospora polytrich*, *Lizonia emperigonia*, *Neottiella rutilans*, *Octospora humosa*, *Pezizella polytrichi*
Pottia
Octospora coccinea, *O. melina*
Pseudoscleropodium
Pezizella muscicola
Reboulia
Bryoscyphus marchantiae
Riccia
Leucoscypha ricciae
Scapania
Epibryon casaresii
Schistidium
Bryomyces microcarpus
Sphagnum
Badhamia lilacina, *Hymenoscyphus vasaensis*, *Leucoscypha erminea*, *L. leucotricha*, *Pezoloma ciliifera*, *P. iodocyanescens*, *Pseudoplectania sphagnicola*, *Sarcoleotia turficola*
Tetraplodon
Octospora alpestris
Tortula
Lamprospora crouanii, *Neottiella hetieri*, *Phoma muscicola*

FUNGI ON FUNGI

DISCOMYCETES

KEY TO GENERA

Apothecia on uredinia and telia of *Phragmidium* ..... *Micropodia*
Apothecia not on *Phragmidium* 1
1. Ascospores 15–20 × 4–6, often kidney-shaped, paraphyses much branched at apex ..... *Polydesmia*
Ascospores not more than 11 long 2
2. Ascospores globose or subglobose 3
Ascospores not globose or subglobose 4
3. Ascospores 6–7 diam. ..... *Hyalopeziza*
Ascospores about 2 × 1.5, on *Chaetosphaerella* ..... *Pithyella*
4. Ascospores 1-septate, apothecia sulphur yellow ..... *Bisporella*
Ascospores without septa 5
5. Ascospores about 10 × 6 ..... *Ascophanus*
Ascospores 8–11 × 2.5–3 ..... *Phaeohelotium*
Ascospores not more than 8 × 1–2 6
6. Apothecia blackish brown with white margin ..... *Pyrenopeziza*
Apothecia whitish or yellowish ..... *Cistella*

Ascophanus consociatus (Berk. & Br.) Phill.
Apothecia gregarious, 0.1–0.15 mm diam., pale yellow or whitish, outer surface rugose and granular. Asci 8-spored. Ascospores broadly fusiform, about 10 × 6, pale yellow with coarsely granular contents. Paraphyses filiform. On old *Chaetosphaeria cupulifera.*

Bisporella sulfurina (Quélet) Carpenter (Fig. 42)
Apothecia 0.5–1 mm diam., sulphur yellow. Ascospores hyaline, mostly 1-septate, 9–10 × 2. Very common on stromatic pyrenomycetes such as *Diatrype stigma* and *Diatrypella favacea*, Sept.–Feb.

Cistella
Apothecia sessile or short-stalked, whitish or yellowish, excipulum covered with short, cylindrical or clavate hairs, often granulate towards their tips. Paraphyses filiform, about the same length as the asci. Ascospores hyaline, without septa.

KEY

Excipular hairs cylindrical, smooth ..... *incrustata*
Excipular hairs with swollen tips granulate ..... *stereicola*

Cistella incrustata (Ellis) Dennis
Apothecia superficial, gregarious, up to 0.3 mm diam., convex, short-stalked, whitish, downy, encrusted with extruded spores. Excipular hairs about 15 × 3–5, cylindrical, rounded at apex, smooth, without septa. Asci clavate, pore J+. Ascospores hyaline, smooth, 5–6 × 1–1.5. Paraphyses simple or branched at base. On *Hypoxylon rubiginosum.*

Cistella stereicola (Cooke) Dennis (Fig. 43)
Apothecia more or less cup-shaped but tapered below, up to 0.5 mm diam., yellowish. Excipular hairs 10–15 long, granulate over their swollen tips. Asci 8-spored. Ascospores 5 × 2, slightly clavate. On *Stereum.*

Hyalopeziza ilicincola (Berk. & Br.) Korf & Kohn (Fig. 44)
Apothecia clustered, furfuraceous, externally dirty white, disc pinkish grey. Asci clavate with spores at first in one row then in two rows. Ascospores hyaline, globose, 6–7 diam., each with a large guttule. On *Myriangium* and other fungi.

Micropodia oedema (Desm.) Boud. (Fig. 45)
Apothecia gregarious, arising from a stroma, erumpent, 0.15–0.17 mm diam., very pale brown. Asci about 45 × 7. Ascospores tapered towards the base, hyaline, 8–10 × 1.5–2. On uredinia and telia of *Phragmidium mucronatum*, May.

Phacohelotium extumescens (P. Karsten) Dennis (Fig. 46)
Apothecia gregarious, cup-shaped, up to 0.7 mm diam., cream, drying yellow ochre. Asci up to 50 × 6–8. Ascospores hyaline, 8–11 × 2.5–3, often somewhat curved. Paraphyses very narrow. Mainly on *Diatrype stigma* and *Eutypa* species, Oct.–Mar.

Pithyella erythrostigma (Berk. & Br.) Boud. (Fig. 47)
Apothecia superficial, short-stalked, pale red, somewhat translucent. Asci 8-spored. Ascospores subglobose, about 2 × 1.5. On *Chaetosphaerella phaeostroma.*

Polydesmia pruinosa (Berk. & Br.) Boud. (Fig. 48)
Apothecia sessile, white, pruinose. Asci clavate, up to 100 × 12, pore J+. Ascospores hyaline, often more or less kidney shaped, 15–20 × 4–6, often with a few large guttules. Paraphyses narrow, much branched at the apex. Very common on stromatic pyrenomycetes, especially during the winter months when the white, pruinose apothecia are especially conspicuous. We have found it growing on *Cryptosphaeria eunomia*, *Diatrype disciformis*, *D. stigma*, *Diatrypella favacea*, *D. quercina*, *Eutypella flavovirens*, *E. prunastri*, *Hypoxylon multiforme*, *H. rubiginosum* and *Ustulina deusta.*

Pyrenopeziza kolaensis (P. Karsten) Sacc.
Apothecia gregarious, hemispherical, furfuraceous, blackish brown when

fresh with a white margin and pale disc, 0.2–0.3 mm diam. Asci 25–30 × 4–5. Ascospores hyaline, 5–8 × 1.5. On Corticiaceae and *Stereum.*

OTHER ASCOMYCETES

KEY TO GENERA

Ascomata with walls made up of radiating rows of dark brown, thick-walled cells ..... *Trichothyrina*
Ascomata not so 1
1. Fruit bodies erect, stalked, often club-shaped stromata with perithecia immersed in upper part ..... *Cordyceps*
Fruit bodies not so 2
2. Ascospores filiform, almost as long as asci, on *Claviceps* ..... *Barya*
Ascospores not so 3
3. Ascospores hyaline 4
Ascospores brown 13
Ascospores with two end cells hyaline and two median cells brown . 20
4. Ascospores dividing to form 16 part-spores inside the ascus 5
Ascospores not forming part-spores 6
5. Perithecia immersed in a pulvinate stroma ..... *Hypocrea*
Perithecia seated on or partly immersed in a felted hyphal subiculum ..... *Protocrea*
6. Ascospores without septa 7
Ascospores 1-septate 8
Ascospores with more than one transverse septum 12
7. Ascospores very small, allantoid ..... *Calosphaeria*
Ascospores fusiform, 15–45 long with pointed, often solid tips *Peckiella*
Ascospores different, often with guttules, perithecia black, collapsing from above in a cupulate manner ..... *Nitschkia*
8. Ascospores with short acutely pointed basal appendage ... *Pyxidiophora*
Ascospores with appendage or solid tip at each end 9
Ascospores without appendages or solid tips 10
9. Septum near base of ascospore ..... *Apiocrea*
Septum in middle of ascospore ..... *Hypomyces*
10. Perithecia black, collapsing from above in a cupulate manner . *Nitschkia*
Pseudothecia hyaline or pale ochraceous, setose ..... *Acanthostigmella*
Pseudothecia partly or completely immersed in a pulvinate brown stroma; in sori of rust fungi, especially *Puccinia* ..... *Eudarluca*
Perithecia brightly coloured, mostly yellow or red 11
11. Perithecia formed directly on host or on stroma ..... *Nectria*
Perithecia formed on a hyphal subiculum ..... *Nectriopsis*
12. Ascospores not more than 10 long with up to three septa ..... *Acanthostigmella*

Ascospores 30–50 long with 7 to 11 septa ..... *Tubeufia*
13. Ascospores with longitudinal and transverse septa ..... *Berlesiella*
Ascospores with 2 or 3 septa ..... *Anomalemma*
Ascospores without septa 14
Ascospores 1-septate 16
14. Ascospores cylindrical ..... *Syspastospora*
Ascospores citriform with coarsely reticulate walls ..... *Sphaerodes*
Ascospores otherwise 15
15. Perithecia often with long necks, not collapsing in a cupulate manner ..... *Melanospora*
Perithecia collapsing from above in a cupulate manner ..... *Nitschkia*
Perithecia hairy, formed on a dark subiculum, parasitic on *Clavulina* ..... *Helminthosphaeria*
16. Ascomata (perithecia) pale or brightly coloured 17
Ascomata dark brown or black 18
17. Perithecia flesh-coloured or pale yellow-ochre; parasitic on *Helminthosporium velutinum* ..... *Letendraea*
Perithecia bright yellow or red ..... *Nectria*
18. Pseudothecia solitary, often immersed in cavities of the host fungus ..... *Didymosphaeria*
Pseudothecia partly immersed, gregarious; on *Endoxylina* *Scotiosphaeria*
Ascomata (perithecia or pseudothecia) superficial 19
19. Pseudothecia gregarious on a superficial prosenchymatous stroma; on *Cylindrobasidium* and possibly other Corticiaceae ..... *Anomalemma*
Pseudothecia on a loose hyphal network; parasitic on *Appendiculella* ..... *Dimerium*
Perithecia on a dark subiculum collapsing from above in a cupulate manner ..... *Nitschkia*
20. Perithecia setose ..... *Litschaueria*
Perithecia not setose, but setae often present on mycelial mat ..... *Chaetosphaerella*

Acanthostigmella pallida Dennis & Barr (Fig. 49)
Pseudothecia hyaline or pale ochraceous, 35–60 diam., setose. Setae hyaline or pale brown, without septa, thick-walled, up to 30 × 5. Ascospores 7.5–10 × 2.5–3.5, fusiform to ellipsoid, hyaline, 1-septate or, rarely, 3-septate, with 1–3 guttules in each cell. On *Hypoxylon mammatum* and *Lasiosphaeria.*

Anomalemma epochnii (Berk. & Br.) Sivan. (Fig. 50)
Pseudothecia about 0.3 mm diam., black, growing in small groups on a superficial prosenchymatous stroma. Asci clavate, bitunicate, 8-spored. Ascospores fusiform, brown, smooth, 24–30 × 4.5–7, with 1–3 septa, constricted at the middle septum. In the *Exosporiella* conidial state, hyaline conidiophores 4–7 thick provide a close palisade and form conidia in

succession at their tips. Conidia straight or slightly curved, ellipsoid or cylindrical rounded at the apex, caudate at the base, usually 4-septate, smooth, cells at each end hyaline or pale brown, intermediate cells brown or dark brown, 23–35 × 7–9 including basal appendage. On *Cylindrobasidium evolvens* and possibly other Corticiaceae, mostly in its *Exosporiella* state.

Apiocrea
Perithecia crowded on a golden yellow or yellowish green subiculum, subglobose to somewhat conical, 0.4–0.5 mm diam. Asci 8-spored. Ascospores fusiform, pointed with a solid tip at each end, hyaline, verrucose, 1-septate near the base. Mostly found in a *Sepedonium* state.

KEY

Subiculum golden yellow, chlamydospores spherical ..... *chrysosperma*
Subiculum yellowish green, chlamydospores ellipsoid ..... *tulasneana*

Apiocrea chrysosperma (Tul.) Sydow (Fig. 51)
Perithecia at first hyaline, then yellowish orange, finally reddish brown. Ascospores 20–30 × 5–6. Chlamydospores of *Sepedonium* state bright yellow, 10–16 diam., coarsely verrucose. This is often preceded or accompanied by a *Verticillium*-like state in which there is an abundance of hyaline mycelium bearing irregularly verticillate conidiophores. Conidia hyaline, smooth, 0- to 2-septate, pyriform or oblong-ovoid, often somewhat constricted in the middle, 10–30 × 5–12. Very common on *Paxillus involutus*, *Boletus* species, especially *B. edulis*, and *Scleroderma citrinum*. *Boletus* species when attacked are often malformed with thick stems and small caps rapidly becoming soft and deliquescing.

Apiocrea tulasneana (Plowr.) Petch (Fig. 52)
Perithecia yellow, sometimes with greenish tops. Ascospores 24–33 × 5–7, coarsely verrucose, with septum very near base. Chlamydospores mostly 20–25 × 8–9, hyaline to yellow or pale brown, verrucose. Conidia of *Verticillium*-like state ovoid, without septa, hyaline, smooth, 7–15 × 5–6. On *Boletus* species.

Barya aurantiaca Plowr. & Wilson (Fig. 53)
Perithecia gregarious, obpyriform to somewhat conical, about 0.3 × 0.1 mm, yellow, orange around the ostiole, seated on a white floccose subiculum. Asci cylindrical, 200–250 × 3 containing 8 filiform ascospores about as long as the ascus. On germinating *Claviceps purpurea*.

Berlesiella nigerrima (Bloxam ex Currey) Sacc. (Fig. 54)
Pseudothecia 0.05–0.1 mm diam., black, with very short projecting dark brown spines, crowded, partly immersed in dark grey pulvinate stromata about 1 mm across. Ascospores pale olivaceous brown, 15–21 × 5–6, with 5–6 transverse septa and 1 longitudinal septum. On old stromata of *Diatrype stigma*, *Eutypa acharii* and *Hypoxylon multiforme*, Sept.–April.

Calosphaeria parasitica Fuckel
Perithecia solitary or gregarious, 0.3–0.35 mm diam., black, long-necked, smooth or sparsely covered with brown hyphae. Asci with long stalks. Ascospores hyaline, allantoid, 3.5–4.5 × 0.5. Associated with and often embedded in the stromata and perithecial cavities of *Quaternaria dissepta*, with necks of the *Calosphaeria* protruding through the discs of the *Quaternaria*.

Chaetosphaerella
Perithecia seated on a dark blackish brown to black velvety mycelial mat which also bears the conidiophores of the *Oedemium* conidial state and sometimes dark brown to black setae. Asci 8-spored. Ascospores 3-septate, smooth, with 2 median cells brown and end cells hyaline. Frequently found growing on stromata of diatrypaceous fungi, especially *Diatrype stigma* and *Eutypa flavovirens*.

KEY

Ascospores 20–26 long, conidia 1-septate ..... *fusca*
Ascospores 32–35 long, conidia 3-septate ..... *phaeostroma*

Chaetosphaerella fusca (Fuckel) E. Müller & Booth (Fig. 55)
Perithecia up to 0.4 × 0.3 mm, black. Ascospores 20–26 × 7–8.5. Conidia of *Oedemium* state dumb-bell shaped, 12–20 × 9–14, brown in the middle, paler at each end, borne on branched conidiophores.

Chaetosphaerella phaeostroma (Durieu & Mont.) Müller & Booth (Fig. 56)
Perithecia up to 0.35 × 0.5 mm, dark grey to black. Ascospores curved, 32–35 × 6–9. Conidiophores of *Oedemium* state branched, nodose. Conidia straight, 20–35 × 10–15, median cells brown, end cells hyaline. Setae often formed. A very common fungus.

Cordyceps
Stromata erect, stalked, club-shaped or with an ovoid or subglobose head capping a more or less cylindrical stalk. Perithecia immersed in head, usually flask-shaped, ostioles sometimes papillate, Asci very long, cylindrical, 8-spored. Ascospores filiform, hyaline, almost as long as the asci, breaking up into short part-spores while still in the ascus. Parasitic on *Elaphomyces* buried in soil.

KEY

Stromata at first yellow or greenish yellow, part-spores 2.5–5 × 2 ..... *ophioglossoides*
Stromata with head at first golden brown or chestnut brown 1

1. Part-spores cylindrical, 10–20 × 2–3 ..... *capitata*
   Part-spores fusoid, 20–50 × 3–7 ..... *canadensis*

Cordyceps canadensis Ell. & Ev.
Similar to *C. capitata* but part-spores fusoid, larger and with solid ends.

Cordyceps capitata (Holmsk.) Link (Fig. 57)
Stromata up to 9 cm high, with subglobose or ovoid head up to 2 cm diam., golden brown or chestnut brown, becoming black; stalk 1 cm thick, at first yellow, blackening later. Asci about 15 wide. Part-spores cylindrical, thin-walled, 10–20 × 2–3. On *Elaphomyces granulatus.*

Cordyceps ophioglossoides (Ehrenb. ex Pers.) Link (Fig. 58)
Stromata solitary or in small groups, up to 10 cm high, more or less club-shaped, with an ovoid or oblong, usually laterally compressed head capping a stalk 1–3 mm thick, at first yellow or greenish yellow then black. Asci 7 wide. Part-spores 2.5–5 × 2. On *Elaphomyces granulatus*, *E. muricatus* and *E. variegatus.*

Didymosphaeria
Pseudothecia solitary, immersed, dark brown to black. Asci 8-spored. Ascospores uniseriate, 1-septate, brown.

KEY

Parasitic on *Diatrypella* ..... *futilis*
Parasitic on *Leptosphaeria* ..... *conoidea*
Parasitic on *Phyllachora* ..... *winteri*

Didymosphaeria conoidea Niessl (Fig. 59)
One or more pseudothecia of this species are seen occasionally inside the pseudothecia of *Leptosphaeria doliolum* when these are sectioned. Asci 80–90 × 8. Ascospores 8–12 × 4–5.

Didymosphaeria futilis (Berk. & Br.) Rehm (Fig. 60)
Pseudothecia 0.2–0.4 mm diam., with very small necks. Ascospores olivaceous brown, smooth, 8–14 × 3.5–5. Pseudoparaphyses abundant. This plurivorous species has been found growing on *Diatrypella favacea.*

Didymosphaeria winteri Niessl
Develops in stromata of *Phyllachora.* Ascospores brown, 11–14 × 4–6.

Dimerium meliolicola (Petrak) Hansf. (Fig. 61)
Pseudothecia black, 0.1–0.15 mm diam., superficial on a loose network of pale yellowish brown hyphae 2–5 wide. Asci 50–75 × 10–15, 8-spored. Ascospores oblong-fusiform, 1-septate at or just above the middle, brown, 13–17 × 4–6. Overgrowing and apparently parasitic on *Appendiculella calostroma.*

Eudarluca caricis (Fr.) O. Eriksson (Fig. 62)
Pseudothecia basally or completely immersed in a globose or pulvinate brownish stroma. Asci 70–80 × 8–11, 8-spored. Ascospores spindle-shaped, 1-septate, hyaline, smooth, 16–21 × 3.5–5. Most commonly found in its *Sphaerellopsis* state (often called *Darluca filum*) where the blackish-brown conidiomata, which are often formed in rows, have one or more locules. Conidia hyaline to very pale brown, irregularly verruculose, 1-septate, 15–20 × 2.5–5, with a small gelatinous cap at one end. Commonly parasitic in the sori of rust fungi, especially those of *Puccinia* species.

Helminthosphaeria clavariarum (Tul.) Fuckel (Fig. 63)
Perithecia 0.2–0.3 mm diam., black, hairy, growing on a dark brown subiculum. Asci cylindrical with 8 spores in one row. Ascospores ellipsoid-fusiform, sometimes more curved on one side, dark brown, 10–13 × 6–7. *Diplococcium* conidial state has brown, irregularly branched conidiophores up to 120 × 3–5, with pores through which short chains of conidia are formed. Conidia mostly ellipsoid but sometimes clavate or dumb-bell shaped, pale to dark brown, smooth, 13–23 × 6–8.5, 1-septate, the septum appearing as a broad blackish-brown band. On *Clavulina cinerea* and *C. cristata*, causing blackening.

Hypocrea pulvinata Fuckel (Fig. 64)
Stromata pulvinate, up to 8 mm diam. and 2 mm thick, at first white and tomentose, becoming pale yellow and smooth, dotted with ostioles, finally pale brown. Perithecia sunken just below the surface. Asci cylindrical with 16 hyaline, smooth part-spores, which are oval to wedge-shaped, 4–5 × 2.5–3, or occasionally spherical 3 diam. On decaying polypores, especially *Piptoporus betulinus*, Sept.–May.

Hypomyces
Perithecia gregarious, mostly brightly coloured, soft-walled, globose to obpyriform, papillate, seated on or in a hyphal subiculum. Asci cylindrical, mostly 8-spored. Ascospores hyaline, medianly 1-septate, narrowly fusiform, tapered to a point and shortly appendaged at each end.

KEY

Subiculum soon becoming rose pink ..... *rosellus*
Subiculum other colours 1
1. Ascospores 13–16 long ..... *broomeanus*
   Ascospores 18–26 long ..... *aurantius*
   Ascospores 28–40 long ..... *ochraceus*

Hypomyces aurantius (Pers.) Tul. (Fig. 65)
Subiculum white becoming ochraceous, usually with a white edge. Perithecia about 0.3 mm diam., at first yellow, honey-coloured or orange, often becoming finally reddish orange or red. Ascospores usually slightly

curved, with finely verruculose walls, 18–26 × 4–6. *Cladobotryum* state has 1-septate conidia 10–19 × 6–8. Common on old agarics, especially *Armillaria mellea*, and on many polypores including *Bjerkandera adusta*, *Ischnoderma benzoinum*, *Phaeolus schweinitzii*, *Piptoporus betulinus*, *Polyporus badius*, *P. squamosus*, *Trametes gibbosa* and *T. versicolor*.

Hypomyces broomeanus Tul. & C. Tul.
Subiculum white or pale brown, rather compact. Perithecia up to 0.3 mm diam., pale brown, covered by white tomentum except around the ostiole. Ascospores with verrucose walls, 13–16 × 3.5–4. *Gliocladium* conidial state white. Conidiophores about 100 × 4 with all branches becoming parallel to the stripe; conidia hyaline, ovoid to oblong, slightly inequilateral, 5–12 × 2–2.5, hanging together in slimy masses, larger ones sometimes 1-septate. On *Heterobasidion annosum*, Nov.–March.

Hypomyces ochraceus (Pers.) Tul. & C. Tul.
Subiculum white to somewhat flesh-coloured or ochraceous. Perithecia about 0.3 mm diam., partly immersed in hyphal mat, yellow or reddish. Ascospores often inequilateral, constricted at septum when old, with verrucose walls, 28–40 × 6–7. *Verticillium* conidial state has branches in whorls of 2 to 4, or solitary, conidia 11–21 × 9–12, chlamydospores 2- to 4-septate, constricted at septa, 50–140 × 24–34, hyaline to reddish purple. On *Lactarius* species including *L. helvus*, *L. rufus* and *L. volemus*, also on species of *Russula*. Perithecia are not formed until the agarics have rotted away on the ground.

Hypomyces rosellus (Alb. & Schw.) Tul. (Fig. 66)
Subiculum at first white but soon turning rose pink. Perithecia 0.15 mm diam. rose-red. Ascospores with verrucose walls, 20–36 × 5–7. *Cladobotryum* state has 3-septate, hyaline conidia 25–35 × 10–13. Found most commonly on *Stereum hirsutum* but also on *Physisporinus sanguinolentus*, *Piptoporus betulinus*, *Polyporus squamosus* and *Trametes versicolor*.

Letendraea helminthicola (Berk. & Br.) Weese (Fig. 67)
Perithecia superficial, solitary or clustered, globose to ovoid, 0.1–0.15 mm diam., with a short neck, flesh-coloured or pale yellow-ochre, smooth. Asci cylindric-clavate, 8-spored, 60–70 × 10–14. Ascospores oblong-fusoid, pale brown, 1-septate, smooth, 12–18 × 5–6. Parasitic on *Helminthosporium velutinum*.

Litschaueria corticiorum (Höhnel) Petrak (Fig. 68)
Perithecia gregarious or scattered, erumpent to superficial, black, setose, up to 0.4 × 0.3 mm, collapsing laterally or in a cupulate manner. Setae with or without septa, pale to dark brown, up to 120 long, 4–6 wide at base. Asci 8-spored. Paraphyses branched and anastomosing. Ascospores ellipsoid or ellipsoid-fusiform, straight or slightly curved, 10–17 × 4–6, smooth, becoming 3-septate when mature, median cells brown, end cells hyaline or very pale brown. On decaying *Phanerochaete sordida*, *Stereum hirsutum*, etc.

Melanospora
Perithecia solitary or gregarious, mostly superficial, more or less globose, some species with long necks; with hyaline setae around ostiole, wall translucent yellowish or reddish brown but appearing blackish brown to black when full of mature spores. Asci usually clavate, 8-spored. Ascospores brown or dark brown, smooth, without septa, with two apical germ pores.

KEY

Perithecial necks short, less than 100 long 1
Perithecial necks more than 100 long 2
1. Ascospores mostly citriform, 12–17 wide ..... *brevirostris*
Ascospores ellipsoid-fusiform, 7–11 wide ..... *fusispora*
2. Body of perithecium white tomentose ..... *caprina*
Body of perithecium only slightly hairy ..... *lagenaria*

Melanospora brevirostris (Fuckel) Höhnel (Fig. 69)
Perithecia up to 0.4 mm diam., smooth or slightly hairy, neck up to 50 long, setae around ostiole 40–70 long. Ascospores 20–34 × 12–17. Parasitic on *Geopora arenosa* and occasionally other discomycetes.

Melanospora caprina (Fr. ex Hornem.) Sacc. (Fig. 70)
Perithecia up to 0.8 mm diam., crowded on a brown hyphal subiculum, neck up to 2 mm long surmounted by a ring of hyaline setae. Ascospores ellipsoid to citriform, 16–22 × 9–16. On *Stereum hirsutum*, *Tomentella ferruginea* and old rhizomorphs of *Armillaria mellea*.

Melanospora fusispora (Petch) Doguet (Fig. 71)
Perithecia 0.2–0.3 mm diam., yellow to orange when young, neck very short or absent, setae around ostiole about 120 long. Ascospores 20–25 × 7–11. Parasitic on *Beauveria bassiana* and *Paecilomyces farinosus*.

Melanospora lagenaria (Pers.) Fuckel (Fig. 72)
Perithecia up to 0.8 mm diam. with necks up to 1.5 mm long. Ascospores ellipsoid or citriform, 12–22 × 8–14. On *Bjerkandera adusta*, *Trametes versicolor* and occasionally other polypores.

Nectria
Perithecia brightly coloured, mostly yellow or red, at least when young, rarely setose. Ascospores 1-septate.

KEY

On *Meliola niessleana*, perithecia setose ..... *aureola*
On Aphyllophorales 1

On Pyrenomycetes 3
1. Perithecia collapsing from above to form cups, ascospores 5–7 wide, on *Polyporus* and *Trametes* ..... *peziza*
Perithecia not collapsing to form cups, ascospores less than 5 wide ... 2
2. Ascospores 12–14 long, on *Heterobasidion annosum* ..... *polyporina*
Ascospores 7–11 long, on *Stereum*, *Corticium* and *Polyporus* . *berkeleyana*
3. Ascospores 3–4 wide 4
Ascospores wider 5
4. Perithecia showing pinched collapse which involves the apical disc ..... *episphaeria*
Perithecia not showing pinched collapse ..... *purtonii*
5. Ascospores 10–15 × 4.5–6, on *Diatrypella* ..... *magnusiana*
Ascospores larger 6
6. Ascospores 6–8 wide, on *Leptosphaeria* ..... *leptosphaeriae*
Ascospores 8–10 wide, on *Hapalocystis* and *Pseudovalsa* ..... *wegeliniana*

Nectria aureola Winter
Perithecia superficial, gregarious, very small, pale yellow, with short, rigid, hyaline setae covering the upper parts. Ascospores fusoid, hyaline, 1-septate, 14 × 2.5. On *Meliola niessleana.*

Nectria berkeleyana (Plowr. & Cooke) Dingley
Perithecia scattered or gregarious, globose, 0.25 mm diam., papillate, scarlet, smooth, seated on a pale or rose-coloured subiculum. Ascospores oblong-ovoid, hyaline when young, yellowish and minutely verruculose when old, 7–11 × 4. On *Stereum hirsutum* and on species of *Corticium* and *Polyporus.*

Nectria episphaeria (Tode) Fr. (Fig. 73)
Perithecia 0.1–0.2 mm diam., red, translucent, when dry showing pinched collapse which involves the apical disc. Ascospores mostly 7–10 × 3–4, becoming pale brown and verruculose. Especially common on stromata of *Diatrype stigma* but found also on *Diatrypella favacea*, *D. quercina*, *Eutypa lata*, *E. ulicis*, *Hypoxylon fragiforme*, *Lopadostoma turgidum*, *Melanconis alni*, *Melanomma pulvis-pyrius*, *Melogramma spinferum* and *Quaternaria quaternata.*

Nectria leptosphaeriae Niessl (Fig. 74)
Perithecia superficial, scattered or clustered, flesh-coloured at first, becoming orange-red then rather dark red, ampulliform, 0.3–0.4 mm diam., collapsing laterally when dry. Ascospores ellipsoid to broadly fusiform, slightly constricted at the septum, hyaline to pale brown, 17–25 × 6–8. A *Fusarium* conidial state is sometimes present, with 3- to 5-septate conidia 60–65 × 4–6 which are pinkish in mass. Apparently parasitic on *Leptosphaeria acuta* and *L. doliolum.*

Nectria magnusiana Rehm ex Sacc. (Fig. 75)
Perithecia globose, 0.25–0.35 mm diam., densely crowded on and obscuring a poorly developed stroma, yellowish red, smooth, with a large, flat apical disc, collapsing when old. Asci 70–80 × 9–12. Ascospores obliquely monostichous, ellipsoid or broadly fusiform, smooth, becoming pale brown, 10–15 × 4.5–6. Preceded by a *Dendrodochium* conidial state on the same stroma, with branched conidiophores, subulate phialides up to 20 × 2 and hyaline, allantoid conidia 4.5–6 × 1.5–2. On *Diatrypella favacea* and *D. quercina.*

Nectria peziza (Tode) Fr. (Fig. 76)
Perithecia superficial, scattered or gregarious, 0.25–0.35 mm diam., yellow becoming brownish orange, somewhat crystalline and looking like little tangerine lozenges when fresh, collapsing from above to form cups. Asci 70–90 × 7–10. Ascospores hyaline to pale straw-coloured, with longitudinally striate walls, 12–16 × 5–7. Found occasionally on *Polyporus squamosus* and *Trametes versicolor* although mostly on wood and bark.

Nectria polyporina Petch
Perithecia about 0.2 mm diam., flask-shaped with short neck, yellowish red or red, smooth-walled, crumpent in small groups on a stroma. Ascospores fusoid, 12–14 × 3–4.5. On upper surface of fruit bodies of *Heterobasidion annosum.*

Nectria purtonii (Grev.) Berk. (Fig. 77)
Perithecia densely crowded on and obscuring a thin stroma, 0.15–0.25 mm diam., yellow to red, short-necked with flat or concave discs. Asci 60–70 × 6–9, with an apical ring. Ascospores slightly constricted at septum, smooth, becoming pale brown, 8–11 × 3–4. Often preceded by a *Fusarium*-like conidial state with curved, 1-septate, hyaline conidia 10–18 × 2–2.5. On effete, often valsoid pyrenomycetes; has been found on *Melanconis stilbostoma* and *Valsa* species.

Nectria wegeliniana (Rehm) Höhnel (Fig. 78)
Perithecia superficial, scattered or gregarious, 0.2–0.3 mm diam., red, darkening with age. Asci up to 100 × 9–10. Ascospores at first hyaline but becoming reddish brown, verrucose and thick-walled, 15–19 × 8–10. On old stromata of *Hapalocystis bicaudata* and *Pseudovalsa modonia.*

Nectriopsis aureonitens (Tul. & C. Tul.) Maire (Fig. 79)
Perithecia about 0.15 mm diam., golden yellow, darker around ostiole, seated on a white or yellowish hyphal subiculum. Ascospores ovoid-fusiform, hyaline, 1-septate, constricted at septum, minutely verruculose, 10–13 × 3–4. *Gliocladium* conidial state tufted, conidiophores hyaline, verruculose, branches turning up to become parallel with conidiophore. Conidia hyaline, 2–6 × 1.5–2, held together in slimy masses. Mostly on *Stereum hirsutum*, Sept.–Oct.

Nitschkia
Perithecia mostly superficial, black, sometimes warted, tending to collapse from above in a cupulate manner when old, often seated on a dark subiculum.

KEY

Ascospores mostly straight, fusiform 1
Ascospores mostly slightly curved, not fusiform 2
1. Ascospores 6–9 × 1.5–2.5 ..... *grevillei*
Ascospores 12–18 × 4–6 ..... *collapsa*
2. Ascospores reniform, 3.5–5 wide, coloured ..... *confertula*
Ascospores not reniform, 2–3 wide, hyaline 3
3. Perithecia 0.2–0.3 mm diam., on *Nectria* ..... *parasitans*
Perithecia 0.3–0.45 mm diam., not on *Nectria* ..... *cupularis*

Nitschkia collapsa (Romell) Chenant. (Fig. 80)
Perithecia 0.5–0.75 mm diam. Ascospores often 1-septate, becoming pale greyish brown, 12–18 × 4–6. Often growing on *Diatrype stigma*; if on wood mostly associated with other fungi.

Nitschkia confertula (Schw.) Nannf. (Fig. 81)
Perithecia 0.3–0.5 mm diam., black, collapsing to become cupulate, in groups seated on a blackish brown subiculum. Ascospores reniform, pale brown or greyish brown, biguttulate, 7–11 × 3.5–5. Always growing with and sometimes on *Hypoxylon rubiginosum.*

Nitschkia cupularis (Pers.) P. Karsten (Fig. 82)
Perithecia 0.3–0.45 mm diam. Ascospores hyaline with four large guttules, 12–19 ×2–2.5. Has been found growing on *Botryosphaeria stevensii*, but more commonly on wood with other fungi.

Nitschkia grevillei (Rehm) Nannf. (Fig. 83)
Perithecia 0.3–0.5 mm diam. Ascospores hyaline with 2–4 guttules, occasionally 1-septate, 6–9 × 1.5–2.5. Occasionally found growing directly on fungi such as *Peroneutypa heteracantha* but mostly on wood associated with fungi.

Nitschkia parasitans (Schw.) Nannf. (Fig. 84)
Perithecia 0.2–0.3 mm diam. Ascospores hyaline, 9–16 × 2–3. Always on stromata of *Nectria cinnabarina.*

Peckiella
Perithecia obpyriform or subglobose, seated on a hyphal subiculum. Asci 8-spored. Ascspores without septa, fusiform with pointed, often solid tips, hyaline, walls minutely verruculose.

KEY

Ascospores 15–25 long ..... *lateritia*
Ascospores 27–45 long ..... *viridis*

Peckiella lateritia (Fr.) Maire (Fig. 85)
Subiculum white then pale yellow to yellowish brown. Perithecia partly immersed, 0.2–0.3 mm diam., golden brown. Ascospores 15–25 × 4–5. On *Lactarius deliciosus* and *L. torminosus.* Oct.–Nov.

Peckiella viridis (Alb. & Schw.) Sacc. (Fig. 86)
Subiculum thin, at first bright egg yellow, then greenish and finally almost black. Perithecia gregarious, 0.3–0.4 mm diam., pale to blackish brown. Ascospores 27–45 × 5–6, tips often curved or hooked. On various agarics, mostly *Lactarius* species.

Protocrea farinosa (Berk. & Br.) Petch (Fig. 87)
Perithecia 0.2–0.25 mm diam., hyaline becoming yellow-ochre, mealy, seated on or partly immersed in a cottony, felted, creamy hyphal subiculum. Asci cylindrical, 80–90 × 3–4. Ascospores initially eight, oblong-ovoid or oblong-fusiform, hyaline, minutely verruculose, 8–10 × 3–4, 1-septate, dividing at the septum to form two part-spores. Commonly found on rotten wood but also fairly frequently on old fruit bodies of fungi such as *Junghunia nitida*, *Perenniporia medulla-panis* and various resupinates.

Pyxidiophora asterophora (Tul.) Lindau (Fig. 88)
Perithecia gregarious, partly immersed in substrate, about 0.1 mm diam., with protuberant, sometimes curved neck. Ascus walls diffluent. Ascospores ellipsoid-fusiform with acutely pointed base, hyaline, sometimes with a brown spot in the wall. Parasitic on *Nyctalis lycoperdoides* which itself parasitises *Russula nigricans.*

Scotiosphaeria endoxylinae A. Sivanesan (Fig. 89)
Perithecia gregarious, partly immersed, black, globose, up to 0.25 mm diam., thick-walled, sometimes showing cupulate collapse. Asci 8-spored, cylindrical. Ascospores ellipsoid, brown, smooth, 1-septate, 6–10 × 2.5–4. Paraphyses filiform. On *Endoxylina pini.*

Sphaerodes episphaeria (Phill. & Plowr.) Clem. (Fig. 90)
Cleistothecia superficial, more or less globose, about 0.3 mm diam., yellow or brown. Asci with diffluent walls. Ascospores citriform, blackish brown to black, walls coarsely reticulate, 25–35 × 12–18, with two terminal pores. Parasitic on *Hypomyces ochraceus.*

Sphaerodes fimicola, described under 'Fungi on Dung', has been recorded on sclerotia of *Sclerotinia sclerotiorum* and on old polypores.

Syspastospora parasitica (Tul.) P. Cannon & D. Hawksw. (Fig. 91)
Perithecia scattered, mostly superficial, about 0.1–0.2 mm diam., dark

brown when mature, smooth, with a straight or curved neck 0.5–2 mm long. Ascus walls diffluent. Ascospores very variable in size, mostly cylindrical, with two terminal pores, 4–10 × 2–2.5, pale to rather dark brown, smooth. Mostly on *Paecilomyces farinosus* but also occasionally on *Beauveria bassiana*, *Sarcopodium circinatum* and other fungi.

Trichothyrina parasitica (Fabre) v. Arx (Fig. 92)
Thyriothecia crowded, orbicular, 80–130 diam., upper wall of radiating rows of dark brown, thick-walled cells, basal wall bowl-shaped, ostiolar collar of dark brown, small, thick-walled cells in 2 or 3 rings. Asci bitunicate, 8-spored. Ascospores hyaline, 1-septate, fusiform or cylindrical with rounded ends, sometimes curved, 14–18 × 4–6, often with 2 guttules, a tuft of 2 to 6 cilia attached just above the septum. On *Chaetosphaerella fusca*, *Diatrype stigma* and *Eutypa acharii*.

Tubeufia cerea (Berk. & Curtis) Booth (Fig. 93)
Pseudothecia in groups, superficial, greenish yellow to almost black, warted, hairy, 0.15–0.25 mm diam., hairs yellow, sometimes branched, up to 100 × 3–6. Asci 70–120 × 9–12. Ascospores fusoid, 30–50 × 3–5, hyaline with 7–11 septa. Preceded and accompanied by bright lemon yellow or greenish-yellow colonies of its *Helicosporium* state, with dark brown conidiophores up to 350 × 4–5 and conidia helically coiled 2 or 3 times in one plane, 10–20 diam., with filaments about 1 thick. Commonly found growing on *Diatrype stigma*, *Lasiosphaeria hirsuta*, *Polydesmia pruinosa*, etc.

HYPHOMYCETES

KEY TO GENERA

Sporodochia black with white borders, on *Russula* ..... *Myrothecium*
Not so 1
1. Conidia helically coiled ..... *Helicosporium*
Conidia allantoid 4.5–6 × 1.5–2 ..... *Dendrodochium*
Conidia brown, muriform, with short projecting horns ..... *Oncopodiella*
Conidia caudate, mostly 4-septate ..... *Exosporiella*
Conidia not so 2
2. Conidiophores synnematous, with phialides coming off at right-angles to main axis ..... *Tilachlidium*
Conidiophores mononematous 3
3. Conidiophores with branches mostly in verticils 4
Conidiophores unbranched or with branches not in verticils 7
4. Conidia septate 5
Conidia not septate 6
5. Conidia hyaline, with 1 or 3 septa ..... *Cladobotryum*

Conidia brown, 2-septate ..... *Spondylocladiella*
6. Conidia in slimy heads at tips of phialides ..... *Verticillium*
Conidia dry, on short pegs at ends of branches ..... *Calcarisporium*
7. Large chlamydospores present 8
No large chlamydospores 9
8. Chlamydospores 2-celled, the upper cell large and with usually 6 wart-like protuberances ..... *Stephanoma*
Chlamydospores 1-celled, coarsely verrucose, often yellow . *Sepedonium*
9. Conidia hanging together in large slimy masses 10
Conidia dry, solitary or in chains 11
10. Slimy masses pinkish or orange ..... *Fusarium*
Slimy masses colourless or white ..... *Gliocladium*
11. On rust fungi, usually forming violaceous sporodochia, conidia spherical ..... *Tuberculina*
Not so 12
12. Conidia in chains, sometimes quite short 13
Conidia not in chains 20
13. Branching at apex of conidiophore penicillate, conidial heads often blue-green or grey-green ..... *Penicillium*
Conidia separated from each other by disjunctors, heads large with numerous branches ..... *Amblyosporium*
Not so 14
14. Conidia and conidiophores hyaline or pale violaceous 15
Conidia and conidiophores brown or olivaceous 16
15. Conidia 1-septate ..... *Hormiactis*
Conidia without septa ..... *Paecilomyces*
16. Conidia without septa, in short chains formed on terminal and intercalary ampullae ..... *Gonatobotryum*
Conidia mostly with one or more septa 17
17. Conidia with distinct protuberant scars at one or both ends 18
Not so 19
18. Conidia dumb-bell shaped ..... *Oedemium*
Conidia not so ..... *Cladosporium*
19. Conidiophores unbranched, with single chain of conidia at apex ..... *Heteroconium*
Conidiophores branched, 1-septate conidia formed through pores in side walls of branches ..... *Diplococcium*
20. Conidia with a large spiny or verruculose apical cell and a small mostly smooth cell ..... *Mycogone*
Conidia not so 21
21. Conidia hyaline or almost so 22
Conidia coloured, mostly brown 25
22. Conidia without septa 23
Conidia septate 24

23. Conidiophores nodose, conidia formed on terminal and intercalary ampullae ..... *Gonatobotrys*
    Conidia on tapered denticles at apex of conidiophore . *Pleurophragmium*
24. Conidia 1-septate ..... *Didymopsis*
    Conidia with 2 to 3 septa ..... *Trichoconis*
    Conidia with up to 12 septa ..... *Monacrosporium*
25. Conidia without septa, almost spherical ..... *Hansfordia*
    Conidia with septa 26
26. Conidiophores branched ..... *Oedemium*
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27. Conidia formed laterally through pores ..... *Spadicoides*
    Conidia terminal 28
28. Conidia broadly fusiform to ellipsoid, 11–13 wide ..... *Endophragmia*
    Conidia cylindrical to obovoid, 5–6 wide ..... *Endophragmiella*

Amblyosporium
Conidiophores erect, stout, septate, hyaline or pale straw-coloured, branched at the apex forming rounded heads. Branches fragmenting into chains of conidia separated from one another by disjunctors. Conidia without septa, dry, thin-walled.

KEY

Conidia barrel-shaped, verruculose or echinulate ..... *botrytis*
Conidia subglobose or broadly ellipsoid, smooth ..... *spongiosum*

Amblyosporium botrytis Fresen. (Fig. 94)
Colonies effuse, yellowish white to buff. Conidiophores up to 5 mm long, 12–20 thick, repeatedly branched at the apex, hyaline or pale straw-coloured. Conidia commonly barrel-shaped, verruculose to echinulate, mostly 15–25 × 6–8. Often on wood but has been found on *Fomes fomentarius* and *Clavaria* species.

Amblyosporium spongiosum (Pers.) Hughes (Fig. 95)
Colonies effuse, conspicuous, floccose, yellowish to bright orange. Conidiophores hyaline or straw-coloured, up to 5 mm long and 45 wide, septate, thin-walled, branched in a *Botrytis*-like way at the apex. The terminal branches fragment to form chains of conidia separated by delicate disjunctors up to 20 × 3–5. Conidia subglobose to broadly ellipsoid, with smooth, thin walls, 10–28 × 9–20, pale yellow to orange in mass turning buff when old. On old sporophores of *Lactarius piperatus*, *L. vellereus*, *Paxillus involutus* and other agarics.

Calcarisporium arbuscula Preuss (Fig. 96)
Colonies white, with hyphae growing in and over the surface of the fungus host and bearing conidiophores which are hyaline, septate, up to 150 × 2–5,

and verticillately branched towards the apex. Conidia borne on short pegs or denticles at the ends of the branches where there is usually a slight swelling; they are narrowly ovoid, hyaline, smooth, dry, 4–6 × 1.5–2. Found frequently and on many different kinds of fungi, in particular on the discomycetes *Dasyscyphus pygmaeus*, *D. virgineus* and *Hyaloscypha hyalina*, but quite commonly also on *Diatrypella quercina*, *Hypoxylon multiforme*, *Rosellinia aquila*, *Xylaria longipes* and *X. polymorpha* and occasionally on agarics such as *Hygrocybe pratensis*, *Mycena galericulata*, *Russula emetica* and *R. nigricans*.

Cladobotryum
Conidiophores hyaline, with branches commonly in verticils and conidia formed at the ends of the terminal ones. Conidia often in loose chains, smooth-walled, hyaline, with 1 to 3 septa.

KEY

Conidia 3-septate ..... *Hypomyces rosellus*, v.s.
Conidia 1-septate 1
1. Conidia 22–25 × 10.5–11.5 ..... *mycophilum*
   Conidia 10–19 × 6–8 ..... *Hypomyces aurantius*, v.s.

Cladobotryum mycophilum (Oudem.) W. Gams & Hoozemans (Fig. 97)
On *Phellinus ferruginosus*, conidia nearly all 1-septate.

Cladosporium aecidiicola Thuemen (Fig. 98)
Colonies effuse, dark olive or olivaceous brown, velvety. Conidiophores fasciculate, sometimes branched, flexuous, brown or olivaceous brown, smooth below, often verruculose towards the apex, up to 100 × 4–6. Conidia catenate, subspherical, fusiform or oblong, with very pronounced scars, mostly 0- to 1-septate, verrucose, olivaceous brown, 6–18 × 5–9. On aecia of rust fungi including *Puccinia phragmitis* and *Uromyces limonii*.

Cladosporium uredinicola Speg. (Fig. 99)
Colonies effuse, olivaceous, velvety. Conidiophores straight or flexuous, occasionally branched, septate, usually with groups of 2 or 3 scars at the apex and also sometimes lower down, pale olive, smooth or minutely verruculose, up to 300 × 3–5. Ramoconidia 25–30 long. Conidia spherical, fusiform, ellipsoid or oblong, very pale olive, smooth or minutely verruculose, 0- to 3-septate, 3–5 diam. or 7–25 × 3–6. On uredinia of rust fungi including *Puccinia recondita* and *Triphragmium ulmariae*.

Dendrodochium, v.s. under *Nectria magnusiana*.

Didymopsis helvellae (Corda) Sacc. & March. (Fig. 100)
Colonies effuse, thin, powdery, scarcely visible to the naked eye. Conidiophores erect, with a few short, straight branches. Conidia narrowly pyriform or clavate-pyriform, 1-septate below the middle, smooth, hyaline

or yellowish, 14–17 × 4–5.5. On *Helvella lacunosa* and *Trichophaea woolhopei.*

Diplococcium clarkii M.B. Ellis (Fig. 101)
Colonies effuse, dark brown to black. Conidiophores loosely branched, up to 200 × 5–8, septate, smooth, brown, paler towards base. Conidia catenate, arising through pores, ellipsoid or cylindrical, often slightly curved, with 1 to 3 but mostly 3 septa, brown or dark brown, 18–32 × 7–9. On hymenium of *Megalocystidium luridum* and *Trechispora cohaerens*, Apr.–May.

Diplococcium, v.s. under *Helminthosphaeria clavariarum.*

Endophragmia dennisii M.B. Ellis (Fig. 102)
Colonies hairy, greyish brown. Conidiophores up to 200 × 6–8. Conidia broadly fusiform or ellipsoid, truncate at base, with 2 or 3 septa, smooth, brown or dark brown, with apical cell or cells hyaline or pale brown, 22–31 long, 11–13 thick in the broadest part, 4.5–8 wide at base. On hymenium of *Lyomyces sambuci.*

Endophragmiella eboracensis Sutton (Fig. 103)
Colonies brown, hairy. Conidiophores sometimes branched irregularly, flexuous, up to 65 × 4–5. Conidia cylindrical to obovoid, 14–26 × 5–6, smooth, with one to three septa, tapered to a truncate base, brown, basal cell often pale. On *Diatrype stigma.*

Exosporiella, v.s. under *Anomalemma epochnii.*

Fusarium, v.s. under *Nectria leptosphaeriae* and *N. purtonii.*

Gliocladium, v.s. under *Hypomyces broomeanus* and *Nectriopsis aureonitens.*

Gonatobotrys simplex Corda (Fig. 104)
Colonies effuse, white, cottony or cobwebby. Conidiophores up to 250 × 5–7, with several nodose swellings which bear conidia at the ends of flat-topped pegs. Conidia hyaline, smooth, 10–15 × 5–8. A contact mycoparasite on *Hypomyces rosellus*, old resupinates and species of *Alternaria* and *Cladosporium.*

Gonatobotryum fuscum Sacc. (Fig. 105)
Colonies effuse, hairy, dark brown. Conidiophores dark brown, up to 700 long, 12–15 thick, nodose with terminal and intercalary conidiogenous ampullae up to 28 diam. Conidia mostly in chains of two, brown, without septa, smooth, ellipsoid or oblong rounded at the ends, 10–25 × 6–13. A contact mycoparasite on species of *Ceratocystis*, *Chalaropsis*, *Graphium* and *Leptographium.*

Hansfordia pulvinata (Berk. & Curtis) Hughes (Fig. 106)
Colonies effuse, grey or olivaceous grey. Conidiophores repent or erect, very variable in length, 2–5 thick, unbranched and pale brown to mid-brown below; the upper part bears a number of primary branches which themselves may branch. Conidia borne on short denticles, almost spherical, hyaline or pale brown, verruculose or minutely echinulate, 4–7 diam. Occasionally found growing on other fungi, e.g. *Fulvia fulva* and *Venturia inaequalis.*

Helicosporium, v.s. under *Tubeufia cerea.*

Heteroconium
Colonies effuse, thin or velvety, superficial. Conidiophores pale brown or olivaceous brown. Conidia septate, dry, in long, unbranched chains formed terminally on the conidiophores.

KEY

Conidia 3–4 wide, in spirally twisted chains ..... *chaetospira*
Conidia 4–7 wide, in straight chains ..... *tetracoilum*

Heteroconium chaetospira (Grove) M.B. Ellis (Fig. 107)
Colonies cottony, pale, thin, scarcely visible to the naked eye. Conidiophores up to 50 × 3–4, solitary, simple, often swollen near the base. Conidia fusiform, usually curved slightly, very pale brown, smooth, with 0 to 4, mostly 1 or 3, septa, 20–35 × 3–4. On *Chaetosphaeria cupulifera*, *Sporoschisma mirabile*, etc.

Heteroconium tetracoilum (Corda) M.B. Ellis (Fig. 108)
Colonies olivaceous, velvety, often forming glistening tufts around the ostioles of diatrypaceous fungi. Conidiophores pale olivaceous brown, up to 65 × 2.5–5, usually straight or slightly curved, septate. Conidia straight or slightly curved, fusiform or cylindrical, thick-walled, with 1 to 6, usually 3 or 4 septa, pale olive, smooth, 15–65 × 4–7. Most commonly found on *Diatrype stigma* but recorded also on *Eutypa flavovirens*, *Lopadostoma turgidum* and *Peroneutypa heteracantha.*

Hormiactis alba Preuss (Fig. 109)
Colonies effuse, white. Conidiophores erect, septate, simple below, bearing towards the apex opposite diverging chains of conidia. Conidia hyaline, oblong-ellipsoid, 1-septate, mostly about 10–12 × 3–3.5. On various species of *Agaricus.*

Monacrosporium subtile Oudem. (Fig. 110)
Colonies thin, white, scarcely visible to the naked eye. Conidiophores erect, hyaline, straight or slightly flexuous, 2–4 thick at base, 1–2 at apex. Conidia solitary, terminal, clavate to cylindric-fusoid, with 1 to 12 septa, hyaline, smooth, 40–72 × 5–7. On *Cladosporium*, *Periconia*, etc.

Mycogone
Colonies effuse, white or coloured. Conidiophores simple or branched, usually short and formed almost at right-angles to the vegetative hyphae.

Conidia terminal, 1-septate, apical cell large, sometimes coloured, subspherical, with a thick, verrucose or spiny wall, lower cell smaller and smooth or almost smooth.

KEY

Colonies rose pink, upper cell of conidium 25–35 diam. ..... *rosea*
Colonies white or pale coloured, not rose pink, upper cell of conidium smaller 1
1. Upper cell of conidium 20–23, verrucose ..... *perniciosa*
Upper cell of conidium 16–18, wall with long, blunt spines ..... *cervina*

Mycogone cervina Ditm. (Fig. 111)
Colonies buff. Upper cell of conidium coloured, lower cell hyaline or very pale. On *Helvella lacunosa.*

Mycogone perniciosa Magnus (Fig. 112)
Colonies white, covering substrate with a thin crust. Conidia hyaline. Parasitic on *Agaricus campestris* and *Pluteus* species.

Mycogone rosea Link (Fig. 113)
Colonies effuse, velvety, rose pink. Upper cell of conidium rose, lower cell pale. On various species of *Agaricus* and *Inocybe.*

Myrothecium inundatum Tode (Fig. 114)
Sporodochia sessile, up to 1.5 mm diam., often larger by confluence, with a black centre which becomes flat or concave, and a white margin. Setae few, hyaline, thick-walled, septate, 100–300 × 3–4. Conidia cylindrical, rounded at ends, 2.5–4 × 1–1.5. On decaying fruitbodies of *Russula adusta* and *R. nigricans.*

Oedemium, v.s. under *Chaetosphaerella.*

Oncopodiella hyperparasitica D. Hawksw. (Fig. 115)
Colonies effuse, blackish brown but inconspicuous. Conidiophores pale brown, 10–25 × 2–4. Conidia trigonous, pyriform or irregularly subglobose, muriform, mid- to dark brown, 17–25 diam., with 4 short, hyaline to pale brown protuberant horns. On effete perithecia of *Lasiosphaeria spermoides* and on *Athelia epiphylla.*

Paecilomyces marquandii (Massee) Hughes (Fig. 116)
Colonies lavender, covering the gills of agarics. Conidiophores subulate, septate, up to 400 × 3–6, branched, with branches solitary or in verticils and both stipe and branches terminating in groups of slender phialides. Conidia 4 × 2–3, formed in long chains. Most collections have been made on *Hygrocybe virginea.*

Penicillium
Colonies pale or brightly coloured, often grey-green or blue-green.

Conidiophores solitary or aggregated into fascicles, or compacted to form coremia, septate, hyaline, terminating in branches which form splayed out, brush-like penicilli of varying complexity; the terminal branches are phialides and these form long, unbranched chains of dry, small, greenish conidia at their tips.

KEY

Colonies blue-green ..... *cyclopium*
Colonies grey-green, branches inflated upwards, somewhat wedge-shaped ..... *brevi-compactum*
Colonies yellowish to grey-green, branches not inflated upwards ..... *stoloniferum*

Penicillium brevi-compactum Dierckx (Fig. 117)
Colonies compact, grey-green with a narrow border shading through pale blue-green to white. Conidiophores 4–5 diam., smooth or slightly verruculose. Penicilli complex, branches more or less wedge-shaped, 4–5 wide at base, 6–7 at apex. Conidia globose or subglobose, minutely verruculose, 3.5–4 diam. On *Agaricus silvaticus, Boletus edulis, Collybia peronata, Flammulina velutipes, Hygrophoropsis aurantiaca, Piptoporus betulinus*, etc.

Penicillium cyclopium Westling
Colonies rather dull blue-green, brighter at the edge, shading to a white margin. Conidiophores mostly verruculose, penicilli compact, with primary, secondary and tertiary branches 3–3.5 thick. Conidia in tangled chains, globose or subglobose, minutely verruculose, 3–4 diam. On *Fistulina hepatica* and various agarics.

Penicillium stoloniferum Thom
Rather similar to *P. brevi-compactum* but colonies more yellowish green, conidiophores thinner and flexuous, branches not inflated upwards. Common on *Paxillus involutus*; found also on other agarics and on *Piptoporus betulinus.*

Pleurophragmium acutum (Grove) M.B. Ellis (Fig. 118)
Colonies effuse, brown, thin, hairy. Colonies solitary or in groups of 2 to 4, straight or slightly flexuous, brown, with a number of tapering denticles near the apex, up to 90 × 2–4, sometimes swollen to 7 at base. Conidia fusiform or narrowly ellipsoid, tapered to a point at the base, hyaline, smooth, mostly without septa, very rarely 1-septate, 6–12 × 2–3. On perithecia of *Leptosphaeria acuta.*

Sepedonium, v.s. under *Apiocrea.*

Spadicoides xylogena (A.L. Smith) Hughes (Fig. 119)
Colonies effuse, dark olivaceous brown to black, hairy. Conidiophores

brown, up to 250 × 2–6, septate. Conidia formed singly through small pores, ovoid to broadly ellipsoid, pale to dark brown, mostly 3-septate, septa appearing as dark brown to black bands, 16–34 × 7–10. On *Athelia epiphylla*, *Hypochnicium punctulatum* and other resupinate hymenomycetes.

Spondylocladiella botrytioides Linder (Fig. 120)
Colonies brown to dark brown. Conidiophores branched, septate, smooth-walled, pale brown to brown except near the base where they are hyaline, up to 400 × 6–8, bearing verticils of short conidiogenous branches towards the apex of the stipe and along the branches. Conidia formed singly through a pore at the apex of each conidiogenous branch, ellipsoid to oblong with rounded ends, pale to mid brown, smooth, almost always 2-septate, 13–20 × 8–10. On resupinate hymenomycetes, recorded in Yorkshire on *Corticium* on *Juncus*.

Stephanoma strigosum Wallr. (Fig. 121)
Sporodochia sessile, thin, fragile. Conidiophores hyaline, septate, branched, the stipe and branches often bearing at their ends three subulate phialides. Hyphae and lower part of conidiophore bear characteristic hyaline to pale yellow chlamydospores each consisting of a small basal cell and a much larger cell which has usually six large, wart-like protuberances. Conidia narrowly ellipsoid, 10–17 × 4–5. Chlamydospores, including protuberances, 20–35 diam. On apothecia of *Humaria hemisphaerica*.

Tilachlidium brachiatum (Batsch) Petch (Fig. 122)
Synnemata rigid, white, flocculose, with tapered phialides 25–30 × 2.5 at right-angles to the main axis. Conidia ellipsoid, hyaline, 3–5 × 1.5–2. On rotting agarics and on *Helvella crispa*.

Trichoconis hibernica Deighton & Pirozynski (Fig. 123)
Colonies thin, whitish, inconspicuous. Conidiophores hyaline, smooth, up to 50 × 2.5–4, with septum near base. Conidia borne on narrow, cylindrical separating cells mostly at apex of conidiophore, hyaline, obclavate, smooth, 2- to 3-septate, 21–30 × 3–4, each, when seceding, carrying away on its base a part of the fractured separating cell. On *Appendiculella calostroma*.

Tuberculina
Sporodochia globose to somewhat flattened, or effuse, often arranged in circles, purplish, orange or reddish brown. Conidiophores short, forming a palisade. Conidia spherical or almost so. In sori of rust fungi.

KEY

Conidia 10–13 diam. ..... *maxima*
Conidia 7–10 diam. 1
1. Sporodochia dark violaceous ..... *persicina*
Sporodochia orange to reddish brown ..... *sbrozzii*

Tuberculina maxima Rostr.
Sporodochia effuse, dark purple. Conidia pale violaceous, 10–13 diam. On aecia of *Cronartium flaccidum* and *C. ribicola*.

Tuberculina persicina (Ditm.) Sacc. (Fig. 124)
Sporodochia globose or somewhat flattened above, roughly arranged in circles, dark violaceous. Conidia spherical, pinkish violet, smooth 7–8 (10) diam. On aecia of many rust fungi, very common.

Tuberculina sbrozzii Cav. & Sacc.
Sporodochia effuse, orange or reddish brown. Conidia 8–10 diam. In sori of *Puccinia vincae*.

Verticillium
Colonies usually white or very pale. Conidiophores erect, septate, hyaline or pale, simple or branched, with main axis and branches, when present, bearing phialides mostly in verticils. Conidia hyaline, without septa, produced in slimy balls at the tips of the phialides.

KEY

Conidia 2–3.5 wide ..... *psalliotae*
Conidia 5–6 wide ..... *Apiocrea tulasneana* v.s.
Conidia mostly more than 6 wide 1
1. On *Lactarius* and *Russula* ..... *Hypomyces ochraceus* v.s.
On *Paxillus*, *Boletus* and *Scleroderma* ..... *Apiocrea chrysosperma* v.s.

Verticillium psalliotae Treschow
Conidiophores bear 1 to 10 whorls of 1 to 4 phialides 18–30 × 1–1.5, which are septate at the base. Conidia hyaline, 6–10.5 × 2–3.5. On *Agaricus bisporus*.

COELOMYCETES

Ampelomyces quisqualis Ces. ex Schlecht. (Fig. 125)
Pycnidia pyriform or globose, without ostiole although sometimes appearing papillate, 0.05–0.1 × 0.03–0.05 mm, often at ends of short hyphal branches, pale golden brown. Conidia hyaline to very pale brown, smooth, without septa, guttulate, cylindrical or almost so, with rounded ends, straight or slightly curved, 5–9 × 2–4. On the mycelial mat of powdery mildews, fairly common. Older records were mostly made under the name *Cicinnobolus cesatii*.

Coniothyrium
Pycnidia separate, globose, brown to black, thin-walled, with round ostiole, sometimes papillate. Conidia brown, often thick-walled, without septa or occasionally with one septum.

KEY

Growing on sclerotia ..... *minitans*
Growing on *Hypoxylon* ..... *parasitans*

Coniothyrium minitans Campbell
Pycnidia 0.2–0.7 mm diam., attached by a narrow base. Conidia ellipsoid, brown, 4–6 × 3.5–4, with smooth or minutely verruculose walls; they are extruded in black liquid masses. Parasitic on sclerotia of *Sclerotinia sclerotiorum* and *S. trifoliorum.*

Coniothyrium parasitans (Berk. & Rav.) Tassi
Pycnidia sparse, very small, papillate. Conidia ellipsoid, brown, 7–8 × 3–4, with two guttules. On *Hypoxylon.*

Darluca filum, v.s. under *Eudarluca caricis.*

Hainesia rubi (Westend.) Sacc. (Fig. 126)
Conidiomata separate, 0.2–0.8 mm diam., open cups with the spore mass jelly-like, yellow at first, later turning brown, partly immersed then becoming superficial. Conidia hyaline, smooth, without septa, 5–10 × 2–3.5. Parasitic on uredinia and telia of *Phragmidium mucronatum*, *P. rubi* and *P. violaceum.*

Hyalopycnis blepharistoma (Berk.) Seeler (Fig. 127)
Pycnidia solitary or gregarious, transparent, amber, flask-shaped, short-stalked, 0.3–0.6 mm high, 0.1–0.2 mm wide; neck 30–60 diam., fringed with delicate, splayed out filaments at the tip. Conidia ovoid or irregular in shape, thin-walled, hyaline, amber-yellow in mass, 9–13 × 3.5–5.5. On *Russula adusta* and other agarics.

Sphaerellopsis, v.s. under *Eudarluca caricis.*

PHYCOMYCETES

Chaetocladium, *Mortierella* and other genera with species which parasitise coprophilous fungi are described under 'Fungi on Dung'.

Spinellus fusiger (Link) van Tiegh. (Fig. 128)
Mycelium richly branched, many of the branches spine-like, covering the host fungus with a brownish felt. Sporangiophores unbranched, often narrowing just below the terminal sporangium, occasionally septate, 1 cm or more long, 30–110 thick, hyaline or with yellowish brown contents. Sporangia spherical, 120–300 diam., dark brown to black, walls soon deliquescing; columella cylindrical to pear-shaped. Spores broadly fusiform, pale brown, smooth 35–55 × 10–20. Especially common on species of *Mycena*, including *M. alcalina*, *M. metata*, *M. polygramma*, *M. pura* and *M. sanguinolenta*, but also on other agarics such as *Collybia butyracea* and *C. dryophila.*

Syzygites megalocarpus Ehrenb. (Fig. 129)
Colonies effuse, at first white, then grey or ochraceous, brown when quite old. Sporangiophores erect, 1–4 cm high, up to 70 thick, septate, hyaline to pale brown, smooth, sometimes finely striate, up to 5 or 6 times dichotomously branched, the end branches terminating in sporangia. Sporangia 50–150 diam., yellowish, grey by reflected light, thin-walled, columella hemispherical. Spores spherical or sometimes somewhat angular or broadly ovoid, mostly 12–30 diam., hyaline to pale brown, smooth. Zygospores up to 300 diam. On fruit bodies of *Amanita citrina*, *A. rubescens*, *Leccinum scabrum* and species of *Boletus*, *Calvatia*, *Lactarius*, *Russula* and *Scleroderma.*

BASIDIOMYCETES

Episphaeria fraxinicola (Berk. & Br.) Donk (Fig. 130)
Fruit body 0.2–0.7 mm diam., gregarious, sessile, shallow cup-shaped, with inrolled margin, white, hairy. Hairs often finely encrusted but not swollen at tip. Hymenium lining cup cream. Basidia 4-spored, 20–25 × 7–8. No cystidia. Spores in mass coloured ochraceous or brown, broadly ellipsoid, 6.5–8 × 5–6, obliquely attenuated to a point at the base. On stromatic pyrenomycetes, e.g. *Diatrype stigma.*

Pseudostypella translucens (Gordon) Reid & Minter (Fig. 131)
This small tremellaceous fungus commonly parasitises apothecia of *Lophodermium conigenum*, *L. pinastri* and *L. seditiosum.* Its hyaline basidiospores measure 7–9 × 3–4.

Xenolachne longicornis Hauerslev (Fig. 132)
Fruit body tremellaceous, white to pale buff, glistening and somewhat pruinose, replacing the hymenium of the discomycete host. Characterised by its tapered sterigmata, 2 to each basidium, which are 30–50 long. Basidiospores hyaline, biguttulate, smooth, without septa, obclavate-fusoid, mostly 8–10 × 3. On apothecia of *Cudoniella clavus*, *Discinella margarita* and *Hymenoscyphus vernus.*

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Nectria wegeliniana
Helminthosporium
Letendraea helminthicola
Helvella
Didymopsis helvellae, *Mycogone cervina*, *Tilachlidium brachiatum*
Heterobasidion
Hypomyces broomeanus, *Nectria polyporina*
Humaria
Stephanoma strigosum
Hyaloscypha
Calcarisporium arbuscula
Hygrocybe
Calcarisporium arbuscula, *Paecilomyces marquandii*
Hygrophoropsis
Penicillium brevi-compactum
Hymenoscyphus
Xenolachne longicornis
Hypochnicium
Spadicoides xylogena
Hypomyces
Gonatobotrys simplex, *Sphaerodes episphaeria*
Hypoxylon
Acanthostigmella pallida, *Berlesiella nigerrima*, *Calcarisporium arbuscula*, *Cistella incrustata*, *Coniothyrium parasitans*, *Nectria episphaeria*, *Nitschkia confertula*, *Polydesmia pruinosa*
Inocybe
Mycogone rosea
Ischnoderma
Hypomyces aurantius
Junghunia

Protocrea farinosa
Lactarius
Amblyosporium spongiosum, *Hypomyces ochraceus*, *Peckiella lateritia*, *P. viridis*, *Syzygites megalocarpus*
Lasiosphaeria
Acanthostigmella pallida, *Oncopodiella hyperparasitica*, *Tubeufia cerea*
Leccinum
Syzygites megalocarpus
Leptographium
Gonatobotryum fuscum
Leptosphaeria
Didymosphaeria conoidea, *Nectria leptosphaeriae*, *Pleurophragmium acutum*
Lopadostoma
Heteroconium tetracoilum, *Nectria episphaeria*
Lophodermium
Pseudostypella translucens
Lyomyces
Endophragmia dennisii
Megalocystidium
Diplococcium clarkii
Melanconis
Nectria episphaeria, *N. purtonii*
Melanomma
Nectria episphaeria
Meliola
Nectria aureola
Melogramma
Nectria episphaeria
Mycena
Calcarisporium arbuscula, *Spinellus fusiger*
Myriangium
Hyalopeziza ilicincola
Nectria
Nitschkia parasitica
Nyctalis
Pyxidiophora asterophora
Paecilomyces
Melanospora fusispora, *Syspastospora parasitica*
Paxillus
Amblyosporium spongiosum, *Apiocrea chrysosperma*, *Penicillium stoloniferum*
Perenniporia
Protocrea farinosa
Periconia

FUNGI ON MYXOMYCETES

ASCOMYCETES

Nectria candicans (Plowr.) Samuels
Perithecia white or creamy, hairy, seated on a white subiculum. Hairs rounded at their tips. Ascospores hyaline, 1-septate, 6–9 × 2–3. *Acremonium* state with ellipsoid conidia 7–10(14) × 3–4. On *Amaurochaete atra*, *A. ferruginea*, *Arcyria denudata*, *Diachea subsessilis*, *Diderma globosum*, *D. simplex*, *D. spumarioides*, *Didymium clavus*, *D. megalosporum*, *D. melanosporum*, *Fuligo intermedia*, *F. muscorum*, *F. septica*, *Lycoperdon epidendrum*, *Mucilago crustacea*, *Physarum didermoides*, *P. psittacinum*, *P. pusillum*, *Stemonitis flavogenita*, *S. fusca*, *Trichia floriformis*.

Nectria violacea (Schm. ex Fr.) Fr.
Perithecia violet or purple, globose, about 0.2 mm diam., partly immersed in a white subiculum. Asci 8-spored, cylindrical. Ascospores hyaline, smooth, 1-septate, 6–9 × 2–3. *Acremonium* state has hyaline conidia 6–10 (17) × 2–3. On *Fuligo septica*.

Rhynchonectria longispora (Phill. & Plowr.) Petch
Perithecia crowded, about 0.5 × 0.2 mm, pale yellow. Asci 130–150 × 20–25, mostly 4-spored. Ascospores fusiform, hyaline, 1-septate, with a slender appendage at each end, 50–60 × 5–8. On *Cribraria* sp.

HYPHOMYCETES

Acremonium, v.s. under *Nectria candicans* and *N. violacea*.

Aphanocladium album (Preuss) W. Gams (Fig. 133)
Colonies covering sporangia with a loose white mass of mycelium, composed of hyaline, branched, septate hyphae 2–4 thick. Phialides borne irregularly along the sides of the hyphae, flask-shaped, pointed at apex, 3–5 × 2–3. Conidia oval to subspherical, hyaline, 2–6 × 2–4. On *Arcyria cinerea*, *Comatricha nigra*, *C. pulchella*, *C. typhoides*, *Craterium minutum* (especially common on this), *Cribraria aurantiaca*, *C. rufa*, *C. vulgaris*, *Didymium nigripes*, *Enerthenema papillatum*, *Leocarpus fragilis*, *Trichia affinis* and *T. varia*.

Blistrum
Synnemata erect, capitate, white to cream, with rough-walled subglobose cells protruding from their sides. Conidia small, slimy, formed at the tips of splayed out, tapered phialides at the top of each synnema.

KEY

Conidia cylindrical to ellipsoid, about 5 × 2 ..... *orbiculare*
Conidia globose or oval, smaller 1
1. Conidia globose, 1–1.5 diam. ..... *tomentosum*
Conidia oval 2.5–4.5 × 1–1.5 ..... *ovalisporum*

Blistrum orbiculare (Berk. & Br.) B. Ing
On *Cribraria argillacea* and *Lindbladia tubulina*.

Blistrum ovalisporum (A.L. Smith) Sutton (Fig. 134)
Synnemata up to 200 × 20, projecting cells 3–4 diam. Conidia with small guttules. On *Hemitrichia serpula*, *Perichaena corticalis*, *Trichia affinis*, *T. botrytis*, *T. persimilis* and *T. varia*.

Blistrum tomentosum (Schrad.) Sutton (Fig. 135)
Similar to *B. ovalisporum* except for the very small globose conidia. On *Comatricha pulchella*, *Cribraria argillacea*, *C. aurantiaca*, *C. persoonii*, *C. rufa*, *Diderma effusum*, *Metatrichia floriformis*, *Perichaena corticalis*, *P. depressa*, *Trichia affinis*, *T. botrytis*, *T. decipiens*, *T. favoginea*, *T. lutescens*, *T. varia* and *T. verrucosa*.

Dendryphiella infuscans (Thuem.) M.B. Ellis (Fig. 136)
Conidiophores brown, up to 500 × 4–6 simple or with a few short branches near the apex. Conidia formed on swollen nodes and leaving dark scars when detached, pale brown, smooth or minutely verruculose, 0- to 2-septate, 9–16 × 4–7. Found occasionally on old myxomycetes, but more frequently on dead herbaceous stems.

Gliocladium album (Preuss) Petch (Fig. 137)
Colonies white. Conidiophores hyaline, about 3 wide. Phialides compacted to form a palisade with their tips more or less level, 15–20 long. Conidia ellipsoid or ovoid, smooth, hyaline, 2.5–4 × 1.5–2, aggregated in slimy heads. On *Arcyria cinerea*, *Comatricha nigra*, *Craterium minutum*, *Cribraria aurantiaca*, *C. cancellata*, *C. rufa*, *Didymium squamulosum*, *Physarum leucophaeum*, *P. nutans*, *Stemonitis fusca*, *Trichia affinis* and *T. varia*.

Sesquicillium microsporum (Jaap) Veenbaas Rijks & W. Gams (Fig. 138)
Conidiophores hyaline, smooth, verticillately branched, each branch terminating in a normal phialide 7–14 × 1.5–2 cut off by a septum and the cell below it often with an opening at the end of a short protrusion formed just under the septum. Conidia aggregated in slimy heads, subglobose, hyaline, smooth, 2–2.5 × 1.5–2. On *Craterium leucocephalum*, *Didymium melanospermum*, *Leocarpus fragilis* and *Physarum* sp.

Verticillium
For generic description see under 'Fungi on Fungi'.

