

KEY TO THE GENERA OF AUSTRALIAN MACROLICHENS

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SYNOPSIS

- 1 Thallus fruticose, simple or sparingly to richly divided, with cylindrical, strap-like or broadly flattened lobes or branches, erect, decumbent or pendulous; *or* with a crustose or scaly basal thallus producing fruiting structures on stalks (podetia or pseudopodetia); *or* thallus filamentous and forming small tufts or felt-like mats **KEY A**
- 1: Thallus of ±horizontally spreading scales (squamulose), lobes or leaflets (foliose) 2
- 2 Thallus foliose **KEY B**
- 2: Thallus squamulose **KEY C**

KEY A: FRUTICOSE GENERA

- 1 Fruiting body a small toadstool or club-shaped basidioma 2
- 1: Fruiting body an apothecium, or thallus sterile 4
- 2 *Basidioma club-shaped*, slender, to 2 cm tall, to 2.5 mm wide, simple or sparingly branched, terete in section or somewhat flattened, uniformly whitish or pale orange. Vegetative thallus a thin greenish filmy crust of hyphae and associated algae. Spores simple, colourless, 5–8.5 × 2–3.5 µm. [N.S.W. and Tas.; on damp rotting wood and wet gritty soils; 2 spp.] **Multiclavula** R.H.Petersen
Literature: Petersen & Kantvilas (1986); Kantvilas & Jarman (1999)
- 2: *Basidioma a small toadstool* 3
- 3 *Odour powerful, resembling rotten cabbage or stale urine*. Vegetative thallus a thin film of hyphae and associated algae, to 30 cm wide. Basidioma gregarious, with a pale buff-brown cap to 10 mm diam. and a short excentric stalk, not containing algae. [Tas.; on rotting wood] **Marasmiellus affixus** (Berk.) Singer
Literature: Kantvilas & May (1995)
- 3: *Odour nondescript*. Vegetative thallus a green granular crust. Basidioma scattered to gregarious, with a pale brown cap 5–20 (–35) mm diam. and a stalk 10–20 (–30) mm tall, not containing algae. [Southern Australia; on soil and detritus in forest and heathland; 2 spp.] **Omphalina** Quéél.
Literature: Galloway (1985); Kantvilas & Jarman (1999)

- 4 *Thallus uniformly yellow to orange, K+ red-purple*, shrubby, to 2 (–4) cm tall. Branches flattened to ±terete, to 1.5 (–2.5) mm wide, sparingly to richly divided, often ciliate or with fibrils; soralia present or absent; isidia absent. Apothecia 1–4 (–6) mm diam., with a thalline margin; disc concave to convex. Spores polarilocular, ellipsoidal, 12–19 × 7–12 µm. [W.A., S.A., Qld, N.S.W., A.C.T., Vic. and Tas.; mainly on bark and rock; 8 spp.] **Teloschistes** Norman
Literature: Filson (1969); Filson & Rogers (1979)
- 4: *Thallus not yellow or orange, not K+ red-purple; spores not polarilocular* 5
- 5 Lichen comprising a basal horizontal primary thallus that is leprose-sorediate, crustose, granulose, squamulose or foliose *and* a simple to richly branched erect or decumbent secondary thallus (podetia or pseudopodetia) 6
- 5: Lichen erect, decumbent or pendulous, or filamentous and forming low tufts or felt-like mats, lacking a basal crust, granules or squamules 17
- 6 Podetia hollow 7
- 6: Pseudopodetia ±solid 9
- 7 *Primary thallus emerald green (occasionally yellowish or brownish green), granular-crustose*. Podetia to 25 mm tall, 1–4 mm wide, simple to sparingly forked, ±concolorous with the primary thallus. Apothecia 1–5 mm diam., reddish brown to dark brown, often becoming clustered, convoluted, finally glossy black. Spores simple, spindle-shaped to drop-shaped, 8–14 × 2.5–4.5 µm. [SE Qld, Vic. and Tas.; on bark, wood and soil] **Metus conglomeratus** (F. Wilson) D.J.Galloway & P.James
Literature: Kantvilas (1992b); Kantvilas & Jarman (1999)
- 7: *Primary thallus off-white, pale grey, grey-green or yellowish green* 8
- 8 *Primary thallus granular-crustose to subsquamulose, greyish white to dull grey*. Granules convex, to 0.5 mm wide, discrete or coalescing. Podetia to 20 mm tall, 1–4 mm wide, terete, simple to sparingly forked below, richly branched and often fissured above, concolorous with the thallus or dark brown, covered with granules or partly decorticate. Apothecia 0.5–1.5 mm diam., convex, glossy black, immarginate, often forming clusters to 4 mm wide. Spores simple, ellipsoidal, 10.5–12 × 2.5–4.5 µm. [Tas.; on montane soil] **Pycnothelia caliginosa** D.J.Galloway & P.James
Literature: Kantvilas (1992c)
- 8: *Primary thallus squamulose to ±foliose, pale grey, grey-green, yellow-grey or yellowish green, sometimes brownish when old*; lower surface whitish, tomentose. Podetia erect, (2–) 10–50 (–100) mm tall, simple to sparingly or richly branched and forming dense tangled cushions, corticate or partly decorticate, smooth, granular, sorediate and/or squamulose, sometimes furrowed or split, with branch axils perforate or not; podetial apices sometimes flaring as narrow or broad neat or ragged cups, the cup margin or base occasionally producing tiered podetia. Apothecia conspicuous as bright red to dark brown convex clusters or minute dots on the rims of cups or branch apices. Spores simple, ellipsoidal, 10–16 × 3–5 µm. [Throughout Australia, but especially diverse in the SE; mainly on soil, peat and wood in open situations; 74 spp.] **Cladonia** Hill ex P.Browne
Literature: Archer (1992a, b); Elix & Kantvilas (1995); Hammer (2002)
- 9 *Thallus with cephalodia (containing cyanobacteria), these usually sessile or short-stalked, wrinkled, folded or convoluted, pale grey, purple-grey, reddish brown to dark brown or blackish*. Pseudopodetia with numerous wart-like discoid squamulose or finger-like outgrowths (phyllocladia), whitish to pale grey, shrubby, erect, often richly branched, (0.5–) 1–10 (–20) cm tall; primary thallus of granules, areolae or squamules, sometimes not apparent; phyllocladia sometimes dorsiventral; pseudopodetia with a cartilaginous axis. Apothecia terminal, pale to dark red-brown or blackish, becoming convex; thalline margin absent; proper margin raised or becoming excluded. Spores 1–13-septate, ellipsoidal, fusiform or vermiform. [W.A., Qld, A.C.T. and south-eastern States; especially on montane siliceous rock and peat; 12 spp.] **Stereocaulon** Hoffm.
Literature: Dodge (1929); Galloway *et al.* (1976); Lamb (1977); Galloway (1980); Purvis *et al.* (1992); Kantvilas & Jarman (1999)

- 9: *Pseudopodetia lacking cephalodia and phyllocladia*; thallus usually on soil or bark or overgrowing bryophytes..... 10
- 10 *Apothecia glossy black*. Primary thallus squamulose; squamules sublinear, irregularly to pinnately lobed, sometimes densely overlapping, to 2 mm long and *c.* 0.5 mm wide, pale greenish brown, olive-green or brown above, cream or yellowish brown below; lobules frequent on upper surface or margins. Pseudopodetia to 3 mm long, slender, coralloid, cylindrical and isidia-like or markedly flattened. Apothecia terminal or subterminal on pseudopodetia, to 2 mm diam., convex to hemispherical; margin thin, becoming excluded. Spores simple, ellipsoidal to oblong-ovoid, 5–13 × 4–7 µm [SE Australia; on rotting logs and tree-bases, rarely on rock and clay; 2 spp.]..... **Neophyllis** F. Wilson
Literature: Filson (1992c)
- 10: *Apothecia not black* 11
- 11 Mature pseudopodetia short and inconspicuous beneath broader apothecia, or longer and terete to slightly and irregularly flattened 12
- 11: Mature pseudopodetia flaring from the base to broadly flattened, simple to richly branched..... 15
- 12 *Primary thallus leprose-sorediate*, ecorticate, ±persistent, greyish white, pale greenish grey or yellow-grey. Pseudopodetia erect, decumbent or ±prostrate, slender, simple or branched, often entwined, 1–15 mm tall/long, to 0.4 mm thick, whitish, cartilaginous; surface smooth to tomentose or with leprose-sorediate granules. Apothecia absent. [All States and Territories; rare on shaded siliceous rocks; 3 spp.]..... **Leprocaulon** Nyl.
Literature: Lamb & Ward (1974); Filson & Rogers (1979); Lumbsch (1988)
- 12: *Primary thallus not leprose-sorediate* 13
- 13 *Apothecial disc brownish pink to red-brown or dark brown*; margins of immature apothecia distinctly paler; ascus apex non-amyloid. Primary thallus crustose to small-squamulose, chalky white to pale grey, grey-green or bright green. Apothecia ±sessile to short- or long-stalked, solitary (mostly 0.2–2 mm diam.) or in clusters to 5 mm wide; stalk terete to irregularly laterally compressed, simple to branched, usually 3–7 (–10) mm long, semi-translucent when wet; disc plane to strongly convex and undulate-distorted. Spores simple, ±ellipsoidal, 7–13.5 × 2.5–4.5 µm. [SE Australia; on damp soil and rock]..... **Baomyces heteromorphus** Nyl. ex C. Bab. & Mitt.
Literature: Johnston (2001a)
- 13: *Apothecial disc whitish, pale to deep pink, pink-orange or flesh-coloured*; ascus apex with a thin amyloid cap..... 14
- 14 *Pseudopodetia scattered, resembling small mushrooms*. Primary thallus crustose to minutely squamulose or verruculose, thin to rather thick, continuous to areolate, off-white, grey, greenish to yellowish green; soralia, when present, often coalescing into large patches. Apothecia sessile to stalked, solitary to clustered; stalk to 14 mm tall, simple or, rarely, sparingly branched; disc concave to convex or domed, off-white, pale to deep pink, pink-orange or flesh-coloured, often white-pruinose; margin lacking or distinct. Spores 0 (–1)-septate, ±ellipsoidal to fusiform, 9–27 × 2–8 µm. [E and SE Australia; on rock and soil; 3 spp.]..... **Dibaeis** Clem.
Literature: Johnston (2001b)
- 14: *Pseudopodetia forming dense clumps or swards*. Primary thallus crustose, ephemeral, pale brown to greenish yellow, thin, uneven, ecorticate. Pseudopodetia erect to pendent or decumbent, mostly sterile, whitish to pale grey, simple or repeatedly forked, 3.5–10 (–15) mm tall, terete above, often flattened below, sometimes with grey globose to cerebriform galls 1.5–3 mm wide. Apothecia very rare, convex to subglobose, 1.5–3.5 mm diam., pale to bright pink, immarginate. Spores simple, ellipsoidal, 9.5–19.5 × 3.5–7 µm. [SW Tas.; on soil]..... **Siphulella coralloidea** Kantvilas, Elix & P. James
Literature: Johnston (2001b)

