

Key to the Lichen Genera of the Guianas

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The key deals with c. 190 genera known from or expected in the three Guianas (Guyana, Surinam, French Guiana). Included are all genera known from literature or from recent, unpublished collections. Genera in " " concern provisional identifications or taxa of uncertain or provisional taxonomic position. Genera in [] are known from surrounding areas and expected for the Guianas.

The genera *Cladia*, *Cladina*, and *Cladonia* may now be keyed to species using the [Key to the Cladoniaceae of the Guianas](#), by Ted Ahti and Harrie Sipman, 1997.

Basic knowledge of lichens is required for use of the key. For easier use a simplified terminology is applied. e.g., all interascal filaments are called paraphyses.

Although the key is principally meant for the Guianas, it is likely to be of use throughout the Amazon basin, and genera recorded from that area are included as much as possible.

N.B. The number series of the couplets is incompletely used, because numbers are reserved for future extensions. Interrupted sites are marked by three blank lines.

The following persons are gratefully acknowledged for contributions: R. C. Harris (1986), L. Brako (1986), J. Knoph (1986), A. Aptroot (1996). Errors are my own responsibility!

Additions, corrections, recommendations are very welcome! Please contact Harrie Sipman, who would appreciate such cooperation very much. E-mail: h.sipman@bgbm.org. Please address inquiries about the presentation of this key and about the Smithsonian Institution's Biological Diversity of the Guianas Program to Sara Alexander by E-mail: alexandersar@si.edu.

1a Thallus fruticose, i.e. with free-standing or hanging, terete or flattened, often branched lobes, which may measure a few mm to several dm in length, and which are affixed only at their base, rather uniformly colored on all sides; in addition, squamulose or crustose thallus may be present

2
b Thallus foliose, i.e. forming a flat plate, measuring usually several cm in diam., more or less deeply divided into lobes, which grow usually parallel to their substrate, usually rather closely appressed to it, often attached by tomentum or rhizines on the lower side, so that the whole thallus can usually be lifted off easily; the lower side mostly differing markedly in color

from the upper side, often brownish or black

20

c Thallus squamulose, i.e. at first sight seeming crust-like, but composed of flat, generally separate lobes, rarely exceeding 1-2 mm in length, which grow more or less parallel to

the

substrate, attached to it by their base or by their underside, not by rhizines, so that the thallus cannot be lifted off without breaking into separate lobes; their lower side usually differing markedly in color from the lower side, often whitish

80

d Thallus crustose, i.e. forming a layer which covers the substrate and is affixed to it with its whole lower side, in such a way that it cannot be lifted off, sometimes penetrating into the substrate or even developed inside the substrate (e.g. endophloeodic: growing inside the (outer) bark cells)

100

2a (fruticose) Thallus branches with central cavity

3

b Thallus branches solid, with arachnoid or more compact central tissue

8

3a Thallus surface glossy, pale brown to brown, with usually frequent perforations; terrestrial, occasionally on mossy tree trunks

Cladia

b Thallus surface dull, usually whitish, greenish or greyish; perforations in most species absent, in some species present in axils of ramifications (rarely more frequent, than thallus yellowish)

4

4a Thallus branches with squamules, especially at the base

Cladonia

b Thallus without such appendages

5

5a Rare epiphytic species, known only from Mt. Roraima at c. 2000 m (widespread and common in the Andes)

Oropogon

b Widespread terrestrial species, mostly on white sand, occasionally on decaying tree stumps

6

6a Thallus surface slightly felty, without cortex (*Cladonia signata* would also key out here)

Cladina

b Thallus surface smooth, with thin cortex

Cladonia

8a Thallus branches with tough central strand, which becomes visible between the breaking outer layer by moderate tension

Usnea

- b** Thallus branches without tough central strand, breaking completely by tension
9
- 9a** Epiphytic species, occasionally on decorticated wood
10
- b** Saxicolous species, occasionally on thin soil cover on rock
[15](#)
- 10a** Lobes applanate, over two times wider than thick
11
- b** Lobes more or less terete
[12](#)
- 11a** Thallus greenish grey, over 2 cm long when full-grown, often pendant
Ramalina
b Thallus whitish, c. 1 cm long when full-grown, erect
Siphula
- 12a** Thallus, at least in part, yellow, reaction K+ purple
Teloschistes
b Thallus bluish grey or greenish to whitish yellow, K-
13
- 13a** Thallus bluish grey to black, basal branches sometimes whitish; branches more or less terete; with bluegreen algae
14
- c** Thallus whitish yellow; branches flattened, composed of chains of apothecia; with green algae
Polystroma
- 14a** Richly branched; main branches over 0.1 mm wide, with more or less scattered tomentum; no apothecia; with multilayered cortex; algae *Nostoc* in glomerules, not gelatinous
Dendriscoaulon
b Richly branched; main branches up to 0.1 mm wide, without tomentum; apothecia common (upland); cortex composed of a single cellular layer; algae *Scytonema*, gelatinous
Polychidium
c Sparingly branched; main branches over 0.1 mm wide, without tomentum; apothecia common; no cellular cortex; algae *Nostoc* in chains, gelatinous
Lempholemma
- 15a** Fruticose thallus with granular or squamulose appendages; with green algae
Stereocaulon
b Fruticose thallus without such appendages; algae bluegreen or green
16
- 16a** On rock; thallus composed of brownish to blackish, fruticose parts only; ascomycetes, though rarely fruiting
17
- c** On soil; fruticose thallus yellowish, without algae; in addition, crustose, algiferous, dark green thallus

present; basidiomycete
Multiclavula

17a On temporarily submersed rocks in streams; thallus
gelatinous, black; rare species

18

b On mostly dry rock faces on land; thallus not
gelatinous, white or grey; common species

19

18a Lobes flat, little branched, over 1 cm long

Jenmania

b Lobes rounded and richly branched, forming cushions
less than 1 cm thick

Lichina?