KEY

Conidia about 3 × 2, dictyochlamydospores formed ..... *catenulatum*
Conidia larger, no chlamydospores 1
1. Conidia 4–6 × 2–3 ..... *rexianum*
Conidia 3–6 × 1–1.5 ..... *insectorum*

Verticillium catenulatum (Kamyschko ex Barron & Onions) W. Gams (Fig. 139)
Colonies white or pale yellowish. Conidia in chains, broadly ellipsoid to subglobose, about 3 × 2, each with a minute apiculus. Seen occasionally on myxomycetes including *Physarum psittacinum* and *Trichia affinis.*

Verticillium insectorum (Petch) W. Gams (Fig. 140)
Colonies white. Conidiophores loosely branched. Phialides 15–30 × 1.5–2. Conidia in long chains, spindle-shaped, 3–6 × 1–1.5. Has been recorded on *Trichia verrucosa.*

Verticillium rexianum (Sacc.) Sacc.
Colonies white to pale ochraceous. Conidiophores verticillately branched, smooth or verruculose. Phialides 20–35 × 2–2.5, upwardly curved, mostly in groups of 2–4. Conidia in slimy heads, more or less cylindrical or slightly tapered towards the base, ends rounded, hyaline, smooth, 4–6 × 2–3. Common on *Arcyria cinerea*, *A. denudata*, *A. nutans*, *Ceratiomyxa fruticulosa*, *Comatricha nigra*, *C. typhoides*, *Cribraria argillacea*, *C. aurantiaca*, *C. cancellata*, *Didymium nigripes*, *Physarum compressum*, *P. leucopus* and *Stemonitis axifera.*

FUNGI ON BURNT GROUND AND CHARCOAL

DISCOMYCETES

KEY TO GENERA

Apothecia small, crowded on a white subiculum 1
Apothecia not on a white subiculum 2
1. Ascospores without guttules ..... *Pyronema*
Ascospores with two large and a few small guttules ..... *Byssonectria*
2. Apothecia large, irregularly saddle-shaped, with thick, furrowed stalks ..... *Helvella*
Apothecia roughly ear-shaped, one side much longer than the other ..... *Otidea*
Apothecia more regular, cup-shaped, flat or pulvinate 3
3. Apothecia stalked 4
Apothecia sessile or almost so 6
4. Stalk slender, apothecia deeply cup-shaped ..... *Geopyxis*
Stalks stout, apothecia flatter 5
5. Apothecia mostly less than 1 cm diam., purple ..... *Discinella*
Apothecia 3–15 cm diam. reddish brown ..... *Discina*
6. Ascospores hyaline with appendage at each end ..... *Rhizina*
Ascospores purple or purplish ..... *Ascobolus*
Ascospores neither appendaged nor purple 7
7. Ascus tips turning blue in Melzer's solution (J+) 8
Ascus tips not turning blue (J−) 9
8. Ascospores spherical ..... *Plicaria*
Ascospores more or less ellipsoid ..... *Peziza*
9. Ascospores spherical 10
Ascospores more or less ellipsoid 12
10. Ascospores filled with small guttules or oil drops, apothecia pulvinate ..... *Pulvinula*
Ascospores without or with one large guttule, apothecia not pulvinate 11
11. Discs reddish brown, excipular hairs brown ..... *Sphaerosporella*
Discs some shade of orange, no brown hairs ..... *Lamprospora*
12. Ascospores without guttules 13
Ascospores with one or two large guttules 14
13. Excipulum bearing tapered, brown, septate hairs ..... *Tricharina*

Excipulum without distinct hairs ..... *Aleuria*
14. Apothecia bright pink, minutely downy ..... *Tarzetta*
Apothecium not pink, excipulum hairy 15
15. Excipular hairs hyaline, tapered and thick-walled, disc very bright orange ..... *Neottiella*
Excipular hairs brown, disc duller or pale 16
16. Disc whitish or pale grey, hairs long and pointed ..... *Trichophaea*
Disc dull yellowish brown to reddish orange, hairs rather short, obtuse, usually in clumps ..... *Anthracobia*

Aleuria granulosa (Schum.) Gillet
Apothecia sessile, up to 12 mm diam., flat with upturned, finely crenulate margin, disc yellowish brown. Ascospores hyaline, smooth, 21–22 × 11–12. Paraphyses swollen to 9 at apex, appearing greenish and filled with blackish granules when mounted in lactic cotton blue. On bonfire sites, Sept. In *The British Ascomycotina*, 1985, as *Aleuria* but appears to be not congeneric with the type species *A. aurantia*.

Anthracobia
Apothecia sessile, 2–6 mm diam., with clumps of short, obtuse, septate, non-rooting, brown hairs on the outside; discs usually rather dull reddish orange to yellowish brown. Asci cylindrical, 8-spored, walls J−. Ascospores ellipsoid, hyaline, smooth, with two guttules. Paraphyses clavate. All on burnt ground.

KEY

Paraphyses uncinate at tips ..... *uncinata*
Paraphyses not uncinate at tips 1
1. Hairs with one or two cells, short and fat, over 20 wide, disc reddish orange ..... *macrocystis*
Hairs with several cells, often over 100 long, not more than 20 wide, disc not reddish 2
2. Disc fawn, hairs up to 20 wide and ascospores up to 9 wide . *maurilabra*
Disc ochraceous orange, hairs up to 10 wide and spores up to 11 wide ..... *melaloma*

Anthracobia macrocystis (Cooke) Boud. (Fig. 141)
Ascospores 16–18 × 7–8. July–Oct., common.

Anthracobia maurilabra (Cooke) Boud. (Fig. 142)
Ascospores 19–22 × 8–9. June–Oct., common.

Anthracobia melaloma (Alb. & Schw.) Boud. (Fig. 143)
Ascospores 14–22 × 7–11. Jan.–Oct., common.

Anthracobia uncinata (Velen.) Spooner (Fig. 144)

Ascospores 10–12 × 5–5.5. Uncommon.

Ascobolus carbonarius P. Karsten (Fig. 145)
Apothecia 2–5 mm diam., at first yellowish to brown but finally becoming blackish brown and difficult to see on burnt ground. Asci protruding above surface of disc, walls J−. Ascospores 18–24 × 12–14, purplish brown, verrucose with warts most prominent at each end where they form polar caps. Mar.–Oct., common.

Byssonectria fusispora, described under 'Fungi on Soil', occurs sometimes on burnt areas. The smooth, hyaline ascospores measure 20–30 × 8–10.

Discina ancilis and *Discinella exidiiformis*, both described under 'Fungi on Soil', have been recorded also on charcoal. In the former the ascospores are appendaged and verruculose and measure 25–30 × 12–14, in the latter smooth and about 17 × 10.

Geopyxis carbonarius (Alb. & Schw.) Sacc. (Fig. 146)
Apothecia solitary or gregarious, deeply cup-shaped, up to 1.5 cm diam., light red or reddish brown, with short white teeth at the margin, outer surface and stalk pale. Asci operculate, walls J−. Ascospores hyaline, smooth, without guttules, 14–16 × 6–8. On burnt ground and charcoal.

Helvella lacunosa, described under 'Fungi on Soil', is found not uncommonly on burnt areas in woods. The ascospores measure 16–20 × 10–12.

Lamprospora species which occur on burnt ground are all associated with small mosses and are described under 'Fungi Growing on or with Bryophytes', but they are also keyed out here. The apothecia are small, usually orange and dentate or fimbriate at the margin.

KEY

Ascospores with smooth walls 1
Ascospores with reticulate walls 2
1. Ascospores 14–16 diam. ..... *astroidea*
Ascospores 15–18 diam. ..... *carbonicola*
2. Ascospores 10–13 diam., mesh minute ..... *polytrichi*
Ascospores 12–15 diam., mesh 2–3 wide ..... *dictydiola*

Neottiella species also are constantly associated with mosses, *N. hetieri*, the only one found (with *Funaria*) on burnt ground, has ascospores 14–17 × 8–9.

Otidea violacea A.L. Sm. & Ramsb.
Apothecia up to 6 cm diam., ear-shaped with one side longer than the other, furfuraceous on the outside, all parts violaceous. Ascospores ellipsoid, hyaline, with two guttules, about 10 × 5. Paraphyses straight or hooked at their purple, swollen tips.

Peziza
Apothecia superficial, cup-shaped, especially when young, usually sessile. Asci operculate, tips J+. Ascospores ellipsoid, hyaline, commonly either smooth without guttules or rough-walled with guttules.

KEY

Ascospore walls verruculose 1
Ascospore walls smooth 3
1. Apothecia very large, convoluted, up to 25 cm high ..... *proteana* var. *sparassioides*
Apothecia much smaller, always less than 8 cm diam. 2
2. Apothecia brown, grey below, ascospores 10–12 × 5–6 ..... *petersii*
Apothecia purple or purplish brown, ascospores 11–14 × 6–8 ..... *praetervisa*
Apothecia brown, pale below, ascospores 14–18 × 7–10 ..... *echinospora*
Apothecia white to pale pink or violet, ascospores 12–13 × 5–7 ..... *proteana*
3. Ascospores 13–15 × 7–9, paraphyses often curved at the tip ..... *violacea*
Ascospores 18–21 × 11–13, paraphyses straight ..... *sepiatra*

Peziza echinospora P. Karsten (Fig. 147)
Apothecia 2–8 cm diam., solitary or in small groups, cup-shaped, with an inrolled margin when young which becomes dentate, disc umber to dark brown, outer surface isabelline or whitish and scurfy. Paraphyses straight, slightly swollen at their tips. On burnt soil and charcoal, Apr.–Oct., common.

Peziza petersii Berk. & Curt. (Fig. 148)
Apothecia 2–5 cm diam., solitary or in groups, disc greyish brown to brown, outer surface grey and scurfy. Ascospores with 2 guttules. Paraphyses mostly curved, tips swollen to 5–7, containing brown matter. On burnt ground and charcoal, May–Oct., uncommon.

Peziza praetervisa Bres. (Fig. 149)
Apothecia 1–3 cm diam., solitary or in groups, disc purple or purplish brown, outer surface pale violet, scurfy. Ascospores with two guttules. Paraphyses generally slightly curved, with tips containing purple or brownish purple matter. On burnt ground and charcoal, May–Oct., fairly common.

Peziza proteana (Boud.) Seaver (Fig. 150)
Apothecia 1.5–6 cm diam., mostly solitary, at first cup-shaped, then expanded, white when young, becoming pale reddish or violet. Ascospores with two guttules. Paraphyses swollen to 7–8 at apex. On burnt ground and charcoal, Sept.–Nov.

Peziza proteana var. *sparassioides* (Boud.) Korf
Apothecia very large, much convoluted, white, pale reddish, lilac or ochraceous. Ascospores as in *P. proteana*. On burnt ground in woods, Sept.–Nov.

Peziza sepiatra Cooke (Fig. 151)
Apothecia 0.5–2 cm diam., saucer-shaped at first but soon flattened, greyish brown to blackish brown or almost black, scurfy on the outside. Paraphyses 5–8 thick at apex. On burnt ground and charcoal, July–Oct., uncommon.

Peziza violacea Pers. (Fig. 152)
Apothecia solitary or in small groups, 1–3 cm diam., at first cup-shaped, soon expanding and bending back, disc lilac to purple or purplish brown, outer surface pale grey or greyish violet. Tips of paraphyses often curved and with purplish brown contents. On burnt ground, Apr.–Oct., uncommon.

Plicaria
Apothecia flattened or cup-shaped, sessile, brown or blackish brown, up to 6 cm diam., often with yellow sap. Asci operculate, tips J+. Ascospores spherical, hyaline to pale brown, smooth, verruculose or echinulate.

KEY

Ascospores smooth-walled, 8–9 diam. ..... *leiocarpa*
Ascospores rough-walled, 11–16 diam. 1
1. Ascospores minutely verruculose ..... *trachycarpa*
Ascospores with long spines ..... *anthracina*

Plicaria anthracina (Cooke) Boud. (Fig. 153)
Apothecia 1–3 cm diam., solitary or clustered, at first cup-shaped but soon expanding and becoming flat, very dark sepia to almost black, outer surface only slightly paler, finely scurfy. Paraphyses swollen at apex. On burnt ground, June–Nov., not uncommon.

Plicaria leiocarpa (Currey) Boud. (Fig. 154)
Apothecia 3–10 mm diam., soon expanded, olivaceous brown to sooty brown, rather paler below, flesh exuding yellow juice when cut. Paraphyses slightly swollen at tip, with yellowish contents. On burnt ground, mainly on heaths and sandy soil in pine woods, Nov.–Apr.

Plicaria trachycarpa (Currey) Boud. (Fig. 155)
Apothecia 0.5–3 cm diam., cup-shaped then expanded, disc blackish brown, outer surface dark grey, scurfy or granular. Ascospores often pale brown. Tips of paraphyses up to 8 wide, with brown sap. On burnt ground, Nov.–May.

Pulvinula convexella (P. Karsten) Pfister (Fig. 156)
Apothecia solitary or gregarious, 3–12 mm diam., pulvinate, often somewhat wavy at margin, reddish orange, lower surface paler, pinkish. Asci operculate, walls J−. Ascospores spherical, hyaline, smooth, 13–15 diam., filled with small guttules. Paraphyses branched, slender, curved at tips, filled with reddish-orange granules. On burnt ground, often among moss, also sometimes on sandy soil.

Pyronema
Apothecia seated on a white subiculum, pulvinate, 0.5–2 mm diam., in large groups, often becoming confluent. Asci operculate, walls J−. Ascospores ellipsoid, hyaline, without guttules. Paraphyses filiform.

KEY

Apothecia colourless ..... *glaucum*
Apothecia pale orange to salmon pink 1
1. Ascospores 11–14 × 6–8 ..... *omphalodes*
Ascospores 15–18 × 9–12 ..... *domesticum*

Pyronema domesticum (Sacc.) Sacc. (Fig. 157)

Pyronema glaucum (Boud. ex Quélet) Sacc.

Pyronema omphalodes (Bull.) Fuckel (Fig. 158)
This is the species most frequently found on burnt soil.

Rhizina undulata Fr. (Fig. 159)
Apothecia flat or humped and undulating, up to 25 cm across, although usually smaller than this, reddish brown to black with pale yellow margin and white root-like attachments below. Ascospores hyaline, 25–35 × 9–10, with an appendage at each end which stains deeply in lactic cotton blue. On burnt wood and pine debris.

Sphaerosporella brunnea (Alb. & Schw.) Svrček & Kubička (Fig. 160)
Apothecia up to 5 mm diam., reddish brown, with non-rooting hairs. Hairs at margin subhyaline and tapered, those on the rest of the excipulum adpressed, dark brown, cylindrical and rounded at their tips. Ascospores spherical, hyaline, smooth, 13–15 diam. On burnt ground, often but not always among moss.

Tarzetta rosea (Rea) Dennis (Fig. 161)
Apothecia cup-shaped, split at the edge, up to 1.5 cm diam., sessile, pink, with downy excipulum. Asci operculate, walls J−. Ascospores ellipsoid, hyaline, with smooth walls which stain readily in lactic cotton blue, biguttulate, 17–20 × 10–11. On burnt ground, Sept.–Oct.

Trichaina
Apothecia saucer-shaped or hemispherical, sessile, up to 5 mm diam.; excipulum hairy, hairs tapered, brown, septate, smooth. Asci 8-spored, walls J−. Ascospores ellipsoid, hyaline, without guttules.

KEY

Disc yellowish orange to pale ochraceous, ascospores 14–19 × 9–10 ..... *gilva*
Disc greenish yellow, drying greyish brown, ascospores 12–16 × 8–10 ..... *praecox*

Trichaina gilva (Boud. ex Cooke) Eckblad (Fig. 162)
Apothecia 2–5 mm diam., solitary or in groups, basin-shaped, turning over at the edge to form a lip when mature, yellowish orange when young, soon becoming pale ochraceous. Hairs pale reddish brown, septate, up to 200 × 5–6, broadened to 10 at base. Paraphyses only slightly swollen at tip. On burnt ground overgrown by moss, Apr.–May.

Trichaina praecox (P. Karsten) Dennis (Fig. 163)
Apothecia solitary or in groups, 1–5 mm diam. Hairs brown, 50–200 × 5–8, septate, sometimes swollen towards the base to 10–11. On burnt, moss-covered ground.

Trichophaea
Apothecia hemispherical to lenticular, thick-fleshed, 0.5–15 mm diam., mostly with whitish, cream or pale grey disc, excipulum clothed with long, pointed, septate, brown hairs. Asci operculate, J−. Ascospores ellipsoid, hyaline, smooth, with one or more, commonly two, guttules.

KEY

Ascospores 20–24 × 13–16 ..... *woolhopeia*
Ascospores less than 20 × 10 1
1. Apothecia 0.5–1 mm diam., hairs less than 100 long ..... *leucothecioides*
Apothecia 1–2 mm diam., hairs up to 200 long ..... *abundans*
Apothecia 5–15 mm diam., hairs up to 450 long ..... *hemisphaerioides*

Trichophaea abundans (P. Karsten) Boud. (Fig. 164)
Hairs on margin 60–70 long, on rest of excipulum up to 200. Ascospores 11–15 × 6–8. Paraphyses 6–8 wide at apex. On burnt ground and charcoal, May–Oct.

Trichophaea hemisphaerioides (Mouton) Graddon (Fig. 165)
Ascospores 13–16 × 7–8. Paraphyses 5–6 wide at apex. On burnt ground, especially among *Funaria*.

Trichophaea leucothecioides (Rehm.) Boud.
Apothecia brown. Septate brown hairs 60–90 × 5–6. Ascospores with two small guttules, hyaline, mostly 12 × 9. Paraphyses 2.5 wide at apex. On charred wood.

Trichophaea woolhopeia (Cooke & Phill.) Boud. (Fig. 166)
Apothecia 3–5 mm diam. Brown excipular hairs often clustered and up to 250 long. Paraphyses 7–8 wide at the apex. Ascospores smooth, with one large guttule. On burnt ground, July–Oct.

OTHER ASCOMYCETES

It is very difficult to see these in the field, but when burnt soil surrounding the more obvious discomycetes, such as *Anthracobia* and *Peziza* species, is brought home and scanned under a dissecting microscope they can be found fairly easily.

KEY TO GENERA

Mature ascospores composed of a brown, ellipsoid upper cell and a long, cylindrical, hyaline pedicel ..... *Cercophora*
Mature ascospores ellipsoid or broadly fusiform, with a large brown cell and a small hyaline one 1
1. Brown cell unevenly pigmented ..... *Jugulospora*
Brown cell evenly pigmented ..... *Strattonia*

Cercophora arenicola R. Hilber (Fig. 167)
Perithecia superficial, in groups, 0.6 mm diam., at first warted, with scattered tufts of rigid, brown hairs up to 150 long, but later often becoming almost smooth. Brown cell of ascospore 17–22 × 8–12, sometimes septate, pedicel often guttulate, 25–50 × 5–6. On burnt soil.

Jugulospora rotula (Cooke) Lundq. (Fig. 168)
Perithecia flask-shaped or globose, with only the dark neck protruding above the burnt soil, covered with slender brown hairs. Asci with spores in one row, apical ring J−. Ascospores becoming 1-septate with very small hyaline basal cell cut off from the large brown upper one which is always at first irregularly pigmented but may finally become opaque, 17–19 × 12–14. Commonly found with *Anthracobia*.

Strattonia
Perithecia flask-shaped, brown, hairy, with only the very dark neck protruding above the surface. Asci with 8 spores in one row, apical ring J−. Ascospores broadly fusiform with large, evenly pigmented, brown apical cell and short, triangular, hyaline, basal cell.

KEY

Brown cell of ascospore 12–17 × 6–8 ..... *minor*
Brown cell of ascospore 18–23 × 8–11 ..... *carbonaria*

Strattonia carbonaria (Phill. & Plowr.) Lundq. (Fig. 169)
On bonfire sites, Aug.–Oct.

Strattonia minor Lundq. (Fig. 170)
On bonfire sites.

FUNGI ON SOIL

DISCOMYCETES

KEY TO GENERA

Asci inside veined, irregularly subglobose ascomata ..... *Choiromyces*
Asci covering outer surface of fertile heads or lining open cups 1
1. Ascomata (apothecia) cup-shaped, saucer-shaped, discoid or pulvinate 12
Ascomata not so 2
2. Ascomata sessile, almost spherical with asci covering outer surface of sphere ..... *Sphaerosoma*
Ascomata stalked, variously shaped 3
3. Fertile heads much convoluted or cerebriform 4
Fertile heads not so 5
4. Ascospores containing one or more large guttules ..... *Gyromitra*
Ascospores without guttules but with groups of small granules or droplets capping each end ..... *Morchella*
5. Fertile heads saddle-shaped ..... *Helvella*
Fertile heads hemispherical, smooth 6
Fertile heads conical or thimble-shaped 7
Fertile heads otherwise 8
6. Ascospores long, only 2 wide, budding in ascus ..... *Cudonia*
Ascospores 5–6 wide, not budding ..... *Leotia*
7. Stem with head surrounding upper part and attached only to its apex ..... *Verpa*
Conical head with lower half only free from stem ..... *Mitrophora*
8. Ascomata fan-shaped, yellow or ochraceous ..... *Spathularia*
Ascomata erect, more or less club-shaped 9
9. Ascomata yellowish orange or ochraceous ..... *Mitrula*
Ascomata green or smoky olive ..... *Microglossum*
Ascomata dark blue-green or blackish green ..... *Leotia*
Ascomata dark purplish brown or black 10
10. Ascospores colourless ..... *Thuemenidium*
Ascospores brown 11
11. With blackish-brown protuberant setae among asci and paraphyses ..... *Trichoglossum*
Without such setae ..... *Geoglossum*
12. Apothecial cups often split down one side almost to the base 13
Cups not so split 16

13. Ascospores spherical ..... *Caloscypha*
Ascospores ellipsoid 14
14. Ascospores mostly more than 20 long ..... *Pseudotis*
Ascospores all less than 20 long 15
15. Ectal excipulum 1-layered, composed of cells in rows at right-angles to surface ..... *Flavoscypha*
Ectal excipulum 2-layered ..... *Otidea*
16. Apothecia hairy on the outside 17
Apothecia smooth or minutely downy on the outside 27
17. Hairs stiff, setaceous, clearly visible under a low-power dissecting microscope or lens 18
Hairs inconspicuous, flexuous or adpressed 23
18. Apothecia and hairs white ..... *Leucoscypha*
Hairs and often apothecia also coloured 19
19. Apothecia with red or orange disc, hairs often rooting in flesh ..... *Scutellinia*
Apothecia with chestnut brown disc, hairs not rooting ... *Sphaerosporella*
Apothecia with whitish, greyish or cream disc 20
20. Setaceous hairs often with downwardly pointed prong at base ..... *Trichophaeopsis*
Setaceous hairs without such a prong 21
21. Ascospores smooth-walled, without guttules ..... *Tricharina*
Ascospores with one or two guttules, walls rough or smooth 22
22. Apothecia cup-shaped ..... *Humaria*
Apothecia flat or lenticular, thick ..... *Trichophaea*
23. Apothecia starting development in the soil, splitting open like earthstars as they emerge ..... *Geopora*
Apothecia not so 24
24. Apothecia black, ascospores spherical, smooth ..... *Pseudoplectania*
Apothecia dirty yellow, ascospores spherical, with reticulate-spiny walls ..... *Ramsbottomia*
Apothecia red, yellow or orange, ascospores ellipsoid 25
25. Apothecia arising from a thick, black pseudorhiza in the soil *Microstoma*
Apothecia not so 26
26. Ascospores with smooth walls and no guttules ..... *Cheilymenia*
Ascospores with reticulate or verrucose walls and guttules ..... *Melastiza*
27. Blackish purple tips of asci protruding above pale disc ..... *Ascobolus*
Not so 28
28. Asci operculate 29
Asci inoperculate 47
29. Ascus walls J+ 30
Ascus walls J− 32
30. Ascospores spherical with reticulate walls ..... *Boudiera*
Ascospores spherical, brown ..... *Plicaria*

Ascospores if spherical neither brown nor with reticulate walls 31
31. Apothecia minute (1.5 mm), pink ..... *Iodophanus*
Apothecia up to 20 cm diam., violet with margin cut into petal-like lobes ..... *Sarcosphaera*
Apothecia discoid, pulvinate or convex ..... *Pachyella*
Apothecia more or less cup-shaped or saucer-shaped ..... *Peziza*
32. Ascospores spherical 33
Ascospores ellipsoid, fusiform or oblong rounded at ends 36
33. Ascospore walls spiny ..... *Lamprospora*
Ascospore walls smooth or ornamented but not spiny 34
34. Apothecia pulvinate, ascospores containing numerous guttules ..... *Pulvinula*
Apothecia cup-shaped, not containing numerous guttules 35
35. Apothecia 1–4 cm diam., disc yellow bruising green, ascospore walls always smooth ..... *Caloscypha*
Apothecia 4–10 mm diam., disc not bruising green, ascospore walls often ornamented ..... *Marcelleina*
36. Apothecia small, not more than 3 mm diam. 37
Apothecia always more than 1 cm diam., some very large 39
37. Apothecia crowded on a white subiculum ..... *Byssonectria*
No white subiculum 38
38. Apothecia orange to red, ascospores with guttules ..... *Inermisia*
Apothecia yellow, ascospores with granular contents and no guttules ..... *Kotlabaea*
39. Apothecia sessile 40
Apothecia stalked 41
40. Apothecia yellow or orange ..... *Aleuria*
Apothecia purple or purplish ..... *Japhneadelphus*
41. Stalks long-rooting, densely covered with white hairs ..... *Sowerbyella*
Stalks not so 42
42. Disc plano-convex ..... *Svrcekomyces*
Disc cup-shaped or cyathiform 43
43. Apothecia cyathiform with crenulate margin ..... *Geopyxis*
Apothecia not so 44
44. Apothecia very large, up to 15–20 cm, reddish brown, discs veined or wrinkled 45
Apothecia not so 46
45. Ascospores with verrucose walls and a short appendage at each end ..... *Discina*
Ascospores smooth, without appendages ..... *Disciotis*
46. Stalks short and mostly embedded in soil, ascospore walls staining deeply with cotton blue ..... *Tarzetta*
Stalks much longer or ribbed, ascospore walls not staining deeply with cotton blue ..... *Helvella*

47. Apothecia with bright yellow disc and blackish-brown, toothed margin ..... *Podophacidium*
Apothecia pure white to pale cream, ascospores 25–35 long ..... *Phaeohelotium*
Apothecia and ascospores not so 48
48. Apothecia cup-shaped, *Peziza*-like ..... *Discinella*
Apothecia turbinate or obconical ..... *Ombrophila*

Aleuria

Apothecia 4 mm–10 cm diam., sessile, saucer-shaped or cup-shaped, rarely almost pulvinate, with rather thin and fragile flesh, disc yellow, ochraceous fawn or orange, outer surface sometimes downy. Asci operculate, 8-spored, walls J−. Ascospores ellipsoid, hyaline, with 2 guttules, walls warted or with a reticulum. Paraphyses usually enlarged slightly towards the apex, containing coloured sap which turns green with iodine.

KEY

Disc bright yellow, ascospore walls conspicuously warted ... *luteonitens*
Disc ochraceous fawn, ascospore walls minutely verruculose ... *palustris*
Disc orange, ascospore walls with reticulum 1
1. Ascospores 18–24 × 9–11 ..... *aurantia*
Ascospores 8–11 × 4–7 ..... *cestrica*

Aleuria aurantia (Pers.) Fuckel (Fig. 171)

The orange-peel fungus. Apothecia 5–10 cm diam., disc bright orange, under surface very pale and downy. Reticulum on walls of ascospores coarse, stains deeply with cotton blue in lactic acid, and has projections especially prominent at each end. Very common but more so in some years than others, on bare patches of soil and among grass, along paths, Oct.–May.

Aleuria cestrica (Ell. & Ev.) Seaver

Apothecia 0.5–1 cm diam., disc orange, excipulum yellowish orange. Reticulum on ascospore walls fine, with projections at each end. On bare, damp ground.

Aleuria luteonitens (Berk. & Br.) Gillet (Fig. 172)

Apothecia 1–2 cm diam. Disc bright golden yellow, excipulum pale, smooth. Ascospores with pointed warts on walls, 11–15 × 6–8. On bare ground in the wetter parts of woods, July–Jan.

Aleuria palustris (Boud.) Le Gal (Fig. 173)

Apothecia 4–5 mm diam., sometimes almost pulvinate, ochraceous fawn. Ascospores minutely verruculose, 17–19 × 8–9.5. On the ground in marshes, among rotting remains of *Carex*, *Iris*, etc.

Ascobolus
For generic description see under 'Fungi on Dung'.

KEY

Ascospores broadly fusiform, 25–35 long ..... *viridis*
Ascospores ellipsoid, less than 24 long 1
1. Ascospores mostly 8–9.5 wide ..... *denudatus*
Ascospores mostly 10–13 wide 2
2. Apothecia 2–6 mm diam., disc at first greenish yellow ..... *geophilus*
Apothecia up to 10 mm diam., disc at first olive or purplish *behnitziensis*

Ascobolus behnitziensis Kirscht. (Fig. 174)
Apothecia up to 10 mm diam. and 0.6 mm high. Disc olive or purplish, becoming dark. Outer surface furfuraceous. Ascospores dark purplish brown, 19–24 × 11–14, walls with a fine, pale reticulum. On wet sandy and loamy soil, Oct.–Nov.

Ascobolus denudatus Fr. (Fig. 175)
Apothecia 3–10 mm diam. and up to 1 mm high, some with a crenulate or dentate margin, greenish yellow to brown, often rusty pulverulent on the outside at first and later smooth. Ascus tips protruding above surface of disc, purplish brown. Ascospores narrowly ellipsoid, mostly 17–21 × 8–9.5, becoming purple to purplish brown, with pale, roughly parallel lines which anastomose here and there. On wet ground and debris, all the year round but recorded most frequently Oct.–Nov.

Ascobolus geophilus Seaver (Fig. 176)
Apothecia 2–6 mm diam., less than 1 mm high, greenish yellow, becoming brown or dark brown, minutely furfuraceous near base. Ascospores broadly ellipsoid, mostly 19–23 × 10–13, becoming dark purplish brown, walls with pale reticulum or verruculose. On wet soil, especially where covered with algae, Apr.–Aug.

Ascobolus viridis Currey (Fig. 177)
Apothecia 4–6 mm diam., 1–2 mm high, dirty yellowish green to olivaceous brown, furfuraceous on the outside, with blackish purple tips of asci protruding above surface of disc. Ascospores broadly fusiform, 25–35 × 13–15, violet, with parallel pigmented ridges broken up into various lengths. On wet, mostly clay soil in woods; we have found it several times growing under *Carpinus*, May–Oct.

Boudiera areolata Cooke & Phill. (Fig. 178)
Apothecia pulvinate, sessile, 2–3 mm diam., disc dark brown or purplish brown, excipulum whitish or pale, smooth. Asci protuberant, large, operculate, 8-spored, wall J+. Ascospores spherical, hyaline to yellowish or even golden brown when old, 30–38 diam., wall with reticulum 4–5 deep, so deeply areolate as to appear spiny. Paraphyses stout, somewhat clavate, brown. On damp soil in swampy places, May–June.

Byssonectria fusispora (Berk.) Rogerson & Korf (Fig. 179)
Apothecia densely crowded on a white subiculum, sessile, 1–3 mm diam., yellowish orange, with white anchoring hyphae. Ectal excipulum of subglobose or polygonal cells. Asci operculate, walls J−. Ascospores fusoid-ellipsoid, hyaline, smooth, 20–30 × 8–10, with two large guttules and a few smaller ones. Throughout the year on damp or burnt soil and rotting plant debris.

Caloscypha fulgens (Pers.) Boud. (Fig. 180)
Apothecia solitary or gregarious, 1–4 cm diam., cup-shaped, sometimes split and *Otidea*-like, disc deep yellow, bruising green and drying rather orange, excipulum olivaceous, pruinose. Asci operculate, 8-spored, walls J−. Ascospores spherical, smooth-walled, hyaline, 5–8 diam. Paraphyses forked, septate. On soil and debris in conifer woods, commonly seems to be associated with *Abies*, Mar.–May.

Cheilymenia
Apothecia not more than 2 cm diam., yellow, orange or light red, excipular hairs often inconspicuous, hyaline, yellow or golden brown, simple or sometimes forked at the base or stellate. Asci operculate, walls J−. Ascospores ellipsoid, hyaline, without guttules.

KEY

Disc light red, up to 5 mm diam. ..... *rubra*
Disc bright orange or scarlet, 6–20 mm diam. 1
Disc yellow 3
1. Ascospores distinctly verruculose ..... *cornubiensis*
Ascospores smooth or occasionally minutely verruculose 2
2. Hairs simple ..... *fibrillosa*
Hairs often forked at base or stellate ..... *crucipila*
3. Hairs up to 1000 × 40, lobed at base ..... *vitellina*
Hairs not more than 250 × 20 ..... *theleboloides*

Cheilymenia cornubiensis (Berk. & Br.) Le Gal
Apothecia 1–2 cm diam., attached to soil by rooting hyphae, disc orange, excipular hairs delicate, rounded at ends, septate. Ascospores oblong-ellipsoid, verruculose, 18–22 × 11–13. Paraphyses slender, not swollen at tip. On richly manured ground.

Cheilymenia crucipila (Cooke & Phill.) Le Gal (Fig. 181)
Apothecia 2–8 mm diam., disc bright yellowish orange to reddish orange or scarlet, excipular hairs sometimes simple, more commonly forked or stellate, golden brown, thick-walled, septate, the branches tapered and often

pointed at their tips. Ascospores ellipsoid, walls smooth or finely verruculose, 15-20 × 9-12. Paraphyses swollen at apex to 6-8. On damp, bare ground, among mosses or grass, often in ruts and on the edges of paths in woods, May-Sept.

Cheilymenia fibrillosa (Currey) Le Gal (Fig. 182)
Apothecia 1-2 cm diam., cup-shaped, disc bright orange or yellowish orange, excipulum very pale, with hairs of two sorts: (a) brown, septate, 100-150 × 10-20, (b) adpressed, much more slender and hyaline. Ascospores ellipsoid, smooth, 15-17 × 8-9. Paraphyses narrow, abruptly swollen at tip to 6-8. On ground, usually in woods.

Cheilymenia rubra (Phill.) Boud.
Apothecia about 5 mm diam., disc light red, excipular hairs brown, septate, up to 200 × 40. Ascospores ellipsoid, smooth, 18-20 × 10. Paraphyses somewhat clavate. On ground fertilised with spent hops.

Cheilymenia theleboloides (Alb. & Schw.) Boud. (Fig. 183)
Apothecia 5-10 mm diam., disc yellow, excipular hairs hyaline to golden brown, tapered to a point, septate, up to 200 × 20. Ascospores ellipsoid, smooth, 14-20 × 7-10. Paraphyses swollen to 3-4 at apex, filled with yellow granules. On soil, rotting leaf mould, spent hops, etc., May-Nov.

Cheilymenia vitellina (Pers.) Dennis (Fig. 184)
Apothecia 5-12 mm diam., disc and excipulum yellow, hairs yellowish, septate. Ascospores ellipsoid, 14-17 × 7-9. Paraphyses slightly enlarged to 4-6 at tip. On soil, common in nettle beds and wet places, July-Nov.

Choiromyces meandriformis Vitt. (Fig. 185)
Ascocarps irregularly subglobose, 5-12 cm diam., smooth, yellowish brown; flesh white or yellowish, marbled with pale ochraceous veins, aromatic. Asci formed inside the ascocarp, clavate, 160-180 × 50-70, 8-spored. Ascospores spherical, yellowish, 17-22 diam., covered with blunt, sometimes curved spines up to 4 long. On the ground in deciduous and mixed woods.

Cudonia
Ascocarps gregarious, caespitose or growing in rings, each consisting of a hemispherical or lobed, non-gelatinous, thin, fleshy, convex head and a long, thick, downy stalk. Asci clavate, inoperculate, pore J−. Ascospores long and slender, parallel, hyaline multiseptate, budding inside ascus.

KEY

Head pale cream to ochraceous, sometimes with flesh tints, stalk dark greyish brown ..... *circinans*
Head and stipe the same colour, rather pale ochraceous cinnamon ..... *confusa*

Cudonia circinans (Pers.) Fr. (Fig. 186)
Ascocarps up to 4 cm tall, flesh hollow and violaceous in stalk. Ascospores 30-50 × 2. Paraphyses narrow, strongly curved round at the tip. On the ground in conifer woods, Aug.-Sept.

Cudonia confusa Bres.
Ascocarps 2-3 cm tall, head 7-11 mm diam., stem 1-2 mm thick. Ascospores 35-45 × 2. In conifer woods, Aug.-Sept.

Discina ancilis (Pers.) Sacc. (Fig. 187)
Apothecia solitary or gregarious, 3-10 (15) cm diam., at first cup-shaped but soon becoming flat with an upturned edge, disc reddish brown, irregularly veined or wrinkled, underside pale ochre or flesh-coloured, stalk stout, 1-3 cm long. Asci cylindrical, operculate, walls J−. Ascospores ellipsoid, 25-33 × 12-14, with a pointed appendage 3-5 long at each end, hyaline, walls minutely verruculose, containing 1 to 3 guttules. Paraphyses 7-9 wide at apex, with brown granules. On the ground in conifer woods, Mar.-May; found occasionally on charcoal.

Discinella
Apothecia often clustered, sessile or with a short stalk, cup-shaped, *Peziza*-like but with inoperculate, 8-spored asci, soft-fleshed. Ascospores hyaline, ellipsoid or cylindric-ellipsoid, smooth.

KEY

Apothecia purplish bay to brown ..... *boudieri*
Apothecia white or cream ..... *margarita*
Apothecia pale pink ..... *menziesii*:
Apothecia purple 1
1. Ascospores about 17 × 10 ..... *exidiiformis*
Ascospores 20-22 × 7-8 ..... *purpurascens*

Discinella boudieri (Quélet) Boud. (Fig. 188)
Apothecia often in clusters, at first cup-shaped, then expanded, smooth or slightly scurfy, with very short stalks; soft flesh composed of interwoven hyphae. Ascospores 10-15 × 4-5. Paraphyses slightly swollen to 3 at tip. On sandy soil, Sept.-Oct.

Discinella exidiiformis (Berk. & Br.) Boud.
Apothecia gregarious, 4 mm or more diam., orbiscular, *Exidia*-like lurid purple, margin raised, incurved, short stem thickened upwards. Asci cylindrical. Ascospores broadly ellipsoid, with two guttules, about 17 × 10. On sandy soil and charcoal. In *The British Ascomycotina* as *Discinella* but according to Nannfeldt it has operculate asci. We have seen no fresh collection of this species.

Discinella margarita Buckley (Fig. 189)
Apothecia sessile, 1–4 mm diam., fringed at the margin when fresh with short teeth composed of septate hyphae. Ascospores cylindric-ellipsoid, 9–14 × 3–5. On soil in conifer woods, May–Sept.

Discinella menziesii (Boud.) Boud.
Apothecia up to 1 cm diam. Ascospores 15–17 × 4–5.

Discinella purpurascens (Pers.) Boud.
Apothecia sessile, 1–2 cm diam., deep cup-shaped then expanded, tapered towards the base, livid purple, smooth. Ascospores ellipsoid or broadly fusiform, 20–22 × 7–8. Paraphyses slender, swollen at tip. On the ground, Sept–Oct.

Disciotis venosa (Pers.) Boud. (Fig. 190)
Apothecia 5–20 cm diam., short-stalked, shallow cup-shaped then expanded or reflexed, disc reddish brown, strongly radially wrinkled, excipulum whitish, velvety. Asci operculate, 8-spored, walls J−. Ascospores broadly ellipsoid, 20–26 × 12–17, hyaline, without guttules but with small groups of granules or droplets capping each end. Paraphyses clavate, sometimes forked near base, up to 12 wide at apex, with brown sap. On moist, shady banks, on lawns and on ground in woods, Mar.–May.

Flavoscypha
Apothecia split down one side as in *Otidea*, cup-shaped or ear-shaped, one side sometimes higher than the other; flesh of ectal excipulum made up of rows of cells at right-angles to the surface. Asci cylindrical, operculate, walls J−. Ascospores hyaline, with two guttules.

KEY

Apothecia cup-shaped, 1–3.5 cm diam. ..... *phlebophora*
Apothecia ear-shaped, up to 5 cm high ..... *cantharella*

Flavoscypha cantharella (Fr.) Harmaja (Fig. 191)
Apothecia yellow with whitish base, split down one side. Ascospores 10–12 × 5–6. Paraphyses 3–4 thick. On the ground in woods, Aug.–Sept.

Flavoscypha phlebophora (Berk. & Br.) Harmaja (Fig. 192)
Apothecia sometimes higher on one side and split down the other, disc ochraceous buff or brownish, excipulum lemon yellow and veined, base whitish. Ascospores 10–13 × 5–6. Paraphyses branched towards the tip where they are 4–6 wide. On soil in woods and on clayey banks, Sept.–Oct.

Geoglossum
Ascomata erect, black or almost black, clavate, stalked. Asci inoperculate. Ascospores brown when ripe, often somewhat clavate and curved, with several to many transverse septa. No dark brown setae in the hymenium, which covers the surface of the club.

KEY

Ascospores with up to 15 septa ..... *peckianum*
Ascospores mostly 7-septate, never more than 12 septate 1
1. Paraphyses narrow, curved or flexuous but not swollen towards the apex 2
Paraphyses always swollen towards the apex 3
2. Ascospores up to 110 long ..... *difforme*
Ascospores 60–80 long ..... *starbaeckii*
3. Paraphyses terminating in a row of globose or barrel-shaped brown cells ..... *cookeianum*
Paraphyses not so 4
4. Paraphyses hyaline or extremely pale 5
Paraphyses brown, at least towards the apex 6
5. Paraphyses not or rarely septate, irregularly swollen at apex .. *elongatum*
Paraphyses septate, with more or less pyriform swelling at apex, glued together by brown matrix ..... *fallax*
6. Paraphyses with a simple regular swelling at the apex 7
Paraphyses contorted and irregularly swollen at apex 8
7. Swellings at tips of paraphyses abruptly spherical ..... *viscosum*
Swellings at tips of paraphyses pyriform ..... *glutinosum*
8. Ascospores 85–95 × 7–8 ..... *barlae*
Ascospores 70–80 × 5–6 ..... *nigritum*

Geoglossum barlae Boud. (Fig. 193)
Ascomata 3–5 cm high, with a compressed, olivaceous black, tongue-like, fertile head 1–2 cm wide and a short, dark sooty grey stalk furfuraceous at the top. Asci clavate-fusiform, about 300 × 20. Ascospores smoky or olivaceous brown, 7-septate, 85–95 × 7–8. Paraphyses septate, greyish brown, twisted or spirally contorted and swollen to 6–10 towards the apex. On clay soil; has been recorded in Britain under *Taxus*.

Geoglossum cookeianum Nannf. (Fig. 194)
Ascomata up to 7 cm high, 0.5–1 cm broad, with a slightly compressed, dry, black, often fusiform, fertile head and a rather narrow, slightly scurfy, cylindrical stalk. Asci up to about 200 × 20. Ascospores cylindric-clavate, brown, 7-septate, 50–90 × 6–7. Paraphyses slender, ending in a row of globose or barrel-shaped brown cells 6–8 wide. In grass, often on sandy soil and near the sea, Sept.–Nov.

Geoglossum difforme Fr.
Ascomata caespitose, 2.5–10 cm high, with a somewhat compressed, irregular, black, slightly viscid, fertile head clearly distinct from the narrow cylindrical stalk. Ascospores brown, 7-septate, up to 110 × 7. Paraphyses

filiform, pale and not swollen at the apex. On the ground in grassy places.

Geoglossum elongatum Starb. (Fig. 195)
Ascomata up to 5 cm high, slender, blackish brown, stalk narrow, acutely warted. Asci clavate, up to 150 × 18. Ascospores cylindric-clavate, 0- to 7-septate, 40–60 × 5–7, long remaining hyaline but eventually pale brown. Paraphyses straight or curved, hyaline, irregularly thickened towards the apex or somewhat pyriform. Apices stuck together forming a brown epithecium. On the ground.

Geoglossum fallax Durand (Fig. 196)
Ascomata black, dry. Ascospores with up to 12 septa, 80–100 long, remaining hyaline for a long time but eventually becoming pale brown. Paraphyses with a more or less pyriform swelling at the apex 6–10 wide, hyaline but glued together by a brown matrix. On the ground among grass.

Geoglossum glutinosum Pers.
Ascomata 2.5–5 cm high, black or blackish brown, glutinous, fertile part somewhat compressed, stalk slender, cylindrical. Ascospores brown with 3–7 septa, 60–110 long. Paraphyses with septa and with brown pyriform swelling at the apex. On the ground among grass.

Geoglossum nigritum Cooke
Ascomata 2–6 cm high, 4–8 mm broad, black or blackish brown, dry, slightly furfuraceous, fertile part tongue-shaped, somewhat compressed. Ascospores mostly 7-septate, soon brown, 70–80 × 5–6. Paraphyses septate, brown, curved and irregularly swollen towards the apex. On ground among grass.

Geoglossum peckianum Cooke (Fig. 197)
Ascomata gregarious, 4–8 cm high, 5–10 mm thick, black or blackish brown, glutinous when wet, fertile part clavate. Ascospores cylindric-clavate, brown, when mature mostly 15-septate, 100–125 × 5–7. Ends of paraphyses twisted slightly, swollen, brown. On swampy ground and wet meadows.

Geoglossum starbaeckii Nannf.
This species has paraphyses curved but not thickened at the apex. Ascospores 60–80 long. On acid soil.

Geoglossum viscosum Pers.
Ascomata 5–7 cm high, glutinous, black, fertile head broadly fusiform, stalk slender. Ascospores often 3-septate, brown, about 80 long. Paraphyses with globose swelling at apex. On the ground especially in mountain pastures.

Geopora (including *Sepultaria*)
Apothecia develop in soil and push to the surface where they split open like little earthstars; excipulum often clothed with flexuous, septate, brown hairs. Asci operulate, walls J−. Ascospores broadly ellipsoid or ellipsoid-fusiform, smooth, with usually one or two large guttules.

KEY

	Ascospores more than 30 long	*sumneriana*
	Ascospores less than 30 long	1
1.	Apothecia small, not more than 1–1.5 cm diam.	2
	Apothecia 2–5 cm diam.	4
2.	On sandy soil, especially dunes and dune slacks	*arenosa*
	Not in sand or on dunes	3
3.	Disc bright yellow to pale ochre	*Sepultaria semi-immersa*
	Disc light grey	*tenuis*
	Disc brownish	*Sepultaria geaster*
4.	In sandy soil	*arenicola*
	Under cedars, disc brownish	*sepulta*
	On heavy soil in woods, disc pale	*foliacea*

Geopora arenicola (Lév.) Kers (Fig. 198)
Apothecia gregarious, 2–4 cm diam., sometimes appearing as a hole in the ground, at others coming just above the surface, waxy, margin incurved, often splitting irregularly into lobes, disc at first very pale, becoming yellowish or brownish, excipular hairs flexuous, brown, minutely rough, up to 10–15 thick, septate, binding sand grains together so that the whole surface appears encrusted. Ascospores ellipsoid, narrowed towards each end, 24–28 × 12–16, with one large guttule or rarely 2 guttules. On sandy soil.

Geopora arenosa (Fuckel) Ahmad (Fig. 199)
Apothecia up to 1 cm diam., the margin splitting into lobes the tips of which protrude above the surface, disc cream to ochraceous, excipular hairs flexuous, matted, subhyaline to reddish brown, smooth, 5–6 thick. Ascospores ellipsoid, 22–25 × 11–15, with one or two large guttules. On coastal dune slacks and occasionally on sandy areas inland, June-Oct.

Geopora foliacea (Schaeffer) Ahmad
Rather like *G. sumneriana* according to R.W.G. Dennis but slightly smaller with pale disc and broadly ellipsoid ascospores 25–28 × 15–18, with one or two large guttules. On heavy soil in woods.

Sepultaria geaster (Berk. & Br.) Boud.
Apothecia 1–1.5 cm diam., margin cut into a few lobes, disc brownish, excipulum brown, hairy. Ascospores ellipsoid 18–23 × 10–11, with one large guttule. Paraphyses clavate. On the ground.

Sepultaria semi-immersa (P. Karsten) Massee (Fig. 200)
Apothecia up to 1 cm diam., gregarious, at first subglobose, opening to become cup-shaped, crenulate at margin, bright yellow to pale ochre,

excipulum pale yellow, tomentose. Ascospores ellipsoid with one or two guttules, 17–23 × 9–11. Paraphyses slender, often curved towards the apex. On bare ground.

Geopora sepulta (Fr.) Korf & Burdsall
Apothecia 2.5–5 cm diam., at first globose, then opening and splitting at the margin into a number of lobes, disc brownish, excipulum covered with branched, septate, brown hairs. Ascospores ellipsoid, with one, two or more guttules, 22–24 × 12. Paraphyses rather thick and clavate. On ground under cedars.

Geopora sumneriana (Cooke) de la Torre (Fig. 201)
Apothecia gregarious, 2–7 cm diam., immersed then pushing through to the surface where they open, the margin splitting into a number of lobes which tend to fold back; disc pale cream, excipulum brown, covered with long, branched, septate, brown, encrusted hairs 10–15 thick. Ascospores ellipsoid, 30–36 × 14–16, with two large guttules. Under cedar and yew trees, Mar.–May.

Geopora tenuis (Fuckel) T. Schumacher (Fig. 202)
Apothecia 1–1.5 cm diam., at first cup-shaped then becoming convex, margin split into lobes, disc pale grey, excipulum pale brown, covered with flexuous, smooth, thick-walled, brown hairs, 7–8 wide. Ascospores ellipsoid, with two large and often several small guttules, 20–24 × 11–13. On heavy soil in woods.

Geopyxis
Apothecia cyathiform, short-stalked, excipulum smooth. Asci operculate, walls J−. Ascospores ellipsoid, hyaline, smooth, without guttules.

KEY

Apothecia flesh-coloured ..... *carnea*
Apothecia orange ..... *majalis*

Geopyxis carnea (Cooke & Phill.) Sacc.
Apothecia 1–2 cm diam., thin, firm, flesh-coloured, margin crenulate, excipulum smooth, wrinkled towards base, stalk 6–12 × 2 mm. Ascospores about 13 × 6. Paraphyses filiform, curved towards the apex. On the ground.

Geopyxis majalis (Fr.) Sacc. (Fig. 203)
Apothecia 0.5–2 cm diam., disc orange, margin distinctly crenulate, prominent, pale, excipulum smooth and paler than disc, stalk short, whitish. Ascospores 14–18 × 6–9. Paraphyses straight, swollen to 4 at apex. On ground in pine woods and cleared spruce woods, Apr.–May.

Gyromitra
Ascomata stalked, fertile heads cerebriform, mostly golden or reddish brown, stalk short, thick, ridged or furrowed, often hollow, paler in colour than head. Asci operculate, walls J−. Ascospores ellipsoid to broadly fusiform, hyaline, smooth or minutely verruculose, with guttules. Paraphyses sometimes forked and mostly swollen at the tip.

KEY

Ascospores 7–8 wide ..... *infula*
Ascospores 12–14 wide, appendaged ..... *gigas*
Ascospores 8–12 wide, not appendaged 1
1. Ascospores 18–22 long ..... *esculenta*
Ascospores 22–35 long ..... *ambigua*

Gyromitra ambigua (P. Karsten) Harmaja
Ascomata similar to those of *G. infula* but rather a purplish brown, and ascospores smooth, 22–35 × 8–12. On the ground in conifer woods.

Gyromitra esculenta (Pers.) Fr. (Fig. 204)
Ascomata 5–12 cm high, fertile head 5–20 cm diam., subglobose, irregularly lobed and deeply convoluted, reddish brown or blackish brown, stalk 2–4 cm thick, whitish or pale flesh-coloured, furrowed, furfuraceous. Ascospores ellipsoid, smooth, with two or more yellowish guttules, 18–22 × 9–12. In pine woods on sandy soil, Mar.–May.

Gyromitra gigas (Krombholz) Cooke
Ascomata up to 20 cm high, fertile head hemispherical, 7–30 cm diam., ochraceous to chestnut brown, convoluted, stalk white or creamy. Ascospores appendaged at each end, minutely verruculose, 30–35 × 12–14 including the appendages. In conifer woods, Mar.–May.

Gyromitra infula (Schaeffer) Quélet (Fig. 205)
Ascomata up to 10 cm high, fertile head somewhat saddle-shaped, up to 8 cm diam., dark chestnut brown, not as convoluted as in other species, stalk pale greyish buff. Ascospores narrowly ellipsoid or broadly fusiform, with two guttules, 18–24 × 7–8. In conifer woods, sometimes on sawdust around saw-mill sites, Oct.–Nov.

Helvella
Ascomata stalked, fertile head in most species saddle-shaped or cupulate, not cerebriform or markedly convoluted. In *H. silvicola* only *Otidea*-like. Asci operculate, walls J−. Ascospores with large guttules, hyaline, in 15 species ellipsoid to oblong-ellipsoid, in one broadly fusiform clearly narrowed towards each end and in one spherical to subspherical. Paraphyses straight, often swollen at apex, sometimes brown.

KEY

Ascospores spherical or subspherical ..... *fusca*
Ascospores broadly fusiform ..... *macropus*

Ascospores ellipsoid to oblong-ellipsoid 1
1. Fertile head ear-shaped, *Otidea*-like ..... *silvicola*
Fertile head always cyathiform or cup-shaped 2
Fertile head becoming saddle-shaped or with depressed lobes even if initially cup-shaped 8
2. Outer surface of cup with prominent branched ribs or veins 3
Outer surface without prominent branched ribs or veins 4
3. Main veins connected by numerous anastomosing folds ..... *costifera*
Main veins not so connected ..... *acetabulum*
4. Disc and stalk black ..... *corium*
Not so 5
5. Disc ochraceous brown ..... *cupuliformis*
Disc darker, often greyish or blackish brown 6
6. Disc not compressed laterally, stalk short and stout ..... *leucomelaena*
Disc often compressed laterally, stalk slender 7
7. Stalk often swollen at base, hollow or lacunose ..... *queletii*
Stalk cylindrical, solid ..... *villosa*
8. Ascomata large, 6–10 (15) cm high 9
Ascomata small, 2–5 cm high 11
9. Disc or fertile surface whitish or pale ochraceous, stalk thick, with deep furrows, lacunose ..... *crispa*
Disc or fertile surface ochraceous or greyish brown, stalk slender (0.5–1 cm), smooth ..... *elastica*
Disc or fertile surface black, dark grey or blackish brown 10
10. Stalk slender, cylindrical, solid ..... *atra*
Stalk thick, deeply furrowed longitudinally, hollow or lacunose ..... *lacunosa*
11. Disc or fertile surface black or blackish brown ..... *pezizoides*
Disc pale 12
12. Disc pale greyish brown, stalk pale greyish brown, ascospores 19–21 × 11–12 ..... *ephippium*
Disc pale ochraceous, stalk whitish, ascospores 18–19 × 12–13 . *stevensii*

Helvella acetabulum (L.) Quélet (Fig. 206)
Ascomata 2–10 cm high, solitary or gregarious, fertile head distinctly and usually deeply cup-shaped, up to 6 cm diam., disc brown or greyish brown, outer surface same colour as disc or paler, minutely furfuraceous, with prominent, whitish, branched ribs or veins running up from the short, pale, hollow stalk. Ascospores broadly ellipsoid, with one large guttule, 18–21 × 12–14. Paraphyses swollen to 6–7 at apex. On heathy banks, in open mixed woods, by sides of paths, etc., Apr.–July.

Helvella atra Oeder (Fig. 207)
Ascomata up to 8 cm high, gregarious, fertile head irregularly saddle-shaped or lobed, 2–3 cm across, sometimes with margin deflexed or attached to stalk, upper surface blackish brown or black, lower surface greyish, smooth or slightly downy, stalk up to 1 cm thick, almost cylindrical, greyish, minutely downy, sometimes grooved, solid, flesh white. Hairs of excipulum short, clavate, swollen to 20. Ascospores ellipsoid, with one guttule, 16–19 × 10–12, smooth when mature, minutely verrucose with widely spaced warts when young. Paraphyses 6–8 wide at tip. In woods, sometimes along paths on sandy soil, June–Oct.

Helvella corium (Weberb.) Massee (Fig. 208)
Ascomata 3–5 cm high, fertile head cup-shaped, waxy, with wavy margin, 2–3 (4) cm diam., 1–2 cm deep, disc black, outer surface blackish with brownish down, stalk 2–3 cm long and 1 cm thick at base, tapering upwards to 3–4 mm, black, rugose, downy, hairs septate. Ascospores ellipsoid, with one large guttule, 18–22 × 11–14. Paraphyses clavate, 7–8 wide and brown at tip. On sandy soil including that of dunes, Apr.–Oct.

Helvella costifera Nannf. (Fig. 209)
Resembles *H. acetabulum* but the broad ribs on the outer side of the cup and stalk are connected by numerous anastomosing folds. Ascomata gregarious, 2–6 cm high, fertile head 2–7 cm diam., often somewhat irregularly conical cup-shaped, sometimes split at edge, grey or greyish ochre, paler and downy on outside. Ascospores ellipsoid with one guttule, 17–20 × 11–13. In deciduous and coniferous woods on calcareous soil, June–Oct.

Helvella crispa (Scop.) Fr. (Fig. 210)
Ascomata up to 15 cm high, fertile head more or less saddle-shaped, up to 6 cm across, with two or three lobes, somewhat twisted and wavy at the margin which is free, whitish to pale ochraceous, outer surface downy, stalk thick, white or whitish, with deep furrows, lacunose. Ascospores ellipsoid with large guttule, 17–20 × 10–13. On ground in mixed and deciduous woods, mostly Aug.–Nov., occasionally at other times of the year.

Helvella cupuliformis Dissing & Nannf. (Fig. 211)
Ascomata solitary or gregarious, fertile head 1.5–3 cm diam., shallowly cyathiform or cup-shaped, opening out to become almost flat, ochraceous brown, outer surface furfuraceous, stalk white or creamy, more or less cylindrical, mostly smooth, rarely furrowed, solid, 1.5–2.5 cm long, 4–8 mm thick. Ascospores ellipsoid with large guttule, 18–21 × 12–13. In woods, preferring sandy loam, June–Oct.

Helvella elastica Bull. (Fig. 212)
Ascomata gregarious, up to 10 cm high, fertile head up to 4 cm diam., saddle-shaped when young, becoming more irregular with two or three lobes, disc ochraceous or greyish brown, outer surface paler, smooth, stalk 0.5–1 cm thick, whitish, smooth, hollow. Ascospores ellipsoid, 17–21 × 11–13, with widely spaced warts when young but smooth-walled when

mature. Paraphyses swollen at tip to 8. In woods, July–Oct.

Helvella ephippium Lév. (Fig. 213)
Ascomata 2–5 cm high, fertile head irregularly saddle-shaped or with two or three lobes, disc pale greyish brown, outer surface paler and furfuraceous, stalk cylindrical or flattened, pale greyish brown or slightly yellowish, hairy or velvety. Ascospores ellipsoid, 19–21 × 11–12. On ground in deciduous woods, July–Oct.

Helvella fusca Gillet
Ascomata 4–5 cm high, fertile head roughly saddle-shaped with two or three reflexed lobes, crisped at the margin, about 3 cm diam., disc dark smoky, outer surface dirty white, covered with prominent diverging and anastomosing veins, stipe almost cylindrical, slightly swollen towards the base, deeply sulcate and lacunose, dirty whitish. Ascospores spherical or subspherical. Among grass.

Helvella lacunosa Afz. (Fig. 214)
Ascomata solitary or gregarious, 8–10 cm high, fertile head irregularly saddle-shaped, lobed and convoluted, 5–6 cm diam., disc dark grey to black, outer surface pale grey, stalk deeply furrowed longitudinally, pale grey, hollow or lacunose. Ascospores ellipsoid, 16–20 × 10–12, with one large guttule. Paraphyses hyaline or pale brown, thickened at tip to 8. On ground in woods, sometimes on burnt ground, Sept.–Oct.

Helvella leucomelaena (Pers.) Nannf. (Fig. 215)
Ascomata 1–4 cm high, fertile head 1–3 cm diam., cup-shaped, sometimes split at margin or crenulate, disc rather dark greyish brown, outer surface paler, tomentose, occasionally with traces of veins at the base but often without any, stalk short and stout (0.5–2 cm), embedded in soil, whitish, hollow, longitudinally ribbed or deeply furrowed. Ascospores ellipsoid, with one large guttule and sometimes smaller ones at each end, 18–23 × 10–14. On the ground or among grass in *Larix* and sometimes other conifer woods, Dec.–May.

Helvella macropus (Pers.) P. Karsten (Fig. 216)
Ascomata solitary or gregarious, up to 6 cm high, fertile head usually rather shallow cup-shaped, 2–4 cm diam., disc grey or greyish brown, outer surface paler or same colour, covered with tufts of septate, grey hairs. Ascospores broadly fusiform, mostly with large central guttule and a smaller one at each end, 21–31 × 10–12. On rather bare ground in woods, moss sometimes present, July–Oct.

Helvella pezizoides Afz. (Fig. 217)
Ascomata 3–5 cm high, fertile head cup-shaped to saddle-shaped, disc black or blackish brown, outer surface reddish brown, velvety, stalk 2–4 mm thick, black, solid, covered with hairs. Ascospores ellipsoid, 16–20 × 10–12.

Paraphyses with dark contents. In woods, especially those of pine, Aug.–Oct.

Helvella queletii Bres. (Fig. 218)
Ascomata 2–6 cm high, fertile head irregularly and rather shallowly cup-shaped, often compressed laterally and sometimes split at the margin which is inrolled, disc mid- to dark brown or greyish brown, outer surface downy, off-white or greyish. Stalk slender, up to about 1 cm thick but often swollen at the base, off-white or greyish, closely ribbed, hollow or lacunose. Ascospores broadly ellipsoid, with large guttule, 17–20 × 11–13. In woods or shrubberies on chalky soil, June–Aug.

Helvella silvicola (Beck ex Sacc.) Harmaja
Ascomata oblong, ear-shaped, *Otidea*-like, up to 10 cm high, substipitate, disc blackish brown or blackish purple, outer surface chestnut, paling towards the base to almost white. Ascospores oblong-ellipsoid, smooth, guttulate, 24–26 × 14–17. Paraphyses straight, slightly swollen at apex, pale brown. On ground under *Abies*.

Helvella stevensii Peck (Fig. 219)
Ascomata up to 5 cm high, fertile head at first cup-shaped, then bending downwards or becoming saddle-shaped, disc pale, often ochraceous, outer surface whitish, tomentose, stalk cylindrical, whitish, hairy. Ascospores ellipsoid, 18–19 × 12–13. On ground in deciduous woods, June–Oct.

Helvella villosa (Hedw.) Dissing & Nannf. (Fig. 220)
Ascomata up to 5 cm high, fertile head cup-shaped often becoming somewhat compressed from side to side, 2–3 cm diam., margin often wavy or split, disc dark grey or greyish brown, outer surface slightly paler, furfuraceous, stalk cylindrical, whitish or creamy, solid, downy. Ascospores ellipsoid, 17–20 × 10–12. On ground in woods, May–Oct.

Humaria hemisphaerica (Wigg.) Fuckel (Fig. 221)
Apothecia solitary or gregarious, cup-shaped, 1–3 cm diam., disc greyish white, outer surface rather pale brown, covered with stiff, tapered, thick-walled, septate, dark brown hairs 200–500 long, 15–20 thick near base. Asci operculate, walls J−. Ascospores ellipsoid, hyaline, verrucose, with two guttules, 20–26 × 10–14. Paraphyses hyaline, swollen at apex to 7–8. On bare, damp soil, mostly in woods, July–Oct.

Inermisia pilifera (Cooke) Dennis & Itzerott
Apothecia 1–1.5 mm diam., sessile, hemispherical becoming flattened, orange-red, at first covered with cobwebby hyphae which soon disappear, margin pale, fimbriate. Ectal excipulum made up of globose or polygonal, thin-walled cells. Asci operculate, walls J−. Ascospores ellipsoid, hyaline, smooth, guttulate, 15–16 × 9. On the ground.

Iodophanus carneus, described under 'Fungi on Dung', is found occasionally on soil.

Japhneadelphus amethystinus (Phill.) v. Brummelen (Fig. 222)
Apothecia 1–2 cm diam., sessile, at first cup-shaped then flattening out, purple or purplish, soft-fleshed, smooth. Asci operculate, walls J−. Ascospores ellipsoid, 19–24 × 10–12, coarsely verrucose, with large warts at each end; when young with two large vacuoles. Paraphyses swollen to 5 at tip and embedded in violet-pigmented jelly. Purple pigment sometimes stains ascospores, and the species was described first as an *Ascobolus*. On sandy soil near rivers, Sept.–Oct.

Kotlabaea deformis (P. Karsten) Svrček (Fig. 223)
Apothecia gregarious, sessile, 1–2 mm diam., yellow, disc flat, margin slightly raised and rounded, outer surface smooth. Asci operculate, walls J−. Ascospores ellipsoid, smooth-walled, with granular contents but without guttules, 13–17 × 7–10. Paraphyses with tips swollen to 6–8 and containing yellowish or orange sap. On damp clay soil, June–Oct.

Lamprospora
Apothecia small, sessile, shallow cup-shaped, often dentate or fimbriate at margin. Asci operculate, walls J−, often protruding. Ascospores spherical, spiny. Most species are associated with bryophytes but a few grow on bare damp soil.

KEY

Ascospores 20–23 diam., spines 2–5 long ..... *crec'hqueraultii* var. *macrantha*
Ascospores 16–19 diam. with spines about 1 long 1
1. Apothecia mostly 3–5 mm diam., ascospores with several guttules ..... *crec'hqueraultii*
Apothecia 1–2 mm diam., ascospores with one large guttule ..... *modesta*

Lamprospora crec'hqueraultii (Crouan) Boud. (Fig. 224)
Apothecia gregarious, mostly 3–5 mm diam., mid-pale orange, margin slightly dentate, outer surface faintly downy, bearing short fat, hyaline 1- to 2-septate hairs. Ascospores 16–19 diam., with spines about 1 long. Its var. *macrantha* has larger spores with much longer spines. On wet clay soil of woodland paths, June–Oct. (Fig. 225)

Lamprospora modesta (P. Karsten) Boud. (Fig. 226)
Apothecia gregarious, 1–2 mm diam., pale yellowish orange. Ascospores 16–19 diam., with one guttule and short spines. On damp soil.

Leotia
Ascomata distinctly stalked, gelatinous or subgelatinous, the head either hemispherical and lobed or cylindric-clavate. Asci inoperculate, pore J−. Ascospores hyaline, smooth, often septate. Paraphyses slender, branched.

KEY

Ascomata with olivaceous heads and yellowish or ochraceous stalks ..... *lubrica*
Ascomata bluish or blackish green throughout ..... *atrovirens*

Leotia atrovirens Pers. (Fig. 227)
Ascomata clustered, 2–3 cm high, fertile head rounded and lobed or cylindric-clavate, stalk cylindrical, about 5 mm thick, covered with small scales. Ascospores elliptic-fusiform to navicular, sometimes guttulate and occasionally 1-septate, 18–21 × 5–6. On damp ground in woods, Aug.–Oct.

Leotia lubrica (Scop.) Pers. (Fig. 228)
Jelly babies. Ascomata 3–6 cm high, fertile head slimy when fresh, 1.2–1.4 cm diam., convex, rolled over at rim, stalk cylindrical, 4–8 mm thick. Ascospores elliptic- to cylindric-fusiform, often slightly curved, with 3–7 septa, 20–27 × 5–6. In woods, especially along the edges, sometimes on bare ground but more often among grass or under bracken, Aug.–Oct.

Leucoscypha
Apothecia cup-shaped, sessile, white, margin and outer surface covered with long, white, tapering, thick-walled, septate hairs. Asci operculate, walls J−. Ascospores ellipsoid-fusiform, hyaline, with two guttules, walls minutely spinulose.

KEY

Ascospores 20–30 × 9–13 ..... *erminea*
Ascospores 28–40 × 12–14 ..... *leucotricha*

Leucoscypha erminea (Bomm. & Rouss.) Boud. (Fig. 229)
Apothecia up to 5 mm diam., with hairs 200–900 × 12–18. On wet ground or fallen leaves or tree rootlets. Apothecia usually mature by June.

Leucoscypha leucotricha (Alb. & Schw.) Boud. (Fig. 230)
Apothecia 5–10 mm diam., hairs 400–1000 long, 10–16 thick at base. On damp ground under rotting leaves, in wet woods and in marshy places, July–Sept.

Marcelleina
Apothecia small, cup-shaped, sessile, soft-fleshed, with flat disc, violet, clay-coloured or yellowish clay, outer surface smooth. Asci operculate, walls J−. Paraphyses curved towards the apex. Ascospores spherical, hyaline, smooth or variously ornamented.

KEY

Apothecia clay-coloured or yellowish clay, ascospores 8-9 diam. . *rickii*
Apothecia violet, ascospores 10-12 diam. 1
1. Ascospore walls smooth ..... *atroviolacea*
Ascospore walls rough with elongated, sometimes anastomosing, warts or ridges ..... *persoonii*

Marcelleina atroviolacea (Delile ex de Seynes) v. Brummelen (Fig. 231)
Apothecia solitary or gregarious, 4-10 mm diam., rather dark violaceous. Ascospores with quite smooth walls. On damp ground under herbaceous plants, Aug.-Oct.

Marcelleina persoonii (Crouan & H. Crouan) v. Brummelen (Fig. 232)
Apothecia solitary or gregarious, 5-10 mm diam., disc violet, outer surface a little paler. The curved apices of the paraphyses are loosely cemented together to form an epithecium. On bare soil in damp situations, e.g. under *Juncus* and *Glyceria*, July-Oct.

Marcelleina rickii, see under 'Fungi Growing on or with Bryophytes'.

Melastiza
Apothecia sessile, cup-shaped, becoming flattened with a raised margin, mostly orange or reddish orange, bearing on the outside, especially towards the margin, inconspicuous tufts of septate, pale brown hairs. Asci operculate, walls J−. Ascospores ellipsoid, hyaline, with reticulate or verrucose walls, containing vacuoles which are not always obvious. Paraphyses clavate with yellow or orange contents.

KEY

Ascospores 15-17 × 7-8 ..... *flavorubens*
Ascospores 23-28 × 13-14..... *scotica*
Ascospores 17-21 × 8-11 1
1. Excipular hairs up to 150 long, all cylindrical, rounded at tip ..... *chateri*
Excipular hairs 170-270 long, mostly distinctly tapered ..... *asperula*

Melastiza asperula Spooner (Fig. 233)
Apothecia gregarious, up to 1 cm diam., disc orange, outer surface and margin paler. Two types of hairs present on outer surface, short obtuse ones and distinctly tapered ones up to 270 long, 16-18 thick near base. Ascospores 17-21 × 8-10.5, verruculose, warts more prominent at each end of spore. On debris in pine forests, Nov.

Melastiza chateri (W.G. Sm.) Boud. (Fig. 234)
Apothecia gregarious, 0.5-1.5 cm diam., orange or reddish orange. Hairs 50-150 × 10-17. Ascospores 17-19 × 9-11, walls reticulate, with spiny projections most pronounced at each end. Paraphyses swollen at apex to 9-10 and packed with orange droplets. On ground along sides of roads and woodland paths, found a number of times under elms, on bare patches among grass, Feb.-Oct.

Melastiza flavorubens (Rehm) Pfister & Korf
Apothecia solitary or caespitose, 2-4 mm diam., thick-rimmed, disc yellowish red, outer surface brownish. Ascospores 15-17 × 7-8, at first smooth, with two guttules, later becoming verrucose. Paraphyses swollen to 6 at apex, with yellow contents. On ground in woods.

Melastiza scotica Graddon (Fig. 235)
Apothecia gregarious, 1-3 cm diam., disc bright orange, outer surface paler, with abundant hyaline to brown excipular hairs up to 600 long, 6-7 wide at apex, 15-20 at base. Ascospores 23-28 × 13-14, the walls bearing very large warts 3-6 high. Paraphyses slender, abruptly swollen to 6-9 at apex and with orange contents. Mainly on needle litter in pine woods, Sept.-Nov.

Microglossum
Ascomata clavate, made up of fertile head and sterile stalk, the fertile part often longitudinally furrowed. Asci inoperculate with pore 1+, 8-spored. Ascospores cylindric-fusoid, hyaline, with two to four large guttules, when old often 3-septate. Paraphyses slender, branched, slightly swollen at tip.

KEY

Ascomata green, stalk scurfy ..... *viride*
Ascomata smoky olive, stalk smooth ..... *olivaceum*

Microglossum olivaceum (Pers.) Gillet (Fig. 236)
Ascomata 4-6 cm high, fertile head 6-7 mm thick, as long as or longer than the stalk. Ascospores up to 25 × 8. On the ground in open, grassy places, Sept.-Nov.

Microglossum viride (Pers.) Gillet (Fig. 237)
Ascomata 3-6 cm high, fertile head 3-7 mm thick, stalk 2-4 mm thick. Ascospores 15-21 × 5-6. In woods, sometimes among mosses, Sept.-Nov.

Microstoma protracta (Fr.) Kanouse (Fig. 238)
Apothecia 1-2 cm diam., solitary or more commonly caespitose, long-stalked, infundibuliform, expanding to become shallow cup-shaped, with lobed or reflexed margin; arising from a black pseudorhiza immersed in the soil and usually attached to roots or buried wood. Disc bright red or scarlet, outer surface orange, covered with hyaline flexuous hairs 6-7 thick. Stalk dark below, whitish above. Asci operculate with operculum off-centre, walls J−. Ascospores ellipsoid-fusoid, 25-50 × 12-15, smooth, with one large and several small guttules. On the ground, April.

Mitrophora
Ascomata large, consisting of a long, thick stalk surmounted by a conical fertile head the lower half or third of which is free and well separated from the stalk. Asci operculate, lining broad pits in the fertile head which are separated by sterile ridges. Ascospores broadly ellipsoid, hyaline, creamy in mass, smooth-walled, without guttules but with little groups of granules or droplets capping each end. Paraphyses often branched. septate, swollen at tip.

KEY

Ascomata 3–8 cm high, ascospores 8–9 wide ..... *fusca*
Ascomata much larger, ascospores 12 or more wide 1
1. Ascomata 8–13 cm high, ascospores 14–18 wide ..... *semilibera*
Ascomata 15–20 cm high, ascospores 12–16 wide ..... *gigas*

Mitrophora fusca (Pers.) Lév.
A small species with head bluntly conical, fawn with slightly paler stalk. Stalk furfuraceous and often longitudinally furrowed. Ascospores 21–23 × 8–9. On damp ground.