- 15 *Erect squamules with masses of minute greenish lobules on lower surface near apices.* Basal squamules at first appressed, becoming erect, lobate-laciniate to very deeply dissected, dorsiventral, 0.5–9.5 mm long, 0.2–5 mm wide. Upper surface dull greenish, with vein-like markings; lower surface whitish. Apothecia not seen. [NE Qld; on bark]..
..... **Squamella spumosa** Hammer
Literature: Hammer (2002)
- 15: *Squamules and pseudopodetia without masses of minute greenish lobules* 16
- 16 *Apothecia to 0.8 mm diam., solitary or clustered on upper surface of pseudopodetial apices, pedicellate; disc concave to plane, pale to dark brown; margin thick, paler.* Primary squamules 1–3.5 mm long, 0.2–2 mm wide, lobulate, appressed or recurved, with ascending margins, pale grey-brown to olive-green. Pseudopodetia erect, richly branched, to 20 mm tall, white, yellowish grey or greenish yellow. Spores simple, \pm ellipsoidal, $6\text{--}10 \times 3\text{--}4 \mu\text{m}$. [W.A., Qld, N.S.W., Vic.; on soil and rock; formerly *Ramalea*] **Notocladonia cochleata** (Müll.Arg.) Hammer
Literature: Conran (1992); Hammer (2003)
- 16: *Apothecia 2–6 mm diam., \pm solitary on ventral surface of apices; disc plane to convex, pale yellow to pinkish brown or dark red-brown to purplish brown.* Primary squamules areolate, scattered or overlapping, whitish, pale green, greenish yellow, red-brown or \pm blackened above, whitish below. Pseudopodetia erect, terete near base, becoming flattened to \pm leaf-like above, to 10 mm tall, to 9 mm wide at apex. Spores simple, ellipsoidal, $5\text{--}10 \times 2\text{--}3 \mu\text{m}$. [S and E Australia; mainly on soil, bark and wood; 2 spp.]
..... **Thysanothecium** Mont. & Berk.
Literature: Sammy (1992)
- 17 *Thallus cottony in appearance, in irregular tufts to 10 mm wide or in colonies to 8 cm wide, comprising short branched or tangled lobes to 2.5 mm wide, white to pale yellow; surface granular.* Apothecia sessile, convex to globose, 0.2–1.2 mm diam., pale cream to pinkish, \pm immarginate. Spores simple, bacilliform ($5\text{--}7 \times 1\text{--}1.5 \mu\text{m}$) to globose ($2.5\text{--}5 \mu\text{m}$). [Tas.; on leaves and shoots of endemic conifers and on bark; 3 spp.].....
..... **Roccellinastrum** Follmann
Literature: Kantvilas (1990)
- 17: *Thallus not cottony in appearance* 18
- 18 *Photobiont a filamentous cyanobacterium (Nostoc or Scytonema); thallus erect to spreading or pendulous-decumbent, growing from a \pm terete rooted holdfast, 1–5 cm tall, \pm tree-like in form.* Branches terete to flattened, tangled and \pm coralloid at apices, subdichotomously branching below from 1–4 pale buff-greyish primary stems, naked to pubescent or tomentose below; coralloid branchlets grey, blue-grey, grey-brown or brown-black, sometimes distinctly white-spotted; medulla white. Apothecia unknown. [Qld, N.S.W., Vic. and Tas.; among bryophytes on tree trunks and on boulders; sometimes with green leaflets of *Sticta* sp. attached]
..... **Dendriscoaulon dendriothamnodes** Dughi ex D.J.Galloway
Literature: Galloway (2001a)
- 18: *Thallus lacking this combination of characters* 19
- 19 Thallus hollow 20
- 19: Thallus solid or filamentous, or tufted and rather delicate 25
- 20 *Thallus olive-black to black, of subfruticose squamules to 1.5 mm long, club-shaped, sometimes isidiate, ecorticate, attached to the substratum by hyphae.* Apothecia 1–3 per squamule, immersed; disc punctiform, to 0.2 mm diam., red-brown. Spores > 64 per ascus, globose, $3.5\text{--}4.7 \mu\text{m}$ diam. [N Australia; on rock in arid woodland]
..... **Peltula clavata** (Kremp.) Wetmore
Literature: Büdel (2001)
- 20: *Thallus white, pale grey, grey-green, yellow-grey or yellowish green or brownish; if darker, then thallus >10 mm tall* 21

- 21 *Thallus chalky white, unbranched to very sparingly branched, erect or decumbent. Branches straight or worm-like, to 5 cm tall/long, 1–2 mm wide, with pointed apices, lacking soredia, isidia, pseudocyphellae and apothecia. [Alpine N.S.W. and Vic., also Tas.; on soil].....* **Thamnotia vermicularis** (Sw.) Schaer.
Literature: Filson (1972); Purvis *et al.* (1992)
- 21: *Thallus not chalky white, usually at least moderately to richly branched* 22
- 22 *Apothecia with a dry dark powdery mass of spores and sterile hyphae (mazaedium), terminal, c. 1.2–2.5 mm wide. Thallus white, pale grey or greyish green, richly branched, often twisted, commonly anastomosing; fertile branches erect, c. 3–5 cm long, c. 1.7–2.5 mm wide, often with perforated axils. Spores globose, c. 5.5–7.5 µm diam., dark grey. [Qld; on bark in montane rainforest]* **Bunodophoron diplotypum** (Vain.) Wedin
Literature: Wedin (2001)
- 22 *Apothecia lacking a mazaedium* 23
- 23 *Thallus cartilaginous when dry; apothecia pale green to green, to 2 (–10) mm diam. Thallus erect, to 1 cm or 1–3 cm tall, forming dense low cushions, pale green to green, sparingly to richly branched. Branches terete or flattened, 0.5–2 mm wide or to 10 mm wide, perforate, sometimes markedly inflated. Apothecia terminal or subterminal, concave to convex. Spores 1-septate, ellipsoidal, 8–16 × 4–6 µm. [E and SE Australia; on bark and rock].....* **Ramalina inflata** (Hook.f. & Taylor) Hook.f. & Taylor
Literature: Stevens (1987)
- 23: *Thallus rigid or brittle when dry; apothecia brown-black to black, to 0.7 mm diam. ...* 24
- 24 *Thallus surface smooth; corticate, with an external cartilaginous layer, often glossy; prostrate, straggling, ascending or erect, sparingly branched to richly and dichotomously or irregularly branched, sometimes perforated to fenestrated, inflated or not, 1–8 (–15) cm tall and esorediate, or < 3 mm tall and sorediate, 0.5–8 (–12) mm wide, creamy white, yellow-brown, green, dark brown to ±black. Fertile pseudopodetia sometimes thicker and taller than sterile ones. Apothecia solitary or tiered, concave to plane. Spores simple, 8–15 × 2–5 µm. [Throughout Australia, especially in temperate and cooler areas; mainly on soil, also on bark; 13 spp.].....* **Cladia** Nyl.
Literature: Filson (1992b); Kantvilas & Elix (1999)
- 24: *Thallus surface cobwebby; ecorticate, lacking a cartilaginous layer, dull, erect, repeatedly and intricately branched, forming dense mats, loose, clusters or conspicuous clumps, sometimes dying at base and growing from apices, 2–7 cm tall, esorediate, whitish, ash-grey, dull yellowish or yellow-green. Branches 0.3–1.2 mm diam.; axils perforated or not. Apothecia becoming convex. Spores simple, ovoid, 4–7 × 2 µm. [SE Australia; mainly on alpine and subalpine peat and soil; and see 8:].....* **Cladonia** Hill ex P.Browne
Literature: Archer (1992a, b); Hammer (2002)
- 25 *Thallus minutely tufted, straggling, filamentous or forming felt-like mats, dark grey, blue-grey, dark green, olive-brown or black, often gelatinous when wetted* 26
- 25: *Thallus more robust, usually paler, not gelatinous when wetted*..... 43
- 26 *Thallus straggling or forming filamentous mats*..... 27
- 26: *Thallus forming ±erect tufts or swards* 32
- 27 *Photobiont a unicellular green alga; medulla white. Thallus richly branched, dark olive-brown to black, glossy, forming straggling mats to 10 mm tall, attached to substratum by knob-like anchors; branches ±terete; main branches to 0.4 mm thick. Apothecia to 5.5 mm diam.; disc plane to convex; thalline margin thin. Spores simple, ellipsoidal, 7–12 × 6–8 µm. [SE N.S.W. and Vic. (alpine), Tas.; on rock]* **Pseudephebe pubescens** (L.) M.Choisy
Literature: Kantvilas (1994b); Kantvilas *et al.* (2002)
- 27: *Photobiont a coccoid or filamentous cyanobacterium or a filamentous green alga; medulla not white* 28

- 28 Photobiont a filamentous green alga (*Trentepohlia*) 29
- 28 Photobiont a filamentous cyanobacterium (*Scytonema* or *Stigonema*) 30
- 29 Fungal hyphae of \pm uniform thickness, dark brown to black, \pm parallel, enclosing 10–20 μ m wide filaments of *Trentepohlia* in a rectangular net-like arrangement. Apothecia not seen. [Tas.; on sheltered upland rocks] **Racodium rupestre** Pers.
Literature: Purvis *et al.* (1992); Kantvilas (2002)
- 29: Fungal hyphae contorted and of uneven thickness, dark brown, not parallel, enclosing 10–20 μ m wide filaments of *Trentepohlia* in an irregular pattern. Apothecia not seen. [N.S.W. and Tas.; on coastal and upland rocks] **Cystocoleus ebeneus** (Dillwyn) Thwaites
Literature: Purvis *et al.* (1992); Kantvilas (2002)
- 30 Thallus growing on bark or on the leaves of rainforest trees, blue-grey, dark green, violet-brown or brown. Lobes richly dichotomously branched and tangled, terete, delicate, 0.03–0.15 mm wide, corticate; photobiont *Scytonema*. Apothecia marginal, sessile, to 2 mm diam.; disc red-brown; proper margin paler; thalline margin absent. Spores ellipsoidal, 9–15 \times 5–7 μ m. [Qld, N.S.W. and Tas.] **Polychidium** A.Massal.
Literature: Henssen (1963)
- 30: Thallus growing on damp rocks 31
- 31 Thallus attached to the substratum by blue green rhizine-like hyphae; thalline margin absent; disc convex. Thallus blackish. Branches \pm terete, to 4 mm long, to 0.05 mm wide, comprising filaments of *Stigonema* surrounded by a network of hyphae. Apothecia lateral, sessile, to 1 mm diam. Spores simple, ellipsoidal, 7–9 \times 2.5–3.5 μ m. [W.A.] **Spilonema paradoxum** Bornet
Literature: Henssen (1963); Purvis *et al.* (1992)
- 31: Thallus attached to the substratum by a holdfast; thalline margin distinct; disc punctiform. Thallus greenish to brownish black. Branches \pm terete, to 2 cm long, 0.04–0.07 mm wide, comprising filaments of *Stigonema* surrounded by a network of hyphae. Apothecia uncommon, lateral, immersed, to 0.3 mm diam. Spores usually simple, ellipsoidal, 11–18 \times 3–6 μ m. [W.A., S.A., N.S.W., Vic. and Tas.; 4 spp.] **Ephebe** Fr.
Literature: Henssen (1963)
- 32 Thallus (*pseudopodetia*) whitish or pale grey [See 14:] **Siphulella** Kantvilas, Elix & P.James
- 32: Thallus ash-grey, blue-green, green, violet-brown, olive-brown or black 33
- 33 Thallus growing on bark, leaves, bryophytes or on peaty soil 34
- 33: Thallus growing on rock 38
- 34 Lower surface of lobes whitish to buff, uniformly downy-pubescent. Thallus of erect compacted squamules, forming \pm dense swards or cushions 2–5 cm wide. Squamules 2–6 mm tall, rarely terete; branches erect or flattened. Upper surface brownish green to tawny yellow or red-brown. Cephalodia marginal at branch bases, yellow-brown to blackish at centre, grey-blue at apices, often white-pubescent. Apothecia 3–11 mm diam.; disc plane to undulate or deeply concave, becoming convex, red-brown to brown-black; thalline margin present. Spores ellipsoidal, 18–23 \times 6–10 μ m. [Alpine Vic., on soil and moss] **Psoroma fruticosum** P.James & Henssen
Literature: Jørgensen & Galloway (1992)
- 34: Lower surface of lobes concolorous with upper, not downy-pubescent 35
- 35 Apothecia strongly convex to globose, dividing and coalescing and developing short stalks; spores 1-septate. Thallus olive-grey to brown or blackish, to 1 mm high, forming dense cushions or spreading mats, attached by rhizoidal hyphae, corticate. Lobes 1–5 mm long, 0.1–0.3 mm wide, wrinkled when dry; photobiont *Nostoc*. Apothecia brown to black, to 2.3 mm diam., becoming immarginate, nestling among lobes. Spores fusiform, 17–22 \times 6–8 μ m. [Tas.; on bark and peaty soil] **Wawea fruticulosa** Henssen & Kantvilas
Literature: Henssen & Kantvilas (1985)