19a Thallus dark brown to black; algae
bluegreen; on granite

Peltula

b Thallus white to pale grey; algae green; on sandstone
(cf. also *Toninia*, with thallus composed of rounded, sometimes
rather elongated, warts; recognizable by dark grey color
and frequent presence of apothecia)

Siphula

20a (1, foliose) Lobes with thread-like
appendages (rhizines) on lower side; algae green

21

b Lobes with tomentum on lower side, at least on part of
it; algae mostly bluegreen

41

c Lobes with naked lower side; algae various

61

21a Thread-like appendages on the margins of the lobes
(cilia), sometimes also on underside (rhizines)

22

b Thread-like appendages not on the margins of the lobes,
only on underside (rhizines)

31

22a Cilia with inflated base

23

b Cilia without inflated base

24

23a Upper side of thallus yellowish green, usnic acid
present

Relicina

b Upper side of thallus whitish grey, atranorin present

Bulbothrix

24a Rhizines white or grey, sometimes black, but then
usually with perpendicular side branchlets; lower side
often without cortex, felty; spores biloculate, dark

Heterodermia

b Rhizines black; lower side always with cortex, smooth;

- spores uniloculate, colorless
- 25
- 25a** Rhizines one or more times dichotomously branched
Hypotrachyna
- b** Rhizines mostly unbranched, or in part irregularly branched
- 26
- 26a** Thallus lobes elongate, mostly under 2 mm wide
Parmelinopsis
- b** Thallus lobes short and wide, mostly over 5 mm wide
- 27
- 27a** Underside near lobe tips without rhizines, naked in a
several mm wide zone
Parmotrema
- b** Underside rhizinate to the margin
- 28
- 28a** Underside near margin brown, with scattered rhizines of
variable length
Rimelia
- b** Underside near margin pale, with dense, short rhizines
mixed with scattered longer ones (not yet known from the Guianas)
- Rimeliella*
- 31a** Rhizines absent from marginal zone;
thallus lobes wide, often over 10 mm wide
Parmotrema
- b** Rhizines present till lobe margins; thallus lobes
usually up to 2 mm wide, rather narrow and deeply dissected
- 32
- 32a** Rhizines frequently dichotomously branched
Hypotrachyna
- b** Rhizines mostly unbranched or a few times irregularly
branched
- 33
- 33a** Apothecia completely black, without grey thalline
margin when well developed
Pyxine
- b** Apothecia with grey thalline margin
- 34
- 34a** Spores biloculate, grey to brown; lower side whitish or
black, sometimes without cortex
- 35
- b** Spores uniloculate, hyaline; lower side brown to black,
always with cortex
- 37
- 35a** Thallus appanate; cortex composed of periclinally
arranged hyphae
- 36
- b** Thallus more or less ascendant; cortex composed of
longitudinally arranged hyphae, surface slightly

longitudinally striate
Heterodermia

36a Apothecia with pale hypothecium; thallus without divaricatic acid, with dull, black or pale, lower cortex

Physcia

b Apothecia with dark hypothecium; thallus of Guianan species always with divaricatic acid, with glossy, black lower cortex

Dirinaria

37a Epiphytic or epilithic; thallus whitish grey, without usnic acid

38

b Epilithic; thallus yellowish green, with usnic acid

Xanthoparmelia

38a Lower surface pale brown to brown; spores less than 10 μm long

Pseudoparmelia

b Lower surface dark brown to black; spores over 10 μm long

Canoparmelia

41a Thalli with small, rarely over 5 mm wide, lobes, usually closely appressed; algae always bluegreen

42

b Thalli with usually large, over 5 mm wide lobes, not or loosely appressed; algae bluegreen or green

46

42a Upper surface tomentose; tomentum on lower side often restricted to marginal patches; uncommon

Erioderma

b Upper surface glabrous; tomentum on lower side usually spread over most of the thallus

43

43a Cortex composed of longitudinally arranged hyphae; thallus often with concentric ridges; apothecia without thalline margin

Coccocarpia

b Cortex not composed of longitudinally arranged hyphae; thalli without concentric ridges

44

44a Thallus closely appressed to substrate

45

b Thallus loosely appressed with ascending margins; uncommon

Leioderma

45a Thallus without distinct prothallus; apothecia always with thalline margin

Pannaria

b Thallus with distinct, often tomentose, prothallus;

apothecia with or without thalline margin

Parmeliella

46a Thallus with small, sharply delimited, raised or immersed white or yellow, tomentum-free spots on lower side

47

b Thallus with larger, not sharply delimited, pale, tomentum-free areas on lower side

Lobaria

47a White spots on lower side, with prominent, raised margin (cyphellae)

Sticta

b Yellow spots on lower side, with margin hardly raised above the center (pseudocyphellae)

Pseudocyphellaria

61a Thallus of felty structure

62

b Thallus compact, usually with differentiated cortical layer

[63](#)

62a With bluegreen algae, without ascocarps (basidiolichen); thallus usually growing parallel to substrate

Dictyonema

b With *Trentepohlia* algae, apothecia sometimes present; thallus often growing at right angles to substrate

Coenogonium

63a Thallus scarcely dissected, lobes + hemispherical; basidiolichens without ascocarps

64

b Thallus strongly dissected, lobes usually much longer than wide; apothecia often present

[65](#)

64a Thallus concentrically ridged, with bluish color

Dictyonema

b Thallus smooth with raised margin, with dark greenish

Corella

65a Thallus bluegrey to black, gelatinous; algae *Nostoc* in chains; no cellular cortical layer

Collema

b Thallus bluegrey to black, gelatinous; algae *Nostoc* in chains; cortical layer one cell thick

66

c Thallus whitish grey to greenish grey, not gelatinous; algae green; cortex well developed, several cells thick

[67](#)

66a Spores septate; thallus often under 0.5 mm thick

Leptogium

- b** Spores simple; thallus over 0.5 mm thick
- Physma*
- 67a** Spores dark, biloculate and ovate; underside black, with cortex
- 68
- b** Spores colorless, pluriloculate and bacillar; underside white, without cortex
- Phyiscidia*
- 68a** Apothecia, at least when well developed, without thalline margin
- Pyxine*
- b** Apothecia with persistent thalline margin
- 69
- 69a** Apothecia with dark hypothecium; thallus lobes elongate and laterally confluent
- Dirinaria*
- b** Apothecia with pale hypothecium; thallus lobes not laterally confluent
- Hyperphyscia*
- 80a** (1, squamulose) Perithecia present; spores muriform; algae present in hymenium
- Endocarpon*
- b** Perithecia (rarely) present; spores transversely septate; no algae in hymenium
- Normandina*
- c** Apothecia present, or fruitbodies absent
- 81
- 81a** Squamules + rounded, whitish with raised margin, ca. 1 mm diam.; fruitbodies unknown (parasitic (?) perithecia sometimes present; spores transversely septate; no algae in hymenium)
- Normandina*
- b** Squamules usually elongated and greenish, without raised margin
- 82
- 82a** Squamules on a felty layer of hyphae (prothallus)
- 83
- b** Squamules directly on substrate, sometimes with prothallus penetrating into the substrate, but not forming a layer over the substrate
- [91](#)
- 83a** Algae bluegreen
- 84
- b** Algae green
- [85](#)
- 84a** Thallus without prothallus; apothecia always with thalline margin
- Pannaria*
- b** Thallus with distinct, often tomentose, prothallus; apothecia with or without thalline margin
- Parmeliella*

