A KEY TO THE CORTICOLOUS
MYXOMYCETES.

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The present document is designed to be printed out as an A5 booklet, to mimic the formatting of the original, hence the blank pages at the back.
The Corticolous Myxomycetes comprise a group of slime-moulds that grow primarily, if not exclusively, on the bark of living trees (Keller and Brooks, 1973) with representatives from the five endosporous Orders. The slime-moulds that live in this habitat are small and are difficult to detect in the field, their small size enabling them to take rapid advantage of short periods of rainy weather. This characteristic of rapid development may be used by the mycologist who wishes to study them for, when bark is wetted and placed in a damp chamber, plasmodia quickly become active and sporulate in response to the humid conditions provided.

Gilbert and Martin (1933) inadvertently launched the bark culture method when they set up damp chambers to demonstrate the algae that grew on the bark of living trees to their botany classes. They found, to their surprise, that many sporangia of two undescribed species of slime-moulds had grown on the surface of the bark. Since that time, the moist chamber method has become well established in the study of Myxomycetes for it has the advantage of simplicity and often produces a rewarding variety of species even at times of the year when there is little else around to interest the mycologist. New species are continually being found and many have been described in recent years.

Moist chamber culture of tree bark

Pieces of bark should be removed from trees with a wood chisel and placed in labelled envelopes. Care should be taken not to damage the living tissues of the tree during this operation which might allow the entry of disease organisms. If living wood is included in cultures, the growth of unwanted filamentous moulds is encouraged. One of the most productive types of bark is that of the orchard apple, where bark is easily stripped off by hand. Bark samples may be air-dried if storage or transportation intervenes before moist chambers can be set up.

A moist chamber may be set up in a Petri-dish, previously thoroughly cleaned and rinsed well in hot clean water to destroy stray myxomycete spores that might contaminate the culture. The dish should be lined with a 9 cm diameter filter-paper disc and the pieces of bark placed on this, cut surface downwards and arranged so that they do not overlap. Boiled and cooled tap water may be used to soak the bark for 12 to 24 hours, after which time, the free-standing water is pipetted off or tipped away. Moist chambers should be stored at room temperature with the lids on the dishes in a position where they do not receive direct sunlight and examined after a further 24 to 48 hours for the appearance of some of the smallest corticolous species. Systematic scanning of the bark surfaces with a binocular microscope using a magnification of x10 to x20 should continue every two or three days for about two weeks. After this time it may be necessary to inspect the cultures at less frequent intervals. Boiled and cooled tap-water may be sprinkled over the bark as necessary to maintain damp (but not wet) conditions. Plastic Petri-dishes allow slow evaporation from beneath the lid and this is useful in that it can be used as a fine control of the water-content of the dish.

When specimens are harvested, they should be removed from the bark with a fine mounted needle or with fine watch-maker’s forceps. To prepare microscope mounts, the spores should be removed by repeatedly dipping the sporangium in a drop of the mountant on a slide to enable details of the
capillitium to be readily seen. Species that lack capillitium (*Licea*) are best simply crushed while immersed in the mountant and the parts then teased apart. Those with free-tipped capillititial threads (*Col/odernia* and *Diacheopsis*) or elaters (all Trichiales except *Arcyria*) are best treated in the same way. Lactophenol is the most suitable mountant for many species but cannot be used for the Physarales which contain lime (calcium carbonate). Hoye’s medium is recommended for the physaraceous species, though the effervescence produced when a member of this Order is placed in lactophenol can be used as a test for the presence of lime. Species of *Echinostelium* and *Arcyria* are more easily observed if a little Cotton Blue dye is added to the lactophenol.

Slides and specimens should be labelled to show (a) the substrate, (b) locality, (c) date of collection of the bark sample, (d) date of setting up the moist chamber, (e) date of harvesting and (f) the scientific name of the specimen.

The key

Up to the present time there has been no single published work dealing with all the known corticolous Myxomycetes. The species included in the key are derived from the results of my own work involving about 1000 bark-cultures collected mainly from south-east England but also from other regions of the British Isles and from various countries in western Europe, from Australasia, the Far East and Nepal. Various published works have also been consulted. Bark samples from tropical regions often yield species that are associated with decaying plant litter in this country and these have not been incorporated in the key. On the other hand, a few species that are not known from the bark of living trees and vines are included where confusion may exist with corticolous species or where there is a likelihood that they may be found on bark: These are *Perichaena pedata*, *P. vermicularis*, *P. quadrata*, *Stemonitopsis microspora*, *Macbrideola martini* and *Comatricha filamentosa*. Species that are regularly recorded from litter but which occasionally occur on bark in the British Isles are incorporated into the key.

Nomenclature follows that of Martin and Alexopoulos (1969) except where a year of publication is given after author citations. References to these species are given in the bibliography. Two species of Acrasiales are included and these are illustrated in plate 6. An asterisk placed before the species name is used to indicate taxa known to occur in the British Isles, though these have not necessarily been recorded from bark:

**REFERENCES**


KEY TO THE ORDERS OF CORTICOLOUS SLIME-MOULDS

1
  y : Fruiting structure a sorocarp with a stalk consisting of a chain of cells.  6 ACRASIALES
  z : Fruiting structure a sessile or stipitate sporangium or a plasmodiocarp, the stalk sometimes (in Arctyria) packed with spore-like bodies but never composed of chains of cells.  

2 from 1z
  y : Lime (calcium carbonate) present in the peridium and/or capillitium in normal developments.* Plasmodium usually conspicuous, hyaline (but then drab-coloured from matter picked up from the substrate), white, cream, yellow, orange or scarlet. Spore-mass violaceous-brown, deep purplish-brown to black.  91 PHYSARALES
  z : Lime only very occasionally present and then restricted to the surface of the peridium. Plasmodium not usually evident until just prior to the formation of the fruit-body. Spore-mass white to brightly coloured or brown to fuscous black.  

3 from 2z
  y : Spore-mass dark reddish-brown or purplish-brown to fuscous black. Capillitium usually abundant, composed of dark threads. Columella usually present. Stalk, if present < never packed with granular matter.  58 STEMONITALES
  z : Spore-mass white or coloured, only rarely dull black, never purple-brown. Capillitium hyaline or pale-coloured by transmitted light, or absent. Columella absent or present. Stalk, if present, sometimes packed with granular matter.  

4 from 3z
  y : Capillitium absent. Columella absent. Stalk, if present, never hyaline.  7 LICEALES
  z : True capillitium usually present, if absent then columella usually present. Stalk, if present, hyaline or pigmented.  

Lime not detectable in normal developments of two species: Protophytium phloiogenum and Trabrooksia applanata.
5 from 4z
  y Sporangia minute, globose, 0.02-0.2 mm diameter. Stipitate, the base of the stalk often containing granular refuse matter. Columella present or absent. Capillitium, if present, unsculptured, hyaline or pale brown by transmitted light.

  29 ECHINOSTELIALES
  Rost., emend. Alexop. and Brooks, 1971

  z Sporangia larger, rarely less than 0.2 mm diameter. Sessile or stipitate. Columella absent. Capillitium usually distinctly sculptured, hyaline or yellow, pale brown or pink by transmitted light.

  38 TRICHIALES

  z Spores pink, produced in simple or branched chains, areolate at

ACRASIALES (Cellular Slime-moulds)

6 from ly in key to Orders
  y Spore-mass pink (or rarely white) forming a terminal globose to ovoid sorus, 0.04-0.11 mm diameter. Spores areolate and faintly punctate, 7-12.5µm diameter.

  * Pocheina rosea (Cienk.) Loeblich & Tappan, 1961.

  their points of contact (at opposite poles), 7-15 pm diameter.


LICEALES

7 from 4y in key to Orders
  y Fruit-body a stipitate or sessile sporangium or a plasmodiocarp. Entire peridium persistent. Dictyidine granules absent.

  8 LICEACEAE

  z Sporangiate on a thin stalk. Peridium persistent as a network and sometimes also as a basal cup. Dictyidine granules present.

  26 CRIBRARIACEAE

8 from 7y
  y : Fruit-body sessile.

  9

  z Sporangium typically stipitate

  24

9 from 8y
  y : Dehiscence circumscissile by a preformed lid.