- 35: *Apothecia concave, plane or convex; not dividing, coalescing or becoming stalked; spores simple* 36
- 36 *Lobes flattened, c. 1 mm wide at base, 3–5 mm wide above; apothecia with a scalloped thalline margin.* Thallus to 10 mm wide, 1–6 mm tall, attached by holdfasts. Lobes narrow, flattened, olive-brown, with ridges, veins and minute holes, ecorticate, with terete 0.2–0.3 mm long lobules; photobiont *Nostoc*. Apothecia \pm marginal, to 1 mm diam.; disc brown; thalline margin scalloped; proper margin cup-like (thin section). Spores warty, subglobose to globose, 12–14 \times 8.5–13 μ m. [SE Qld; on bark] **Staurolemma fruticosum** Henssen
Literature: Henssen (1999)
- 36: *Lobes \pm terete, delicate, < 0.5 mm wide; apothecia lacking a thalline margin* 37
- 37 *Thallus ash-grey; apothecia adnate.* Thallus granulose to subfruticose, adnate to ascending, corticate. Lobes dispersed, terete, wrinkled, c. 0.45 mm long, 0.08–0.12 mm wide; photobiont *Nostoc*. Apothecia becoming convex and immarginate, to 0.9 mm diam.; disc orange. Spores ellipsoidal, 13–16 \times 6–7 μ m. [Tas.; on bark] **Santessoniella rugosa** Henssen & Kantvilas
Literature: Henssen & Kantvilas (2000)
- 37: *Thallus blue-grey, dark green, violet-brown or brown; apothecia sessile.* [See 30] **Polychidium** A. Massal.
- 38 *Thallus not gelatinous when wet; medulla white; photobiont a unicellular cyanobacterium; asci containing more than 100 spores.* Thallus subfruticose, forming continuous colonies, olive-brown. Lobes cylindrical, erect, branched in the upper part, 0.5–4 mm long, 0.3–0.8 mm thick, corticate; tips paler, sometimes flattened; stalk terete or flattened in section. Apothecia immersed, 1–3 per lobe, to 0.28 mm diam.; disc punctiform. Spores simple, globose, 3.1–4.5 μ m diam. [NW W.A.; on granite] **Peltula cylindrica** Wetmore
Literature: Büdel (2001)
- 38: *Thallus gelatinous when wet; medulla not white; photobiont a filamentous cyanobacterium; asci 8-spored* 39
- 39 Thallus on seashore or aquatic rocks 40
- 39: Thallus on dry or damp rocks, not on the seashore or aquatic 41
- 40 *Photobiont a coccoid cyanobacterium.* Thallus black, attached by a thick rhizoidal strand. Lobes erect, terete, 3–7 mm tall, 0.25–0.35 mm thick. Apothecia apical, to 0.15 mm diam.; disc plane, reddish brown; thalline margin thick. Spores simple, broadly ellipsoidal to globose, 11–16 \times 9–14 μ m, thick-walled. [Lord Howe I.; on seashore rocks] **Paulia caespitosa** Tretiach & Henssen
Literature: Schultz *et al.* (2000)
- 40: *Photobiont a filamentous cyanobacterium.* Thallus olive-brown to black; attached by a disc-like holdfast. Lobes richly branched, terete or subterete, to 7 (–10) mm tall, 0.1–0.5 mm thick. Apothecia apical, to 0.6 mm diam.; disc punctiform, 0.1–0.2 mm diam.; thalline margin thick. Spores simple, oblong, ellipsoidal or subglobose, 12–18 \times 7–15 μ m, thin-walled. [W.A., S.A., N.S.W., Vic. and Tas.; on seashore and aquatic rocks; 3 spp.] **Lichina** Agardh
Literature: Henssen (1963; 1969); Purvis *et al.* (1992)
- 41 *Lobes flattened, bluish-pruinose, 1–3 mm wide, 0.24–0.3 mm thick, swollen and gelatinous when wet, often with minute globose isidia.* Thallus olive-black to black, lobate, to 2 cm diam. Lobes elongate, irregularly to dichotomously branched; photobiont a unicellular cyanobacterium. Apothecia becoming adnate, to 0.25 mm diam.; hymenium I+ blue. Spores simple, broadly ellipsoidal, 8–12 \times 6–7 μ m. [N.S.W.; on limestone?] **Thyrea confusa** Henssen
Literature: Henssen & Jorgensen (1990)
- 41: *Lobes \pm terete, epruinose, to 0.05–0.06 mm wide, not noticeably swollen when wet, lacking isidia* 42

- 42 Lobes to 1.2 mm tall. Thallus blackish, attached to the substratum by a disc-like holdfast. Lobes erect, to 0.06 mm thick. Apothecia terminal, to 0.2 mm diam.; disc brownish; thalline margin thick; proper margin absent. Spores simple, ellipsoidal. [W.A.]..... **Lichina minutissima** Henssen
Literature: Henssen (1973)
- 42: Lobes to 3 mm tall. Thallus blackish; attached to the substratum by a disc-like holdfast. Lobes erect, 0.05–0.06 mm thick. Apothecia terminal, to 0.2 mm diam.; disc punctiform; thalline margin thick; proper margin absent. Spores simple, ellipsoidal. [W.A.; 2 spp.]..... **Porocyphus** Körb.
Literature: Henssen (1963, 1990)
- 43 Thallus with external cephalodia (containing cyanobacteria), these usually sessile or short-stalked, wrinkled, folded or convoluted, pale grey, purple-grey, reddish brown to dark brown or blackish. [See 9] **Stereocaulon** Hoffm.
- 43: Thallus lacking external cephalodia [internal cephalodia in *Sticta*; see 55]..... 44
- 44 Thallus growing from pebbles (where it is crustose) onto semi-arid or arid soil (where it becomes fruticose). Branches prostrate to ±ascending, simple to sparingly branched, sometimes tapering, terete to flattened, 0.5–1.2 mm thick, whitish to pale greyish green, with or without whitish pseudocyphellae, lacking soredia and isidia. Apothecia not seen in Australia. [W.A., S.A., N.S.W. and Vic.; on calcareous soil; 2 spp.?].....
 **Aspicilia** A.Massal.
Literature: Filson & Rogers (1979); Eldridge & Rosentreter (1997)
- 44: Thallus not growing on semi-arid or arid soil 45
- 45 Apothecia with a dry dark powdery mass of spores and sterile hyphae (mazaedium)... 46
- 45: Apothecia lacking a mazaedium 47
- 46 Branches terete throughout, slender, richly divided; apothecia solitary on ±thicker protruding branches; proper margin persisting until very late as a stiff covering of the mazaedium, then shed in one piece; cortex less than 45 µm thick. Thallus forming loose to compact often extensive colonies, or small cushions or patches, usually white to pale grey. Fertile branches very sparingly branched, to 7 cm long and 0.5–1.5 mm wide. Apothecia terminal, raised well above the thallus, 1–2.5 mm diam. Spores simple, ±globose, 5.5–11 µm diam., colourless to pale grey. [Southern N.S.W., Vic. and Tas.; usually on bark] **Leifidium tenerum** (Laurer) Wedin
Literature: Wedin (2001)
- 46: At least some branches flattened; proper margin of apothecia disintegrating during mazaedial development, the remnants often persisting; (upper) cortex usually much thicker than 45 µm. Thallus erect to decumbent, pendent or prostrate; upper surface whitish, grey, grey-green or greenish brown; lower surface whitish or pale yellow. Fertile branches 1.5–8 (–11) cm tall, 1–5 (–15) mm wide, often with delicate marginal branchlets. Apothecia terminal or subterminal, 1–8 (–15) mm diam.; mazaedium subapically or ventrally orientated Spores simple, ±globose, 2–21 µm diam., usually greyish to reddish brown. [E Qld and N.S.W., Vic. and, especially, Tas.; mostly on bark, also on rock and soil; 14 spp.]..... **Bunodophoron** A.Massal.
Literature: Wedin (2001)
- 47 Thallus branches terete or subterete 48
- 47: Thallus branches distinctly flattened 53
- 48 Thallus with a cartilaginous axis; axis ±white, with or without some dark discolouration, or yellow, pink, wine-red, fawn or dark brown 49
- 48: Thallus lacking a cartilaginous axis..... 50

- 49 *Thallus pale green to green, greyish green, yellow-green, reddish or variegated green and red, not or scarcely blackening towards the holdfast; apothecial disc pale yellow-green.* Thallus erect to pendulous or decumbent, (1-) 2-15 (-100) cm long. Branches simple to elaborately divided, 0.5-1.5 (-2) mm wide, cylindrical, angular or slightly flattened, slightly inflated or not, with or without branchlets, fibrils, papillae, isidia, pseudocyphellae and soralia. Medulla usually white, occasionally pigmented. Apothecia lateral, subterminal, or terminal, (1-) 2-6 (-20) mm diam.; disc concave to plane; margin sometimes with sparse to dense fibrils. Spores simple, ovoid, ellipsoidal or subglobose, 6-11 × 5-8 μm. [Throughout Australia, mainly in coastal regions; on tree trunks, canopy branches, twigs, shrubs, fence posts, power poles and on rock; 37 spp.] ..
..... **Usnea** Adans.
Literature: Stevens (2004)
- 49: *Thallus yellow-green to dull yellow, always variegated with black or purplish black, distinctly blackening towards the holdfast; apothecial disc black, rarely reddish brown.* Thallus erect, subdecumbent or subpendulous, to 8 cm tall. Branches simple to elaborately divided, 0.5-1 mm wide, cylindrical, smooth, with or without branchlets, fibrils, papillae, isidia and soralia; pseudocyphellae absent. Medulla white. Apothecia not seen in Australia. [SE Australia; on montane rocks; 2 spp.]
..... **Neuropogon** Nees & Flot.
Literature: Stevens (2004)
- 50 *Thallus anchored by basal root-like rhizines, forming mats, cushions or extensive tufts, delicate to robust, chalky white, grey, green or brown.* Branches erect, decumbent or pendulous, 0.5-5 cm tall/long, 0.5-5 (-15) mm wide, separate or tangled, simple or branched, terete or flattened. Rhizines pale grey to pale brown, (0.1-) 0.5-1.5 mm thick. Apothecia absent. [Southern Australia, most diverse in Tas.; on soil, peat and bryophytes (rarely on rock); 12 spp.] **Siphula** Fr.
Literature: Kantvilas (1987, 1994c, 1996, 1998, 2002a)
- 50: *Thallus anchored by a holdfast or lacking discrete attachment organs* 51
- 51 *Thallus reddish brown or dark brown, somewhat paler below, to 4 cm tall.* Branches terete, to 1 mm wide, decumbent or scrambling, richly branched and tangled, ending in stiff spine-like projections to 0.3 mm long, usually esorediate and non-isidiate; pseudocyphellae white, elliptical or ±slit-like, or faveolate at main axes. Apothecia terminal or subterminal, 2-2.5 mm diam. (not seen in Australia). [SE N.S.W. and Vic. (alpine), Tas.; on soil, bryophytes and heath; formerly *Coelocaulon*]
..... **Cetraria aculeata** (Schreb.) Fr.
Literature: Kantvilas (1994a)
- 51: *Thallus pale grey-green, pale green, yellowish green or yellowish brown; branches not ending in stiff spine-like projections*..... 52
- 52 *Thallus pale yellowish brown, sometimes pinkish below and mottled blackish above, C+ red; pseudocyphellae distinctive, white, elongate.* Branches ±terete, to c. 8 cm long, to 1.5 mm wide, erect or ±decumbent, ±dichotomously branched, straggling, tangled; apices pointed. Apothecia 1.5-4 mm diam. [Alpine N.S.W. and Tas.; on shrubs, soil and rock]..... **Alectoria nigricans** (Ach.) Nyl.
Literature: Kantvilas (1992a)
- 52: *Thallus usually pale grey-green, pale green, yellowish green or rarely pale yellowish brown, C-; pseudocyphellae shallow whitish depressions or linear markings.* Thallus shrubby, erect or pendulous, growing from a discrete or diffuse holdfast, branching from the base to richly irregularly or dichotomously branched, rigid or flaccid, short-tufted and to 1 cm tall or 1-10 (-30) cm tall. Branches terete to narrowly or broadly strap-shaped, smooth, ridged or channelled, 0.2-5 (-20) mm wide, often with soralia. Apothecia sessile to short-stipitate, usually terminal, 0.2-5 (-10) mm diam., laminal or marginal; disc yellowish green, often lightly pruinose, concave to convex; thalline margin persistent. Spores 1-septate, ellipsoidal to bean-shaped, 8-22 × 3.5-6 μm. [Throughout Australia; on rock and bark, mainly in coastal areas; 27 spp.].....
..... **Ramalina** Ach.
Literature: Stevens (1987)