Mitrophora gigas (Pers.) Lév.
Fertile head smoky brown, 5–7.5 cm high and 5–6 wide, with large oblong pits. Stalk furrowed, dirty white, covered with small, rust-coloured scales, hollow, about 2.5 cm thick at top, swollen below to 5–6 cm. Ascospores 22–27 × 12–16. On the ground in sandy places, Mar.–May.

Mitrophora semilibera (DC) Lév. (Fig. 239)
Fertile head honey-coloured, with dark brown to black ridges, rather acutely conical, about 2.5 cm high, stalk cylindrical or slightly thickened towards the base, white or yellowish, scurfy. Ascospores 23–30 × 14–18. On the ground in and along the edges of woods, especially on boulder clay, in some years very plentiful under *Crataegus*, Apr.–May.

Mitrula
Ascomata clavate, fertile head yellowish orange or ochraceous. Asci inoperculate, 8-spored. Ascospores cylindric, cylindric-fusiform or slightly clavate, hyaline, smooth, 0- to 1-septate.

KEY

Fertile head yellowish orange ..... *paludosa*
Fertile head ochraceous ..... *sclerotipus*

Mitrula paludosa Fr. (Fig. 240)
Ascomata solitary or gregarious, 1.5–5 cm high, fertile head 0.5–1.5 cm thick, stalk white, 2–3 mm thick. Ascospores 10–16 × 2–3. In wet boggy places, often in running water when the stalks are attached to debris, Apr.–June.

Mitrula sclerotipus Boud.
Ascomata up to 2 cm high, slender, arising from small yellow or yellowish-brown sclerotia buried in damp ground in woods, Oct.–Nov. Ascospores 10–13 × 2.5–3.

Morchella
Ascomata large, consisting of a long, thick stalk surmounted by a bluntly conical or roughly spherical fertile head not free from its stalk. Asci operculate, lining broad pits in the fertile head which are separated by sterile ridges. Ascospores broadly ellipsoid, hyaline, smooth-walled, without guttules but with little groups of granules or droplets capping each end; in all species rather similar in size. Paraphyses thick, sometimes branched.

KEY

Fertile head irregularly honeycombed, ridges wavy, remaining light coloured ..... *esculenta*
Fertile heads with pits in rather regular rows between more or less parallel longitudinal ridges 1
1. Ridges not turning black with age ..... *vaporaria*
Ridges turning black with age 2
2. Heads grey or olivaceous ..... *conica*
Heads dark golden brown, reddish brown or blackish brown ..... *elata*

Morchella conica Pers. (Fig. 241)
Ascomata 5–20 cm high, fertile head broadly cylindrical to sharply conical, stalk white or ochraceous, somewhat wrinkled, furfuraceous, hollow. Ascospores 18–25 × 11–14. In damp woods, under *Alnus*, *Fraxinus*, etc., Feb.–May.

Morchella elata Fr. (Fig. 242)
Ascomata seldom more than 10 cm high, fertile head cylindrical to narrowly conical, stalk white or ochraceous, furfuraceous, wrinkled, hollow. Ascospores 18–25 × 11–16. In coniferous woods, Apr.–May.

Morchella esculenta (L.) Pers. (Fig. 243)
Ascomata 10–25 cm high, fertile head mostly irregularly spherical or oval, sometimes bluntly conical, at first greyish, becoming pale ochraceous, stalk white or cream, furfuraceous, hollow. Ascospores 16–25 × 11–16. In woods, under roadside hedges and in grassy places, Apr.–May.

Morchella vaporaria de Brondeau
Ascomata up to 20 cm high, fertile head broadly cylindrical to oval, olivaceous brown, stalk white or cream, furfuraceous, hollow. Ascospores 17–24 × 11–14. Mostly in gardens.

Ombrophila
Apothecia turbinate or obconical, sessile or running down into a short stalk, soft-fleshed, gelatinous, disc flat or convex. Asci inoperculate, pore J+. Ascospores ellipsoid, hyaline, smooth. Paraphyses cylindrical, not branched.

KEY

Apothecia yellowish brown ..... *rudis*
Apothecia violet ..... *violacea*

Ombrophila rudis (Berk.) Phill.
Apothecia fasciculate, stalked, disc flat, rugose, outer surface finely fibrillose striate. Ascospores 7–10 × 3–4. On gravel and peat, June.

Ombrophila violacea Fr. (Fig. 244)
Apothecia obconical, 3–8 mm diam., mauve or pinkish violet throughout. Ascospores 7–11 × 3–4, with a small guttule at each end. In boggy places, often on rotting leaves and other debris, Aug.–Sept.

Otidea
Apothecia sessile or with very short stalks, ear-shaped or deeply cup-shaped, often one side shorter than the other and split almost to the base. Asci operculate, wall J−. Ascospores ellipsoid or ellipsoid-fusiform, with two guttules, mostly smooth-walled. Paraphyses curved at apex and sometimes forked.

KEY

Disc clay-coloured ..... *alutacea*
Disc dark brown 1
Disc luteous or ochraceous 2
1. Ascospores 13–15 × 6.5–7 ..... *bufonia*
Ascospores 16–19 × 8–11 ..... *cochleata*
2. Apothecia large, up to 10 cm high, disc ochraceous flushed with orange or pink ..... *onotica*
Apothecia not more than 5–6 cm high 3
3. Apothecia deep cup-shaped, disc paler than outer surface ..... *grandis*
Apothecia more ear-shaped, outer surface and disc the same colour ..... *leporina*

Otidea alutacea (Pers.) Massee (Fig. 245)
Apothecia often clustered, 3–6 cm high, 2–4 cm broad, deeply cup-shaped, often shorter on one side which is split to the base, disc clay-coloured, outer surface pale fawn, smooth or furfuraceous, flesh yellowish. Ascospores 13–17 (20) × 6–7, with two guttules. Paraphyses curved at tip and slightly lobed. In woods, often on rather bare patches of ground, Aug.–Oct.

Otidea bufonia (Pers.) Boud. (Fig. 246)
Apothecia short-stalked, deeply cup-shaped, split on one side and often broadly crenulate at the margin, 4–7 cm diam., disc dark brown, outer surface pale brown, downy and sometimes lumpy (like a toad's skin); the short, thick, 1-septate, excipular hairs are covered with brownish granules. Ascospores 13–15 × 6.5–7, with two guttules. Paraphyses closely septate. On borders of woods and along woodland rides, Aug.–Oct.

Otidea cochleata (L.) Fuckel (Fig. 247)
Apothecia gregarious, sessile, 2.5–5 cm diam., deeply cup-shaped, with inrolled and irregular margin, sometimes split down one side, disc dark brown, outer surface paler and downy. Ascospores 16–19 × 8–11, with two guttules. Paraphyses branched. On damp ground in woods, Sept.–Oct.

Otidea grandis (Pers.) Rehm
Similar in shape to *O. cochleata*, 5–6 cm diam., with pale ochraceous-yellow disc and olivaceous-umber outer surface, white tomentose at base. Ascospores ellipsoid but narrowed at each end, 15–18 × 7–8, with two guttules, walls sometimes minutely verruculose when mature. On ground in pine woods.

Otidea leporina (Batsch) Fuckel (Fig. 248)
Apothecia solitary or gregarious, ear-shaped, split to base on the shorter side, 4–5 cm high, 3–4 cm wide, luteous or ochraceous, or yellow with rusty overtones. Ascospores 12–14 (16) × 7–8, with two guttules. Paraphyses strongly uncinate at apex. On ground in woods, Sept.–Oct.

Otidea onotica (Pers.) Fuckel (Fig. 249)
Golden-ear fungus. Apothecia solitary or clustered, up to 10 cm high and 3–6 cm wide, split almost to the base on one side, bright ochraceous flushed with orange or pink, short-stalked. Ascospores 12–14 × 5–6, with two guttules. Paraphyses curved at tip. On ground in woods, mostly under oaks, in some years found in great abundance, Sept.–Oct.

Pachyella violaceonigra (Rehm) Pfister (Fig. 250)
Apothecia sessile, 3–10 mm diam., shallow cup-shaped when quite young but soon becoming discoid to convex, disc wrinkled, dark bay brown to blackish purple, outer surface dirty white to pale grey. Asci operculate, walls J+. Ascospores ellipsoid, 20–25 × 10–14, hyaline, smooth, with two large guttules. Paraphyses clavate, with pale brownish contents, 7–8 wide at apex. On bare, wet soil, Apr.–May.

Peziza
Apothecia mostly sessile or subsessile, cup-shaped, sometimes expanded, flesh fragile, various colours but not red, orange or bright yellow. Asci operculate, upper part of wall always J+. Ascospores mostly ellipsoid, with smooth or verrucose walls, hyaline, often with guttules.

KEY

Apothecial disc blackish blue, flesh yielding blue juice on cutting ..... *saniosa*
Discs other colours, no blue juice 1
1. Apothecia growing on sand of coastal dunes ..... *ammophila*
Apothecia growing in swamps and muddy places, discs of young apothecia distinctly olivaceous ..... *limnaea*
Apothecia otherwise 2
2. Flesh yielding bright yellow juice on cutting 3
Juice on cutting quite colourless or none 4
3. Discs reddish brown with distinct purple bloom ..... *plebeia*
Discs greyish brown ..... *succosa*
4. Paraphyses thick, often forked or with short lateral branches ..... *sterigmatizans*
Paraphyses not so 5
5. Flesh distinctly stratified, with several clear-cut layers 6
Flesh not so 7
6. Paraphyses with middle and lower cells much inflated ..... *varia*
Paraphyses not so ..... *repanda*
7. Ascospores fusoid, 25–35 long ..... *gerardii*
Ascospores mostly ellipsoid, never more than 25 long 8
8. Ascospore walls smooth, rarely minutely punctate when quite mature 9
Ascospore walls verruculose or verrucose 14
Ascospore walls with ridges forming an irregular reticulum 18
9. Ascospores with two large guttules ..... *ampelina*
Ascospores without guttules 10
10. Apothecia large (up to 10 cm), bladder-shaped, often with incurved margin ..... *vesiculosa*
Apothecia not so 11
11. Ascospores 17–22 long 12
Ascospores less than 17 long 13
12. Flesh containing very large cells linked together by short hyphae ..... *ampliata*
Flesh not so ..... *hortensis*
13. Disc ochraceous or yellowish buff, ascospores smooth, paraphyses scarcely swollen at tip ..... *cerea*
Disc pale brown, sometimes tinged violet or pinkish, ascospores sometimes minutely punctate, paraphyses swollen at tip to 5–6 ..... *domiciliana*
14. Paraphyses with yellow contents, ascospores 13–17 × 7–9 ..... *michelii*
Paraphyses often with purplish contents, ascospores 18–22 × 10–11, walls densely verruculose ..... *emileia*

Tips of paraphyses cemented together to form a brown epithecial crust, ascospores 13–15 long ..... *badiofusca*
Paraphyses colourless and not forming brown epithecial crust 15
15. Apothecia obconical, small, disc dark livid purple or fuliginous *lividula*
Apothecia and disc not so 16
16. Ascospores 22–23 long, somewhat fusiform, without guttules ..... *badioconfusa*
Ascospores 16–23 × 9–12, with large guttules, walls decorated with spurred warts ..... *limnaea*
Ascospores not more than 20 long 17
17. Apothecia 4–15 mm diam., dark blackish brown ..... *indiscreta*
Apothecia large (up to 7 cm diam.), disc hazel brown, outer surface pale ..... *arvernensis*
Apothecia not more than 4 cm diam., disc dark purplish brown or chestnut, outer surface purplish ..... *depressa*
18. Ascospores 13–14 × 7–8 ..... *ostracoderma*
Ascospores 17–20 × 9–12 ..... *badia*

Peziza ammophila Durieu & Mont. (Fig. 251)
Sand star-cup. Apothecia cup- or goblet-shaped, about 2.5–3 cm diam., deeply incised at the margin, the triangular lobes folding back, rooting stem-like base up to 8 cm long, disc brown, outer surface pale ochraceous. Sand grains adhere closely to the outside of the cup and to the rooting base. Ascospores ellipsoid, smooth, without guttules, 15–21 × 10–12. Paraphyses 6–7 wide at tip. On coastal sand-dunes, near marram grass, Sept.–Nov.

Peziza ampelina Quélet (Fig. 252)
Apothecia solitary or clustered, cup-shaped, 2–5 cm diam., opening out and splitting at margin, disc violet or brownish violet, outer surface pale ochraceous or slightly purplish, somewhat furfuraceous. Ascospores ellipsoid, smooth, 18–22 × 9–12, with two large guttules and/or several small ones. Paraphyses only swollen slightly at apex. On ground in woods and gardens.

Peziza ampliata Pers. (Fig. 253)
Apothecia sessile, 1–3 cm diam., dentate at the margin, disc pale brown or yellowish brown, outer surface paler and pruinose. Flesh containing very large, round cells linked together by short hyphae. Ascospores hyaline, smooth, 18–20 × 10–11, without guttules. Paraphyses swollen to 5–8 at apex. In soil, mostly on very rotten fragments of wood, Apr.–Oct.

Peziza arvernensis Boud. (Fig. 254)
Apothecia 2–7 cm diam., solitary or gregarious, irregularly cup-shaped, undulating, disc hazel brown, outer surface and margin paler. Ascospores ellipsoid, 14–19 × 8–10, without guttules, wall minutely verruculose.

Paraphyses straight, septate, up to 7 at apex. On ground in woods, especially under beech, Apr.–July.

Peziza badia Pers. (Fig. 255)
Apothecia gregarious, sessile, irregularly cup-shaped, 3–9 cm diam., disc olivaceous brown to dark brown, outer surface reddish brown, furfuraceous, flesh with watery juice. Ascospores ellipsoid, 17–20 × 9–12, with two guttules, one often larger than the other, walls with ridges forming an irregular reticulum. Paraphyses septate, scarcely thickening at apex. On ground in woods, July–Oct.

Peziza badioconfusa Korf (Fig. 256)
Apothecia 3–5 cm diam., dark olivaceous brown, outer surface furfuraceous. Ascospores ellipsoid-fusiform, verruculose, without guttules, 22–23 × 10–11. On soil, May.

Peziza badiofusca (Boud.) Dennis (Fig. 257)
Apothecia 1–2 cm diam., with minutely crenulate margin, disc bay brown, outer surface paler, furfuraceous, juice opalescent. Ascus contents pale yellowish. Ascospores ellipsoid, 13–15 × 8.5–9.5, mostly with one large guttule, occasionally with two or three, walls verruculose. Tips of paraphyses cemented together to form a thin, brown epithecial crust. On ground in woods, Sept.–Oct.

Peziza cerea Sow. (Fig. 258)
Apothecia 2–5 cm diam., cup-shaped, disc pale ochraceous or yellowish buff, outer surface white or very pale, minutely furfuraceous. Ascospores ellipsoid, smooth, without guttules, 14–17 × 8–10. Paraphyses straight, scarcely swollen at tip. Found throughout the year on soil between paving stones, old mortar on paths and around houses.

Peziza depressa Pers. (Fig. 259)
Apothecia 2–4 cm diam., cup-shaped, disc dark purplish to brown or chestnut, outer surface paler, purplish especially at margin, juice colourless. Ascospores 16–19 (20) × 10–11, verrucose, with one or two guttules. Paraphyses slightly swollen to 6 at apex. In woods on boulder clay, Aug.–Sept.

Peziza domiciliana Cooke (Fig. 260)
Apothecia 2–6 cm diam., irregularly cup-shaped, often indented at the inrolled margin, sometimes with short stalk, disc pale brown sometimes tinted pinkish or violet, outer surface dirty white to pale ochraceous. Ascospores 14–16 × 8–9, mostly smooth but may become minutely punctate when quite mature, without guttules. Paraphyses swollen to 5–6 at apex. On damp sandy soil and on builders' rubble, July–Sept.

Peziza emileia Cooke (Fig. 261)
Apothecia up to 8–10 cm diam., cup-shaped with rather wavy edge sometimes split, disc violaceous to fawn, outer surface off-white, yellowish near margin. Ascospores ellipsoid, closely and minutely verruculose, with two guttules, 18–24 × 8–11. Paraphyses slightly swollen at tip and often containing purplish matter. On the ground along the edges of woods and on lawns, June–Oct.

Peziza gerardii Cooke
Apothecia gregarious, small, only up to 4–5 mm diam., sometimes with short stalk, often finely toothed at margin, disc violaceous, outer surface pale violaceous, minutely furfuraceous. Ascospores fusoid, smooth, with one or several guttules, 25–35 × 8–10. On clay soil in woods, June–Aug.

Peziza hortensis Crouan & H. Crouan
Apothecia 1–2 cm diam., somewhat flattened, undulating yellowish or ochraceous fawn. Ascospores ellipsoid, 17–22 × 9.5–11, smooth, without guttules. On bare, damp ground in woods, July.

Peziza indiscreta Phill. & Plowr. (Fig. 262)
Apothecia solitary or gregarious, small, only 4–15 mm diam., deep cup-shaped, dark blackish brown but more umber and somewhat verrucose on the outside. Ascosphores ellipsoid, 15–18 × 8–10, verruculose, with one or two guttules. Paraphyses septate, slightly thickened towards the apex. On soil under lime trees and on tree-shaded banks of streams, Oct.

Peziza limnaea Maas Geest. (Fig. 263)
Apothecia 1–4.5 cm diam. sometimes with short stalk, disc nearly always olivaceous when young, darkening and varying from purplish brown to blackish brown when old, outer surface ochraceous or olivaceous to chocolate brown, furfuraceous or verrucose towards the margin, white tomentose at base. Ascospores 16–23 × 9–12, with two guttules, wall ornamented with irregular spurred warts connected by lines or ridges but not forming a reticulum. Paraphyses thickened to 6–9 towards the apex, contents yellow. On mud in alder carrs and other swampy places, July–Oct.

Peziza lividula Phill. (Fig. 264)
Apothecia small, obconical, expanding and flattening out, smooth, flesh very firm, margin entire, disc dark livid purple or fuliginous, undulating. Ascospores ellipsoid to navicular, 16–25 × 7–12.5, verruculose, warts often fused at poles, contents granular. Paraphyses septate, clavate at apex.

Peziza michelii (Boud.) Dennis (Fig. 265)
Apothecia 2.5–5 cm diam., sessile or subsessile, cup-shaped then saucer-shaped, with raised rim, disc reddish brown, outer surface paler, slightly furfuraceous, juice colourless, soon turning milky white. Ascospores ellipsoid, verrucose, with two guttules, 13–17 × 7–9. Paraphyses with yellowish contents. On ground in woods, Aug.–Sept.

Peziza ostracoderma Korf (Fig. 266)
Apothecia 1–2 cm diam., sessile, shallow cup-shaped, disc dark or blackish brown, flesh of large, rounded cells, no juice. Ascospores ellipsoid, with two guttules, 13–14 × 7–8, wall with ridges forming an almost complete network. Paraphyses slender, cylindrical. This species has a *Chromelosporium* conidial state; conidiophores several times dichotomously branched at the apex and spherical, hyaline to cinnamon brown, mostly smooth conidia 5–14 diam. On mushroom casing soil.

Peziza plebeia (Le Gal) Nannf. (Fig. 267)
Apothecia 2–5.5 cm diam., shallow cup-shaped, disc reddish brown with a distinct purplish bloom, outer surface at first pale fawn later reddish brown, flesh on cutting yielding copious yellow juice. Ascospores 14–17.5 × 8–9, with two guttules, walls with rather large, irregular warts. On boulder-clay soil in woods, Aug.

Peziza repanda Pers. (Fig. 268)
Apothecia 5–12 cm diam., shallow cup-shaped, often with crenate margin, disc hazel to chestnut brown, outer surface whitish to creamy fawn, furfuraceous, flesh stratified. Ascospores ellipsoid, smooth, without guttules, 15–16 × 9–10. On ground in woods, often closely associated with fallen timber, Oct.–May.

Peziza saniosa Schrader (Fig. 269)
Apothecia solitary or gregarious, 1–3.5 cm diam., irregularly cup-shaped, flattening out, disc blackish blue, outer surface greyish brown, furfuraceous, flesh yielding blue juice when cut. Ascospores ellipsoid, 14–17 × 7–9, walls rather coarsely verrucose. On the ground in woods, Sept.–Oct.

Peziza sterigmatizans Phill. ex Cooke (Fig. 270)
Apothecia 1–2.5 cm diam., at first irregularly cup-shaped then flattening out, crenulate at margin, disc blackish brown, outer surface paler. Ascospores ellipsoid, 17–22 × 9–12, smooth, without guttules. Paraphyses thick, septate, swollen to 7–10 at apex, with brownish contents, characteristically forked or with short lateral branches or buds. On damp ground by sides of ditches, etc., Sept.–Dec.

Peziza succosa Berk. (Fig. 271)
Apothecia solitary or gregarious, 1.5–6 cm diam., remaining cup-shaped, disc greyish brown to hazel, outer surface paler; flesh yields bright yellow juice on cutting. Ascospores ellipsoid, 18–21 × 10–12, with two guttules, walls ornamented with warts and ridges. Paraphyses slightly swollen at tip, occasionally forked. On ground in woods, July–Sept.

Peziza varia (Hedw.) Fr. (Fig. 272)
Apothecia solitary or gregarious, 2–6 cm diam., cup-shaped then expanded, sometimes shortly stalked, disc greyish brown to hazel, outer surface paler, slightly furfuraceous, flesh distinctly stratified. Ascospores ellipsoid, 14–17 × 9–11, without guttules, smooth. Paraphyses with lower and middle cells much inflated. On soil, often where there is sawdust or buried wood, June–Oct.

Peziza vesiculosa, described under 'Fungi on Dung', is found sometimes on soil that has been well manured. The ascospores are smooth and without vacuoles, and measure 20–24 × 11–14.

Phaeohelotium geogenum (Cooke) Svrček & Matheis (Fig. 273)
Apothecia solitary, substipitate, 2.5–5 mm diam., margin irregular, pure white to very pale cream, waxy-looking when old. Asci inoperculate, pore J−. Ascospores fusiform, often inaequilateral, hyaline, smooth, 25–35 × 4–5. Paraphyses about 2 wide. On bare, damp soil, July–Nov.

Plicaria radula (Berk. & Br.) Boud. (Fig. 274)
Apothecia sessile, cup-shaped, about 2.5 cm diam., disc vinaceous brown, outer surface black, covered with subconical warts. Asci operculate, walls J+. Ascospores spherical, brown 22–25 diam., walls tuberculate. Paraphyses septate, swollen at apex. On ground in woods.

Podophacidium xanthomelum (Pers.) Kavina (Fig. 275)
Apothecia gregarious, 1–4 mm diam., shallow cup-shaped or obconical, disc bright yellow, outer surface brown or blackish brown, furfuraceous, margin blackish brown, toothed; cells of ectal excipulum brown, globose, cells of medullary excipulum also globose but hyaline. Asci inoperculate, pore J+. Ascospores ellipsoid-fusiform, hyaline, smooth, with two guttules, 12–15 × 5–6. Paraphyses slender, sometimes forked and curved at tips. On soil and debris, mostly in coniferous woods.

Pseudoplectania nigrella (Pers.) Fuckel (Fig. 276)
Apothecia solitary or gregarious, sessile, shallowly cup-shaped, 1.5–3 cm diam., black, disc shining, outer surface covered with adpressed, undulating black hairs. Asci operculate, walls J−. Ascospores spherical, hyaline, smooth, 10–12 diam., filled with tiny guttules. Paraphyses slender, forked, brown. On soil and litter in conifer woods, Mar.–May.

Pseudotis apophysata (Cooke & Phill.) Boud. (Fig. 277)
Apothecia gregarious, 1–2 cm diam., deeply cup-shaped, sometimes split down one side, *Otidea*-like and having the same structure, hazel to greyish brown, with disc darker than the outer surface. Asci operculate, walls J−. Ascospores ellipsoid-fusiform, hyaline, smooth, with two guttules, 18–26 × 9–12. Paraphyses curved at apex. On damp clay soil, Aug.–Oct.

Pulvinula
Apothecia pulvinate. Asci operculate, walls J−. Ascospores spherical, smooth, hyaline, with numerous guttules. Paraphyses branched, curved at apex.

KEY

Ascospores 13–15 diam. ..... *convexella*
Ascospores 16–18 diam. ..... *cinnabarina*

Pulvinula cinnabarina (Fuckel) Boud. (Fig. 278)
Apothecia gregarious, 1–2 cm diam., pulvinate, disc vermilion, outer surface paler, smooth. Ascospores 16–18 diam. Paraphyses slightly curved. On sandy soil.

Pulvinula convexella, described under 'Fungi on Burnt Ground and Charcoal', occurs also occasionally on sandy soil.

Ramsbottomia lamprosporoides Buckley
Apothecia solitary or gregarious, at first turbinate then flattened, small, dirty yellow, outer surface covered with branched, septate hairs 150–290 × 11–18, arranged in fascicles. Asci operculate, walls J−. Ascospores spherical or subspherical, hyaline, with one large guttule, 18–20 diam., walls reticulate-echinulate, spines 2–5 long. Paraphyses swollen to 5–6 at apex, full of orange granules which turn blackish green in Melzer's iodine solution. On clay soil, sometimes among mosses, May.

Sarcosphaera coronaria (Jacq.) Schroeter (Fig. 279)
Apothecia solitary or clustered, sessile, 4–20 cm diam. when expanded, deeply cup-shaped, cut at the margin into petal-like lobes which become reflexed, disc violet to purplish brown, outer surface off-white, furfuraceous. Apothecia start development below the soil or humus surface as hollow white balls. Asci operculate, tips J+. Ascospores broadly ellipsoid or cylindrical rounded at the ends, hyaline, smooth, with two guttules, 13–17 × 7–8.5. Paraphyses often branched, septate, some constricted at septa. In woods on chalk or limestone, May–June.

Scutellinia
Apothecia saucer-shaped, disc often red, less frequently reddish brown or other colours, outer surface brown and bearing thick-walled, brown, septate hairs, often with forked bases which root in the flesh. Asci operculate, tips J−. Ascospores ellipsoid or spherical, walls often ornamented.

KEY

Ascopores spherical 1
Ascospores ellipsoid 3
1. Ascospore walls echinulate ..... *asperior*
Ascospore walls verrucose with low warts 2
2. Ascospores 18–22 diam. ..... *trechispora*
Ascospores 22–26 diam. ..... *trechispora* var. *paludicola*

3. Excipular hairs more than 1 mm long 4
Excipular hairs less than 1 mm long 5
4. Hairs not very dark or rigid, ascospores 19–25 × 12–15, walls clearly verruculose ..... *scutellata*
Hairs very dark, rigid, ascospores 17–22 × 11–14, guttulate but appearing smooth ..... *scutellata* var. *cervorum*
5. Ascospore walls coarsely reticulate with deep alveolae *pseudotrechispora*
Ascospore walls verruculose or verrucose 6
6. Ascospores narrowly ellipsoid, 20–25 × 9–12 ..... *hirta*
Ascospores broadly ellipsoid, more than 12 wide 7
7. Paraphyses swollen to 13–14 at apex ..... *ampullacea* var. *parvula*
Paraphyses always less than 13 at apex 8
8. Excipular hairs thin-walled, flexuous, 150–350 long ..... *superba*
Excipular hairs thick-walled, not flexuous, often more than 350 long . 9
9. Ascospores 18–22 × 12–15 ..... *subhirtella*
Ascospores 15–20 wide, subglobose or very broadly ellipsoid 10
10. Disc very bright red, paraphyses 10–12 at apex ..... *pseudoumbrarum*
Disc dull orange-red, often pale, paraphyses 8 wide at apex.. *umbrorum*

Scutellinia ampullacea (Limminghe ex Cooke) O. Kuntze var. *parvula* Le Gal (Fig. 280)
Apothecia 2–5 mm diam., disc dull ochraceous or reddish orange, thick, somewhat pleated in the middle, outer surface brown, hairs 260–440 × 18–28, hyaline to yellowish brown, thick-walled, with a number of thin septa. Paraphyses swollen to 13–14 at apex. Ascospores ellipsoid, 18–26.5 × 13–18 (mostly 23–24 × 15), wall ornamented with low, sometimes anastomosing warts. On wet soil, July. Distinguished from the rather similar *S. umbrorum* by the very swollen tips of the paraphyses.

Scutellinia asperior (Nyl.) Dennis (Fig. 281)
Apothecia 3–7 mm diam., disc vermilion or orange-red, outer surface pale brown, covered with rather short, golden brown hairs. Ascospores spherical, 16–18 diam., covered with spines 1–2 long. Paraphyses swollen to 6–8 at apex. On bare damp ground, May–Oct.

Scutellinia hirta (Schum.) Cooke (Fig. 282)
Apothecia 3–8 mm diam., lobed at margin, disc scarlet, outer surface covered with pointed, septate hairs 200–400 × 12–20. Ascospores rather narrowly ellipsoid, 20–25 × 9–12, walls covered with low warts. Paraphyses swollen to 10 at apex, packed with orange-red granules, contents staining purple in Melzer's iodine solution. On damp ground, wet wood, etc., June–Oct.

Scutellinia pseudotrechispora (Schroeter) Le Gal
Apothecia 2–4 mm diam., disc scarlet, shining, outer surface pale, with sparse, pale brown hairs 160–300 × 15–24. Ascospores ellipsoid, 16–25 ×

11–14, coarsely reticulate with deep alveolae when mature. Paraphyses 2–3 broad, swollen up to 10 at tip, with orange-red contents. On soil in woods, Aug.

Scutellinia pseudoumbrarum Moravec (Fig. 283)
Apothecia 5–10 mm diam., disc bright red, outer surface and margin brown or dark brown, hairs dark blackish brown, septate, pointed, thick-walled, up to 500 (750) × 20–25, forked and rooting at base. Ascospores ellipsoid, 21–25 × 15–20, walls densely covered with large, thick warts. The spore measurements include the thickness of the warts. Paraphyses swollen up to 12 at tip. On soaked peaty soil, Sept.

Scutellinia scutellata (L.) Lambotte (Fig. 284)
Apothecia up to 2 cm diam., disc bright red, outer surface pale brown, covered with closely set, brown, rooting hairs up to 2 mm long which are neither very thick nor very rigid. Ascospores 19–25 × 12–18, minutely verruculose but with the warts always visible. Paraphyses up to 10 wide at apex. On soil and rotten wood, May–Oct.

Scutellinia scutellata var. *cervorum* (Velen.) Le Gal
This variety differs in having more spaced-out, darker, thicker, much more rigid hairs up to 1.5 mm long, and ascospores 17–22 × 11–14 filled with small guttules, which appear to have smooth walls (warts that may be present are so small as to be scarcely visible at normal magnifications).

Scutellinia subhirtella Svrček (Fig. 285)
Apothecia 2–5 mm diam,. disc orange-red to red, hairs 150–600 × 15–30, straight, pointed, yellowish brown, thick-walled, rooting, the roots narrow and forked. Paraphyses 3–4 wide, swollen to 7–10 at apex. Ascospores 18–22 × 12–14 (15), oblong to broadly ellipsoid, usually rounded at ends but sometimes narrowed, walls densely verrucose, warts up to 1 high and 1.5 diam., round or irregularly angular or sinuate but not confluent. On muddy paths, mossy wood, etc., June–Oct.

Scutellinia superba (Velen.) Le Gal
Apothecia 1–3 mm diam., thick-fleshed, disc fiery red, hairs 150–350 × 12–20, flexuous, yellowish brown, thin-walled. Paraphyses about 3 thick, swollen to 8–10 at apex, with reddish contents. Ascospores very broadly ellipsoid to subspherical, 18–26 × 15–24, filled with small guttules, walls finely verruculose. On bare soil between pine roots.

Scutellinia trechispora and its var. *paludicola*, described under 'Fungi Growing on or with Bryophytes', occur also sometimes on bare patches of soil.

Scutellinia umbrorum (Fr.) Lambotte (Fig. 286)
Apothecia 3–8 mm diam., disc dull orange-red or flesh-coloured, mostly rather pale, outer surface brown, hairs 120–850 × 15–40. Ascospores

coarsely verrucose, warts 1.5–2 thick, well separated, 17–26 × 14–20 including warts. Paraphyses swollen to 8 at apex. On wet ground, May–Oct.

Sepultaria, see under *Geopora*.

Sowerbyella radiculata (Sow.) Nannf. (Fig. 287)
Apothecia gregarious or caespitose, cup-shaped, thin-fleshed, up to 4 cm diam., with long, thick, rooting stalk covered with white hairs, disc lemon yellow or sulphur yellow, outer surface whitish or cream, downy. Asci operculate, walls J−. Ascospores broadly ellipsoid, coarsely verrucose, 12–14 × 7–8, with two guttules. Paraphyses 3–5 thick, strongly curved and occasionally lobed at apex, with yellowish sap. On the ground under *Cupressus* and other conifers, also in sandy hedgebanks, Sept.–Nov.

Spathularia flava Pers. (Fig. 288)
Ascomata gregarious or caespitose, 2–10 cm high, flattened and irregularly fan-shaped, with stalk tapered towards base, yellow or ochraceous, stalk whitish or cream, smooth or furfuraceous. Asci inoperculate, pore J−, with spores lying parallel to one another. Ascospores narrowly cylindrical or somewhat clavate, 40–50 × 2–3, tapered at ends, hyaline, smooth, at first guttulate then multiseptate. Paraphyses filiform, branched, strongly curved towards apex. On ground in conifer woods, Aug.–Oct.

Sphaerosoma echinulatum Seaver (Fig. 289)
Apothecia gregarious, almost spherical, 3–8 mm diam., sessile, attached to soil by delicate hyphae; asci finally covering all the exposed surface, reddish or purplish brown, velvety. Asci operculate, walls J+. Ascospores spherical, hyaline, echinulate when mature, 35 diam. including spines (25 without). Paraphyses protruding far beyond the tips of the asci, 12–15 thick at apex, with brownish contents. On wet soil under alders and willows, July.

Sphaerosporella hinnulea (Berk. & Br.) Rifai
Apothecia scattered or gregarious, saucer-shaped to discoid, 5–10 mm diam., disc chestnut brown, outer surface brown to dark brown, clothed with rigid hairs which project above the margin; hairs straight or bent, with pointed or rounded tips, pale brown, septate, up to 200 long and 10 thick at base. Asci operculate, walls J−. Ascospores spherical, smooth, with one large guttule and several smaller ones, 12–14 diam. Paraphyses septate, swollen at apex, with brown contents. On wet sandy soil in woods and among grass, Sept.–Oct.

Svrcekomyces pallidus Spooner (Fig. 290)
Apothecia up to 2 cm diam., short-stalked, whitish, disc plano-convex with reflexed margin, with anchoring hyphae. Ectal excipulum 2-zoned, outer zone of narrow, thin-walled hyphae, inner of large globose cells. Asci operculate, walls J−. Ascospores ellipsoid, hyaline, 17–21 × 8.5–9.5, with two guttules, walls ornamented with ridges and angular warts, larger at each

end, which stain deeply with cotton blue. Paraphyses somewhat swollen to about 5 at apex. On wet soil, with hepatics, under alders, Oct.

Tarzetta
Apothecia deeply cup-shaped, often with a short stalk which may be buried in the soil, outer surface downy, hairs very short, hyaline. Asci operculate, walls J−. Ascospores ellipsoid, with two guttules, smooth walls stain readily with cotton blue.

KEY

Apothecia cream or ochraceous, 2–5 cm diam. ..... *catinus*
Apothecia greyish ochre or greyish brown, not more than 2 cm diam. 1
1. Apothecia 1–2 cm diam., ascospores 19–22 × 13–15 ..... *cupularis*
Apothecia 4–8 mm diam., ascospores 25–27 × 13–14 ..... *gaillardiana*

Tarzetta catinus (Holmsk.) Korf & Rogers (Fig. 291)
Apothecia usually solitary, occasionally clustered, cream or ochraceous, margin slightly crenulate, stalk embedded in soil. Ascospores 20–24 × 11–13. Paraphyses often branched near base, and lobed at the apex. On bare ground in woods and on damp paths, May–Oct.

Tarzetta cupularis (L.) Lambotte (Fig. 292)
Apothecia solitary or gregarious, greyish ochre or pale greyish brown, 1–2 cm diam., margin distinctly crenulate, short-stalked. Paraphyses slightly swollen at apex. On bare ground in woods, July–Oct.

Tarzetta gaillardiana (Boud.) Korf & Rogers (Fig. 293)
Apothecia mostly solitary, greyish brown, short-stalked or sessile, margin subcrenulate. Paraphyses slender, swollen to 3–4 at apex. On sandy soil, Oct.–Nov.

Thuemenidium atropurpureum (Batsch) Kuntze (Fig. 294)
Ascomata gregarious, mostly up to 6 cm but occasionally up to 9 cm high, clavate, with slender, cylindrical, scaly stalks, dark purplish brown to almost black, fertile upper part somewhat compressed and often irregularly furrowed. Asci inoperculate. Ascospores hyaline, cylindrical with rounded ends, often slightly curved, 19–35 × 4–6, 6- to 9-septate when mature. Paraphyses slightly swollen at apex, either filled with or agglutinated by purplish-brown matter. Commonly with *Molinia* and *Polytrichum* on acid soil, Sept.–Dec.

Tricharina
Apothecia always small, saucer-shaped, sessile, with flat, whitish or cream disc, outer surface brown, covered with stiff, pointed, coloured hairs. Asci operculate, walls J−. Ascospores ellipsoid, hyaline, without guttules.

KEY

Disc white, hairs rather pale reddish brown ..... *cretea*
Disc cream, hairs dark brown ..... *ochroleuca*

Tricharina cretea (Cooke) Thind & Waraich (Fig. 295)
Apothecia up to 5 mm diam., outer surface reddish brown, margin appearing dentate where hairs are bunched together; hairs 200–300 long, base 12–14 wide, tapering to 2–3, walls pale reddish brown. Ascospores smooth-walled, 15–19 × 9–12. Paraphyses scarcely thickened at apex. On soil and plaster.

Tricharina ochroleuca (Bres.) Eckblad
Ascospores 16–18 × 10. On damp soil in woods, June–Aug.

Trichoglossum
Ascomata erect, 3–8 cm high, black, velvety, stalked, either clavate or cylindric-fusiform, fertile upper part thicker than stalk, often compressed and furrowed. Asci inoperculate, pore often J+. Ascospores parallel to one another, brown, multiseptate. Paraphyses slightly swollen and often curved and brownish at apex. Thick-walled, stiff, pointed, blackish brown to black protuberant setae formed among the asci and paraphyses.

KEY

Asci 4-spored, ascospores 15-septate ..... *tetrasporum*
Asci 8-spored 1
1. Ascospores normally 15-septate ..... *hirsutum*
Ascospores with 8–14, normally 11, septa ..... *variabile*
Ascospores 7-septate ..... *walteri*

Trichoglossum hirsutum (Fr.) Boud. (Fig. 296)
Ascospores 110–150 × 5–7, with 13–15, mostly 15, septa. Setae up to 180 × 8–9. In boggy meadows, sometimes with *Sphagnum*, Aug.–Nov.

Trichoglossum tetrasporum Sinden & Fitzpatr. (Fig. 297)
Fertile head not more than one-fifth the total length, ellipsoid to subspherical, more or less compressed, sharply delimited from stalk which is 1–2 mm thick. Ascospores 120–160 × 6–7. Paraphyses smoky brown, 3 thick, 7 at apex. Among grass.

Trichoglossum variabile (Durand) Nannf.
An uncommon species found on boggy ground with *Dryas*.

Trichoglossum walteri (Berk.) Durand (Fig. 298)
The 7-septate ascospores are always less than 100 long. Among grass.

Trichophaea
Apothecia sessile, at first globose, becoming lenticular, flattened or

pulvinate, thick, disc whitish or pale, excipular hairs brown, septate, long and pointed. Asci operculate, walls J−. Ascospores ellipsoid to fusiform, with one or two large guttules, hyaline.

KEY

Ascospore walls coarsely verrucose ..... *pseudogregaria*
Ascospore walls smooth or minutely verruculose 1
1. Ascospores 18–24 × 8–11, walls smooth or minutely verruculose ..... *gregaria*
Ascospore walls always smooth 2
2. Ascospores 14–20 × 9–12 ..... *albospadicea*
Ascospores 20–24 × 13–16 ..... *woolhopeia*

Trichophaea albospadicea (Grev.) Boud.
Apothecia gregarious, 4–6 mm diam., disc white to greyish, hairs closely septate, pale brown, 100–350 × 12. Ascospores ellipsoid. Paraphyses 3 thick, very slightly thickened at apex. On ground in woods.

Trichophaea gregaria (Rehm) Boud. (Fig. 299)
Apothecia gregarious, 1–2.5 mm diam., disc pale bluish grey, outer surface brown, hairs coppery brown, 200–400 × 10, tapered to a rounded tip. Ascospores ellipsoid-fusiform. On bare damp ground, especially on woodland paths, June–Sept.

Trichophaea pseudogregaria (Rick.) Boud. (Fig. 300)
Similar to *T. gregaria* but apothecia 2–5 mm diam. and ascospores coarsely warted. On bare soil on woodland paths and under *Mercurialis perennis*, Aug.–Sept.

Trichophaea woolhopeia, described under 'Fungi on Burnt Ground and Charcoal', occurs also sometimes where there is no obvious sign of burning.

Trichophaeopsis bicuspis (Boud.) Korf & Erb (Fig. 301)
Apothecia 2–4 mm diam., white with brown rim, outer surface covered with dark brown, septate, pointed hairs up to 500 × 15, many of which have a downwardly pointed prong or branch arising near the base. Asci operculate, walls J−. Ascospores ellipsoid, hyaline, smooth, 15–20 × 10–11. On damp soil and rotting leaves and twigs on the ground, June–Oct.

Verpa
Ascomata made up of a long stout stalk with a thimble-shaped or bell-shaped fertile head surrounding the upper part of it and attached inside only at its apex; surface smooth or with shallow, vertical, irregular grooves. Asci operculate. Ascospores large, ellipsoid, hyaline, smooth, without vacuoles but often with little groups of granules or droplets capping each end.

KEY

Stipe banded horizontally with scarcely distinguishable, very pale brown scales ..... *conica*
Stipe clearly banded with distinct brown scales ..... *digitaliformis*

Verpa conica (O. Müller) Swartz (Fig. 302)
Thimble-cap. Ascomata solitary or gregarious, 3–12 cm high, fertile head 1.5–4 cm, honey to olivaceous brown or reddish brown, under-surface ochraceous. Stalk cylindrical, slightly swollen at base, whitish or cream, obscurely banded with only very slightly darker scales, 0.5–1.5 cm thick, hollow and fragile. Ascospores 18–25 × 11–15. On roadsides and along the scrubby edges of woods, often under hawthorn, Apr.–May.

Verpa digitaliformis Pers.
Ascomata 4–6 cm high, fertile head rather dark brown or greyish brown. Stalk pale reddish brown or orange-brown, with zones of adpressed brown scales. Ascospores 19–22 × 12–14. In hedgebanks and among grass on sandy pastures, Apr.–May.

OTHER ASCOMYCETES

Heleococcum aurantiacum Jørgensen (Fig. 303)
Cleistothecia less than 0.5 mm diam., spherical, smooth, whitish or pale orange or ochraceous, gregarious on a thin mycelial mat growing on the surface of soil or compost. Only likely to be seen when looking at larger fungi under a lens or dissecting microscope. Asci subspherical, 8-spored. Ascospores ellipsoid, golden brown, smooth, 1-septate, with one to three guttules in each cell, 25–30 × 10–15.

Podostroma alutaceum (Pers.) Atk. (Fig. 304)
Stromata erect, club-shaped, 2–4 cm tall, pale yellowish, upper fertile part dotted with minute ostioles of immersed perithecia. Asci containing 16 part-spores. Part-spores spherical or broadly ellipsoid, hyaline, minutely verruculose, 4–4.5 × 3–4. On the ground in conifer woods, Sept.–Oct.

Sordaria arenicola Grove
Perithecia scattered, ovoid, 0.7–0.8 × 0.4–0.5 mm, black, with a thick neck covered with usually simple, rarely septate, dark brown, tapered hairs 50–100 × 4, except sometimes around the ostiole. Ascospores ovoid-lenticular, compressed, dark blackish brown, smooth, 30–34 × 14–16. In dune slacks, July–Sept., on fine sand among *Nostoc*, the mycelium binding the sand grains together.

FUNGI ON DUNG

DISCOMYCETES

KEY TO GENERA

Dark purplish to black tips of asci protruding above surface of disc ... 1
Ascus tips, if protruding, hyaline or pale ... 2
1. Ascospores firmly stuck together both in the ascus and when projected from it ... *Saccobolus*
Ascospores not stuck together ... *Ascobolus*
2. Asci either operculate or with a subapical ring, and then opening by a slit ... 3
Asci inoperculate (opening by a pore) ... 15
3. Apothecia hairy or setose ... 4
Apothecia smooth or slightly downy ... 7
4. Hairs rather inconspicuous but seen quite easily under a microscope . 5
Hairs conspicuous, setiform ... 6
5. Asci with thickened subapical ring and vertical slit down to this ring, polysporous ... *Ascozonus*
Asci operculate, 8-spored ... *Cheilymenia*
6. Asci 8-spored, a number to each apothecium ... *Lasiobolus*
Asci polysporous, very-large, usually only 1, only rarely 2 or 3, to each apothecium ... *Trichobolus*
7. Walls of asci staining blue in iodine solution (J+) ... 8
Walls of asci not staining blue (J−) ... 10
8. Apothecia usually large and always more than 7 mm diam. ... *Peziza*
Apothecia never more than 4 mm diam., usually smaller ... 9
9. Apothecia pale tangerine or flesh-coloured ... *Iodophanus*
Apothecia white, grey, violet or purplish brown ... *Thecotheus* (see also young *Ascobolus*)
10. Asci thick-walled below a subapical ring, opening by a slit .... *Thelebolus*
Asci not so ... 11
11. Apothecia always very small and never more than 0.2 mm diam., asci polysporous ... *Ryparobius*
Asci mostly 8-spored; species of *Coprotus* with polysporous asci have larger apothecia ... 12
12. Apothecia very small, just groups of asci surrounded by paraphyses, arising from a basal pad ... *Ascodesmis*
Apothecia not so, excipulum always present ... 13
13. Apothecia often goblet-shaped, margin projecting above disc and often inturned, yellowish brown, frequently with purplish tints ... *Fimaria*

Apothecia not so ... 14
14. Apothecia orange, with soft flesh made up of large globose cells some of which project and make the outer surface granular ..... *Coprobia*
Apothecia not so, if orange then outer surface not granular ..... *Coprotus* (see also *Ascophanus*)
15. Apothecia with long stalks arising from small black sclerotia *Martininia*
Apothecia short-stalked, cup-shaped, arising from blackened stromatic areas ... *Lanzia*
Apothecia sessile, pulvinate, without stroma ... *Pezizella*

Ascobolus

Apothecia having tips of asci projecting well above the surface, with their dark purple to black contents contrasting strongly with the much paler, often yellowish disc. Asci broad, operculate, walls J+ or J−, spores in two or three rows not cohering to form a single mass. Ascospores ellipsoid or spherical, dark purplish, walls smooth or verrucose, in some species with fine, pale lines forming a network or appearing as longitudinal, sometimes anastomosing striae.

KEY

Ascospores spherical ... 1
Ascospores broadly ellipsoid ... 2
1. Ascospore walls verruculose, without lines ... *brassicae*
Ascospore walls with lines which sometimes anastomose ..... *crosslandii*
2. Ascospores mostly 50–80 long ... *immersus*
Ascospores not more than 17 long ... 3
Ascospores more than 17 but less than 50 long ... 6
3. Ascospores with wrinkled coats, paraphyses swollen to 15–18 at apex ... *rhytidisporus*
Not so ... 4
4. Fine lines on mature ascospore walls forming a reticulum ..... *carletonii*
Lines as longitudinal, occasionally anastomosing striae ... 5
5. Disc bright greenish yellow, margin prominent, distinctly crenulate ... *crenulatus*
Disc olive green, margin prominent but not crenulate ..... *cervinus*
Disc brownish yellow, margin not prominent ..... *minutus*
6. Ascospore walls without striae ... 7
Ascospore walls with striae ... 10
7. Ascospore walls coarsely warted ..... *stictoideus*
Ascospore walls irregularly warted, with large unpigmented areas ... *degluptus*
Ascospore walls smooth or finely granular ... 8
8. Ascospores up to 17 wide ... *elegans*
Ascospores 10–13 wide ... 9

9. Disc sulphur yellow, dark outer wall of apothecium furfuraceous or warted ..... *boudieri*
   Disc yellowish green, dark outer wall of apothecium smooth .... *mancus*
10. Ascospores mostly less than 20 long and 10 wide 11
    Ascospores mostly more than 20 long and 10 wide 12
11. Apothecia distinctly stalked ..... *lignatilis*
    Apothecia sessile ..... *denudatus*
12. Both disc and outer surface of apothecia with pinkish or purplish tints ..... *roseopurpurascens*
    No pinkish or purplish tints to apothecia 13
13. Apothecia 0.3–1 mm diam., obconical or urceolate, disc whitish, outer surface yellowish brown ..... *albidus*
    Apothecia larger, not obconical, at first yellowish green or olivaceous 14
14. Apothecia not more than 3 mm diam., rather thin, substipitate ..... *perplexans*
    Apothecia up to 5 mm diam., and 0.8 mm thick, furfuraceous on the outside ..... *furfuraceus*

Ascobolus albidus Crouan (Fig. 305)
Apothecia obconical or urceolate, 0.3–1 mm diam., disc white or whitish, outer surface yellowish brown, smooth, without margin. Ascospores 20–40 × 10–15. On dung of cow, horse, sheep, rabbit, etc.

Ascobolus boudieri Quélet (Fig. 306)
Apothecia up to 0.6 mm diam., more or less pyriform, disc sulphur yellow, outer surface brown or dark brown, warted or furfuraceous, especially the upper part. Ascospores 20–25 × 10–13. On dung of cow, horse and rabbit.

Ascobolus brassicae Crouan (Fig. 307)
Apothecia up to 2 mm diam., with prominent, often crenulate margin, disc white to pale pinkish brown, outer surface whitish or pale golden brown. Ascospores pale purple, 10–15 diam., warts on wall often rather widely spaced. On dung of fox, rabbit and small rodents, especially common, according to Malcolm Clark, on mouse dung associated with grass debris. It can be found under almost every large tussock of *Deschampsia caespitosa* and other tussock-forming grasses.

Ascobolus carletonii Boud. (Fig. 308)
Apothecia up to 1 mm diam., without prominent margin, disc white, outer surface white or whitish, furfuraceous towards base. Ascospores 13–17 × 7–8.5. On dung of capercaillie and grouse.

Ascobolus cervinus Berk. & Br. (Fig. 309)
Apothecia up to 1.5 mm diam., with prominent margin, disc and outer surface olive green. Ascospores 14–16 × 8–9. On deer dung.

Ascobolus crenulatus P. Karsten. (Fig. 310)
Apothecia up to 2 mm diam., with prominent crenulate margin, disc greenish yellow, outer surface greenish yellow to pale olivaceous, furfuraceous. Ascospores 9–15 × 6–8. On dung of pheasants and other large birds, deer, dog and rabbit.

Ascobolus crosslandii Boud. (Fig. 311)
Apothecia up to 2 mm diam., with irregularly toothed margin, disc yellowish green, outer surface same colour becoming darker with age. Ascospores 11–13.5 diam. On dog dung.

Ascobolus degluptus v. Brummelen (Fig. 312)
Apothecia up to 0.5 mm diam., without distinct rim, disc greyish white, outer surface whitish to pale brown. Ascospores 28–35 × 16–18, pigment often forming a cap at each end. On dung of rabbit, sheep and goose.

Ascobolus denudatus, described under 'Fungi on Soil', is rarely found on dung. Ascospores 17–21 × 8–9.5.

Ascobolus elegans J. Klein (Fig. 313)
Apothecia up to 0.5 mm diam., without a margin, disc yellowish green or yellowish brown, outer surface golden brown to brown. Ascospores 22–30 × 12–17. On horse, cow, rabbit and goose dung.

Ascobolus furfuraceus Pers. (Fig. 314)
Apothecia up to 5 mm diam., margin sometimes furfuraceous or toothed, disc yellowish green, outer surface at first the same colour but becoming ochraceous or brown, whitish furfuraceous. Ascospores 18–30 × 10–15. On dung of cow, deer, horse, rabbit, etc.

Ascobolus immersus Pers. (Fig. 315)
Apothecia up to 1.5 mm diam., without a margin, disc yellow or greenish yellow, outer surface golden brown or greenish brown. Ascospores 45–80 × 25–40. On dung of cow, horse, sheep, dog, rabbit, etc.

Ascobolus lignatilis Alb. & Schw. (Fig. 316)
Apothecia up to 12 mm diam., thick-stalked, with fimbriate or crenulate margin, disc dirty yellow or yellowish green, outer surface similarly coloured, furfuraceous. Ascospores 17–20 × 8.5–10. On cow dung and manure heaps.

Ascobolus mancus (Rehm) v. Brummelen (Fig. 317)
Apothecia up to 0.4 mm diam., without a margin, disc yellowish green, outer surface olivaceous or dark brownish green, smooth. Ascospores 18–24 × 10–12. On horse and rabbit dung.

Ascobolus minutus Boud. (Fig. 318)
Apothecia up to about 1 mm diam., without a margin, disc brownish

yellow, outer surface same colour as disc or brown, smooth. Ascospores 12–15 × 7–8.5. On dog and rabbit dung.

Ascobolus perplexans Massee & Salmon (Fig. 319)
Apothecia up to 3 mm diam., margin somewhat toothed, disc greenish yellow, outer surface greenish yellow to brown. Ascospores 20–25 × 10–13. On dung of deer, horse and sheep.

Ascobolus rhytidisporus v. Brummelen (Fig. 320)
Apothecia up to 0.6 mm diam., without a margin, disc hyaline or watery white, outer surface hyaline above, pale golden brown towards base. Ascospores 12–16 × 7–11. The wrinkled coat of the ascospore and swollen tips of paraphyses clearly distinguish this recently described species. On dung of mice and voles.

Ascobolus roseopurpureus Rehm (Fig. 321)
Apothecia up to 2 mm diam., margin somewhat toothed or lobed, disc and outer surface with pinkish or purplish tints. Ascospores 18–30 × 10–13. On dung of cow, deer, horse, sheep and rabbit.

Ascobolus stictoideus Speg. (Fig. 322)
Apothecia about 0.5 mm diam., without a margin, disc very pale olivaceous, outer surface similar or watery white. Ascospores 26–32 × 15–17. On dung of cow, deer, horse, sheep and rabbit.

Ascodesmis
Apothecia solitary or gregarious, hyaline to brown, often forming crusts, globose, very small, 50–250 diam., without an excipulum, just groups of protuberant asci surrounded by paraphyses and arising from a pad of basal cells. Asci broadly clavate, obliquely operculate, mostly 8-spored, walls thin, J−. Ascospores spherical or broadly ellipsoid, without guttules, when mature pale brown with darker markings, ridges, spines, etc.

KEY

Ascospore walls ornamented with a reticulum formed of prominent ridges ..... *microscopica*
Ascospore walls without a true reticulum 1
1. Ascospore walls bearing spines often broadened at their tips and seldom anastomosing ..... *nigricans*
Ascospore walls with a conspicuous simple or branched ridge plus isolated or joined warts and spines ..... *porcina*

Ascodesmis microscopica (Crouan) Seaver (Fig. 323)
Ascospores 11–15 × 8–13. Paraphyses plentiful. On dung of dog, goat, rabbit and rat.

Ascodesmis nigricans v. Tieghem (Fig. 324)
Ascospores 10–12 × 8–10. Paraphyses plentiful. On dung of dog, donkey, goat, sheep, etc.

Ascodesmis porcina Seaver (Fig. 325)
Ascospores 11–14 × 7–11. Paraphyses few. On pig dung.

Ascophanus
Most species have been removed from this genus but there still remain a few in the *British Ascomycotina* check list. Descriptions of these are included here although they cannot be separated in the key from *Coprotus*. Apothecia small, 2 mm or less diam., sessile, without hairs. Asci operculate, walls J−. Paraphyses slender, often swollen at their tips, sometimes forked. Ascospores ellipsoid, hyaline or subhyaline, smooth, with or without guttules.

KEY

Apothecia bright orange or red ..... *bresadolae*
Apothecia pale smoky grey ..... *cinerellus*
Apothecia chestnut brown ..... *misturae*

Ascophanus bresadolae Boud.
Apothecia 1–2 mm diam., densely gregarious, becoming expanded, convex, without a margin. Asci up to 240 × 10–12. Ascospores 12–15 × 7–8. Paraphyses straight or curved, often branched, septate, 2 wide, 3–4 at apex, filled with yellow granules. On rabbit dung.

Ascophanus cinerellus (P. Karsten) Speg.
Apothecia 0.3–0.4 mm diam. Asci 38–42 × 6–7. Ascospores 5–7 × 3–4. On cow dung.

Ascophanus misturae (Phill.) Boud. (Fig. 326)
Apothecia up to 1 mm diam., smooth. Asci up to 160 × 13. Ascospores 13–16 × 8–11. Paraphyses forked, with swollen tips. On dung and manured soil.

Ascozonus
Apothecia less than 1 mm diam., off-white or pale yellowish with white fringing hairs. Asci clavate, with a thickened ring some way below the apex and a vertical slit opening down to this ring, polysporous, walls J−. Ascospores hyaline, smooth, narrowly ellipsoid or broadly fusiform. Paraphyses slender.

KEY

Asci with not less than 128 spores ..... *subhirtus*
Asci with 16 spores ..... *parvisporus*

Asci with 32 spores ..... *crouanii*
Asci broad with about 96 spores ..... *leveilleanus*
Asci with 64 spores 1
1. Apothecia with thick, stem-like base made up of wart-like cells ..... *woolhopensis*
Apothecia sessile, flattening ..... *cunicularius*

Ascozonus crouanii (Sacc.) Boud.
Ascospores 12 × 3. On rabbit dung.

Ascozonus cunicularius (Boud.) Hansen
Ascospores navicular, 9–14 long. On rabbit dung.

Ascozonus leveilleanus (Phill.) Boud. (Fig. 327)
Ascospores 11–14 × 5–7. On mouse dung, Sept.–Feb.

Ascozonus parvisporus (Renny) Boud.
On rabbit dung.

Ascozonus subhirtus (Renny) Boud.
On rabbit dung.

Ascozonus woolhopensis (Renny) Boud. (Fig. 328)
Ascospores 12–14 × 3–4. Hairs 25–30 × 7–8. On dung of rabbit, water vole, etc.

Cheilymenia
For description of genus see under 'Fungi on Soil'.

KEY

Ascospores with yellowish contents, more than 26 long ..... *pulcherrima*
Ascospores hyaline, not more than 26 long 1
1. Hairs not lobed or forked at base ..... *raripila*
Hairs lobed or forked at base 2
2. 3- to 5-armed stellate hairs on lower part of the excipulum..... *stercorea*
No stellate hairs ..... *fimicola*

Cheilymenia fimicola (de Not. & Bagl.) Dennis (Fig. 329)
Apothecia solitary or gregarious, sessile, 2–6 mm diam., saucer-shaped with flat, orange or reddish orange disc, outer surface paler. Hairs about 500 × 25–30, reddish brown, septate. Ascospores 17–22 × 8–12. Mostly on cow dung, occasionally on horse and rabbit dung.

Cheilymenia pulcherrima (Crouan & H. Crouan) Boud.
Apothecia sessile, 1–2 mm diam., disc orange yellow. Hairs pale brown, 150–250 × 15–20. Ascospores 26–30 × 12–14. On cow dung.

Cheilymenia raripila (Phill.) Dennis (Fig. 330)
Apothecia sessile, 2–3 mm diam., saucer-shaped, yellow, often rather pale.

Hairs tapered, hyaline or very pale, 150–280 long, with rounded base 15–25 wide. Ascospores 22–26 × 12–14. On cow, sheep and rabbit dung.

Cheilymenia stercorea (Pers.) Boud. (Fig. 331)
Apothecia solitary or gregarious, sessile, 1–3 mm diam., disc orange, outer surface paler. Hairs on upper part and margin pale brown, pointed, septate, up to 750 × 10–20. Ascospores 18–20 × 9–11. On cow and deer dung.

Coprobia granulata (Bull.) Boud. (Fig. 332)
Apothecia 1–3 mm diam., sessile, often in large conspicuous groups, orange, with thick, soft flesh made up of large, globose or subglobose cells some of which protrude and make the outer surface granular. Asci operculate, walls J−. Ascospores ellipsoid, hyaline, smooth, without guttules, 16–18 × 7–8. Paraphyses swollen to 9–13 at apex and filled with orange granules. Very common on cow dung.

Coprotus
Apothecia small, not more than 1.5 mm diam., sessile, discoid or pulvinate, excipulum much reduced. Asci operculate, tips often protuberant, walls J−. Ascospores ellipsoid, hyaline or pale yellow, smooth, some with a guttule. Paraphyses simple or branched, septate, sometimes curved at apex.

KEY

Apothecia yellow to orange, paraphyses with yellow or orange granules or sap 1
Apothecia translucent to white, drying faintly yellowish, no pigment in paraphyses 2
.1. Ascospores less than 15 long ..... *aurorus*
Ascospores 15–18 long ..... *ochraceus*
2. Asci 8-spored 3
Asci with more than 8 spores 5
3. Asci broadly clavate, paraphyses swollen to 5–8 at apex ..... *granuliformis*
Asci cylindrical, paraphyses never strongly inflated 4
4. Asci less than 55 long, paraphyses filiform and strongly uncinate at apex ..... *glaucellus*
Asci 65–85 long, paraphyses slightly inflated and uncinate at apex ..... *lacteus*
5. Asci 16-spored, spores 11–16 × 8–10 ..... *sexdecemsporus*
Asci 64-spored ..... *niveus*
Asci 32-spored 6
6. Ascospores less than 13 long, asci 50–110 long ..... *albidus*
Ascospores more than 13 long, asci longer ..... *rhyparobioides*

Coprotus albidus (Boud.) Kimbrough
Apothecia 0.2–0.4 mm diam. Asci broadly clavate, 50–100 × 20–30.

Ascospores 10–12.5 × 5–7.5. Paraphyses 5–6 wide at apex. On dung of cow, rabbit, mice and other small rodents.

Coprotus aurorus (Crouan & H. Crouan) Kimbrough *et al.* (Fig. 333)
Apothecia 0.2–0.5 mm diam., yellow to bright orange. Asci 65–90 × 10–15. Ascospores hyaline to pale yellow, 12–14 × 6–8.5. Paraphyses mostly branched, 4–5 wide at apex. On cow dung.

Coprotus glaucellus (Rehm) Kimbrough (Fig. 334)
Apothecia up to 1.2 mm diam. Asci 40–55 × 8–12. Ascospores 7.5–9 × 4.5–5.5. On dung of deer, rabbit, etc.

Coprotus granuliformis (Crouan & H. Crouan) Kimbrough (Fig. 335)
Apothecia 0.2–0.6 mm diam., margin slightly darker than disc.
Asci 40–55 × 15–30. Ascospores 9–15 × 6.5–9.5. On cow, deer and sheep dung.

Coprotus lacteus (Cooke & Phill.) Kimbrough *et al.* (Fig. 336)
Apothecia 0.2–0.5 mm diam. Asci 65–85 × 12–20. Ascospores 8–10 × 5–6.5. On dung of cow, deer, horse, rabbit and sheep.

Coprotus niveus (Fuckel) Kimbrough *et al.*
Apothecia 0.2–0.5 mm diam. Asci broadly clavate, up to 130 × 60. Ascospores 8–12 × 4–7. On dung of cow, horse and rabbit.

Coprotus ochraceus (Crouan & H. Crouan) Larsen
Apothecia pale yellow to orange, up to 1.5 mm diam. Asci cylindrical, up to 150 × 12–18. Ascospores 14–18 × 9–11. Paraphyses swollen at tip to 4–5 and slightly uncinate. Found especially on cow dung.

Coprotus rhyparobioides (Heimerl) Kimbrough
Apothecia 0.1–0.3 mm diam. Asci up to 175 × 75. Ascospores 13.5–17.5 × 7–8. Paraphyses slightly uncinate. Mainly on dung of deer and rabbit.

Coprotus sexdecemsporus (Crouan & H. Crouan) Kimbrough (Fig. 337)
Apothecia 0.5–1 mm diam. Asci up to 140 × 30. Ascospores hyaline to slightly yellowish, 11–16 × 8–10. Paraphyses strongly uncinate at tip. On cow, horse, deer and rabbit dung.

Fimaria
Apothecia often almost goblet-shaped, especially when young, sometimes hemispherical, turbinate or saucer-shaped, up to 4 mm diam. but mostly smaller, yellowish brown or brown, often with a purplish tint, outer surface smooth or downy; margin projecting above disc and frequently remaining inturned for some time, entire, toothed or fimbriate. Asci operculate, walls J−. Ascospores remaining hyaline or becoming yellowish brown, smooth, mostly without guttules, ellipsoid or oblong-ellipsoid. Paraphyses slender, sometimes branched, seldom swollen at tip. Excipulum of large cells with pigment between them.

KEY

Ascospores over 20 long ..... *hepatica*
Ascospores less than 10 long ..... *equina*
Ascospores 10–13 long ..... *porcina*
Ascospores over 13 but less than 20 long 1
1. Disc chestnut brown, ascospores 15–17 × 7–8.5 ..... *cervaria*
Disc yellow or yellowish, ascospores not more than 16 long 2
2. Ascospores 14–16 × 9–10.5, paraphyses swollen to 3–5 at apex *leporum*
Ascospores 13–15 × 7.5–8.5, paraphyses not swollen at apex . *theioleuca*

Fimaria cervaria (Phill. ex Stevenson) v. Brummelen (Fig. 338)
Apothecia up to 3 mm diam. and 1 mm high, margin crenulate or fimbriate, disc chestnut brown, sometimes slightly purplish, outer surface similarly coloured, overlaid by a network of brownish hyphae. Paraphyses branched towards apex. On deer dung.

Fimaria equina Graddon (Fig. 339)
Apothecia up to 4 mm diam., margin entire, dark, disc and outer surface pinkish clay coloured. Ascospores 9 × 4.5. On horse dung.

Fimaria hepatica (Batch) v. Brummelen (Fig. 340)
Apothecia hemispherical or saucer-shaped, up to 4 mm diam., with crenulate or toothed margin, disc rather pale to mid-reddish brown, dotted with tips of asci, outer surface reddish or purplish brown. Ascospores 20–37 × 10–13. On rabbit and small rodent dung.

Fimaria leporum (Alb. & Schw.) Velen.
Apothecia 1–3 mm diam., disc yellowish, outer surface reddish or purplish brown. Ascospores sometimes with one guttule when young. On rabbit and hare dung.

Fimaria porcina Svrček & Kubička
On pig dung.

Fimaria theioleuca (Rolland) v Brummelen (Fig. 341)
Apothecia 1–4 mm diam., turbinate, substipitate, margin entire or fimbriate, disc pale yellow, outer surface golden brown or brown. Ascospores becoming pale yellowish brown. Paraphyses narrow, often branched. On deer, rabbit and sheep dung.

Iodophanus carneus (Pers.) Korf (Fig. 342)
Apothecia sessile, pulvinate, 0.5–1.5 mm diam., pale tangerine to flesh-coloured; whole disc with protuberant asci stains blue in Melzer's iodine solution. Asci very large, clavate, walls J+. Ascospores ellipsoid, mostly 20–26 × 11–13, hyaline, minutely verruculose, without guttules. Paraphyses septate, sometimes forked, up to 8 thick at apex. On dung of deer, rabbit, sheep, etc.

Lanzia cuniculi (Boud.) Dumont (Fig. 343)
Apothecia cup-shaped, about 2 mm diam., pale brown, with short, thick stalks arising from blackened stromatic areas on the surface of rabbit pellets. Asci inoperculate, pore distinct, J+. Ascospores ellipsoid or almost so, hyaline, smooth, 13–15 × 4–5, with two guttules, finally 1-septate. Paraphyses slender, straight.

Lasiobolus papillatus (Pers.) Sacc. (Fig. 344) (commonly called *L. ciliatus*)
Apothecia up to 0.8 mm diam., sessile, turbinate or cup-shaped, soft-fleshed, yellow or pale yellowish orange, bearing on the outside hyaline, thick-walled, pointed, non-septate, setiform hairs up to 500 × 35. Asci operculate, 8-spored, walls J−. Ascospores ellipsoid, hyaline, smooth, without guttules, mostly 17–22 × 9–13. Paraphyses slender, forked. On dung of cow, deer, horse, rabbit, sheep, etc.

Martininia panamaensis (Whetzel) Dumont & Korf (Fig. 345)
Apothecia up to 3 mm diam., cup-shaped, long-stalked, disc pale olivaceous or greyish, outer surface reddish brown, smooth, stalk reddish brown, arising from a small (2–3 mm), round, black sclerotium immersed in the dung. Asci inoperculate, 8-spored. Ascospores ellipsoid, greyish brown, smooth, 4–4.5 × 2. Paraphyses slender. On horse dung.

Peziza
For description of genus see under 'Fungi on Soil'.

KEY

	Ascospores verruculose to spinulose, with one guttule	*pleurota*
	Ascospores smooth, without guttules	1
1.	Ascospores 13–16 × 7–9	*fimeti*
	Ascospores 15–22 × 9–10	*bovina*
	Ascospores 20–24 × 11–14	*vesiculosa*

Peziza bovina Phill. (Fig. 346)
Apothecia sessile, 8–12 mm diam., disc somewhat umbilicate, umber with paler margin. On cow, deer and rabbit dung.

Peziza fimeti (Fuckel) Seaver
Apothecia substipitate or sessile, up to 2 cm diam., pale brown. On cow, deer, mouse and rabbit dung.

Peziza pleurota Phill. (Fig. 347)
Apothecia 2.5–3 cm diam., often elongated on one side and split on the other (*Otidea*-like), fresh yellowish brown to umber brown. Paraphyses swollen and brown at their tips. Ascospores mostly 15 × 8. On cow dung.

Peziza vesiculosa Bull. (Fig. 348)
Apothecia often in clusters, up to 10 cm diam., cup-shaped or bladder-shaped, strongly incurved at the margin which may split, fragile, disc fawn, ochraceous or yellowish brown, outer surface paler, sometimes whitish, furfuraceous. On dung or manure heaps especially where there is plenty of straw.

Pezizella albula (Phill.) Sacc. (Fig. 349)
Apothecia solitary or clustered, sessile, pulvinate, up to 1 mm diam., fresh yellowish brown, becoming reddish brown to blackish brown on drying, with raised, paler margin. Asci inoperculate, 8-spored. Ascospores ellipsoid or ellipsoid-fusiform, some slightly clavate, hyaline, 7–14 × 2–3. Paraphyses slender. On horse and rabbit dung.

Ryparobius
Apothecia always very small, never more than 0.2 mm diam., disc flat or convex. Asci polysporous, containing 32–250 spores, usually with a large operculum which may secede, walls J−. Ascospores ellipsoid to oblong or ovoid, hyaline, smooth, small or very small, never more than 6–7 × 3–4. Paraphyses mostly slender, septate, sometimes few or absent.

KEY

	Asci containing 32 spores	*brunneus*
	Asci containing more than 32 spores	1
1.	Apothecia reddish 0.1–0.2 mm diam.	*myriosporus*
	Apothecia not reddish, mostly smaller	2
2.	Apothecia transparent, yellowish, rarely brownish yellow, asci 77–90 × 38–40	*pachyascus*
	Apothecia brown or brownish, asci 118–130 × 50	*polysporus*
	Apothecia grey or grey to tawny	3
3.	Apothecia grey to tawny, asci 40–48 × 24	*dubius*
	Apothecia grey, asci 50–100 × 18–20	*dubius* var. *lagopi*

Ryparobius brunneus Boud.
Apothecia densely crowded together, very small, smooth, tawny or yellowish brown. Asci oblong, broad, pointed at the base, 32-spored. Ascospores minute, oblong-ovoid, subacute at each end, hyaline. Paraphyses septate, only slightly swollen at apex. On dung of cow, donkey and grouse.

Ryparobius dubius Boud.
Apothecia scattered, very small, often immersed, somewhat globose, grey to tawny, disc convex, pellucid, without margin. Asci oblong to oblong-ovoid, rounded or somewhat attenuated at base, 40–45 × 24, with 100–128 spores. Ascospores ellipsoid, subacute at ends, hyaline, about 6 × 4. Paraphyses few or none. On dog, rabbit and sheep dung.

Ryparobius dubius var. *lagopi* Boud. ex Rea
Apothecia about 150 diam., pale greyish, with only 10–15 asci. Asci

cylindric-clavate, 55–100 × 18–20, with 128 spores. Ascospores hyaline, smooth, 6–7 × 3.5–4. Paraphyses longer than asci, swollen to 4 at apex. On grouse dung.

Ryparobius myriosporus (Crouan) Boud.
Apothecia mostly crowded together, 100–200 diam., becoming reddish, smooth towards margin, disc flat. Asci protuberant, very large, ovoid, scarcely attenuated at base, containing 150–250 spores, operculum large. Ascospores minute, ovoid, acute at apex, at first filling the ascus then forming a ball at its tip. On dung of dog, sheep and horse.

Ryparobius pachyascus Zukal ex Rehm
Apothecia gregarious, globose depressed, 60–100 diam., partly immersed, thin, diaphanous, yellowish, rarely brownish yellow, with 1–16, mostly 4–8, asci. Asci ovoid, pointed at base, 77–90 × 38–40, polysporous. Ascospores ovoid, hyaline, 6 × 3. On rabbit and horse dung.

Ryparobius polysporus (P. Karsten) Speg.
Apothecia scattered or gregarious, sessile, smooth, brown or brownish, 100 diam., with only a few asci. Asci ellipsoid, 118–130 × 50, containing 150–200 spores. On cow, horse, rabbit and hare dung.

Saccobolus
Apothecia superficial, sessile, rarely more than 1 mm diam., pulvinate or lenticular, without a distinct margin. Asci large, clavate, truncate, operculate, their almost black tips protruding above the surface of the disc at maturity, walls J+. Ascospores mostly 8, 4 in one species, firmly stuck together both in the ascus and when projected from it, mostly purplish brown or black, with smooth or rough walls.