  10

  z Dehiscence not circumscissile.
10 from 9y
  y : Sporangia bright coppery brown when dry. Lid coarsely papillate on the inside.
  z : Sporangia fuscous black when dry, not coppery. Lid smooth. Spores olive-brown
      by transmitted light, smooth and with a thin-walled pale area (germinative pore);
      (11-)13-15(-16) μm diameter. * Licea kleistobolus Martin

11 from 9z
  y : Dehiscence by the separation of well-defined angular platelets.
  z : Dehiscence by means of an apical slit, or irregular; if platelets are present then these obscure and visible only in microscope mounts.

12 from 11y
  y : Sporangia markedly globose. Spores in clusters of about 10-20, ovate to turbinate, densely warty on the part turned to the outside of the cluster, smooth elsewhere, 9-11 μm diameter. Platelet margins thickened but lacking pegs. * Licea synsporos Nann.-Brem. 1968
  z : Sporangia pulvinate. Spores free, globose. Platelet margins not thickened, usually possessing pegs.

13 from 12z
  y : Spores smooth and with a pale germinative pore.
  z : Spores distinctly warty or distinctly spinulose, with or without a germinative pore.

14 from 13y
  y : Sporangia always very small, 0.05-0.15 mm diameter, dark brown. Peridial platelets without pegs. Spores 13 μm diameter, rosy-brown or brown by transmitted light. * Licea belmontiana Nann.-Brem.
  z : Sporangia larger, more than 0.15 mm diameter, sometimes elongate, yellow-brown to chestnut-brown. Peridial platelets usually with only scattered pegs. Spores (8-)9-11(-12) μm diameter, pale yellow to pale yellowish-brown by transmitted light. * Licea castanea G. Lister
15 from 13z
y Platelets small (about 70µm diameter) and numerous. Spores grey by transmitted light, with a conspicuous pale area, 11-13 pm diameter.

* Licea testudinacea Nann; Brem.

z Platelets larger (about 100-300 pm diameter). Spores not grey by transmitted light.

16 from 15z
y Spores bearing large, irregularly-distributed, fugaceous warts, 15-18 pm diameter, pale red-brown by transmitted light. Sporangia dull black in the dry state, not shining.

* Licea chelonoides Nann; Brem.

z Spores regularly and minutely warted, the warts not fugaceous, Sporangia dark brown or shining black in the dry state.

17 from 16z
y Sporangia ochre to dark reddish-brown, dull, Platelet margins forming prominent ridges thus sporangium outline angular, Spores dark reddish-brown in the mass, pale ferruginous by transmitted light, (9-)10-12(-13) pm diameter,

* Licea minima Fries

z Sporangia dark purple-brown to black, shining. Platelet margins not prominent thus sporangium outline smooth, Spores dark olive in the mass, pale olive-brown by transmitted light transmitted light.

18 from 17z
y : Spores 15-20 pm diameter, Sporangia more than 0.3 mm diameter

* Licea pusilla Schrad, v pusilla

z : Spores 11-15 pm diameter. Sporangia less than 0,3 mm diameter.

* Licea pusilla v, pygmaea Meylan 1933

19 from 11z
y Dehiscence by means of a distinct preformed apical slit. Fructifications elongate, usually forming simple or branched plasmodiocarps up to about 1 mm in length, somewhat compressed laterally.

* Licea biforis Morgan

z : Dehiscence by irregular fracturing of the peridium and not by means of a distinct preformed longitudinal slit, Fructifications predominantly sporangiate, not laterally compressed.

20
20 from 19z

y Base of the sporangium surrounded by a thickened marginal ring containing dark refuse matter. Spores pale rose to pale yellow-brown, thin-walled and bearing minute pale spinules (oil-immersion lens), 10-12 pm diameter.

* Licea marginata Nanny Brem.

z Sporangia without a dark basal ring.

21 from 20z

y Sporangia very minute, 0.05-0.15 mm diameter. Peridium membranous, fragile, shining corypally through an apical opening in an outer covering of mucilage, entirely free of granular matter and pale yellow-brown by transmitted light. Spores smooth, with a pale germinative area, at first pale yellow by transmitted light but becoming pale brown at maturity, mostly 15-17 lam diameter.

Licea punctiformis Martin

z Sporangia usually larger, at least 0.08 mm diameter. Peridium not coppery, often containing refuse matter and then dark. Spores smooth, roughened or warted, yellow by transmitted light, less than 14 pm diameter.

* Licea microscopica nov. spec. t

22 from 21z

y Spores 8-10 pm diameter, bearing large pale warts. Peridium gelatinous externally. Sporangia dark brown in black, (0.08-)0.10-0.15(-0.20) mm diameter.

Licea punctiformis Martin

z Spores usually 10-12 pm diameter, smooth or minutely roughened. Sporangia yellow-brown, rarely less than 0.15 mm diameter.

† Licea microscopica D.W. Mitchell, sp.nov.

Sporangia sparsi. Sporangium minutum, 0.05-0.15 mm Tatum, subgloboeum, sessile, in sacco gelatinoe cum quisquilib. in suscum. ad apicem peridium expositum. Peridium cupreum, nitidum, fugax, in aquam fatiscens, granulosum, lucem orientem versus visum favidum. Sporae (13)15-17(18) pm latae, globosae, laeves, lucem orientem versus yisae prima dilute floraeed maturitatem palido-brunnescens, aerola tenuiore instructae. Dehiscentia adapicum disposita. Plasmodium nondum notum.

Sporangia scattered, minute, sessile, subglobose, shining corypally,- enclosed by a gelatinous sack containing refuse matter, the peridium showing through the top, 0.05-0.15 mm diameter. Spores, viewed by transmitted light, at first pale yellow but becoming pale brown at maturity, smooth, globose and with a pale area showing as one third of the view in optical section, (13-)15-17(-18) pm diameter. Dehiscence by fragmentation of the exposed upper part of the sporangium wall Peridium very delicate and fragmenting on mounting, granular, yellowish by transmitted light. Plasmodium unknown:

23 from 22z

y Sporangia subglobose to elongate (up to about two diameters). Peridium firm, finely tuberculate as seen under the high power of the binocular microscope, the tubercles disappearing when the specimen has been moistened and mounted. Spores 10-12 µm diameter, thick-walled, minutely roughened.

z Sporangia globose to ovate. Peridium not tuberculate. Spores (9-)10-12(-13) µm diameter, smooth and with a thin-walled germinative area to one side.

*Licea pumila* Martin and Allen

24 from 8z

y Sporangia usually urn-shaped and operculate. Stalk slender. Spores 8-11 diameter, smooth.

z Sporangia globose, never operculate, dehiscence irregular. Stalk stout. Spores 9-14 µm diameter.

*Licea tenera* Jahn

25 from 24z

y Peridium dark brown to fuscous, rugose in the dry state and sometimes showing irregular platelets. Spore-mass dark brown. Spores yellowish-brown to pale smoky-brown by transmitted light, paler on one side, faintly spinulose to nearly smooth, (10-)11-13(-14) µm diameter.

z: Peridium dull yellow to yellowish-brown, smooth and sometimes bearing conspicuous warts, never divided into platelets. Spore-mass yellow. Spores pale yellow by transmitted light, uniformly coloured, minutely warted, 9-12 µm diameter.

*Licea pedicellata* (Wingate) Martin

26 from 7z

y Sporangium purple. Nodes of the peridial net large, usually over 20 µm diameter.

z: Sporangium brownish. Nodes very much smaller, up to 16 µm diameter.

*Cribraria violacea* Rex

27 from 26z

y Total height up to 1 mm. Stalk 50-80% of total height. Calyculus present. Peridial nodes not expanded. Spores minutely roughened. Spore-mass yellow.

z Total height 1.5-3 mm. Stalk 85-95% of total height. Calyculus absent. Peridial nodes expanded. Spores spinulose. Spore-mass hazel-brown.

*Cribraria minutissima* Schw.
Peridial net with markedly triangular meshes. Dictydine granules pale ochraceous by transmitted light, 1.5-2.0(-3.0) μm diameter. Spores 8-10 μm diameter. *Cribraria pachydictyon*
Nann.-Brem.

Peridial net with mostly quadrilateral meshes. Dictydine granules dark purplish-brown by transmitted light, 1.0-1.3(-2.0) μm diameter. Spores 5-7 μm diameter. *Cribraria microcarpa*(Schrader) Pers.