- 53 Thallus loosely attached..... 54
- 53: Thallus firmly anchored by a holdfast or basal root-like rhizines..... 55
- 54 *Thallus growing on bark or rock in forest*, lobate or tufted, to 2 cm tall. Branches elongate, overlapping, weakly channelled, to 1–2 (–4) mm wide, eciliate, lacking isidia and laminal pseudocyphellae, with minute subterete to flat marginal projections; marginal pseudocyphellae small, becoming powdery-soresiate. Upper surface dull pale grey, pale olive, to brown or very dark brown (almost black), sometimes bright green when fresh and moist, smooth to weakly wrinkled. Lower surface smooth, glossy, very sparingly pale-rhizinate, off-white to pale brown. Apothecia and pycnidia not seen in Australia. [Tas.; formerly *Cetraria*] **Tuckermannopsis chlorophylla** (Willd.) Hale
Literature: Filson (1994); Kantvilas *et al.* (2002)
- 54: *Thallus growing on peat, litter, soil or alpine plants*, erect or decumbent, 2–4 cm tall, olive-green, reddish brown to dark brown. Branches 1–5 mm wide, dorsiventral, plane or channelled, dichotomously or irregularly branched, with or without soredia, non-isidiate; margins and/or lower surface with pseudocyphellae; margins usually entire, with or without delicate projections. Apothecia marginal at lobe apices (not seen in Australia). [Alpine N.S.W., Vic. and Tas.; 3 spp.]..... **Cetraria** Ach.
Literature: Filson (1994); Kantvilas *et al.* (2002)
- 55 *Lower surface of thallus with cyphellae (white, pin-prick-like or 2 (–4) mm diam. pits)*. Thallus forming extensive patches, 2–10 (–20) cm wide, monophyllous, polyphyllous or with lobes deeply divided. Lobes rounded, bean-shaped, lanceolate or linear, simple or dichotomously or irregularly branched, 1–6 (–25) cm long, 1–10 (–30) mm wide, attached directly to a holdfast or growing from a thick 1–20 mm long stalk; upper surface pale grey-green, olive-brown to red-brown when dry, often bright green when wet. Lower surface whitish, pale cream, pale tan, brown or blackish, naked or partly to completely tomentose, smooth or with ridges, wrinkles or veins. Apothecia marginal or laminal, 0.5–5 mm diam., pale to dark red-brown, yellow-orange or orange-red. Spores 1–3-septate, fusiform-ellipsoidal, 22–50 × 6–14 µm. [E Qld and N.S.W., southern Vic. and Tas.; on bark and mossy trunks in rainforest, also on rock and soil; 23 spp.]..... **Sticta** (Schreb.) Ach.
Literature: Galloway (2001b)
- 55: *Lower surface of thallus without cyphellae*..... 56
- 56 *Thallus anchored by basal root-like rhizines, forming mats, cushions or extensive tufts on soil, peat and bryophytes (rarely on rock)*. [See 50] **Siphula** Fr.
- 56: *Thallus anchored by a holdfast; on bark or rock* 57
- 57 *Thallus pale grey to pale mauve-grey, C+ red, ±pendulous*, irregularly branched, of strap-shaped tapering branches, to 25 cm long, to 2 mm wide, with or without marginal leaflets; soralia bluish white, discrete or confluent; photobiont orange-brown, short-filamentous (*Trentepohlia*). Apothecia rare, to 1 mm diam. solitary or clustered, plane to convex, blackish but with a white pruina; hypothecium dark. Spores 3-septate, oblong-fusiform, 20–30 × 4–6 µm [Tropical W.A., N.T. and Qld; on coastal rocks and trees; 2 spp.]..... **Roccella** DC.
Literature: Purvis *et al.* (1992)
- 57: *Thallus pale grey-green, pale green, yellowish green or pale yellowish brown, C–; photobiont green, unicellular*. Apothecia common, yellowish green, often lightly pruinose; hypothecium pale. [See 52:] **Ramalina** Ach.

KEY B: FOLIOSE GENERA

- 1 *Thallus felty or radially fibrillose to densely erect-hairy*, often overlapping or in rosettes; a basidiolichen to 2–20 cm wide or wider; individual components ±semicircular to strap-shaped. Upper surface blue-green, grey-green or dark green, sometimes concentrically zoned, often with a narrow whitish margin; photobiont *Scytonema*; hyphae sheathing the photobiont often short-celled and with strongly corrugated walls. Lower surface initially concolorous with upper and similarly fibrillose, sometimes forming a whitish smooth to subreticulate sheet from minute coalescing discs. Basidia uncommon, club-shaped or cylindrical; spores hyaline, ±ellipsoidal, colourless. [E and SE Australia, mainly tropical; on bark, wood, rock and soil; 4 spp.]..... **Dictyonema** C.Agardh ex Kunth
Literature: Parmasto (1978)
- 1: *Thallus not felty or radially fibrillose to densely erect-hairy*; an ascolichen 2
- 2 Thallus not markedly layered (vertical section), blue-grey, lead-grey, violet-grey, dark green, olive-brown, dark brown to ±black, gelatinous and often swollen and pulpy when wet, papery, leathery or cartilaginous when dry; photobiont *Nostoc*..... 3
- 2: Thallus layered, usually paler and/or brighter, not gelatinous or noticeably swollen when wet; photobiont a green alga or a cyanobacterium 9
- 3 *Thallus with a 1 cell-thick cortex of rounded or angular cells*, firmly or loosely attached to ±cushion-forming, 0.8–7 (–10) cm wide. Lobes spreading to ascending, rounded to elongate, (0.3–) 1–5 (–8) mm wide, to 0.25 (–0.5) mm thick, bluish grey, lead-grey, dark grey-brown or ±black, smooth to plicate, ridged or blistered, lacking soredia, with or without isidia (granular, cylindrical, club-shaped, scale-like or coralloid) or lobules. Lower surface naked or with sparse (to dense) tomentum, rhizines or holdfasts. Apothecia adnate, sessile or pedicellate, (0.3–) 1–5 (–8) mm diam.; disc usually concave to plane, pale yellow, orange, red-brown or dark brown; thalline margin smooth to wrinkled, ridged, nodulose, isidiate or squamulose, often paler than the thallus. Spores (septate to) muriform, ellipsoidal or fusiform, 15–40 × 6–20 µm. [Most diverse in E and SE Australia; mainly on bark; also on rock, mosses and soil; 35 spp.]...
..... **Leptogium** (Ach.) S.F.Gray
Literature: Verdon (1992b, 2001)
- 3: *Thallus ecorticate or with a cortex-like layer of interwoven hyphae* 4
- 4 *Thallus olive-grey with white marbling, membranous, partly fenestrate*. Lobes elongate, fan-shaped, to 3 mm wide, swelling when wet and to 0.5 mm thick; lobe margins with coarse blue-grey ±granular structures (gymnidia). Lower surface veined, white, darker and with scattered tufts of blackish rhizohyphae at the centre. Apothecia absent. Herbarium specimens often covered with crystals. [A.C.T.; on bark].....
..... **Kroswia crystallifera** P.M.Jørg.
Literature: Jørgensen (2002)
- 4: *Thallus without this combination of characters* 5
- 5 *Lobes umbilicate, solitary or aggregated*. Thallus 8–20 mm wide, often bluish white-pruinose. Lobes brownish black, with or without granulose soredia. Apothecia very rare, resembling perithecia, 0.1–0.3 mm diam. Spores simple, ellipsoidal, 8–12 × 6–7 µm. [Qld, N.S.W. and Vic.; on calcareous rocks]
..... **Thyrea girardii** (Durieu & Mont.) Bagl. & Car.
Literature: Clauzade & Roux (1985)
- 5: *Lobes not umbilicate* 6

- 6 *Spores with (1–) 3–9 (–17) transverse septa, or muriform.* Thallus tightly or loosely adnate to ±cushion-forming, 0.5–6 (–10) cm wide. Lobes spreading to ascending, rounded to elongate, often overlapping, (0.5–) 1–10 (–20) mm wide, usually olive-green, dark green or blackish, smooth to wrinkled, ridged or blistered, naked to tomentose, lacking soredia, with or without isidia or lobules. Lower surface with sparse to dense rhizines or holdfasts. Apothecia adnate, sessile or pedicellate, (0.5–) 1–3 (–8) mm diam.; disc concave to convex, pale to dark red, red-brown or dark brown, sometimes white- or grey-pruinose; thalline margin usually thin, smooth, wrinkled or warted. Spores ellipsoidal, oblong, fusiform to broadly acicular, usually in the range 25–65 × 4–12 µm. [Most diverse in E and SE Australia; mainly on bark and rock; 21 spp.] **Collema** Weber ex F.H.Wigg.
Literature: Filson (1992d)
- 6: *Spores simple* 7
- 7 *Apothecia lacking a thalline margin.* Thallus grey-violet, membranous to foliose, cartilaginous when dry, 2.5–8 cm wide. Lobes cylindrical or flattened, 3–10 mm long, 0.5–2 mm wide, with ridges and veins, basally channelled. Apothecia to 1 mm diam.; disc convex to hemispherical, dark red-brown; proper margin thick, finally enclosing base of hymenium (thin section). Spores ellipsoidal, 10–11 × 7–8 µm. [SE N.S.W.; on soil] **Ramalodium succulentum** Nyl. ex Cromb.
Literature: Henssen (1992)
- 7: *Apothecia with a well-defined thalline margin (at least when immature)* 8
- 8 *Apothecial disc pale yellow to yellow-brown, weakly concave to convex, epruinose; hyphae of proper margin parallel to surface (thin section).* Thallus adnate to loosely adnate, initially squamulose, becoming foliose, 1.5–3 cm wide or aggregated to c. 6 cm. Squamules ±round, becoming irregularly to subradiately lobate. Lobes elongate, ±ascending, 1–2 mm wide, lead-grey to brownish grey, phyllidiate, strongly longitudinally wrinkled when dry. Lower surface channelled when dry, white to pale grey, attached by cortex, holdfasts and inconspicuous rhizines. Apothecia sessile to short-pedicellate, 1–2 mm diam.; thalline margin vertically wrinkled, becoming excluded. Spores ellipsoidal, 12–15 × 5–8 µm. [Tropical Qld; on bark] **Leightoniella zeylanensis** (Leighton) Henssen
Literature: Verdon & Streimann (1995)
- 8: *Apothecial disc pale orange to reddish brown, concave to plane, pruinose or not; hyphae of proper margin perpendicular to surface.* Thallus leathery, adnate, to 10 cm wide, to 0.5 mm thick, lacinate to lobate, spreading to cushion-forming. Lobes elongate, oblong or fan-shaped, ascending or erect, to 10 mm wide, smooth, wrinkled or ridged, lead-grey, olive-brown or blackening, with or without pruina and isidia; margins ±thickened, entire, scalloped or incised. Lower surface rhizinate, pale yellowish brown to black. Apothecia ±sessile or subpedicellate, 1–4 mm diam.; thalline margin thick, persistent. Spores ellipsoidal, 13–20 × 10–13 µm. [NE Qld, N.S.W., Vic. and Tas.; on bark; 4 spp.] **Physma** A.Massal.
Literature: Verdon (1992c)
- 9 Lower surface of thallus with ±rounded cyphellae or pseudocyphellae; thallus usually paler and duller when dry, becoming darker (often bluish) and/or brighter when wet; photobiont a green alga or cyanobacterium. 10
- 9: Lower surface of thallus lacking cyphellae and pseudocyphellae 11