KEY

Asci 4-spored ..... *quadrisporus*
Asci 8-spored 1
1. Apothecia white, not changing colour 2
Apothecia yellow, amber or ochraceous 3
Apothecia other colours, if at first white, soon becoming pale violet or wine-coloured 4
2. Walls of apothecia covered with tapered squamules formed from clumps of septate hyphae ..... *caesariatus*
No such squamules formed ..... *globuliferellus*
3. Spores verruculose, 16–23 × 7.5–9.5 ..... *citrinus*
Spores smooth, 20–30 × 10–15 ..... *glaber*
4. Apothecia hyaline, ascospores black, their walls coarsely verrucose or covered with lumps of pigment ..... *beckii*
Apothecia and ascospores not so 5

5. Apothecia at first white, soon becoming pale violet or wine-coloured 6
Apothecia darker, either brown or dark violet to almost black 7
6. Spore balls subspherical, 20–26 × 18–20, ascospore walls verrucose ..... *dilutellus*
Spore balls elongated, 28–38 × 10–13, ascospore walls smooth ..... *depauperatus*
7. Apothecia brown ..... *obscurus*
Apothecia violet to almost black ..... *versicolor*

Saccobolus beckii Heimerl (Fig. 350)
Apothecia up to 0.7 mm diam., solitary or gregarious, hyaline except for dark contents of asci. Asci 8-spored, spore clusters compact, 40–60 × 18–24. Ascospores ellipsoid-fusiform, eventually black, 18–23 × 9–12, coarsely verrucose or surface covered with large lumps of pigment. On cow and deer dung.

Saccobolus caesariatus Renny ex Phill. (Fig. 351)
Apothecia up to 0.2 mm diam., solitary, white, outer surface covered with tapered squamules formed from clumps of septate hyphae. Spore clusters compact, 38–44 × 15–17, with thick gelatinous coat. Ascospores fusiform-ellipsoid, eventually violaceous brown, 16–18 × 7–9, walls smooth to minutely punctate. On rabbit and sheep dung.

Saccobolus citrinus Boud. & Torrend (Fig. 352)
Apothecia solitary or gregarious, 0.1–0.3 mm diam., all ochraceous yellow or with disc lemon yellow. Spore clusters 44–50 × 14–17. Ascospores ellipsoid-fusiform, with truncate ends, some slightly asymmetrical, eventually brownish purple, 16–23 × 7.5–9.5, walls finely verruculose. On dung of cow, horse, sheep, etc.

Saccobolus depauperatus (Berk. & Br.) Hansen (Fig. 353)
Apothecia scattered or gregarious, up to 0.2 mm diam., white to pale wine or violaceous including disc. Spore clusters compact, 28–38 × 10–13 Ascospores ellipsoid-fusiform, or ellipsoid, some asymmetrical, eventually dark purplish brown, 10–15 × 5–7.5, smooth or minutely granular. On cow, deer, horse, sheep and rabbit dung.

Saccobolus dilutellus (Fuckel) Sacc. (Fig. 354)
Apothecia scattered or gregarious, up to 0.5 mm diam., entirely white or with disc pale violet. Spore clusters compact, subspherical, 20–26 × 18–20. Ascospores eventually brownish purple. 12–14.5 × 6.5–7.5, verruculose, with warts of two sizes. On dung of fox, horse, mouse, pheasant, rabbit, etc.

Saccobolus glaber (Pers.) Lambotte (Fig. 355)
Apothecia solitary or gregarious, up to 1 mm diam., yellow or amber including disc. Spore clusters 50–70 × 15–25 with thick gelatinous coat.

Ascospores fusiform-ellipsoid, eventually purplish brown, 20–30 × 10–15, walls usually smooth. On cow, deer, horse and sheep dung.

Saccobolus globuliferellus Seaver (Fig. 356)
Apothecia scattered, up to 0.4 mm diam., white including disc. Spore clusters subspherical, mostly 18–28 × 15–20. Ascospores ellipsoid, smoky or dark brown, 12–14 × 6–7, verruculose, warts scattered. On horse and rabbit dung.

Saccobolus obscurus (Cooke) Phill. (Fig. 357)
Apothecia gregarious, up to 0.8 mm diam., pale to dark brown, disc usually pale. Spore clusters 25–45 × 14–20. Ascospores ellipsoid, eventually purplish brown, 14–18 × 8–9.5, verrucose, warts variable in size. On goat and rabbit dung, also on sacking.

Saccobolus quadrisporus Massee & Salmon
Apothecia up to 0.7 mm diam., violet to almost black including disc. Asci 4-spored. Spore clusters 40–50 × 15–17. Ascospores ellipsoid, blackish violet, 17–20 × 7–10, smooth except for a more densely pigmented girdle which may be verrucose or reticulate. On goose dung.

Saccobolus versicolor (P. Karsten) P. Karsten (Fig. 358)
Apothecia scattered or gregarious, occasionally up to 2 mm diam., pale to dark violet or almost black. Spore clusters sometimes curved, 40–60 × 15–20. Ascospores ellipsoid-fusiform, somewhat asymmetrical, greyish purple to purplish brown, 14–22 × 7–10, smooth, finely verruculose or with pale lines forming a reticulum. On dung of cow, deer, horse, rabbit, mouse, etc.

Thecotheus
Apothecia pulvinate, discoid or doliiform, not more than 4 mm diam. Asci often protuberant, operculate, with 8 or 32 spores, walls J+. Ascospores large, hyaline, smooth or verrucose, in one species appendaged.

KEY

Ascospores with an appendage at each end which stains strongly with cotton blue ..... *apiculatus*
Ascospores without appendages 1
1. Asci 32-spored ..... *pelletieri*
Asci 8-spored ..... *cinereus*

Thecotheus apiculatus Kimbrough (Fig. 359)
Apothecia 1–1.5 mm diam., doliiform or turbinate, at first white or yellowish, finally purplish brown. Asci 8-spored. Ascospores 15–20 × 8–11, with small appendage at each end. On horse dung.

Thecotheus cinereus (Crouan) Chenant (Fig. 360)
Apothecia up to 4 mm diam., pale grey. Ascospores rough-walled, 30–40 × 15–18. On dung.

Thecotheus pelletieri (Crouan) Boud. (Fig. 361)
Apothecia up to 1 mm diam., white or pale lilac. Ascospores ellipsoid-fusiform, thick-walled, 30–35 × 14–17. Paraphyses forked, swollen at tip to 5–7. On cow and horse dung.

Thelebolus
Apothecia not more than 0.5 mm diam., subglobose or turbinate. Asci broad, thick-walled below the subapical ring, thin-walled above it, opening by a slit, walls J−, containing 8 to many spores. Ascospores ellipsoid, hyaline, walls smooth or minutely verruculose.

KEY

Asci one or very few, each with more than 64 spores 1
Asci several, each with not more than 64 spores 2
1. Asci up to 250 × 150, with about 1000 spores ..... *stercoreus*
Asci not more than 140 × 80 ..... *nanus*
2. Asci 8-spored, up to 50 × 15 ..... *microsporus*
Asci 32-spored, 30–55 × 16–18 ..... *caninus*
Asci with 48–64 spores, 60–100 × 20–30 ..... *crustaceus*

Thelebolus caninus (Auersw.) Spooner (Fig. 362)
Apothecia gregarious, subglobose, about 0.1 mm diam., pale fawn or brown, with 8–13 asci. Ascospores 7–9 × 4–4.5, walls minutely verruculose. Paraphyses clavate, swollen at tip to 4–4.5. On old dog dung.

Thelebolus crustaceus (Fuckel) Kimbrough (Fig. 363)
Apothecia gregarious, sometimes confluent, 0.1–0.2 mm diam., subglobose to cup-shaped, greyish brown, disc flat, yellowish brown, asci few. Ascospores 7–10 × 4.5–5.5. Paraphyses few. On dung of cow, dog, horse, etc.

Thelebolus microsporus (Berk. & Br.) Kimbrough (Fig. 364)
Apothecia gregarious, 0.25 mm diam., yellowish brown, containing several asci. Ascospores 7–8 × 3.5–4. Paraphyses swollen at tip to 5–6 and containing green sap. On cow, deer and rabbit dung.

Thelebolus nanus Heimerl (Fig. 365)
Apothecia subglobose, up to 0.15 mm diam., hyaline, with one or few asci. Asci 50–140 × 30–80, polysporous. Ascospores 5–6 × 3. Paraphyses slender, septate. On dung of cow, rabbit and grey squirrel.

Thelebolus stercoreus Tode (Fig. 366)
Apothecia 0.2–0.4 mm diam., yellowish brown, normally with only the one very large ascus. Ascospores 5–7 × 3–4. On dung of cow, deer, horse, etc.

Trichobolus
Apothecia discoid or turbinate, less than 0.5 mm diam., whitish or pale, bearing on the outer surface stiff, thick-walled, septate, setiform hairs, and each usually containing one very large ascus, although exceptionally two or three asci may be formed. Asci with 1500–7000 spores, opening by a vertical slit or tear, walls J−. Ascospores without guttules, hyaline, thin-walled.

KEY

Asci 150–200 × 125–150, hairs up to 150 long ..... *sphaerosporus*
Asci up to 520 × 470, hairs up to 600 long ..... *zukalii*

Trichobolus sphaerosporus Kimbrough (Fig. 367)
Setiform hairs 100–150 long, 7–10 wide at base. Ascospores spherical or subspherical, 9–9.5 × 8.5–9. Paraphyses slender, long and branched. On deer dung.

Trichobolus zukalii (Heimerl) Kimbrough
Setiform hairs 100–600 long, up to 17 wide at base. Ascospores 9–11 × 7–8.5. Paraphyses with a few branches at the apex. On deer dung.

OTHER ASCOMYCETES

KEY TO GENERA

Ascomata with ostioles (perithecia and pseudothecia) 1
Ascomata without ostioles (cleistothecia and gymnothecia) 23
1. Stroma present 2
No obvious stroma 5
2. Stroma forming a thin, dark clypeus around ostioles ..... *Hypocopra*
Stroma forming rather slender black strands, with hairy perithecia attached laterally ..... *Wawelia*
Stroma pulvinate, orange ..... *Selinia*
Stromata erect, dark brown to black 3
3. Stromata each containing a single perithecium, not made up of a distinct stalk and head, often fasciculate ..... *Bombardioidea*
Stroma made up of a distinct stalk and head with several or many perithecia 4
4. Heads spherical, dark brown, with protruding perithecia .. *Podosordaria*
Heads with flat white tops dotted with dark ostioles of immersed perithecia ..... *Poronia*
5. Ascospores with three or more cells 6
Ascospores with two cells 7
Ascospores one-celled 14

6. Ascospores all lying longitudinally parallel to one another in the ascus, brown ..... *Sporormia*
Ascospores not so arranged, brown ..... *Sporormiella*
7. Ascospore cells both hyaline 8
Ascospore cells both dark brown 9
Ascospores with wide brown cell and narrow hyaline cell (pedicel) .. 12
8. Ascospores ellipsoid, 12–14 long ..... *Nectria*
Ascospores fusiform to clavate, over 35 long ..... *Pyxidiophora*
9. Ascospores neither strongly constricted at the septum nor with a germ slit in each cell ..... *Arnium*
Ascospores either strongly constricted at the septum or with a germ slit in each cell 10
10. Ascospores with a long hyaline appendage at each end .... *Zygospermella*
Ascospores with sheath but without gelatinous appendages 11
11. Pseudothecia with dark setiform hairs around their necks ..... *Trichodelitschia*
Pseudothecia without setiform hairs ..... *Delitschia*
12. Ascospores long remaining cylindrical, vermiform and hyaline, with many guttules, an appendage at each end; brown cell developing late ..... *Cercophora*
Not so, brown cell and hyaline pedicel soon differentiated 13
13. Short hairs agglutinated to form more or less triangular scales ..... *Schizothecium*
Hairs of various kinds formed but not forming scales ..... *Podospora*
14. Ascospores hyaline or very pale 15
Ascospores brown, often very dark 17
15. Perithecia without dark hairs or hyaline setae ..... *Phomatospora*
Perithecia with hairs or setae 16
16. Perithecia with long dark hairs surrounding ostiole, ascospores limoniform ..... *Lophotrichus*
Perithecia with necks crowned by splayed out hyaline setae, ascospores oblong-ellipsoid ..... *Viennotidea*
Perithecia covered with soft hairs, ascospores cylindrical, flexuous, with appendages ..... *Cercophora*
17. Ascospores reniform, 3–5 × 2–3, extruded in reddish brown tendrils ..... *Microascus*
Ascospores not reniform, larger 18
18. Short necks of perithecia fringed with rigid hyaline setae ... *Melanospora*
Setae or hairs, when present, brown or dark brown 19
19. Ascospores large, with thick, tapered, gelatinous appendage at each end or fringed ..... *Arnium*
Ascospores neither appendaged nor fringed 20
20. Perithecia normally smooth or softly and sparsely hairy 21
Perithecia markedly hairy or setose in the upper part 22

21. Perithecia orange or golden brown, ascospores with pore at each end ..... *Sphaerodes*
    Perithecia not orange or golden brown, ascospores with basal pore only, often with gelatinous sheath ..... *Sordaria*
22. Setae on perithecia simple, short, ascospores flattened, with lateral germ slit ..... *Coniochaeta*
    Setae long, often coiled or branched, ascospores usually with one or two pores but no germ slit ..... *Chaetomium*
23. Ascomata mostly with rather thin, fragile, pseudoparenchymatous walls (cleistothecia) 24
    Ascomata made up of a loose network of hyphae, often with characteristic appendages (gymnothecia) 34
24. Ascospores 2-celled 25
    Ascospores 1-celled 26
25. Cells of ascospore equal, both golden brown ..... *Heleococcum*
    Cells of ascospore unequal, large brown cell and much smaller hyaline one ..... *Zopfiella*
26. Ascomata comprising a spherical, pale brown head on top of a slender stalk ..... *Onygena*
    Ascomata (cleistothecia) sessile 27
27. Cleistothecial wall smooth 28
    Cleistothecial wall bearing hairs or appendages 31
28. Ascospores spherical 29
    Ascospores not spherical 30
29. Ascospores 9–13 diam., walls smooth ..... *Orbicula*
    Ascospores 12–25 diam., walls spinulose ..... *Roumegueriella*
30. Ascospores 3 × 2–2.5, walls spinulose ..... *Anixiopsis*
    Ascospores 5.5–6 × 3.5–4, walls smooth ..... *Pseudeurotium*
31. Cleistothecia more or less hairy all over, ascospores 9 × 6 or larger ..... *Thielavia*
    Cleistothecia with few appendages or these arising from the base, ascospores smaller 32
32. Ascospores spherical, 3 diam., cleistothecia black, with spirally twisted and compressed, hyaline appendages at base ..... *Pleuroascus*
    Ascospores not spherical, cleistothecia different 33
33. Cleistothecia reddish brown, with few hyaline hair-like appendages coiled at their tips ..... *Arachnomyces*
    Cleistothecia black, shining, with long, dark brown, thick-walled, uncinate hairs ..... *Kernia*
34. Peridial hyphae dark brown with radiating spine-like branches, appendages dark brown, uncinate ..... *Myxotrichum*
    Peridial hyphae and appendages not dark brown 35
35. Appendages absent 36
    Appendages present 38

36. Peridia poorly developed, hyphae thin-walled ..... *Arachniotus*
    Peridia well-developed, more complex 37
37. Thick-walled, branched and anastomosing peridial hyphae ending in straight or curved teeth or spines ..... *Gymnoascus*
    Peridial hyphae rough-walled, few hyphal tips spine-like ..... *Pseudogymnoascus*
38. Appendages uncinate ..... *Gymnoascus*
    Appendages comb-like with recurved teeth ..... *Ctenomyces*
    Appendages spiral, cells of peridial hyphae dumb-bell-shaped ..... *Arthroderma*

Anixiopsis fulvescens (Cooke) de Vries var. *stercoraria* (Hansen) de Vries (Fig. 368)
Cleistothecia sessile on a mat of white mycelium, globose, brown, smooth, 0.2–0.25 mm diam., walls pseudoparenchymatous. Asci numerous, subspherical, 8-spored. Ascospores broadly ellipsoid, 4–5 × 3–5, hyaline, then pale yellow or yellowish brown, walls appearing finely spinulose but under high magnification seen to be reticulately sculptured. It has a *Chrysosporium* conidial state. On dung.

Arachniotus
Gymnothecia with poorly developed walls composed of loosely interwoven, thin-walled hyphae, without appendages. Ascus walls evanescent. Ascospores subspherical or lenticular, with equatorial ring or furrow, hyaline, yellow or reddish brown. Ascocarp initials consist of two spirally entwined gametangia of equal size.

KEY

Gymnothecia brick red or reddish orange ..... *ruber*
Gymnothecia white ..... *candidus*
Gymnothecia golden brown ..... *confluens*
Gymnothecia lemon yellow ..... *citrinus*

Arachniotus candidus (Eidam) Schroeter
Gymnothecia globose, snow-white, 0.5–2 mm diam. Ascospores ellipsoid or subspherical, hyaline, smooth, 3–4 × 2–2.5. Mycelium bears arthroconidia and chains of chlamydospores. On dung and feathers.

Arachniotus citrinus Massee & Salmon
Gymnothecia deep lemon yellow, often confluent, 0.5–1 mm diam.; surrounding mycelium also lemon yellow. Ascospores lenticular, 5–6 × 3–4.5, smooth, lemon yellow, thickened at each end and along a median band. On dung.

Arachniotus confluens (Sartory & Bainier) Apinis (Fig. 369)
Gymnothecia 20–80 diam., usually in hairy clumps, up to 0.5 mm diam.

Ascospores lenticular or angular, golden or reddish brown, 5–6.5 × 3.5–4, walls minutely verruculose. On cat and dog dung.

Arachniotus ruber (v. Tieghem) Schroeter (Fig. 370)
Gymnothecia 0.5 mm diam., solitary or confluent. Ascospores subglobose with equatorial furrow, red or orange-red, smooth, 4.5–5.5 × 3.5–4.5. On cat and rat dung.

Arachnomyces nitidus Massee & Salmon (Fig. 371)
Cleistothecia superficial, solitary or gregarious, globose, reddish brown or brown, less than 1 mm diam., wall pseudoparenchymatous, bearing a few long, simple, hair-like, hyaline appendages coiled at their tips. Asci 8-spored. Ascospores oblate, smooth, hyaline, 3.5–5 × 2–3. On dung.

Arnium
Perithecia flask-shaped, with a semi-transparent or dark wall, covered with delicate hairs; in some species with thicker, straight hairs arising from the darker neck region. Asci with 4 to many spores, with or without an apical ring. Ascospores broadly fusiform or ellipsoid, mostly rather large, dark brown, occasionally 1-septate, with 1 or 2 germ pores and in all species except *A. macrothecum* a thick, tapered, gelatinous appendage at each end.

KEY

Asci many-spored, spores 18–22 × 12–14.5 ..... *leporinum*
Asci normally 8-spored 1
1. Necks of perithecia with long, straight, setiform hairs 2
Necks without long setiform hairs 3
2. Ascospores fringed, mostly 42–55 × 20–30 ..... *macrothecum*
Ascospores appendaged at each end, mostly 35–40 × 17–20 .. *cervinum*
3. Ascospores not more than 40 long, often asymmetric, appendages longitudinally striate ..... *caballinum*
Ascospores often more than 40 long, symmetrical, appendages not longitudinally striate 4
4. Ascospores uniseriate in ascus ..... *olerum*
Ascospores biseriate or irregularly arranged 5
5. Asci with 4 or 8 spores, ascospores mostly 35–50 × 18–25 ..... *hirtum*
Asci always with 8 spores 6
6. Ascospores not more than 44 long ..... *mendax*
Ascospores not less than 47 long ..... *tomentosum*

Arnium caballinum Lundq. (Fig. 372)
Perithecia up to 1 mm high and 0.5 mm broad, partly immersed, with a few, short, rigid hairs. Ascospores 30–40 × 18–24. On cow, deer and horse dung.

Arnium cervinum Lundq. (Fig. 373)
Perithecia almost 1 mm high and 0.5 mm broad. Rigid hairs up to 250 × 3.5–5. On deer dung.

Arnium hirtum (Hansen) Lundq. & Krug (Fig. 374)
Perithecia about 1 mm high, 0.6–0.7 mm broad. On cow, horse and sheep dung.

Arnium leporinum (Cain) Lundq. & Krug (Fig. 375)
Perithecia up to 1 mm high and 0.6 mm broad. Rigid, septate, brown hairs in neck region up to 300 × 3–5. Gelatinous appendage at each end of ascospore up to 70 × 3–5. On deer, hare, rabbit and vole dung.

Arnium macrothecum (Crouan & H. Crouan) Lundq. (Fig. 376)
Perithecia 0.5–1 mm high, about 0.5 mm broad. Rigid, septate, brown hairs in neck region stuck together in tufts up to 1 mm long. On cow, horse and rabbit dung.

Arnium mendax Lundq. (Fig. 377)
Perithecia up to 1 × 0.5 mm. Ascospores mostly 38–44 × 20–23. Mainly on deer dung, occasionally on that of horse and rabbit.

Arnium olerum (Fr.) Lundq. & Krug (Fig. 378)
Perithecia over 1 mm high and almost 1 mm broad, hairy. Ascospores mostly 40–50 × 25–30. On dung of horse and cow, also on rotting woody herbaceous stems, e.g. cabbage stalks and dead stems of *Angelica sylvestris.*

Arnium tomentosum (Speg.) Lundq. & Krug (Fig. 379)
Perithecia over 1 mm high and almost 1 mm broad. Ascospores mostly 48–58 × 22–30. Occasionally seen on dung but more frequently on rotting woody herbaceous stems.

Arthroderma curreyi Berk. (Fig. 380)
Colonies white or creamy, fluffy or cottony. Gymnothecia more or less spherical, white or yellowish, 0.1–0.5 mm diam., with peridium consisting of a hyphal network. Peridial hyphae composed of short, dumb-bell-shaped cells, their ends swollen, thick-walled and spiny, constricted areas thin-walled and smooth. Appendages few, arising from free ends of peridial hyphae, all spiral, thin-walled, hyaline, septate. Asci 8-spored, 5 × 4–5. Ascospores yellowish in mass, lenticular, smooth, 2.5–3.5 × 2. Sometimes found on dung but more often overgrowing plant debris and even living mosses.

Bombardioidea
Stromata erect, 1–1.5 mm tall, solitary or more commonly in small fascicles, with rooting bases immersed in dung, brown or blackish brown, sometimes rugulose, each containing a single separable perithecium. Asci cylindrical with long, slender stalks, 4-spored or 8-spored, with spores in one row,

apical ring J−. Ascospores ellipsoid to broadly fusiform, at first hyaline, becoming olivaceous to blackish brown, smooth, with germ pores and often a gelatinous sheath.

KEY

Asci 8-spored, spores 20–30 × 10–15 ..... *bombardioides*
Asci 4-spored 1
1. Ascospores 22–34 × 15–20 ..... *serignanensis*
Ascospores 35–42 × 18–24 ..... *stercoris*

Bombardioidea bombardioides (Auersw. ex Niessl) C. Moreau ex Lundq. (Fig. 381)
Stromata nearly 1.5 mm by about 0.5 mm. Ascospores ellipsoid, dark brown, with apical germ pore and 2–5 small basal pores; gelatinous sheath present. On hare, rabbit and deer dung.

Bombardioidea serignanensis (Fabre) Lundq. (Fig. 382)
Stromata up to 1.5 × 0.5 mm. Ascospores blackish brown, broadly ellipsoid or ellipsoid-fusiform, with apical germ pore and 5–7 scattered small pores; gelatinous sheath sometimes present. On rabbit dung.

Bombardioidea stercoris (DC) Lundq. (Fig. 383)
Stromata just over 1 mm high and 0.5–0.75 mm broad. Ascospores blackish brown, broadly fusiform, with apical and basal germ pore and scattered small pores; gelatinous sheath usually present. On deer, rabbit and hare dung.

Cercophora
Perithecia pear-shaped or flask-shaped, with lower part immersed in the substrate, brown, often darker towards the ostiole, mostly covered with slender hairs and sometimes with agglutinated short hairs in the neck region. Asci 8-spored, somewhat clavate, with apical ring J−. Ascospores at first cylindrical, flexuous or bent, hyaline, containing a number of large guttules, appendaged at each end; later swelling at the upper end, a septum then cutting off the swollen cell which turns brown.

KEY

Perithecial neck bearing groups of swollen cells or hairs ..... *mirabilis*
Perithecial neck without such groups 1
1. Perithecia covered with flexuous brown hairs ..... *silvatica*
Perithecia glabrous or covered with white or greyish tomentum ..... *coprophila*

Cercophora coprophila (Fr.) Lundq. (Fig. 384)
Perithecia up to 1 × 0.75 mm, mostly in dense clusters. Ascospores initially

45–65 × 5–6; when mature with swollen cell 18–25 × 9–13; gelatinous appendage at each end up to 50 × 2–3. Mostly on cow dung, occasionally on that of horse, sheep and deer.

Cercophora mirabilis Fuckel (Fig. 385)
Perithecia almost 1 mm by about 0.5 mm, scattered or in small groups; swollen, agglutinated, 1 to 4-septate, obtuse brown hairs in neck region 10–30 × 5–6. Ascospores initially 50–70 × 4–5; when mature, swollen brown cell 15–25 × 10–11; gelatinous appendages up to 50 × 2–3, often disappearing. Mostly on cow dung, rarely on that of horse, sheep and deer.

Cercophora silvatica Lundq. (Fig. 386)
Perithecia about 1 × 0.5 mm, scattered or in small groups. Ascospores initially 40–50 × 3–3.5; when mature with brown cell 14–17 × 7–9. Mostly on deer dung.

Chaetomium
Perithecia clothed, always abundantly around the ostiole, with brown, setiform hairs which may be simple or branched, straight, wavy or spirally coiled, smooth or ornamented. Ascospores are freed from their asci inside the perithecium and emerge through the ostiole to be held by the terminal hairs in large, dark masses. *Chaetomium* species are seldom found on dung except when this is mixed with straw. Eleven species have been found associated with dung during the past 50 years but most of them only once or twice.

KEY

Ascospores quadrangular-lobed in face view ..... *quadrangulatum*
Ascospores not so 1
1. At least some and often all terminal hairs on perithecia repeatedly branched dichotomously 2
At least some and often all terminal hairs circinate or spirally coiled ... 5
No spiral coils and no dichotomous branching of hairs 6
2. Ascospores long and narrow, 9–12 × 2.5–3 ..... *fusum*
Ascospores not so 3
3. Ascospores 12–14 × 8–11 × 7–9 ..... *elatum*
Ascospores smaller, not more than 8 long 4
4. Some terminal hairs long and tapering ..... *funicola*
All terminal hairs repeatedly dichotomously branched ..... *indicum*
5. Ascospores 9–12 × 5–7 ..... *aureum*
Ascospores 7–11 × 7–9 × 4–6 ..... *crispatum*
Ascospores 5–7.5 × 5–6.5 ..... *bostrychodes*
6. Ascospores 12–17 × 7–9, walls often striate ..... *murorum*
Ascospores not more than 12 long, walls not striate 7
7. Ascospores mostly fusiform, 9–11 × 4.5–6 ..... *atrobrunneum*
Ascospores not so, flattened in one plane, 9–12 × 8–10 × 6–7 *globosum*

Chaetomium atrobrunneum L. Ames
Perithecia globose to ovate, olivaceous, often pale, up to 0.15 mm diam., terminal hairs only occasionally branched, straight, slightly curved or wavy, long, tapering, indistinctly septate, 3–4 thick at base, smooth-walled or very nearly so. Asci clavate. Ascospores mostly fusiform with subapical germ pore, greyish brown, 9–11 × 4.5–6. Has been found on rabbit dung.

Chaetomium aureum Chivers
Perithecia globose to ovate, olivaceous, often pale, up to 0.15 mm diam., terminal hairs rather pale golden brown, arcuate, towards the end often circinate or coiled, verrucose, 3–5 thick at base. Asci clavate. Ascospores somewhat navicular, often with a germ pore at each end, 9–12 × 5–7. Recorded on horse and rabbit dung.

Chaetomium bostrychodes Zopf
Perithecia variable in shape, up to 0.4 mm high and 0.25 mm wide, at first rather metallic, steely grey, later black; terminal hairs brown, verrucose, spirally coiled, some with coiled branches, 4.5–6.5 thick; lateral hairs setiform. Asci clavate, long-stalked. Ascospores limoniform or subspherical, hyaline to olivaceous, 5–7.5 × 5–6.5 × 4.5–5.5. On rabbit dung.

Chaetomium crispatum Fuckel
Perithecia spherical, grey to black, up to 0.25 mm diam.; hairs verrucose, 5–8 thick, flexuous at first but tending to become contorted or coiled, especially distally, and with an occasional coiled branch. Asci cylindrical, rather persistent, with spores in one row. Ascospores flattened, broadly ovate in face view, with apical germ pore, 7–11 × 7–9 × 4–6. On dog, fox, mouse and rabbit dung.

Chaetomium elatum Schm. & Kunze (Fig. 387)
Perithecia ovoid, up to 0.5 × 0.4 mm, greyish green or olivaceous; terminal hairs dark brown, verrucose, 4–5 thick at base, repeatedly dichotomously branched. Asci clavate. Ascospores flattened, limoniform in face view, with apical germ pore, dark olivaceous brown, 12–14 × 8–11 × 7–9. On dung, including that of rabbit.

Chaetomium funicola Cooke (Fig. 388)
Perithecia up to 0.2 mm diam., dark olivaceous, with some hairs long, tapering and setiform, others branched, often dichotomously. Asci clavate. Ascospores ovoid or limoniform, 6–8 × 4–5.5. Rarely seen on dung.

Chaetomium fusum L. Ames
Perithecia spherical or ovoid, up to 0.25 × 0.2 mm, blackish olivaceous or cinnamon brown; terminal hairs sometimes simple and setiform, but mostly dichotomously branched, 5–6 thick, dark brown, somewhat verrucose; lateral hairs simple, septate. Asci pyriform or clavate. Ascospores narrowly fusiform or cylindrical, tapered at each end, greyish brown, 9–12 × 2.5–3. Only occasionally found on dung.

Chaetomium globosum Kunze
Perithecia globose or ovoid, brown, olivaceous or greyish green; terminal hairs long, unbranched, mostly flexuous, sometimes slightly coiled, about 4 wide. Ascospores somewhat flattened, limoniform in face view, brown, with rather thick walls, 9–12 × 8–10 × 6–7, with apical germ pore. Has been found on rabbit and sheep dung.

Chaetomium indicum Corda
Perithecia less than 0.2 mm diam.; terminal hairs repeatedly dichotomously branched, brown, verrucose, 5–6 thick at base. Ascospores somewhat flattened, ovate or ellipsoid, dark brown, thick-walled, 6–7 × 4–5 × 3.5–4.5, with single germ pore. Found only occasionally on dung.

Chaetomium murorum Corda
Perithecia ovoid, about 0.2–0.25 mm diam., pale to dark grey, often reddish brown or violet around the ostiole; terminal hairs undulate to arcuate, sometimes circinate at apex, brown, septate, smooth or verrucose, 4–6 thick. Ascospores ellipsoid, 12–17 × 7–9, brown, with apical germ pore; walls often striate. On mouse and rabbit dung.

Chaetomium quadrangulatum Chivers
Superficially resembling *C. bostrychodes* but ascospores quite different, somewhat flattened, quadrangular-lobed in face view, pale olivaceous, 7–7.5 × 6–7 × 4–5. On rabbit dung.

Coniochaeta
Perithecia subspherical, flask-shaped or somewhat conical, at least the upper part setose, dark brown to black, setae dark, mostly short and pointed. Asci with apical apparatus, 8-spored or polysporous. Ascospores one-celled, brown to dark brown, often somewhat flattened and with a lateral germ slit.

KEY

Asci polysporous ..... *hansenii*
Asci 8-spored 1
1. Ascospores in face view 8–9 × 6–7 ..... *leucoplaca*
Ascospores in face view 10–14 × 10–13 ..... *discospora*
Ascospores in face view 12–17 × 6–8 ..... *saccardoi*
Ascospores in face view 17–23 × 13–19 ..... *scatigena*

Coniochaeta discospora (Auersw. ex Niessl) Cain (Fig. 389)
Perithecia 0.2–0.4 mm diam., setae 20–40 long. Ascospores 10–14 × 10–13 × 5–6. On rabbit dung.

Coniochaeta hansenii (Oudem.) Cain (Fig. 390)
Perithecia up to 0.5 × 0.35 mm, setae 60–100 long, 4–5 thick at base. Ascospores 7–8 × 6–7 × 4–5. On rabbit dung.

Coniochaeta leucoplaca (Berk. & Rav.) Cain
Perithecia about 0.2 mm diam., setae 25–30 × 3–5. Ascospores 8–9 × 6–7 × 4, with mucilaginous sheath. On deer dung.

Coniochaeta saccardoi (Marchal) Cain (Fig. 391)
Perithecia 0.3–0.4 mm diam., setae 29–35 × 3–6. Ascospores 12–17 × 6–8 × 4–5. On rabbit dung.

Coniochaeta scatigena (Berk. & Br.) Cain (Fig. 392)
Perithecia about 0.5 × 0.3 mm, setae 40–80 long. Ascospores 17–23 × 13–19 × 7–15. On rabbit dung.

Ctenomyces serratus Eidam (Fig. 393)
Characterised by curved, comb-like appendages with pointed recurved teeth which surround the gymnothecia and arise from the thick-walled peridial hyphae. Gymnothecia 0.1–0.35 mm diam., orange-brown. Asci small, walls evanescent. Ascospores lenticular, pale orange in mass, 3–3.5 × 2–2.5

Delitschia
Pseudothecia up to about 1 mm high, mostly immersed in dung, black, with large necks which protrude above the surface. Asci bitunicate. Ascospores usually large, dark brown when mature, 1-septate, sometimes constricted at septum, with germ slit in each cell, mostly with gelatinous sheaths.

KEY

Asci 256-spored ..... *myriaspora*
Asci 8-spored 1
1. Ascospores less than 20 long 2
Ascospores more than 20 long 4
2. Ascospores 8–10 × 3–4 ..... *perpusilla*
Ascospores 10–20 long 3
3. Ascospores 10–14 × 5–6 ..... *marchalii*
Ascospores 14–18 × 6–10 ..... *niesslii*
Ascospores 18–20 × 6–7.5 ..... *consociata*
4. Ascospores mostly more than 20 wide 5
Ascospores mostly less than 20 wide 6
5. Ascospores 50–65 × 19–23 ..... *furfuracea*
Ascospores 50–75 × 25–35 ..... *winteri*
6. Pseudothecia hairy, ascospores 37–50 × 17–20, not deeply constricted at septum ..... *chaetomioides*
Pseudothecia smooth 7
7. Ascospores 40–55 × 16–21, not deeply constricted at septum ..... *patagonica*
Ascospores 45–55 × 13–16, deeply constricted at septum, one cell usually larger than the other ..... *canina*
Ascospores about 52 × 18, dividing into two parts ..... *didyma*

Delitschia canina Mouton (Fig. 394)
Pseudothecia up to 0.7 × 0.5 mm. Ascospores oblong-ellipsoid, 45–55 × 13–16, constricted at septum, the cells, which are usually unequal in size, separating readily, yellowish brown, becoming dark and opaque. On cow, dog and sheep dung.

Delitschia chaetomioides P. Karst.
Pseudothecia up to 1 mm high, covered with long, flexuous, brown, septate, sometimes branched and mostly rough-walled hairs 3–5 thick. Ascospores oblong-ellipsoid, 37–50 × 17–20, not deeply constricted at septum. On horse and rabbit dung.

Delitschia consociata Mouton
Pseudothecia very small, smooth. Ascospores in two rows, oblong, broadly rounded at ends, 18–20 × 6–7.5, not or only slightly constricted at septum. On deer and rabbit dung.

Delitschia didyma Auersw. (Fig. 395)
Pseudothecia 0.75 mm diam. Ascospores obliquely monostichous, oblong-ovoid, rounded at ends, about 52 × 18, strongly constricted at septum and finally dividing into two parts. On horse, rabbit and hare dung.

Delitschia furfuracea Niessl ex Rehm
Pseudothecia up to 0.8 × 0.6, smooth or with short hairs around the neck. Ascospores ellipsoid-fusiform, flattened on one side, 50–65 × 19–23, slightly constricted at septum. On rabbit, hare, goat and donkey dung.

Delitschia marchalii Berl. & Vogl. (Fig. 396)
Pseudothecia 0.2–0.4 mm diam. Ascospores ellipsoid, 10–14 × 5–6, not constricted at septum. On rabbit, deer and goose dung.

Delitschia myriaspora Breton & Faurel
Pseudothecia up to 0.5 mm diam., sparsely hairy. Ascospores 14–15 × 6–8, ellipsoid, not or only slightly constricted at septum, dark reddish brown. On rabbit and hare dung.

Delitschia niesslii Oud.
Pseudothecia 0.3–0.5 mm diam., neck dome-shaped. Ascospores oblong-ellipsoid, 14–18 × 6–10, slightly constricted at septum, cells not separating. On cow, deer, horse and rabbit dung.

Delitschia patagonica Speg. (Fig. 397)
Pseudothecia smooth, up to 0.7 × 0.6 mm. Ascospores oblong-ellipsoid, 40–55 × 16–21, broadly rounded at ends, scarcely constricted at septum. On cow, deer, horse, sheep and rabbit dung.

Delitschia perpusilla Speg.
Pseudothecia 0.2–0.5 mm diam. Ascospores oblong-ellipsoid 8–10 × 3–4, not constricted at septum. On dung.

Delitschia winteri (Phill. & Plowr.) Sacc. (Fig. 398)
Pseudothecia about 0.5 × 0.4 mm. Ascospores ellipsoid, slightly constricted at septum, 50–75 × 25–35, gelatinous sheath thick in fresh collections. Mostly on dung of rabbit but found also on that of cow and sheep.

Gymnoascus
Gymnothecia globose, up to 0.5 mm diam., yellow, orange or rosaceous to orange brown; peridium a network of thick-walled, branched and anastomosing hyphae terminating in straight or curved teeth or spines; additional uncinate appendages present or absent. Asci 8-spored. Ascospores with smooth or rough walls, 3–5 × 2–4.

KEY

No additional appendages, ends of peridial hyphae with hooked teeth ..... *reesii*
Additional uncinate appendages present 1
1. Peridial hyphae with distinct swollen joints at septa. Ascospores with echinulate walls ..... *californiensis*
Peridial hyphae without distinct swollen joints at septa. Ascospores lenticular with smooth walls ..... *uncinatus*

Gymnoascus californiensis (Orr & Kuehn) Apinis (Fig. 399)
Gymnothecia rosaceous to orange brown.

Gymnoascus reesii Baranetzky (Fig. 400)
Gymnothecia yellow, orange or yellowish brown.

Gymnoascus uncinatus Eidam
Gymnothecia yellow, orange or yellowish brown.

Heleococcum aurantiacum, described under 'Fungi on Soil', has been recorded on dung and is found sometimes on mushroom compost.

Hypocopra
Perithecia large, spherical, immersed, with a variable amount of stromatic tissue around the ostioles. Asci cylindrical with spores in one row, apical ring and plug J+ (blue or red). Ascospores without septa, ellipsoid, dark brown, smooth, with germ slits and thick mucilaginous sheaths.

KEY

Ascospores 9–14 long ..... *parvula*
Ascospores 20–25 long 1
Ascospores more than 25 long 2

1. Stroma between necks of perithecia covered by a mat of blackish brown hairs ..... *equorum*
Stroma at first with white hyphae around black ostioles, later smooth ..... *brefeldii*
2. Ascospores 16–20 wide ..... *merdaria*
Ascospores 19–24 wide ..... *stercoraria*
Ascospores not more than 14 wide 3
3. Ascospores distinctly flattened on one side ..... *planispora*
Ascospores ellipsoid, narrowed towards the ends ..... *stephanophora*

Hypocopra brefeldii (Zopf) Zopf
Perithecia 0.5–1 mm diam. Ascospores ellipsoid, dark olivaceous brown, 23–25 × 12–14. On hare and rabbit dung.

Hypocopra equorum (Fuckel) Winter (Fig. 401)
Perithecia 0.4–0.6 mm diam. Ascospores ellipsoid, dark brown, 20–25 × 10–13. On rabbit dung.

Hypocopra merdaria (Fr.) Fr. ex Kickx (Fig. 402)
Perithecia about 1 mm diam., superficial stroma around necks thin. Ascospores ellipsoid, dark brown, 28–35 × 16–20. On dung of deer, rabbit, sheep, goose, etc.

Hypocopra parvula Griff.
Stroma clypeate or spreading, dark brown or black. Perithecia immersed. Ascospores somewhat flattened on one side, 9–14 × 6–7.

Hypocopra planispora Krug & Cain (Fig. 403)
Stroma clypeate. Perithecia about 1 × 0.5 mm, yellowish brown with black necks 0.2 mm long. Ascospores 25–30 × 10–14, very dark brown. On hare and rabbit dung.

Hypocopra stephanophora Krug & Cain (Fig. 404)
Stromata loosely clustered. Perithecia about 1 × 0.5 mm. Ascospores 26–32 × 13–14, dark brown. On horse dung.

Hypocopra stercoraria (Sow.) Sacc. (Fig. 405)
Ascospores 40–50 × 19–24. On horse dung.

Kernia nitida (Sacc.) Nieuwl. (Fig. 406)
Colonies cottony, usually grey or black but white when there is an abundance of aerial mycelium. Cleistothecia 0.1–0.4 mm diam., black and shining by reflected light, bearing a number of dark brown to black, thick-walled hairs many of which are circinate at the tip, walls smooth or ornamented with warts or rings. Asci 8–15 mm diam., 8-spored. Ascospores without septa, ellipsoid, straw-coloured in mass or somewhat coppery when wet, 4–7 × 3.5–4.5. *Scopulariopsis* conidial state has conidia 4–12 × 2–4.5. On cow dung.

Lophotrichus
Perithecia black, spherical, with short or long necks, hairy; lateral hairs hyaline, septate, tapered to a point; terminal hairs surrounding the ostiole very long and dark. Asci short-stalked, 8-spored. Ascospores without septa, somewhat limoniform, hyaline or very pale, extruded in coppery tendrils.

KEY

Terminal hairs often curved or circinate at tip.
Ascospores 7–10.5 long ..... *ampullus*
Terminal hairs straight, tapered to a point.
Ascospores 6–7.5 long ..... *bartlettii*

Lophotrichus ampullus R. Benj. (Fig. 407)
Perithecia up to 0.25 mm diam., necks up to 0.75 mm long. Terminal hairs up to 1.5 mm long, often twisted, dark greyish brown, encrusted. Ascospores limoniform, 7–10.5 × 5.5–7.5. On goat dung.

Lophotrichus bartlettii (Massee & Salmon) Malloch & Cain (Fig. 408)
Perithecia up to 0.3 mm diam., short-necked. Terminal hairs up to 1.5 mm long, black, septate. Ascospores somewhat variable in shape, often sublimoniform, 6–7.5 × 5–5.5. On rat dung.

Melanospora brevirostris, described under 'Fungi on Fungi', has been recorded several times on dung.

Microascus longirostris Zukal (Fig. 409)
Perithecia superficial or partly immersed, spherical, black, 0.2–0.4 mm diam., with cylindrical necks up to 0.3 mm long, sparsely beset with pointed hairs. Asci spherical, 8-spored, walls evanescent. Ascospores without septa, reniform, 3–5 × 2–3, with gelatinous sheaths, extruded in reddish brown tendrils. Conidia of *Scopulariopsis* conidial state 4–7 × 2–3. On dung.

Myxotrichum chartarum (Nees) Kunze (Fig. 410)
Gymnothecia globose, greyish green to blackish brown, up to 1 mm diam.; periderm a network of thick-walled, dark brown hyphae with radiating spine-line branches, appendages dark brown, smooth, uncinate and thickened at their tips. Asci oval, 8-spored. Ascospores ovoid, 4–5 × 2–3, walls finely striate, at first hyaline, becoming pale orange-brown. Conidia 3–8 × 1.5–3.5.

Nectria suffulta Berk. & Curt. (Fig. 411)
Perithecia gregarious, superficial, orange-yellow, about 0.5 mm diam., globose, flattened around the ostiole to form a disc from the margin of which triangular silvery tufts of hyphae up to 0.1 mm long spread out horizontally. Asci 8-spored. Ascospores ellipsoid, 1-septate, hyaline, smooth, 12–14 × 4–5. On horse dung.

Onygena corvina, described under 'Fungi on Bones, Feathers, Paper, etc.', is found occasionally on dung.

Orbicula parietina (Schrader) Hughes (Fig. 412)
Cleistothecia scattered or gregarious, superficial, 1–1.3 mm diam., smooth, purplish brown; walls pseudoparenchymatous, thin, fragile. Asci cylindrical or slightly clavate, with 8 spores in one row, formed over the surface of a cushion at the base of the cleistothecium. Paraphyses mostly branched. Ascospores spherical or subspherical, 9–13 diam., hyaline to yellow, smooth. Walls of asci break down and the cavity of the cleistothecium becomes filled with a yellow powdery mass of spores. Seen occasionally on dung but is not uncommon on other substrata such as compost.

Phomatospora coprophila Richardson (Fig. 413)
Perithecia immersed, 0.15 mm diam., with protuberant conical necks, brown. Asci narrow, cylindrical, with apical ring. Ascospores cylindrical, hyaline, 3.5–4.5 × 2–2.5. On cow, deer and sheep dung.

Pleuroascus nicholsonii Massee & Salmon (Fig. 414)
Cleistothecia gregarious, 0.1–0.2 mm diam., black, fragile, partly immersed in a white to reddish, felted subiculum. Each cleistothecium bears ventrally a number of spirally twisted and compressed hyaline appendages. Asci numerous, spherical, 8 diam., 8-spored, walls diffluent. Ascospores globose, 3 diam., sooty brown in mass. On guinea-pig dung.

Podosordaria
Stromata dark brown to black, with long stalks rooted in dung, crowned by spherical heads 2–4 mm diam., from which protrude a relatively small number of brown or black perithecia. Asci cylindrical with 8 spores in one row; apical ring large, J+. Ascospores large, ellipsoid, dark brown, with thin mucilaginous sheaths.

KEY

Ascospores 13–17 × 6–9 ..... *leporina*
Ascospores 20–26 × 11–15 ..... *tulasnei*
Ascospores 40–60 × 20–30 ..... *pedunculata*

Podosordaria leporina (Ell. & Ev.) Dennis
Perithecial walls brown. On rabbit dung.

Podosordaria pedunculata (Dickson) Dennis
Perithecia blackish brown. On dung and richly manured soil.

Podosordaria tulasnei (Nitschke) Dennis (Fig. 415)
Perithecia blackish brown to black. On rabbit dung.

Podospora

Perithecia occasionally superficial but more commonly partly immersed in dung, mostly obpyriform or flask-shaped, pale brown except for the neck which is dark and often carbonaceous. The body of the perithecium is usually covered, at least initially, with slender, flexuous hairs, and other sorts of hairs are formed in some species. The ascospore when ripe consists of a swollen brown cell, a much narrower hyaline pedicel and gelatinous appendages variously attached. Nearly always on dung.

KEY

Asci 4-spored ..... *pauciseta*
Asci with 16–32 spores ..... *pleiospora*
Asci 64-spored 1
Asci 128-spored ..... *setosa*
Asci 256-spored ..... *curvicolla*
Asci 512-spored ..... *granulostriata*
Asci 8-spored 2

1. Brown cell 15–20 long, appendages very small ..... *collapsa*
   Brown cell 24–34 long, appendages broad, fibrillose ..... *myriospora*
2. Brown cell 17–20 long ..... *fimbriata*
   Brown cell 25–30 long 3
   Brown cell more than 48 long 4
   Brown cell more than 30 but less than 46 long 5
3. Perithecia covered with short, brown, hyaline-tipped hairs ..... *appendiculata*
   Perithecia with flexuous hairs and, to one side of the neck, straight, rigid, brown hairs ..... *ellisiana*
4. Perithecia covered with straight or curved rigid hairs ..... *fimiseda*
   Perithecia smooth or with slender, flexuous hairs ..... *intestinacea*
5. Perithecia with tapered tufts of agglutinated hairs in the neck region ..... *excentrica*
   Perithecia with short, rigid, pointed hairs on upper part ..... *perplexans*
   Perithecia with black protuberances around base of neck ..... *decipiens*
   Perithecial walls smooth or with only slender, flexuous hairs 6
6. Spores without appendages but with narrow sheath around brown cell and pedicel ..... *globosa*
   Appendages one at each end ..... *pyriformis*
   Appendages four at each end 7
7. Ascospores 30–40 long ..... *communis*
   Ascospores 40–45 long ..... *gwynne-vaughaniae*

Podospora appendiculata (Auersw. ex Niessl) Niessl (Fig. 416)

Perithecia superficial, ellipsoid to ovoid, with hardly any neck, 0.7–0.8 × 0.4–0.6 mm, covered with short hairs. Hairs 50–80 × 4, brown, septate, with hyaline, rounded tips. Asci clavate but tapered towards apex, 8-spored. Ascospores with brown cell ellipsoid, 25–30 × 12–15, pedicel 10–14 × 5, appendages at each end persistent, about 40–50 long. On dung of cow, deer, horse, rabbit, hare, etc.

Podospora collapsa (Griffiths) Cain (Fig. 417)

Perithecia partly immersed, obpyriform, about 0.5 × 0.4 mm, upper part covered with long, flexuous, septate, brown hairs 2–2.5 wide. Asci 64-spored. Ascospores with brown cell 15–20 × 10–15, pedicel narrowly clavate, up to 40 long, collapsing; appendages very small and disappearing. On rabbit dung.

Podospora communis (Speg.) Niessl (Fig. 418)

Perithecia partly immersed, obpyriform, 0.7–1 × 0.4–0.5 mm, covered, except the neck, with flexuous, thin hairs which finally disappear; neck up to 0.4 long but often shorter. Asci 8-spored. Ascospores with brown cell 30–40 × 15–25, pedicel 20–40 × 5–6, appendages four at each end and persistent. Mostly on cow dung, occasionally on that of horse and rabbit.

Podospora curvicolla (Winter) Niessl (Fig. 419)

Perithecia immersed except for neck, obpyriform, about 0.5 mm diam., with neck up to 0.3 long, thinly hairy except in the neck region where hairs, up to 0.5 mm long, stick together and form erect, tapered tufts. Asci contain about 256 spores. Ascospores with brown cell 14–17 × 9–11, pedicel 6–8 × 2–3; very short appendage at each end soon disappears. On dung, usually of rabbit and hare, occasionally on that of horse, mouse, coypu, deer, pheasant, etc.

Podospora decipiens (Winter ex Fuckel) Niessl (Fig. 420)

Perithecia partly immersed , obpyriform, about 1 × 0.5 mm, smooth or thinly hairy; neck up to 0.5 mm long, with black protuberances up to 20 × 5 around its base. Asci 8-spored. Ascospores with brown cell 35–42 × 20–22, pedicel 55–75 × 7–8.5, apical appendage about 30 × 15, longitudinally striate or made up of fibrils, basal appendages two or three, attached at point where the pedicel joins the brown cell, resembling apical appendage but smaller, persistent. Mostly on dung of cow and horse but also on that of deer and rabbit.

Podospora ellisiana (Griffiths) Mirza & Cain (Fig. 421)

Perithecia partly immersed, flask-shaped, 0.5–0.7 × 0.3–0.5 mm, covered with thin hairs; neck about 0.2 mm long, with rigid straight hairs often sticking up to one side of the base. Asci 8-spored. Ascospores with brown cell 25–28 × 12–13, pedicel 12–14 × 4, simple appendage at each end about 50 long. On cow and horse dung.

Podospora excentrica Lundq. (Fig. 422)

Perithecia mostly immersed, obpyriform, 0.5 × 0.4 mm, hairy, with rather

short neck, from the base of which arise a few tapered, agglutinated tufts of hairs about 0.2–0.3 mm long. Asci 8-spored. Ascospores with brown cell 30–38 (40) × 18–24, slightly flattened on one side, pedicel 12–16 × 6; one appendage lateral and broadly attached, the other surrounding and extending beyond the pedicel, up to 50 long. On goat dung.

Podospora fimbriata (Bayer) Cain
Perithecia partly immersed, ovoid, 0.4–0.7 × 0.3–0.4 mm, hairs on upper part, below neck, agglutinated, septate, their terminal cells mostly fimbriate. Asci 8-spored. Ascospores with brown cell flattened on one side, navicular in face view, 17–20 × 8–9.5, pedicel 6–8 × 2, collapsing. On goose dung.

Podospora fimiseda (Ces. & de Not.) Niessl (Fig. 423)
Perithecia partly immersed, obpyriform or flask-shaped, covered with straight or curved, rigid hairs up to 0.1 mm long; neck up to 0.4 mm long. Asci 8-spored. Ascospores with brown cell 48–60 × 28–31, pedicel 35–45 × 5, appendages about 150 long, apical one excentric. Mostly on cow and horse dung.

Podospora globosa (Massee & Salmon) Cain (Fig. 424)
Perithecia partly immersed, broadly obpyriform, about 0.7 mm diam., smooth or almost so. Asci 8-spored. Ascospores with brown cell 35–45 × 20–25, pedicel 25–40 × 6–7, brown cell and pedicel surrounded by thin mucilaginous coat. On cow and deer dung.

Podospora granulostriata Lundq.
Perithecia partly immersed, obpyriform, about 1 mm diam., hairy, neck up to 0.3 mm long, bearing rigid, septate, brown hairs up to 120 × 5–6. Asci with over 500 spores. Ascospores with brown cell 20–25 × 12–15, pedicel 12–16 × 5–6; several granular appendages at each end about 50 long. On deer, cow and rabbit dung.

Podospora gwynne-vaughaniae (Page) Cain
Perithecia partly immersed, obpyriform, sparsely hairy. Asci 8-spored. Ascospores with brown cell 40–45 × 22–25, pedicel sheathed, appendages usually four at each end. On rabbit dung.

Podospora intestinacea Lundq. (Fig. 425)
Perithecia partly immersed, obpyriform or flask-shaped, hairy to smooth, up to just over 1 × 0.4–0.6 mm, neck up to 0.4 mm long. Asci 8-spored. Ascospores with brown cell 50–70 × 22–32, pedicel about 30 long, with large, intestine-like, tapered appendages. On cow, horse and sheep dung.

Podospora myriospora (Crouan & H. Crouan) Niessl (Fig. 426)
Perithecia partly immersed, obpyriform, about 1 × 0.5 mm, with neck up to 0.5 mm long, hairy or almost smooth. Asci 64-spored. Ascospores with brown cell 24–34 × 14–19, pedicel 34–40 × 6–7, apical appendage up to 45 long, made up of a number of fibrils; basal appendages two or three, also made up of fibrils and attached where the pedicel joins the brown cell. On dung of cow, horse, rabbit, etc.

Podospora pauciseta (Ces.) Traverso (Fig. 427)
Perithecia partly immersed, obpyriform, about 0.7 × 0.5 mm, smooth or slightly hairy; neck short, with, on one side, tapered tufts of rigid brown hairs. Asci 4-spored. Ascospores with brown cell 35–40 × 17–19, pedicel 16–18 × 3.5–5; with an apical and a basal appendage and several smaller appendages attached to the pedicel. On dung of cow, horse, sheep, goose, rabbit, etc.

Podospora perplexans (Cain) Cain (Fig. 428)
Perithecia partly immersed, obpyriform, up to 1.5 × 0.7 mm, with flexuous hairs below and short, more rigid, pointed hairs on upper part and neck. Asci 8-spored. Ascospores with brown cell 35–45 × 19–24, pedicel 25–40 × 5–6, one apical and one basal appendage up to 150 long. On horse, cow and rabbit dung.

Podospora pleiospora (Winter) Niessl (Fig. 429)
Perithecia partly immersed, obpyriform, up to about 1 × 0.5 mm, covered below with flexuous hairs; neck up to 0.3 mm long, with blackish protuberances up to 20 long around the base. Asci 16 to 32-spored. Ascospores with brown cell 30–36 × 18–23, pedicel 35–60 × 5–8; apical appendage up to 30 × 10, longitudinally fibrillose, basal fibrillose appendages two or three attached where the pedicel joins the brown cell. On dung, including that of cow, deer, horse, pheasant and rabbit.

Podospora pyriformis (Bayer) Cain (Fig. 430)
Perithecia partly immersed, broadly obpyriform, up to 1.5 × 0.7 mm, hairy at first, becoming smooth, neck up to 0.5 mm long. Asci 8-spored. Ascospores with brown cell 35–45 × 23–27, pedicel 30–60 × 9–12; one apical and one basal appendage up to about 150 long. On dung, including that of cow, deer and horse.

Podospora setosa (Winter) Niessl (Fig. 431)
Perithecia partly immersed, obpyriform, up to 0.7 × 0.5 mm, neck up to 0.25 mm long, bearing stiff, brown, septate hairs up to 0.2 mm long. Asci 128-spored. Ascospores with brown cell 18–21 × 11–13, pedicel 10–12 × 2–3, one apical and one basal appendage up to 50 long. On dung, including that of cow, deer, goose, horse, sheep and rabbit.

Poronia punctata (L.) Fr. (Fig. 432)
Fruit body consisting of a stroma shaped rather like a nail, with a black stalk embedded in dung (usually of horse) and a flat white head with black dots, the ostioles of sunken perithecia. Asci with eight spores in one row.

Ascospores bean-shaped, smooth, blackish brown, 18–25 × 8–12, with gelatinous coats.

Pseudeurotium ovale Stolk (Fig. 433)
Cleistothecia superficial, globose, smooth, thin-walled, dark brown, 0.15–0.2 mm diam. Asci subglobose, 8-spored. Ascospores hyaline to brown, smooth, 5.5–6 × 3.5–4. On dung, probably associated with nematodes.

Pseudogymnoascus roseus Raillo (Fig. 434)
Gymnothecia globose, 0.1–0.3 mm diam., pinkish brown; periderm a lax network of hyaline or pale, rough-walled anastomosing hyphae, without appendages but some hyphal ends spine-like. Asci subglobose, in clusters on short stalks, 8-spored. Ascospores oval or fusiform, pinkish or yellowish brown in mass, 2.5–4 × 2–3. On dung.

Pyxidiophora
Perithecia superficial or partly immersed, mostly 0.1–0.2 mm diam., subglobose, with, as a rule, long, tapered necks, translucent, hyaline or ochraceous. Asci clavate, walls deliquescing with age, mostly with 2 to 4 spores. Ascospores large, elongate-fusiform or somewhat clavate, tapered towards the base, septate, guttulate, with gelatinous walls, mostly hyaline but sometimes with brown caps or subapical patches.

KEY

Ascospores 35–43 long ..... *microspora*
Ascospores 45–53 long ..... *petchii*
Ascospores 53–65 long ..... *grovei*

Pyxidiophora grovei (D. Hawksworth & Webster) Lundq. (Fig. 435)
Perithecia pale ochraceous. Ascospores 1 to 2 septate, 53–65 × 4–5. On horse dung.

Pyxidiophora microspora (D. Hawksworth & Webster) Lundq.
Perithecia hyaline. Ascospores 1-septate, 35–43 × 3.5–5. On dog and sheep dung.

Pyxidiophora petchii (Breton & Faurel) Lundq. (Fig. 436)
Perithecia hyaline to pale ochraceous. Ascospores 1-septate, 45–53 × 5–7. On rabbit dung.

Roumegueriella rufula (Berk. & Br.) Malloch & Cain (Fig. 437)
Cleistothecia superficial, subglobose, about 0.3 mm diam., pale to mid golden brown. Asci subglobose, 8-spored, walls deliquescing with age. Ascospores yellow, spherical, 12–25 diam., with rather thick walls which are verruculose or spinulose, each containing one large guttule or oil drop.

Cleistothecia eventually filled with free spores. On dung and other substrata.

Schizothecium
Perithecia partly or wholly sunken in the dung, somewhat pear-shaped, dark brown or blackish brown, with usually short, septate hairs agglutinated to form more or less triangular scales, especially in the neck region. Asci mostly clavate, without an apical ring. Ripe ascospores consisting of a brown cell and a persistent, hyaline pedicel; often also with appendages.

KEY

Asci 4-spored 1
Asci 8-spored 2
1. Brown cell 12–15 × 7–9 ..... *nanum*
   Brown cell 19–24 × 12–14 ..... *tetrasporum*
2. Perithecia with hairs as well as scales 3
   Perithecia with scales or protruding swollen cells only 7
3. Asci broadest at apex, brown cell 22–23 × 11–13 ..... *pilosum*
   Asci tapering towards apex 4
4. Brown cell longer than 30 5
   Brown cell shorter than 30 6
5. Hair tufts or scales over 300 long, brown cell 32–38 × 18–20 ..... *aloides*
   Tufts or scales shorter, brown cell 30–38 × 22–27 ..... *glutinans*
6. Tufts or scales up to 120 long, brown cell 26–30 × 13–16 ..... *conicum*
   Tufts or scales shorter, brown cell 24–28 × 15–19 ..... *squamulosum*
7. Brown cell 17–23 × 10–12 ..... *vesticola*
   Brown cell 22–27 × 11–13 ..... *hispidulum*

Schizothecium aloides (Fuckel) Lundq. (Fig. 438)
On cow dung.

Schizothecium conicum (Fuckel) Lundq. (Fig. 439)
Perithecia about 1 × 0.4 mm. Pedicel 10–20 × 2–3. A long appendage at each end of ascospore and sometimes short ones attached to pedicel. On cow and horse dung.

Schizothecium glutinans (Cain) Lundq. (Fig. 440)
On dung of horse, rabbit and small rodents.

Schizothecium hispidulum (Speg.) Lundq.
On cow, horse and sheep dung.

Schizothecium nanum Lundq. (Fig. 441)
Perithecia about 0.5 × 0.3 mm. Pedicel 7 × 1.5, appendages 10–12 long at each end, soon disappearing. On rabbit and small rodent dung.

Schizothecium pilosum (Mouton) Lundq.
On cow, horse and rabbit dung.

Schizothecium squamulosum (Crouan & H. Crouan) Lundq. (Fig. 442)
On vole and rabbit dung.

Schizothecium tetrasporum (Winter) Lundq. (Fig. 443)
On rabbit, coypu and small rodent dung.

Schizothecium vesticola (Berk. & Br.) Lundq. (Fig. 444)
Perithecia 0.3–0.4 × 0.2–0.25. On horse and small rodent dung.

Selinia pulchra (Winter) Sacc. (Fig. 445)
Perithecia flask-shaped, 0.5–0.7 mm diam., solitary or a few together, embedded in yellowish to reddish orange, irregular, pulvinate stromata 1.5–3 mm diam. Asci large, with 8 or fewer spores. Ascospores without septa, ellipsoid-fusiform, hyaline or yellowish, thick-walled, mostly 50–60 × 20–25, with granular contents. In dung of cow, horse and sheep.

Sordaria
Perithecia mostly grouped close together, for the most part immersed, obpyriform, brown or blackish brown, smooth or softly hairy. Asci cylindrical, 8-spored except in one species, apical ring J−. Ascospores without septa, dark brown to blackish brown, smooth, with basal germ pore, no appendages but in many species with a gelatinous sheath. Mostly on dung.

KEY

	Ascospores less than 10 long	1
	Ascospores more than 10 long, asci always 8-spored	2
1.	Asci 8-spored	*minima*
	Asci polysporous	*polyspora*
2.	Ascospores mostly more than 24 long	3
	Ascospores mostly less than 24 long	4
3.	Ascospores 15–17 wide	*superba*
	Ascospores 17–22 wide	*macrospora*
4.	Ascospores 16–19 wide, without a sheath	*humana*
	Ascospores not more than 15 wide, with sheath	5
5.	Ascospores narrowly ellipsoid or cylindrical, 22–26 × 9–12	*alcina*
	Ascospores ellipsoid or obovoid	6
6.	Ascospores ellipsoid, 17–24 × 10–13	*fimicola*
	Ascospores obovoid to broadly ellipsoid, 18–23 × 13–15	*lappae*

Sordaria alcina Lundq. (Fig. 446)
Perithecia close together, spherical to broadly obpyriform, 0.4–0.5 mm diam., almost smooth. Asci 8-spored. Ascospores narrowly ellipsoid, occasionally cylindrical, with rounded ends, smooth, 22–26 × 9–12, with thick, gelatinous sheath. On dung of cow and deer.

Sordaria fimicola (Rob. ex Desm.) Ces. & de Not. (Fig. 447)
Perithecia close together, obpyriform, about 0.4 × 0.3 mm, sparsely hairy. Asci 8-spored. Ascospores ellipsoid, 17–24 × 10–13, with persistent gelatinous sheath. On dung of cow, deer, horse, rabbit, grey squirrel, etc.

Sordaria humana (Fuckel) Winter (Fig. 448)
Perithecia mostly in groups, 0.4–0.8 × 0.3–0.5 mm. Asci 8-spored. Ascospores broadly obovoid to subspherical, 20–25 × 16–19, without a sheath. On dung of dog, horse, rabbit, etc.

Sordaria lappae Potebna (Fig. 449)
Perithecia mostly in groups, 0.4–0.5 × 0.3–0.4 mm, almost smooth. Asci 8-spored. Ascospores obovoid to broadly ellipsoid, 18–23 × 13–15, with sheath. On dog, horse and sheep dung.

Sordaria macrospora Auersw. (Fig. 450)
Perithecia in groups, subglobose to obpyriform, 0.7 × 0.5–0.6 mm, softly hairy. Asci 8-spored. Ascospores broadly ellipsoid, 28–36 × 17–22, with sheath. On dung of rabbit, hare, horse, etc.

Sordaria minima Sacc. & Speg. (Fig. 451)
Perithecia subglobose, 0.1–0.15 mm diam. Asci 8-spored. Ascospores ovoid to ellipsoid, mostly 8 × 4. On cow dung.

Sordaria polyspora Phill. & Plowr. (Fig. 452)
Perithecia scattered, globose, with a few hairs on the upper part. Asci polysporous with about 128 spores. Ascospores 5–8 × 4–5. On rabbit dung.

Sordaria superba de Not. (Fig. 453)
Perithecia in groups, obpyriform, sparsely hairy, 0.6–0.7 × 0.4–0.5 mm. Asci 8-spored. Ascospores broadly ellipsoid, 25–30 × 15–17, with sheath. On deer and rabbit dung.

Sphaerodes fimicola (Hansen) P. Cannon & D. Hawksw. (Fig. 454)
Perithecia superficial, frequently gregarious, more or less spherical, with very short necks, 0.25–0.5 mm diam., orange or golden brown, smooth or sparsely hairy, occasionally with setae around neck up to 50 long. Asci about 50 × 30, with 4–8 spores. Ascospores without septa, limoniform, dark brown or blackish brown, with a pore at each end, walls reticulate, 15–25 × 10–16. On old dung of sheep.

Sporormia fimetaria de Not. (Fig. 455)
Pseudothecia small, mostly immersed. Asci large, bitunicate. Ascospores dark brown, with 15–19 septa, tending to break up at the septa, each surrounded by a gelatinous sheath, lying longitudinally parallel to one

another in the ascus, 50–58 × 3.5–4.5; cells without germ slits. On dung of herbivores.

Sporormiella

Pseudothecia scattered or gregarious, mostly immersed, subglobose, obpyriform or lageniform, dark brown to black, smooth, with short necks. Asci large, bitunicate, 8-spored, with spores arranged transversely or obliquely. Ascospores dark brown, smooth, with three or more transverse septa.

KEY

Ascospores 12-septate ..... *antarctica*
Ascospores 4-septate ..... *pentamera*
Ascospores 6-septate 1
Ascospores 7-septate 2
Ascospores 3-septate 5
1. Ascospores 70–80 × 16–19 ..... *heptamera*
Ascospores 45–55 × 7–9 ..... *vexans*
2. Ascospores 10–12 wide, third cell larger than the others ..... *corynespora*
Ascospores 6–9 wide, third cell not larger than others 3
3. Ascospores strongly constricted at middle septum and readily fragmenting into two parts ..... *bipartis*
Ascospores not so constricted 4
4. Ascospores 34–40 long ..... *pascua*
Ascospores 40–48 long ..... *octomera*
5. Ascospores not more than 25 long 6
Ascospores more than 25 long 7
6. Ascospores 16–20 × 4–5, perithecia purplish black ..... *nigropurpurea*
Ascospores 16–25 × 5–7, perithecia not purplish ..... *pulchella*
7. Ascospores over 65 long 8
Ascospores not more than 60 long 10
8. Ascospores 91–114 × 18–21, second cell broader than the others ..... *borealis*
Second cell not broader than the others 9
9. Ascospores 65–95 × 15–18, much constricted at septa ..... *megalospora*
Ascospores 90–115 × 15–20 ..... *ovina*
10. Ascospores not more than 35 long 11
Ascospores more than 35 long 12
11. Asci cylindrical, abruptly contracted to a short stalk ..... *minima*
Asci clavate, gradually tapered to a stalk about 30 long ..... *leporina*
12. Ascospores never more than 46 long and 10 wide 13
Ascospores frequently 50–60 long and more than 10 wide 14
13. Ascospores not fragmenting easily, end cells usually longer than central ones ..... *lageniformis*

Ascospores readily fragmenting, end cells not longer than central ones ..... *australis*
14. Ascospores deeply constricted at septa, easily fragmenting .. *intermedia*
Ascospores not deeply constricted at septa, not fragmenting ..... *grandispora*

Sporormiella antarctica (Speg.) Ahmed & Cain (Fig. 456)

Pseudothecia 0.3–0.4 × 0.2–0.3 mm. Ascospores 12-septate, 46–60 × 9–10, fifth cell down larger than the others, germ-slit indistinct, sheath narrow, hyaline. On goose, horse and rabbit dung.

Sporormiella australis (Speg.) Ahmed & Cain (Fig. 457)

Pseudothecia 0.2–0.3 × 0.2 mm. Ascospores 3-septate, 38–46 × 7–8, segments easily separable, germ-slit oblique, sheath broad. On dung of cow, deer, horse, rabbit, sheep, etc.

Sporormiella bipartis (Cain) Ahmed & Cain (Fig. 458)

Pseudothecia 0.25–0.35 × 0.2–0.25 mm. Ascospores 7-septate, 46–58 × 6–7, deeply constricted and easily separating at the middle septum into two 4-celled parts, germ-slit diagonal, sheath narrow. On rabbit, deer and partridge dung.

Sporormiella borealis (Egel.) Krug (Fig. 459)

Pseudothecia 0.4–0.5 × 0.3–0.4 mm. Ascospores slightly curved, 3-septate, 91–114 × 18–21, second cell down rather broader than the others, sheath broad, hyaline. On cow dung.

Sporormiella corynespora (Niessl) Ahmed & Cain (Fig. 460)

Pseudothecia 0.3–0.4 mm diam. Ascospores 7-septate, straight or curved, 50–59 × 10–12, third cell down larger than the others, germ-slit diagonal, sheath narrow. On deer and rabbit dung.

Sporormiella grandispora Ahmed & Cain ex Krug (Fig. 461)

Pseudothecia 0.3–0.4 mm diam. Ascospores 3-septate, cylindric-fusiform, 45–60 × 12–14, germ-slits parallel, sheath broad. On rabbit, cow, deer, horse and sheep dung.

Sporomiella heptamera (Auersw.) Ahmed & Cain (Fig. 462)

Pseudothecia 0.5 mm diam. Ascospores 6-septate, cells swollen, end cells rounded, 70–80 × 16–19. On rabbit dung.

Sporormiella intermedia (Auersw.) Ahmed & Cain (Fig. 463)

Pseudothecia 0.25 mm diam. Ascospores straight or slightly curved, 3-septate, 40–60 × 8–12, strongly constricted at septa, easily separated into parts, germ-slits oblique, sheath present. On cow, deer and rabbit dung.

Sporormiella lageniformis (Fuckel) Ahmed & Cain (Fig. 464)

Pseudothecia 0.25 mm diam. Ascospores 3-septate, constricted at septa,

35–45 × 7–10, end cells tapering, conical, often longer than the two middle cells, sheath present. On old horse dung.

Sporormiella leporina (Niessl) Ahmed & Cain (Fig. 465)
Pseudothecia 0.2–0.25 mm diam. Asci clavate tapering gradually into a stalk about 30 long. Ascospores 3-septate, 30–35 × 5.5–6.5, upper cell tapered, somewhat conical, germ-slits variable, sheath of medium thickness. On rabbit, deer, cow and horse dung.

Sporormiella megalospora (Auersw.) Ahmed & Cain (Fig. 466)
Pseudothecia 0.4–0.5 × 0.3–0.4 mm. Ascospores very dark, 3-septate, 65–95 × 15–18, much constricted at septa, middle cells cylindrical, end cells slightly longer and somewhat conical, sheath thick, persistent. On deer and horse dung.

Sporormiella minima (Auersw.) Ahmed & Cain (Fig. 467)
Pseudothecia 0.1–0.15 mm diam. Asci cylindrical, abruptly contracted below to a very short stalk. Ascospores 3-septate, 28–32 × 5–6, middle cells doliiform, end cells rather longer, easily fragmenting, sheath soon disappearing. On horse, cow, rabbit and fox dung.

Sporormiella nigropurpurea Ell. & Ev. (Fig. 468)
Pseudothecia 0.3 mm diam., embedded in a flattish stroma 0.5–1 cm diam., all dark grey to purplish black. Ascospores straight, 3-septate, dark brown, 16–20 × 4–5, middle cells rounded, end cells longer. On cow dung.

Sporormiella octomera (Auersw.) Ahmed & Cain (Fig. 469)
Ascospores cylindric-fusiform, 7-septate, not fragmenting at the central septum, 40–48 × 7–8. On old deer and rabbit dung.

Sporormiella ovina (Desm.) Ahmed & Cain (Fig. 470)
Pseudothecia lageniform. Ascospores 3-septate, 90–115 × 15–20, central cells cylindrical or doliiform, end cells slightly tapered. On dung.

Sporormiella pascua (Niessl) Ahmed & Cain (Fig. 471)
Pseudothecia 0.15–0.2 mm diam. Ascospores 7-septate, 34–40 × 6–9, more or less cylindrical, slightly constricted in the middle but not fragmenting, end cells slightly longer than broad, others shorter than broad. On cow dung.

Sporormiella pentamera (Oud.) Ahmed & Cain (Fig. 472)
Ascospores 4-septate, 70–80 × 17–19. On dung.

Sporormiella pulchella (Hansen) Ahmed & Cain (Fig. 473)
Pseudothecia 0.25–0.3 mm diam. Ascospores 3-septate, 16–25 × 5–7, cylindric-fusiform, end cells slightly longer than middle cells, bluntly conical, germ-slits oblique, sheath narrow. On cow, deer, rabbit and sheep dung.

Sporormiella vexans (Auersw.) Ahmed & Cain (Fig. 474)
Pseudothecia 0.2 mm diam. Ascospores 6-septate, 45–55 × 7–9, fragmenting easily, end cells longer than wide, others shorter than wide. On deer dung.

Thielavia
Cleistothecia spherical or subspherical, dark-walled, hairy in dung species, asci stalked, broadly clavate, 8-spored. Ascospores non-septate, brown, smooth, with germ-pore at one or both ends.