85a Hymenium IKI+ orange
[Opegraphaceae]
(probably undescribed genus, known so far from Neblina, Venezuela)
b Hymenium IKI+ blue
86

86a Upper surface of squamules byssoid, lacking cortex and woolly by free hyphae
Crocynia
b Upper surface of squamules more or less smooth, sometimes pruinose, cortex present
87

87a Squamules with an upper and lower cortex comprised of a thin layer of cubic cells
Eschatogonia
b Squamule cortex otherwise, lower cortex usually absent
88

88a Spores generally over 25 µm, transversely multiseptate
Squamacidia
b Spores generally under 25µm, 1-2-loculate
Phyllopsora

91a Algae bluegreen
Peltula
b Algae green
92

92a Squamules greenish above, whitish below, usually elongate (primary thallus squamules of *Cladonia* may key out here)
"Biatora"
b Squamules whitish grey on both sides, elongate and erect

Siphula
c Squamules whitish grey on both sides, usually roundish
93

93a Apothecia stalked and raised above the squamules, usually on branched pseudopodetia
Stereocaulon
b Apothecia sessile between the squamules
Toninia(s.l.)

100a (1, crustose) Foliicolous species, found on living leaves
101
b Corticolous, terrestrial or saxicolous species
[200](#)

101a (foliicolous) Thallus with dish-like, stalked isidia; ascocarps unknown *Porina*
(*Phyllophiale*)
b Thallus naked or with somewhat hair-like hypophores with flattened tips, producing conidia
102

- c** Thallus with c. 0.1-2 mm long, sterile bristles/hairs
[170](#)
- 102a** Apothecia present, rounded
103
b Lirellae present, elongate with black, distinctly carbonaceous labiae
Opegrapha
c Perithecia present
[150](#)
- d** Ascocarps absent, but conidangia present
[180](#)
e Black-rimmed goniocystangia resembling ascocarps, but producing goniocysts, present *Opegrapha* gr. *lambinoni*
- 103a** Ascocarps (seemingly) without excipular tissue, without visible margin
104
b Ascocarps with clearly differentiated margin
[110](#)
- 104a** Fruitbodies white, with asci scattered in loose, hyphal tissue; spores muriform
105
b Fruitbodies usually colored, compact, with asci in distinct, gelatinous hymenium
[106](#)
- 105a** Spores muriform
Cryptothecia
b Spores transversely septate only
Stirtonia
- 106a** Paraphyses straight; spores transversely septate; asci with I+ blue tholi; hymenium I+ blue
Bysssolecania
b Paraphyses branched and anastomosing; asci with I-negative tholi; hymenium I+ red or blue
107
c Paraphyses branched and anastomosing; asci with I-negative tholi; hymenium I-negative
[110](#)
- 107a** Spores transversely septate
108
b Spores muriform
Arthothelium
- 108a** Conidia filiform, over 50 μ m long, produced in elongate pycnidia with lateral pore
Eremothecella
b Conidia bacillar, under 20 μ m long, produced in rounded pycnidia with apical pore
Arthonia
- 110a** Apothecia immersed in the thallus, disc

- level with thallus surface, sometimes surrounded by a raised thalloid margin
- 111
b Apothecia adnate to sessile, often constricted at the base; disc above thallus surface
- [115](#)
- 111a** Thallus with cortical layer of quadratic, rectangular or rounded cells, one cell-layer thick
- 112
b Thallus without cortical layer or with a cartilaginous cortical layer
- [113](#)
- 112a** Spores transversely septate; epithelial algae absent
Asterothyrium
b Spores muriform; epithelial algae present
Gyalectidium
- 113a** Paraphyses simple; with splitting, erect or recurved, thalline margin
Chroodiscus
b Paraphyses branched and anastomosing; without thalline margin
- 114
- 114a** Spores bicellular; hyphophores stalked
Echinoplaca
b Spores at least 3-septate; hyphophores without stalk, consisting of a sessile, gelatinous ball
Actinoplaca
- 115a** Hymenium I+ blue, at least near the asci; asci I+ blue, usually in the tholus, at least along the outside
- 116
b Hymenium I+ reddish; asci I-negative
Mazosia
c Hymenium and asci I-negative or very pale blue
- [135](#)
- 116a** Spores simple
- 117
b Spores transversely septate only
- [118](#)
c Spores muriform
- [126](#)
- 117a** Thallus smooth, containing green algae; apothecia with pronounced margin "Lecidea" gr.
piperis
b Thallus granular, containing bluegreen algae; apothecia soon convex and immarginate "aff."
Leprocollema?
- 118a** Excipulum formed externally by loose, felty hyphae, which surround the apothecia as a thin circle
Byssoloma

b Excipulum compact, also externally
119

119a Asci with a I+ blue tubular structure in the tholus
120

b Asci without tubular structure, with or without a I+
blue axial mass

[121](#)

120a Apothecia usually over 0.5 mm wide, flat; I-positive
tubular structure in ascus apex distinctly stained over its
whole length; excipulum usually filled with crystals

Badimia

b Apothecia mostly under 0.5 mm side, soon convex; I-positive
tubular structure in ascus apex most distinctly stained
in its basal part; excipulum not filled with crystals

Fellhanera

121a Campylidia never present; asci with
conical or rounded, I+ pale blue axial mass

122

b Campylidia (usually) present; asci without I+ pale
blue axial mass

[123](#)

122a Asci with conical axial mass; excipulum
prosoplectenchymatic

Bacidia

b Asci with rounded axial mass; excipulum
paraplectenchymatic

Woessia (incl.