- 10** *Lower surface with cyphellae: round to irregular shallow to deep craters; crater rim swollen and with a small pore, or sharply defined, raised and with a broad pore; base of crater with a white (rarely yellowish) pit membrane.* Thallus lobate, spreading, \pm loosely attached, 2–10 (–20) cm wide. Lobes irregularly branching, often overlapping, rounded to variously incised, thin and fragile to leathery, 5–20 (–80) mm wide. Upper surface smooth, wrinkled or faintly ridged, sometimes shallowly faveolate or pitted, glossy or matt, often maculate, without pseudocyphellae, with or without isidia, soredia or phyllidia. Lower surface pale or dark, usually densely tomentose, occasionally with anchoring tufts of hyphae or rhizines. Apothecia uncommon, sessile, 1–3 mm diam.; disc red-brown to dark brown, epruinose; margin smooth or warted. Spores 1–3 (–7)-septate, $25\text{--}53 \times 7\text{--}11 \mu\text{m}$. [Mainly E and SE Australia; on bark and mossy trunks in rainforest, also on rock and soil; 23 spp.] **Sticta** (Schreb.) Ach.
Literature: Galloway (2001b)
- 10:** *Lower surface with pseudocyphellae: \pm dot-like to raised-conical, exposing the white or yellow medulla, not recessed, usually lacking a rim; pit membrane absent.* Thallus lobate, rosette-forming or irregularly lacinate, or \pm dichotomously branched to complex-tangled, loosely to firmly attached, 3–10 (–30) cm wide. Lobes rounded to elongate, spreading to overlapping, 2–15 (–50) mm wide. Upper surface smooth, wrinkled, ridged or hairy, often shallowly to deeply faveolate, often maculate, with or without isidia, pseudoisidia, phyllidia, pseudocyphellae or soredia. Lower surface usually with a pale to dark often thick and felted tomentum. Apothecia semi-immersed to sessile or subpedicellate, (0.5–) 1–3 (–10) mm diam.; disc yellow-brown, pale to dark red-brown or \pm black; margin entire or variously uneven, with or without isidia, phyllidia or soredia. Spores usually 1–3 septate and $20\text{--}35 \times 6\text{--}11 \mu\text{m}$. [Mainly E and SE Australia; on bark, soil or rock, often mixed with bryophytes; 39 spp.] **Pseudocyphellaria** Vain.
Literature: Galloway *et al.* (2001)
- 11** Lower surface of thallus glossy black, lacking rhizines and tomentum; lobes hollow or solid 12
- 11:** Lower surface of thallus white, grey, yellowish or brown; if black then with rhizines or tomentum; lobes solid 13
- 12** *Upper surface usually perforated; spores 2–8 per ascus, $25\text{--}65 \times 15\text{--}45 \mu\text{m}$.* Thallus \pm radiating, rosette-forming to irregularly spreading, (1–) 3–10 (–25) cm wide. Lobes hollow, contiguous or overlapping, convex to terete and \pm inflated, lobulate or not, usually 1–3 mm wide. Upper surface shades of grey, greenish or brownish, with or without soredia or isidia, sometimes with dark patches; perforations to 2 (–3) mm wide; walls of internal cavity partly or entirely white, yellow, orange, purplish or black. Apothecia sessile to pedicellate, often cup-like, usually 2–5 mm diam.; disc concave to convex, pale to dark brown or red-brown; thalline margin well developed. [Mainly SE Australia, most diverse in Tas.; usually on bark; 29 spp.] **Menegazzia** A.Massal.
Literature: James & Galloway (1992)
- 12:** *Upper surface without perforations; spores 8 per ascus, $5\text{--}9 \times 3.5\text{--}7 \mu\text{m}$.* Thallus \pm radiating, rosette-forming to irregularly spreading, 1–10 (–30) cm wide. Lobes inflated, hollow or \pm solid, somewhat flattened, convex or tubular, usually elongate, (0.5–) 1–5 (–10) mm wide, with or without soredia, lacking isidia, sometimes with black margins. Upper surface off-white, pale yellowish grey or grey to brown-black, often with black markings; medulla cobwebby, usually white. Lower surface wrinkled, often fissured or perforate. Apothecia sessile or subpedicellate, 1–10 (–20) mm diam.; disc concave to convex, rarely perforate, pale to dark brown, red-brown or blackish; thalline margin entire to involute or scalloped. [Mainly SE Australia; on bark, twigs, dead wood, rocks and soil in cool to cold areas; 12 spp.] **Hypogymnia** (Nyl.) Nyl.
Literature: Elix (1992); Kantvilas *et al.* (2002)
- 13** Thallus lemon-yellow, bright yellow or yellow-orange 14
- 13:** Thallus white or shades of grey, green or brown, at most yellowish green 15

- 14 *Thallus sorediate (in Australia), K⁻; spores 8–50 per ascus, simple or 1-septate, not polarilocular.* Thallus closely appressed, greyish yellow, bright yellow to greenish yellow. Lobes finely divided, overlapping and to 0.4 mm wide or to 2 mm wide, smooth, sometimes pruinose; margin entire or scalloped, granular-sorediate or the soredia more coarse and spreading. Lower surface white to pale brown, with scattered white rhizines. Apothecia sessile, to 1.5 mm diam.; disc concave to slightly convex, round to distorted, pale yellow to orange-yellow; thalline margin slightly prominent, sometimes scalloped, persistent, sometimes becoming sorediate. Spores 6–15 × 4–6 μm. [Throughout Australia; usually on nutrient-enriched bark, also on rock; 2 spp.]..... **Candelaria** A. Massal.
Literature: Filson (1992a)
- 14: *Thallus lacking soredia (in Australia), K⁺ purple-red; spores 8 per ascus, polarilocular.* Thallus closely or rather loosely attached, rosette-forming or irregularly spreading, subdichotomously to irregularly branched, 2–10 (–15) cm wide, brilliant yellow to yellow-orange (greyish in shade). Lobes radiating or overlapping, 0.5–5 (–7) mm wide, concave to convex, smooth or wrinkled; margins raised or down-turned. Lower surface white to pinkish brown, with sparse white to brown rhizines or holdfasts. Apothecia mainly in the thallus centre, becoming sessile, rounded to distorted, to 3 mm diam.; disc concave to slightly convex, often darker than the thallus; thalline margin thin, smooth to scalloped, usually persistent. Spores 9–16 × 5–10 μm. [Mainly southern Australia; on rock (often coastal) and bark (especially nutrient-enriched); 3 spp.] **Xanthoria** (Fr.) Th. Fr.
Literature: Filson (1969)
- 15 *Apothecia with a dry dark powdery mass of spores and sterile hyphae (mazaedium).* Thallus broadly foliose, smooth and green to brownish green above, wrinkled and whitish below. Lobes 3–20 mm long, 2.3–8.3 (–15) mm wide, sometimes deeply incised between apothecia. Apothecia marginal, sessile or appearing stalked, to 2.5 mm diam.; thalline receptacle disappearing early. Spores globose, 3.6–6 μm diam., ±reddish brown. [Tas.; on bark in rainforest; 2 spp.]..... **Calycidium** Stirt.
Literature: Wedin (2002)
- 15: *Apothecia lacking a mazaedium* 16
- 16 *Thallus attached at a single point by a ±central strand (umbilicus); on montane to alpine rocks, 1–6 (–10) cm diam., of 1–many lobes, rosette-forming or rounded, ±brittle when dry, ±soft and leathery when wet.* Lobes rounded, wavy or contorted, the centre often raised. Upper surface smooth, granular, warted, cracked, wrinkled, ridged or blistered, shades of grey, green to brown or ±black; margin entire or incised, sometimes with rhizines, cilia or soredia. Lower surface off-white to ±black, smooth, warted or pitted, naked or with defunct rhizines. Apothecia adnate, sessile or stalked, 1–2 (–4) mm diam.; disc black, usually richly folded, with irregular horse-shoe-shaped or concentric ridges; thalline margin absent. Spores usually simple, ellipsoidal, 8–20 × 3–9 μm. [SE Australia; 9 spp.]..... **Umbilicaria** Hoffm.
Literature: Llano (1950); Galloway (1985); Purvis *et al.* (1992)
- 16: *Thallus not attached at a single point by a ±central strand; habitats various* 17
- 17 *Apothecia on lower surface of lobe apices.* Thallus ±loosely attached, spreading, rosette-forming, 4–10 (–15) cm diam. Lobes rounded to elongate, often ascending or lobulate, 2–10 mm wide. Upper surface smooth, undulate, reticulate or faveolate, dull or glossy, yellow-green, bronze-green, blue-green, grey-brown or dark brown, sometimes isidiate or with scale-like phyllidia on ridges or lobe margins; photobiont a green alga or cyanobacterium; medulla white or yellow. Lower surface smooth, wrinkled or blistered, corticate, partly naked, pubescent or tomentose, whitish, pale to dark brown or black. Apothecia rounded, elliptical or bean-shaped, 2–8 (–10) mm diam.; disc pale to dark red-brown; thalline margin thin, pale, slightly raised, entire or minutely toothed. Spores 1–3-septate, fusiform, 14–27 × 5–9 μm. [E and SE Australia; on bark, rock and mossy trees; 4 spp.]..... **Nephroma** Ach.
Literature: White & James (1988); Kantvilas & Jarman (1999)
- 17: *Apothecia laminal or marginal on upper surface, or thallus sterile* 18

- 18 *Lower surface with a network of pale to dark narrow or broad veins with conspicuous simple branched or tufted rhizines*, with or without tomentum, ecorticate. Thallus rosette-forming, compact or in extensive patches to 20 cm wide. Lobes rounded or elongate, diverging or overlapping, 5–30 (–50) mm wide. Upper surface smooth, undulate or blistered, bright green, blue-grey, grey-brown or brown, dull or glossy, with or without tomentum or pruina, with or without marginal leaflets or soralia; photobiont a cyanobacterium (*Nostoc*) or a green unicellular alga (then sometimes with cephalodia on upper or lower surface). Apothecia marginal, on horizontal or ascending marginal lobules, round or elliptical, plane, convex or saddle-shaped, to 5 (–8) mm diam./long; disc red-brown to black; margin thin, entire or scalloped. Spores 3–7-septate, narrowly fusiform, *c.* (20–) 40–90 × 3–6 μm. [Mainly E Australia; on soil, bare or mossy bark and rock; 15 spp.] **Peltigera** Willd.
Literature: Galloway (1985); Purvis *et al.* (1992)
- 18: *Lower surface without a network of veins* 19
- 19 *Apothecia adnate; proper margin absent or soon becoming excluded; thalline margin absent*. Thallus to 8 (–10) cm wide, whitish, yellowish grey, lead-grey, bluish green or ±blackish, corticate, and with cortical hyphae parallel to long axis of lobes. Lobes plane to convex, rarely channelled, usually spreading or contiguous, rarely overlapping, linear, broadly fan- or wedge-shaped, less than 1 mm wide or 1–8 (–10) mm wide, sparingly or richly branched, with or without pruina and isidia; margins sometimes lobulate; photobiont *Scytonema*. Lower surface pale to black; rhizines dense, white to black, sometimes projecting beyond margins. Apothecia concave, plane or strongly convex, to 3 mm diam., pale yellow, reddish or black. Spores simple, ellipsoidal to fusiform, 6–14 × 2–5 μm. [Mainly tropical and subtropical Australia; on bark, rarely on rock and leaves; 8 spp.] **Coccocarpia** Pers.
Literature: Arvidsson (1992)
- 19: *Apothecia sessile to pedicellate; proper and/or thalline margin persistent* 20
- 20 *Growing on moss over alpine siliceous rocks*. Thallus small-foliose, forming rosettes to 4 cm diam., corticate above. Lobes to 2.5 mm wide, dark blue-green to brown (reddish brown to dark green when wet), spreading or overlapping, ascending to suberect, broader and incised at apices; margins with peg- or scale-like isidia; photobiont *Nostoc*. Lower surface with sparse brownish rhizohyphae and slender rhizines. Apothecia sessile to short-pedicellate, 0.4–1 mm diam.; disc ±plane, red-brown to dark brown; proper margin paler, entire to scalloped. Spores 1 (–2)-septate, narrowly ellipsoidal, 17–24 × 5–8 μm. [N.S.W., Vic. and Tas.] **Massalonia carnosa** (Dicks.) Körb.
Literature: Jørgensen & Elix (1988); Purvis *et al.* (1992)
- 20: *Not growing on moss over alpine siliceous rocks* 21
- 21 Thallus rather pale when dry, but lead-grey, blue-grey, dark blue-green, blue-black or brown-black when wet; photobiont a filamentous cyanobacterium; lower surface with tomentum and/or rhizohyphae, occasionally also with rhizines 22
- 21: Thallus colour scarcely changing when wet, or thallus brightening but not much darker; photobiont a green alga (sometimes with cephalodia containing cyanobacteria on upper or lower surface); lower surface of thallus usually attached by rhizines 29
- 22 *Upper surface coarsely faveolate to areolate, with or without connecting ridges forming a net-like pattern; lower surface white to pale brown, with naked blister-like areas separated by pale to dark brown or blue-black tomentum*. Thallus loosely attached, not forming a rosette, 8–16 cm wide. Lobes sublinear to irregular, 3–6 mm or 10–20 mm wide; apices rounded. Upper surface yellow-green to olive-brown or tan when dry, with or without soredia or isidia; photobiont *Nostoc*; medulla white. Rhizines sparse to dense, simple or squarrose. Apothecia very rare. [E and SE Australia; on bark, rarely on rock; *L. retigera* and *L. scrobiculata*] **Lobaria** (Schreb.) Hoffm.
Literature: Elix (2001a)
- 22: *Upper surface not reticulate-faveolate or reticulate-areolate; lower surface without naked blister-like areas separated by tomentum* 23
- 23: *Upper surface stiffly hairy or cobwebby-tomentose* 24