**ECHINOSTELIALES**

29 from 5y in key to Orders

x : Spore-mass white, cream, yellow or pink. Peridium fugaceous, but often persistent as a hyaline collar around the top of the stalk. Capillitium, if present, hyaline.

y Spore-mass red-brown. Peridium usually forming a dark collar around the top of the stalk, sometimes persistent as pale fragments which remain attached to the tips of the capillitium. Capillitium brownish.

z : Spore-mass black. The entire peridium persistent. Capillitium hyaline.

30 **ECHINOSTELIACEAE**

31 from 30y

y Capillitium present. Sporangia usually over 0.3 mm total height. Spores not dispersed as a mass.

z : Capillitium absent. Sporangia less than 0.3 mm total height. Spores easily dispersed as a mass which tends to cling together (tested by stroking the sporangium upwards with a fine needle).

32

31 from 30y

y Capillitium forming a complete wide-meshed surface net with few free ends. Spores 9-10(-12) μm diameter, areolate. *Echinostelium cribrarioides* Alexop.

z Capillitium with many free ends and, at most, forming only a few small meshes. Spores 6-9(-10) μm diameter, areolate or smooth.

*Echinostelium minutum* de Bary
32 from 30z

y Sporangia exceedingly minute, 0.02-0.45 mm total height, 0.02-0.03 mm diameter, with usually less than a dozen spores. Stalk with a lunate structure at the tip and a discoid base.

z: Sporangia more than 0.05 mm total height and usually over 0.03 mm diameter with many more than a dozen spores. Stalk without a lunate structure at its tip and without a discoid base.

* Echinostelium lunatum Olive & Stoianovitch 1971

33 from 32z

y: A conspicuous fusiform (or lenticular) lumella present, 5-9 pm tall. Spores light pink, (9.5-)12-15 pm diameter

z: Columella, if present, not fusiform. Spores colourless, cream or pink by transmitted light, 6.0-10.5 µm diameter.

* Echinostelium fragile. Nann.-Brem.

34 from 33z

y Spore-mass bright pink. Sporangia 0.06-0.07 mm total height, about 0.035 mm diameter. Stalk 50-75% of total height. Spores 9-10.5 pm diameter, eolate, pale pink by transmitted light. Columella absent or very small and inconspicuous.

* Echinostelium roseum Ing

Z Spore-mass white, cream, yellow or pink. Sporangia 0.07-0.15 mm total height. Stalk more than 75% of total height. Spores 6-8(-9) µm diameter, smooth or areolate, colourless to pale yellow or pink by transmitted light. Tip of the stalk bearing a sub-globose columella 7-15 µm diameter.

* Echinostelium elachiston Alexop.
Total height about 0.5-1.0 mm. Spores 7-10 µm diameter, pallid by transmitted light, finely to coarsely warded and with an irregular system of ridges. Stalk usually with a prominent oval swelling. Peridium persistent as triangular or polygonal flakes which remain attached to the capillitial tips.

Total height less than 0.6 mm. Spores 12-15 µm diameter, pale violaceousbrown by transmitted light, minutely spinulose or verruculose to almost smooth. Stalk about ten times wider at the base than at the apex, lacking any swelling. Peridium persisting as a wide-meshed surface net with few free ends, often also as nodes at the junctions of the net or as flakes.

Peridial flakes smooth.

Peridial flakes faintly or distinctly, marked with a reticulate pattern of ridges or warts.

Sporangia less than 0.15 mm diameter. Stalk tapered from (20-)40-60(-100) µm at the base (measured as a slide-mount) to 3 µm at the apex, pallid along its entire length. Collar, columella and capillitium voilet-brown by transmitted light. Peridium persisting as small more-or-less triangular nodes in the surface net. Spores (11-)12-13(-14) µm diameter.

Sporangia 0.17-0.25 mm diameter. Stalk tapered from 150 µm at the base to 15 µm at the apex, the lower two-thirds to three-fourths black, the upper part red-brown: Collar, columella and capillitium red-brown by transmitted light. Peridium absent or remaining as only a few irregular fragments attached to the capillitial tips. Spores 13.5-15 µm diameter.
TRICHLIALES

38 from 5z in key to Orders

y : Spore-mass tinted lilac or red, without yellowish tints in the fresh state. Capillitial threads 0.5-3 µm diameter, either smooth or very minutely tuberculate.

z : Spore-mass yellow to ochre or grey, never tinted lilac or red. Capillitial threads (1-)2-6(-8) µm diameter, distinctly sculptured.

39 from 38y

y : Capillitium of rather scanty threads, 2-3 µm diameter, tapered from the base of the sporangium upwards, branched and anastomosed with wide membranous expansions. Spore-mass rose-pink. Spores adhering in clusters of 4-12, minutely warted on the outer side, 10-11 µm diameter. Peridium rugose when dry, neither iridescent nor coppery.

z : Capillitium of long flexuous threads, 0.5-2 µm diameter, not tapered, unbranched or sparsely branched. Spore-mass lilac-grey to dull red. Spores clustered or free, evenly warted or spinulose, 9-12 µm diameter. Peridium dull coppery - or iridescent.

* Dianema repens G.Lister & Cran

40 from 39z

y : Spore-mass lilac-grey (fading to ochraceous with age). Spores free. Capillitial threads 0.5-1 µm diameter, sculptured with a long spiral of very minute tube circles, not flattened and without expansions.

z : Spore-mass dull red. Spores clustered or free. Capillitial threads 1.5-4 µm diameter, roughened or spinulose, flattened and with bulbous expansions 7-27 µm in diameter.

* Calomyxa metallica (Berk.) Nieuwl.

* Minakatella longifila

G. Lister

41 from 38z

y : Capillitium bearing rings, spines and/or blunt cogs but never bearing spiral bands

z Capillitium bearing 2-6 distinct spiral bands, the spirals either smooth or spined.

42

52
42 from 41y

y Capillitial threads either simple or sparsely branched, with free ends present in slide mounts. Sporangia sessile or stipitate, never with cell-like bodies in the stalk. Entire peridium persistent.

z: Capillitium profusely branched and anastomosed to form a complete network with no (or very few) free ends. Sporangia stipitate, the stalk filled with spore-like bodies. Peridium forming a basal calyculus, the remainder fugaceous.  

43 from 42y

y Spores reticulate, 13-15 µm diameter, yellow in the mass. Elaters 3-4 µm diameter, bearing minute warts that are sometimes arranged in very indistinct spirals. *Oligonema flavidum* (Peck) Peck

z Spores minutely warty or spinulose, 8-14 (-17) µm diameter, yellow to ochraceous-yellow in the mass. Capillitial threads 1.5-4 µm diameter, bearing warts and/or spines, or nearly smooth, or annulate.  

44 from 43z

y Sporangia usually stalked; sessile fructifications sometimes occur but are usually accompanied by stalked sporangia. Peridium single.

z Sessile or very short-stalked, often forming short plasmochroi diocarps. Peridium double, at least at the top or at the base of the sporangium.  

45 from 44y and from 25z in key to Liceales

y Sporangium usually bearing prominent dark warts that are firmly embedded in the peridium. Stalk stout and up to 50% of the total height, occasionally absent. Capillitial threads 2-3 µm diameter, (sometimes absent), bearing warts or spines up to 4 µm long. Capillitium with rounded intercallary and axillary swellings. Spores 10-12 µm diameter, densely and minutely warted. *Perichaena minor* (G.Lister) Hagelst.

46 from 44z
y Spore-mass sometimes short-plasmodiocarpous. Inner layer of the peridium pale yellow, smooth or faintly sculptured, ochre-yellow. Primarily plasmodiocarpous, Inner layer of the peridium hyaline and with conspicuous papillae, Capillitial threads minutely warded or spinulose, 2.2.5(-4)µm diameter. Spores 10-12(-15) µm diameter.

*z Perichaena vermicularis* (Schw.) Rost,

47 from 46z
y : Capillitial threads usually bearing long spines up to about 6µm long. Spores (849-11(-12) µm diameter. Dehiscence irregular.

*z Perichaena chrysosperma* (Currey) A.Lister

z Capillitial threads never bearing long spines, Spores 9.14(-17) µm diameter.
Dehiscence irregular or circumscissile.

48 from 47z
y : Spores distinctly warty, (11-)12.14(-17) µm diameter. Dehiscence irregular or circumscissile. Hypothallus well-developed,

*z Perichaena corticalis* (Batsch) Rost,

z Spores spinulose or faintly roughened, 9.11(-42) µm diameter, Dehiscence circumscissile by a preformed lid, Hypothallus not apparent,

49 from 48z
y : Sporangia markedly flattened, crowded and angular by mutual pressure, 0.5-1.5 mm diameter. Lid fugaceous, Sporangia depressed or pulvinate or globose, 0.1-0.5 mm diameter. Lid persistent.