Bacidina)

123a Hypothecium purplish; apothecia
black, sometimes with white pruina

Tapellaria

b Hypothecium usually not purplish; apothecia variously colored

124

124a Ascospores 3-septate, fusiform

125

b Ascospores 7-septate, bacillar; campylidia as in
Calopadia

"Tapellariopsis"

c Ascospores multiseptate, over 10-septate, acicular;
no campylidia

Bapalmuia

125a Campylidia producing flask-shaped, c 20 µm long conidia

Barubia

b Campylidia producing ovoid, c. 10 µm long conidia

Loflammia

126a Margin of apothecium with long, stiff hairs

Lasioloma

b Margin of apothecium without such hairs

127

127a Epithecial algae present

Sporopodium

b Epithecial algae absent

128

128a Apothecia black, sometimes with white pruina, with flat disc; hypothecium purplish

Tapellaria

b Apothecia dark brown, with flat disc

Calopadia

c Apothecia red to carmine, with flat disc

Loflammia

d Apothecia yellowish, soon convex

Logilvia

135a Apothecia elongate to angular or round, not constricted at base, margin formed by a dark tissue which originally covers the disc

Aulaxina

b Apothecia round to slightly irregular, margin not formed by a dark tissue which originally covers the disc

136

136a Apothecia proliferating on their margins; mainly on leaf margins

Polystroma

b Apothecia not proliferating on their margins

137

137a Paraphyses simple, straight

138

b Paraphyses branched and anastomosing

[139](#)

138a Apothecia yellow; spores bicellular in cylindrical asci (NB: for species determination it is important to look for the pycnidia, which are often found on separate plants)

Dimerella

b Apothecia variously colored; spores variously septate in clavate asci

Gyalidea

139a Excipulum thinly spreading laterally over the thallus

Echinoplaca

b Excipulum not spreading, forming a prominent margin

140

140a Without bristle-like hyphophores

Gyalideopsis

b With bristle-like hyphophores

Actinoplaca

150a Thallus subcuticular, very glossy (incl. *Phylloporis*, *Raciborskiella*)

Strigula

b Thallus epicuticular, forming a usually dull sheet

- over the cuticula of the leaf
151
- 151a** Perithecia smooth
[154](#)
b Perithecia with warts, bristles or a disc-like expansion around the pore; spores transversely septate or muriform
152
- 152a** Perithecia whitish, with a disc-like extension around the pore or with more scattered scales
Aspidothelium
(included in
Thelenella)
- b** Perithecia reddish or black, with bristle-like extensions, usually in a whirl around the pore
153
- 153a** Asci bitunicate; spores 14-17 x 3-4 μm , 3-septate
Lyromma
b Asci thinwalled; spores usually over 18 μm long
Porina
- 154a** Spores pale grey-brown, transversely 3-septate
Microtheliopsis
b Spores colorless, transversely septate or muriform
155
- 155a** Spores two-celled
156
b Spores transversely pluriseptate
[157](#)
c Spores muriform
[158](#)
- 156a** Spores under 30 μm long
Anisomeridium
b Spores over 50 μm long
Musaespora
- 157a** Ascocarps solitary
Porina
b Ascocarps grouped in raised thallus parts
"Flavobathelium"
- 158a** Perithecia with outer wall containing dark-brown pulveraceous masses, often irregularly shaped
Phyllobathelium
b Perithecia with outer wall without such masses, regular
159
- 159a** Spores lumbricoid, with few longitudinal cells
Phylloblastia
b Spores oval, with numerous longitudinal cells
Thelenella
- 170(101)** (Sterile, hairy plants cannot be identified with certainty; they are arranged artificially under

- Tricharia melanothrix* Fée, with black hairs, and *T. leucothrix* Fée, with white hairs)
- a** Apothecia immersed, disc level with thallus surface, sometimes surrounded by a raised, rim-like thallus area
- 171
- b** Apothecia sessile, often constricted at the base
- [178](#)
- 171a** Hairs white. often over 1 mm long
- 172
- b** Hairs brown to black, short, under 0.2 mm
- [177](#)
- 172a** Perithecia present; hairs tiny, on the perithecia
- Porina*
- b** Apothecia present; hairs mostly on the thallus
- 173
- 173a** Hairs tiny, dense, forming tomentose areas on the thallus and thalloid apothecial margins
- Mazosia*
- b** Hairs larger, often over 1 mm long, bristle-like
- 174
- 174a** Thallus with cortical layer of quadratic, rectangular or rounded cells, one cell-layer thick
- 175
- b** Thallus without cortical layer or with a cartilaginous cortical layer
- [176](#)
- 175a** Spores transversely septate; epithelial algae absent
- Asterothyrium*
- b** Spores muriform; epithelial algae present
- Gyalectidium*
- 176a** Ascocarps surrounded by a raised thalloid rim
- Calenia*
- b** Ascocarps without raised thalloid rim, with a more or less distinct excipulum
- Echinoplaca*
- 177a** Ascocarps without black proper margin
- Caleniopsis*
- b** Ascocarps with black proper margin
- Aulaxina*
- 178a** Excipulum laterally spreading over the thallus, thus apothecia seemingly immarginate
- Echinoplaca*
- b** Excipulum not laterally spreading, apothecia distinctly marginate
- Tricharia*
- 180a** campylidia present: greyish or yellowish ear-like structures which are strongly raised on one side, and produce conidia: various species of *Badimia*, *Loflammia*,

- Sporopodium*, not identifiable without apothecia;
artificially arranged in the genus *Pyrenotrichum*
- 181
b hygrophores or other brush-like conidiogenous structures
- 186
c immersed or slightly exserted conidangia, black or
concolorous with thallus
- 188
- 181a** Campylidia producing ovoid, pyriform, simple or
uniseptate conidia
- 182
b Campylidia producing flask-shaped, non-septate
conidia
- Barubia*
c Campylidia producing filiform, septate, sometimes
branched conidia
- 184
182a Campylidia producing uniseptate conidia with unequal
cells; usually found with ascomata
- Byssoloma*
b Campylidia producing simple conidia
- 183
- 183a** Campylidia short, on top of a thalloid cylinder;
algae between the conidiophores
- Sporopodium*
b Campylidia not on thalloid cylinder; no algae between
the conidiophores (*Loflammia* and *Logilvia* have similar
campylidia, but are unlikely to be found without ascomata)
- Musaespora*
- 184a** Campylidia with branched, somewhat star-shaped conidia
- Lasioloma*
b Campylidia with unbranched conidia
- 185
- 185a** Campylidia with cylindrical, to c. 40 µm long
conidia without appendages
- Arthonia*
b Campylidia with cylindrical, c. 100 µm long
conidia with appendages
- Badimia*
c Campylidia with tapering, c. 50 µm long conidia without
appendages (genera to be separated by ascoma characters)
- Calopadia/Tapellaria*
- 186a** True hyphophores present, producing conidia
in a free-hanging gelatinous ball
- Echinoplaca*
b Conidia not produced in a free-hanging gelatinous
ball, but in a conidangium inside the brush-like structure
- 187
- 187a** Conidangia brown to black, star-like branched; on leaf