- 23: Upper surface smooth or minutely roughened, not hairy or cobwebby-tomentose 25
- 24 *Thallus Pd+ yellow-orange, stiffly hairy or cobwebby-tomentose*; loosely attached, variously lobed, to 5 cm wide. Lobes to 5 mm wide, soraliolate (and sterile) or not (and fertile); soralia marginal, bluish grey; margins entire, often ascending and involute when dry. Lower surface white to pale cream; margins with bundles of blackish rhizohyphae. Apothecia marginal, sessile to subpedicellate, 1–2 mm diam., with photobiont cells penetrating the base of the apothecium (thin section); disc plane to convex, often ±pruinose, dark brown; proper margin sparsely hairy, concolorous with thallus, becoming excluded. Spores simple, ellipsoidal, 10–12 × 7–8 μm. [E Qld, N.S.W. and Tas; on bark in rainforest; 2 spp.]..... **Erioderma** Fée
Literature: Jørgensen & Galloway (1992)
- 24: *Thallus Pd-, cobwebby-tomentose*, forming loosely attached rosettes to 4 cm wide. Lobes separate to almost overlapping, plane to concave, to 6 mm wide, soraliolate; soralia bluish grey, ±linear; margins wavy, slightly thickened, subascending, entire to delicately incised. Upper surface pale greyish blue when dry, dark blue-green when wet. Lower surface white at margins, buff in the centre, with bundles of white to bluish rhizohyphae. Mature apothecia not seen. [E Qld, N.S.W. and Tas; on bark in rainforest] **Leioderma solediatum** D.J.Galloway & P.M.Jørg.
Literature: Jørgensen & Galloway (1992)
- 25 *Thallus solediate; lower surface with a woolly brownish tomentum, sometimes with occasional rhizohyphae near margin.* Thallus ±adnate or loosely attached, forming rosettes to 5 cm wide. Lobes concave to undulate, separate to almost overlapping, 0.5–4 mm wide, with thickened adnate to ascending or involute margins. Upper surface bluish grey to olive-grey or brownish; soralia superficial and marginal to laminal or on lower margins of upturned lobes, concolorous or paler. Lower surface whitish at margins, pale buff to ochre-brown at the centre. Apothecia not seen in Australia. [N.S.W. and Tas.; on bark in wet forest and heathland; 2 spp.]..... **Fuscoderma** (D.J.Galloway & P.M.Jørg.) P.M.Jørg. & D.J.Galloway
Literature: Jørgensen & Galloway (1992)
- 25: *Thallus esorediate and lacking a tomentum; very rarely solediate, then with rhizohyphae* 26
- 26 *Photobiont penetrating the base of the hymenium (thin section).* Thallus rounded or irregular, forming rosettes to 6 cm wide. Lobes concave to plane, elongate to ascending, separate to overlapping, 1–5 mm wide, with scalloped involute margins. Upper surface smooth to uneven, bluish grey, rarely brownish. Lower surface white at the margins, brown towards the centre, with bundles of white to blue-black rhizohyphae. Apothecia sessile, to 1 (–1.5) mm diam.; disc concave to plane, epruinose, pale to dark red-brown; proper margin paler; thalline margin absent. Spores ellipsoidal, 12–23 × 6–12 μm. [N.S.W., Vic. and Tas.; on twigs and mossy rocks; 3 spp.]..... **Leioderma** Nyl.
Literature: Jørgensen & Galloway (1992)
- 26: *Photobiont not penetrating the base of the hymenium*..... 27
- 27 *Apothecia with a proper margin only, or with proper margin surrounded but not obscured by a crown-like thalline margin.* Thallus rounded, ±loosely attached, 0.5–5 (–8) cm wide. Lobes plane to slightly concave, sometimes overlapping, broadly wedge- to fan-shaped, 2–8 mm wide, greyish blue when wet; with or without lobules or granular soralia. Upper surface smooth or transversely ridged; photobiont *Scytonema*. Lower surface whitish to pale buff, usually with white or blue-black rhizohyphae. Apothecia sessile, to 0.3–1.5 (–2) mm diam.; disc concave to plane or convex, reddish brown; proper margin paler or darker. Asci with distinct amyloid plug. Spores ellipsoidal, 10–16 × 4–9 μm. [Southern Australia; on rock and bark; 9 spp.]..... **Degelia** Arv. & D.J.Galloway
Literature: Jørgensen & Galloway (1992); Jørgensen (2001)
- 27: *Apothecia with a thalline margin only, or with thalline margin obscuring the proper margin* 28

- 28** *Thallus with a thick felted prothallus of silky blue-black to brown-black rhizohyphae projecting beyond margin.* Thallus rounded, rosette-forming, closely attached, to 8 cm wide. Lobes plane to slightly convex, separate at the thallus margin, contiguous in the centre, 0.5–2 mm wide. Upper surface smooth or wrinkled, with or without dense isidia, greyish white, pale to dark blue-grey; photobiont *Nostoc*. Apothecia sessile, often aggregated in the thallus centre, 0.4–2.5 mm diam.; disc concave to plane, red-brown to ±black; thalline margin thick, smooth to minutely scalloped. Spores ellipsoidal, 12–16 × 8–10 µm. [E and SE Australia; on mossy bark and rock; 17 spp.] **Parmeliella** Müll.Arg.
Literature: Jørgensen & Galloway (1992); Jørgensen (2001)
- 28:** *Prothallus not prominent, very rarely projecting beyond thallus margin.* Thallus rosette-forming, ±loosely attached, to 8 (–10) cm wide. Lobes plane to concave, 1–4 (–5) mm wide, greyish blue to brownish or blue-green, sometimes isidiate, lobulate or sorediate; margins ±entire or incised. Upper surface smooth or wrinkled, dull or glossy, grey-brown or pale brownish; photobiont *Nostoc*. Lower surface whitish or yellowish to pale buff-brown, with blue-black rhizohyphae. Apothecia sessile, often clustered, to 2.5 mm diam.; disc plane to convex, reddish brown to dark brown; thalline margin scalloped or scaly, obscuring the proper margin. Spores ellipsoidal or subglobose, 9–25 × 5–12 µm. [E and SE Australia; on bark, rock and moss in lowland forest; 25 spp.]..... **Pannaria** Delise
Literature: Jørgensen & Galloway (1992); Jørgensen (2001, 2003)
- 29** Upper surface dull yellow, yellow-green to greenish yellow or straw-yellow, K– (containing usnic acid); apothecia lecanorine, with a ±distinct thalline margin, or lecideine and with a thin excluded proper margin; spores simple, colourless, usually ellipsoidal..... 30
- 29:** Upper surface whitish, grey, grey-green, greenish white, olive-green or dark brown to brown-black, K+ yellow or K– (usnic acid usually lacking); apothecia lecanorine, lecideine, biatorine, or thallus sterile; spores simple to septate, variously shaped, colourless to dark brown..... 41
- 30** *Lower surface ecorticate, felt-like, sometimes veined or pitted; apothecia with only an indistinct proper margin.* Thallus loosely attached, to 10 cm wide and 4 cm tall. Lobes elongate, richly branched, flat to ascending or almost erect, sometimes strongly recurved, 6–12 mm wide, smooth, with a thickly corticate upper surface, lacking soredia and isidia. Lower surface sparsely to moderately rhizinate, off-white to blackish. Apothecia on margins of lobes or terminal on marginal lobes, to 3 mm diam.; disc convex to hemispherical, pale to dark reddish brown. Spores 12–15 × 4–5 µm. [Mainly southern Australia; on soil and litter; 2 spp.]..... **Heterodea** Nyl.
Literature: Filson (1992e)
- 30:** *Lower surface corticate, not veined or pitted; apothecia usually with a distinct thalline margin*..... 31
- 31** Lower surface naked, or with rhizohyphae, tomentum or a thick spongy hypothallus.. 32
- 31:** Lower surface rhizinate, lacking a spongy hypothallus 35
- 32** Thallus unattached or very loosely attached to the substratum..... 33
- 32:** Thallus partly ±crustose and very closely attached to the substratum, or lower surface with a thick spongy hypothallus 34
- 33** *Thallus unattached, contracting into balls or clumps when dry and dispersed by wind, dorsiventral and forming 1–4 cm wide rosettes when wet.* Lobes remaining separate, linear-elongate, 1–3 mm wide, dichotomously branched, smooth, obscurely maculate, with or without soredia, lacking isidia, pseudocypellae and cilia. Lower surface wrinkled, pale. Apothecia rare, sessile to subpedicellate, 0.5–2.5 mm diam.; disc weakly concave, red-brown. Spores 5–10 × 2.5–5 µm. Conidia bifusiform. [Inland Australia; on ±arid soil; 2 spp.]..... **Chondropsis** Nyl. ex Cromb.
Literature: Elix (1994e)

- 33:** *Thallus very loosely attached, remaining dorsiventral when dry.* Lobes separate to overlapping, weakly concave or plane to strongly convoluted, irregular to linear, sparingly to richly branched, \pm apically incised, 0.1–20 mm wide. Upper surface often darkening with age, smooth, wrinkled or cracked, maculate or not, without pseudocyphellae, with or without soredia and isidia; lobe margins often black-rimmed. Lower surface plane or channelled, smooth to wrinkled, pale ivory to yellow, tan, brown or black; rhizines sparse to very dense, rarely absent, usually simple. Apothecia frequently lacking, sessile to subpedicellate; disc usually concave, red-brown to brown or black. Spores ellipsoidal, $5.5\text{--}14 \times 3.5\text{--}8 \mu\text{m}$. Conidia usually bifusiform. [Throughout Australia; most diverse on rock and soil in semi-arid and arid regions; 235 spp.] **Xanthoparmelia** (Vain.) Hale
Literature: Elix (1994z, 1995, 1996b, 1997a, b, 2001b, 2003a); Elix & Kantvilas (1999a, b, 2001); Elix *et al.* (2000); Kantvilas *et al.* (2002)
- 34** *Thallus almost subcrustose; margins lobate and tightly attached.* Thallus to 4 cm wide. Lobes contiguous, sublinear, plane to convex, dull to glossy, 0.2–0.8 mm wide, with or without isidia, lacking soredia, pseudocyphellae, cilia and maculae; thallus centre becoming \pm areolate. Lower surface pale tan to black, tomentose and/or with rhizohyphae. Apothecia initially sunken, becoming sessile, 0.3–0.8 mm diam.; disc concave, brown to brown-black. Spores $9\text{--}14 \times 5\text{--}6 \mu\text{m}$. Conidia elongate-bacilliform. [S.A. and Qld; semi-arid rocks; 3 spp.] **Karoowia** Hale
Literature: Elix (1994j, 2000)
- 34:** *Thallus loosely attached; lower surface with a thick spongy pale yellow-brown to dark brown or black hypothallus.* Thallus to 5–10 (–12) cm wide. Lobes narrow, linear, often constricted, complex-overlapping in the centre, \pm dichotomously branched at thallus margins, 0.5–2 mm wide, with or without isidia or soredia, lacking pseudocyphellae, maculae and cilia. Apothecia sessile to pedicellate, to 3 (–10) mm diam.; disc pale yellowish brown to dark red-brown. Spores $6\text{--}15 \times 4\text{--}6 \mu\text{m}$. Conidia cylindrical to bacilliform. [Mainly SE Australia; usually on bark; 2 spp.]
..... **Pannoparmelia** (Müll.Arg.) Darb.
Literature: Galloway & Sammy (1994b); Kantvilas *et al.* (2002)
- 35** *Lobes with bulbate marginal cilia.* Thallus adnate to tightly adnate, 1–8 (–10) cm wide. Lobes contiguous or separate, sublinear to linear-elongate, usually smooth, (0.3–) 1–3 (–6) mm wide, with or without isidia, lobules and maculae, lacking soredia and pseudocyphellae. Lower surface pale tan to black; rhizines simple to richly branched. Apothecia sessile, 0.5–3 (–6) mm diam.; disc concave to \pm convex, pale to dark brown; margin occasionally rhizinate or with black pycnidia. Spores $3\text{--}12 \times 2\text{--}6 \mu\text{m}$. Conidia bacilliform or bifusiform. [Mainly tropical E Australia; on bark (on rock in Tas.); 24 spp.] **Relicina** (Hale & Kurok.) Hale
Literature: Elix (1994v, 1996a); Kantvilas *et al.* (2002)
- 35:** *Lobes lacking bulbate marginal cilia* 36
- 36** *Lobe apices truncate (as if cut off); rhizines squarrosely to dichotomously branched.* Thallus tightly to loosely adnate, to 2–7 cm wide. Lobes separate to loosely overlapping, sublinear, dichotomously branched, 1–3 mm wide, plane, smooth to wrinkled, white-maculate, with or without terminal soralia, lacking pseudocyphellae, cilia and isidia. Lower surface glossy, wrinkled, \pm pale brown at lobe apices. Apothecia absent or sessile to subpedicellate, 1–5 mm diam.; disc splitting radially. Spores $9\text{--}11 \times 5\text{--}7 \mu\text{m}$. Conidia not seen. [Tas.; usually on bark; *H. reducens* and *H. sinuosa*]
..... **Hypotrachyna** (Vain.) Hale
Literature: Elix (1994h); Kantvilas *et al.* (2002)
- 36:** *Lobe apices rounded or incised; rhizines usually simple* 37
- 37** Primary and marginal lobes broad; widest lobes more than 5 mm wide 38
- 37:** Primary and marginal lobes narrow, less than 2 mm wide 39