KEY

Hairs of two kinds, longer ones 1–3 mm long ..... *fimeti*
No hairs more than 30 long ..... *wareingii*

Thielavia fimeti (Fuckel) Malloch & Cain (Fig. 475)
Cleistothecia 0.25–0.5 mm diam., greyish green. Long hairs arising from base of cleistothecium dark brown, smooth, 5–7 thick. Shorter, greyish green, rough-walled hairs evenly distributed over surface. Ascospores dark brown, flattened, more or less ellipsoid but with a protuberance at each end, 13–16 × 10–13 × 8–9. On dung.

Thielavia wareingii Seth (Fig. 476)
Cleistothecia olive to dark brown. Hairs 9–30 × 2.5–3.5, brown, sometimes branched, smooth or rough. Ascospores subspherical or ovoid, smoky brown, 9–14 × 6–9 or, rarely, up to 21 × 13. On rabbit dung.

Trichodelitschia bisporula (Crouan & H. Crouan) Lundq. (Fig. 477)
Pseudothecia scattered, mostly immersed, pyriform, 0.25 mm diam., blackish brown, with rigid, black, setiform hairs, 100–120 long, around their short necks. Asci cylindrical, 8-spored. Ascospores ellipsoid, dark brown, 1-septate, deeply constricted at the septum, smooth, 18–25 × 8–11, each with a thick, hyaline, gelatinous sheath. On dung.

Viennotidea fimicola (Marchal) P. Cannon & D. Hawksw. (Fig. 478)
Perithecia partly immersed, sometimes with only the neck showing, globose to pyriform, up to 0.3 mm diam., yellowish to golden brown or reddish brown, with cylindrical or slightly tapered neck 0.5–3 mm long, crowned at the apex with spreading, hyaline setae about 60 long. Asci subglobose, 8-spored, walls diffluent. Ascospores oblong-ellipsoid, hyaline, 5–8 × 2–3, with germ pore at one end. As they are being extruded, the ascospores collect in shining, pearly globules. On rabbit, deer and cow dung.

Wawelia octospora Minter & Webster (Fig. 479)
Perithecia globose, short-necked, black, hairy, up to 0.5 mm diam., attached laterally to flexuous, black, stromatal strands which develop from the surface of incubated rabbit dung. Hairs covering the lower part of the

perithecium short, those from the upper part long and tangled, pale brown, septate, branched; large dark masses of extruded ascospores are held by these hairs. Asci cylindrical, 8-spored. Ascospores without septa, ellipsoid, slightly flattened on one side, 9–12 × 6–8, dark brown, smooth, with longitudinal germ-slit.

Zopfiella erostrata (Griffiths) Udagawa & Furuya (Fig. 480)
Cleistothecia scattered, superficial, globose, 0.2–0.25 mm diam., black, covered with flexuous, septate, brown hairs 4–5 thick and up to 1 mm long. Asci clavate, 8-spored, walls evanescent. Ascospores each composed of an ellipsoid brown cell 10–12 × 6.5–7.5 with apical germ pore, and a cylindrical, hyaline pedicel 6–8 × 3. On dung of mouse, rabbit and horse.

Zygospermella
Perithecia flask-shaped, black, about 1 mm diam., with erect, rigid, setiform, dark brown hairs in the neck region. Asci 8-spored. Ascospores dark brown, 1-septate, constricted at the septum, with a long, hyaline, gelatinous appendage at each end.

KEY

Ascospores 36–48 × 11–14 ..... *striata*
Ascospores 48–70 × 11–17 ..... *insignis*

Zygospermella insignis (Mouton) Cain (Fig. 481)
Gelatinous appendages hollow, not striate. On cow dung.

Zygospermella striata Lundq.
Gelatinous appendages longitudinally striate or fibrillose. On horse dung.

HYPHOMYCETES

KEY TO GENERA

Conidiophores very short or scarcely distinct from vegetative hyphae 1
Conidiophores long, erect, quite distinct from vegetative hyphae 3
1. Conidia with more than one cell ..... *Monodictys*
Conidia 1-celled 2
2. Conidia hyaline, extruded from hooked phialides ..... *Onychophora*
Conidia dark brown, spherical ..... *Gilmaniella*
3. Conidiophores mononematous 4
Conidiophores synnematous 5
4. Conidia 1-celled ..... *Oedocephalum*
Conidia 2-celled ..... *Arthrobotrys*
5. Synnemata pink ..... *Stilbella*

Synnemata dark with paler, grey-green heads ..... *Mycosylva*
Synnemata dark brown ..... *Doratomyces*

Arthrobotrys superba Corda (Fig. 482)
Colonies white, cottony. Conidiophores simple, up to 500 × 4–5, tapering towards the apex then swelling again to 5–9 and bearing up to 15 conidia on short denticles; frequently then proliferating straight on and forming successively a number of similar heads. Conidia 1-septate, hyaline, 14–27 × 6–11. On dung, often predacious and catching eelworms by adhesive loops and network. Other predacious species seen occasionally on dung are *A. oligospora* Fresen., with conidia mostly 20–30 × 13–16, and *A. conoides* Drechsler, with conidia 25–45 × 10–13.

Doratomyces
Colonies effuse, grey, brown, blackish brown or black. Erect, dark brown synnemata bear long chains of small, pale brown conidia which vary in shape but are always truncate at the base.

KEY

Conidia with verrucose walls ..... *nanus*
Conidia smooth-walled 1
1. Conidia 3–5 × 2–3 ..... *microsporus*
Conidia larger 2
2. Heads of synnemata spherical or subspherical, conidia rounded at apex ..... *purpureofuscus*
Heads of synnemata ellipsoid or cylindrical, conidia often pointed at apex ..... *stemonitis*

Doratomyces microsporus (Sacc.) Morton & Smith (Fig. 483)
Synnemata up to 600 high, with long, cylindrical or ellipsoid heads. Conidia ovoid with rounded or acutely pointed apex, 3–5 × 2–3. On deer dung.

Doratomyces nanus (Ehrenb.) Morton & Smith (Fig. 484)
Synnemata up to 900 high, with subspherical or ellipsoid heads. Conidia ovoid, 6–8.5 × 5–6, rounded or bluntly pointed at apex, verrucose, truncate base often with a collar. Quite common on dung of deer, mouse and rabbit.

Doratomyces purpureofuscus (Fr.) Morton & Smith (Fig. 485)
Synnemata up to 900 high, with spherical or subspherical heads. Conidia ovoid to oblong, rounded at apex, 5–7 × 3.5–4.5. On dung of deer, pig and rabbit.

Doratomyces stemonitis (Pers.) Morton & Smith (Fig. 486)
Synnemata often more than 1 mm high, with ellipsoid or cylindrical heads. Conidia ovoid, usually pointed at apex, 6–8.5 × 4–4.5. Conidia of an

Echinobotryum state are seen sometimes attached to the sides of the synnemata; they are obpyriform or obturbinate, mucronate, with a broad, flat base, mid to dark brown, verrucose, 9–14 × 5–8 and hang together in clusters. On mouse and rabbit dung.

Gilmaniella humicola Barron (Fig. 487)
Colonies effuse, pale grey to dark blackish brown. Hyphae hyaline and smooth or brown and verruculose or spinulose, often with thick, dark, transverse septa. Conidia acropleurogenous, solitary, dry, spherical, 7–8 (10) diam., dark brown, with smooth, thick walls and a small but distinct pore. On horse dung.

Monodictys asperospora (Cooke & Massee) M. B. Ellis (Fig. 488)
Colonies effuse, velvety, mouse-grey. Conidia clavate or pyriform, sometimes twisted, few-celled, often constricted at septa, verrucose, basal cell pale brown, upper cell mid to dark brown, 10–20 × 7–14. On sheep dung.

Mycosylva clarkii Tulloch (Fig. 489)
Colonies effuse, greyish green with white or bright yellow margin, made up of numerous erect synnemata with powdery heads of conidia. Synnemata up to 2 mm high, with dark stipes and paler, grey-green heads 2–2.5 mm diam. Conidia solitary or in short chains, spherical or broadly ellipsoid, 3–4 diam., hyaline or subhyaline, smooth or minutely verruculose. On dung and manured soil.

Oedocephalum
Colonies white, pale ochraceous or pinkish, often tufted, mealy. Conidiophores erect, usually solitary and unbranched, hyaline, septate, terminating in a swollen, spherical or obovoid vesicle which is often cut off by a septum. Vesicle covered with conidia which are borne on minute denticles. Conidia non-septate, hyaline, pale ochraceous in mass, or slightly pinkish, smooth or verruculose.

KEY

Conidia verruculose, mostly 5–8 × 3–4 ..... *pallidum*
Conidia smooth, 10–20 × 9–14 ..... *glomerulosum*

Oedocephalum glomerulosum (Bull.) Sacc. (Fig. 490)
Colonies effuse, white to pinkish or pale ochraceous. Conidiophores up to 400 × 7–12, vesicle 20–40 diam. Conidia obovoid, ellipsoid or broadly cylindrical, pinkish in mass. On dung of mouse, rat, sheep, etc.

Oedocephalum pallidum (Berk. & Broome) Cost. (Fig. 491)
Colonies mealy, white to pale ochraceous. Conidiophores up to 400 × 7–14, vesicle about 20–30 diam. Conidia ellipsoid to cylindrical, ochraceous buff in mass. On dung of cow, horse, rabbit, hare, etc.

Onychophora coprophila Gams, Fisher & Webster (Fig. 492)
Colonies white. Conidiophores hyaline, short, arising laterally on the hyphae and consisting usually of two or three cells terminating in a hooked phialide. Other similar phialides are borne along the sides. Conidia hyaline, smooth, 3.5–5 × 2–2.5. On rabbit dung.

Stilbella erythrocephala (Ditmar) Lindau (Fig. 493)
This fungus forms upright synnemata with white or pale cream stalks and globose, slimy, orange or pinkish-orange heads. The synnemata are usually 1–2 mm high and composed of very slender filaments closely packed together below but splayed out in the head where they terminate in phialides which produce enormous numbers of conidia. Conidia hyaline 3–5 × 2–3. On old rabbit pellets, often covering much of the surface. It inhibits the growth of other coprophilous fungi such as *Ascobolus* and *Pilobolus*. It is found also on dung of cow, deer and dog.

PHYCOMYCETES

KEY TO GENERA

Sporangia contain at least 2 and usually many spores 1
Only 1-spored sporangioles formed 14
1. Sporangia more or less spherical, spores irregularly arranged, never in one row 2
Sporangia more or less cylindrical, spores always in one row 11
2. Sporangiophores with a main axis terminating in a large sporangium, and lateral branches below this regularly arranged, usually in verticils . 3
Sporangiophores simple or irregularly branched 6
3. Side branches and branchlets more or less straight 4
Branchlets formed on short branches always recurved at their ends (hamate) ..... *Helicostylum*
4. Side branches mostly terminating as setae ..... *Chaetostylum*
Side branches not terminating as setae 5
5. Side branches repeatedly dichotomously branched ..... *Thamnidium*
Side branches simple or occasionally branched ..... *Actinomucor*
6. Sporangiophores at least 4–5 cm long and often much longer, with metallic lustre ..... *Phycomyces*
Sporangiophores always much shorter and without metallic lustre 7
7. Sporangiophores arising from creeping stolons which also bear rhizoids 8
Sporangiophores not arising from creeping stolons 9
8. Sporangiophores arising opposite rhizoids, sporangia spherical, spores often striate ..... *Rhizopus*
Sporangiophores not arising opposite rhizoids, sporangia pyriform, spores not striate ..... *Absidia*

9. Sporangia hyaline ..... *Mortierella*
   Sporangia coloured, usually brown or black 10
10. Sporangiophore terminating in a vesicle which subtends a shining black sporangium ..... *Pilobolus*
    Sporangiophores rapidly elongating and attaching their terminal black sporangia to adjacent substrata ..... *Pilaira*
    Sporangiophores not so, sporangia rarely black ..... *Mucor*
11. Sporangiophore branches recurved or spirally coiled ..... *Dispira*
    Sporangiophore branches when present not recurved or spirally coiled 12
12. Sporangiophores delicate, repeatedly and regularly dichotomously branched ..... *Piptocephalis*
    Sporangiophores stout, not repeatedly dichotomously branched 13
13. Sporangiophore base swollen, with a holdfast ..... *Syncephalis*
    Sporangiophore without a holdfast ..... *Syncephalastrum*
14. Sporangiophores simple 15
    Sporangiophores with branches 16
15. Sporangiferous upper part of sporangiophore a swollen cylinder .... *Mycotypha*
    Sporangiferous upper part of sporangiophore a globose vesicle .... *Rhopalomyces*
16. Ends of many branches setose ..... *Chaetocladium*
    Ends of branches not setose 17
17. Main axis of sporangiophore and each branch terminating in a swollen vesicle ..... *Cunninghamella*
    No such terminal swellings 18
18. Upwardly and inwardly curved branches in a whorl at the apex of each sporangiophore ..... *Kickxella*
    Lateral branches closely septate towards their ends where elongated sporangioles are borne in a comb-like manner ..... *Coemansia*

Absidia

Closely related to *Rhizopus* with rhizoids, stolons and indefinite growth of aerial mycelium. Sporangiophores at intervals along stolons, singly or in small groups, never opposite the rhizoids; they broaden gradually to form a wedge-shaped base to the columella, called an apophysis. The sporangia are pyriform and the walls deliquesce, whereas in *Rhizopus* the sporangia are spherical and the walls fragment. The smaller sporangiospores of *Absidia* never show the striations commonly found in *Rhizopus*.

KEY

Rhizoids poorly developed, spores 3–7 × 2.5–5 ..... *corymbifera*
Rhizoids strongly developed, spores 3–5 diam. ..... *coerulea*

Absidia coerulea Bainier (Fig. 494)

Sporangiophores plentiful, arising from stolons in pairs or whorls of 3 or 4, occasionally branching, up to 500 × 6–12, hyaline then purplish blue to pale brown, smooth or minutely verruculose, septum 10–15 below apophysis. Sporangia pale brown, 20–60 diam., columella hemispherical with small projections. Spores 3–5 diam., spherical, hyaline. Rhizoids pale brown. Found occasionally on dung.

Absidia corymbifera (Cohn) Sacc. & Trott. (Fig. 495)

Sporangiophores up to 450 × 4–12, arising from stolons singly or in whorls, simple or occasionally branched, hyaline to pale golden brown, apophyses minutely verruculose. Sporangia mostly 20–40 diam., hyaline to grey, columella when young often conical with one or two twisted projections. Spores óvoid to subglobose, 3–7 × 2.5–5. Found occasionally on dung.

Actinomucor elegans (Eidam) Benjamin & Hesseltine (Fig. 496)

Stolons and rhizomes branched, up to 25 thick. Sporangiophores 1 cm or more high, mostly arising opposite rhizoids, up to 30 thick, septate, branched, often with a whorl of short branches which may themselves branch, beneath the terminal sporangium; the branches terminate in small sporangia. Sporangia without apophyses, spherical, many-spored, buff by reflected light, dark grey by transmitted light, with smooth or, more often, persistent, spiny walls, terminal ones 80–120 diam., lateral or secondary ones 20–50 diam., columella long ovoid to pyriform. Spores 6–8 diam. Walls of sporangia split and curl back in an irregularly stellate manner. On rabbit dung.

Chaetocladium

Sporangiophores arising singly or in whorls from hyphae, stolons or galls, hyaline to pale yellow, with smooth or rough walls, very variable in length, tapered to their sterile apices, and bearing laterally whorls or clusters of forking branches, some of which terminate in vesicles and bear numerous small, spherical, one-spored, greyish sporangioles on little pegs, others terminate in sterile spines. There are no multispored sporangia. Parasitic on other Mucorales on dung.

KEY

Sporangioles with almost smooth walls, 4–6 (8) diam. ..... *brefeldii*
Sporangioles with distinctly spinulose or echinulate walls, 6–10 (13) diam. ..... *jonesii*

Chaetocladium brefeldii van Tieh. & Le Monn. (Fig. 497)

On *Pilobolus* on deer dung, on *Pilaira* on rabbit dung and on *Mucor mucedo* on horse dung.

Chaetocladium jonesii (Berk. & Broome) Fresen. (Fig. 498)
On various mucoraceous fungi on rabbit dung.

Chaetostylum fresenii van Tiegh. & Le Monn. (Fig. 499)
Sporangiophores hyaline, 1–3 cm high and about 50 thick near base, with smooth or finely striate walls, often, but not always, bearing at the apex a single many-spored, *Mucor*-type sporangium with columella, and laterally a number of smaller, few-spored sporangia. Side branches arise in whorls from swollen parts of main axis; the small sporangia are formed on short stalks arranged in verticils on these branches and the branches then grow on as setae or, very occasionally, end in sporangia. Sporangia terminating main axis 100–200 diam., pale yellow or olivaceous grey. Spores hyaline, ovoid, ellipsoid or irregular, 8–14 (22) × 4–8. Sporangium walls are encrusted and diffluent. On dung and other substrata.

Coemansia
Sporangiophores often yellowish, with a main axis and lateral branches the end parts of which are closely septate and bear on one side, in a brush-like or comb-like manner, numerous separate, elongated sporangioles each on its own little peg.

KEY

Branches arranged spirally on axis, sporangioles 6–11 long ..... *erecta*
Branches arranged on one side only of axis which curves over, sporangioles 16–18 (23) long ..... *scorpioidea*

Coemansia erecta Bainier (Fig. 500)
Sporangiophores up to 4 mm long, 7–14 thick. Sporangioles rounded at apex tapered to a truncate base, 6–9 (11) × 1.5–2.5. Mainly on mouse and bat dung.

Coemansia scorpioidea Linder (Fig. 501)
Sporangiophores up to 2 mm long, 7–9 thick. Sporangioles somewhat inaequilateral, acicular, pointed at each end, 16–18 × 2. On bird (especially duck) dung.

Cunninghamella
Sporangiophores long, hyaline or pale, visible to the naked eye, often branched, with branches in verticils, non-septate, swollen to form a more or less spherical or pyriform, smooth or verrucose vesicle at the apex of the main axis and at the end of each branch. Sporangioles develop singly and cover the surface of each vesicle, they are dry and powdery, pinkish or yellowish in mass.

KEY

Sporangioles with smooth or minutely rough walls ..... *elegans*
Sporangioles with echinulate walls ..... *echinulata*

Cunninghamella echinulata (Thaxter) Thaxter
Sporangiophores up to 1.5 cm high. Terminal vesicles up to 50 diam., lateral vesicles 15–30 diam. Sporangioles globose, 10–14 diam., or ellipsoid to ovoid 15–20 × 8–15, distinctly echinulate. On horse dung.

Cunninghamella elegans Lendner (Fig. 502)
Sporangiophores up to 3 cm high. Terminal vesicles up to 40 diam., lateral ones 10–30 diam. Sporangioles globose 7–11 diam., or ellipsoid to ovoid 9–13 × 6–10. Colonies rather greyish. Recorded occasionally on dung.

Dispira cornuta van Tiegh. (Fig. 503)
Main axis of sporangiophore erect, up to 5 mm long, septate, 10–12 thick, hyaline, bearing at a height of about 2–3 mm from the base up to 5 branches which are themselves sympodially branched, both branches and branchlets tending to be recurved or spirally coiled. Terminal branchlets sterile and tapered to a point. Intermediate lateral, fertile branches bear globose vesicles 10–15 diam., which are covered by sporiferous branchlets 7–9 × 3–5, made up of 2 cells bearing, distally, whorls of 2-spored sporangia. Spores ovoid, 3.5–6 × 2–3, in dry heads. Mostly found on mouse and rabbit dung.

Helicostylum piriforme van Tiegh. (Fig. 504)
Sporangiophores upright, hyaline, 1 mm or more long, 10–30 wide, sometimes bearing at the apex a single, many-spored, *Mucor*-type sporangium and always having laterally a number of smaller sporangia with far fewer spores. Short, thick, lateral branches are formed in one or more verticils from swollen parts of the main axis, and these each bear a number of slender, hamate branchlets bearing at their recurved tips small sporangia. Sporangia terminating main axis up to 180 diam., blackish, with apophysis and columella. Spores ellipsoid, 5–9 × 4–6. On dung of various animals.

Kickxella alabastrina Coemans (Fig. 505)
Sporangiophores shining white or pale cream, up to 2 mm high, 18–20 thick, slightly swollen at the apex around which short, upwardly and inwardly curved branches are formed in a whorl. These branches are dichotomously forked at their tips; they bear on the upper side numerous one-spored sporangioles on short pegs. Sporangioles hyaline, ellipsoid-fusiform, 9–10 (15) × 3–4.5. On dung of horse, small rodents, etc.

Mortierella
Mycelium fine, hyaline, often with smell of garlic. Sporangiophores borne singly or, if grouped, lacking stolons, hyaline, branched or unbranched,

usually tapering, delicate, often not more than 0.5 mm long. Sporangia white, without a columella, wall delicate and may collapse around spores.

KEY

Sporangiophores with a ring of smaller sporangia subtending a large apical sporangium ..... *capitata*
Sporangiophores not so 1
1. Sporangia few-spored, spores 16–25 diam. ..... *reticulata*
Sporangia many-spored, spores smaller 2
2. Spores 4–10 diam. ..... *candelabrum*
Spores 6–10 × 4–6 ..... *bainieri*

Mortierella bainieri Costantin (Fig. 506)
Sporangiophores 2–3 mm high, up to 20 thick at base, with ascending branches tapering to about 8. Sporangia approximately 50 diam., many-spored, walls deliquescing and leaving behind a distinct collar. Spores more or less cylindrical, rounded at ends, 6–10 × 4–6. Occasionally overgrowing other fungi on horse dung.

Mortierella candelabrum van Tiegh. & Le Monn. (Fig. 507)
Sporangiophores richly branched to form a structure resembling an inverted candelabrum, up to 1 mm tall and 50 thick, branches greatly tapered. Sporangia many-spored, walls deliquescing and leaving behind a distinct collar. Spores globose or subglobose, often with oil drops, thin-walled, 4–10 diam. On dung.

Mortierella capitata Marchal (Fig. 508)
Sporangiophores up to 500 × 18–20, with a ring of smaller sporangia subtending the larger terminal sporangium. Spores globose, 8–10 diam., each surrounded by a thick gelatinous coat. On mouse dung.

Mortierella reticulata van Tiegh. & Le Monn. (Fig. 509)
Sporangiophores clustered, about 150 high, tapered, with short lateral branches at right-angles; main axis and branches terminating in sporangia. Sporangia with 2–8 (mostly 4) spores, walls deliquescing and leaving behind a collar. Spores with a finely reticulate wall, 16–25 diam. Found occasionally on dung including that of dog.

Mucor
Sporangiophores solitary or, if grouped, not on stolons, up to 3 cm high, easily visible to the naked eye, hyaline. Sporangia yellowish when young, later often grey, brown or black, with well-developed columella.

KEY

Spores globose 1
Spores ovoid, ellipsoid or cylindric-ellipsoid 2

1. Spores rough-walled ..... *plumbeus*
Spores smooth-walled ..... *globosus*
2. Branched sporangiophores with intercalary gemmae ..... *racemosus*
Sporangiophores without gemmae 3
3. Spores frequently more than 10 long ..... *mucedo*
Spores not more than 10 long 4
4. Sporangiophores of two kinds, tall and short, sporangia up to 200 diam. ..... *saturninus*
Sporangiophores of one type, sporangia not more than 80 diam. 5
5. Mature sporangia yellowish or white ..... *geneviensis*
Mature sporangia dark brownish olive or greyish brown ..... *hiemalis*

Mucor geneviensis Lendner
Sporangiophores over 1 cm high, about 18 thick, hyaline, sparingly sympodially branched. Sporangia up to 80 diam., yellowish or white, smooth, wall deliquescing. Spores hyaline, yellow in mass, twice as long as broad, 6–10 × 3–5 (mostly 8 × 4). On deer and rabbit dung.

Mucor globosus Lendner
Sporangiophores richly branched, up to 2 cm high, about 20 thick. Sporangia golden brown. Spores globose, yellowish, 4–8 diam. On rabbit dung.

Mucor hiemalis Wehmer
Sporangiophores at first simple then sympodially branched, up to 3 cm high. Sporangia mostly 60–70 diam., yellowish to dark brownish olive or greyish brown. Spores in mass dark brown or greenish, 7–8 × 2.5–4.5. Found occasionally on dung.

Mucor mucedo (L.) Fresen. (Fig. 510)
Sporangiophores erect, stiff, unbranched or infrequently with a single branch, 1–3 cm high or occasionally higher, up to 70 thick, hyaline. Sporangia mostly 150–200 diam., yellow or yellowish grey, greyer when dry, wall finely roughened, soon deliquescing. Spores hyaline, greyish yellow in mass, regularly cylindric-ellipsoid, 9–13 × 5–7. On horse, mouse and rabbit dung.

Mucor plumbeus Bon.
Sporangiophores up to 1 cm high, unbranched or branched in a mixed monopodial and sympodial manner. Sporangia brown, seldom more than 100 diam., wall strongly encrusted, dehiscing when dry; apical projections on columella characteristic. Spores globose, pale brownish, with thick, usually rough walls, 4–8 (12) diam. Found occasionally on dung.

Mucor racemosus Fresen. (Fig. 511)
Sporangiophores 0.2–2 cm high, with racemose and sympodial branching, and swellings which form intercalary gemmae. Sporangia about 70 diam.,

yellowish brown, round or oval columella eventually shrivelling. Spores ovoid, 6-9 × 4-7. On mouse dung.

Mucor saturninus Hagem
Sporangiophores of two types, tall (2-3 cm) and short, sympodially branched. Sporangia up to 200 diam., at first yellowish, later grey to black, only those on tall sporangiophores with deliquescent walls. Spores ellipsoid, mostly 7 × 4 (6-8 × 4-6). On deer and sheep dung.

Mycotypha microspora Fenner (Fig. 512)
Sporangiophores in clusters, erect, simple or occasionally branched, sporangiferous upper part swollen, cylindrical, 200-300 × 15-20. One-spored sporangioles borne on short pegs covering swollen part, greyish or brownish in mass, 2-4 diam. Occasionally found on dung.

Phycomyces
Sporangiophores usually without septa, simple, at least 4-5 cm long and often much longer, 50-150 thick, with a metallic lustre. Sporangia up to 500 diam., dark olivaceous to black, columella present, variable in shape. Spores oblong-elliptic to ovoid, rarely globose, rather thick-walled, hyaline to yellowish, smooth.

KEY

Spores 8-13 × 5-7.5 ..... *blakesleanus*
Spores 18-30 × 8-16 ..... *nitens*

Phycomyces blakesleanus Burgeff (Fig. 513)
Sporangiophores dark olivaceous grey. Columella conical, ovate or obovate. Occasionally on dung.

Phycomyces nitens Kunze (Fig. 514)
Sporangiophores steel-blue to brown, finely striate, with droplets adhering to smooth wall, constricted immediately below the sporangium. On dung of cat, rodents, etc.

Pilaira
Sporangia tough-walled, black, with sticky base. Sporangiophores cylindrical, about 25-30 thick, hyaline, not swollen, elongating very rapidly when the sporangium is ripe and placing it in contact with an adjacent blade of grass or other nearby object. The sporangium dehisces by a transverse crack around the base and through this a ring of mucilage is extruded. On making contact with a leaf surface the mucilaginous ring sticks firmly to it, the sporangium becomes detached from its columella and the sporangiophore collapses. Under moist conditions the mucilage absorbs water so that a large sporangial drop may be formed.

KEY

Spores yellowish, 8-10 × 6 ..... *anomala*
Spores hyaline, 12-20 × 6-10 ..... *moreaui*

Pilaira anomala (Ces.) Schroet. (Fig. 515)
Sporangia 100-250 diam., spores oval. On dung of cow, deer, horse, rabbit, squirrel, etc.

Pilaira moreaui Ling Yong
Sporangia 300-400 diam., spores ellipsoid to cylindrical. On cow, horse and rabbit dung.

Pilobolus
Sporangiophores hyaline, glistening, often becoming yellowish, arising from a swollen cell, which is often buried in the dung, and terminating in a large vesicle. On top of each vesicle is a black, shining, flattened, tough-walled sporangium which dehisces by a transverse crack around the base, and through this is extruded a mucilaginous ring or pad which comes to separate the sporangium from its conical columella. The conidiophores are phototropic and bend over towards the light; their walls are often seen to be covered with drops of liquid. The vesicle itself is full of liquid under pressure and acts as a little gun, projecting its sporangium up to 2-2.5 m. The mucilage enables the sporangium to become firmly attached to a grass leaf or other vegetation. If an animal eats the grass, then the sporangium releases its spores into the gut and in this way they pass on to the next lot of dung.

KEY

Spores spherical 1
Spores ellipsoid or cylindrical 2
1. Spores thick-walled, 8-14 diam. ..... *oedipus*
   Spores thin-walled, 12-20 diam. ..... *sphaerosporus*
2. Spores 6-12 × 4-7, hyaline or yellowish ..... *crystallinus*
   Spores 11-20 × 6-10, orange-coloured ..... *kleinii*

Pilobolus crystallinus (Wiggers) Tode (Fig. 516)
Sporangiophores 5-10 mm high, 50-150 thick, swollen base immersed in dung, vesicle 600-1200 × 300-800. Sporangia 100-400 × 100-150. Spores ellipsoid, hyaline or yellowish, 6-12 × 4-7. On dung of deer, horse, rabbit, squirrel, etc.

Pilobolus kleinii van Tiegh.
Sporangiophores 2.5-5 mm high, 100-150 thick, vesicle 500-900 × 400-700, with orange-red contents contracted, ring-like. Sporangia 300-350 × 150-250. Spores ellipsoid to cylindrical, 11-20 × 6-10, orange-coloured, with thin, smooth walls. On dung of various animals including deer, donkey, horse, rabbit, sheep and squirrel.

Pilobolus oedipus Montagne
Sporangiophores 1–3 mm high, 90–120 thick, vesicle 600–850 × 500–650, with thin wall and orange-red contents. Sporangia 300–550 × 150–250. Spores spherical, 8–14 diam., with smooth, thick, 2-layered wall and orange-red contents. On dung.

Pilobolus sphaerosporus (Grove) Palla
Similar to *P. oedipus* but spores 12–20 diam., with thin walls and orange-yellow contents. On dung, uncommon.

Piptocephalis
Sporangiophores delicate, with or without rhizoids, repeatedly and regularly dichotomously branched, with the tips of the end branches slightly swollen and bearing several cylindrical sporangia which contain spores in a single row and eventually break up into one-spored pieces. Heads dry or slimy. Obligate parasites on other fungi, mainly Mucorales on dung. They are attached to their host by appressoria.

KEY

Sporangia always 2-spored ..... *lepidula*
Sporangia often with more than 6 spores (6–11) ..... *cylindrospora*
Sporangia often with more than 2 but less than 6 spores 1
1. Sporangia 2- to 3-spored, end cell bearing sporangia deeply grooved ..... *arrhiza*
Sporangia up to 5-spored 2
2. Rhizoids present ..... *repens*
Rhizoids absent ..... *freseniana*

Piptocephalis arrhiza van Tiegh.
No rhizoids. Dichotomous branches of sporangiophores with many septa, end cells bearing sporangia large, splayed out, deeply grooved. Sporangia with 2 or 3 spores. Spores shortly cylindrical, 6–8 × 4–4.5. On Mucoraceae.

Piptocephalis cylindrospora Bainier (Fig. 517)
No rhizoids. Sporangiophores up to 1.5 cm high, septate. Swollen ends bearing sporangia 6–9 diam., sporangia 20–35, each with up to 11 spores, dry. Spores cylindrical, 4–7.5 × 2–2.5. On Mucoraceae on rabbit dung.

Piptocephalis freseniana de Bary
No rhizoids. Sporangiophores up to 1.5 cm high, 18 thick, swollen ends bearing sporangia obconical with up to 30 small protrusions which subtend the 3- to 5-spored sporangia. Spores 4–8 × 2–4. On rabbit dung.

Piptocephalis lepidula (Marchal) Benjamin
Sporangiophores upright, up to 1 cm high, 6–12 thick; swollen end cells bearing sporangia round, 3–7 diam., with up to 30 two-spored sporangia. Spores ellipsoid, 4–6.5 × 2–2.5. On rabbit dung.

Piptocephalis repens van Tiegh. (Fig. 518)
Sporangiophores upright, with rhizoids, up to 1 cm high, 10–20 thick, septate, when old brownish, striate. Swollen ends bearing sporangia obconical, 15–20 broad, with a small protrusion subtending each sporangium. Sporangia 4 to 5-spored, spores shortly cylindrical, 4–8 × 3–4. On *Mucor mucedo*, etc. on dung.

Rhizopus stolonifer (Ehrenb.) Lind (Fig. 519)
Sporangiophores mostly unbranched, brown, 1–3 mm high, 12–25 thick, arising in groups of 2 to 5 from clumps of forked rhizoids, which are linked together by stolons, i.e. creeping branches. Each sporangiophore bears at its apex a single, at first white, then black, sporangium about 0.1–0.3 mm diam., with a large columella and apophysis. Spores dry, blackish brown, often striate, angular or ovoid, 8–15 (20) × 6–8 (11). Seen occasionally on dung.

Rhopalomyces
Sporangiophores erect, at first hyaline, later golden brown, smooth, without septa, up to about 1 mm high, 10–18 thick, swollen at the apex to form a large vesicle over the surface of which are scattered tapered spicules each bearing at its tip a single sporangiole. Sporangioles ellipsoid or obovoid.

KEY

Sporangioles 35–48 × 12–20 ..... *elegans*
Sporangioles 50–60 × 25–35 ..... *magnus*

Rhopalomyces elegans Corda (Fig. 520)
Vesicles 40–60 diam. On dung and manured soil, also on rotting vegetables.

Rhopalomyces magnus Corda (Fig. 521)
Vesicles 65–75 diam. On dung of sheep, vole and other small rodents; also on the fungus *Auricularia mesenterica*.

Syncephalastrum racemosum Cohn ex Schroet. (Fig. 522)
A large, conspicuous fungus superficially resembling *Mucor*. Sporangiophores up to about 1.5 cm high and 10–15 wide, swelling at the apex to form a vesicle over the surface of which a number of cylindrical sporangia develop. The sporangiophores are at first simple and without septa but eventually branch irregularly and become septate, each branch terminating in a vesicle covered with sporangia. Heads of sporangia grey to brown, 20–70 diam. Spores in a single chain of 5–10 (18) inside each sporangium, globose or ovoid, 2–8 × 4–6. Sometimes on dung but also on many other substrata.

Syncephalis
Sporangiophores stout, each with a 'holdfast' at its base, either unbranched or crowned by a whorl of short branches bearing cylindrical sporangia.

Sporangia arise occasionally directly but mostly from short, often forked branches which develop on the upper part of the sporangiophore.

KEY

Sporangiophores with nodes ..... *nodosa*
Sporangiophores without nodes ..... *depressa*

Syncephalis depressa van Tiegh. & Le Monn.
Sporangiophores solitary or in small fascicles, upright, pale yellowish, up to 0.75 mm high, about 10 thick, rarely branched; swollen apex obconical, up to 40 wide, with a ring of 12–20 very short branches each bearing 2–5 cylindrical sporangia containing 5–12 spores. Spores cylindrical, 4–9 × 2.5–4. On Mucoraceae on dung.

Syncephalis nodosa van Tiegh. (Fig. 523)
Sporangiophores hyaline or pale yellowish, 0.1–0.2 mm high, 5–10 thick, swollen at apex to 20; this bears a ring of very short branches which each subtend 2–5 cylindrical sporangia containing 2–5 spores. Spores barrel-shaped, 8–10 × 4–6. Sporangiophores often have up to three nodes, distinctly swollen. On Mucoraceae on dung.

Thamnidium elegans Link (Fig. 524)
Sporangiophores up to 2 cm high, 30 thick, with terminal normal spherical sporangium, and numerous smaller sporangia (up to 12–14 diam.), without columella, formed some distance below the apex at the ends of terminal branches of a complex dichotomously branched system. Each small sporangium contains up to six spores, 7–12 (15) × 5–8. Sporangia are hyaline to pale grey. On rabbit dung.

FUNGI ON BONES, FEATHERS, PAPER, CLOTH, ETC.

DISCOMYCETES

Cheilymenia cadaverina (Velen.) Svrček
Apothecia 2–4 mm diam., in clusters, thick-fleshed, fuscous. Hairs 200–300 × 15–25, broad at base, tapering gradually, brown, septate. Asci 150–200 × 10–18. Paraphyses filiform, simple, swollen to 8–10 at apex, ochraceous. Ascospores ellipsoid, obtuse, hyaline, smooth, without guttules, 14–22 × 9–15. On hawk and tawny owl pellets.

Iodophanus carneus, described under 'Fungi on Dung', has been found on rotting cloth and old mouldy books.

Peziza linteicola Phill. & Plowr.
Apothecia 1–2 cm diam., sessile, caespitose, cup-shaped, sometimes split down one side, dark brown, margin crenulate, outer surface scurfy. Ascospores ellipsoid, hyaline, smooth, without guttules, 12–15 × 8–10. Swollen tips of paraphyses contain two guttules. On damp, rotting, linen cloth.

Pyronema domesticum, described under 'Fungi on Burnt Ground and Charcoal', occurs also on damp plaster and wallpaper.

Saccobolus obscurus, described under 'Fungi on Dung', has been found also growing on old sacking.

OTHER ASCOMYCETES

KEY TO GENERA

Ascomata with ostioles (perithecia) 1
Ascomata without ostioles 3
1. Perithecia yellow or orange, ascospores 1-septate, hyaline ..... *Nectria*
Perithecia brown or black, ascospores without septa, coloured, usually brown 2
2. Perithecial hairs bearing characteristic short, hyaline or very pale, clavate or pyriform sterile branches ..... *Ascotricha*
Perithecial hairs without such sterile branches ..... *Chaetomium*
3. Ascomata mostly with rather thin, fragile, pseudoparenchymatous

walls (cleistothecia) 4
Walls of ascomata made up of a loose network of hyphae, often with characteristic appendages (gymnothecia) 9
4. Ascospores 4-celled ..... *Preussia*
Ascospores 1-celled 5
5. Ascomata comprising a spherical, pale brown head on top of a slender stalk ..... *Onygena*
Ascomata (cleistothecia) sessile 6
6. Ascospores spherical 7
Ascospores not spherical 8
7. Ascosores 9–13 diam., smooth ..... *Orbicula*
Ascospores 12–25 diam., walls spinulose ..... *Roumegueriella*
8. Ascospores lenticular, walls smooth ..... *Eurotium*
Ascospores broadly ellipsoid, walls finely reticulate, often appearing spinulose ..... *Anixiopsis*
9. Peridial hyphae poorly developed or absent, hyphae thin-walled, no appendages ..... *Arachniotus*
Peridial hyphae well-developed, mostly thick-walled, often with appendages 10
10. Appendages comb-like, with recurved teeth ..... *Ctenomyces*
Appendages mid to dark brown, with numerous short branches in verticils ..... *Actinodendron*
Appendages not so 11
11. Radial branches of brown peridial hyphae forming spines or growing into dark-coloured appendages, often with incurved or circinate tips ..... *Myxotrichum*
Not so 12
12. Peridial hyphae always breaking up at maturity, appendages forming closely wound coils ..... *Shanorella*
Peridial hyphae strongly constricted at septa and rough-walled, not breaking up at maturity 13
13. Peridial hyphae verticillately branched, appendages of two or three kinds ..... *Nannizzia*
Peridial hyphae not verticillately branched, appendages all septate, spiral ..... *Arthroderma*

Actinodendron verticillatum (A. L. Sm.) Orr & Kuehn (Fig. 525)
Gymnothecia globose, up to 3 mm diam. including appendages. Peridial hyphae loosely interwoven, bearing appendages and conidia. Appendages brown to dark brown, septate, narrow, broadening towards the apex to 10–12 and verticillately branched, each verticil with four or eight brown branches up to 15 long, terminating in hyaline, thin-walled hyphae which often break off. Ascus walls diffluent. Ascospores lenticular, yellowish brown, 3–4.5 × 2–3. Conidia 5–13 × 4–6 or subglobose and 1.5–3 diam. On feathers and rabbit bones.

Anixiopsis fulvescens (Cooke) de Vries
Cleistothecia sessile on a mat of white mycelium, globose, brown, smooth, 0.25 mm diam., with pseudoparenchymatous walls. Asci numerous, subspherical, 8-spored. Ascospores broadly ellipsoid, hyaline to yellowish brown, 4.5–7 × 4–6, with reticulately sculptured walls which may appear to be spinulose. On feathers.

Arachniotus hyalinosporus (Kuehn, Orr & Ghosh) Apinis
Peridial hyphae absent, no discrete gymnothecia formed. Asci in groups 20–90 diam. among hyphae, 8-spored, walls diffluent. Ascospores hyaline, pale yellow in mass, smooth, 2.5–3.5 × 2–2.5. Hyphae sometimes forming erect fascicles up to 1 cm long, which may be coloured green. Arthroconidia 5–10 × 2–3 seen occasionally. On owl pellets.

Arthroderma
Colonies white or creamy, fluffy or cottony. Gymnothecia roughly spherical, white, yellowish or buff, with peridium consisting of a hyphal network. Peridial hyphae, composed of thick-walled, mostly spiny cells, either symmetrically constricted and dumb-bell-shaped, or asymmetrically constricted and uncinately branched on the outside of the main hypha. Thin-walled, septate, spiral appendages present. Asci 8-spored, walls diffluent. Ascospores yellowish in mass, lenticular, smooth or minutely verruculose, 2.5–3.5 × 2.

KEY

Peridial hyphae composed of dumb-bell-shaped cells, not uncinately branched on the outside of main hypha ..... *curreyi*
Peridial hyphae uncinately branched on outside of main hypha 1
1. Cells symmetrically dumb-bell-shaped ..... *uncinatum*
Cells with thickenings accentuated on one side only ..... *quadrifidum*

Arthroderma curreyi, described under 'Fungi on Dung', occurs also on feathers, bones, etc.

Arthroderma quadrifidum Dawson & Gentles
Gymnothecia globose, pale buff, 0.4–0.7 mm diam. Peridial hyphae uncinately branched, cells asymmetric, with knobs on one side only, looking like vetebrae. On feathers, etc.

Arthroderma uncinatum Dawson & Gentles
Gymnothecia globose, pale buff, about 0.5–0.8 mm diam. excluding appendages. Peridial hyphae uncinately branched, cells 7–11 × 4–7, symmetrically dumb-bell-shaped. Macroconidia terminal or lateral, fusiform, multiseptate. On woollen cloth, feathers, etc.

Ascotricha
Perithecia solitary, globose or subglobose, always with a distinct neck,

olivaceous brown to black. Terminal hairs arising from the neck simple or branched, geniculate or curved but not spirally coiled, dark brown to black, bearing distinctive, short, hyaline or very pale brown, clavate or pyriform sterile branches. Similar lateral hairs sometimes but not always arise from the wall of the perithecium below the neck. Asci cylindrical, 8-spored, walls diffluent. Paraphyses evanescent. Ascospores uniseriate, pale to dark brown, simple, ellipsoid, sometimes laterally compressed (discoid), with equatorial germ-slit, issuing through the ostiole in a long tendril. With *Dicyma* conidial states.

KEY

Perithecial hairs slender and whip-like, ascospores 5–7 × 3–4.5 ..... *amphitricha*
Perithecial hairs thick, not whip-like 1
1. Perithecia up to 230 diam., ascospores 7–9 × 7–8 × 3.5–5.5 .. *chartarum*
Perithecia not more than 140 diam., ascospores 8–9.5 × 3.5–6 × 3.5–4.5 ..... *lusitanica*

Ascotricha amphitricha (Corda) Hughes (Fig. 526)
Perithecia 150–200 diam. Terminal hairs usually simple, sparsely septate, often 500 or more long, 3.5–5 wide at base, tapering to 2–3, dark brown; hyaline sterile branches up to 7 × 5. Few lateral hairs. Conidia of *Dicyma* state subglobose or pyriform, pale, smooth or minutely verruculose, 4–5 × 3.5–4.5. On paper.

Ascotricha chartarum Berk. (Fig. 527)
Perithecia mostly 140–230 diam. Terminal hairs erect, rigid, geniculate and dichotomously branched, septate, olivaceous brown to blackish brown, 5–6.5 wide at base; hyaline or pale sterile branches, up to 12 × 4, formed at geniculations and forks. Lateral hairs often plentiful. *Dicyma* state frequently accompanying perithecia, with conidiophores sometimes arising from terminal hairs; conidia in clusters, 4.5–7 × 3–6, pale brown, verruculose. On cardboard, paper, plaster, linoleum, etc.

Ascotricha lusitanica R. Kenneth (Fig. 528)
Perithecia 60–140 diam. Terminal hairs geniculate, simple or with 1–3 branches, 150–300 long, 3–6.5 thick at base; sterile branches 8–14 × 3–6. Lateral hairs few. *Dicyma* state often accompanying perithecia, conidiophores dichotomously branched, conidia smooth, 5–9 × 3–6. On cloth.

Chaetomium
The species found on paper, cloth, etc. are also all coprophilous and have been described under 'Fungi on Dung'. They include *C. elatum*, *C. funicola* and *C. globosum*.

Ctenomyces serratus, described under 'Fungi on Dung', is found also on feathers.

Eurotium herbariorum (Wiggers) Link (Fig. 529)
Cleistothecia spherical, about 0.1 mm diam., rather pale yellow, smooth, soft-walled. Asci subglobose, 10–12 diam., thin-walled, 8-spored. Ascospores lenticular with faint equatorial furrow, hyaline, 5–6 (7) × 4–5. Usually accompanied by a powdery, bluish-green *Aspergillus* conidial state in which the conidia are formed in unbranched chains from the open ends of phialides. The phialides, which are about 7–10 × 4, cover the surface of a vesicle 30–40 diam. which terminates each 0.5–1 mm-tall, erect, hyaline conidiophore. Conidia spherical, rough, 5–6.5 diam., bluish green in mass. On herbarium sheets, etc.

Myxotrichum
Gymnothecia globose, peridium a network of branched, thick-walled hyphae, with usually brown radial hyphae which either form spines or grow on into appendages, often with incurved or circinate tips. Asci 8-spored.

KEY

Peridial appendages more or less straight, upper part not branched 1
Peridial appendages branched in upper part, side branches deflexed ..... *deflexum*
Peridial appendages uncinate 2
1. Peridial hyphae smooth ..... *ochraceum*
Peridial hyphae asperulate ..... *cancellatum*
2. Appendages thickened at their tips ..... *chartarum*
Appendages not thickened at their tips ..... *aeruginosum*

Myxotrichum aeruginosum Mont.
Septate appendages elongated, curved, with ends tapered towards the tip. Ascospores oval or elliptic-fusiform, 3.5–5 × 1.5–3, hyaline or pale. On damp cardboard.

Myxotrichum cancellatum Phill.
Arched, brown, asperulate peridial hyphae form a latticed network from which arise radiating, brown, smooth, spine-like appendages 50–350 long, 3–5 thick at base. Ascospores ellipsoid, hyaline, smooth, 3–4 × 1–2. On damp paper.

Myxotrichum chartarum, described under 'Fungi on Dung', has been found on damp paper and cardboard, rotting canvas and leather.

Myxotrichum deflexum Berk.
Gymnothecia black, 0.1–0.4 mm diam. including appendages. Peridial hyphae dark brown, smooth. Appendages up to 200 × 1.5–3, with straight

lateral branches usually deflexed, up or down, and with their apices often hyaline. Ascospores pale yellowish orange in mass, lenticular, delicately striate, 4–5.5 × 2.5–3. On damp paper, rotting canvas, etc.

Myxotrichum ochraceum Berk. & Br.
Gymnothecia up to 0.5 mm diam. excluding appendages, brown. Peridial hyphae brown. Appendages 90–1700 long, 5 wide at base, tapered, branches arising from base only and turning upwards. Ascospores hyaline or pale yellow, orange-yellow in mass, 3.5–5 × 1.5–3. On damp corrugated cardboard.

Nannizzia
Gymnothecia globose, with the peridium consisting of a network of hyaline, septate, verticillately branched hyphae, asperulate, more or less symmetrically constricted, cells fairly thick walled; free hyphal ends abundant, with appendages of two or three kinds: (1) elongated, slender, smooth, septate, occasionally branched, straight or loosely coiled hyphae, (2) slender tightly coiled hyphae, (3) macroconidia. Asci 8-spored. Ascospores lenticular, yellow.

KEY

Gymnothecia 1.5–2 mm diam. including appendages ..... *cajetani*
Gymnothecia 2–5 mm diam. including appendages ..... *ossicola*

Nannizzia cajetani Ajello
Gymnothecia pale yellow. Appendages of two kinds: (1) long and tapered, up to 500 × 2.5–3.5, (2) smooth hyphae coiled in spirals. Ascospores ovoid, smooth, golden, 3–3.5 × 1.5–2. With *Microsporum* conidial state. On feathers.

Nannizzia ossicola (Rostr.) Apinis
Gymnothecia at first white, becoming grey or yellowish when old; peridial hyphae hyaline, loosely interwoven, branched and anastomosing, 2–5 thick, septate, delicately asperulate; appendages relatively short, verruculose, bent, straight or coiled and rounded at tips. Ascospores hyaline, slightly rough, lenticular, 2–3.5 × 1–1.5. On bones and feathers of dead sea-birds.

Nectria funicola (Berk. & Br.) Berk. (Fig. 530)
Perithecia scattered or gregarious, often on a thin stroma, obpyriform, about 0.15–0.2 mm., yellow or orange, sparsely covered with hyaline hairs 40–50 × 4. Asci clavate, 8-spored. Ascospores fusiform-ellipsoid, 1-septate, slightly constricted at septum, hyaline, smooth, 16–20 × 6–8. On decaying rope and damp cardboard.

Onygena
Ascomata solitary or clustered, each composed of a smooth, pale, sterile

stalk surmounted by a subglobose, darker, fertile head. There is no ostiole and the rather pale brown peridial wall finally bursts, exposing a yellowish mass of asci and spores lying among loosely interwoven hyphae. Asci subglobose, thin-walled. Ascospores ellipsoid or cylindric-ellipsoid, pale brown, smooth.

KEY

Ascospores 5–8 × 2–3 ..... *corvina*
Ascospores 7–9 × 4–6 ..... *equina*

Onygena corvina (Alb. & Schw.) Fr. (Fig. 531)
Ascomata 2–13 mm high, head 1–2 mm diam., pale brown or ochraceous. Peridium about 10 thick. On owl pellets, feathers, hair, sheep's wool, etc.

Onygena equina (Willd.) Pers. ex Fr.
Ascomata 2–10 mm high, head 2–4 mm diam., at first white to cream, then brownish. Peridium up to 20 thick. Mainly on horns and hooves of cattle and sheep; also once on the skull of a dead finch.

Orbicula parietina, described under 'Fungi on Dung', occurs also on damp paper and cardboard; found once on an owl pellet.

Preussia
Cleistothecia superficial, globose or subglobose, black, smooth, shining, 0.2–0.5 mm diam. Asci broadly clavate, stalked, 8-spored. Paraphyses filiform, diffluent. Ascospores cylindrical-ellipsoid, 3-septate, brown, smooth, deeply constricted at septa and frequently breaking up into segments; cells with longitudinal germ-slits.

KEY

Asci long-stalked, ascospores mostly 6–7 wide ..... *funiculata*
Asci short-stalked, ascospores 5 wide ..... *vulgaris*

Preussia funiculata (Preuss) Fuckel (Fig. 532)
Stalk of ascus 30–60 long. Ascospores 26–38 × 5–7.5, end cells longer than intermediate ones. On decaying rope.

Preussia vulgaris (Corda) Cain (Fig. 533)
Stalk of ascus up to 20 long. Ascospores 25–32 × 5, end cells seldom slightly longer than intermediate ones. On old sacks, rotting cloth, etc.

Roumegueriella rufula, described under 'Fungi on Dung', is found also on damp paper.

Shanorella spirotricha R. Benj.
Gymnothecia 0.1–0.2 mm diam., globose or ovoid, clustered, bright golden yellow. Peridium composed of a network of septate, thick-walled, smooth,

pale yellow hyphae which break up at maturity. Appendages numerous, forming closely wound coils of 20–30 turns, 25–40 × 10–20. Asci 8-spored, walls diffluent. Ascospores bright yellow in mass, flattened oblate, 3–4 × 2, smooth except for a roughened equatorial band. On feathers and on rabbit fur.

HYPHOMYCETES

KEY TO GENERA

Colonies setose, setae brown or greyish brown, conidia spherical, thick-walled ..... *Botryotrichum*
Colonies not setose 1
1. Conidiophores very short or scarcely distinct from vegetative hyphae 2
Conidiophores distint from vegetative hyphae, often erect and relatively long 3
2. Conidia without septa, borne on short, flat-topped pegs .. *Rhinotrichum*
Conidia septate, not on pegs ..... *Monodictys*
3. Conidiophores synnematous ..... *Doratomyces*
Conidiophores mononematous 4
4. Conidia or ramoconidia with septa 5
Conidia without septa 9
5. Conidia usually with longitudinal as well as transverse septa 6
Conidia or ramoconidia with only transverse septa 7
6. Conidia always in long chains, beaked ..... *Alternaria*
Conidia mostly solitary, no true beaks ..... *Ulocladium*
7. Conidia or ramoconidia mostly 1-septate, rarely with 2 or 3 septa 8
Conidia large, 5 to 11-septate ..... *Dendryphion*
8. Ramoconidia and conidia formc at ends of long, rough-walled hyphae. Colonies blackish brown, mostly on brickwork in cellars ..... *Rhinocladiella*
Not so. Conidiophores shorter, mostly olivaceous brown ..... *Cladosporium*
9. Conidia not formed in chains 10
Conidia formed in chains 14
10. Colonies white and fluffy, side branches of conidiophores somewhat diamond-shaped ..... *Botryosporium*
Colonies usually coloured; if white, conidiophores not branched 11
11. Colonies pale ochraceous, pinkish or white, conidiophores terminating in vesicles covered with conidia on short denticles ..... *Oedocephalum*
Colonies much darker, conidiophores different 12
12. Conidia dry, conidiophores brown, bearing short, often clavate, pale, sterile branches ..... *Dicyma*
Conidia aggregated in dark, slimy masses 13

13. Conidiophores with groups of short phialides at apex ..... *Stachybotrys*
Conidiophores simple, often arising laterally from mycelial ropes ..... *Gliomastix*
14. Colonies green or bluish green, dry conidia formed by phialides which cover the surface of terminal vesicles ..... *Aspergillus*
Not so 15
15. Conidia truncate and with a rim at the base ..... *Scopulariopsis*
Conidia with equatorial bands or girdles which protrude at the ends ..... *Stephanosporium*
Conidia not so 16
16. Conidiophores tree-like, often with branches almost at right-angles ..... *Oidiodendron*
Conidiophores not so 17
17. Conidia formed by fragmentation of upper part of conidiophore ..... *Wallemia*
Conidia formed by phialides 18
18. Conidiophores simple, phialides often arising laterally on mycelial ropes ..... *Gliomastix*
Conidiophores often branched, not arising laterally on mycelial ropes 19
19. Phialides long and slender, conidia usually rather pale ..... *Paecilomyces*
Phialides short and fat, in groups at apex of conidiophore, conidia almost black ..... *Memnoniella*

Alternaria alternata (Fr.) Keissler (Fig. 534)
Colonies effuse, grey, very dark olivaceous or black. Conidiophores solitary or in small groups, simple or branched, straight or flexuous, septate, pale to mid brown or olivaceous brown, smooth, up to 50 × 3–6, with one or several scars. Conidia formed in long, often branched chains, obclavate, obpyriform, ovoid or ellipsoid, often with a short, conical or cylindrical beak, sometimes up to but not more than one-third the length of the conidium, pale to mid golden brown, smooth or verruculose, with up to 8 transverse and usually several longitudinal or oblique septa, 20–60 × 9–18; beak pale, 2–5 thick. Found on damp ceiling paper, cardboard and occasionally textiles.

Aspergillus, v.s. under *Eurotium herbariorum*.

Botryosporium longibrachiatum (Oudem.) Maire (Fig. 535)
Colonies extensive, white, fluffy or cobwebby. Conidiophores very long and branched, side branches swollen and more or less diamond-shaped at their tips, behind which they give rise to short, lobed branches which bear the conidia. Conidia ellipsoid, hyaline, smooth, 8–11 × 4–4.5. This species has been found several times on twine used to support tomato plants in greenhouses.

Botryotrichum piluliferum Sacc. & March. (Fig. 536)
Colonies effuse, at first white, later buff or grey, setose. Setae unbranched, up to 250 × 2–5, flexuous, brown or greyish brown, often verrucose or encrusted, especially near the base. Conidiophores often branched, the branches sometimes at right-angles to the main axis, smooth, colourless, bearing conidia terminally. Conidia spherical, with very thick walls, hyaline, smooth, 9–16 diam. On decaying canvas, damp paper, etc.

Cladosporium herbarum (Pers.) Link (Fig. 537)
Colonies effuse, olive green or olivaceous brown, velvety. Conidiophores straight or flexuous, sometimes geniculate, often nodose, pale to mid olivaceous brown or brown, smooth, up to 250 × 3–6, with vesicular swellings, when present, 7–9 diam. Conidia in fairly long, often branched chains, pale to mid brown or olivaceous brown, rather thick-walled, distinctly verruculose, with low warts, nearly always 0- to 1-septate although 1 or 2 additional septa are formed occasionally, mostly 8–15 × 4–6, with a scar at one end or at each end, small but clearly protuberant. On damp paper, cloth, etc.

Cladosporium sphaerospermum Penz. (Fig. 538)
Colonies olive green or olivaceous brown, pulverulent. Conidiophores usually less than 300 × 3–5, pale to mid or occasionally dark olivaceous brown, smooth or verruculose. Ramoconidia 0- to 3-septate, smooth or verruculose. Conidia mostly globose or subglobose, 3–4.5 diam., olivaceous brown, verrucose, the warts clearly visible in water or air bubbles. On damp paper, textiles, paintwork, etc., very common.

Dendryphion nanum (C.G. Nees) Hughes (Fig. 539)
Colonies black, velvety. Conidiophores formed singly or in groups of two to six, branched at the apex, black and shining by reflected light, dark brown by transmitted light, 80–300 long, 10–12 thick at base, 7–9 at apex; primary branches 2, 3 or 4 bearing secondary branches which are themselves sometimes branched. Branches irregular, with large, dark scars. Conidia solitary or in chains, obclavate to almost cylindrical, but always somewhat tapered towards the ends, rounded or with a scar at the apex, truncate with a well-defined, dark brown scar at the base, 5- to 11-septate, brown except for the end cells which are subhyaline, smooth or verruculose, 45–90 long, 10–12 thick in the broadest part, 4–6 wide at the ends. Found occasionally on damp sacking in contact with soil.

Dicyma, v.s. under *Ascotricha*.

Doratomyces microsporus and *D. stemonitis*, described under 'Fungi in Dung', have been found also on feathers and old damp sacking.

Gliomastix murorum (Corda) Hughes (Fig. 540)
Colonies effuse, white and cottony when young, becoming black when sporing freely. Phialides frequently arising from mycelial ropes, subulate, hyaline and smooth at base, olivaceous brown and roughened with granules at the apex which sometimes has a small collarette, 20–30 × 2–3. Conidia in long chains which sometimes slime down, mostly subspherical 2.5–5.5 × 2–4.5, dark olivaceous brown to black, usually roughened with granules. On damp wallpaper, cardboard, textiles, etc.

Gliomastix murorum var. *felina* (March.) Hughes (Fig. 541)
Found on wet cardboard, paint, old rope, etc., has broadly ellipsoid conidia up to 7 × 4, which are always aggregated in slimy masses at the tips of the phialides.

Memnoniella echinata (Riv.) Galloway (Fig. 542)
Colonies effuse, black, velvety or powdery. Conidiophores usually simple, occasionally forked, 50–100 × 3–4, grey, often covered in part with dark granules. Phialides in groups of 4–10 at the apex of the conidiophore, clavate or pyriform. Conidia formed in chains, spherical or sometimes slightly flattened dorsiventrally, 3–5.5 diam., grey to black, verrucose. On damp paper and textiles.

Monodictys asperospora, described under 'Fungi on Dung', has been found on damp wallpaper.

Monodictys levis (Wiltshire) Hughes (Fig. 543)
Colonies grey or greyish brown. Conidiophores very short, hyaline, arising from a weft of superficial mycelium. Conidia clavate or pyriform, sometimes twisted, few-celled, often constricted at septa, clear pale to mid brown or greyish brown, smooth, base conico-truncate, 17–30 × 15–19. This species has been found on damp sacking and feathers.

Oedocephalum glomerulosum and *O. pallidum*, described under 'Fungi on Dung', occur also on paper, paper-backed sacking, etc.

Oidiodendron tenuissimum (Peck) Hughes (Fig. 544)
Colonies grey or blackish brown. Conidiophores brown or olivaceous brown, smooth or verrucose, up to 300 × 1.5–2.5. Conidia globose, subglobose or ellipsoid, the outer wall dark and distinctly verruculose, 2–4 × 1.5–2.5, linked in chains by narrow connectives, resembling beads on a string. This has been found growing on Kraft bags.

Paecilomyces
Colonies effuse, floccose or funiculose, sometimes compact and matted. Conidiophores simple or complex in structure, but always with characteristic phialides which have long, slender, tapered necks which bend away from the main axis. Conidia ellipsoid, hanging together in long chains.

KEY

Colonies flesh pink ..... *carneus*
Colonies pale, dull brown or yellowish brown ..... *variotii*

Paecilomyces carneus (Duché & Heim) Brown & Smith
Colonies compact and matted. Phialides 12–16 long. Conidia ellipsoid, rough-walled, 3–4 × 2–2.5. Seen occasionally on damp walls.

Paecilomyces variotii Bainier (Fig. 545)
Colonies floccose or funiculose. Phialides 15–20 long. Conidia 5–7 × 2.5–3, in very long chains. On paper including photographic paper.

Rhinocladiella cellaris (Pers.) M. B. Ellis (Fig. 546)
Colonies effuse, felted, olivaceous to blackish brown. Hyphae brown, minutely and closely verruculose or echinulate. Conidiophores formed at ends of very long hyphae, 1.5–3 thick, lower part rough, upper part smooth, with numerous small scars. Ramoconidia up to 65 × 2–3, 0- to 3-septate, bearing numerous conidia. Conidia narrowly ellipsoid or clavate, rarely septate, hyaline or pale olive, smooth to minutely verruculose, 4–8 (15) × 1.5–2.5. Found mostly on brickwork in cellars.

Rhinotrichum
Colonies effuse, white or very pale buff, floccose or cottony. Conidiophores hyaline, differing little from vegetative hyphae but bearing conidia on short, flat-topped pegs. Conidia simple, hyaline, ellipsoid, pyriform or subglobose.

KEY

Conidia 7–10 × 5–6, smooth-walled ..... *lanosum*
Conidia 12–16 × 10–14, walls echinulate ..... *domesticum*

Rhinotrichum domesticum Balfour-Browne (Fig. 547)
On damp paper.

Rhinotrichum lanosum (Cooke) Cooke (Fig. 548)
On damp wallpaper and ceilings.

Scopulariopsis
Colonies effuse, velvety or funiculose, white, buff or grey. Conidiophores simple or branched, with branches usually restricted to the apical region, and here the terminal ones form conidia in long chains at their tips. Faint rings close together near the ends show where successive conidia have been formed. Conidia dry, ellipsoid, obovoid, pyriform or subspherical, without septa, truncate with a rim at the base, hyaline or coloured, smooth or verrucose.

KEY

Colonies effuse, white or very rarely pale buff ..... *candida*
Colonies small, slow-growing, greyish ..... *chartarum*

Scopulariopsis candida (Guéguen) Vuillemin (Fig. 549)
Colonies velvety or powdery, sometimes funiculose. Conidiophores often simple, rarely branched. Conidia subglobose to broadly ovoid, 5–8 × 4–7, white or very pale buff in mass. On owl pellets.

Scopulariopsis chartarum (G. Smith) G. Smith (Fig. 550)
Colonies smoke-grey or mouse-grey, velvety or floccose. Conidiophores consisting of solitary annellides formed along the sides of hyphae, 5–15 × 2–2.5. Conidia 4–5.5. × 3–4. On damp wallpaper.

Stachybotrys atra Corda (Fig. 551)
Colonies effuse, black. Conidiophores simple or branched, up to 100 × 3–5, at first hyaline but soon becoming olivaceous brown to black and rough or covered with granules; each main stem or branch bears at its apex a group of phialides. Conidia aggregated in large, slimy, black and glistening heads, individually broadly ellipsoid to subspherical, dark blackish brown to black, verrucose, 8–11 × 5–10. Commonly found on damp paper and cloth.

Stephanosporium cereale (Thuem.) Swart (Fig. 552)
Colonies effuse, purplish grey to black. Conidiophores 10–50 × 1.5–2.5, often branched like a tree, mid to dark brown, end branches fragmenting to form conidia 3–5 × 2–3. Conidia catenate, dry, when mature lying at different angles and often at right-angles to one another, simple, lenticular, though not excessively flat, brown or greyish brown, with a dark, very distinctive equatorial band or girdle which protrudes slightly at each end. Found occasionally on damp paper and textiles.

Ulocladium
Colonies effuse, brown, olivaceous brown, dark blackish brown or black. Conidiophores branched or unbranched, often geniculate, brown, smooth or verruculose, with scars where conidia have become detached. Conidia solitary in most species, but secondary conidia, on short secondary conidiophores, give rise to false chains in some; they vary in shape but are often broadly ellipsoid or obovoid, with a minute projecting hilum, pale to dark blackish brown, smooth or verrucose, with transverse and also usually longitudinal or oblique septa.

KEY

Conidia often in false chains ..... *chartarum*
Conidia solitary, rarely forming false chains 1
1. Walls of all cells of conidia regularly and closely verruculose or verrucose ..... *botrytis*

Walls of cells verruculose except those of the basal cell which are smooth ..... *oudemansii*
Walls of all cells of conidia commonly smooth 2
2. Conidia 10–15 wide ..... *consortiale*
Conidia 15–20 wide ..... *alternariae*

Ulocladium alternariae (Cooke) Simmons (Fig. 553)
Conidia mostly broadly ellipsoid, golden brown, smooth or occasionally inconspicuously roughened, with 1–5, most commonly 3 transverse septa and 1 or more longitudinal septa, 18–35 × 15–20. On damp wallpaper and ceilings.

Ulocladium botrytis Preuss (Fig. 554)
Colonies effuse, dark blackish brown to black, velvety. Conidiophores often dichotomously branched near the apex, geniculate, pale to mid golden brown, smooth, up to 100 × 3–5. Conidia solitary, usually broadly ellipsoid to obovoid, frequently with a distinct projecting hilum, golden brown, closely verruculose or verrucose, with mostly three transverse septa and one longitudinal septum. Fairly common on damp paper and cloth.

Ulocladium chartarum (Preuss) Simmons (Fig. 555)
Conidiophores up to 50 × 5–7, golden brown. Conidia quite commonly in chains of 2–10, often with short false beaks which are really thin-walled germ tubes, brown, smooth or verruculose, with 1–5, commonly 3 transverse septa and several oblique or longitudinal septa, 18–38 × 11–20. On wet paper, fibres and emulsion paint.

Ulocladium consortiale (Thuem.) Simmons (Fig. 556)
Conidiophores up to 60 × 4–5, pale golden brown. Conidia obovoid to ellipsoid, often germinating apically to form conidiophores which bear solitary conidia, smooth or occasionally inconspicuously roughened, golden brown, with 1–5 transverse and several longitudinal septa, 16–34 × 10–15. On damp paper.

Ulocladium oudemansii Simmons (Fig. 557)
Conidia obovate, clavate or ellipsoid, with 3–5 transverse and several longitudinal septa, golden brown to dark blackish brown, 18–34 × 9–17. Has been found a few times on paintwork.

Wallemia sebi Johan-Olsen
Colonies slow-growing, often irregular in shape, brown, reddish brown, orange, cream or blackish brown. Conidiophores slender (1–3 thick), closely packed together but not forming synnemata or sporodochia, straight or flexuous, subhyaline, smooth, upper part fragmenting to form conidia. Conidia catenate, dry, at first hyaline, cubical and smooth, later becoming straw-coloured, brown in mass, spherical or subspherical and minutely verruculose, 2–3.5 diam. Found occasionally on rotting cloth although much more commonly in foodstuffs.