- upper surface
Lyromma
b Conidangia pale brown, simple; on leaf margin
Woessia
- 188a** Conidangia black
189
b Conidangia pale, inconspicuous
Dimerella
- 189a** Conidia simple
Anisomeridium
b Conidia septate
190
- 190a** Conidangia separate
Strigula
b Conidangia in groups of c. 10-30 in elevated
thallus areas
Phyllobathelium
- 200a** (100, crustose, non-foliicolous lichens) Ascocarps present
201
b Ascocarps and conidangia absent; usually sterile crustose
lichens; only a selection of common and characteristic
species treated
- [401](#)
c Ascocarps absent, conidangia present
- [450](#)
- 201a** Ascocarps rounded, with open disc (apothecia),
immersed, sessile or stalked
202
b Ascocarps closed, with porus (perithecia), immersed or
sessile
300
c Ascocarps elongate, with open or slit-like disc
(lirellae), immersed or sessile
- [350](#)
- 202a** Apothecia covered by powdery, staining masses of spores
ripening in a layer above the asci (mazaedia); apothecia
sessile or sometimes on long, thin stalks (Caliciales)
203
b Apothecia not covered by spore masses, not staining,
releasing spores from each ascus separately, immersed or sessile,
rarely stalked
- [210](#)
- 203a** Apothecia pin-shaped, with up to 2 mm long, thin
stalk; spores simple, pale brown
204
b Apothecia sessile
- [205](#)
- 204a** Apothecia black; spores two-celled, dark brown
Calicium

b Apothecia brownish; spores simple, pale brown

Chaenotheca

205a Apothecia without thalline margin

206

b Apothecia with thalline margin

[207](#)

206a Spores two-celled

Pyrgidium

b Spores four-celled

Pyrgillus

207a Spores two-celled

Tylophoron

b Spores four-celled

Schistophoron

210a Hymenium I+ blue, at least near asci; asci I+ blue, at least along their outside, and usually also in their tips; paraphyses usually straight and unbranched, except near the tips, rarely branched and anastomosing; spores simple or variously septate, with rather equal cells (Lecanorales)

211

b Hymenium I+ red or blue; asci I-negative, except sometimes for a small, I+ blue ring around the ocular chamber; paraphyses densely branched and anastomosing; spores variously-septate but not simple, often with a single, much larger cell terminally or (sub)medially (Opegraphales, Arthoniales)

[260](#)

c Hymenium I-negative, rarely pale blue; asci I-negative or very pale blue throughout; paraphyses straight and unbranched, except sometimes near the tips, rarely branched and anastomosing; spores variously septate but not simple, with rather equal cells (terminal spore parts may still lack septation in young spores) (Gyalectales, Graphidales)

[280](#)

211a Spores grey to brown, at least when old, usually bicellular

212

b Spores persistently hyaline, various

[214](#)

212a Spore septa thin, lumina cubical; pycnidia bacillar, up to 5.5 μm long

Buellia

b Idem; pycnoconidia filiform, curved, up to 30 μm long

[*Amandinea*]

c Spore septa thickened, lumina rounded or more complicated

213

213a Apothecial margin without algae, concolorous with the disc; spores with thin-walled, rather pointed poles

Hafellia

b Apothecial margin with algae, usually concolorous with thallus; spores usually with thickened polar walls, not pointed

Rinodina

214a Spores simple

215

b Spores transversely septate only

[230](#)

c Spores muriform

[250](#)

215a Apothecial margin lecanorine, of same color as thallus, with algal layer

216

b Apothecial margin lecideine or biatorine, of same color as disc, without algal layer, or apothecia without distinct margin

[220](#)

216a Spores under 20 μm long

217

b Spores over 30 μm long

[218](#)

217a Spores 8/ascus

Lecanora

b Spores many/ascus

Maronia

218a Disc often punctiform, ascocarps often in compound groups immersed in warts; spores thick-walled and generally over 50 μm long

Pertusaria

b Disc open, apothecia separate; spores under 50 μm long

Ochrolechia

220a Apothecial disc bright red, K+ purplish

Pyrrhospora

b Apothecial disc not bright red, usually brown or black, K-

221

221a Spores more than 16 per ascus, small and globose

Piccolia

b Spores fewer than 16 per ascus, never globose

222

222a Paraphyses anastomosing; exciple absent or indistinct; apothecia soon convex and globular

[*Micarea*]

b Paraphyses not anastomosing; exciple present, usually obvious in young apothecia at least; apothecia often flat

223

223a Algae bluegreen; thallus slightly gelatinous; on periodically inundated rock

"*Psorotichia*"

b Algae green; thallus not gelatinous; substrate various
224

224a Asci with strongly I+ blue tholus, in which a paler
axial mass may be present

225

b Asci with weakly I+ blue tholus, in which an
I+ blue central tube may be present "Lecidea" gr.
piperis

225a Apothecia dark brown to black; thallus whitish or greenish,
often K+ yellow or C+ orange; mostly on tree bark
[*Lecidella*]

b Apothecia pink or brownish to blackish discolored; thallus
gray, granular, K-, C+ red; on burnt or decaying worked wood

Trapeliopsis

c Apothecia variously colored; thallus reactions
different; mostly on tree bark

Biatora

s.l.