- 38 *Lobes apically rounded or subrotund, never incised; spores 12–21 × 5–11 μm.* Thallus usually loosely adnate to adnate, 3–10 (–20) cm wide. Lobes irregular, 1–5 (–8) mm wide, smooth, wrinkled or ridged, with or without soredia, isidia, pseudocyphellae and maculae, lacking cilia. Lower surface black except for a narrow brown marginal zone; rhizines usually simple or tufted. Apothecia sessile to subpedicellate, 1–7 (–10) mm diam.; disc red-brown to dark brown. Conidia usually bifusiform. [Throughout Australia; on bark and rock; 14 spp.]..... **Flavoparmelia** Hale
Literature: Elix (1994g); Kantvilas *et al.* (2002)
- 38: *Lobes ±apically incised; spores 5.5–14 × 3.5–8 μm.* [See 33:].....
..... **Xanthoparmelia** (Vain.) Hale
- 39 *Thallus growing on rock or soil.* [See 33:] **Xanthoparmelia**(Vain.) Hale
- 39: *Thallus growing on bark or wood*..... 40
- 40 *In subalpine or alpine habitats.* Thallus adnate, to 3 cm wide. Lobes sublinear, 0.5–1.5 mm wide, plane, wrinkled or ridged, with incised apices, densely sorediate, lacking pseudocyphellae, isidia, maculae and cilia. Lower surface pale brown to black; rhizines simple or sparingly branched. Apothecia rare, sessile to short-pedicellate, 1–2 mm diam. Spores 7–11 × 2.5–3 μm. Conidia curved-elongate. [SE Australia; on bark and wood] **Parmeliopsis ambigua** (Wulf.) Nyl.
Literature: Elix (1994s); Kantvilas *et al.* (2002)
- 40: *In tropical or subtropical habitats.* Thallus tightly adnate to adnate, (1–) 2–6 (–10) cm wide. Lobes irregular to linear-elongate, contiguous in the centre, spreading at margins, 0.5–2 (–3) mm wide, smooth to transversely cracked, with or without simple cilia, isidia and maculae, lacking soredia and pseudocyphellae. Lower surface pale tan to brown; rhizines simple to richly branched. Apothecia sessile, to 3 mm diam.; disc concave to plane, pale brown to red-brown. Spores 5–9 × 3–6 μm. Conidia bacilliform to fusiform [W.A., N.T. and Qld; mainly on bark; 4 spp.]..... **Relicinopsis** Elix & Verdon
Literature: Elix (1994w)
- 41 Lobes broad, (3–) 5–15 (–30) mm wide..... 42
- 41: Lobes narrow; broadest lobes < 5 mm wide..... 49
- 42 *Upper surface coarsely reticulate-faveolate, with connecting ridges; lower surface pale brown, with naked blister-like areas separated by dark brown tomentum.* Thallus adnate centrally, ±free at the margin, 10–15 cm wide. Lobes sublinear, irregularly to dichotomously branched, 4–10 mm wide; apices ±rounded; margins subascending. Upper surface tan to olive-brown, isidiate; isidia mainly on ridges, at first cylindrical, becoming coralloid. Lower surface sparsely to densely rhizinate centrally. Apothecia rare on ridges, 3–5 mm diam.; disc plane, red-brown; thalline margin ±isidiate. Spores 3-septate, fusiform, 20–22 × 5–6 μm. [E Australia; on bark (rarely on rock) in forest]....
..... **Lobaria isidiophora** (Schreb.) Hoffm.
Literature: Elix (2001a)
- 42: *Upper surface not reticulate-faveolate; lower surface without naked blister-like areas separated by tomentum.* 43
- 43 Upper surface with linear pattern-forming or dot-like pseudocyphellae, or with reticulate cracks or prominent effigurate maculae..... 44
- 43: Upper surface without pseudocyphellae; if maculate, the maculae neither effigurate nor forming reticulate patterns 48
- 44 Pseudocyphellae dot-like 45
- 44: Pseudocyphellae or maculae linear, often forming intricate or reticulate patterns 46

- 45 *Lower surface whitish to pale brown, occasionally ±black (then lobes 4–8 mm wide and rhizines dense). Thallus loosely adnate to adnate, 5–20 cm wide. Lobes 4–10 (–15) mm wide, pale grey to grey-green (sometimes bluish or blackening with age), eciliate, with or without soredia and isidia; margins often ascending; apices rounded; pseudocyphellae laminal or marginal; rhizines usually sparse and concolorous with the lower surface. Apothecia subpedicellate to pedicellate, 2–8 (–10) mm diam.; disc concave to plane, pale to dark brown. Spores broadly ellipsoidal to subglobose, 10–18 × 6–15 μm. Conidia thread-like or hook-shaped. [Mainly S and E Australia; on bark, rock and wood; 6 spp.] **Punctelia** Krog
Literature: Elix (1994u); Kantvilas *et al.* (2002)*
- 45: *Lower surface black, but paler near lobe margins and with sparse rhizines. Thallus loosely adnate, 6–14 cm wide. Lobes 5–20 mm wide, pale grey, eciliate, with marginal soredia; apices rounded; pseudocyphellae laminal. Apothecia not seen in Australia. [SE Qld; on bark and rock] **Cetrelia olivetorum** (Nyl.) W.L.Culb. & C.F.Culb.
Literature: Elix (1994d)*
- 46 *Lobe margins without cilia. Thallus loosely adnate to adnate, thin and firm or thick and leathery, 8–20 (–60) cm wide. Lobes crowded or contiguous, linear or irregular, (2–) 4–10 (–25) mm wide, pale to dark greenish grey to brownish grey, with or without isidia or soredia. Lower surface black; rhizines simple, forked or squarrose. Apothecia sessile to pedicellate, 4–15 mm diam.; disc pale to dark brown, concave, becoming undulate or fissured. Spores ellipsoidal, 10–15 × 6–10 μm. Conidia cylindrical or bacilliform to bifusiform. [Mainly S and E Australia; on rock, soil and bark; 14 spp.]... **Parmelia** Ach.
Literature: Elix (1994e); Kantvilas *et al.* (2002)*
- 46: *Lobe margins with simple or branched black cilia*..... 47
- 47 *Rhizines squarrose. Thallus loosely adnate to adnate, to 4–20 cm wide. Lobes plane, 3–30 mm wide. Upper surface pale grey to dark grey or grey-green, smooth to wrinkled, finely maculate, with or without soredia, lacking pseudocyphellae and isidia. Lower surface glossy black, with or without rhizines; margins brown. Apothecia subpedicellate to pedicellate, 2–10 mm diam.; disc concave, brown to dark brown, usually becoming perforated. Spores ellipsoidal, 10–18 × 6–11 μm. Conidia bacilliform or filiform. [S and E Australia; on bark and rock; 6 spp.] **Rimelia** Hale & A.Fletcher
Literature: Elix (1994x); Kantvilas *et al.* (2002)*
- 47: *Rhizines usually simple, rarely branched. Thallus loosely adnate to adnate, to 5–20 cm wide. Lobes plane, irregular, 5–15 mm wide. Upper surface pale grey to grey, yellow-grey, grey-green or pale green, maculate, without pseudocyphellae, with or without soredia and isidia. Lower surface pale tan to brown or black; rhizines dimorphic, 0.1–0.5 mm long and *c.* 1–2 mm long. Apothecia subpedicellate to pedicellate, 2–30 mm diam.; disc brown to brown-black, perforated or not. Spores ellipsoidal, 8–19 × 5–10 μm. Conidia bacilliform or filiform. [E Australia; mainly on bark; 9 spp.].....
..... **Canomaculina** Elix & Hale
Literature: Elix (1994y)*
- 48 *Lobes eciliate or with cilia (0.2–) 0.5–4 (–6) mm long; if cilia < 0.5 mm long, not in lobe axils. Thallus loosely adnate to adnate, (3–) 5–10 (–30) cm wide. Lobes rounded, (2–) 5–15 (–30) mm wide, grey, grey-green or pale green, with or without isidia or soredia. Lower surface brown or black, with a rhizine-free marginal zone > 1 mm wide; rhizines usually simple. Apothecia usually pedicellate, (1–) 3–10 (–25) mm diam.; disc pale to dark brown Spores 8–37 × 5–18 μm. Conidia bacilliform, sometimes with a swelling at one end. [Mainly tropical, subtropical and warm-temperate Australia; on bark or rock; 40 spp.]..... **Parmotrema** A.Massal.
Literature: Elix (1994t, 1995, 1996b); Kantvilas *et al.* (2002); Elix & Rogers (2004)*
- 48: *Lobes ciliate especially in lobe axils; cilia c. 0.5 mm long. Thallus loosely adnate to adnate, leathery, 5–20 cm wide. Lobes 3–10 mm wide, yellowish grey to pale grey-green, sparsely isidiate. Lower surface black; rhizines simple. Apothecia sessile, 2–7 mm diam.; disc brown. Spores 14–18 × 8–10 μm. Conidia bacilliform. [NE Qld; on bark and rock] **Parmelinella wallichiana** (Taylor) Elix & Hale
Literature: Elix (1994q)*

- 49: Thallus attached by a cottony hypothallus, or tomentose and with rhizohyphae 50
49: Thallus usually attached by simple or variously branched rhizines 53
- 50: Thallus with cephalodia 51
50: Thallus lacking cephalodia 52
- 51: *Thallus yellowish or golden brown when dry; cephalodia with conspicuous blue-grey granular soralia*. Thallus closely attached, 2–6 cm wide. Lobes irregularly divided, concave or plane, 1–3.5 mm wide, lettuce-green when wet. Cephalodia to 1 mm wide, becoming lobed, pale brown, yellowish, flesh-coloured or concolorous with the thallus; soredia dark grey-blue when wet. Apothecia rare, sessile, 0.5–1.5 mm wide, ±cup-like; disc pale pink to red-brown, ±white-pruinose; thalline margin often fissured. Spores simple, ovoid or subglobose, 12–15 × 10–13 µm. [N.S.W., Vic. and Tas.; on bark and rock in forest] **Psoroma durietzii** P.James & Henssen
Literature: Jørgensen & Galloway (1992)
- 51: *Thallus pale grey-green when dry; cephalodia lacking soralia*. Thallus ±closely attached, forming rosettes or irregularly spreading, 3–10 (–20) cm wide. Lobes elongate, 1–3 mm wide, concave, ±raised at margins, ±ascending or overlapping towards centre. Upper surface bright green to olive-brown when wet, with or without soredia or with scale-like phyllidia; soredia granular, in marginal soralia, whitish or greenish white. Lower surface ±tomentose with simple yellow-brown to brown rhizohyphae from centre to margin. Cephalodia globose and clustered or flattened-lobate, to 2 mm wide, pale purplish grey or purple-black. Apothecia sessile or subpedicellate, 1–5 mm diam.; disc plane to weakly convex, sometimes gyrose-etched, pale orange-red to dark brown or black; thalline margin thick. Spores subglobose to ovoid-ellipsoidal, 11–20 × 8–12 µm. [E Qld, N.S.W., Vic, Tas.; on bark (rarely on rock) in forest; 25 spp.] **Pannaria** Delise
Literature: Jørgensen & Galloway (1992); Jørgensen (2001, 2003)
- 52: *Hypothallus whitish to pale brown, sparse, not or scarcely projecting beyond lobe margins*. Thallus ±loosely attached, to 6 cm diam. Lobes plane to convex, 0.3–1 mm wide; apices free. Upper surface greenish, greenish grey to yellowish brown; isidia sparse to abundant, cylindrical, simple or branched. Lower surface ecorticate. Apothecia sessile, 0.5–1.5 mm diam.; disc plane to slightly convex, white, pink or brownish, surrounded by minutely scalloped thalline lobules. Spores 8 per ascus, 1–3-septate, 23–37 × 1.8–2 µm. Conidia filiform. [NE Qld; on bark and mossy trunks] **Physcidea australasica** Kalb & Elix
Literature: Kalb & Elix (1995)
- 52: *Hypothallus brown-black, dense and prominent, often projecting beyond lobe margins*. Thallus pale grey, bluish grey or olive-grey, loosely to firmly attached, to 2–30 cm wide. Lobes plane to ±convex, 0.4–1.8 mm wide, often ±articulated. Upper surface without pseudocypbellae and maculae, with or without soredia and isidia. Apothecia uncommon, sessile to pedicellate, 1–2 mm diam.; disc dark brown to black. Spores many per ascus, simple, elongate, c. 12 × 2–3 µm. Conidia bacilliform. [E Qld and N.S.W.; on rock and bark; 3 spp.] **Anzia** Stizenb.
Literature: Galloway & Sammy (1994a); Yoshimura *et al.* (1995)
- 53: Lobes with marginal cilia 54
53: Lobes lacking marginal cilia 65
- 54: *Cilia swollen at base (bulbate)*. Thallus adnate to tightly adnate, 1–6 (–10) mm wide. Lobes contiguous, rarely overlapping, 0.1–2.5 (–5) mm, with or without isidia or lobules, esorediate. Upper surface grey, smooth, maculate. Lower surface pale brown to black; rhizines simple to dichotomously branched. Apothecia sessile to subpedicellate, 0.8–4 mm diam.; disc concave, pale to dark brown, with or without a crown of minute black swellings on inner part of thalline margin. Spores 6–15 × 4–8 µm. Conidia bifusiform or bacilliform. [Tropical and subtropical E Australia; on bark and rock; 9 spp.] **Bulbothrix** Hale
Literature: Elix (1994a, 1995)
- 54: *Cilia simple or branched, not bulbate* 55