*z Perichaena depressa* Libert

*z Perichaena quadrata* Macbr.

50 from 42z
y : Sporangia globose to ovate, ochraceous yellow, Stalk pale, Calyculus coarsely papillate.

*z Arcyria pomiformis* (Leers) Rost.

z Sporangia ovate to cylindrical, lacking ochraceous tints. Stalk grey to black. Calyculus not papillate,
Sporangia greyish-white. Calyculus funnel-shaped, smooth or delicately stippled within. Capillitium 2-6(-10) µm diameter at the base of the sporangium, (1.5)-2-4 µm diameter in the upper part. Spores 6-7 p.m diameter. *Arcyria cinerea (Bull.) Pers.

Sporangia greyish-white to dark olive-grey. Calyculus wide, dish-shaped, strongly reticulate within. Capillitium homogeneous, 4-6 µm diameter with swellings to 81µm or more. Spores 7-9 µm diameter. Arcyria nigella Emoto

52 from 41z
y: Capillitial threads united into an intricate net with few free ends. 53
z: Capillitial threads formed into simple or sparsely branched elaters, hence many free ends visible. 55 Trichia

53 from 52y
y: Sporangia grey or ochraceous. Stalk usually well developed and packed with spore-like bodies. Peridium forming a basal calyculus, the remainder fugaceous. *Arcyria leiocarpa (Cooke) Martin & Alexop.

z: Fructification yellow, brown or almost black. Stalk, if present, very short and never packed with spore-like bodies. Entire peridium persistent. 54 Hemitrichia

54 from 53z
y: Sporangia short-stalked or sessile on a constricted base, shining orange-yellow and usually iridescent. Capillitium with 2-4 loose spiral bands. Spores 9-12 pm diameter, appearing distinctly warted under dry x40 objective but seen to be delicately reticulate under x100 oil immersion lens. *Hemitrichia abietina (Wigand) G.Lister

z: Sporangia sessile, globose to pulvinate to plasmodiocarpous, yellow-brown to dark red-brown or nearly black, never iridescent. Capillitium with 4-6 often irregular spiral bands. Spores 10-14 pm diameter, minutely roughened. *Hemitrichia karstenii (Rost.) A. Lister
55 from 52z
  y Stipitate. Peridium marked into platelets by pale lines of dehiscence. Elaters with long-tapering tips. Spores 9-12 pm diameter,
  z Sessile, Peddium not divided into platelets. Elaters short-tapered or bulbous at the tips. Spores 10-14 pm diameter,

56 from 55y
  y: Sporangia 0.6-0.8 mm diameter, (1-) 2-4 mm tall. Stalk 30-50% of total height. Elaters 4-5 pm diameter, with 3 5 spiral bands, the tapering part about 100 pm long, Spores 9-11 pm diameter, finely warty, *Trichia botrytis* (Gmel,) Pets,
  z: Sporangia about 0.3 mm diameter, 1.0-1.5 mm tall, Stalk 65-75% of total height, Elaters about 4 pm diameter, with 3 or 4 spiral bands; the tapered part 30-40 pm long, Spores 9-10(-12) pm diameter with prominent warts up to 0.5 pm high, *Trichia munda* (A, Lister) Meylan 1925b

57 from 55z
  y: Peridium dull, yellow to red-brown and sometimes darkening with age, thickened with granular deposits, Elaters 3.5 pm diameter, with 4 or 5 regular or irregular spiral bands, Spores spinulose, *Trichia contorta* (Ditmar) Rost,
  z: Peddium shining, olive-yellow to bright yellow, membranous and translucent and without granular deposits. Elaters 3-4.5 pm diameter, with 5 or 6 close spiral bands, Spores finely warty, *Trichia lutescens* (A,Lister)
LEGEN D FOR FIGURES
Plate 1. Sessile Licea spp.
1a - L. kleistobolus, sporangium, xlOO. lb
- L. kleistobolus, spore, x500.
2a - L. parasitica, sporangium, xlOO.
2b - L. parasitica, spore, x500.
3a - L. biforis, plasmodiocarp, x50.
3b - L. biforis, three spores, x500.
4a - L. marginata, sporangium, xlOO.
4b - L. marginata, spore, x500.
5a - L. pumila, mounted sporangium (crushed, xlOO.
5b - L. pumila, three spores, x500.
6a - L. synsporos, sporangium, xlOO.
6b - L. synsporos, -spore-cluster, x500.
6c - L. synsporos, portion of peridium showing thickened margin of platelets, x500.
7a - L. belmontiana, sporangium, xlOO.
7b - L. belmontiana, spore, x500.
7c - L. belmontiana, platelet margin, x500.
8a L. castanea, sporangium, xlOO.
8b - L. castanea, spore, x500.
9a - L. testudinacea, sporangium, x50.
9b - L. testudinacea, spore, x500.
10a - L. minima, sporangium, x50.
10b - L. minima, spore, x500.
10c - L. minima, portion of peridium showing marginal pegs, x500.
11 - L. chelonoides, spore, x500.
12a - L. pusilla, spore, x500.
12b - L. pusilla, sporangium, x50.
13a - L. microscopica, sporangium, x50.
13b - L. microscopica, spore, x500.
13c - L. microscopica, diagrammatic vertical section:
- a = green alga forming substrate, g = gelatinous outer layer of peridium, p = peridium, s = spore-mass, x250.
14a - L. punctiformis, mounted sporangium (crushed), xlOO. 14b - L. punctiformis, spore, x500.
15a - L. tenera, sporangium, x50.
15b - L. tenera, spore, x500.

Plate 2. Stalked Licea spp. and Cribraria spp.
16a - L. operculata, sporangium, x50.
16b - L. operculata, spore, x500.
17a - L. pedicellata, spore, x500.
17b - L. pedicellata, two sporangia, x50.
18 - Cribraria violacea, sporangium, x50.
19 - C. minutissima, sporangium, x50.
20a -- C. pachydictyon, peridial node with dictydidine granules, xl000.
20b - C. pachydictyon, sporangium, x60.
21a - C. microcarpa, peridial node with dictydidine granules, xl000.
21b - C. microcarpa, sporangium, x60.
Plate 3. Echinosteliaceae.

22 - *Echinostelium cribrarioides*, sporangium and spores, x250.
23 - *E. minutum*, two sporangia and spores, x250.
24 - *E. lunatum*, sporangium and spores, x250.
25 - *E. elachiston*, sporangium and spores, x250.
26 - *E. roseum*, sporangium and spores, x250.
27 - *E. fragile*, sporangium and spores, x250.
28 - *Clastodera pachypus*, sporangium and spores, x125.
29 - *C. microcarpum*, sporangium and spores, x90.
30a - *C. debaryanum* var. *debaryanum*, sporangium and spores, x125. 30b - *C. debaryanum* var. *emperatorium*, sporangium and upper part of stalk, x125.

Plate 4. Trichiales.

31 - *Dianema repens*, plasmodiocarp, x25.
32a - *Calomyxa metallica*, capillitium and spore, x500. 32b - *Calomyxa metallica*, two sporangia, x25.
33a - *Minakatella longifila*, capillitium and spores, x500.
33b - *Minakatella longifila*, portion of aethalium, x15.
34a - *Oligonema flavescens*, elaters and spore, x500.
34b - *Oligonema flavidum*, sporangia, x25.
35a - *Perichaena minor*, capillitium and spore, x500.
35b - *Perichaena minor*, three sporangia, x25.
36a - *Perichaena pedata*, capillitium and spore, x500.
36b - *Perichaena pedata*, two sporangia, x25.
37a - *Perichaena vermicularis*, capillitium and spore, x500.
37b - *Perichaena vermicularis*, plasmodiocarp, x25.

Plate 5. Trichiales.