230a Apothecia with distinct margin of
same color as thallus, with algae

231

b Apothecia with margin of different color as thallus,
usually of same color as disc, or without distinct margin

[234](#)

231a Apothecia sessile with constricted base, with entire
or crenulate margin; disc red, K+ purplish

232

b Apothecia immersed, with lacerate, erect margin; disc
grey to pale brown, often white-pruinose

Phlyctella

232a Spore septa thickened, about as thick as lumina;
spores ovoid to fusiform, less than 5 times as long as wide

233

b Spore septa thin; spores bacillar, over five times as
long as wide

Haematomma

233a Spores two- to four-celled

Caloplaca

b Spores more than four-celled

Letrouitia

234a Apothecia without distinct margin, very soon globose
[*Micarea*]

b Apothecia with a distinct margin, at least when young

235

235a Spores 2-loculate

236

b Spores 3- or more-loculate

[240](#)

- 236a** Spores 2/ascus, over 40 µm long
Lopezaria
b Spores 8/ascus, under 30 µm long
237
- 237a** Asci with ocular chamber surrounded by I+ weakly staining, rounded axial mass (*Lecanora*-type); spores halonate; exciple with well-defined cortical and medullary parts, but lacking algae
"*Megalaria*"
b Asci without rounded, I+ weakly staining axial mass around ocular chamber; spores not halonate; exciple compact
238
- 238a** Ascus tholus containing a conical, I+ weakly staining axial mass around ocular chamber *Biatora*
s.l.
b Ascus tholus containing a tubular, I+ strongly staining structure; apothecia yellowish "*Catillaria*"
s.l.
- 240a** Spores extremely large, broad ellipsoid, 70-140 x 25-35 µm, 1/ascus
Megalospora
b Spores smaller or long fusiform or filiform, usually 8/ascus
241
- 241a** Apothecia with weak, soon inapparent margin; apothecia soon convex to globose; paraphyses branched
[*Micarea*]
b Apothecia with prominent, rather persistent margin; disc more or less flat; paraphyses unbranched for most of their length, rarely (in *Fellhanera*) branched
242
- 242a** Ascus tholus containing a more or less conical, I+ weakly staining axial mass around ocular chamber
243
b Ascus tholus containing a tubular, I+ strongly staining structure
245
- 243a** Spores acicular, generally more than 5 times as long as wide
244
b Spores fusiform, less than 5 times as long as wide *Biatora*
s.l.
- 244a** Excipulum paraplectenchymatic; asci with rounded axial mass *Woessia*
(*Bacidina*)
b Excipulum prosoplectenchymatic; asci with conical axial mass
Bacidia
- 245a** Excipulum with byssoid outer layer

Byssoloma

- b** Excipulum smooth outside

246

- 246a** Apothecia usually over 0.5 mm wide, flat; I-positive tubular structure in ascus apex distinctly stained over its whole length

Badimia

- b** Apothecia mostly under 0.5 mm side, soon convex; I-positive tubular structure in ascus apex most distinctly stained in its basal part

Fellhanera

- 250a** Apothecia yellow, K+ dark purple

251

- b** Apothecia not yellow, K-

[252](#)

- 251a** Thallus white

Brigantiaea

- b** Thallus green suffused more or less with yellow

Letrouitia

- 252a** Ascus tholus containing a tubular I+ strongly staining structure; no campylidia present; paraphyses little branched

Lopacidia

- b** Ascus tholus without tubular, I+ structure, often with wide ocular chamber; usually campylidia present; paraphyses strongly branched

253

- 253a** Campylidia consisting of a thalloid tube and a short, brownish "ear"; excipulum paraplectenchymatic

Sporopodium

- b** Campylidia consisting of a large, greyish "ear" sitting directly on the thallus; excipulum paraplectenchymatic

Calopadia

- 260a** Ascocarps compound, with several, often punctiform discs in raised areas concolorous with the thallus or differently colored (stromatoid); spores transversely septate only

261

- b** Ascocarps simple, with single disc, at age sometimes deformed (not stromatoid); spores transversely septate or muriform

[270](#)

- 261a** Thallus felty, greenish

Dichosporidium

- b** Thallus with compact upper layer

262

- 262a** Discs arranged in lines, often loosely accumulated

263

- b** Discs not arranged in lines, densely accumulated in roundish groups

[264](#)

263a Discs in whitish fields differing from the thallus; thallus greenish to yellowish; spores 4-celled, c. 15-20 x 5 µm "Leucodecton"

seriale

b Discs in fields not differing from the thallus: thallus whitish, dull; spores variously septate

Enterographa

264a Ascocarp discs wider, pruinose, in rounded groups [Syncesia]

b Ascocarp discs punctiform, blackish

265

265a Spores bacillar, 3-8-septate, widest above the middle and gradually tapering towards both ends; no red pigment in medulla

Chiodecton

b Spores biclavate, 4-7-septate, with a larger and a smaller swollen part; often with spotted red pigment in medulla

Erythrodecton

270a Ascocarps without margin, adnate over their whole width; asci broad-clavoid to globose, with thick apical dome with large ocular chamber (*Arthonia*-type); spores variously septate, often macrocephalic (with one terminal cell much larger than the others)

271

b Ascocarps with distinct, thalloid or lecideine margin; asci elongate, with thin apical dome with small ocular chamber, often surrounded by small I+ blue ring (*Opegraphaceae*-type); spores transversely septate only, never macrocephalic (terminal cells not larger than the others)

[274](#)

271a Hymenium gelatinous, not byssoid; ascocarps clearly distinct
272

b Hymenium byssoid, not gelatinous; ascocarps sometimes scarcely distinct from thallus

[273](#)

272a Spores transversely septate only (when discs punctiform and more or less grouped, see *Enterographa*)

Arthonia

b Spores muriform

Arthothelium

273a Spores transversely septate only

Stirtonia

b Spores muriform

Cryptothecia

274a Apothecial margin carbonized throughout, black
275

b Apothecial margin not carbonized externally, whitish

or thalloid

[276](#)

275a Ascospores acicular, 3-45-septate; disc permanently black

[*Bactrospora*]

b Ascospores fusiform, 3-19-septate; disc often yellow-pruinose

Cresponea

276a Apothecia with thalloid margins covering a dark excipulum, not constricted at base

Mazosia

b Apothecial margin not thalloid, without algae; often constricted at base

277

277a Ascospores 3-septate; apothecia appressed and large, often over 2 mm diam.

Sagenidiopsis

b Ascospores 5-7-septate; apothecia sessile with constricted base, not over 1.5 mm wide

Lecanactis

280a Spore lumina rounded at maturity by abundant endospore
281

b Spore lumina cubical, at most with lightly rounded edges, without or with scarce endospore

[290](#)

281a Hymenium separated from the surrounding apothecium margin by a split; in dry state seemingly with a double margin

Thelotrema

b Hymenium not separated from the margin

282

282a Margin not carbonized, apothecia immersed in the thallus
283

b Margin at least partly carbonized and black; apothecia more or less exserted

[284](#)

283a Apothecial margin round; discs tiny, rarely over 0.5 mm wide

Myriotrema

b Apothecial margin lacerate, forming slips which cover the disc in part; discs often several mm wide "*Thelotrema*"

pr.p.