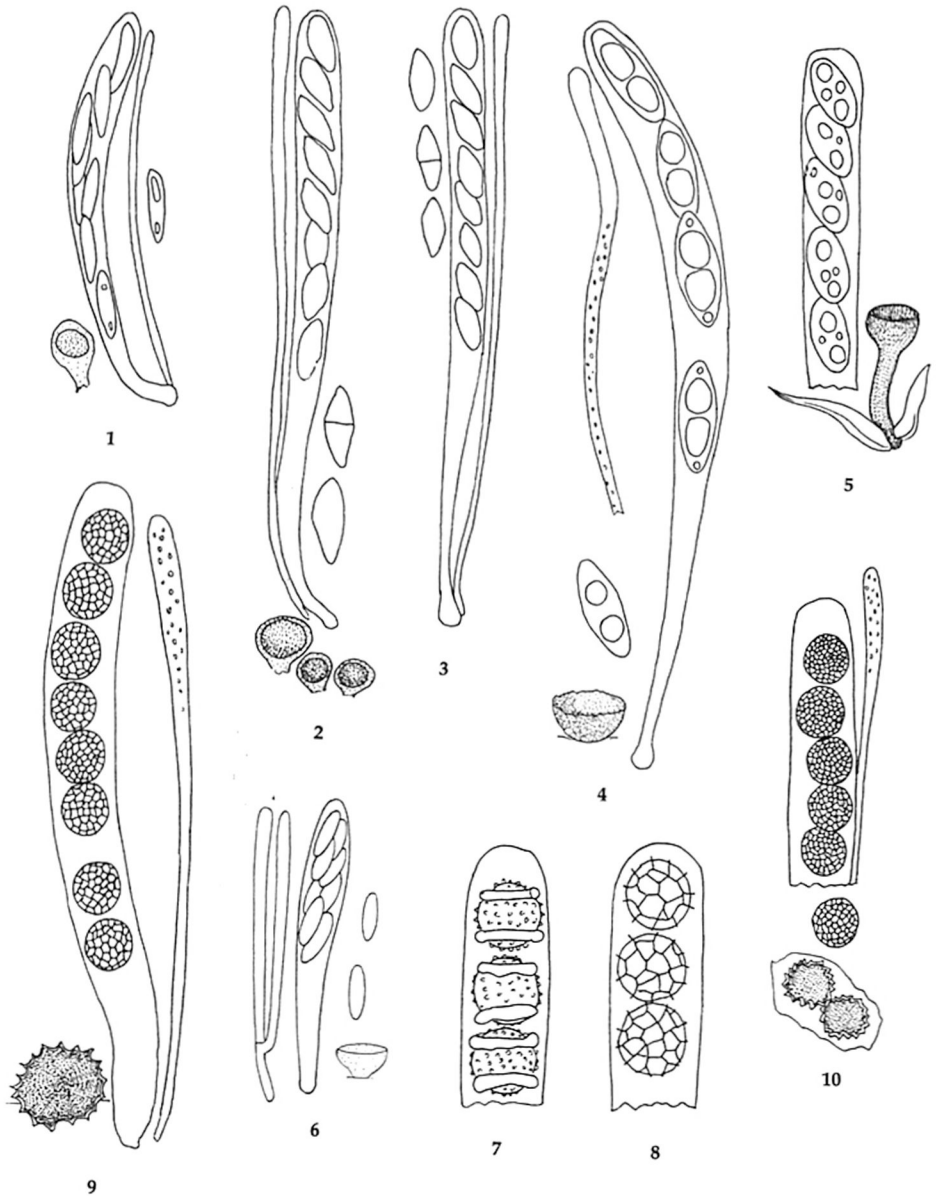

Plate 1. Discomycetes growing on or with bryophytes. 1, *Bryoscyphus conocephali*; 2, *B. dicrani*; 3, *B. marchantiae*; 4, *Byssonectria tetraspora*; 5, *Helotium fulvum*; 6, *Hymenoscyphus vasaensis*; 7, *Lamprospora annulata*; 8, *L. crouanii*; 9, *L. dictydiola*; 10, *L. polytrichi.*

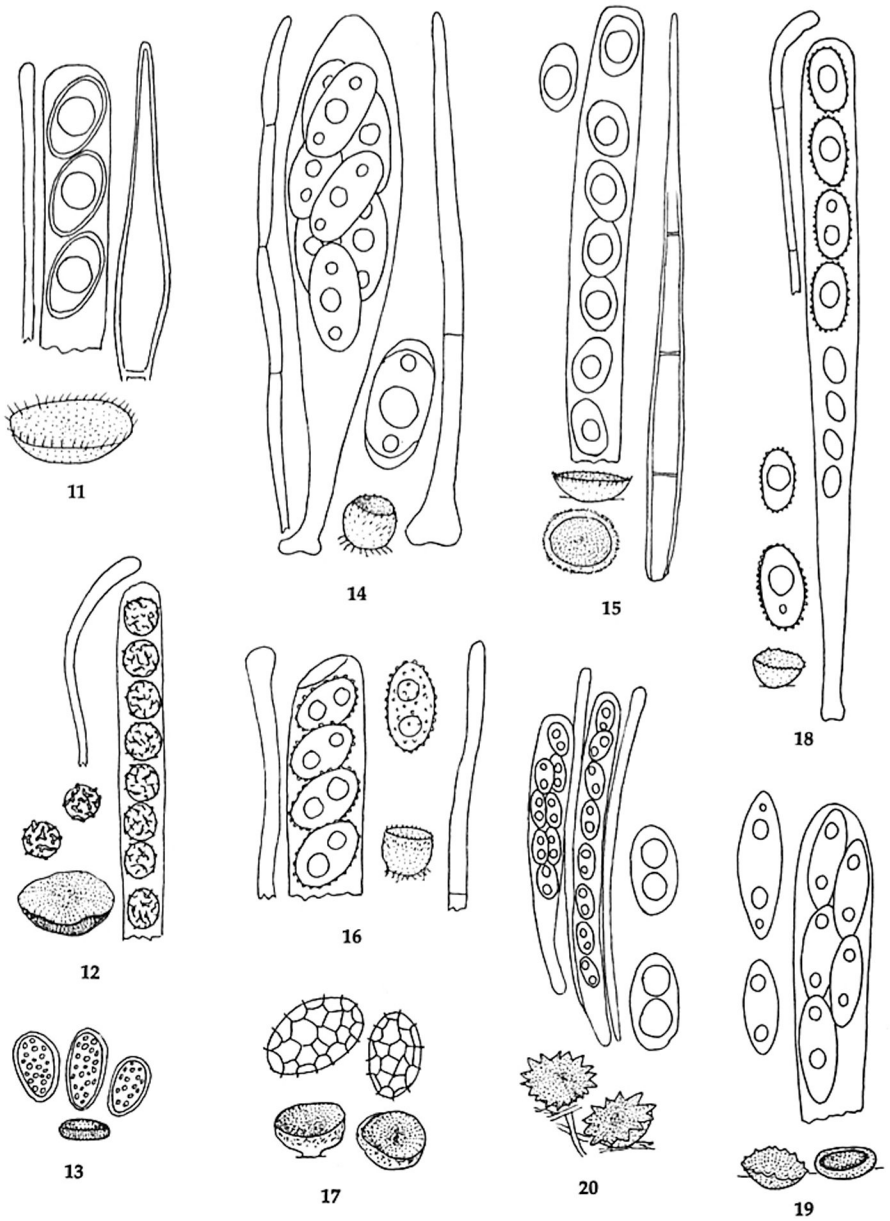

Plate 2. Discomycetes growing on or with bryophytes. 11, *Leucoscypha ricciae*; 12, *Marcelleina rickii*; 13, *Mniaecia jungermanniae*; 14, *Neottiella crozalsiana*; 15, *N. hetieri*; 16, *N. ithacaensis*; 17, *N. rutilans*; 18, *Octospora alpestris*; 19, *O. coccinea*; 20, *O. convexula.*

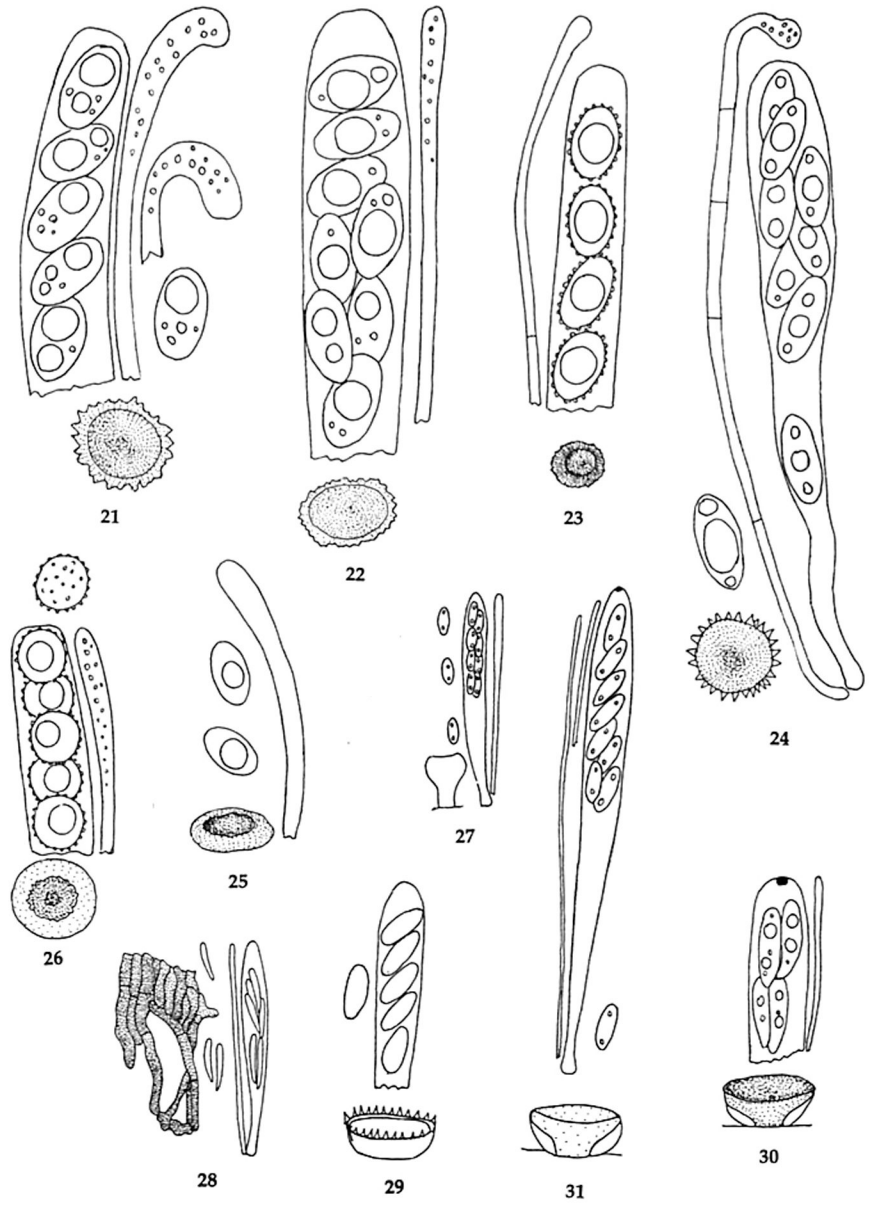

Plate 3. Discomycetes growing on or with bryophytes. 21, *Octospora humosa*; 22, *O. leucoloma*; 23, *O. melina*; 24, *O. musci-muralis*; 25, *O. rustica*; 26, *O. wrightii*; 27, *Pezizella muscicola*; 28, *P. polytrichi*; 29, *Pezoloma ciliifera*; 30, *P. iodocyanescens*; 31, *P. obstricta.*

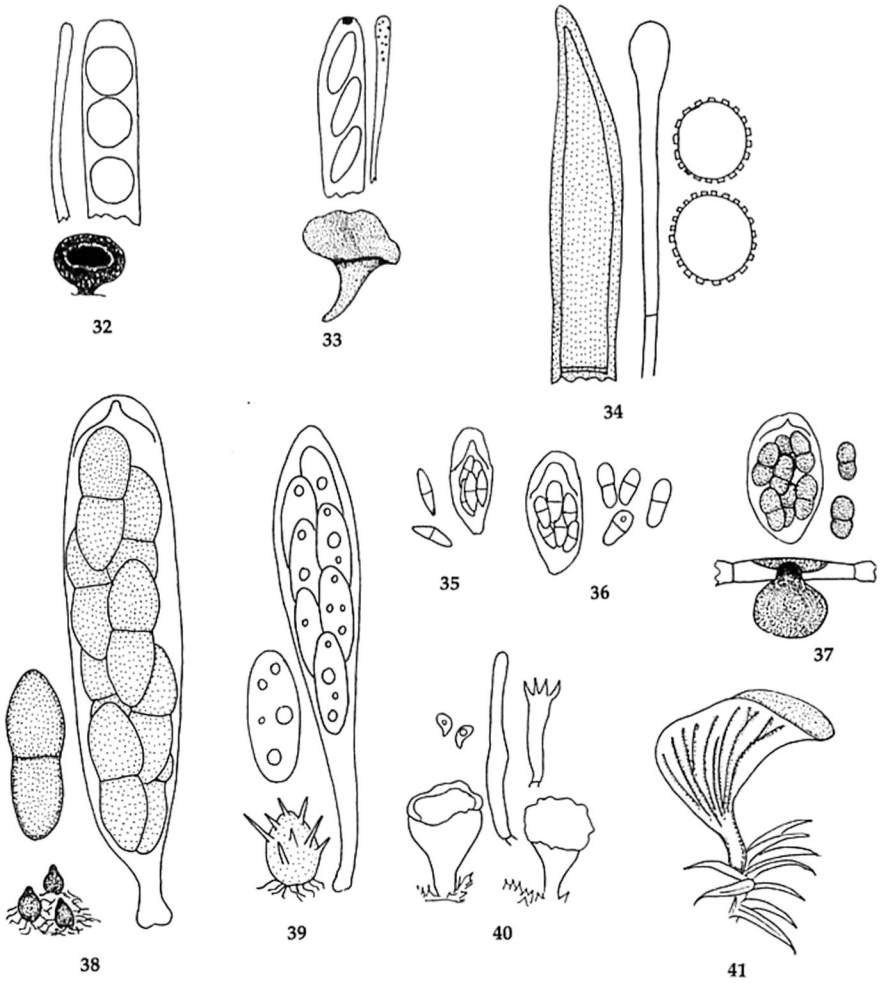

Plate 4. Various groups of fungi growing on or with bryophytes. 32, *Pseudoplectania sphagnophila*; 33, *Sarcoleotia turficola*; 34, *Scutellinia trechispora*; 35, *Bryochiton microscopicum*; 36, *B. perpusillus*; 37, *Hypobryon validum*; 38, *Lizonia emperigonia*; 39, *Nectriella lophocoleae*; 40, *Cyphellostereum laeve*; 41, *Leptoglossum tremulum.*

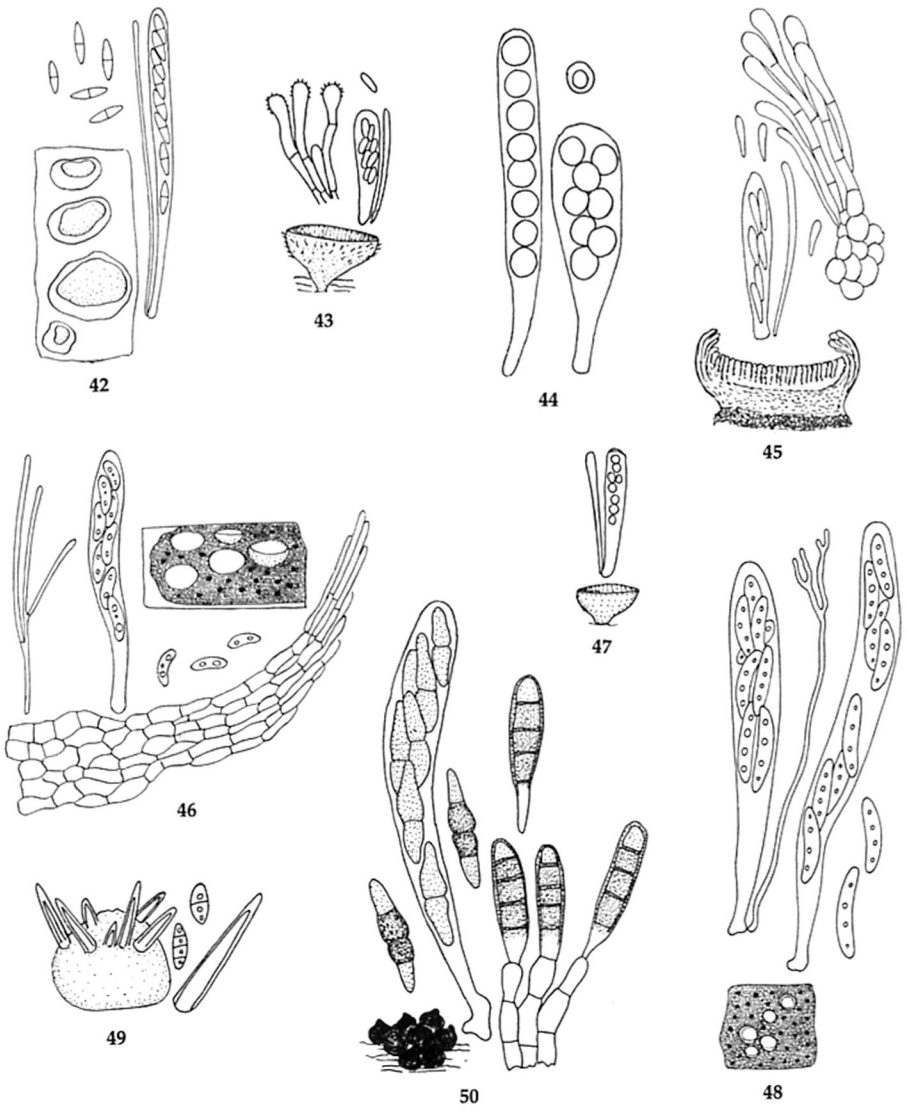

Plate 5. Ascomycetes on fungi. 42, *Bisporella sulfurina*; 43, *Cistella stereicola*; 44, *Hyalopeziza ilicincola*; 45, *Micropodia oedema*; 46, *Phaeohelotium extumescens*; 47, *Pithyella erythrostigma*; 48, *Polydesmia pruinosa*; 49, *Acanthostigmella pallida*; 50, *Anomalemma epochnii.*

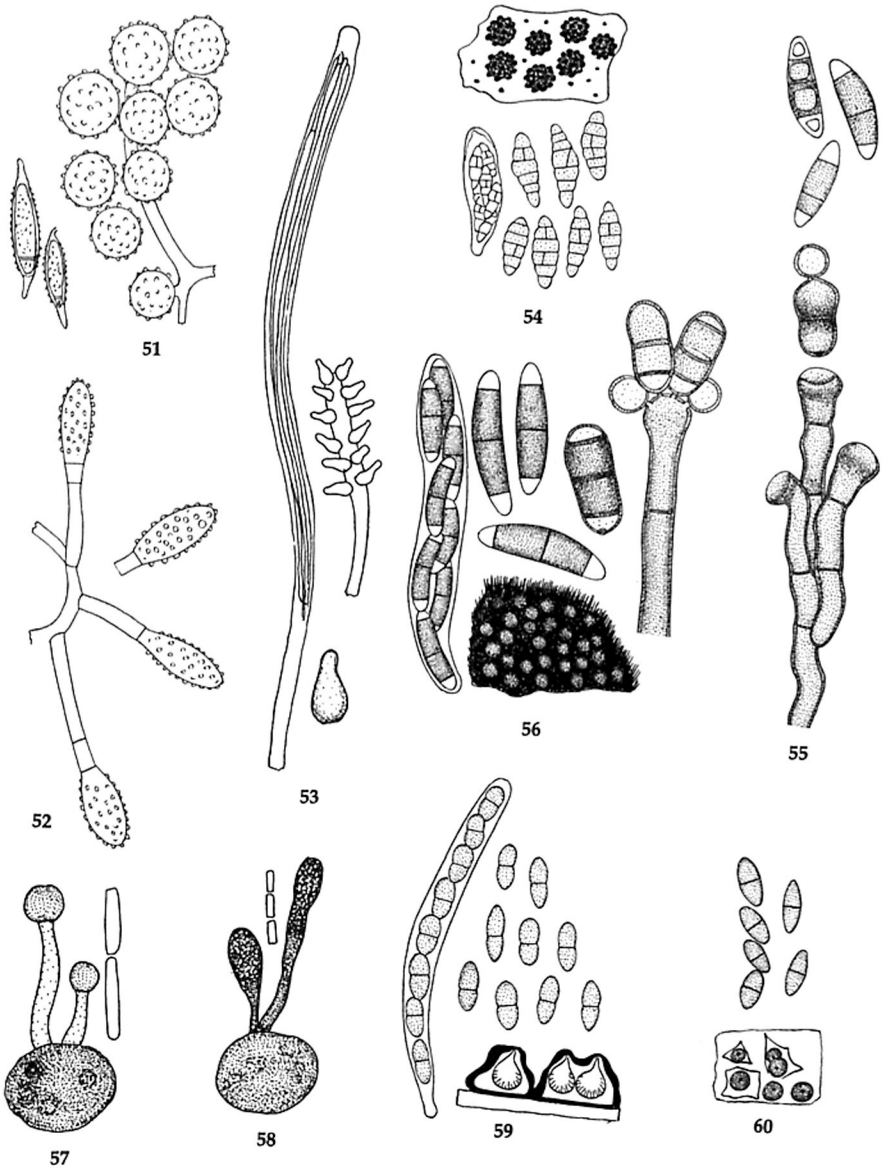

Plate 6. Ascomycetes on fungi. 51, *Apiocrea chrysosperma*; 52, *A. tulasneana*; 53, *Barya aurantiaca*; 54, *Berlesiella nigerrima*; 55, *Chaetosphaerella fusca*; 56, *C. phaeostroma*; 57, *Cordyceps capitata*; 58, *C. ophioglossoides*; 59, *Didymosphaeria conoidea*; 60, *D. futilis.*

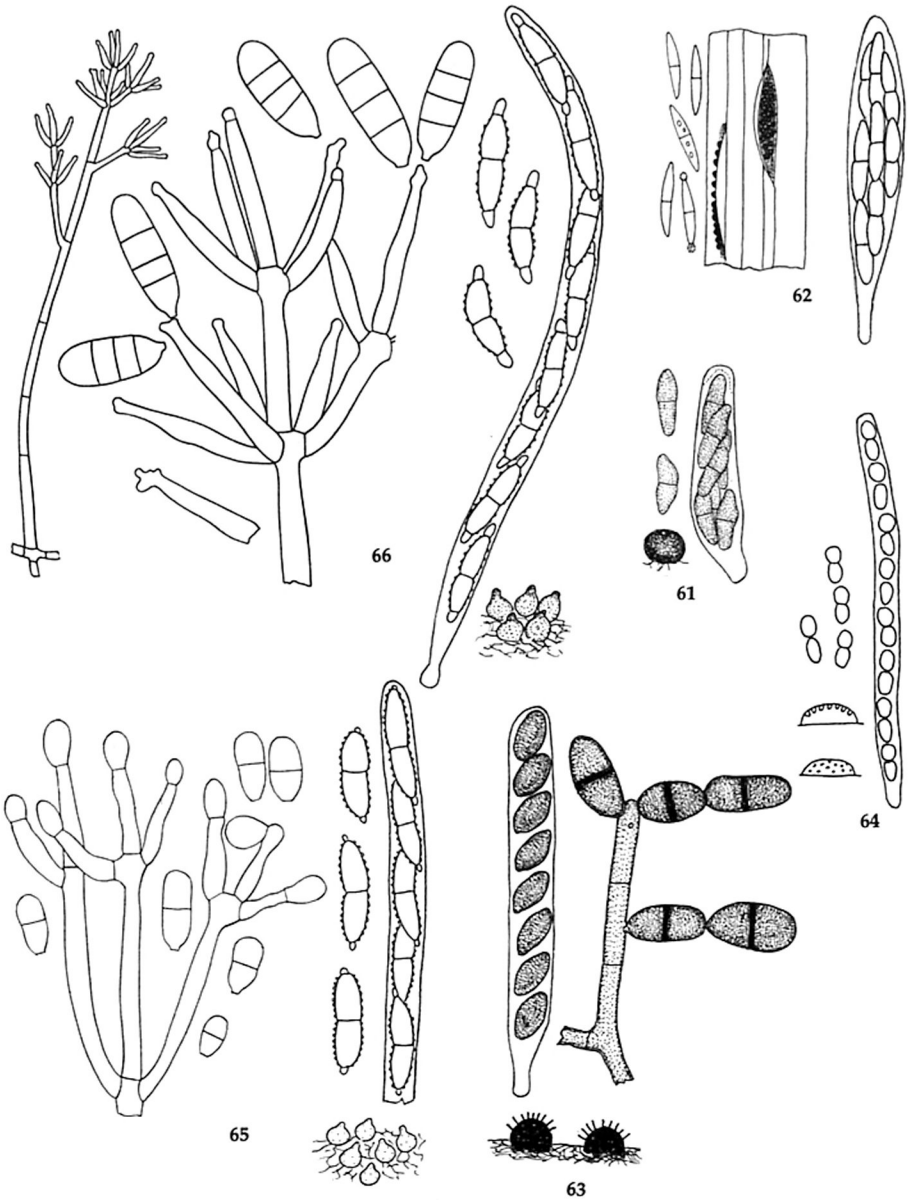

Plate 7. Ascomycetes on fungi. 61, *Dimerium meliolicola*; 62, *Eudarluca caricis*; 63, *Helminthosphaeria clavariarum*; 64, *Hypocrea pulvinata*; 65, *Hypomyces aurantius*; 66, *H. rosellus.*

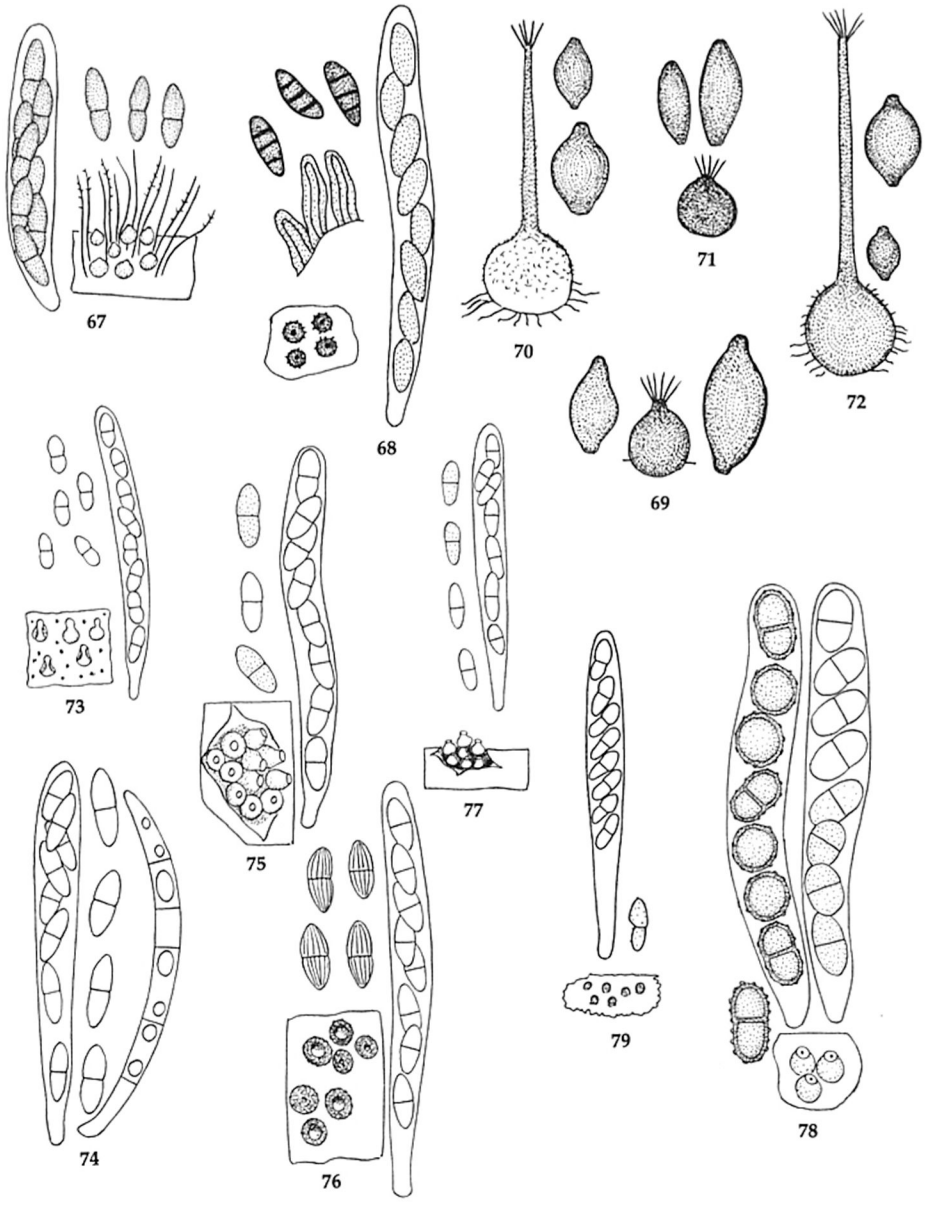

Plate 8. Ascomycetes on fungi. 67, *Letendraea helminthicola*; 68, *Litschaueria corticiorum*; 69, *Melanospora brevirostris*; 70, *M. caprina*; 71, *M. fusispora*; 72, *M. lagenaria*; 73, *Nectria episphaeria*; 74, *N. leptosphaeriae*; 75, *N. magnusiana*; 76, *N. peziza*; 77, *N. purtonii*; 78, *N. wegeliniana*; 79, *Nectriopsis aureonitens.*

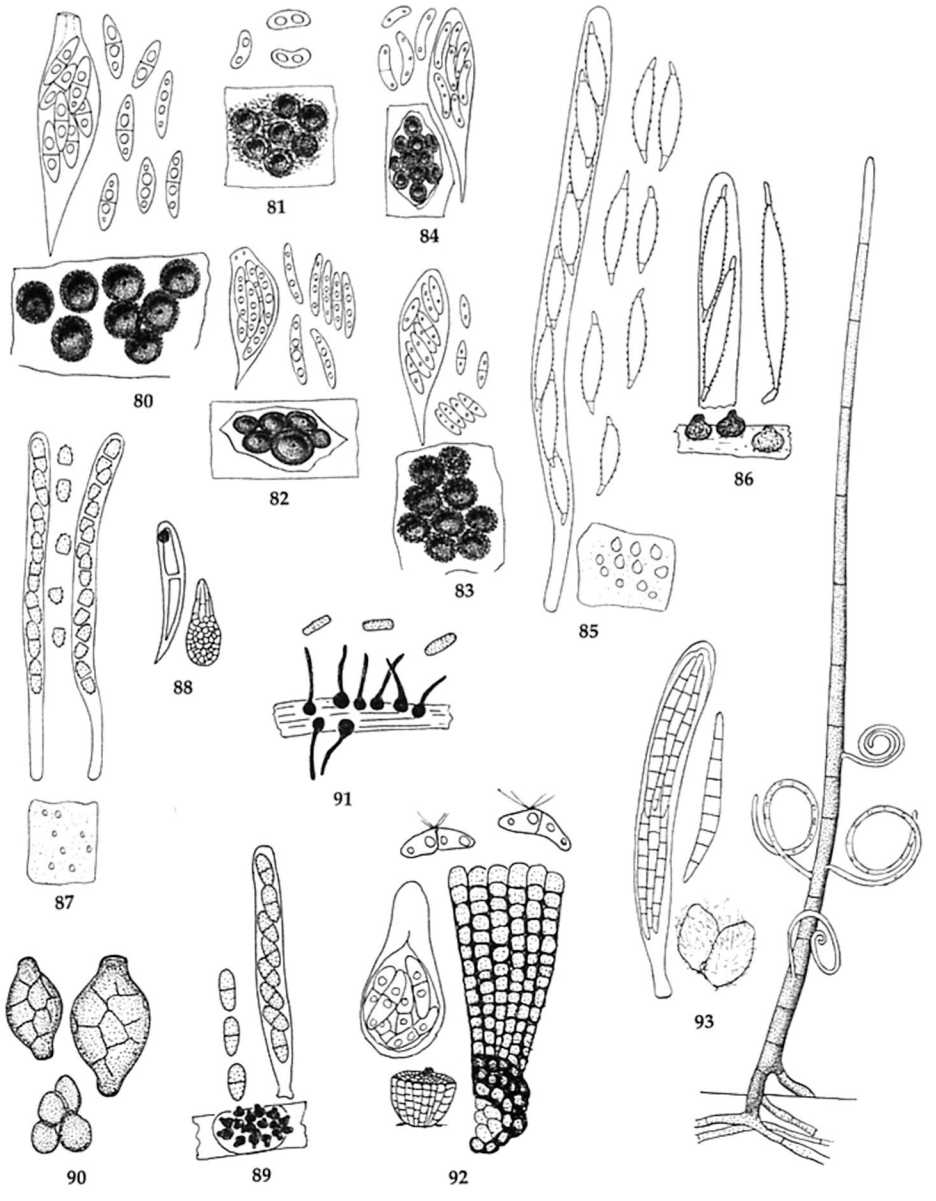

Plate 9. Ascomycetes on fungi. 80, *Nitschkia collapsa*; 81, *N. confertula*; 82, *N. cupularis*; 83, *N. grevillei*; 84, *N. parasitans*; 85, *Peckiella lateritia*; 86, *P. viridis*; 87, *Protocrea farinosa*; 88, *Pyxidiophora asterophora*; 89, *Scotiosphaeria endoxylinae*; 90, *Sphaerodes episphaeria*; 91, *Syspastospora parasitica*; 92, *Trichothyrina parasitica*; 93, *Tubeufia cerea.*

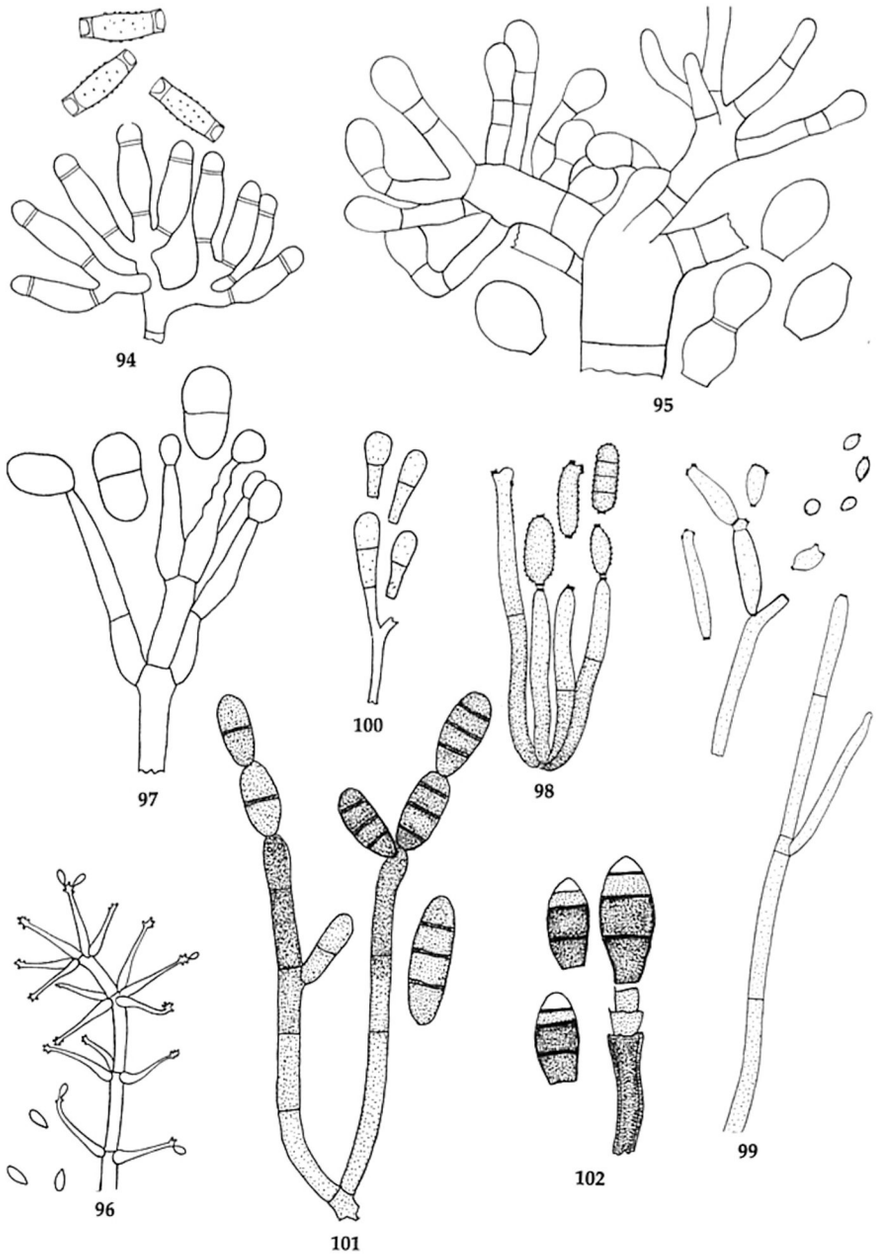

Plate 10. Hyphomycetes on fungi. 94, *Amblyosporium botrytis*; 95, *A. spongiosum*; 96, *Calcarisporium arbuscula*; 97, *Cladobotryum mycophilum*; 98, *Cladosporium aecidiicola*; 99, *C. uredinicola*; 100, *Didymopsis helvellae*; 101, *Diplococcium clarkii*; 102, *Endophragmia dennisii.*

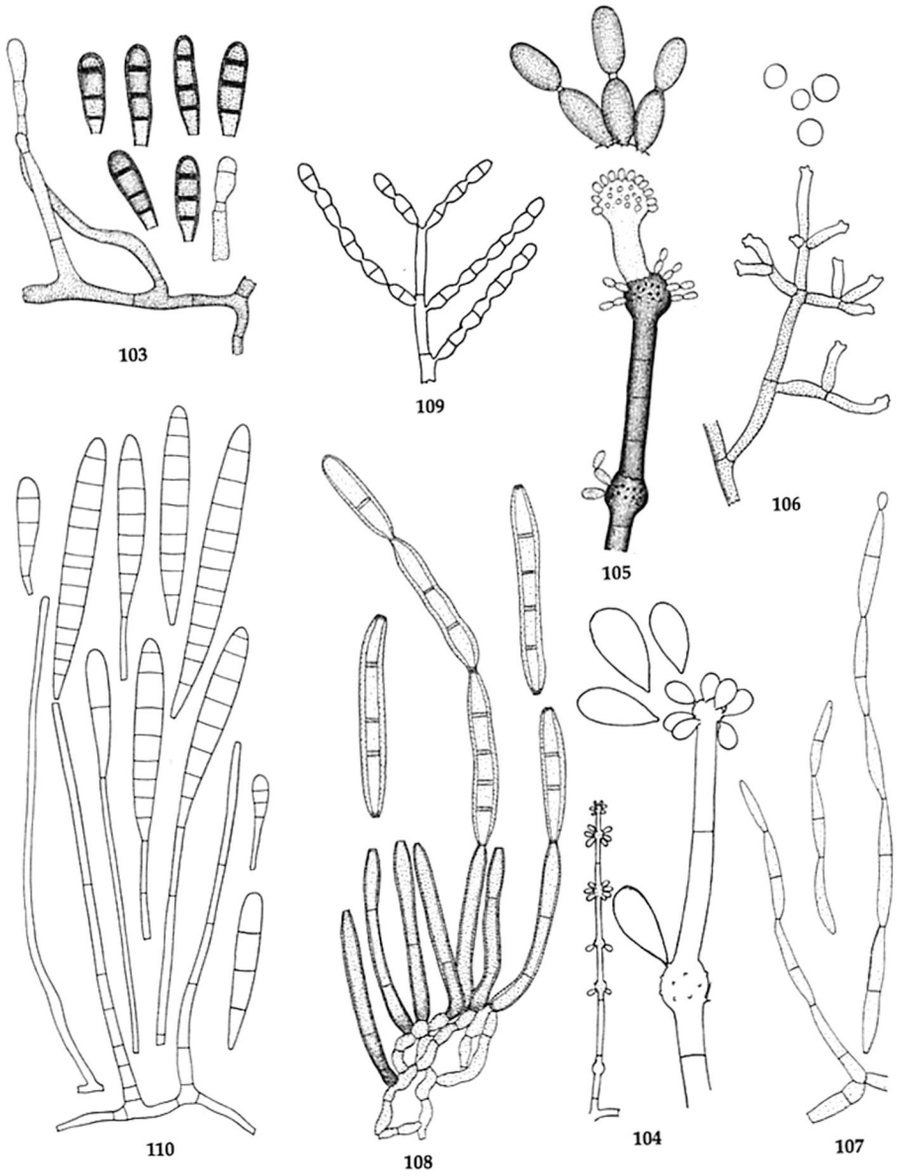

Plate 11. Hyphomycetes on fungi. 103, *Endophragmiella eboracensis*; 104, *Gonatobotrys simplex*; 105, *Gonatobotryum fuscum*; 106, *Hansfordia pulvinata*; 107, *Heteroconium chaetospira*; 108, *H. tetracoilum*; 109, *Hormiactis alba*; 110, *Monacrosporium subtile.*

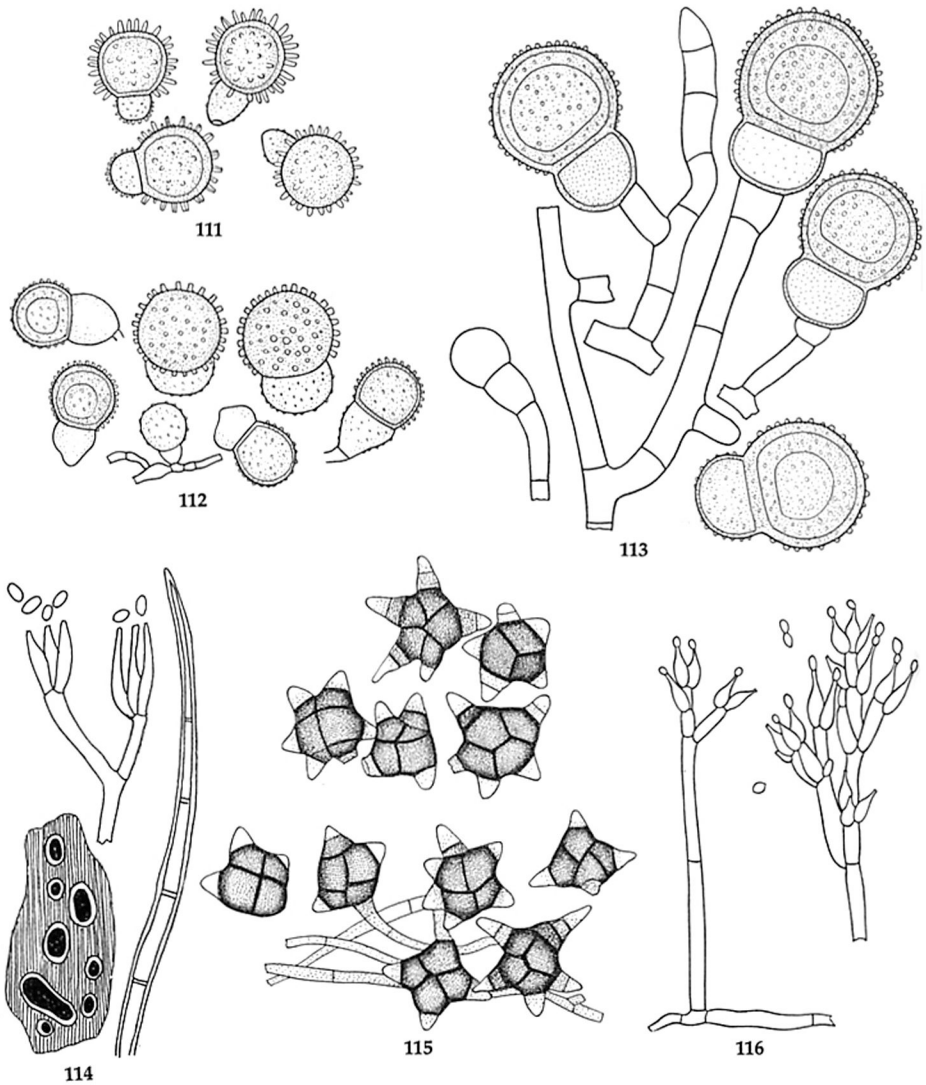

Plate 12. Hyphomycetes on fungi. 111, *Mycogone cervina*; 112, *M. perniciosa*; 113, *M. rosea*; 114, *Myrothecium inundatum*; 115, *Oncopodiella hyperparasitica*; 116, *Paecilomyces marquandii.*

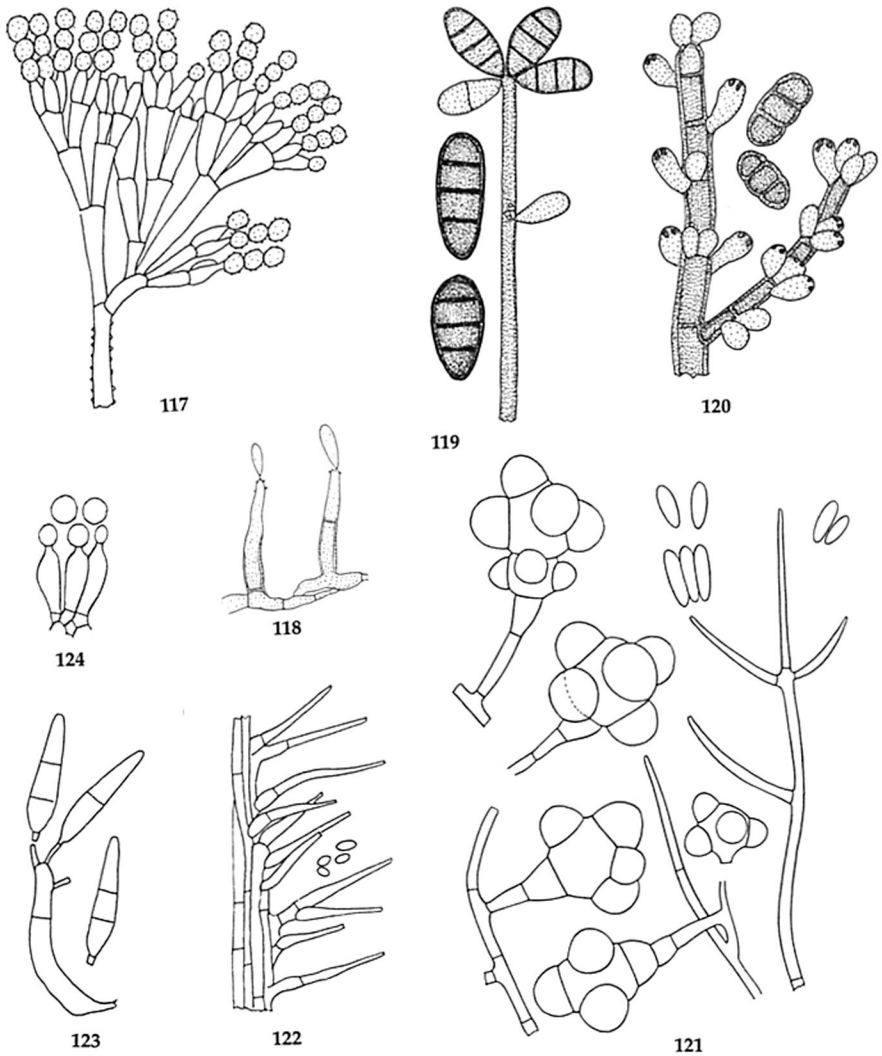

Plate 13. Hyphomycetes on fungi. 117, *Penicillium brevi-compactum*; 118, *Pleurophragmium acutum*; 119, *Spadicoides xylogena*; 120, *Spondylocladiella botrytioides*; 121, *Stephanoma strigosum*; 122 *Tilachlidium brachiatum*; 123, *Trichoconis hibernica*; 124, *Tuberculina persicina.*

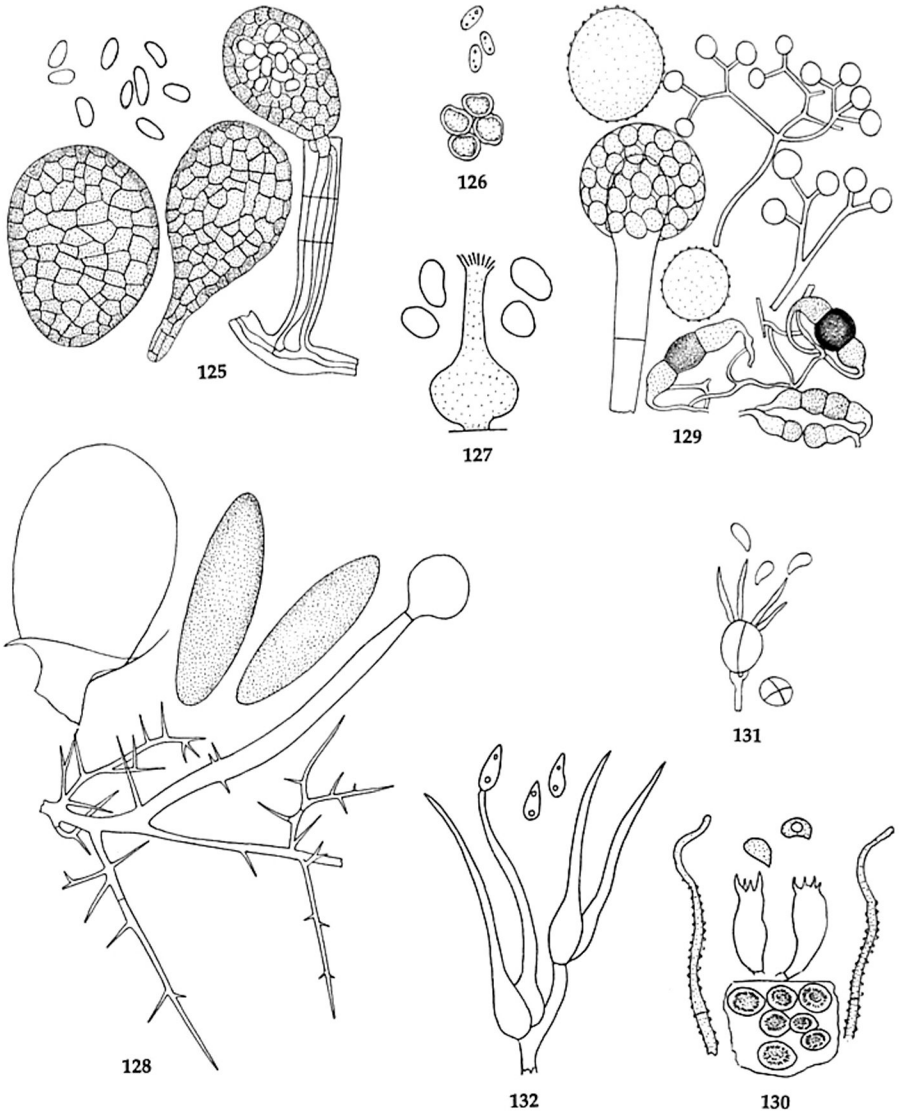

Plate 14. Various groups of fungi on fungi. 125, *Ampelomyces quisqualis*; 126, *Hainesia rubi*; 127, *Hyalopycnis blepharistoma*; 128, *Spinellus fusiger*; 129, *Syzygites megalocarpus*; 130, *Episphaeria fraxinicola*; 131, *Pseudostypella translucens*; 132, *Xenolachne longicornis.*

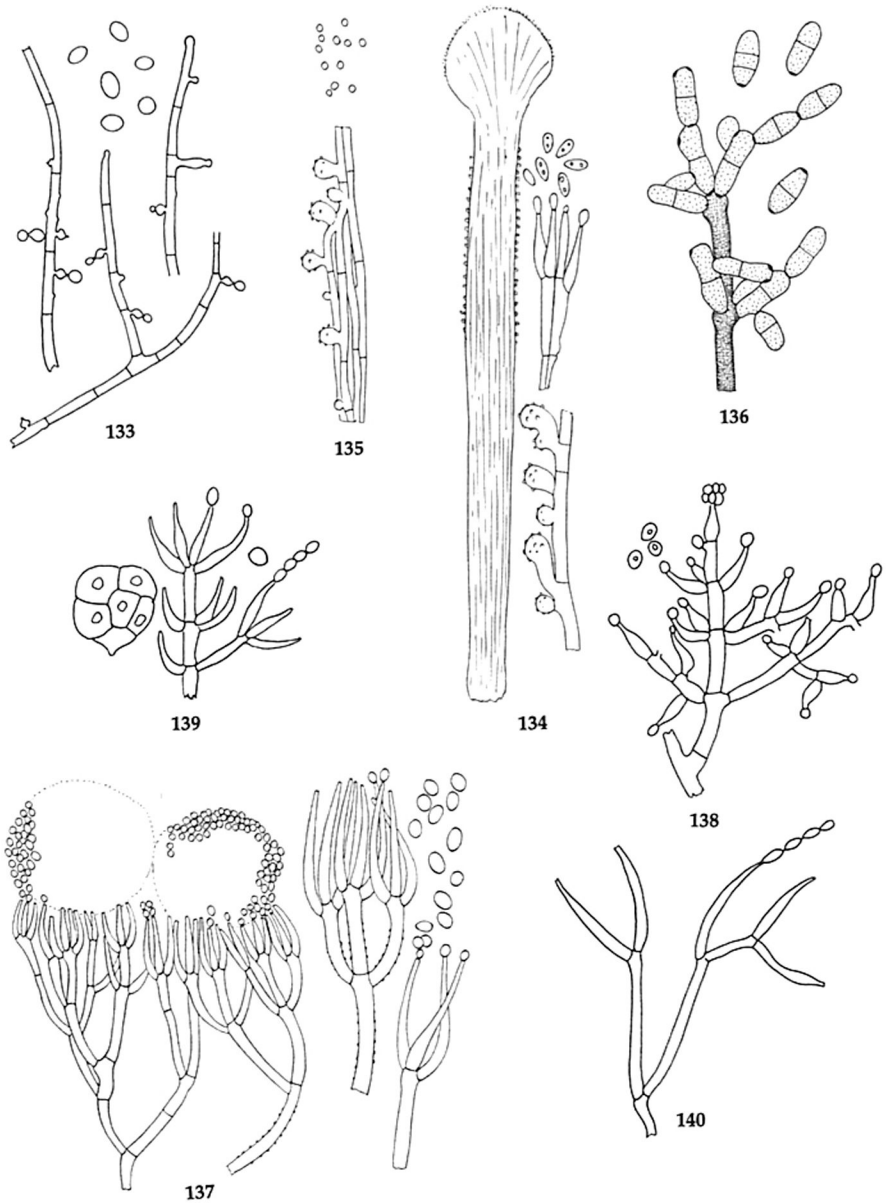

Plate 15. Hyphomycetes on myxomycetes. 133, *Aphanocladium album*; 134, *Blistrum ovalisporum*; 135, *B. tomentosum*; 136, *Dendryphiella infuscans*; 137, *Gliocladium album*; 138, *Sesquicillium microsporum*; 139, *Verticillium catenulatum*; 140, *V. insectorum.*

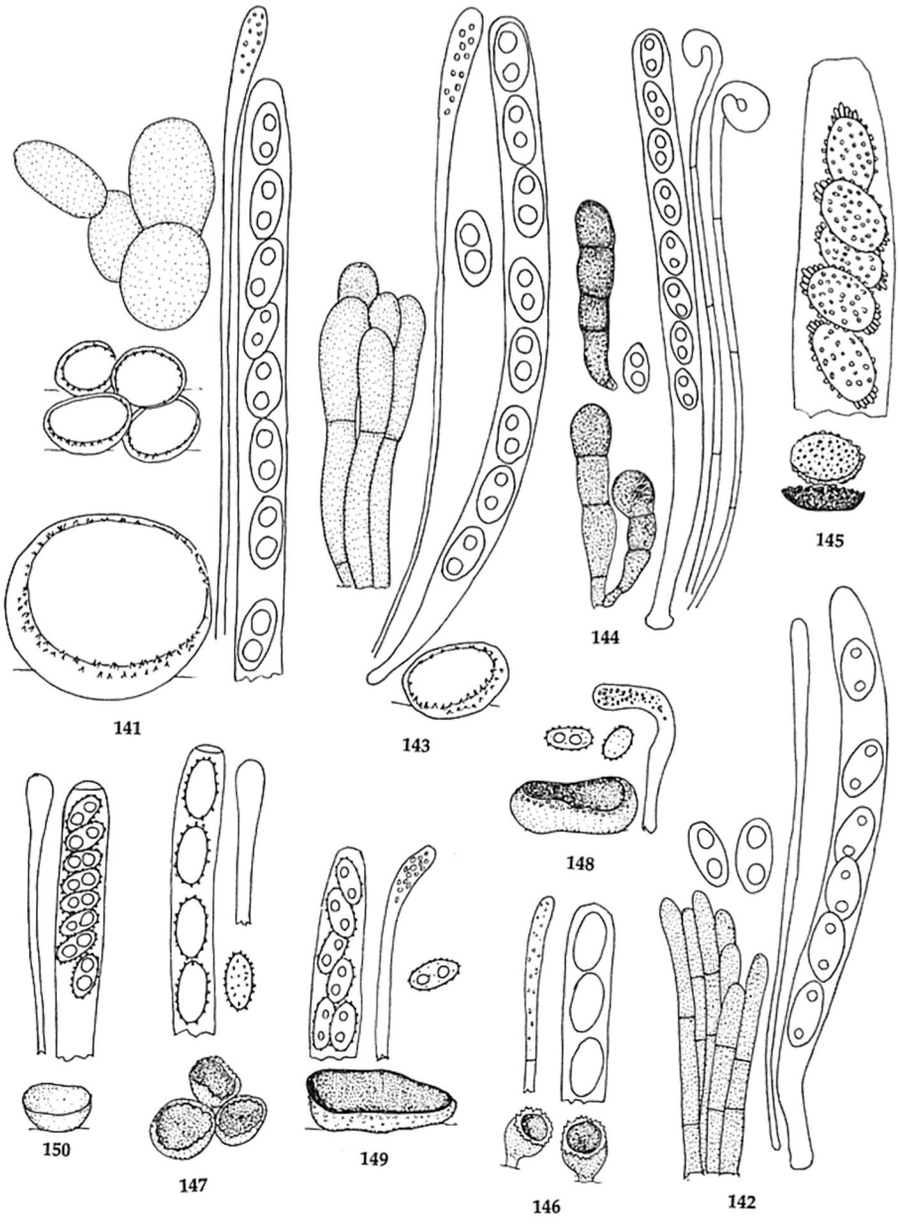

Plate 16. Discomycetes on burnt ground and charcoal. 141, *Anthracobia macrocystis*; 142, *A. maurilabra*; 143, *A. melaloma*; 144, *A. uncinata*; 145, *Ascobolus carbonarius*; 146, *Geopyxis carbonarius*; 147, *Peziza echinospora*; 148, *P. petersii*; 149, *P. praetervisa*; 150, *P. proteana.*

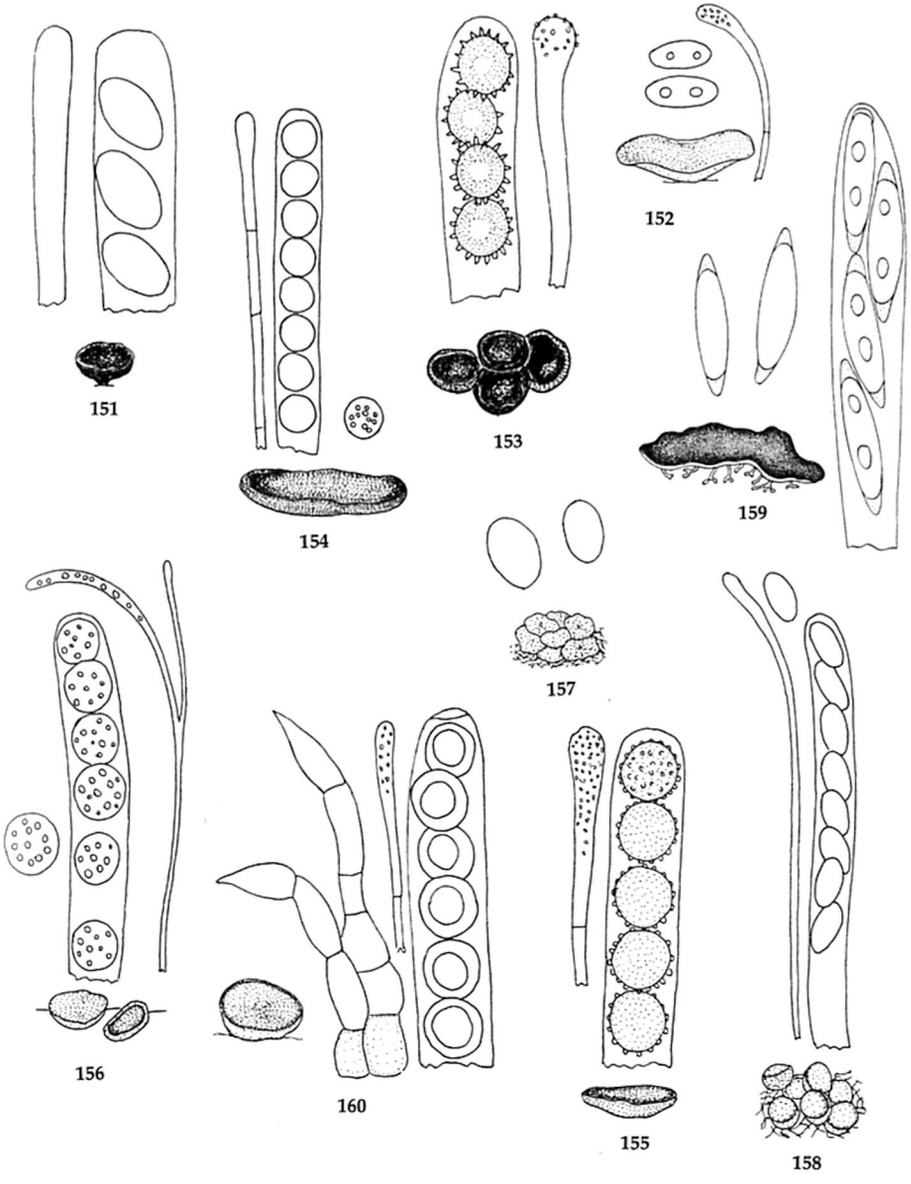

Plate 17. Discomycetes on burnt ground and charcoal. 151, *Peziza sepiatra*; 152, *P. violacea*; 153, *Plicaria anthracina*; 154, *P. leiocarpa*; 155, *P. trachycarpa*; 156, *Pulvinula convexella*; 157, *Pyronema domesticum*; 158, *P. omphalodes*; 159, *Rhizina undulata*; 160, *Sphaerosporella brunnea.*

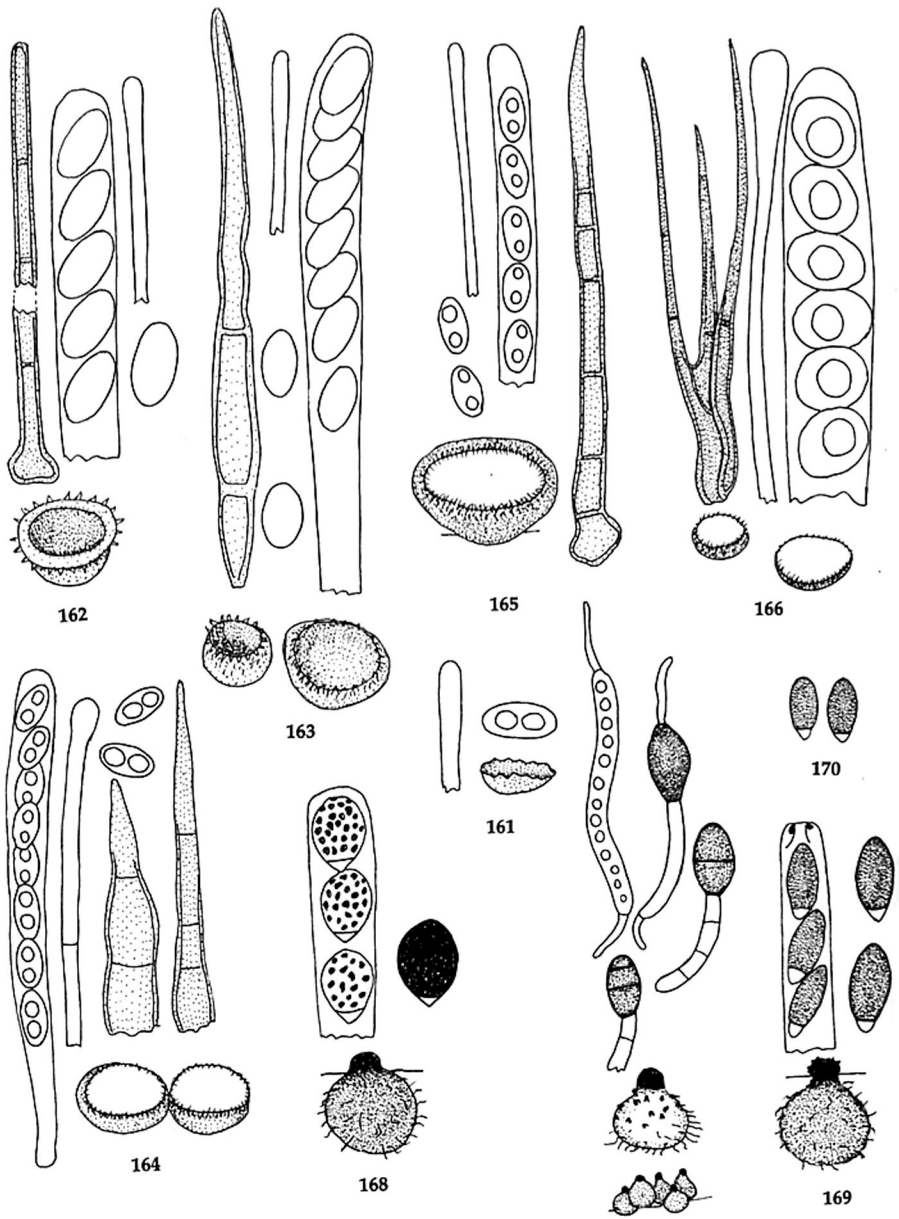

Plate 18. Discomycetes and other ascomycetes on burnt ground and charcoal. 161, *Tarzetta rosea*; 162, *Tricharina gilva*; 163, *T. praecox*; 164, *Trichophaea abundans*; 165, *T. hemisphaerioides*; 166, *T. woolhopeia*; 167, *Cercophora arenicola*; 168, *Jugulospora rotula*; 169, *Strattonia carbonaria*; 170, *S. minor.*

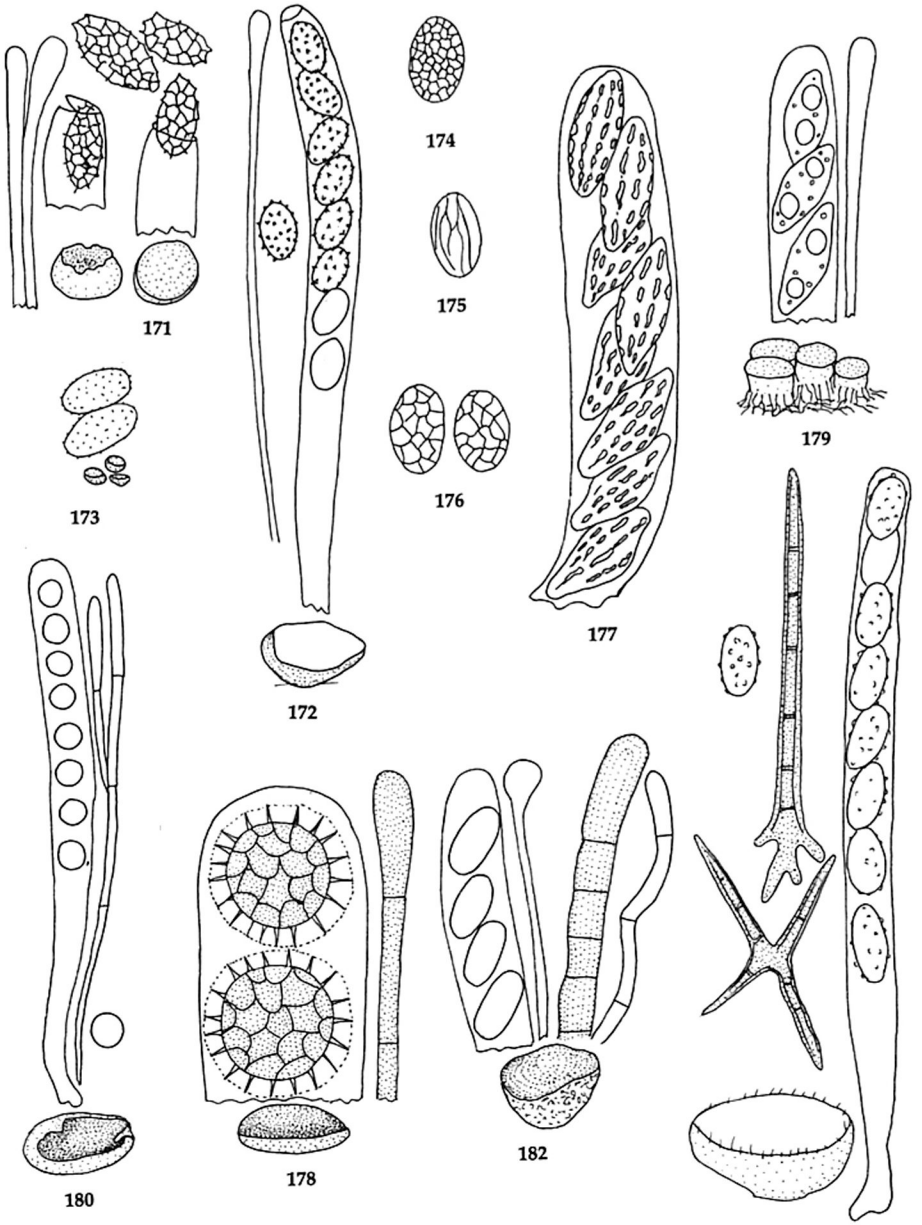

Plate 19. Discomycetes on soil. 171, *Aleuria aurantia*; 172, *A. luteonitens*; 173, *A. palustris*; 174, *Ascobolus behnitziensis*; 175, *A. denudatus*; 176, *A. geophilus*; 177, *A. viridis*; 178, *Boudiera areolata*; 179, *Byssonectria fusispora*; 180, *Caloscypha fulgens*; 181, *Cheilymenia crucipila*; 182, *C. fibrillosa.*

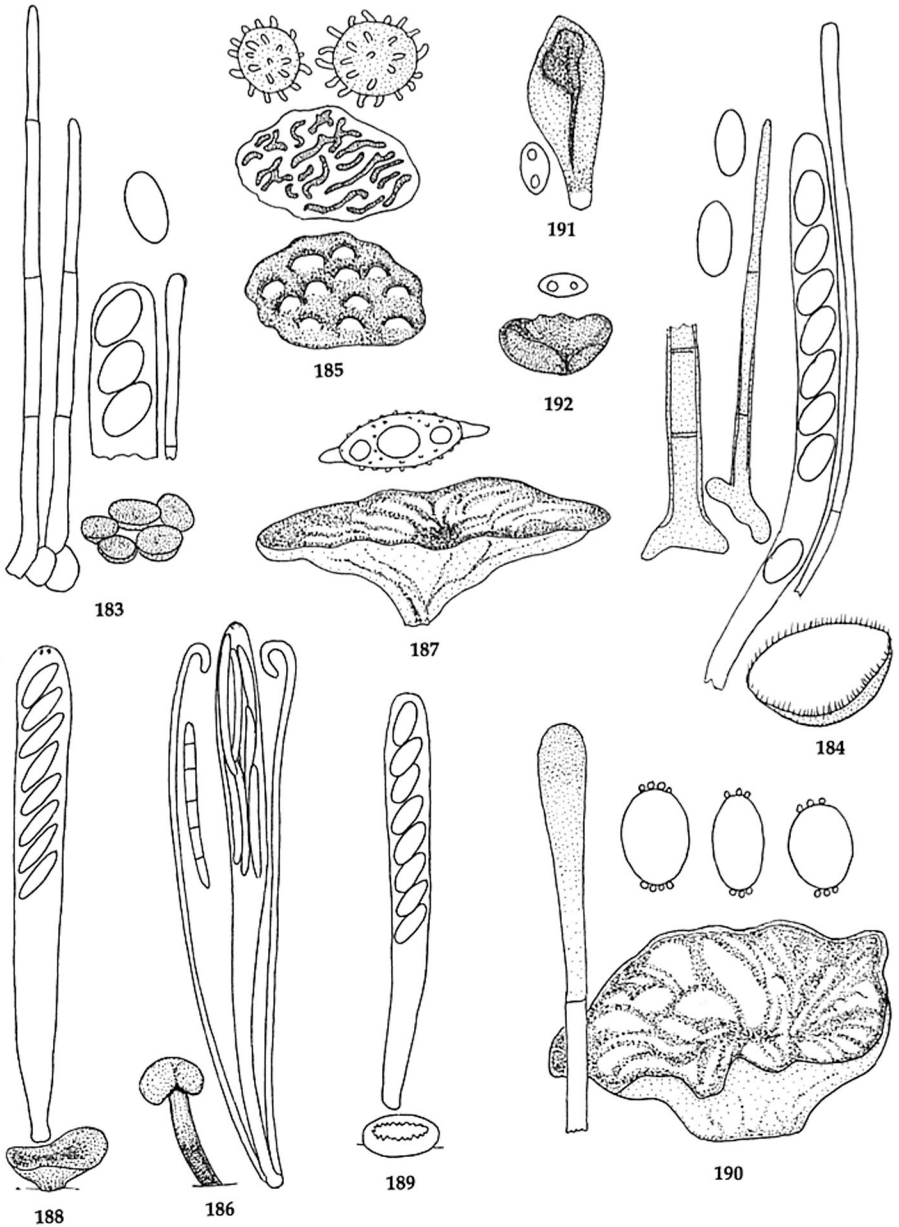

Plate 20. Discomycetes on soil. 183, *Cheilymenia theleboloides*; 184, *C. vitellina*; 185, *Choiromyces meandriformis*; 186, *Cudonia circinans*; 187, *Discina ancilis*; 188, *Discinella boudieria*; 189, *D. margarita*; 190, *Disciotis venosa*; 191, *Flavoscypha cantharella*; 192, *F. phlebophora.*

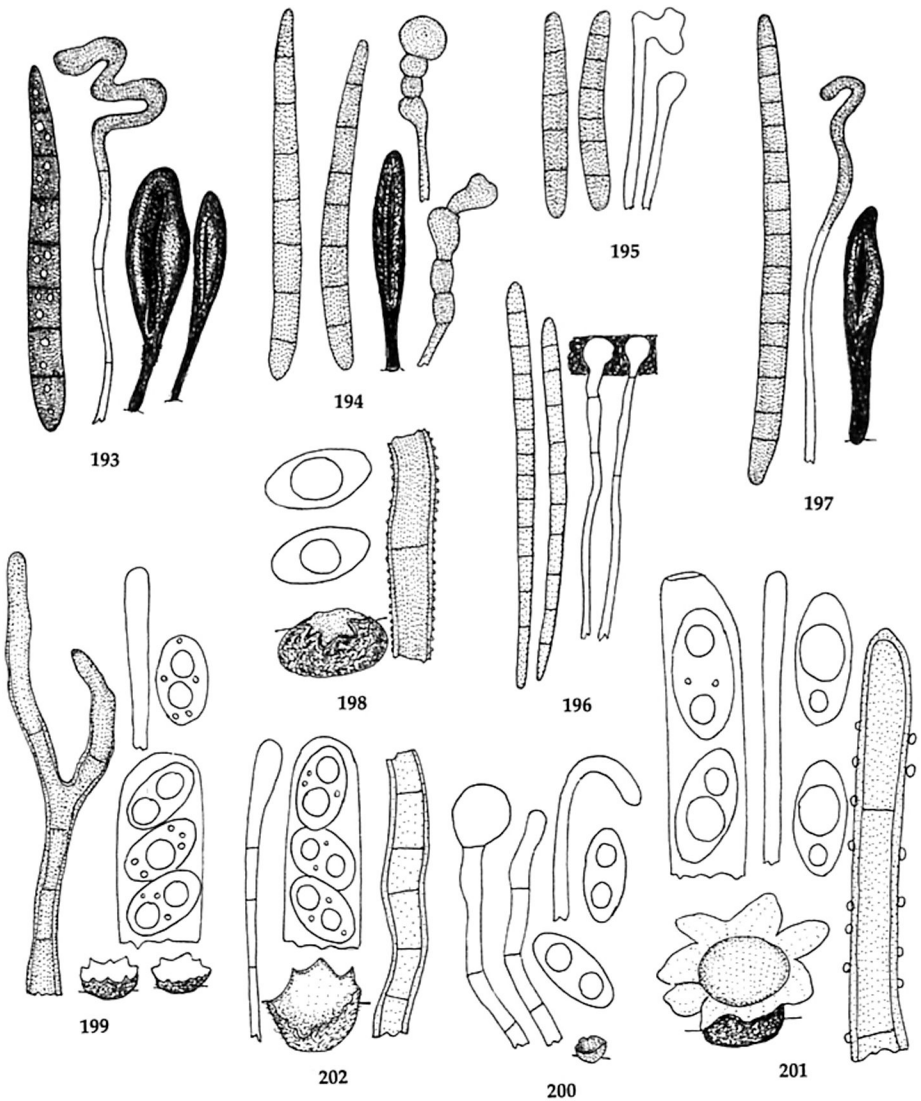

Plate 21. Discomycetes on soil. 193, *Geoglossum barlae*; 194, *G. cookeianum*; 195, *G. elongatum*; 196, *G. fallax*; 197, *G. peckianum*; 198, *Geopora arenicola*; 199, *G. arenosa*; 200, *Sepultaria semi-immersa*; 201, *Geopora sumneriana*; 202, *G. tenuis.*

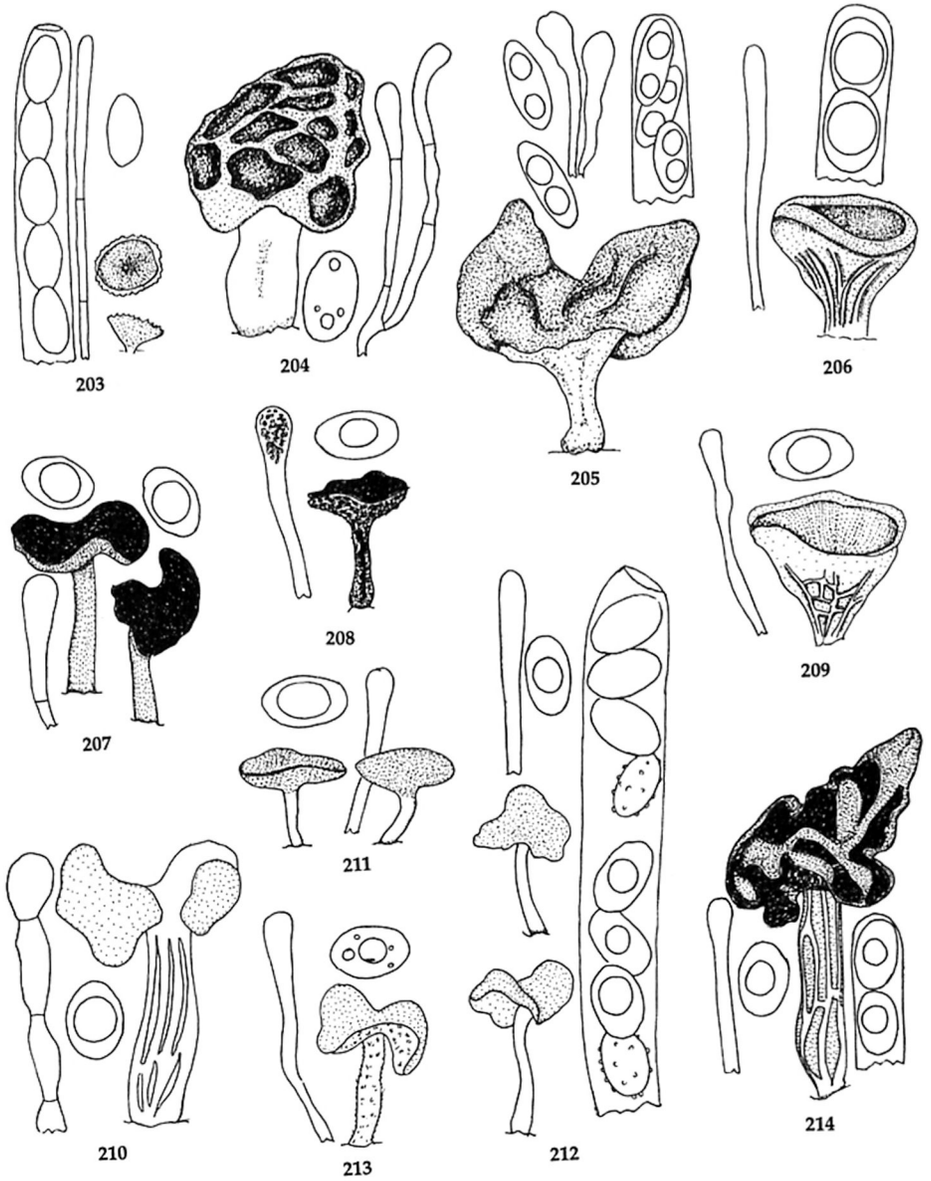

Plate 22. Discomycetes on soil. 203, *Geopyxis majalis*; 204, *Gyromitra esculenta*; 205, *G. infula*; 206, *Helvella acetabulum*; 207, *H. atra*; 208, *H. corium*; 209, *H. costifera*; 210, *H. crispa*; 211, *H. cupuliformis*; 212, *H. elastica*; 213, *H. ephippium*; 214, *H. lacunosa.*