38a - *Arcyria leiocarpa*, sporangium, x25.
38b - *Arcyria leiocarpa*, portion of calyculus, x500.
38c - *Arcyria leiocarpa*, capillitium and spore, x500.
39a - *Perichaena chrysosperma*, capillitium and spore, x500.
39b - *Perichaena chrysosperma*, two sporangia and plasmodiocarp, x25.
40a - *Perichaena corticalis*, capillitium and spore, x500.
40b - *Perichaena corticalis*, four sporangia, x25.
41a - *Perichaena depressa*, capillitium and spore, x500.
41b - *Perichaena depressa*, four sporangia, one with lid lost and devoid of spores, x25.
42a - *Perichaena quadrata*, capillitium and spore, x500.
42b - *Perichaena quadrata*, seven sporangia, x25.
43a - *Arcyria pomiformis*, portion of calyculus, x500.
43b - *Arcyria pomiformis*, sporangium, x25.
43c - *Arcyria pomiformis*, portion of capillitium and spore, x500.
44a - *Arcyria cinerea*, sporangium, x25.
44b - *Arcyria cinerea*, spore and portion of capillitium from the upper part of the sporangium, x500.
44c - *Arcyria cinerea*, portion of capillitium from near the base of the sporangium, x500.
44d - *Arcyria cinerea*, portion of calyculus, x500.
45a - *Arcyria nigella*, portion of calyculus, x500.
45b - *Arcyria nigella*, spore and portion of capillitium, x500.
45c - *Arcyria nigella*, sporangium, x25.
Plate 6. Trichiales and Acrasiales.

46a - Hemitrichia abietina, three sporangia, x25,
46b - Hemitrichia abietina, capillitium and spore, x500,

47a - *Hemitrichia karstenii*, sporangium, x25.
47b - Hemitrichia karstenii, ccppillitium and spore, x500.

48a - Trichia botrytis, sporangium, x25.
48b - Trichia botrytis, spore and elater, x500.

49a - *Trichia munda*, sporangium, x25.
49b - Trichia munda, spore and elater, x500.

50a - *Trichia contorta*, two sporangia, x25.
50b - *Trichia contorta* var. inconspicua, elater and spore, x500.
50c - Trichia contorta var. *contorta*, elater, x500.

51a - Trichia lutescens, three sporangia, x25.
51b - Trichia lutescens, spore and portions of two elaters, x500.

52 - *Pocheina rosea*, sorocarp, x500.

53 - Acrasis *rosea*, two sorocarps, x500.
A KEY TO THE CORTICOLOUS MYXOMYCETES. Part II.
David W. Mitchell

STEMONITALES

58 from 3y in key to Orders

y : Sporangia sub-globose to pulvinate, sessile or occasionally with a very short thick stalk.
Columella absent. Capillitium arising from the peridium at the base of the sporangium, pale purplish-brown or hyaline by transmitted light. 59

z Sporangia globose to cylindrical, stipitate. Almost always with a distinct columella from which the capillitium arises. Capillitium purple-brown to black by transmitted light. 60

59 from 58y

y : Spores 10-15 µm diameter, echinulate. Capillitium 2-4 µm diameter at the base of the sporangium, tapering to very fine at the top. Plasmodium olive-brown to purplish-brown and often enveloping the sporangium as a transparent layer. Peridium iridescent only when the sporangium is extruded from the mucilaginous outer layer during development.

* Colloderma oculatum (Lippert) G. Lister

z : Spores (16-)18-2.2 µm diameter, strongly spinose. Capillitium not tapered. Plasmodium white or grey, never enveloping the sporangium. Peridium iridescent.

* Diacheopsis insessa (G. Lister) Ing

60 from 58z

y : Sporangia cylindrical. Capillitium with membranous expansions at some of the internal junctions, and supporting a surface net over the entire surface of the sporangium, except sometimes around the apex. 61

z : Sporangia globose, ovate or cylindrical. Capillitium without expanded junctions and only occasionally with a true surface net. 66

61 from 60y

y : Spores spinulose or warted but not in a reticulate pattern. 62

z : Spores spinulose-reticulate. 65
62 from 61y
y: Spores prominently spiny-warted, 10.5-12.5 µm diameter, black in the mass. Capillitial branches very dark, coarse and flattened. Surface net with very coarse meshes about 30-100 µm diameter (thus difficult to see when flattened in a slide-mount).

z: Spores finely warted, 5-9 µm diameter, brown in the mass. Capillitial branches not flattened (except for expansions at the junctions), tapered towards the periphery. Surface net with fine meshes about 5-25 µm diameter.

63 from 62z
y: Spores 5-7 µm diameter, minutely roughened or minutely punctate.

z: Spores 7-9 µm diameter, distinctly warted.

64 from 63z
y: Spores lilac-brown by transmitted light. Surface net with irregular meshes about 5-20 µm diameter and with many free, spine-like ends.

z: Spores pale reddish-grey by transmitted light. Surface net with fairly regular meshes, about 10-20 µm diameter and without free ends.

65 from 61z
y: Spores 8-9 µm diameter, violet-brown by transmitted light, black in the mass.

z: Spores 6-7.5 µm diameter, pale red-brown by transmitted light, red-brown in the mass.

66 from 60z
y: Spores faintly banded-reticulate, 3-4.5 µm diameter.

z: Spores smooth, spinulose or warted and never reticulate. Very rarely less than 5 µm diameter.

*Stemonitis mussooriensis* Martin, Thind & Sohi

63

*Stemonitis* axifera (Bull.) Macbr.

64

*Stemonitis flavogenita* Jahn

65

*Stemonitis* herbatica Peck

66

*Stemonitis nigrescens* Rex

*Stemonitopsis amoena* (Nann.-Brem.) Nann.-Brem. 1974

*Stemonitopsis microspora* (A. Lister) Nann.-Brem. 1974
Primary branches of the capillitium arising either from the top of the stalk (columella absent) or from the tip of a very short columella. Spores 8-10 µm diameter.

*Collaria elegans* (Racib.)
Dhillon & Nann.-Brem. 1977

Columella always present, extending at least to about the centre of the sporangium and often reaching to the top.

Stalk often hollow (containing air when mounted), transparent or opaque, never appearing fibrous by transmitted light.

Stalk solid, distinctly fibrous (especially at the base) by transmitted light.

Stalk solid, usually black along its entire length. Sporangia 0.25-0.75 mm diameter, iridescent.

Stalk often hollow, usually red to ochre at the base and darkening towards the apex. Sporangia 0.07-0.3 mm diameter, rarely iridescent.

Sporangia 0.5-0.75 mm diameter. Stalk usually exceeding 75% of total height. Capillitium flexuous, much branched and anastomosed to form a dense and intricate network. Capillitial threads dark brown along their entire length. Spores 6-8(-10) µm diameter.

Sporangia 0.25-0.5 mm diameter. Stalk about 50% of total height. Capillitium with fewer branches and fewer anastomoses forming a more lax network. Capillitial threads straighter and pale at their tips. Spores 7.5-8.5 µm diameter.

*Collaria arcyrionema* (Rost.)
Nann.-Brem. 1967

Collaria *biasperospora* (Kowalski)
Dhillon & Nann.-Brem. 1977

Peridium persistent and usually iridescent.

Peridium evanescent.

Macbrideola *scintillans* Gilbert
72 from 71z
   y: Spores clustered, 9.5-10.5 pm diameter, warded on the exposed outer part, the remainder smooth. Capillitium anastomosed to form a more-or-less complete open network with short spine-like processes.

   z: Spores free, 7-9 or 12-14 pm diameter, evenly warded. Capillitium branching but with few or no anastomoses, or absent.

* Macbrideola synsporos
  (Alexop.) Alexop.

73 from 72z
   y: Capillitium robust and remaining stout to the periphery.

   z: Capillitium more-or-less flexuous and tapered to the periphery, or capillitium absent.

74 from 73y
   y: Spores minutely warded, (7.5-)8.5-9 pm diameter.

   z: Spores spinulose, 12-14 pm diameter.

* Macbrideola cornea
  (G. Lister & Cran) Alexop. v. cornea
  Macbrideola cornea v. macro-spora Nann.-Brem. 1971

75 from 73z
   y: Spores minutely and uniformly warded, 8.5-9.5 pm diameter. Capillitium either absent or arising from 1 or 2 (-4) short primary branches.

   z: Spores minutely warded and bearing clusters of larger warts, 6.5-7 pm diameter. Capillitium arising from 3 or 4 or more longer primary branches.

76 from 68z
   y: Spores distinctly warded or distinctly spinose, at least 11 pm diameter in normal developments. Sporangium globose.

   z: Spores smooth, roughened, minutely warded or minutely spinulose. Sporangium globose, ovate or cylindrical.
Capillitium stout and rigid, intricately branched and anastomosed throughout the sporangium. Spores 11-14(-16)µm diameter with a small pale oval germinative pore. The lower part of the stalk surrounded by a hyaline outer layer containing pale brown fibres. *Comatricha rigidireta* Nann.-Brem.