284a Apothecia with raised thalline margin, discs visible through thallus splits, pale, often white-pruinose

Ocellularia

b Apothecia exserted above thallus, without thalloid margin; discs brownish

285

285a Apothecia compound, with several, often elongated discs

level with the margin; spores hyaline, transversely septate
Glyphis

b Apothecia simple; margin raised above the disc; spores grey, muriform

Gyrostomum

c Apothecia simple; margin not exerting the disc, sometimes with thalline fragments; spores grey, bacillar

Phaeographis

pr.p.

290a Paraphyses branched and anastomosing throughout

Gyalideopsis

b Paraphyses unbranched, except sometimes near the tips

291

291a Terrestrial; spores grey, muriform

Diploschistes

b Epiphytic, rarely on rock; spores various

292

292a Apothecia immersed or level with thallus, often over 1 mm large; margin lacerate or not

293

b Apothecia sessile with constricted base, mostly under 1 mm large; margin entire or crenate

[294](#)

293a Margin lacerate

"*Thelotrema*"

(perhaps better included in

Chroodiscus)

b Margin entire or inapparent

Cyclographina

294a Apothecia proliferating from their margins and thus forming coralloid-branched structures, greenish; on twigs or leaf margins; spores 6-8-celled; hymenium usually absent

Polystroma

b Apothecia not proliferating, pale yellow to orange; on various substrates; spores bicellular

Dimerella

c Apothecia not proliferating, with carbonized excipulum more or less covered by pale pruina or thallus; on mosses or decaying bark or wood; spores muriform

Ramonia

300a (201) Spores simple

301

b Spores septate

[302](#)

301a Spores thickwalled, spherical; paraphyses persistent

Monoblastia

b Spores thinwalled, elongate; paraphyses disappearing in an early stage

[*Verrucaria*]

302a Spores (finally) brown

303

b Spores persistently colorless

[314](#)

303a Spore septa thin

304

b Spore septa seemingly thick, due to thickened endospore

[305](#)

304a Spores with 1-3 transverse septa; ascomata simple
Mycomicrothelia

b Spores muriform; ascomata multilocular by lateral fusion of separate ostioles

Mycoporum

305a Spores muriform

Anthracotheceium

b Spores transversely septate only, with 3 or more septa

306

d Spores uniseptate

307

306a Spores three- or more-septate, under 50 μm long when three-septate

Pyrenula

b Spores three-septate, over 70 μm long

Architrypethelium

307a Spores without pigment granules in endospore

Distopyrenis

b Spores with pigment granules in endospore

[*Granulopyrenis*]

314a Spores septa seemingly thick, due to thick endospore layer, causing rounded lumina; ascomata often compound, in extensive pseudostromata

315

b Spore septa thin; ascomata usually simple

[323](#)

315a Spores muriform

316

b Spores transversely septate only

[319](#)

316a Ostiole apical

317

b Ostiole lateral, free or fused

[318](#)

317a Ascomata in brown, usually shiny pseudostromata containing yellow or orange pigments, K- or K+ red; pseudostroma wall composed of brown, jigsaw puzzle-like hyphae

Bathelium

b Ascomata not in brown pseudostromata, or wall not

composed of brown, jigsaw puzzle-like hyphae
Laurera

318a Ostioles free

[*Campylothelium*]

b Ostioles fused to other ostioles to form compound
ascomata

Cryptothelium

319a Thallus poorly developed, indicated by a
whitish patch on bark; ascomata naked at maturity,
never aggregated in pseudostromata

Pseudopyrenula

b Thallus well developed; ascomata immersed in thallus
or in pseudostromata

320

320a Ostioles free, apical

321

b Ostioles fused to form a compound ascoma

Astrothelium

321a Paraphyses branched and anastomosing; ascus apex with narrow
ring surrounding a small ocular chamber; wall thickening
of spores most pronounced in the edges of the septae

Trypethelium

b Paraphyses unbranched; ascus apex with a wide apical
ring and wide ocular chamber; wall thickening of the
spore more equal (incl. *Plagiotrema lageniferum*)

Lithothelium

323a Ascus tip thin and uniform, truncate;
ascomal wall often bright colored (*Trichotheliaceae*);
paraphyses unbranched

324

b Ascus tip more or less thickened with an apical
indentation, rounded; paraphyses often branched

[327](#)

324a Ascomata with a subapical whorl of stiff black hairs

Trichothelium

b Ascomata without hairs

325

325a Spores transversely septate; asci with chitinoid
apical ring (incl. *Trichothelium* sensu Harris 1995 pr.p.,
Pseudosagedia)

Porina

b Spores muriform; asci without chitinoid apical ring,
with slight subapical constriction

326

326a Medulla white or pale yellowish

Clathroporina

b Medulla yellow to orange or brownish

Myeloconis

327a Paraphyses mostly unbranched; macroconidia usually present, cylindrical, septate

Strigula

b Paraphyses branched, especially above level of asci; macroconidia more or less globose or lacking

328

328a Ascomata multilocular, chambers laterally fused with separate ostioles

329

b Ascomata simple

[330](#)

329a Spores with 1-3 transverse septa only

[*Tomasellia*]

b Spores muriform

Mycoporum

330a Spores muriform

331

b Spores transversely septate

[335](#)

331a Asci with indistinct apical thickening; spores usually 8/ascus; (following Harris 1995 with inclusion of *Aspidothelium*, with an apical disc-like expansion or subapical scales on the perithecia)

Thelelenella

b Asci with pronounced apical thickening with strong ocular chamber (*Arthopyrenia*-like), spores 2/ascus in neotropical species

Julella

335a Spores fusiform, 3-11-septate, over 4 μm wide; asci and paraphyses as in *Trypethelium*

Polymeridium

b Spores filiform, 5->10-septate, 1.5-2 μm wide

Celothelium

c Spores ovoid-fusiform, 1-septate, rarely 3-septate in old age

336

336a Lower spore cell usually the shorter; lichenized; microconidia globose to ellipsoid; macroconidia often present, simple, globose to ellipsoidal; ostiole often lateral

Anisomeridium

b Lower spore cell usually the longer; mostly non-lichenized; microconidia rod-shaped; macroconidia lacking; ostiole always apical