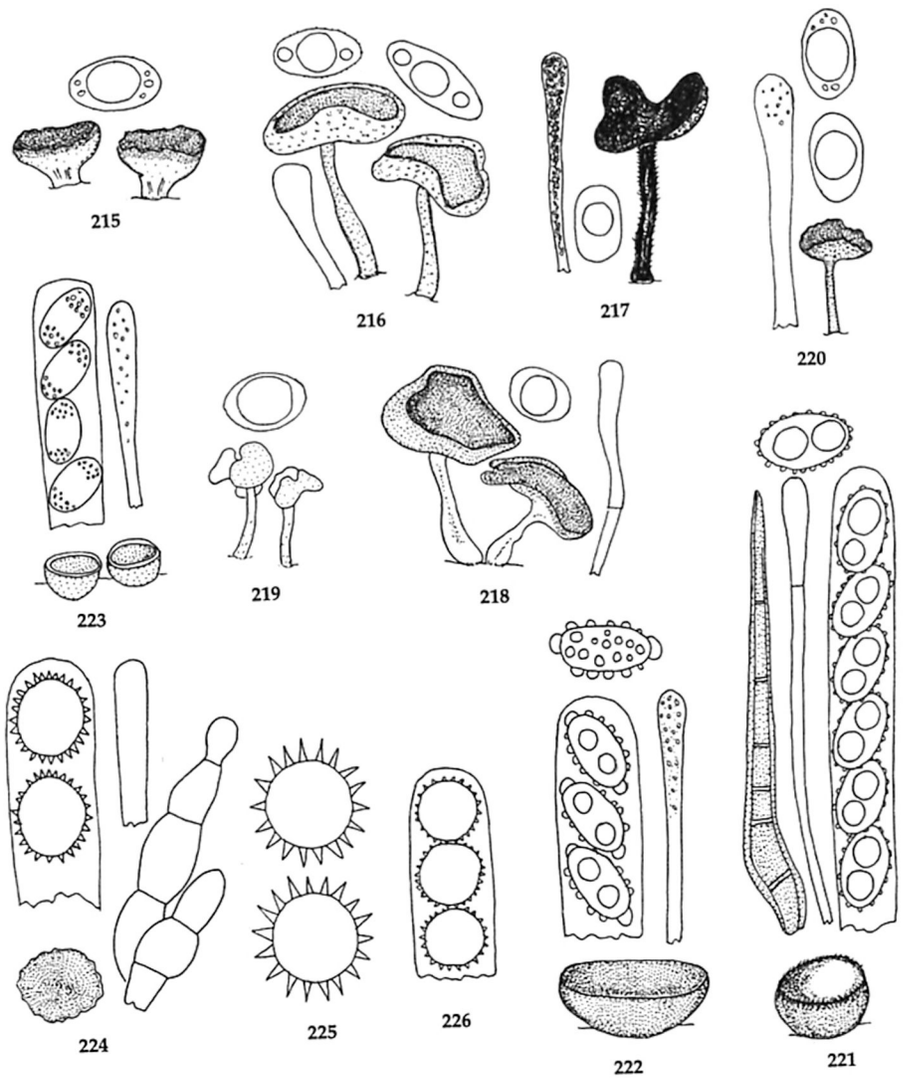

Plate 23. Discomycetes on soil. 215, *Helvella leucomelaena*; 216, *H. macropus*; 217, *H. pezizoides*; 218, *H. queletii*; 219, *H. stevensii*; 220, *H. villosa*; 221, *Humaria hemisphaerica*; 222, *Japhneadelphus amethystinus*; 223, *Kotlabaea deformis*; 224, *Lamprospora crec'hqueraultii*; 225, *L. crec'hqueraultii* var. *macrantha*; 226, *L. modesta.*

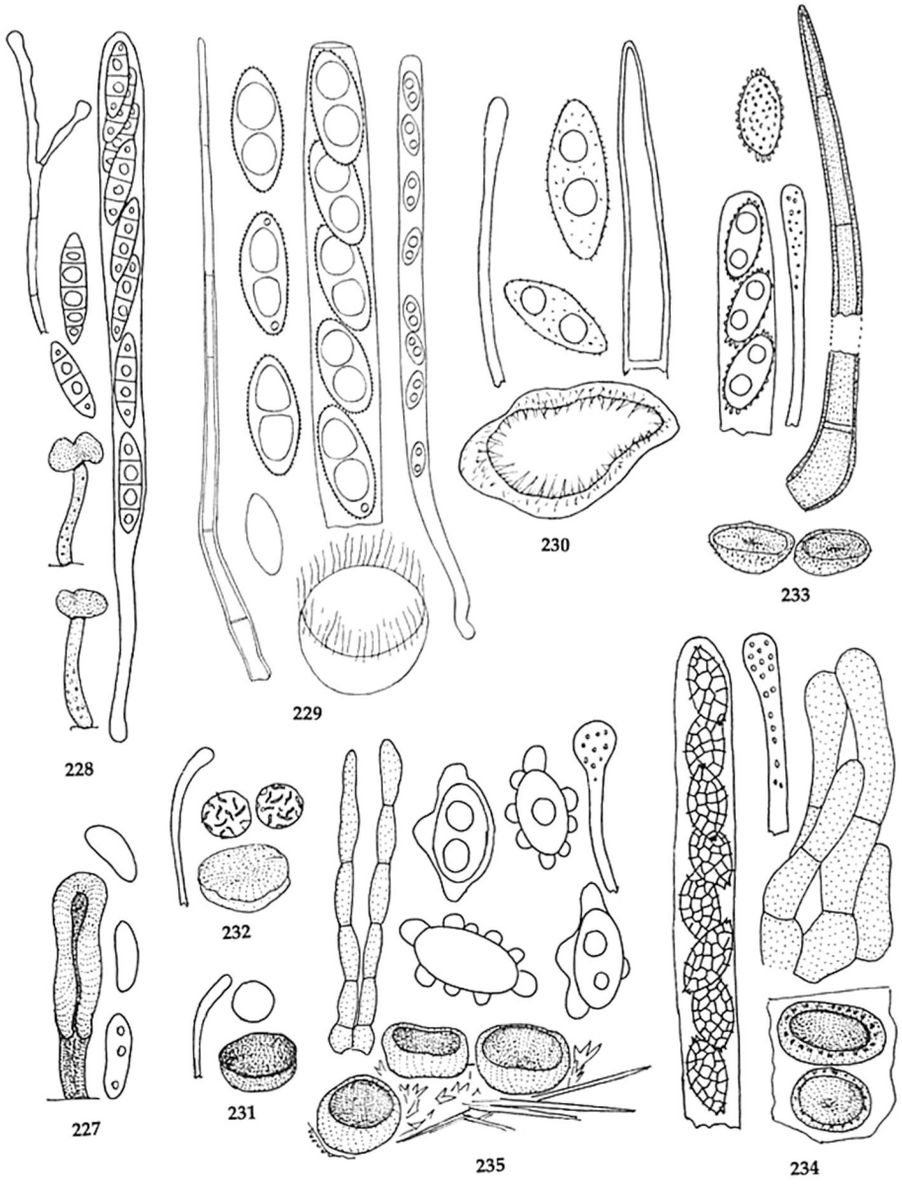

Plate 24. Discomycetes on soil. 227, *Leotia atrovirens*; 228, *L. lubrica*; 229, *Leucoscypha erminea*; 230, *L. leucotricha*; 231, *Marcelleina atroviolacea*; 232, *M. persoonii*; 233, *Melastiza asperula*; 234, *M. chateri*; 235, *M. scotica.*

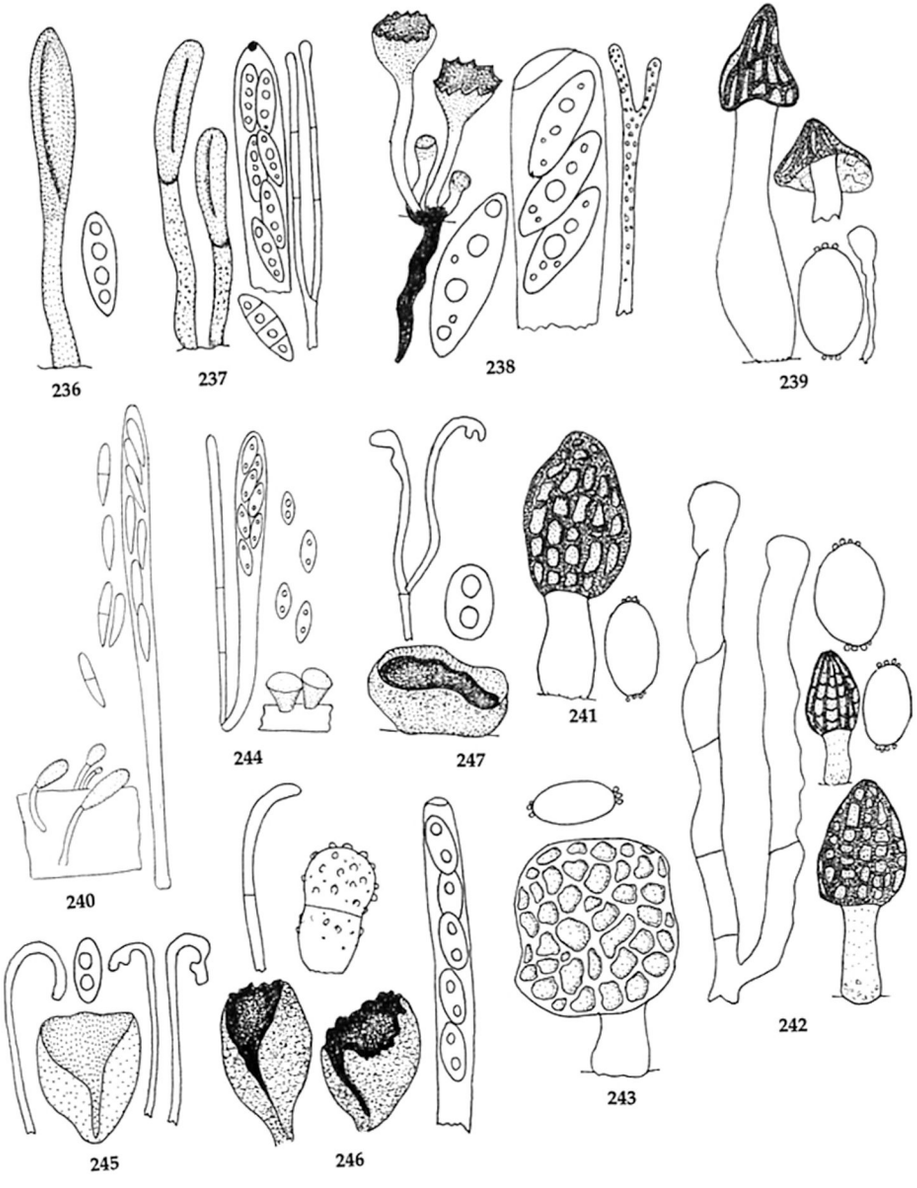

Plate 25. Discomycetes on soil. 236, *Microglossum olivaceum*; 237, *M. viride*; 238, *Microstoma protracta*; 239, *Mitrophora semilibera*; 240, *Mitrula paludosa*; 241, *Morchella conica*; 242, *M. elata*; 243, *M. esculenta*; 244, *Ombrophila violacea*; 245, *Otidea alutacea*; 246, *O. bufonia*; 247, *O. cochleata.*

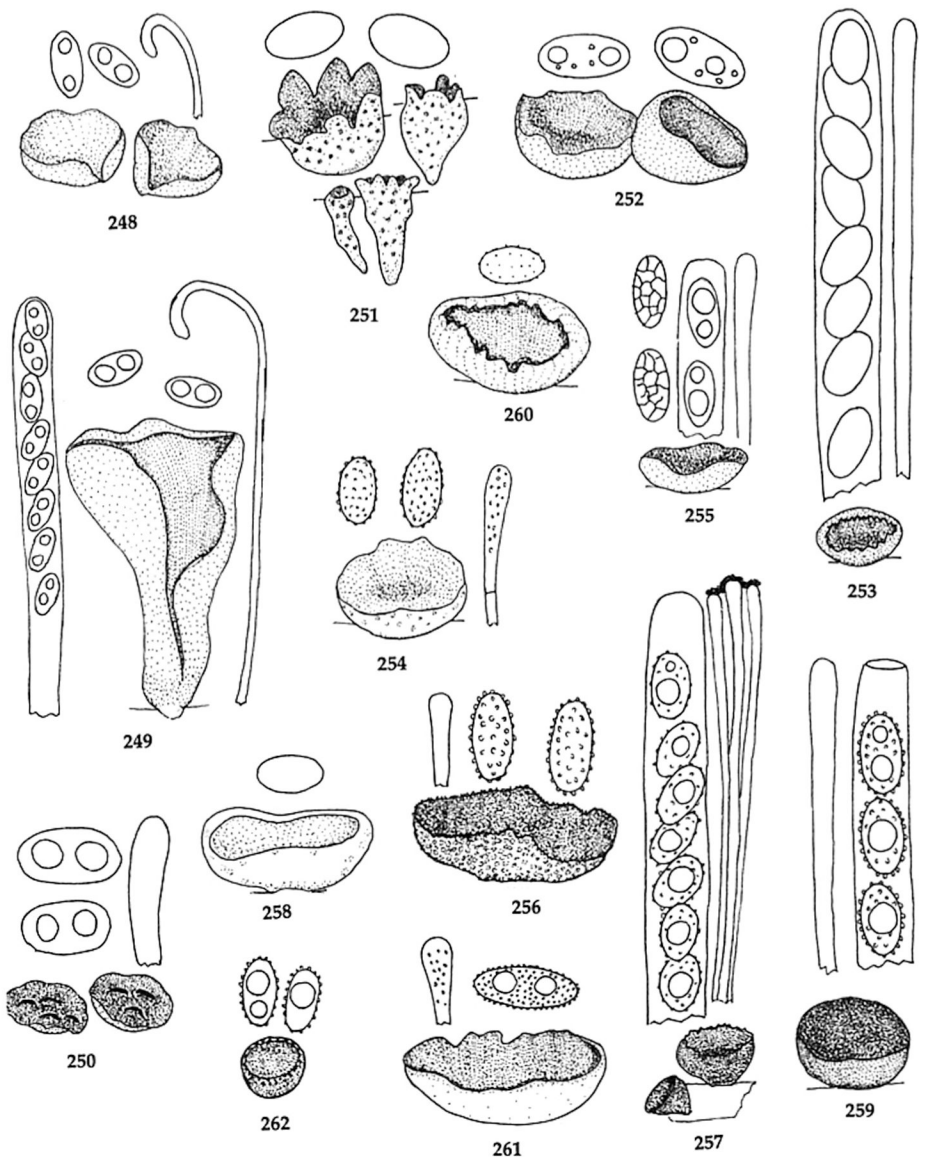

Plate 26. Discomycetes on soil. 248, *Otidea leporina*; 249, *O. onotica*; 250, *Pachyella violaceonigra*; 251, *Peziza ammophila*; 252, *P. ampelina*; 253, *P. ampliata*; 254, *P. arvernensis*; 255, *P. badia*; 256, *P. badioconfusa*; 257, *P. badiofusca*; 258, *P. cerea*; 259, *P. depressa*; 260, *P. domiciliana*; 261, *P. emileia*; 262, *P. indiscreta.*

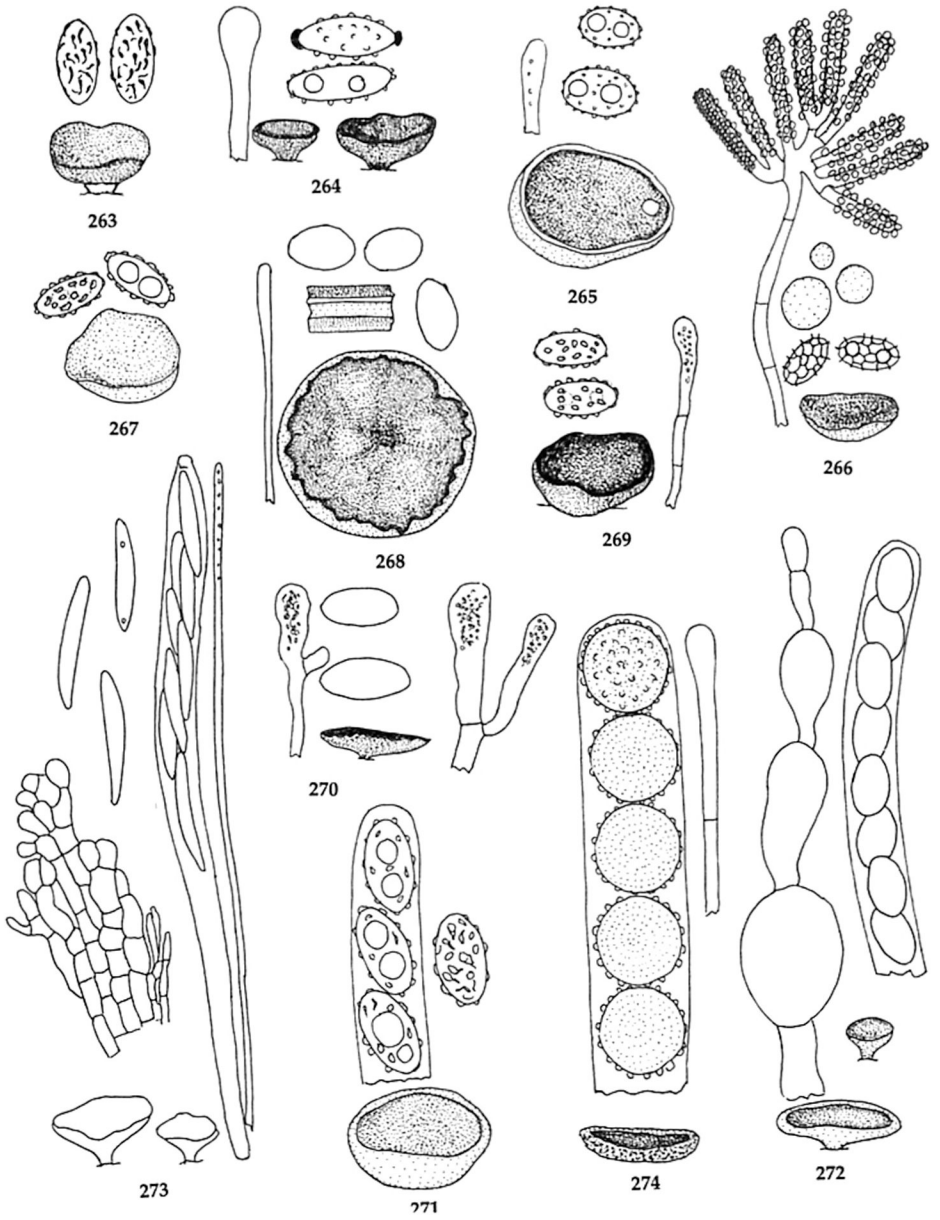

Plate 27. Discomycetes on soil. 263, *Peziza limnaea*; 264, *P. lividula*; 265, *P. michelii*; 266, *P. ostracoderma*; 267, *P. plebeia*; 268, *P. repanda*; 269, *P. saniosa*; 270, *P. sterigmatizans*; 271, *P. succosa*; 272, *P. varia*; 273, *Phaeohelotium geogenum*; 274, *Plicaria radula.*

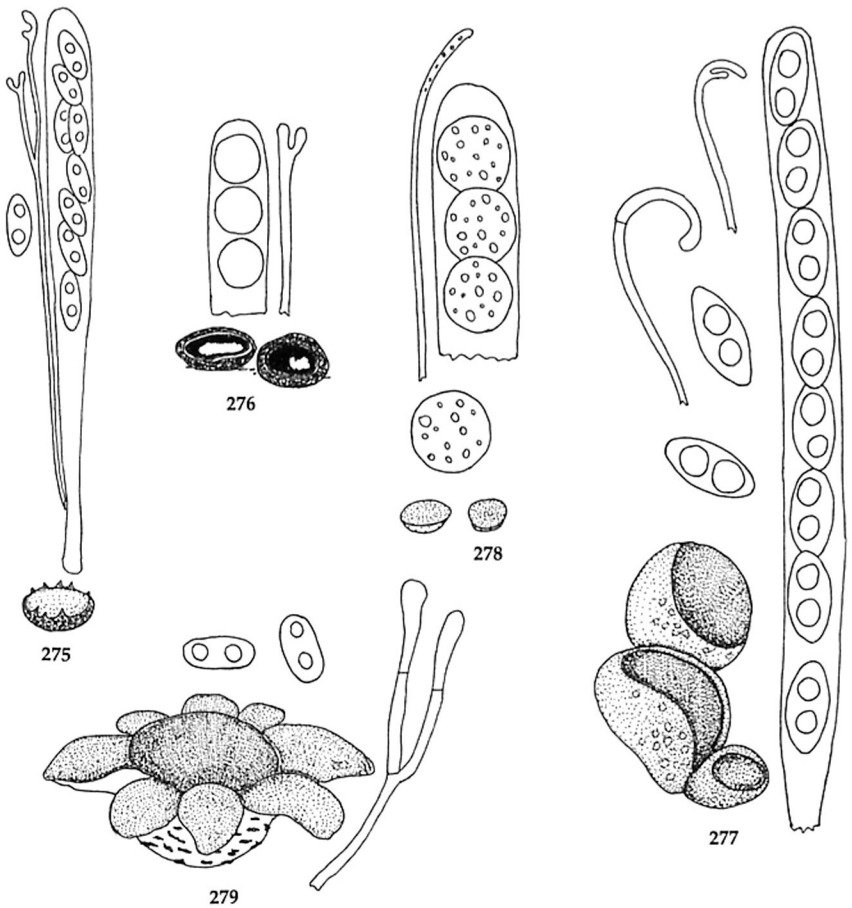

Plate 28. Discomycetes on soil. 275, *Podophacidium xanthomelum*; 276, *Pseudoplectania nigrella*; 277, *Pseudotis apophysata*; 278, *Pulvinula cinnabarina*; 279, *Sarcosphaera coronaria.*

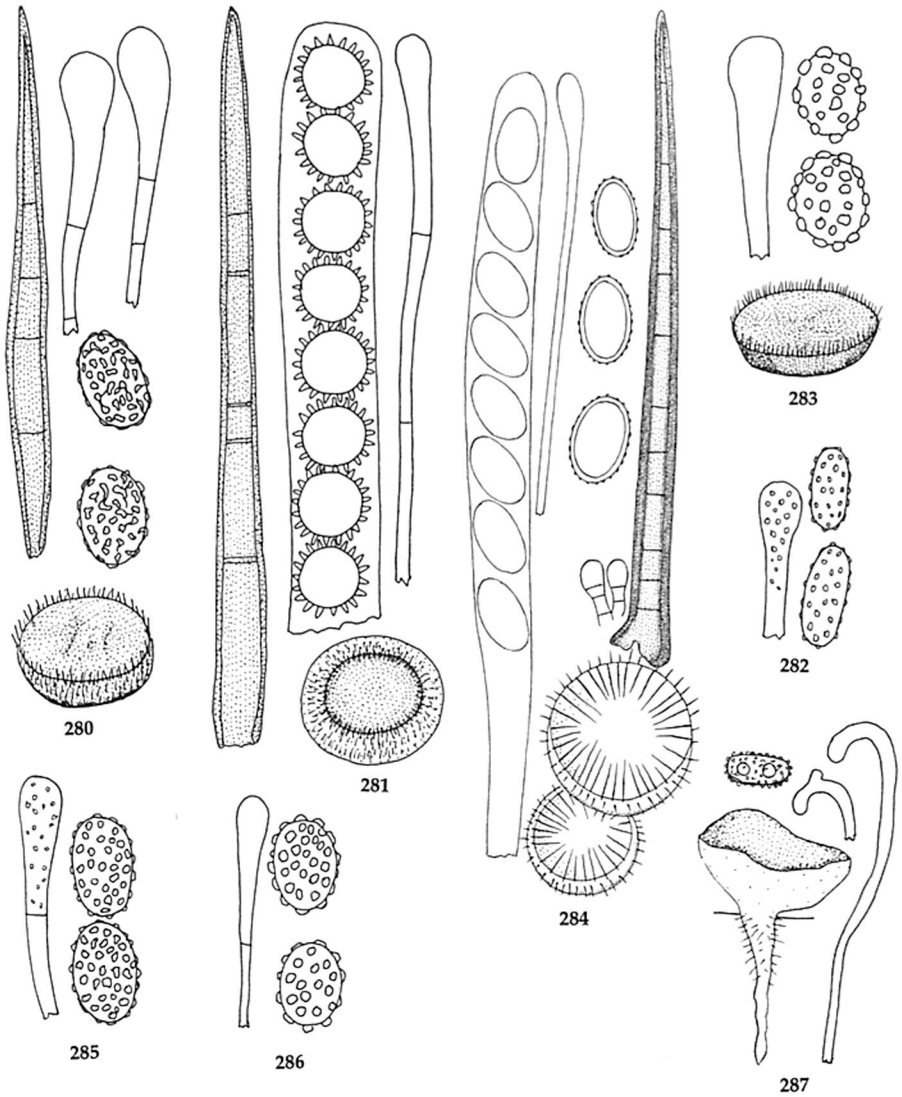

Plate 29. Discomycetes on soil. 280, *Scutellinia ampullacea* var. *parvula*; 281, *S. asperior*; 282, *S. hirta*; 283, *S. pseudoumbrarum*; 284, *S. scutellata*; 285, *S. subhirtella*; 286, *S. umbrorum*; 287, *Sowerbyella radiculata.*

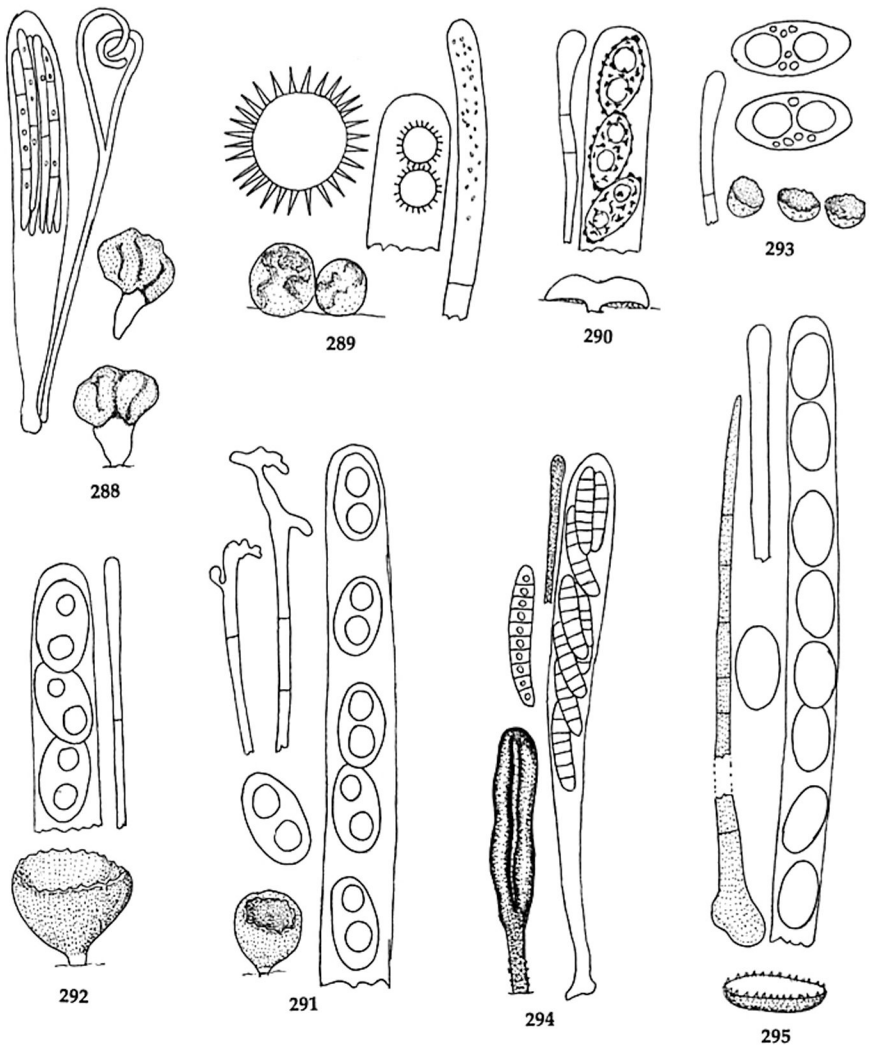

Plate 30. Discomycetes on soil. 288, *Spathularia flava*; 289, *Sphaerosoma echinulatum*; 290, *Syrcekomyces pallidus*; 291, *Tarzetta catinus*; 292, *T. cupularis*; 293, *T. gaillardiana*; 294, *Thuemenidium atropurpureum*; 295, *Tricharina cretea.*

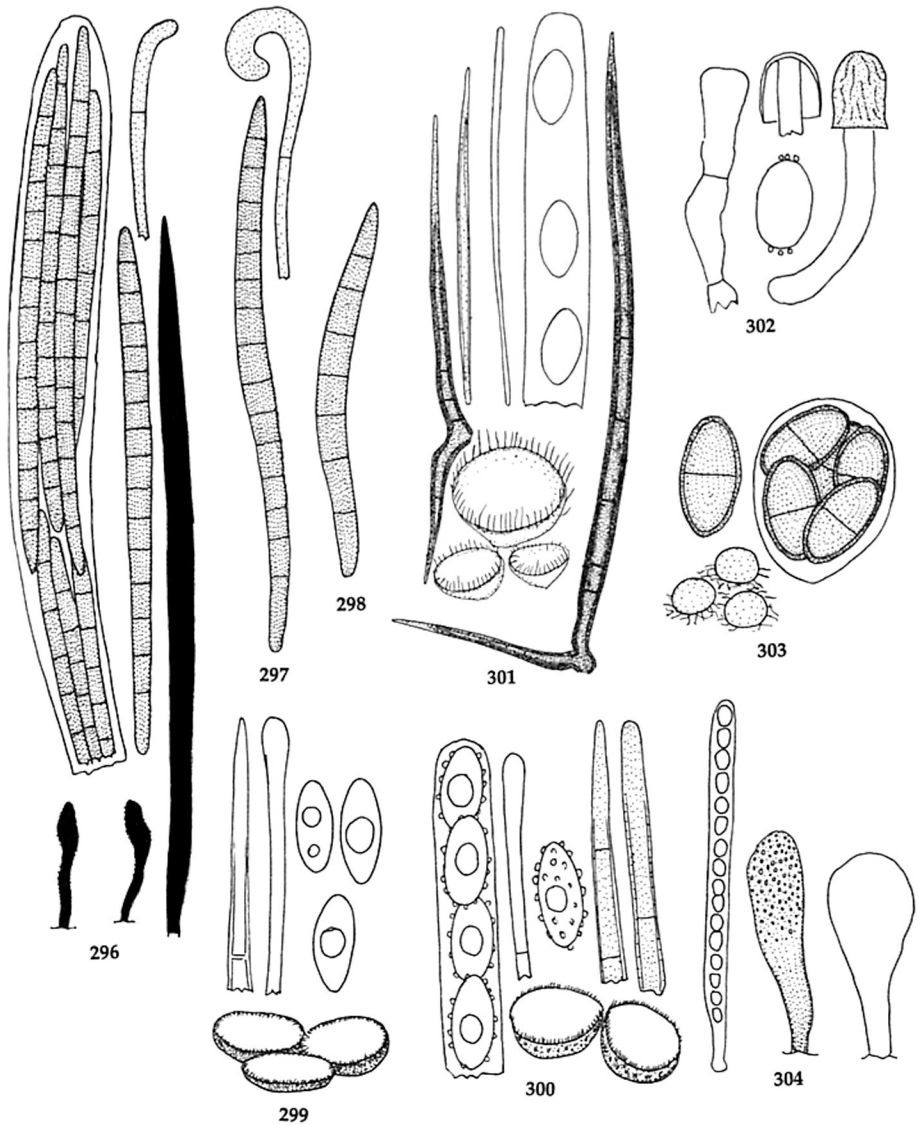

Plate 31. Discomycetes and other ascomycetes on soil. 296, *Trichoglossum hirsutum*; 297, *T. tetrasporum*; 298, *T. walteri*; 299, *Trichophaea gregaria*; 300, *T. pseudogregaria*; 301, *Trichophaeopsis bicuspis*; 302, *Verpa conica*; 303, *Heleococcum aurantiacum*; 304, *Podostroma alutaceum.*

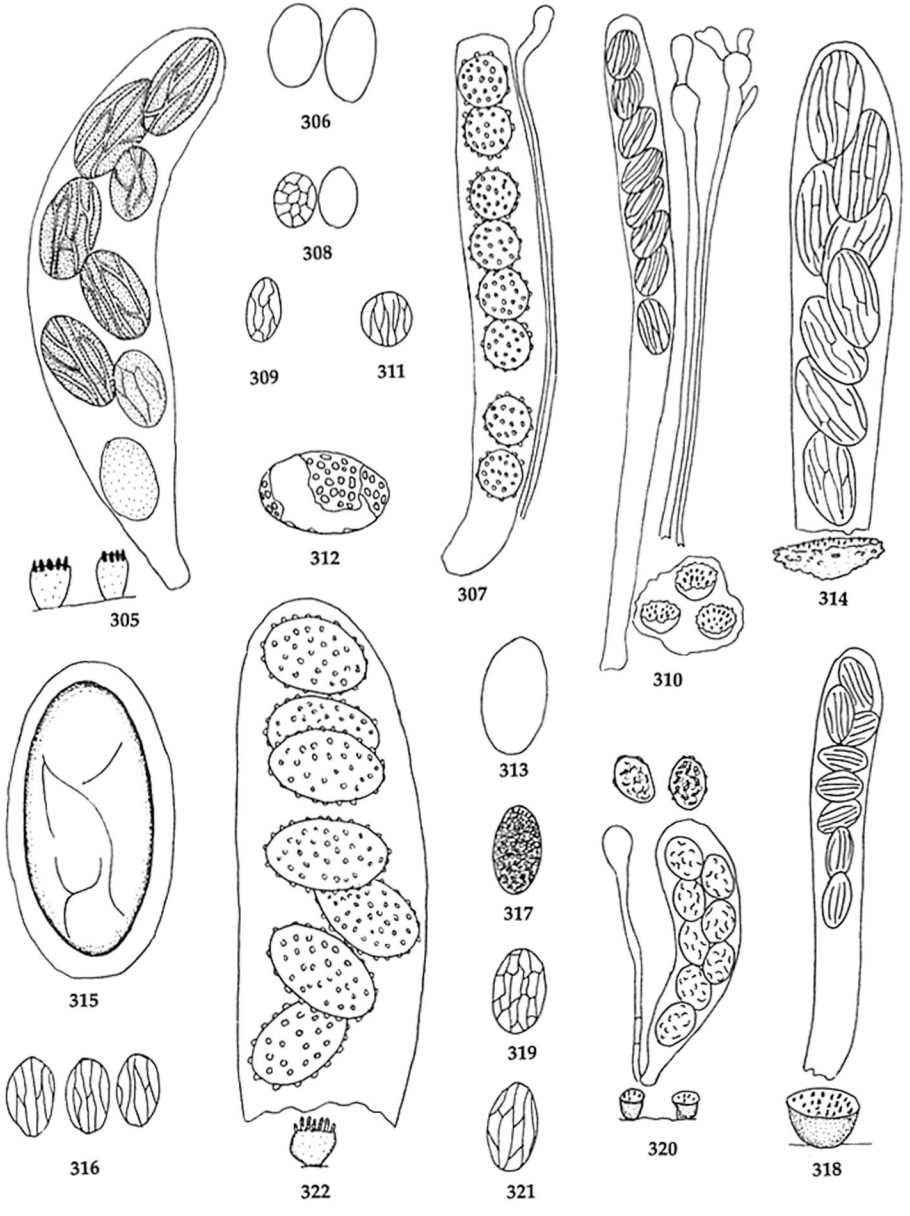

Plate 32. Discomycetes on dung. 305, *Ascobolus albidus*; 306, *A. boudieri*; 307, *A. brassicae*; 308, *A. carletonii*; 309, *A. cervinus*; 310, *A. crenulatus*; 311, *A. crosslandii*; 312, *A. degluptus*; 313, *A. elegans*; 314, *A. furfuraceus*; 315, *A. immersus*; 316, *A. lignatilis*; 317, *A. mancus*; 318, *A. minutus*; 319, *A. perplexans*; 320, *A. rhytidisporus*; 321, *A. roseopurpureus*; 322, *A. stictoideus*.

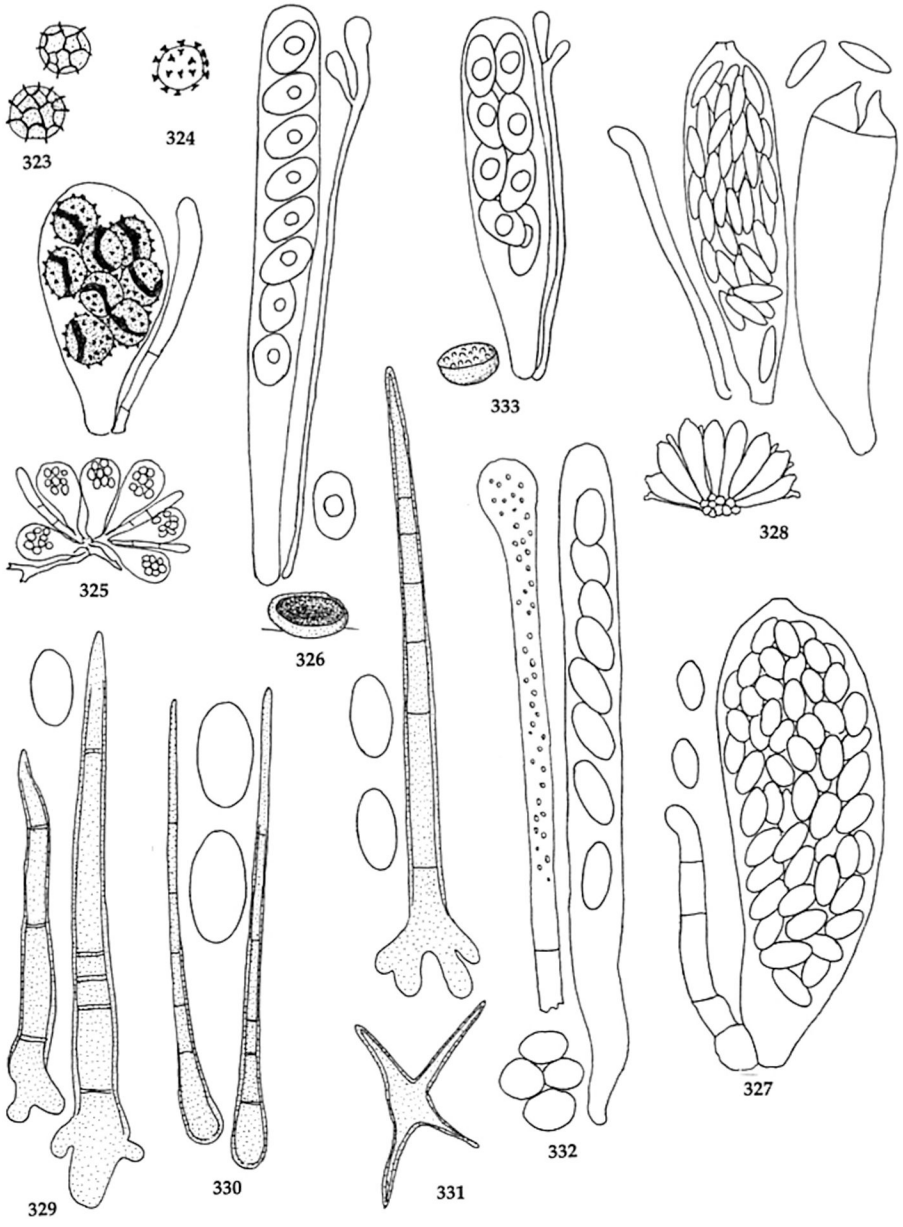

Plate 33. Discomycetes on dung. 323, *Ascodesmis microscopica*; 324, *A. nigricans*; 325, *A. porcina*; 326, *Ascophanus misturae*; 327, *Ascozonus leveilleanus*; 328, *A. woolhopensis*; 329, *Cheilymenia fimicola*; 330, *C. raripila*; 331, *C. stercorea*; 332, *Coprobia granulata*; 333, *Coprotus aurorus*.

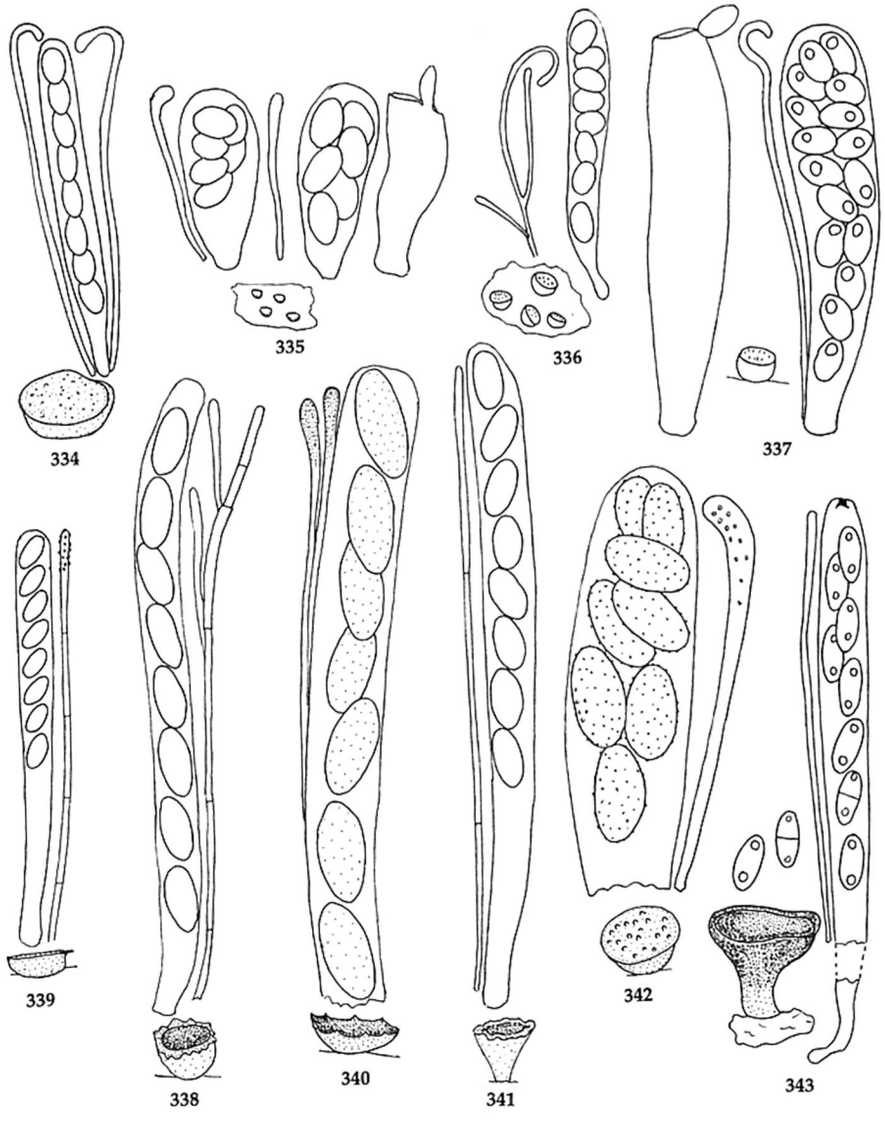

Plate 34. Discomycetes on dung. 334, *Coprotus glaucellus*; 335, *C. granuliformis*; 336, *C. lacteus*; 337, *C. sexdecemsporus*; 338, *Fimaria cervaria*; 339, *F. equina*; 340, *F. hepatica*; 341, *F. theioleuca*; 342, *Iodophanus carneus*; 343, *Lanzia cuniculi.*

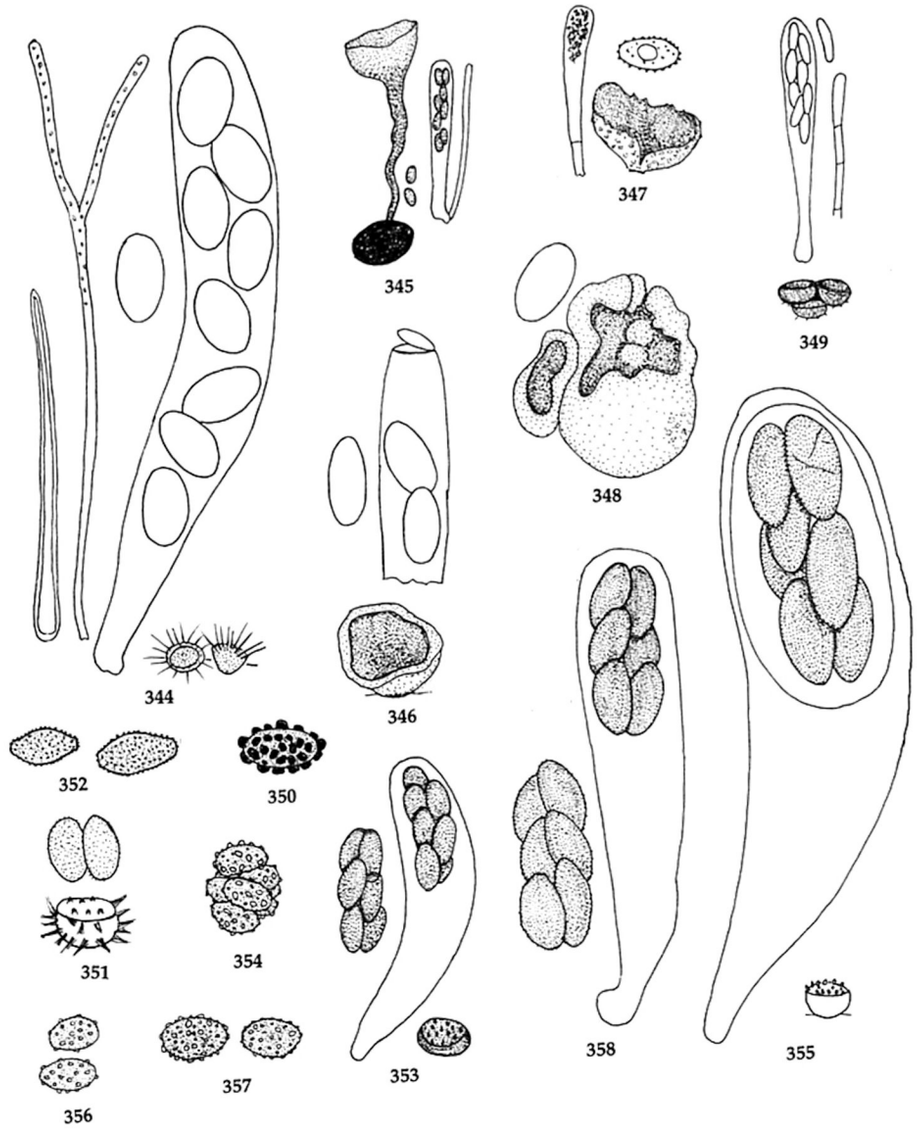

Plate 35. Discomycetes on dung. 344, *Lasiobolus papillatus*; 345, *Martininia panamaensis*; 346, *Peziza bovina*; 347, *P. pleurota*; 348, *P. vesiculosa*; 349, *Pezizella albula*; 350, *Saccobolus beckii*; 351, *S. caesariatus*; 352, *S. citrinus*; 353, *S. depauperatus*; 354, *S. dilutellus*; 355, *S. glaber*; 356, *S. globuliferellus*; 357, *S. obscurus*; 358, *S. versicolor.*

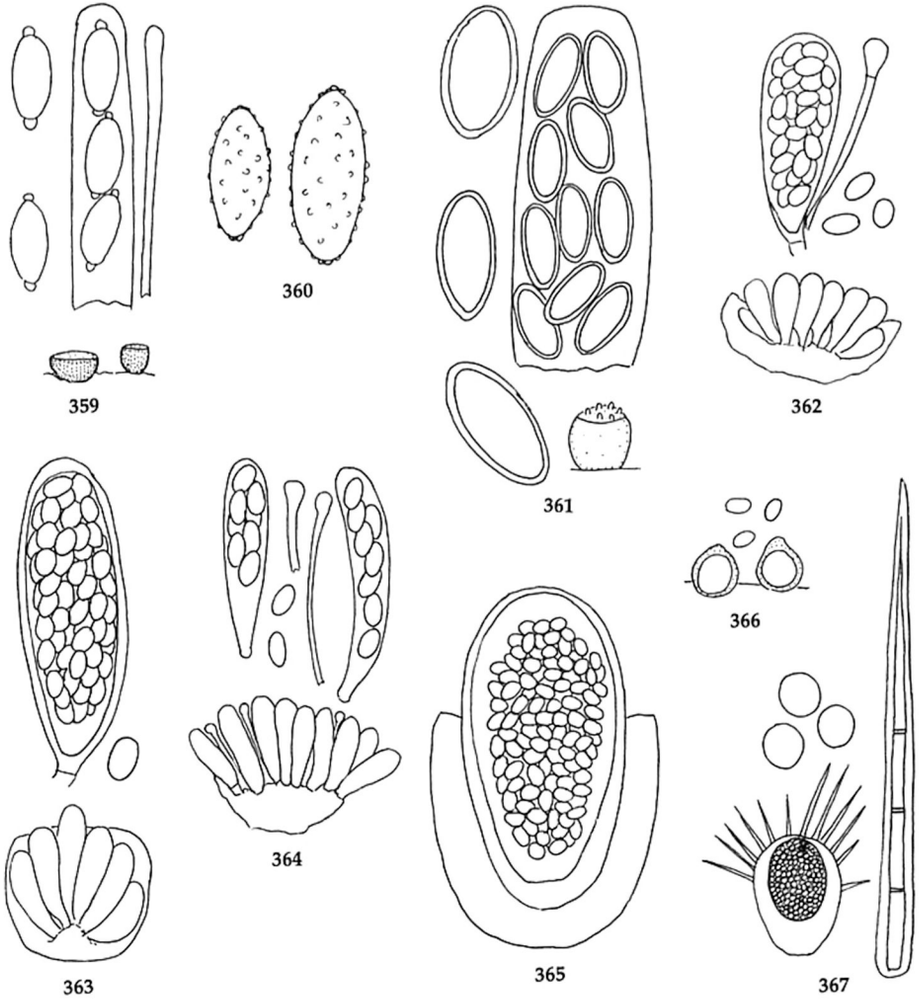

Plate 36. Discomycetes on dung. 359, *Thecotheus apiculatus*; 360, *T. cinereus*; 361, *T. pelletieri*; 362, *Thelebolus caninus*; 363, *T. crustaceus*; 364, *T. microsporus*; 365, *T. nanus*; 366, *T. stercoreus*; 367, *Trichobolus sphaerosporus.*

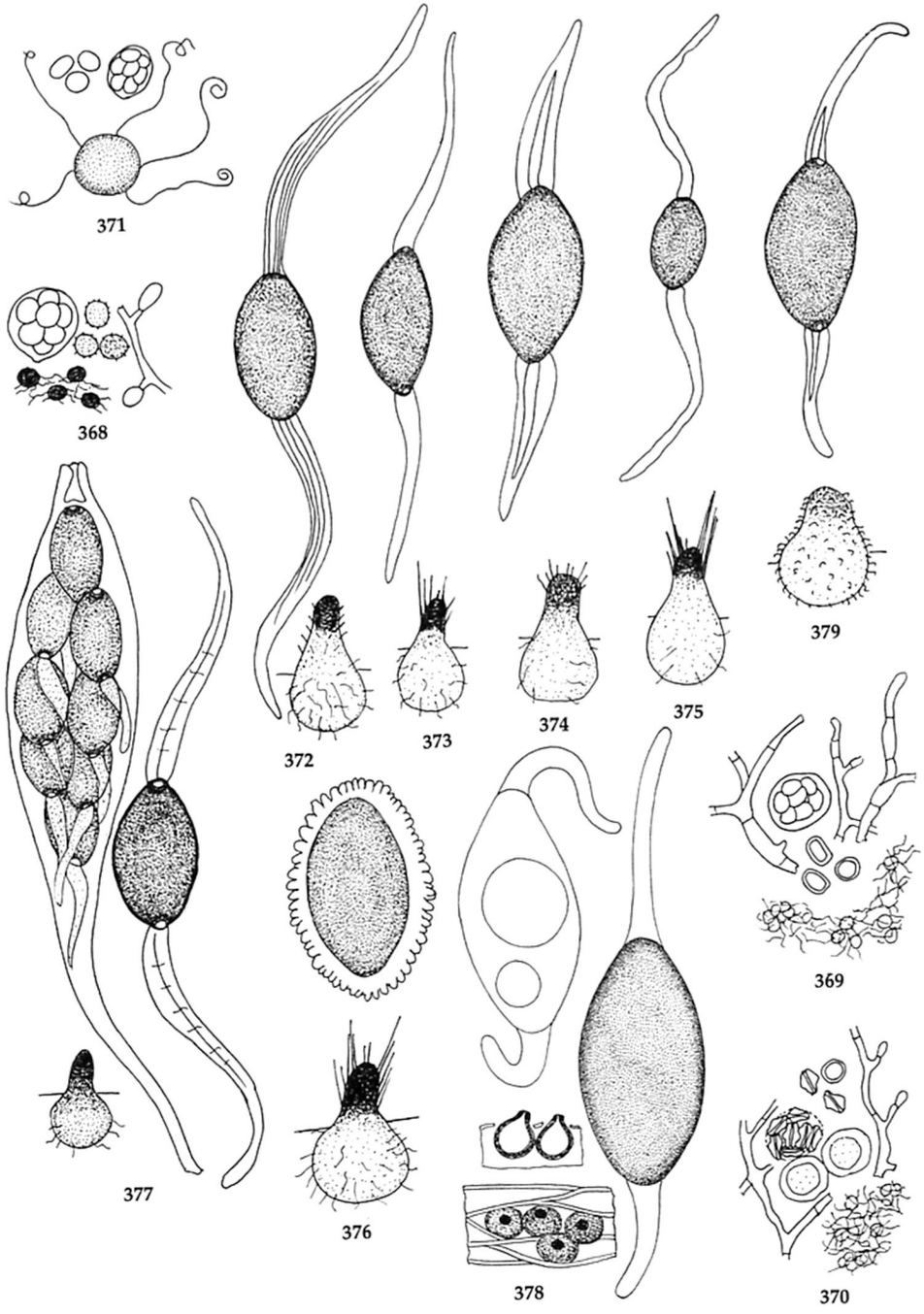

Plate 37. Ascomycetes on dung. 368, *Anixiopsis fulvescens* var. *stercoraria*; 369, *Arachniotus confluens*; 370, *A. ruber*; 371, *Arachnomyces nitidus*; 372, *Arnium caballinum*; 373, *A. cervinum*; 374, *A. hirtum*; 375, *A. leporinum*; 376, *A. macrothecum*; 377, *A. mendax*; 378, *A. olerum*; 379, *A. tomentosum.*

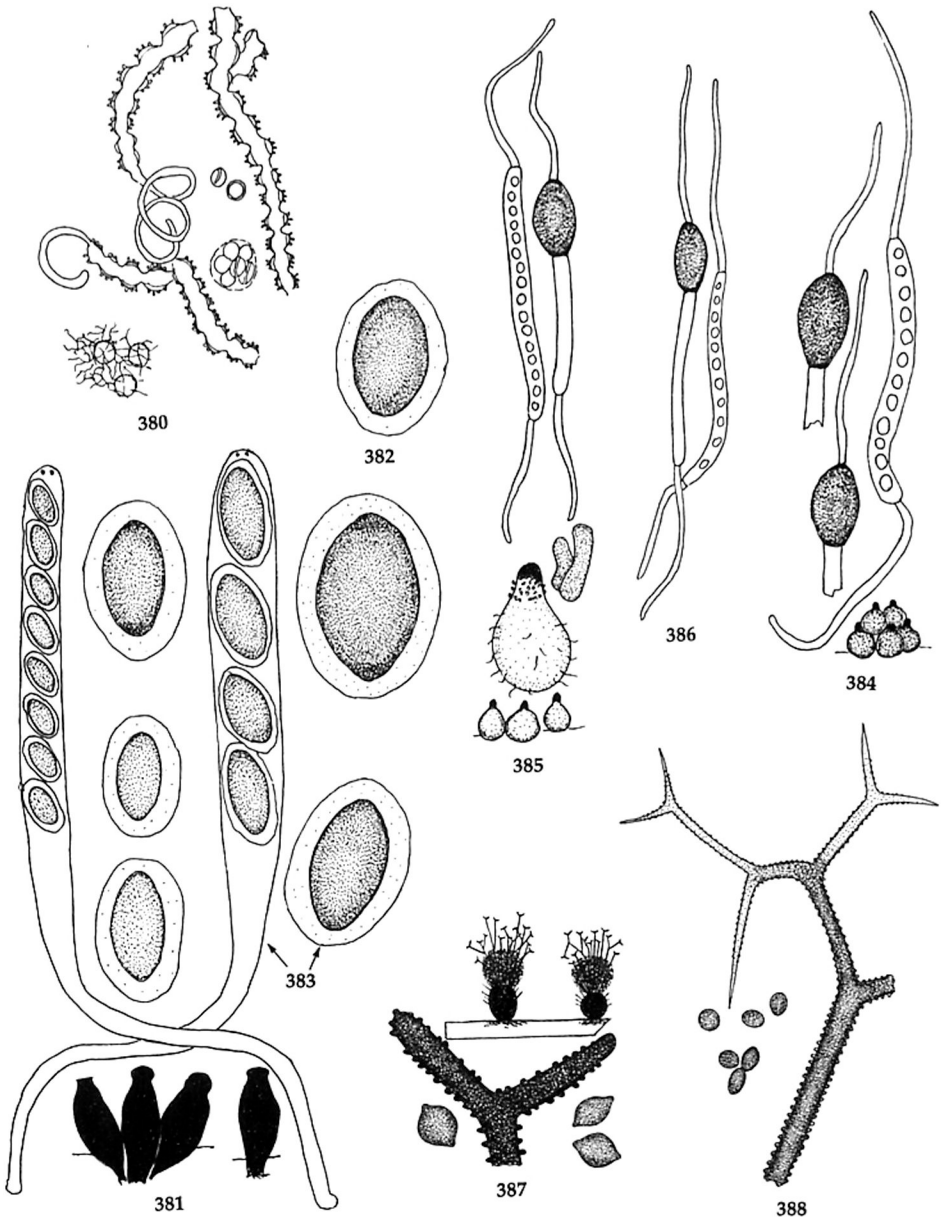

Plate 38. Ascomycetes on dung. 380, *Arthroderma curreyi*; 381, *Bombardioidea bombardioides*; 382, *B. serignanensis*; 383, *B. stercoris*; 384, *Cercophora coprophila*; 385, *C. mirabilis*; 386, *C. silvatica*; 387, *Chaetomium elatum*; 388, *C. funicola.*

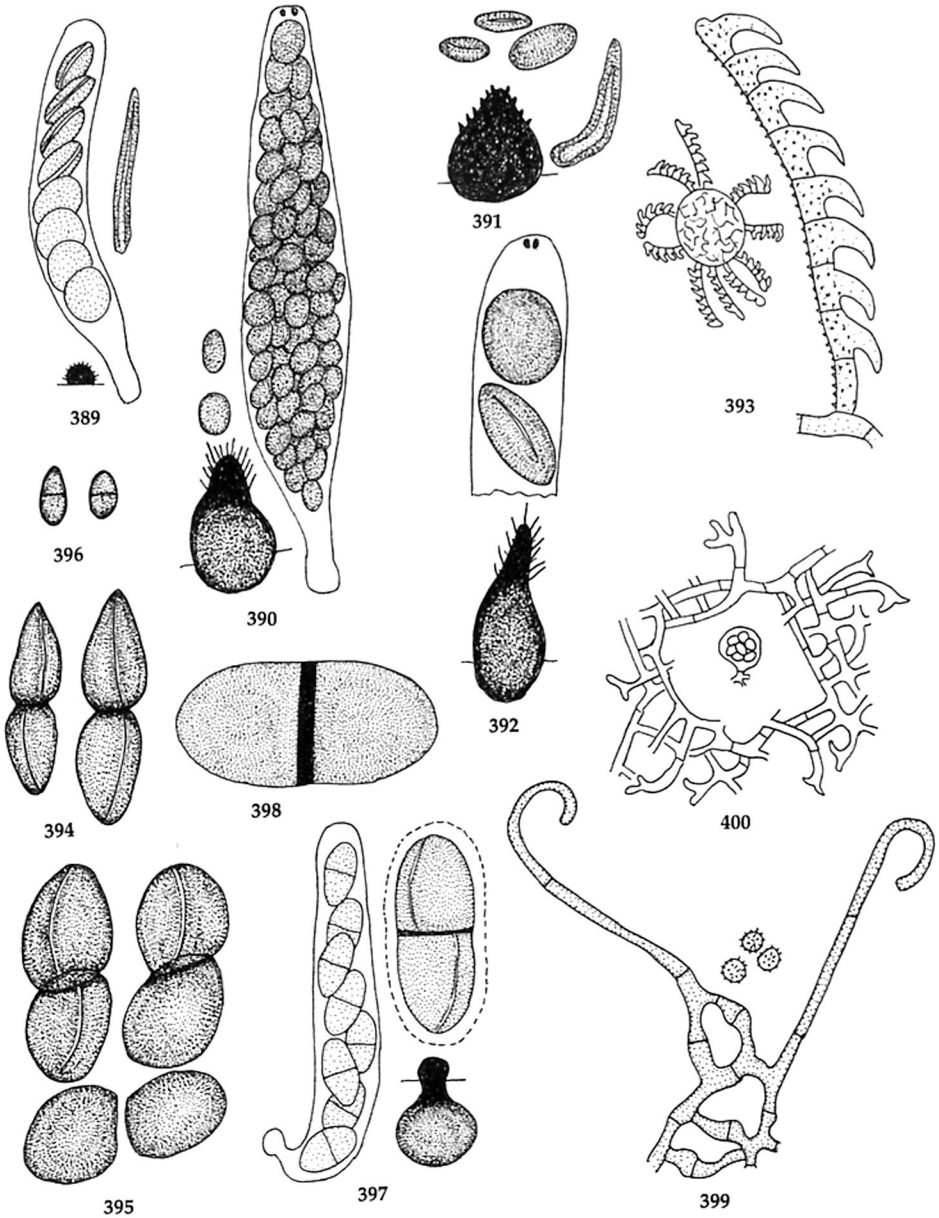

Plate 39. Ascomycetes on dung. 389, *Coniochaeta discospora*; 390, *C. hansenii*; 391, *C. saccardoi*; 392, *C. scatigena*; 393, *Ctenomyces serratus*; 394, *Delitschia canina*; 395, *D. didyma*; 396, *D. marchalii*; 397, *D. patagonica*; 398, *D. winteri*; 399, *Gymnoascus californiensis*; 400, *G. reesii.*

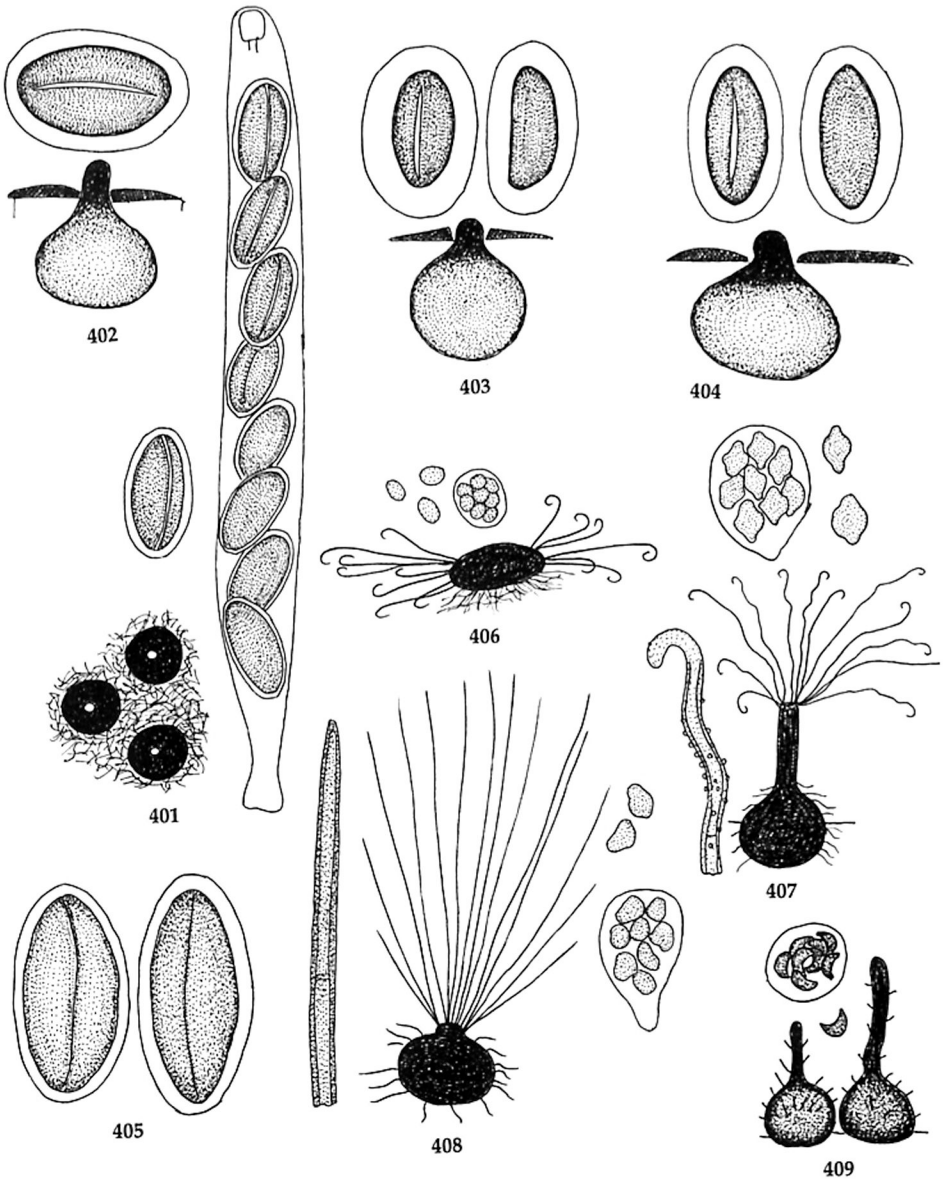

Plate 40. Ascomycetes on dung. 401, *Hypocopra equorum*; 402, *H. merdaria*; 403, *H. planispora*; 404, *H. stephanophora*; 405, *H. stercoraria*; 406, *Kernia nitida*; 407, *Lophotrichus ampullus*; 408, *L. bartlettii*; 409, *Microascus longirostris.*

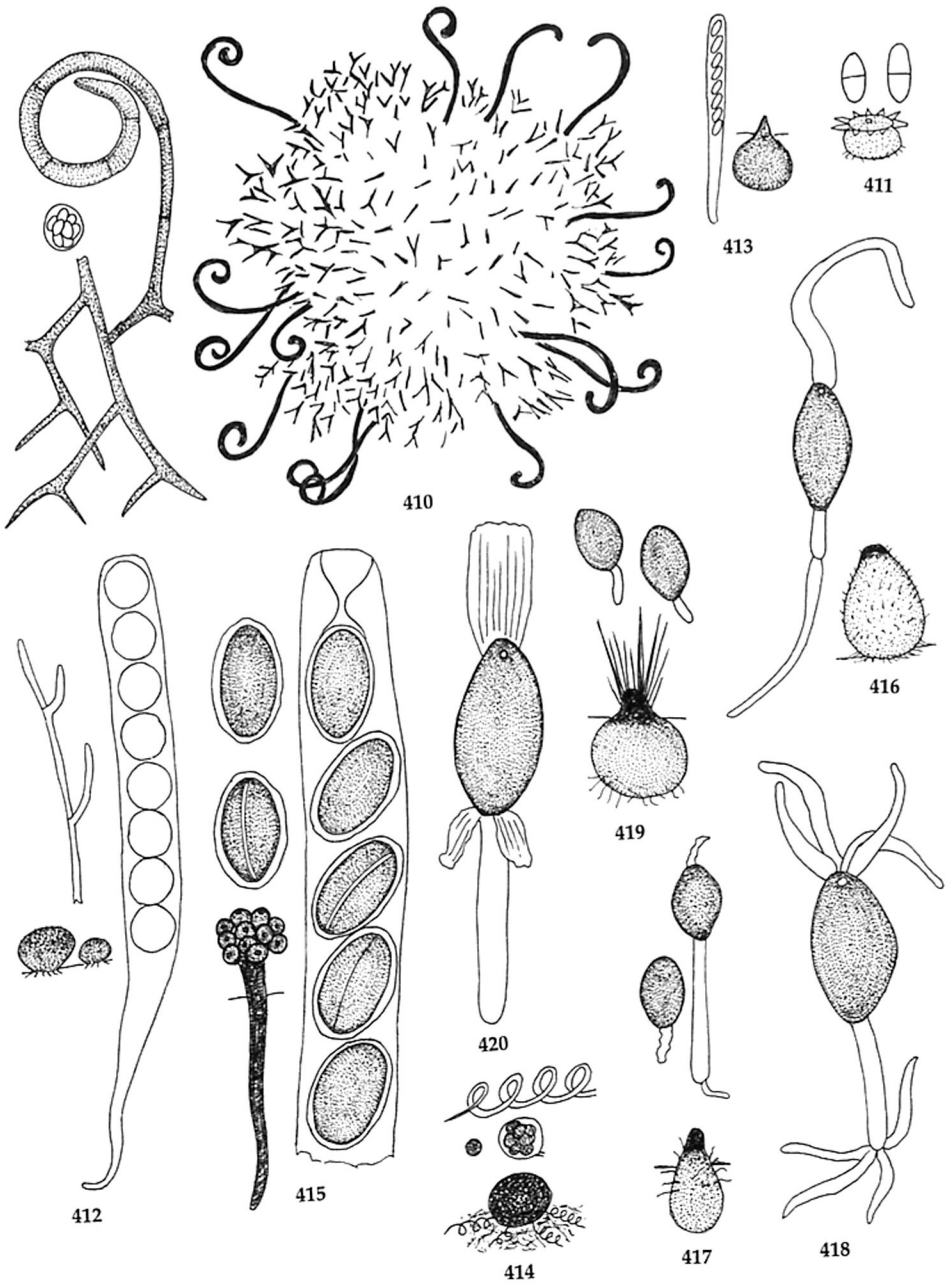

Plate 41. Ascomycetes on dung. 410, *Myxotrichum chartarum*; 411, *Nectria suffulta*; 412, *Orbicula parictina*; 413, *Phomatospora coprophila*; 414, *Pleuroascus nicholsonii*; 415, *Podosordaria tulasnei*; 416, *Podospora appendiculata*; 417, *P. collapsa*; 418, *P. communis*; 419, *P. curvicolla*; 420, *P. decipiens.*

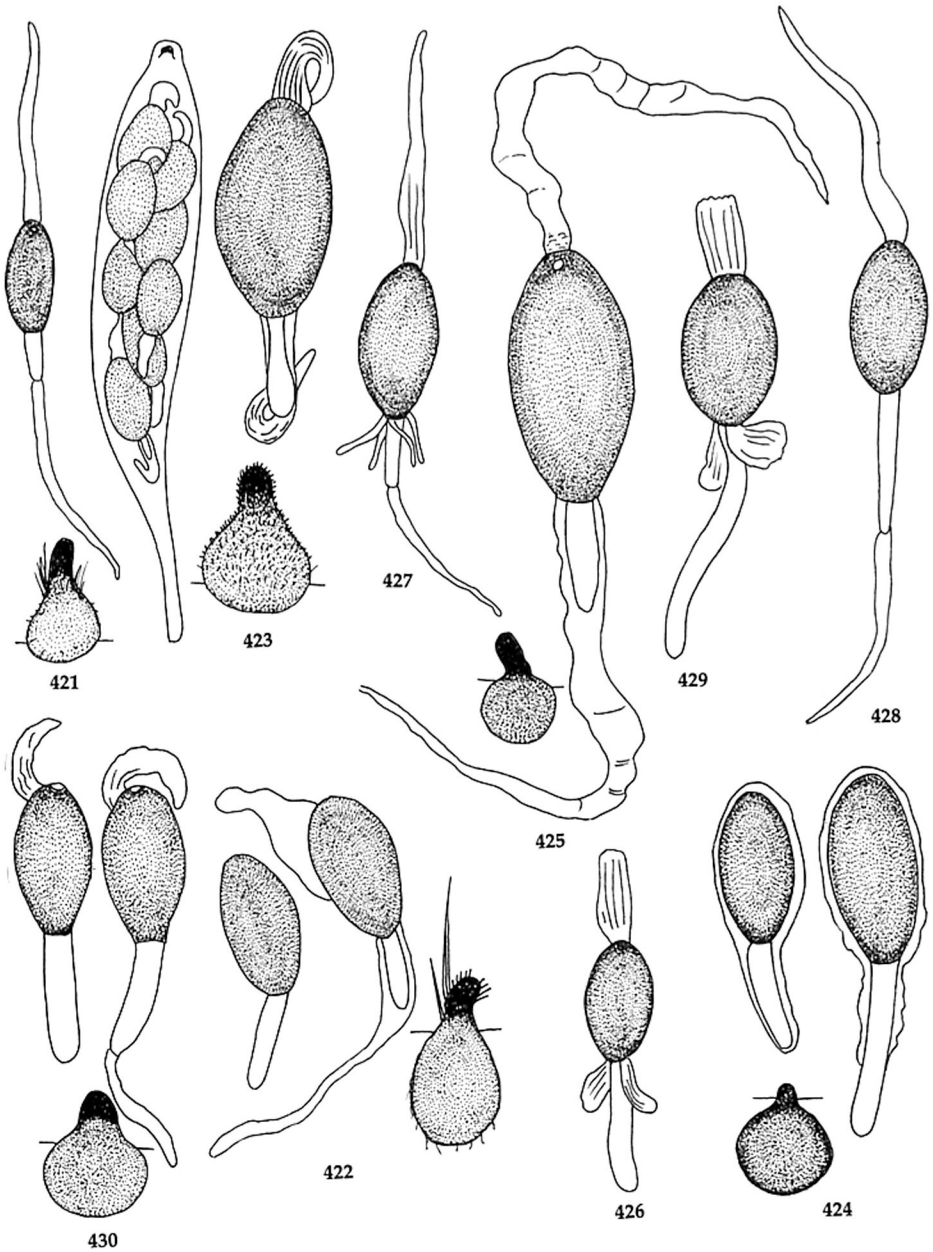

Plate 42. Ascomycetes on dung. 421, *Podospora ellisiana*; 422, *P. excentrica*; 423, *P. fimiseda*; 424, *P. globosa*; 425, *P. intestinacea*; 426, *P. myriospora*; 427, *P. pauciseta*; 428, *P. perplexans*; 429, *P. pleiospora*; 430, *P. pyriformis.*