Capillitium either stout and rigid or fine and flaccid, more-or-less dichotomously branched and with few anastomoses thus not forming an intricate network. Spores without a germinative pore. Stalk without a hyaline outer layer.

**77 from 76y**

**y** Capillitium stout and rigid, intricately branched and anastomosed throughout the sporangium. Spores 11-14(-16)µm diameter with a small pale oval germinative pore. The lower part of the stalk surrounded by a hyaline outer layer containing pale brown fibres. *Comatricha rigidireta* Nann.-Brem.

**z** Capillitium either stout and rigid or fine and flaccid, more-or-less dichotomously branched and with few anastomoses thus not forming an intricate network. Spores without a germinative pore. Stalk without a hyaline outer layer.

**78 from 77z**

**y** : Columella extending to the top of the sporangium and either ending in an apical plate from which most of the capillitium arises or the apical plate absent and then the capillitium arising from the length of the columella. Spores (9-) 11-14.5 µm diameter.

*Enerthenema papillatum* (Pers.) Rost.

**z** : Columella extending to about the centre of the sporangium, or shorter.

**79 from 78z**

**y** : Spores 12-13 µm diameter, prominently spinose, the spines up to 1 µm long.

**80**
Paradiacheopsis microcarpa
nov. comb. for Comatricha microcarpa (Meylan) Kowalski 1975

* Paradiacheopsis solitaria
(Nann.-Brem.) Nann.-Brem. 1967

Paradiacheopsis fimbriata
(G. Lister & Cran) Hertel 1956

Paradiacheopsis rigida
(Brdndzl) Nann.-Brem. 1967

Comatricha nodulifera
Wollman & Alexop. 1956
86 from 85y

y: Spores with a distinct pale germinative pore. Primary branches of the capillitium not noticeably horizontal. **Comatricha ellae** Harkonen Harkonen 1978 (syn. **C. nannengae** 1977)

z: Spores without a germinative pore. Primary branches of the capillitium noticeably horizontal (i.e. perpendicular to the columella). Diminutive form of **Comatricha laxa** Rost.

87 from 85z

y: Primary branches of the capillitium stout and strikingly horizontal (i.e. perpendicular to the columella). Capillitium not sinuous, with many free ends at the periphery. **88**

z: Primary branches of the capillitium neither noticeably stouter than the remainder of the capillitium nor horizontal. Capillitium sinuous, looped and anastomosed at the periphery, thus few free ends present. **89**

88 from 87y

y: Capillitium both branched and anastomosed to form an internal network, with many short free ends at the periphery. Spores 7-9(-11) µm diameter. **Comatricha laxa** Rost.

z: Capillitium with only very few anastomoses, with long fine free ends at the periphery. Spores 6-7 pm diameter. **Comatricha longipila** Nann.-Brem.

89 from 87z

y: Sporangia globose to ovate, the stalk
90 from 89z

y: Sporangia ovate. Capillitium tangled between adjacent sporangia. Peridium persistent as a large funnel-shaped collar around the top of the stalk. Spores 10-11 μm diameter, minutely spinulose.

z: Sporangia ovate to cylindrical. Capillitium not connected between adjacent sporangia. Peridium entirely fugaceous. Spores (4-) 6-7 (-8) μm diameter, minutely warted.

**Comatricha filamentosa**
Meylan 1921

*Comatricha fragilis* Meylan 1925a

*PART III* completing this work will be published in Vol.13 pt.1.
LEGEND FOR FIGURES

Plate 7. Stemonitales
54a — *Colloderma oculatum*, two sporangia, x25
54b — *Colloderma oculatum*, capillitium and spores, x250
55a — *Diacheopsis insessa*, four sporangia on *Cladonia*, x25
55b — *Diacheopsis insessa*, capillitium and spores, x250
56a — *Stemonitis mussooriensis*, three sporangia, x25
56b — *Stemonitis mussooriensis*, central portion of columella, capillitium and spores, x250
57 — Habit of *Stemonitis axifera* and *S. flavogenita*, x12
58 — *Stemonitis axifera*, central portion of columella, capillitium and spores, x250
59 — *Stemonitis flavogenita*, central portion of columella, capillitium and spores, x250

Plate 8. Stemonitales
60 — Habit of *Stemonitis herbatica* and *S. nigrescens*, x12
61 — *Stemonitis herbatica*, central portion of columella, capillitium and spores, x250
62 — *Stemonitis nigrescens*, central portion of columella, capillitium and spores, x250
63a — *Stemonitopsis amoena*, two sporangia, x12
63b — *Stemonitopsis amoena*, central portion of columella and capillitium, x250
63c — *Stemonitopsis amoena*, surface net and spores, x500
64a — *Stemonitopsis microspora*, sporangium, x12
64b — *Stemonitopsis microspora*, central portion of columella and capillitium, x250
64c — *Stemonitopsis microspora*, peripheral capillitium and spores, x500
64d — *Stemonitopsis microspora*, spores, x1000
65 — *Collaria elegans*, sporangium, x100

Plate 9. Stemonitales
66a — *Collaria arcyronema*, sporangium, x50
66b — *Collaria arcyronema*, two spores, x500
67a — *Collaria biasperospora*, sporangium, x50
67b — *Collaria biasperospora*, two spores, x500
68a — *Macbrideola scintillans*, two sporangia, x100
68b — *Macbrideola scintillans*, spore, x500
69a — *Macbrideola synsporos*, spore-cluster, x500
69b — *Macbrideola synsporos*, two sporangia, x100
70a — *Macbrideola cornea* var. *cornea*, sporangium, x100
70b — *Macbrideola cornea* var. *cornea*, capillitium and spore, x500
70c — *Macbrideola cornea* var. *macropora*, spore, x500
71a — *Macbrideola decapillata*, capillitium and spore, x500
71b — *Macbrideola decapillata*, three sporangia, x100
72a — *Macbrideola martini*, three spores, x500
72b — *Macbrideola martini*, sporangium, x100

Plate 10. *Enerthenema papillatum*
73a — Diminutive form, lacking the apical disc, x100
73b — Ditto, x100
73c — Typical form, x100
73d — Aberrant form, x100
73e — Spore, x500
Plate 1 1. *Paradiacheopsis solitaria*, ten collections, x100
74a — Spore, x500

75a — *P. cribrata*, two sporangia, x100
75b — *P. cribrata*, peripheral capillitium and spore, x500
76a — *P. acanthodes*, peripheral capillitium and spore, x500
76b — *P. acanthodes*, sporangium, x100
77a — *P. microcarpa*, spore, x500
77b — *P. microcarpa*, sporangium, x100
78a — *P. fimbriata*, spore, x500
78b — *P. fimbriata*, sporangium, x100
79a — *P. rigida*, two spores, x500
79b — *P. rigida*, sporangium, x100

80a — *C. rigidireta*, sporangium, x100
80b — *C. rigidireta*, spore, x500
81a — *C. nodulifera*, portion of capillitium and spore, x500
81b — *C. nodulifera*, sporangium, x100
82a — *C. ellae*, sporangium, x100
KEYS

A KEY TO THE CORTICOLOUS MYXOMYCETES. Part III.

David W. Mitchell

PHYSARALES

The calcium carbonate deposition that is characteristic in almost all members of this Order is sometimes inhibited by the high humidity produced by moist-chamber cultivation. To obviate this, the lid of the container may be wedged open during the period of sporangial formation.