337

337a Paraphyses slender, without refractive bodies near the septa; asci clavate

Arthopyrenia

b Paraphyses short-celled, with refractive bodies near

the septa; asci obpyriform
Naetrocymbe

350a (201) Paraphyses branched and anastomosing; hymenium
I+ red or blue; spore lumina not rounded, at most with
slightly rounded edges; asci with rather thin apical dome with
small ocular chamber often surrounded by a small I+ blue ring

351

b Paraphyses unbranched except sometimes near the tip;
hymenium I-, rarely pale blue; spore lumina often rounded, more
or less lentiform; asci usually with distinct apical dome,
completely I-negative

[355](#)

351a Ascocarp walls (labiae) conspicuous and carbonized, at
least internally

353

b Ascocarp walls indistinct, not carbonized

[354](#)

353a Spores with transverse septa only;
excipulum externally carbonized;

Opegrapha

b Spores muriform; excipulum with outer thalline
cover; ascocarps often short lirelliform to rounded

Helminthocarpon

354a Spores muriform

Arthothelium

b Spores transversely septate only

Arthonia

355a Ascocarps in stellate or rounded clusters

356

b Ascocarps single

[360](#)

356a Spores muriform, colorless

Medusulina

b Spores transversely septate only

357

357a Spores colorless; merocarps with rounded ends

Glyphis

b Spores grey to brown; merocarps with pointed ends

Sarcographa

360a Spores biloculate, with cubical lumina

Melaspilea

b Spores pluriloculate, mostly with lenticular lumina
(when mature)

361

361a Spores transversely septate only, with lenticular
lumina (when mature)

362

- b** Spores muriform
- [363](#)
- 362a** Spores colorless
- Graphis*
 - b** Spores brown
- Phaeographis*
- 363a** Spores colorless, with or without lenticular lumina (when mature)
- 364
 - b** Spores grey to brown, with lenticular lumina (when mature)
- Phaeographina*
- 364a** Paraphyses unbranched, also at the tips; spore lumina lenticular when mature
- Graphina*
 - b** Paraphyses branched and anastomosing in the epithecium only, parallel below; spore lumina persistently cubical
- Cyclographina*
- 401a** (200, sterile, crustose) Thallus leprose, consisting only of soredia
- 402
 - b** Thallus byssoid, of woolly appearance while without cortex and entirely composed of very loose hyphae
- [403](#)
 - c** Thallus not leprose or byssoid. Here many usually sorediate or isidiate species would key out, belonging to various groups like *Pertusaria*, *Thelotremataceae*, *Porina*. Only a selection is included here
- [406](#)
- 402a** Thallus bright yellow, fine-grained
- Chrysothrix*
 - b** Thallus shades of grey
- Lepraria*
- 403a** Thallus zoned, i.e. with a differentiated marginal zone, of a paler color and gradually thinning out
- 404
 - b** Thallus not zoned, usually with an abrupt border, often lobed
- Crocynia*
- 404a** Thallus margin whitish; thallus greenish, with felty isidia
- Dichosporidium*
 - b** Thallus margin blackish; thallus pinkish, without isidia
- Sagenidiopsis*
 - c** Thallus margin whitish; thallus bluegreen, without isidia
- Dictyonema*

- 406a Medulla with conspicuous color, yellow, orange or reddish
407
b Medulla white
[415](#)
- 407a Medulla completely or partly red or pink; sorediate or
isidiate
408
b Medulla orange or yellow; sorediate
[409](#)
- 408a Medulla with scattered red spots; thallus surrounded
by black prothallus and with soralia
Erythrodictyon
b Medulla pink throughout; with glossy, short,
clavate isidia; with hypoprotocetraric acid *Ocellularia*
rhodostroma
- 409a Thallus greenish, glossy, with scattered
soralia-like, yellow spots
Myeloconis
b Thallus grey, dull, with raised, often dense,
yellow soralia *Megalospora*
"chlorites"
- 415a With soralia
416
b With schizidia; forest undergrowth species
[420](#)
c With isidia
[425](#)
- 416a Thallus C+ red; on well-lit sites *Pertusaria*
velata
b Thallus C-; on tree trunks in forest
417
- 417a Soredia fine; with stictic acid (P+ orange, K+ orange)

"Thallotrema"
b Soredia coarse, in part corticate; with
hypoprotocetraric acid (P-, K-) *Myriotrema*
neofrondosum
- 420a Schizidia accumulated in groups, which may look
soralium-like and may be raised or shortly stalked;
with hypoprotocetraric acid (P-, K-) *Myriotrema*
neofrondosum
b Schizidia arising single, leaving scattered scars on
the thallus
421
- 421a Thallus bluegrey-pruinose; with unknown substance *Myriotrema*
sp.
b Thallus greenish, not pruinose; with various substances
422

- 422a** Schizidia small, less than 0.2 mm wide; with
 protocetraric acid (P+ red) *Myriotrema*
parvidiscum
 b Schizidia 0.5-0.6 mm wide
 423
- 423a** With psoromic acid (P+ yellow, K-) *Ocellularia*
berkeleyana
 b With stictic acid (P+ orange, K+ orange) *Myriotrema*
 sp.?
 c With cinchonarum unknowns (P+ red) *Myriotrema*
 sp.?
- 425a** Forest undergrowth species with large, greenish,
 glossy thalli
 426
 b Various habitats, thallus different not
 treated
- 426a** Isidia cylindrical; with psoromic acid (P+ yellow) *Myriotrema*
hartii
 b Isidia flagellate, gradually tapering from the base
 to the tip, with basal constriction and easily
 falling off; no lichen substances (P-) *Thelotrema*
brasiliensis
- 450a** (200) Conidangia campylidia, with "ear"-shaped,
 grey or brownish, geotropically directed extension
 (see also couplet 181 f.f.) "*Pyrenotrichum*",
 451
 b Conidangia hyphophores, brush-like with widened tip
 carrying a gelatinous "drop"; usually immixed with
 longer, sterile hairs
Echinoplaca
 c Conidangia immersed not
 treated
- 451a** Campylidia producing simple, pyriform or short-
 bacillar conidia
 452
 b Campylidia producing septate, filiform conidia
[453](#)
- 452a** "Ear"-shaped part short, on top of a short, thalloid
 cylinder
Sporopodium
 b "Ear"-shaped part large, directly on thallus
Musaespora
- 453a** Campylidia grey, producing conidia without appendages
Calopadia
 b Campylidia brown, producing conidia with appendages
Badimia

by Harrie Sipman, for the Biological Diversity of the Guiana Shield Program, 1997