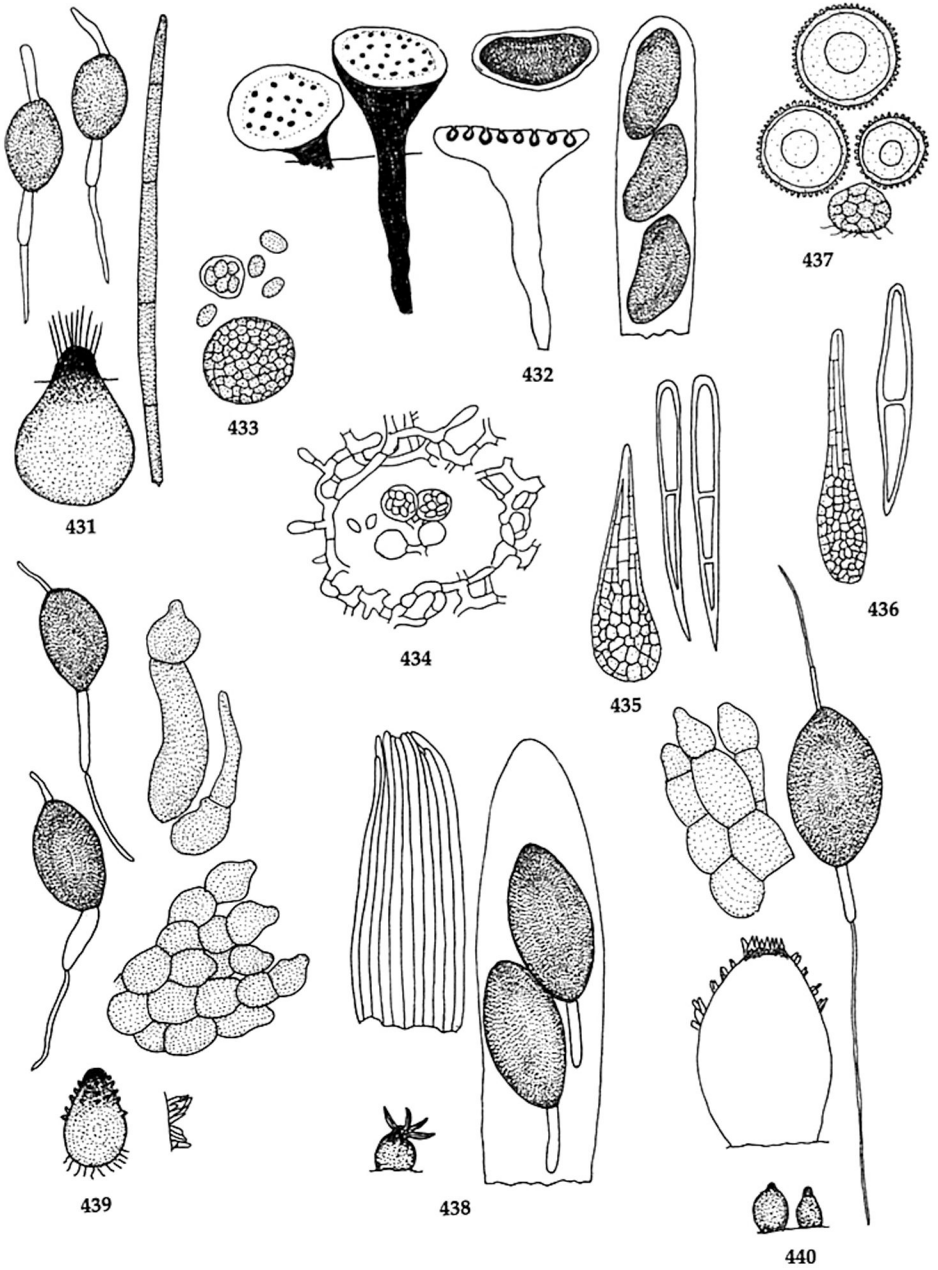

Plate 43. Ascomycetes on dung. 431, *Podospora setosa*; 432, *Poronia punctata*; 433, *Pseudeurotium ovale*; 434, *Pseudogymnoascus roseus*; 435, *Pyxidiophora grovei*; 436, *P. petchii*; 437, *Roumegueriella rufula*; 438, *Schizothecium aloides*; 439, *S. conicum*; 440, *S. glutinans.*

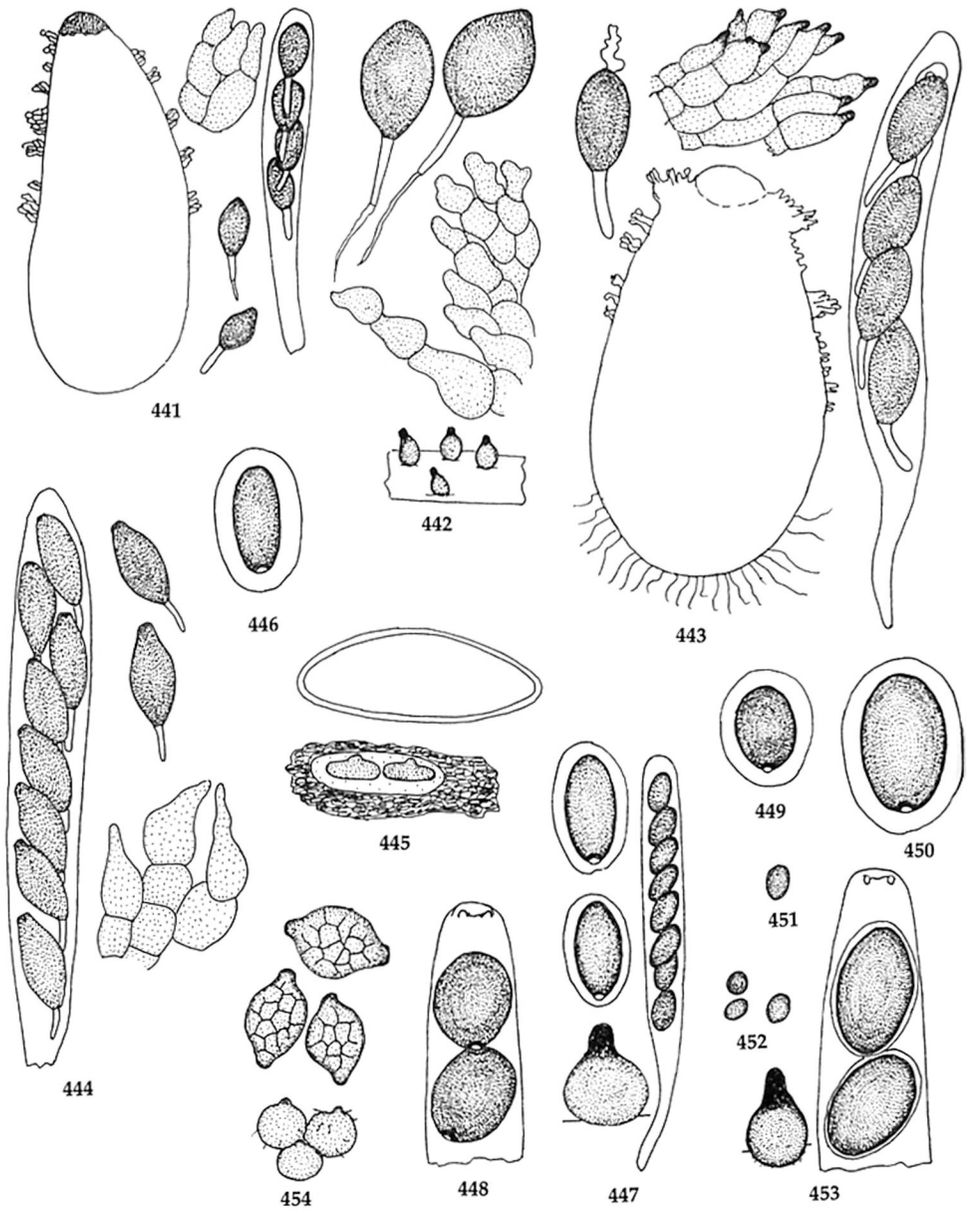

Plate 44. Ascomycetes on dung. 441, *Schizothecium nanum*; 442, *S. squamulosum*; 443, *S. tetrasporum*; 444, *S. vesticola*; 445, *Selinia pulchra*; 446, *Sordaria alcina*; 447, *S. fimicola*; 448, *S. humana*; 449, *S. lappae*; 450, *S. macrospora*; 451, *S. minima*; 452, *S. polyspora*; 453, *S. superba*; 454, *Sphaerodes fimicola.*

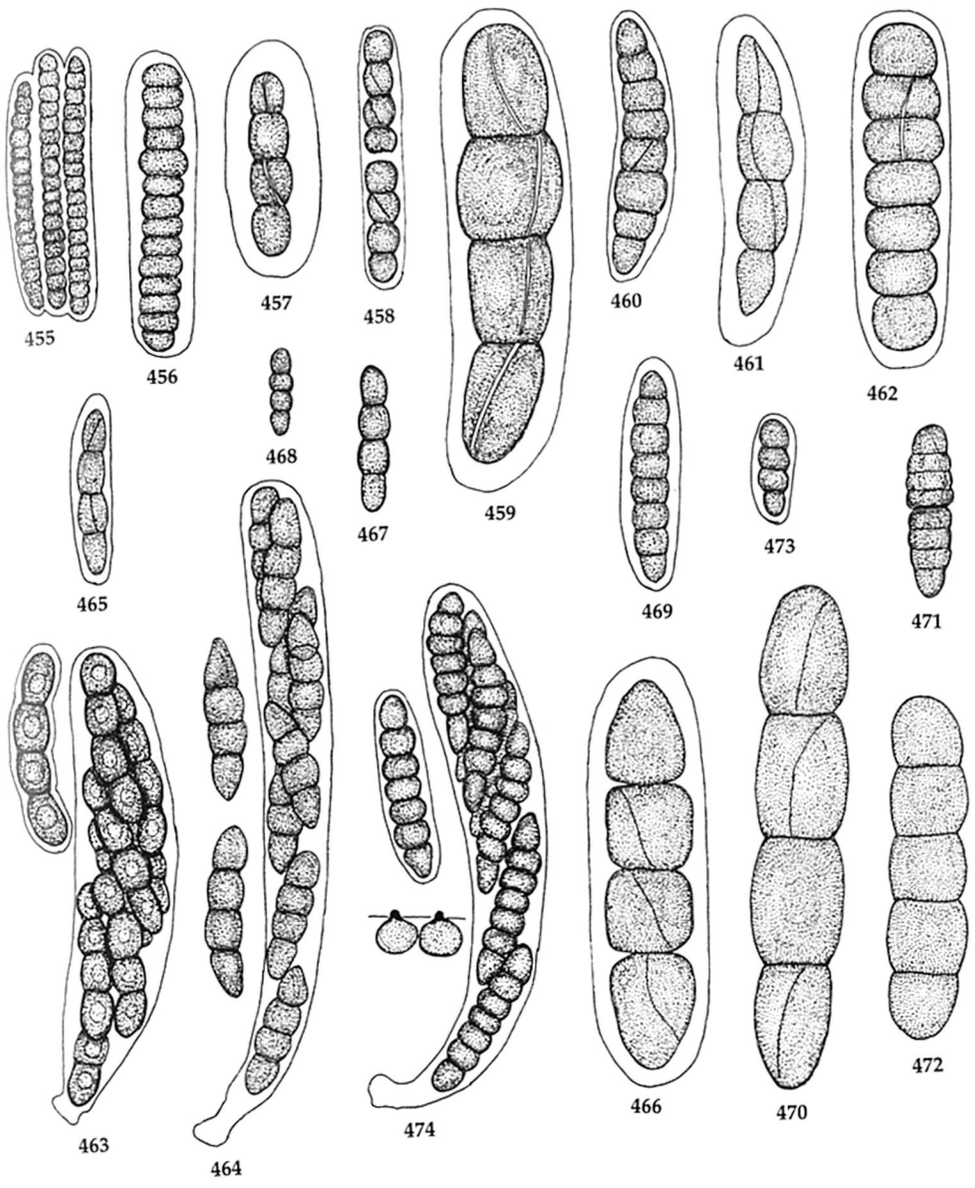

Plate 45. Ascomycetes on dung. 455, *Sporormia fimetaria*; 456, *Sporormiella antarctica*; 457, *S. australis*; 458, *S. bipartis*; 459, *S. borealis*; 460, *S. corynespora*; 461, *S. grandispora*; 462, *S. heptamera*; 463, *S. intermedia*; 464, *S. lageniformis*; 465, *S. leporina*; 466, *S. megalospora*; 467, *S. minima*; 468, *S. nigropurpurea*; 469, *S. octomera*; 470, *S. ovina*; 471, *S. pascua*; 472, *S. pentamera*; 473, *S. pulchella*; 474, *S. vexans.*

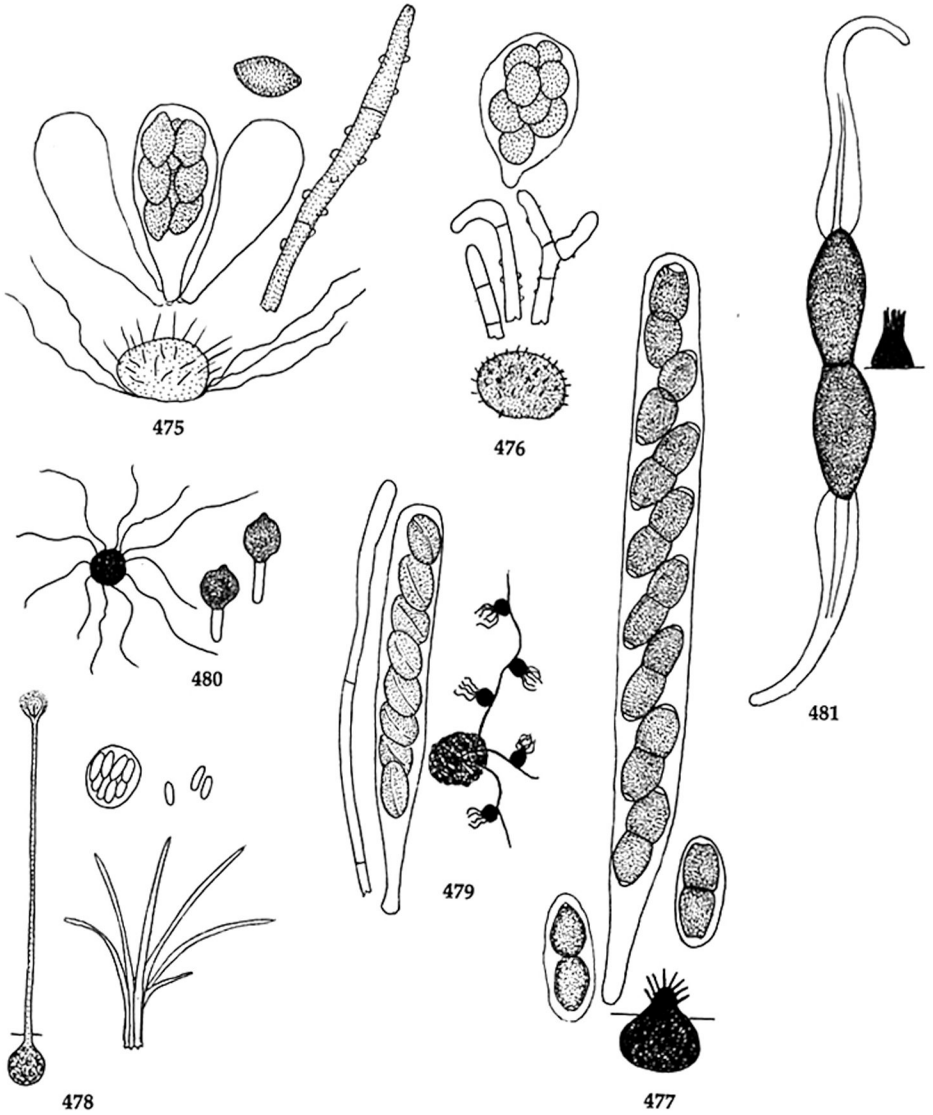

Plate 46. Ascomycetes on dung. 475, *Thielavia fimeti;* 476, *T. wareingii;* 477, *Trichodelitschia bisporula* 478, *Viennotidea fimicola;* 479, *Wawelia octospora;* 480, *Zopfiella erostrata;* 481, *Zygospermella insignis.*

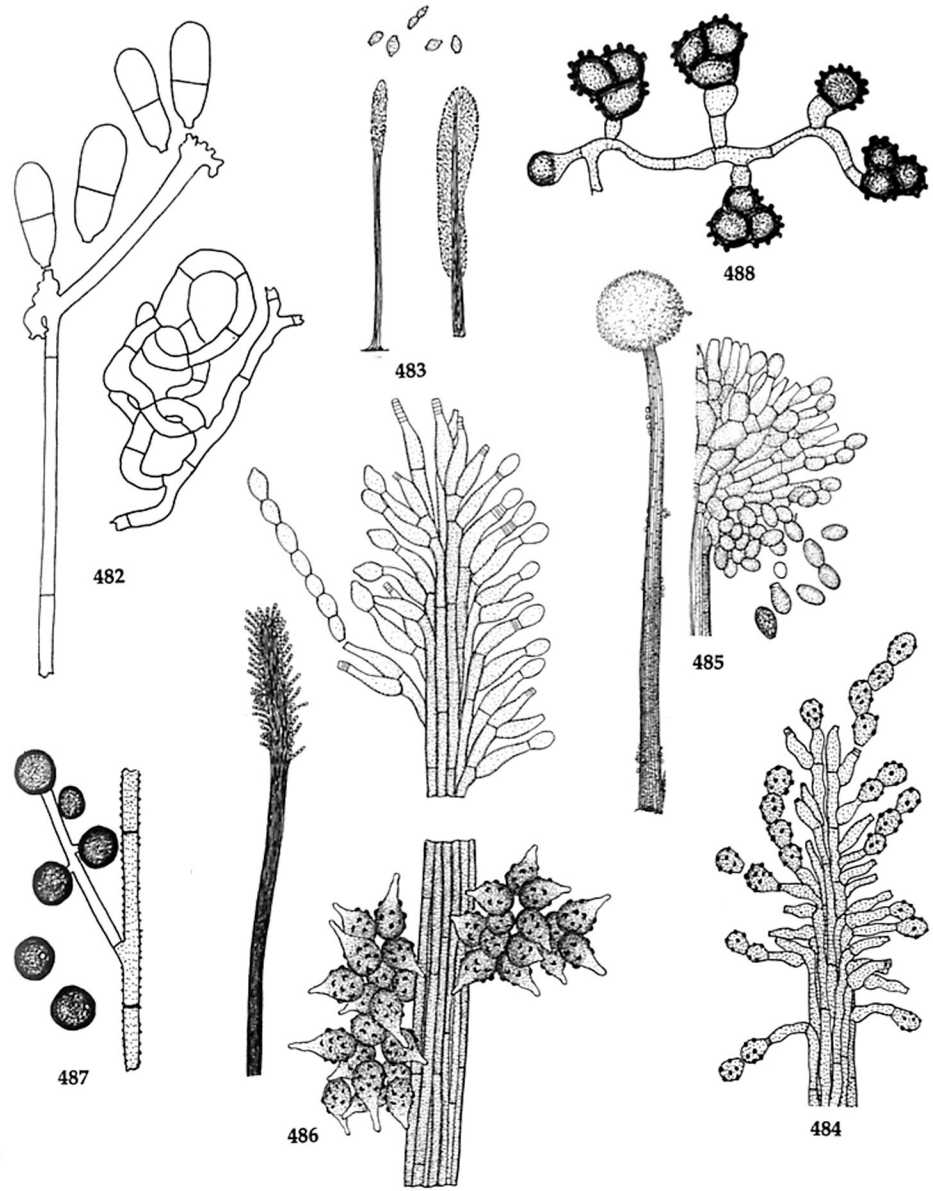

Plate 47. Hyphomycetes on dung. 482, *Arthrobotrys superba*; 483, *Doratomyces microsporus*; 484, *D. nanus*; 485, *D. purpureofuscus*; 486, *D. stemonitis*; 487, *Gilmaniella humicola*; 488, *Monodictys asperospora.*

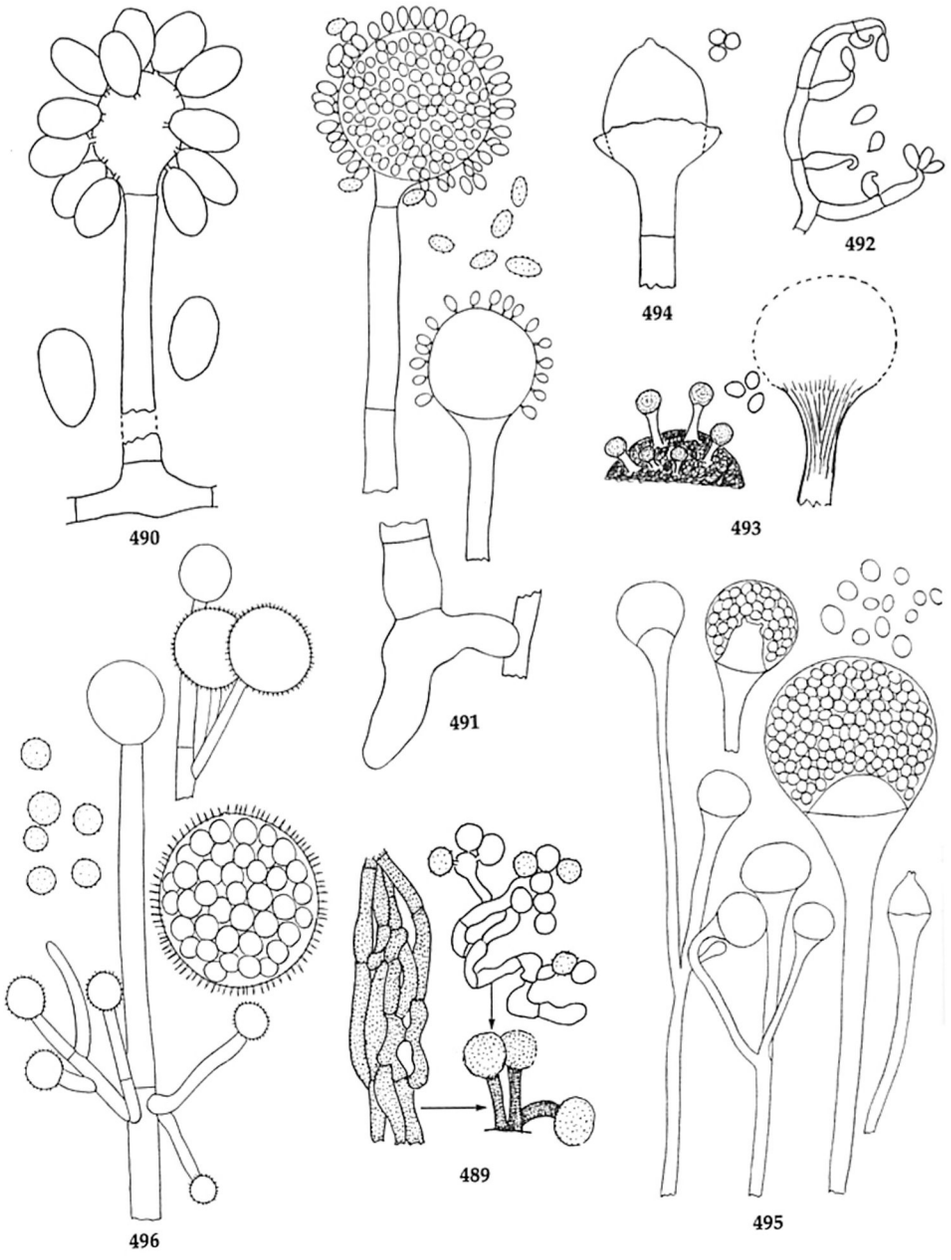

Plate 48. Hyphomycetes and phycomycetes on dung. 489, *Mycosylva clarkii*; 490, *Oedocephalum glomerulosum*; 491, *O. pallidum*; 492, *Onychophora coprophila*; 493, *Stilbella erythrocephala*; 494, *Absidia coerulea*; 495, *A. corymbifera*; 496, *Actinomucor elegans.*

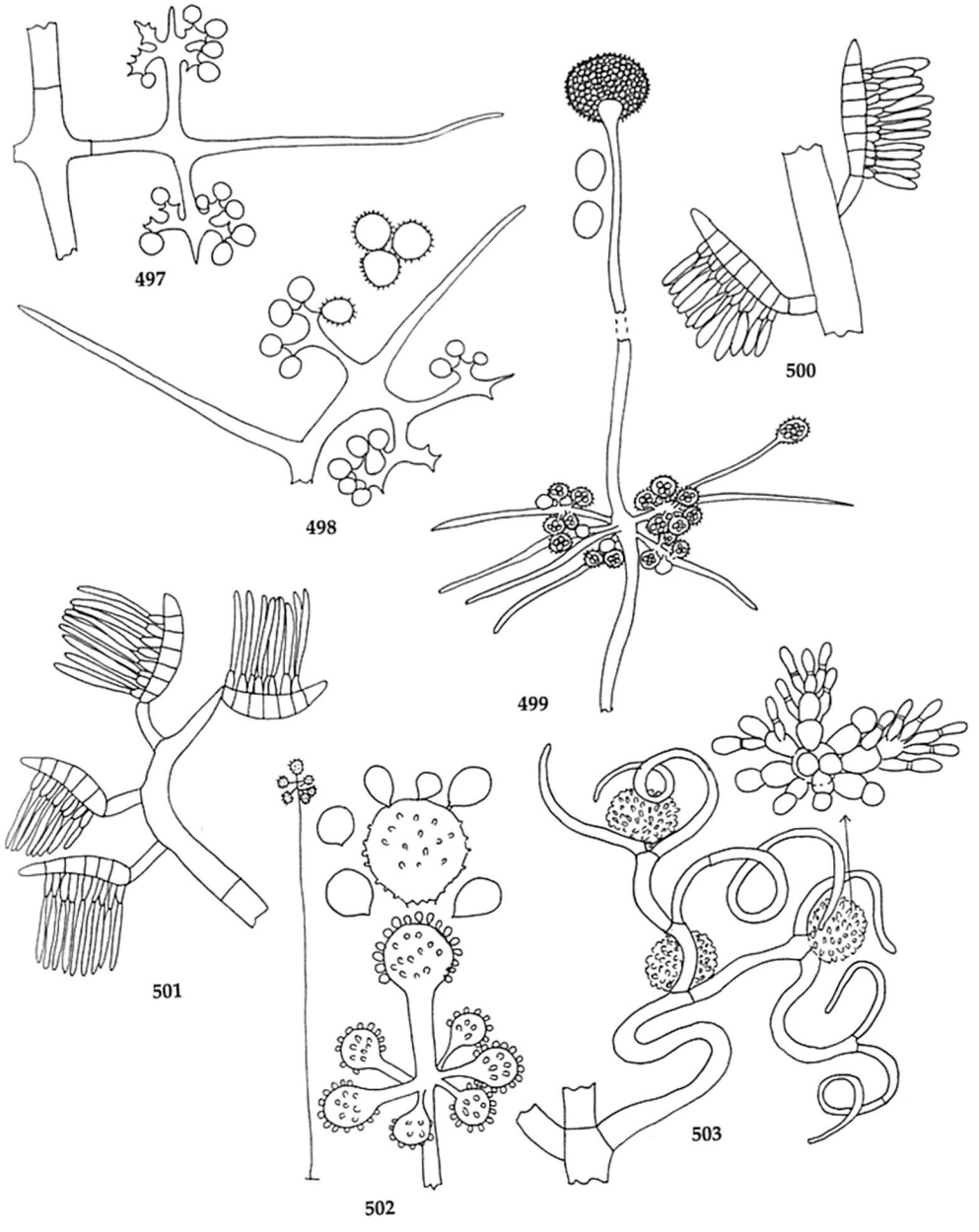

Plate 49. Phycomycetes on dung. 497, *Chaetocladium brefeldii*; 498, *C. jonesii*; 499, *Chaetostylum fresenii*; 500, *Coemansia erecta*; 501, *C. scorpioidea*; 502, *Cunninghamella elegans*; 503, *Dispira cornuta.*

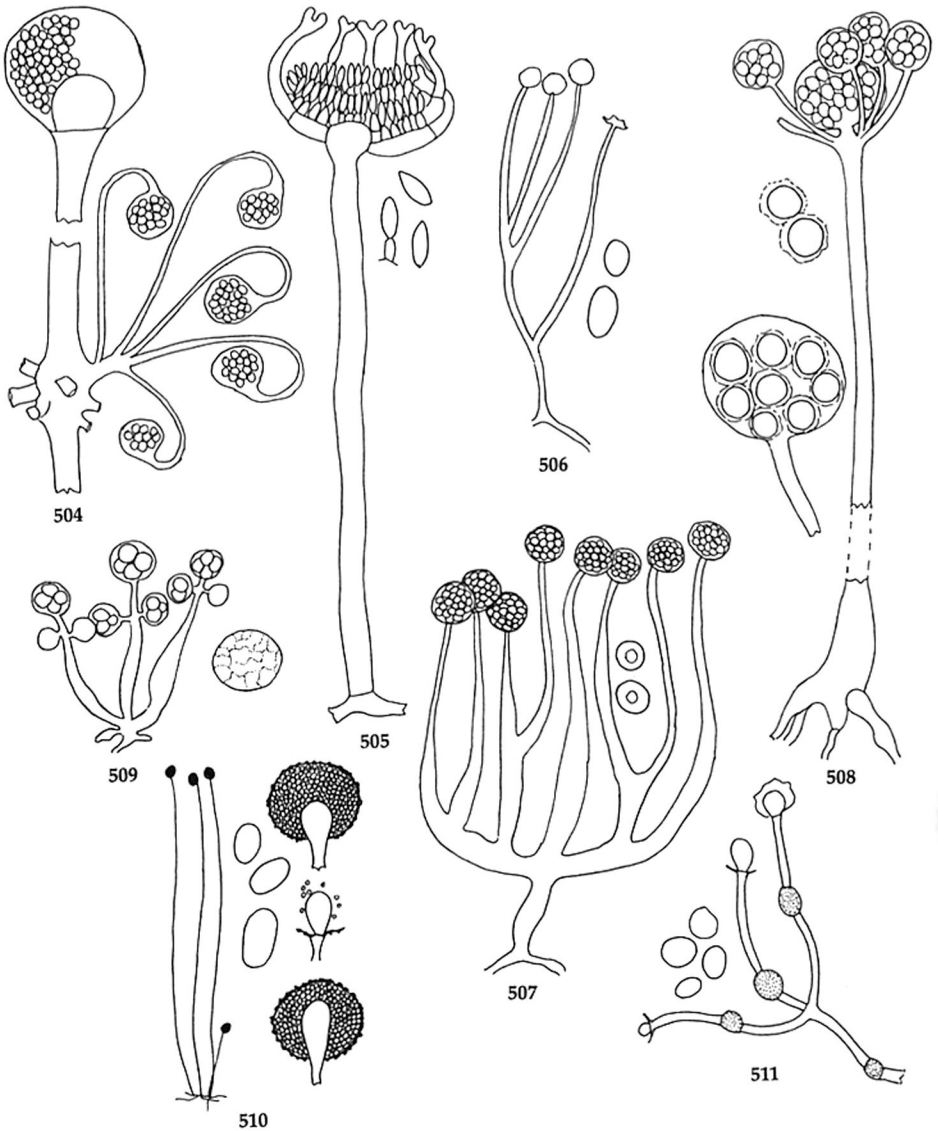

Plate 50. Phycomycetes on dung. 504, *Helicostylum piriforme*; 505, *Kickxella alabastrina*; 506, *Mortierella bainieri*; 507, *M. candelabrum*; 508, *M. capitata*; 509, *M. reticulata*; 510, *Mucor mucedo*; 511, *M. racemosus.*

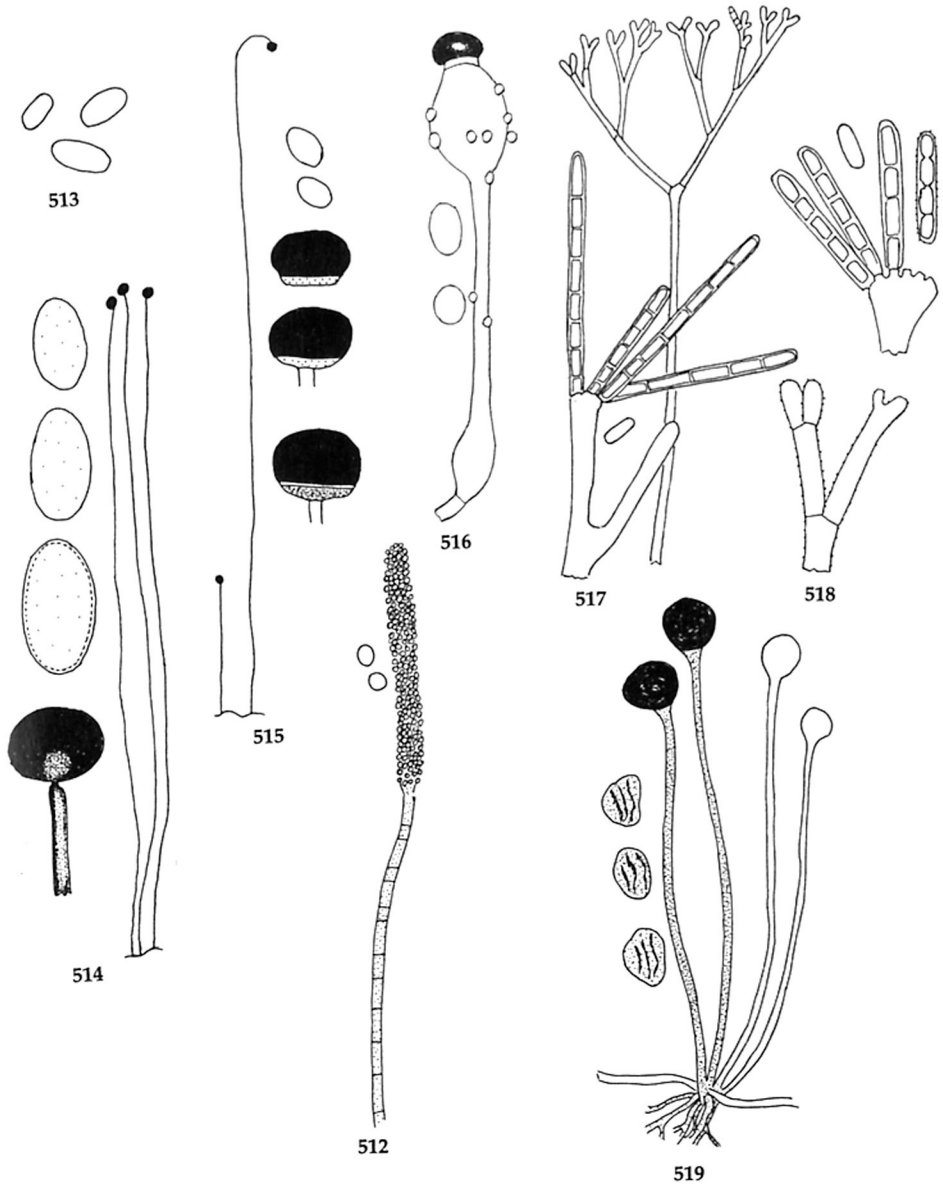

Plate 51. Phycomycetes on dung. 512, *Mycotypha microspora*; 513, *Phycomyces blakesleanus*; 514, *P. nitens*; 515, *Pilaira anomala*; 516, *Pilobolus crystallinus*; 517, *Piptocephalis cylindrospora*; 518, *P. repens*; 519, *Rhizopus stolonifer.*

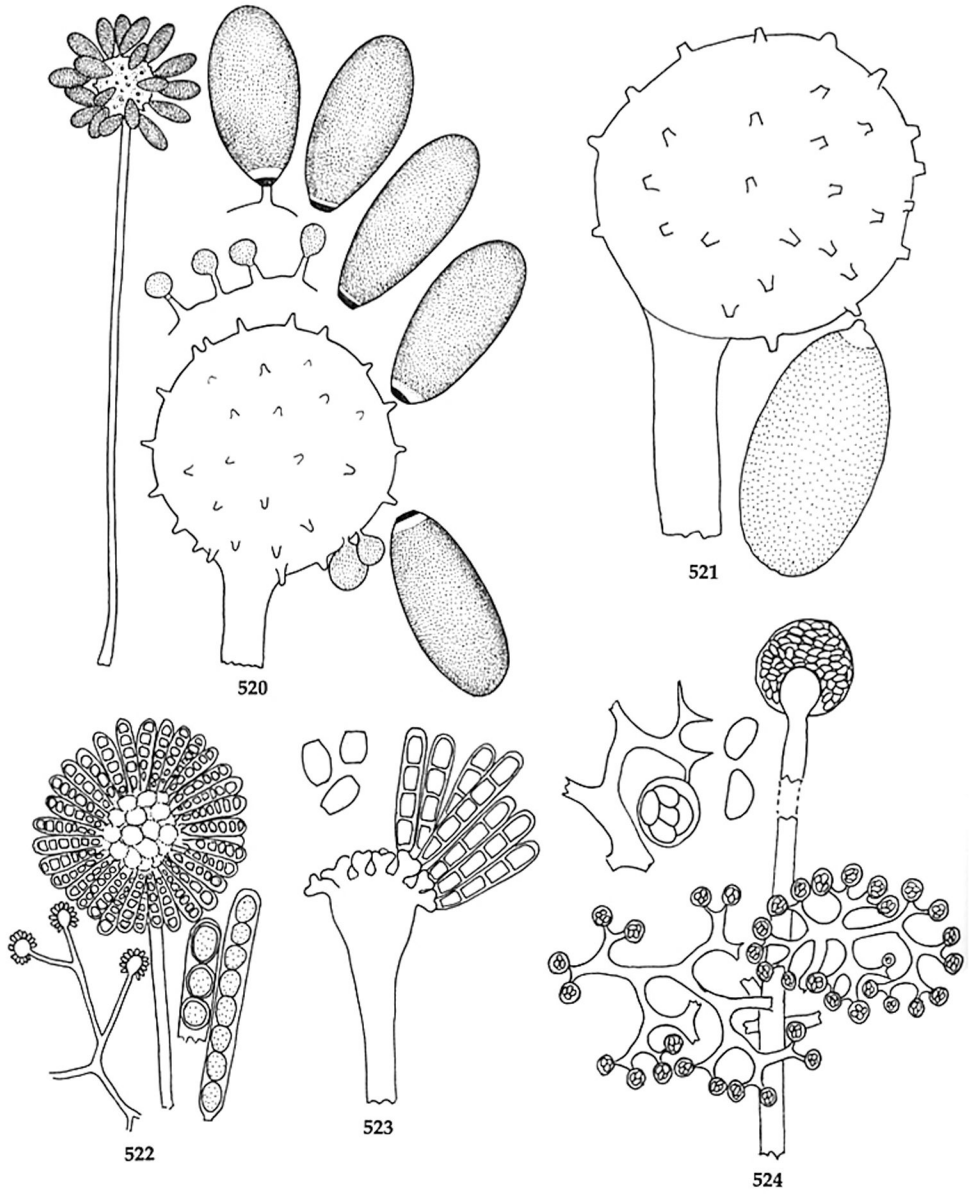

Plate 52. Phycomycetes on dung. 520, *Rhopalomyces elegans*; 521, *R. magnus*; 522, *Syncephalastrum racemosum*; 523, *Syncephalis nodosa*; 524, *Thamnidium elegans.*

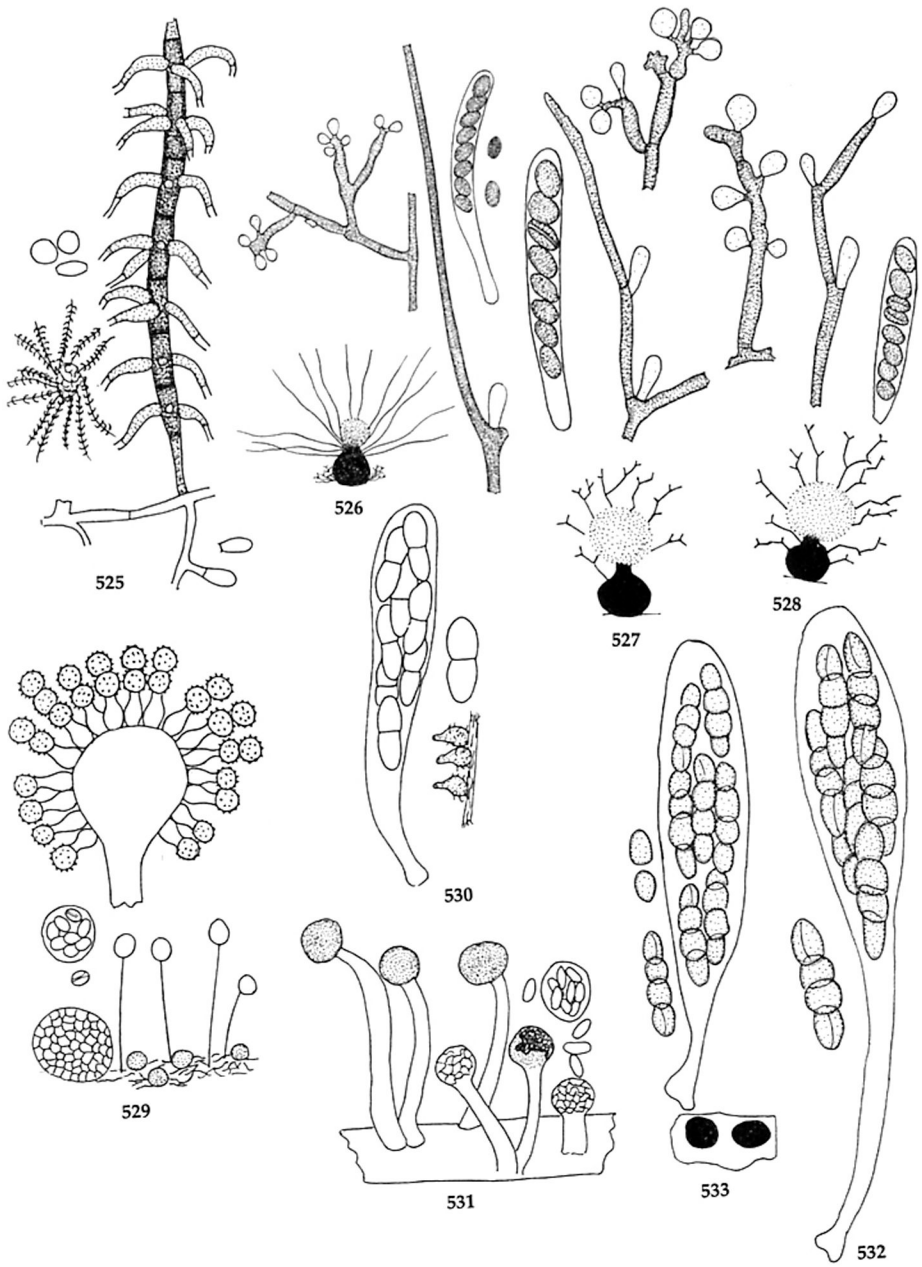

Plate 53. Ascomycetes on bones, feathers, paper, cloth, etc. 525, *Actinodendron verticillatum*; 526, *Ascotricha amphitricha*; 527, *A. chartarum*; 528, *A. lusitanica*; 529, *Eurotium herbariorum*; 530, *Nectria funicola*; 531, *Onygena corvina*; 532, *Preussia funiculata*; 533, *P. vulgaris.*

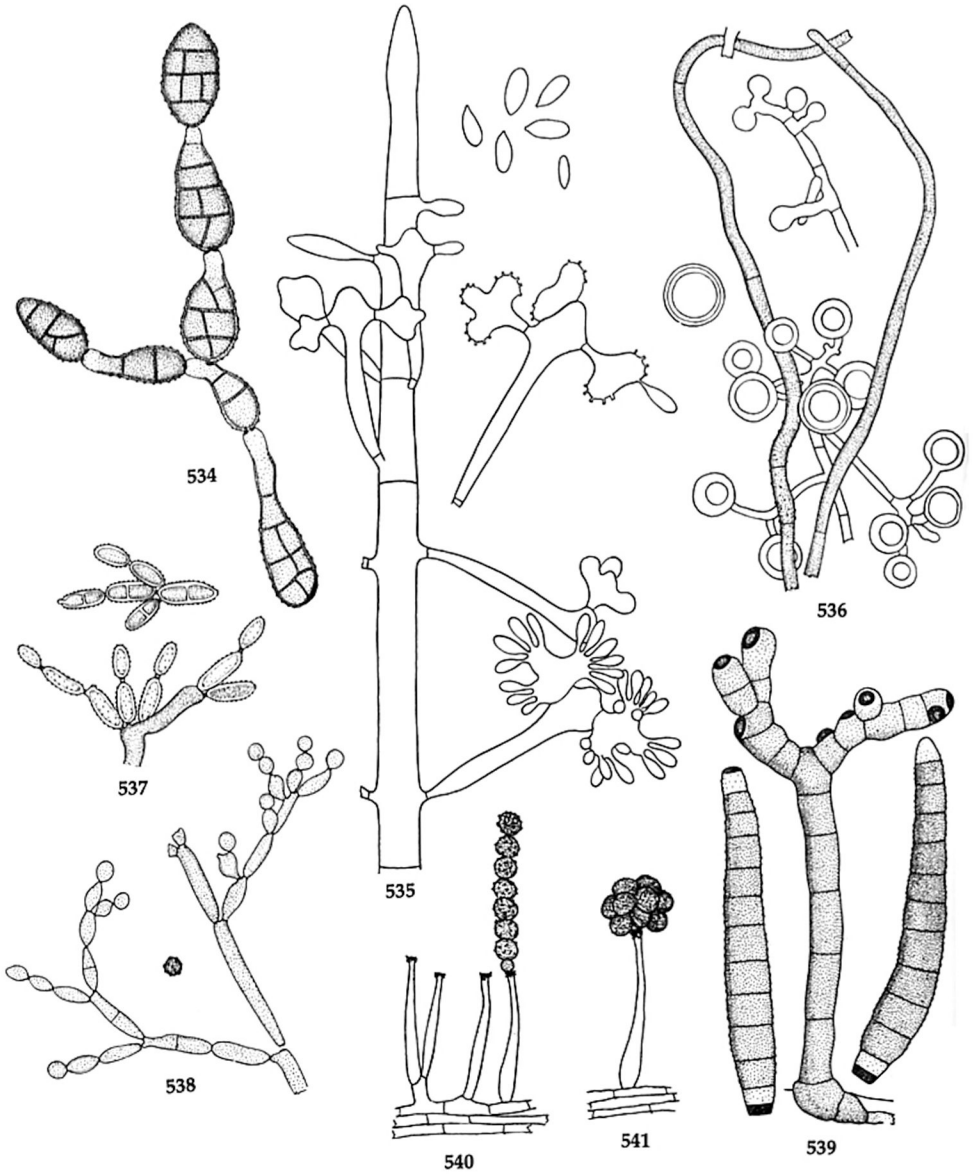

Plate 54. Hyphomycetes on bones, feathers, paper, cloth, etc. 534, *Alternaria alternata*; 535, *Botryosporium longibrachiatum*; 536, *Botryotrichum piluliferum*; 537, *Cladosporium herbarum*; 538, *C. sphaerospermum*; 539, *Dendryphion nanum*; 540, *Gliomastix murorum*; 541, *G. murorum* var. *felina*.

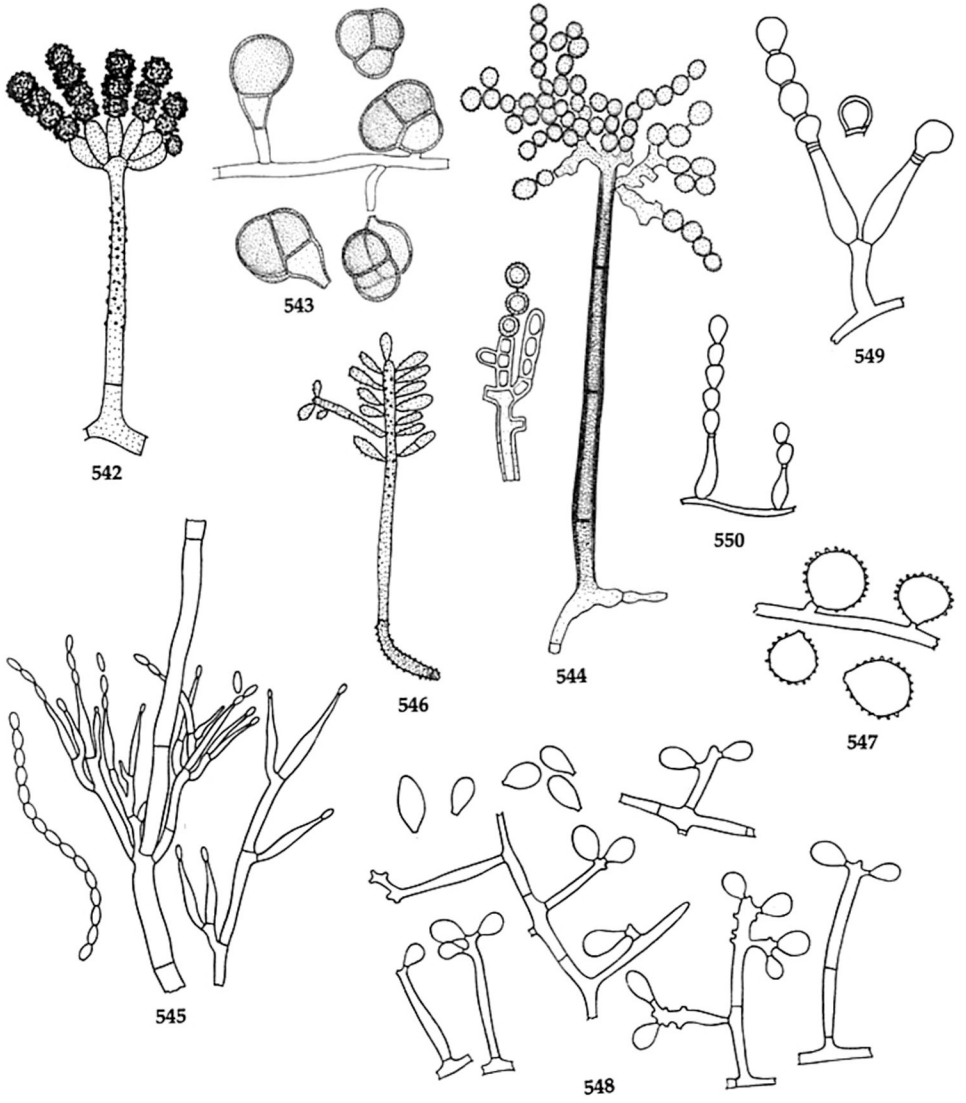

Plate 55. Hyphomycetes on bones, feathers, paper, cloth, etc. 542, *Memnoniella echinata*; 543, *Monodictys levis*; 544, *Oidiodendron tenuissimum*; 545, *Paecilomyces variotii*; 546, *Rhinocladiella cellaris*; 547, *Rhinotrichum domesticum*; 548, *R. lanosum*; 549, *Scopulariopsis candida*; 550, *S. chartarum*.

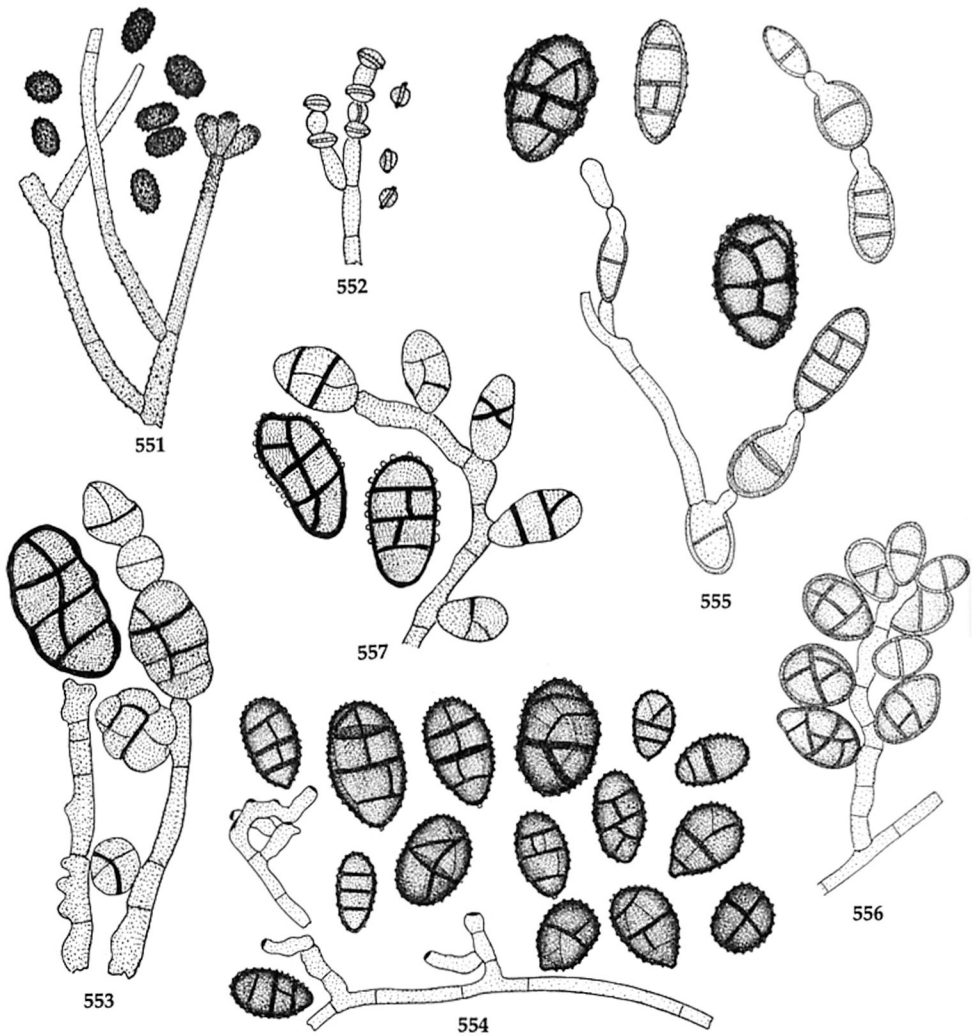

Plate 56. Hyphomycetes on bones, feathers, paper, cloth, etc. 551, *Stachybotrys atra*; 552, *Stephanosporium cereale*; 553, *Ulocladium alternariae*; 554, *U. botrytis*; 555, *U. chartarum*; 556, *U. consortiale*; 557, *U. oudemansii.*

SOME RECOMMENDED BOOKS AND USEFUL ADDRESSES

General Works

Alexopoulos, C.J., Mims, C.W. and Blackwell, M. (1996) *Introductory Mycology*. 4th edn. New York: John Wiley & Sons. [The most comprehensive modern textbook.]

Cannon, P.F. & Walker, C. (1996) Data and specimen collection: fungi. In A.C. Jermy, D. Long, M.J.S. Sands, N.E. Stork & S. Winser (eds) *Biodiversity Assessement: A Guide to Good Practice*. London: Department of the Environment pp. 41-53

Ellis, M.B. & Ellis, J.P. (1997) *Microfungi on Land Plants: An Identification Handbook*. 2nd edn. Slough: Richmond Publishing. [A valuable adjunct to the present book, especially for fungi associated with materials of plant origin such as card and paper.]

Hawksworth, D.L., Kirk, P.M., Sutton, B.C. & Pegler, D.N. (1995) *Ainsworth & Bisby's Dictionary of the Fungi*. 8th edn. Wallingford: CAB International. [A starting point into the information on fungi world-wide, including all generic names, entries for substrates, numerous references, terms, keys to families, etc.]

Webster, J. (1980) *Introduction to Fungi*. 2nd edn. Cambridge: Cambridge University Press. [A good general introduction to the structure and classification of fungi based mainly on species which can be found in the British Isles.]

Special Works

Breitenbach, J. & Kränzlin, F. (1984) *Fungi of Switzerland*. Vol. 1. *Ascomycetes*. Luzern: Verlag Mykologia. [Valuable for the beautiful colour photographs.]

Cannon, P.F., Hawksworth, D.L. & Sherwood-Pike, M.A. (1985) *The British Ascomycotina: An Annotated Checklist*. Wallingford: CAB International.

Carmichael, J.W., Kendrick, W.B., Conners, I.L. & Sigler, L. (1980) *Genera of Hyphomycetes*. Edmonton: University of Alberta. [Includes illustrations of accepted genera.]

Dennis, R.W.G. (1978) *British Ascomycetes*. 3rd edn. Vaduz: J. Cramer. [Especially valuable for discomycetes and dung fungi, and including many coloured figures.]

Dix, N.J. & Webster, J. (1995) *Fungal Ecology*. London: Chapman & Hall. [Includes information on fungi associated with many of the substrates treated here.]

Ellis, M.B. (1971) *Dematiacious Hyphomycetes*. Wallingford: CAB International.

Ellis, M.B. (1976) *More Dematiacious Hyphomycetes*. Wallingford: CAB International.

Sutton, B.C. (1980) *The Coelomycetes*. Wallingford: CAB International.

Zycha, H., Siepmann, R. & Linnemann, G. (1969) *Mucorales*. Vaduz: J. Cramer. [Still the standard work on this group, in German but with many illustrations.]

Fungi on or with bryophytes (bryophilous fungi)

Dobbeler, P. (1978) Moosebewohnende Ascomyceten. I. Die Pyrenocarpen, den gametophyten besiedelnden Arten. *Mitteilungen aus der Botanischen Staatssammlung, München* **14**: 1-360. [In German with excellent drawings of pyrenomycetes.]

Racovitza, A. (1959) Etude systematique des champignons bryophiles. *Mémoires, Muséum d'Histoire Naturelle, Paris, nouvelle série* **B 10**: 1-288. [In French but with 84 plates, includes mitosporic fungi.]

Fungi on fungi (fungicolous fungi)

De Hoog, S. (1978) Notes on some fungicolous hyphomycetes and their relatives. *Persoonia* **10**: 33-81, [Includes a key to 11 species of *Cladobotryum.*]

Fletcher, J.T., White, P.F. & Gaze, R.H. (1986) *Mushrooms - Pest and Disease Control.* Newcastle upon Tyne: Intercept. [Primarily concerned with cultivated mushrooms but of value for species on other agarics.]

Hawksworth, D.L. (1981) A survey of the fungicolous conidial fungi. In G.T. Cole & B. Kendrick (eds) *The Biology of Conidial Fungi.* New York: Academic Press pp. 171-244. [Review with line drawings.]

Jeffries, P. & Young, T.W.K. (1994) *Interfungal Parasitic Relationships.* Wallingford: CAB International. [A comprehensive review.]

Rogerson, C.T. & Samuels, G.J. (1995) ["1994"] Agaricolous species of *Hypomyces. Mycologia* **86**: 839-866.

Samuels, G.J. (1988) Fungicolous, lichenicolous, and myxomyceticolous species of *Hypocreopsis, Nectriopsis. Nectria, Peristomialis*, and *Trichonectria. Memoirs of the New York Botanical Garden* **48**: 1-78. [Includes keys.]

Fungi on lichens (lichenicolous fungi)

Clauzade, G., Diederich, P. & Roux, C. (1989) Nelikenigintaj fungoj likenlogaj: illustrita determinlibro. *Bulletin de la Société linnéenne de Provence, numéro spécial* **1**: 1-142. [Keys to the world species in Esperanto.]

Hawksworth, D.L. (1983) A key to the lichen-forming, parasitic, parasymbiotic and saprophytic fungi occurrring on lichens in the British Isles. *Lichenologist* **15**: 1-44. [Also available separately from the British Lichen Society; keys to 218 species, with spore drawings for 141.]

Purvis, O.W., Coppins, B.J., Hawksworth, D.L., James, P.W. & Moore, D.M. (1992) *The Lichen Flora of Great Britain and Ireland.* London: Natural History Museum Publications. [Includes lichens that grow obligately on others and some lichenicolous fungi.]

Fungi on slime moulds (myxomyceticolous fungi)

Ing, B. (1974) Mouldy myxomycetes. *Bulletin of the British Mycological Society* **8**: 25-30.

Rogerson, C.T. & Stephenson, S.L. (1993) Myxomyceticolous fungi. *Mycologia* **85**: 456- 469.

Samuels, G.J. (1988) Fungicolous, lichenicolous, and myxomyceticolous species of *Hypocreopsis, Nectriopsis. Nectria, Peristomialis,* and *Trichonectria. Memoirs of the New York Botanical Garden* **48**: 1-78. [Includes keys.]

Fungi on burnt ground and charcoal (pyrophilous fungi)

Webster, J., Rifai, M.A. & El-Abayed, M. (1964) Cultural observations on some soil discomycetes from burnt ground. *Transactions of the British Mycological Society* **47**: 445-454. [Good line drawings of a few discomycetes on burnt ground.]

Fungi on soil

Domsch, K.H., Gams, W. & Anderson, T.H. (1980) *Compendium of Soil Fungi.* 2 vols. London: Academic Press. [Monographic treatment of most commonly isolated species with keys, including many that can fruit on the surface or in damp chambers without cultivation.]

Fungi on dung (coprophilous fungi)

Bell, A. (1983) *Dung Fungi: An illustrated Guide to Coprophilous Fungi in New Zealand.* Wellington: Victoria University Press. [Useful as many species on mammal dung are cosmopolitan.]

Eliasson, U. & Lundqvist, N. (1979) Fimicolous myxomycetes. *Botaniska Notiser* **132**: 551-568.

Lunqvist. N. (1972) Nordic *Sordariaceae s. lat. Symbolae Botanicae Upsaliense* **20** (1): 1-374. [Comprehensive well-illustrated account including many coprophilous species.]

Richardson, M.J. & Watling, R. (1997) *Keys to Fungi on Dung.* Revised edn. Stourbridge: British Mycological Society. [Includes line drawings.]

Seifert, K.A., Kendrick, B. & Murase, G. (1983) A key to hyphomycetes on dung. *University of Waterloo, Biology Series* **27**: 1-62.

Fungi on bones, feathers, paper, cloth, etc.

Onions, A.H.S., Allsopp, D. & Eggins, H.O.W. (1981) *Smith's Introduction to Industrial Mycology.* 7th edn. London: Edward Arnold. [Descriptions and photographs of species occurring on paper, cloth, and other manufactured materials.]

Useful Addresses

British Mycological Society, P.O. Box 30, Stourbridge, West Midlands DY9 9PK. [Membership details, lists of field meetings, etc.]

CABI Bioscience, UK Centre (Egham), Bakeham Lane, Egham, Surrey TW20 9TY; tel. 01784 470 111; fax 01784 470 909. [Incorporating the International Mycological Institute.]

Richmond Publishing Co. Ltd., P.O. Box 963, Slough SL2 3RS; tel. 01753 643104; fax 01753 646553; e-mail rpc@richmond.co.uk. [Specialist mail-order suppliers of mycological books.]

Royal Botanic Garden, Inverleith Row, Edinburgh EH3 5LT; tel. 0131 552 7171; fax 0131 552 0382; e-mail herbarium@rbg.org.uk.

Royal Botanic Gardens, Kew, Richmond, Surrey TW9 3AB; tel. 0181 332 5000; fax 0181 332 5284; e-mail info@rbgkew.org.uk.

GLOSSARY

acicular having the form of a needle
acropetal produced in succession towards the apex
acropleurogenous borne at the tip and along the sides
aecia cluster-cups of rust fungi which contain 1-celled spores in chains
allantoid sausage-shaped and slightly curved
alveolae small hollows in a surface
ampullae small, flask-like structures
ampulliform flask-shaped, with the swollen part at the base
anastomosing joining together, often making a network
annellides closely annellate, holoblastic, conidiogenous cells
apophysis a wedge-shaped base to the columella below the peridium of a sporangium
apothecia open ascomata bearing asci in an exposed hymenium
arcuate arc-like
areolate divided by cracks into small areas
arthroconidia conidia formed as part of a thallus, often cylindrical, truncate at each end or one end
ascomata structures bearing or containing asci
ascospores spores formed inside an ascus
ascus a sack-like cell usually containing eight spores
asperulate delicately asperate or rough with points
basidia spore-bearing structures in Basidiomycetes
basidiospores spores formed, commonly in fours, on basidia
basipetal produced in succession towards the base
biseriate arranged in two rows
bitunicate 2-walled
byssoid made up of slender threads
caespitose in groups or tufts
capitate having a well-formed head
catenate developing in chains
caudate having a tail
cerebriform convoluted like a brain
chlamydospores thick-walled, non-deciduous spores
cicatrised bearing scars
cilia hair-like outgrowths
circinate coiled
citriform lemon-shaped
clamp connections (clamps) looping hyphal outgrowths which connect two adjacent cells in a hypha

clathrate latticed, net-like
clavate club-shaped
cleistothecia usually spherical ascomata without ostioles
clypeate having a clypeus
clypeus a shield-like stroma overlying one or more perithecia
columella a sterile central axis inside a fruit body
concolorous having the same colour
confluent running together
conico-truncate having the shape of a truncated cone
conidia asexual spores which when mature are liberated from a conidiophore
conidiogenous producing conidia
conidiomata structures bearing or containing conidia
conidiophore a hypha which bears one conidium or several conidia
coprophilous living on dung
coremia loosely bound-together fascicles
crenate having the edge indented with rounded teeth
crenulate delicately crenate
cruciate in the form of a cross
cuneiform wedge-shaped
cupulate cup-shaped
cyathiform like a cup which is wider at the top than at the bottom
cystidia distinctively shaped sterile hyphae formed by Basidiomycetes especially in the hymenium
deflexed bent over abruptly
dentate toothed
denticles cylindrical or tapered, tooth-like projections
diaphanous transparent or nearly so
dichotomous branching, often successively, into two more or less equal arms
dictyochlamydospore a multicelled chlamydospore
diffluent breaking up in water
disc the ascus-producing part of a discomycete
discoid flat and circular, disc-like
discrete separate
disjunctor a connecting piece between spores in a chain
doliiform barrel-shaped
echinulate spiny
ectal outermost
effete dead, no longer sporulating
effuse spread out
elaters narrow elastic threads which aid spore dispersal
endospore inner spore wall
epispore outer spore wall

epithecium a layer formed by fusion of tips of paraphyses or their branches and covering asci
erumpent bursting through to the surface
evanescent fugacious, having a short existence
excipulum tissue forming the flanks of an apothecium
falcate sickle-shaped
fasciculate arranged in bundles
fibrillose covered with silk-like fibres
filiform slender and thread-like
fimbriate fringed
flexuous bent alternately in opposite directions
floccose cottony
flocculose delicately cottony
foot-cell a *Fusarium* spore cell obliquely attenuated at the base
fulvous tawny
funiculose aggregated to form strands
furfuraceous scurfy
fusiform spindle-shaped, tapering at each end
fusoid somewhat fusiform
gametangia mother-cells which give rise to sex-cells or gametes
geniculate bent like a knee
globose spherical or almost so
granulate covered with very small granules
guttules oil-like droplets
gymnothecia ascomata made up of a loose network of hyphae, often with characteristic appendages
hamate hooked
helicoid in the form of a spiral
hilum a scar formed at the point of attachment
hyaline transparent or almost so
hygrophanous appearing water-soaked when wet
hymenium the spore-bearing layer of a fungus
hypha a fungus thread or filament
hypophyllous borne on the lower surface of a leaf
infundibuliform funnel-shaped
inoperculate not opening by an apical lid but commonly by a pore instead
intercalary between apex and base
isabelline tawny yellow
laciniate as if torn into strips
lacunose having hollows
lanceolate spear-shaped
lenticular shaped like a biconvex lens
limoniform lemon-shaped
loculès cavities

medullary inner or innermost
Melzer's iodine solution a reagent containing iodine, potassium iodide, distilled water and chloral hydrate
mollisioid saucer-shaped as in the genus *Mollisia*
moniliform swollen at intervals like a string of beads
mononematous composed of a single thread or filament
monopodial with a main axis giving off branches one at a time, often alternately
monostichous in one row
mucronate ending in a short, sharp point
muriform longitudinally and transversely septate
mycelium a mass or group of hyphae making up the thallus of a fungus
navicular boat-shaped
nodose having node-like swellings
obclavate the shape of a club upside down, thickened towards the base
obconical inversely conical
oblate having the form of a spheroid markedly wider than long
obovate inversely ovate
obovoid egg-shaped with the broad end at the base
obpyriform pear-shaped with the broad end at the base
obtuse rounded or blunt
operculate opening by a little lid
orbicular spherical
ostiole an opening in the wall of a fruit body through which spores are extruded
ovoid egg-shaped
papillate with a nipple-like protuberance
paraphyses sterile threads growing between asci or conidiophores
part-spores 1-celled spores resulting from the breaking up of a 2- or more-celled ascospore
patelliform like a plate with a well-defined edge
pedicel a short stalk
penicillate arranged like a paint brush
penicilli splayed-out paint-brush-like structures
percurrent growing straight on through the open end left when the first conidium becomes detached, or through a terminal pore
periderm the membrane surrounding a sorus or a group of asci
peridial enclosing fruiting structures
peridium a wall surrounding fruiting structures
perithecia sub-globose or flask-shaped ascomata with ostioles
phialides cells that usually produce many conidia which ooze out through one or more openings and often hang together in chains or slimy clumps
phototropic reacting to light stimulus, bending towards the light
plumose feathery

plurilocular having several locules
polyphialides phialides with more than one opening
polysporous many-spored
pomiform apple-shaped
prosenchymatous clearly made up of hyphal elements which are twisted together to form a tissue
pruinose with a frost-like or floury covering
pseudoparaphyses downward-growing, paraphysis-like hyphae in locules of ascomycetes
pseudoparenchymatous resembling parenchyma of flowering plants, appearing cellular although made up of hyphal elements
pseudorhiza a fungal rooting base
pseudoseptate with the appearance of having septa which do not reach right across a spore from one side wall to another
pseudothecia ascomata of loculoascomycetes with asci formed in one or more locules in a stroma which is sometimes very much reduced and may resemble a perithecium
puberulent minutely downy
pubescent softly hairy or downy
pulverulent powdery
pulvinate cushion-shaped
punctate marked with very small spots or hollows
punctiform dot-like
pycnidia globose or flask-like conidiomata containing conidia
pyriform pear-shaped
racemose produced first on one side and then on the other of a main axis, development being from the base up and indefinite
ramoconidia apical branches of conidiophores which resemble conidia
recurved curved backwards
reniform kidney-shaped
repent creeping
reticulate net-like
revolute having the edge rolled over
rhizoid a thin root-like outgrowth
rostrate beaked or strongly attenuated at the apex
rugose coarsely wrinkled
rugulose finely wrinkled
sclerotia masses of aggregated hyphae, often with a rind of thick-walled cells
scutellum the upper wall of a thyriothecium
septum a dividing cell wall
sessile without a stalk
setaceous bristle-like
setae bristle-like, often erect and thick-walled hyphae

setiform having the form of a seta
setose bearing setae
setulae delicate appendages arising from the surface of a spore
spicules needle-like outgrowths
spinulose delicately spiny
sporangiferous sporangium-bearing
sporangiole a small, one-spored sporangium without columella
sporangiophore a sporophore bearing sporangia
sporangium the organ in phycomycetes with produces asexual spores endogenously
sporodochia stromata bearing closely packed, short conidiophores
squamule a small scale
stellate star-shaped
sterigmata small, delicate outgrowths commonly arising in groups of four at the ends of basidia and each bearing at its tip a basidiospore
stipe a stalk
stipitate stalked
stolon a propagative runner
striae delicate lines, grooves or ridges
striate marked with striae
strigose covered with bristle-like hairs
stromata cushion-like, club-shaped or cylindrical masses of fungal cells or closely interwoven hyphae
subiculum a mycelial mat below fruiting bodies
subulate rather slender and tapered to a point like an awl
sulcate grooved
sympodial proliferating, the main axis elongating by growth of a succession of apices, each of which develops behind and to one side of the previous apex
synnemata synnematous conidiophores
synnematous composed of several or many tightly adpressed threads or filaments
thyriothecia more or less flattened ascomata, often with radiate upper walls
tomentose downy
tremelloid jelly-like
trigonous having three angles with plane faces between them
triradiate three-armed
truncate ending abruptly as if cut straight across
tuberculate covered with wart-like projections
turbinate top-shaped
umbilicate with a small hollow
uncinate hooked
uniseriate in one row

unitunicate 1-walled
urceolate pitcher-shaped
venter the expanded basal part of a fruiting body
ventricose inflated, very broadly fusiform
vermiform worm-shaped
verrucose coarsely warted
verruculose finely warted
verticil a whorl
verticillate arranged in whorls
vinaceous wine-coloured, purplish-red
zonate zoned or banded
zygospore a spore formed by the uniting of two gametes similar in form and size

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Numbers in *italics* refer to the illustrations on Plates 1–56