91 from 2y in key to Orders
  y : Lime either absent or present in the form of amorphous granules.  92
  z : Lime present as stellate or angular crystals over the peridium.  121 Didymium

92 from 91y
  x : Capillitium branched and anastomosed to form a reticulate network with expanded (usually calcareous) nodes.  93
  y : Capillitium formed from invaginations of the peridium and consisting of tubules that point downwards and which are connected to the base of the fruit-body by slender hyaline threads. Lime present or absent.  120
  z : Capillitium essentially non-calcareous, consisting of simply-branched threads and never with expanded calcareous nodes. Lime present and more-or-less restricted to the peridium and to the columella (when present).  126 Diderma

93 from 92x
  y : Capillitium duplex, i.e. composed of two distinct "systems", one filled entirely with lime, the other more-or-less limeless.  94
  z : Capillitium homogeneous, i.e. composed of a single system of threads or tubules with expanded nodes.  95

94 from 93y
  z : Peridium shining chestnut-brown. Duplex capillitium consisting of brown nodes and slender colourless tubules which are never spiny. Sporangiate and stalked.  * Leocarpus fragilis (Dicks.) Rost.
95 from 29z in key to Echinosteliales and from 93z
   y : Lime not detectable in any part of the sporangium by
       application of acid. Sporangia minute, 0.07-0.15
       mm diameter, 0.1-0.75 mm total height. Peridium
       shining silver. Capillitial junctions occasionally
       expanded into more-or-less triangular
       hyaline nodes.
   z Lime readily detectable visually or by
       application of acid. Fruit-bodies larger.
       Peridium never silver. Capillitial junctions
       expanded into large calcareous nodes.

96 from 95z
   y : Capillitium consisting of a network of fine
       hyaline limeless threads with expanded
       calcareous nodes at some or all of the
       junctions.
   z : Capillitium consisting of a network of coarse
       calcareous tubules with, at most,
       only very few hyaline limeless threads.

97 from 96y
   y : Lime-nodes white.
   z : Lime-nodes yellow to orange.

98 from 97y
   y : Fruit-bodies laterally flattened. Dehiscence
       by means of a longitudinal apical slit.
   z : Sporangia not laterally flattened.
       Dehiscence irregular.

99 from 98y
   y : 8-10 µm diameter, minutely and
   z : Spores 10-12 µm diameter, verrucose, the warts
       sometimes distributed irregularly.
       Sporangia often fan-shaped.

100 from 98z
   y : Columella present, usually extending to
       the top of the sporangium.
   z : Columella absent.

101 from 100z
   y : Sporangia sessile. Spores encircled by a pale band. * Physarum ovisporum
       G. Lister

   z : Sporangia stipitate. Spores not encircled
       by a pale band.
102 from 101z
  y: Lime-nodes fusiform. Capillitium radiating from the base of the sporangium and branching more-or-less dichotomously.  
  z: Lime-nodes angular or rounded, not fusiform. Capillitium not dichotomous.

* Physarum nutans Pers.  
* Physarum leucophaeum Fries

103 from 97z
  y: Lime-nodes fusiform. Capillitium radiating from the base of the sporangium and branching more-or-less dichotomously.  
  z: Lime-nodes angular or rounded, not fusiform. Capillitium not dichotomous.

104 from 103y
  y: Peridium and stalk yellow or orange.  
    Spores 7-9 µm diameter.  
  z: Peridium iridescent blue with scanty yellow lime, Stalk black. Spores (9-)10-11 (-12) µm diameter.

* Physarum viride (Bull.) Pers.  
* Physarum bethelii Macbr.

105 from 103z
  y: A small yellow conical columella present.  
    Stipitate, the stalk stuffed with yellow lime.  
  z: Columella absent (pseudocolumella occasionally present). Stalk, if present, orange to red-brown, without lime or with scanty deposits in the wall only.

* Physarum citrinum Schum.

106 from 105z
  y: Peridium iridescent blue or bronze. Lime-nodes orange.

* Physarum psittacinum Ditmar

  z: Peridium not iridescent. Lime-nodes yellow to orange.

107
Long-plasmodiocarpous and typically reticulate, though often forming short plasmodiocarps and sometimes sessile globose sporangia. Immature fruit-body greenish. Spores verruculose with a paler and more sparsely warted hemisphere. Lime-nodes pale yellow. *Physarum serpula* Morgan

Short-plasmodiocarpous to sporangiate, sporangia either sessile or sometimes with a short stalk up to 20% of the total height. Immature fruit-body greenish. Spores evenly verruculose. Lime-nodes deep yellow to orange. *Physarum decipiens* Curtis (including *P. auriscalpium* Cooke, following Farr, 1961)

Sporangiate and typically stalked, the stalk usually 20% to 75% of the total height. Never with greenish tints during development. Spores verruculose, sometimes bearing clusters of larger warts.


*Sporangia* usually with long strand-like stalks.

*Badhamia utricularis* (Bull.) Berk.

Spore-clusters very loose, easily broken up when mounting. Spores globose and more-or-less uniformly warted. Sporangia usually with long strand-like stalks. *Badhamia utricularis* (Bull.) Berk.

Spore-clusters persistent, not easily broken up when mounting. Spores elliptical to ovate, densely warted-on the exposed outer surface. Sporangia sessile or very short-stalked.
from 110z

111 Spore-clusters composed of 10-40 spores. Sporangia flesh-coloured to dirty-white. Capillitial lime white to apricot. Plasmodium colourless.

*Badhamia versicolor* A. Lister

z Spore-clusters composed of 4-12(-20) spores. Sporangia never flesh-coloured. Capillitial lime white or yellow. Plasmodium yellow.

112 Sporangia yellow (sometimes fading with age). Capillitial lime yellow. Peridium double, the inner layer hyaline and often iridescent, the outer layer coated with yellow lime.

*Badhamia nitens* Berk.

y: Sporangia white, greyish or greenish, sometimes iridescent. Capillitial lime white. Peridium single.

113 Spores 13-14 µm diameter, dark purplish brown by transmitted light. Sporangia sessile or short-stipitate.

*Badhamia capsulifera* (Bull.) Berk.

z: Spores (9-)10-11(-12)µm diameter, pale purplish-brown by transmitted light. Sporangia sessile.

*Badhamia dubia* Nann. – Brem., 1968.

114 Fruit-body orange, yellow or greenish-yellow, often fading rapidly after drying. Capillitial lime yellow or orange.

*Badhamia regulosa* Keller & Brooks, 1975

z: Fruit-body white or iridescent, without yellow tints in the peridium and capillitium. Capillitial lime white.


*Badhamia regulosa* Keller & Brooks, 1975

y: Fruit-bodies usually sessile, yellow to greenish-yellow in the fresh state. Peridium with lime-scales, not strongly wrinkled. Capillitium physaroid. Capillitial lime yellow to orange-yellow.

107
116 from 114z
y : Peridial lime sparse. Peridium delicate and often iridescent. Capillitium fine, usually badhamoid. Plasmodium yellow or orange.

z : Lime usually abundant, coating the peridium thickly. Capillitium often physaroid. Plasmodium white or cream-coloured.

117

117 from 116y
y : Sporangia usually with long flaccid stalks, the stalks red-brown to ochre. Badhamia utricularis (Bull.) Berk

z : Sporangia sessile or rarely erect on very short yellowish stalks. *Badhamia foliicola A. Lister

118 from 116z
y : Spores 12-16 µm diameter with a very open overlying reticulation (more-or-less in the shape of pressure ridges). Sporangia usually stalked, the stalk often more than 50% total height. (Macbr.) *Badhamia gracilis Macbr.

z : Spores lacking any trace of a reticulate pattern. Sporangia sessile or occasionally very short-stipitate. 119

119 from 118z
Y : Spores densely and minutely verruculose, rarely smooth, pale lilac-brown or pale lilac-grey by transmitted light, 11-14 µm diameter, often ovoid. Hypothallus red and base of the sporangium usually red. Pseudocolumella often present. (Fries) *Badhamia panicea Rost.

z : Spores densely and minutely spinulose, brown by transmitted light, 12-18 µm diameter, globose or nearly so. Stalk, when present, black. Pseudocolumella never present. *Badhamia affinis
from 91z

121 y: Fruit-body containing erect pillars (trabeculae) 7-22 µm diameter, containing white lime-crystals and extending from the base of the fruit-body to the upper peridium. Capillitial threads often lacking but, when present, delicate and undulating and joining the base of the fruit-body to the upper part of the peridium. Spores 10-12 µm diameter, minutely and irregularly warded.

z: Fruit-body without trabeculae. Capillitium of fine threads.

* Didymium sturgisii
Hagelst.

122 from 121z

y: Spores clustered into groups of 4-25, ovate to sub-globose, spinose on the exposed outer surface, elsewhere nearly smooth, 11-12 x 12-14 µm diameter.

Didymium synsporon
Keller & Brooks, 1973

123

z: Spores free, globose.

123 from 122z

y: Sub-globose columella of white lime present. Stalk, if present, calcareous, white or pink.

squamulosum

z: Columella absent. Stalk, if present, non-calcareous and dark.

* Didymium
Alb. & Sciiw.) Fries

124 from 123z

y: Sporangia discoid, stipitate, the stalk dark brown to black. Capillitium delicate, sparsely branched. Spores almost smooth, 6-7(-8) µm diameter.

z: Pulvinate to plasmodiocarpous, sessile. Capillitium coarse. Spores 11-15 µm diameter.

* Didymium clavus
(Alb. & Schw.) Rab.

125 from 124z

y: Peridium with a smooth eggshell-like white crust of compact lime-crystals. Capillitium tapered upwards from the base of the sporangium. Spores 11-14 µm diameter, minutely warted to smooth.

z: Peridial lime-crystals forming a rough surface. Capillitial threads coarse, not tapered, 1-4 µm diameter. Spores 12-15 µm diameter, spinose, the spines up to 1 µm in length.

orthonemata

* Didymium difforme
(Pers.) S.F. Gray

Didymium
Keller & Brooks, 1973
126 from 92z
   y : Peridium double, consisting of a thick white calcareous outer layer and a delicate grey membranous inner layer. Spores 7-10 µm diameter, minutely warty, the warts often grouped into clusters.

   z : Peridium single, encrusted with lime. Spores 8-16 µm diameter, never with clustered warts. 127

127 from 126z
   y : Peridium membranous. Spores (10-) 12-13(-15) µm diameter. Capillitium of rather stout threads, often with wide membranous expansions at the junctions.

   z : Peridium cartilaginous. Spores usually less than 12 µm or more than 13 µm diameter. Capillitium of finer threads, never with membranous expansions at the junctions. 128

128 from 127z
   y : Columella absent. Peridial lime smooth, not divided into platelets. Capillitium often bearing small calcareous granules and rounded refractile swellings. Diderma imperialis Emoto

   z : Columella present. Peridial lime typically reticularly wrinkled into polygonal platelets. Capillitium lacking calcareous granules and without refractile swellings. 129

129 from 128z
   y : Columella clavate, reaching to the centre of the sporangium with the capillitium arising mostly from its apex. Stalk usually present, devoid of lime and blackish, especially at its base. Spores 8-10(-12) µm diameter, yellowish-brown by transmitted light, uniformly verruculose. * Diderma rugosum (Rex) Macbr.

   z : Columella sub-cylindrical, reaching almost to the top of the sporangium with the capillitium arising from along its length as well as from its apex. Stalk usually present, with a central constriction dividing it into a white calcareous upper part and a blackish non-calcareous lower part. Spores 14-16 µm diameter, violet-brown by transmitted light, densely spinulose, paler on one side. Diderma corrugatum Brooks & Keller, 1977

* Diderma hemisphaericum (Bull.) Horn.
* Diderma chondrioderma (de Bary & Rost.) G. Lister
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ADDITIONAL REFERENCES
A number of undescribed taxa (especially in the genera *Licea, Echinostelium* and *Comatricha*) are 
of fairly regular occurrence in moist chambers of bark from living trees and vines. The worker is 
referred to the current series of papers by H.W. Keller and others on Corticolous Myxomycetes. 
Two papers that were published after the preparation of the earlier sections of this key include 
descriptions of two new spp. of *Echinostellium* and five new spp. of *Licea*. These are as follows:

*Mycologia* 68, 1204-1220.

LEGEND FOR FIGURES

Plate 15. Physarales
89a - Ciencowskia reticulata, plasmodiocarp and sporangium, x 25
89b - Ciencowskia reticulata, spores and capillitium, x 500
90a - Leocarpus fragilis, three sporangia, x 25
90b - Leocarpus fragilis, spore and capillitium, x 500
91a - Protophysarum phloiogenum, two sporangia, x 25
91b - Protophysarum phloiogenum, spore and part of a sporangium, x 500
92a - Physarum bivalve, sporangium, x 25
92b - Physarum bivalve, spore and capillitium, x 500
93a - Physarum compressum, sporangium, x 25
93b - Physarum compressum, spore and capillitium, x 500

Plate 16. Physarum spp.
94 - P. crateriforme, sporangia of two forms.
95a - P. ovisporum, sporangium, x 25
95b - P. ovisporum, spores and capillitium, x 500
96a Habit of P. nutans and P. viride, three sporangia, x 25
96b Spore and lime-rich capillitium of P. nutans and P. viride, x 500
96c - Almost limeless capillitium of P. nutans and P. viride, x 500
97a - P. leucophaeum, three sporangia, x 25
97b - P. leucophs eum, spore and capillitium, x 500
98a - P. bethelii, three sporangia, x 25
98b P. bethelii, spore and capillitium, x 500

Plate 17. Physarum spp.
99a - P. citrinum, two sporangia, x 25
99b - P. citrinum, spore and capillitium, x 500
100a - P. psittacinum, two sporangia, x 25
100b - P. psittacinum, spore and capillitium, x 500
101a - P. serpula, plasmodiocarpous and sporangiate fructifications, x 25
101b - P. serpula, spore and capillitium, x 500
102a - P. decipiens, sporangium and plasmodiocarp, x 25
102b - P. decipiens, spore and capillitium, x 500
103a - P. limonium, three sporangia, x 25
103b - P. limonium, spore and capillitium, x 500
104a - P. oblatum, two sporangia, x 25
104b - P. oblatum, spore and capillitium, x 500

Plate 18. Badhamia spp.
105a - B. utricularis, two sporangia, x 25
105b - B. utricularis, spores and capillitium, x 500
106a - B. versicolor, four sporangia, x 25
106b - B. versicolor, spores and capillitium, x 500
107a - B. nitens, two sporangia, x 25
107b - B. nitens, spores and capillitium, x 500
108a - B. capsulifera, two sporangia, x 25
108b - B. capsulifera, spores and capillitium, x 500
109a - B. dubia, two sporangia, x 25
109b - B. dubia, spores and capillitium, x 500
110a - B. rugulosa, stalked and sessile sporangia, x 25
110b - B. rugulosa, spores and capillitium, x 500
Plate 19. Physarales
111a - Badhamia foliicola, three sporangia, x 25
111b - Badhamia foliicola, spores and capillitium, x 500
112a - Badhamia gracilis, three sporangia, x 25
112b - Badhamia gracilis, spores and capillitium, x 500
113a - Badhamia panicea, two sporangia, x 25
113b - Badhamia panicea, spores and capillitium, x 500
114a - Badhamia affinis, two sporangia, x 25
114b - Badhamia affinis, spores and capillitium, x 500
115a - Badhamiopsis ainoae, two plasmodiocytes, x 25
115b - Badhamiopsis ainoae, spores and capillitium, x 500
116a - Crania applanata', three plasmodiocytes, x 25
116b - Crania applanata, spore and capillitium, x 500

Plate 20. Didymium spp.
117a - D. sturgisii, plasmodiocyte, x 25
117b - D. sturgisii, spores, trabeculae and capillitium showing attachment to peridium, with crystals, x 500
118a - D. synsporon, plasmodiocyte, x 25
118b - D. synsporon, spores and detail of capillitium showing attachment to peridium, with crystals, x 500
119a - D. squamulosum, two sporangia and a plasmodiocyte, x 25
119b - D. squamulosum, spores and capillitium showing attachment to peridium, with crystals, x 500
120a - D. clavus, two sporangia, x 25
120b - D. clavus, spores and detail of capillitium showing attachment to peridium, with crystals, x 500
121a - D. difforme, sporangium, x 25
121b - D. difforme, spores and detail of capillitium showing attachment to peridium, with crystals, x 500
122a - D. orthonemata, plasmodiocyte, x 25
122b - D. orthonemata, spore and detail of capillitium showing attachment to peridium, with crystals, x 500

Plate 21. Diderma spp.
123a - D. hemisphaericum, three sporangia, x 25
123b - D. hemisphaericum, spores and capillitium showing attachment to peridium, x 500
124a - D. chondrioderma, three sporangia, x 25
124b - D. chondrioderma, spores and capillitium attached to sporangium base and to peridium, x 500
125a - D. imperialis, sporangium, x 25 (after Emoto)
125b - D. imperialis, spore, x 500 (after Emoto)
126a - D. rugosum, three sporangia, x 25
126b - D. rugosum, spores and capillitium attached to sporangium base and to peridium, x 500
127a - D. corrugatum, two sporangia, x 25
127b - D. corrugatum, spores and attachment of capillitium to peridium, x 500