- 55 *Cilia markedly tapered from base, commonly forked; upper surface of thallus with effigurate maculae.* Thallus loosely adnate to adnate, 5–12 cm wide. Lobes plane, irregular to linear, 1–4 mm wide. Upper surface pale to mid-grey, with or without soredia or isidia; cilia 0.3–1 mm long. Lower surface usually black; rhizines black, moderately dense to dense, simple to squarrose or sparingly forked. Apothecia subpedicellate, 2–8 mm diam.; disc brownish. Spores ellipsoidal, 12–20 × 8–12 μm. Conidia filiform. [E Australia; mainly on bark; 9 spp.; including *Rimeliella*]..... **Canomaculina** Elix & Hale
Literature: Elix (1994b, 1997c)
- 55: *Cilia not markedly tapered, mostly simple; upper surface of thallus emaculate or with simple maculae* 56
- 56 Medulla at least partly yellow to orange or orange-red, C– or C+ more intensely yellow 57
- 56: Medulla white; if partly yellow, C+ rose or red 58
- 57 *Lobes 0.2–1.5 mm wide.* [See 85:]..... **Phaeophyscia** Moberg
- 57: *Lobes (1–) 2–4 mm wide.* Thallus loosely adnate to adnate, 4–10 cm wide. Lobes plane, with or without soredia and isidia; cilia sparse to dense. Upper surface grey, often with a yellowish tinge, emaculate or with simple maculae, without pseudocyphellae, with or without soredia and isidia. Lower surface black. Apothecia sessile to subpedicellate, 2–5 mm diam. Spores ellipsoidal, 8–14 × 5–8 μm. Conidia bacilliform or weakly bifusiform. [Coastal Qld and N.S.W.; on bark; 3 spp.]. **Myelochroa** (Asah.) Elix & Hale
Literature: Elix (1994l)
- 58 *Lobe apices with helmet-shaped soralia.* Thallus loosely attached, to 2 cm diam. Lobes to 2 mm wide at tips; cilia off-white to black. Upper surface pale to dark grey, K+ yellow, rarely white-pruinose. Lower surface white to grey; rhizines sparse, white to black. Apothecia not seen in Australia. [SE Australia; on bark and rock]..... **Physcia adscendens** H.Olivier
Literature: Purvis *et al.* (1992); Moberg (2001)
- 58: *Lobe apices without helmet-shaped soralia* 59
- 59 *Cilia 1.5–5 (–15) mm long, off-white, grey or black.* [See 71]..... **Heterodermia** Trevis.
- 59: *Cilia 0.5–2 mm long, grey-brown to black*..... 60
- 60 *Lobes becoming markedly channelled.* Thallus loosely adnate, straggling, to 3–7 cm wide. Lobes linear, strap-shaped, 0.5–2.5 mm wide, grey to grey-green, with ±apical soralia. Lower surface glossy, wrinkled, black, but pale brown near lobe apices; rhizines sparse, simple or squarrose. Apothecia not seen in Australia. [Vic.; on bark]..... **Everniastrum sorocheilum** (Vain.) Hale ex Sipman
Literature: Elix (1994f)
- 60: *Lobes not becoming channelled*..... 61
- 61 *Cilia grey-brown, robust.* Thallus to 4 cm wide. Lobes rounded to elongate, plane to convex, initially ascending, later overlapping, 1–2 (–2.5) mm wide, smooth, lacking soredia and isidia; apices finely white-pruinose. Upper surface whitish green to grey-green. Lower surface with grey-brown to dark brown tomentum; rhizines grey-brown, submarginal to marginal, ±simple, 0.3–1.5 mm long. Apothecia 0.3–1.5 mm diam., on a whitish 0.5–1 mm long stalk; disc concave to weakly convex, black; thalline margin initially thick, pale grey, becoming excluded. Spores 1-septate, ellipsoidal, 10–17 × 3.5–5 μm. [SE Qld; on damp rocks] **Solenopsora elixiana** Verdon & Rambold
Literature: Verdon & Rambold (1998)
- 61: *Cilia black, slender*..... 62
- 62 *Upper surface K–.* [See 86]..... **Phaeophyscia hispidula** (Ach.) Essl.
- 62: *Upper surface K+ yellow* 63

- 63: *Lobe apices ±rounded; cilia mainly in lobe axils, sparse to moderately dense.* Thallus tightly adnate to adnate, 2–10 cm wide. Lobes plane, sublinear to subirregular, 0.5–5 mm wide, with or without soredia, pustules or isidia. Upper surface grey to grey-green; medulla white, very rarely lower parts yellow-orange. Lower surface dark brown to black; rhizines usually simple. Apothecia sessile to subpedicellate, to 5 mm diam; disc pale to dark brown. Spores broadly ellipsoidal or subglobose, 8–14 × 5–9 µm. [S and E Australia; usually on bark or wood, rarely on rock; 9 spp.] **Parmelina** Hale
Literature: Elix (1994p); Elix & Kantvilas (2001); Kantvilas *et al.* (2002)
- 63 *Lobe apices truncate (as if cut off); cilia mostly evenly dispersed, moderately dense to dense* 64
- 64 *Rhizines usually simple.* Thallus loosely to tightly adnate, 2–6 (–10) cm wide. Lobes plane, linear or sublinear, 0.5–5 mm wide, with or without soredia, pustules or isidia. Upper surface grey; medulla white, rarely partly yellow. Lower surface ivory to black. Apothecia sessile to subpedicellate, often rare or absent, 1–4 (–20) mm diam.; disc pale to dark brown. Spores ellipsoidal, 9–20 × 6–14 µm. [E and SE Australia; usually on bark; 9 spp.] **Parmelinopsis** Elix & Hale
Literature: Elix (1994r); Kantvilas *et al.* (2002)
- 64: *Rhizines dichotomously branched.* [See 73] **Hypotrachyna** (Vain.) Hale
- 65 *Lower surface of thallus tomentose at least in the centre.* Thallus loosely or tightly adnate, membranous to leathery, 3–10 (–20) cm wide. Lobes sublinear to irregular, 1–5 mm wide; apices rounded or truncate. Upper surface grey, green, yellow-green or pale olive-brown, bright green when wet, smooth, wrinkled or pitted, lacking soredia and isidia. Lower surface pale yellow to dark brown; rhizines sparse to dense, simple or squarrose. Apothecia sessile to subpedicellate, 2–5 (–7) mm diam.; disc dark red to red-brown, with a thalline margin. Spores 1–15-septate, fusiform or acicular, 35–80 × 3–9 µm, colourless or brown. [E Qld and NE N.S.W.; on bark, rarely on rock and mosses; 8 spp.] **Lobaria** (Schreb.) Hoffm..
Literature: Elix (2001a)
- 65: *Lower surface of thallus lacking tomentum* 66
- 66 Upper surface K+ yellow or K+ yellow → red 67
- 66: Upper surface K– 76
- 67 *Thallus usually very closely appressed to the substratum by means of the lower cortex or by very short and inconspicuous rhizines* 68
- 67: *Thallus distinctly rhizinate, usually more loosely attached to the substratum* 69
- 68 *Upper surface with linear, irregular or reticulate pseudocyphellae; lobes not fusing laterally; medulla shades of yellow, orange, red or white.* Thallus rounded to irregular, to 6 (–20) cm wide. Lobes dichotomously to irregularly branched, concave to convex, radiating or contiguous, less commonly overlapping, 0.2–1 (–3) mm wide. Upper surface silvery white, yellowish white, pale grey or pale grey-brown, sometimes pruinose, with or without soralia, isidia or pustules. Lower surface black. Apothecia sessile, to 1.5 mm diam.; disc plane to slightly convex, black; proper margin usually prominent, sometimes with a thalline rim. Spores 1-septate, oblong to ellipsoidal, 10–22 × 5–9 µm, brown, thick-walled. [Mainly coastal in tropical and subtropical Australia; on rock, bark and wood; 26 spp.] **Pyxine** Fr.
Literature: Rogers (1986a, b); Sammy (1988); Kalb (1994, 2001)
- 68: *Upper surface lacking pseudocyphellae; lobes frequently fusing laterally; medulla white.* Thallus rounded to irregular, to 2–6 (–15) cm wide, sometimes appearing almost crustose. Lobes radiating, dichotomously branched, 0.2–1.5 (–5) mm wide; apices rounded or truncate. Upper surface whitish to pale grey or greenish grey to grey-brown and C–, or yellowish grey and C+ orange, with or without pruina, soralia or finger-like or club-shaped isidia. Lower surface pale yellowish brown, brown-black or black. Apothecia sessile or short-stalked, 0.2–1.5 (–2.5) mm diam.; disc concave to convex, black, sometimes white- or purple-pruinose; thalline margin smooth, minutely scalloped or sorediate. Spores 1-septate, ellipsoidal, 10–25 × 4.5–10 µm, brown, thick-walled. [Mainly tropical and subtropical Australia; on rock and bark; 13 spp.]

-**Dirinaria** (Tuck.) Clem.
Literature: Awasthi (1975); Kalb (1996, 2001)
- 69** Upper surface with pseudocyphellae 70
69: Upper surface lacking pseudocyphellae 71
- 70** *Lower surface usually whitish to pale brown; pseudocyphellae dot-like.* [See **45**].....
.....**Punctelia** Krog
- 70:** *Lower surface black; pseudocyphellae or maculae linear, often forming intricate or reticulate patterns.* [See **46**]..... **Parmelia** Ach.
- 71** *Upper cortex with hyphae running parallel to upper surface (thin section).* Thallus forming rosettes or extensive mats to 10 (–20) cm wide, loosely or firmly attached. Lobes short, separate or contiguous or ascending and linear-elongate, richly branched, sometimes overlapping, 0.5–3 (–7) mm wide, plane to slightly convex. Upper surface pale grey to greenish white (the thallus centre sometimes much darker), with or without laminal, apical or marginal soralia, isidia or lobules. Lower surface corticate or decorticate; pale to dark, sometimes blue- to purple-black in the centre; rhizines simple to branched, 0.5–3 (–9) mm long, pale grey to black, usually marginal and darker towards lobe apices. Apothecia sessile or pedicellate, 0.5–5 (–10) mm diam.; disc plane to slightly convex, dark brown to ±black; thalline margin entire, scalloped, sorediate, isidiate or lobulate. Spores 1-septate, ellipsoidal, 20–50 × 10–24 µm, brown. [Mainly in tropical and subtropical Qld and N.S.W.; usually on bark or rock; 24 spp.]
.....**Heterodermia** Trevis.
Literature: Kurokawa (1962, 1973)
- 71:** *Upper cortex of rounded or polygonal cells* 72
- 72** *Lower surface of lobes with a narrow erhizinate marginal zone.* Thallus adnate or tightly adnate, 1–8 (–12) cm wide. Lobes sublinear to ±irregular, 0.5–5 (–7) mm wide; apices usually ±rounded. Upper surface greyish white to grey or grey-green, with or without maculae, isidia, pustules and soredia. Lower surface usually black, rarely pale brown; rhizines simple, tufted or not, concolorous. Apothecia sessile or subpedicellate, 0.5–5 (–15) mm diam.; disc usually concave, red-brown to dark brown; margin entire, scalloped, sorediate or pustulate. Spores usually ellipsoidal, 7–20 × 4–9 µm. Conidia usually bifusiform. [Mainly tropical and subtropical Australia; on bark and rock; 14 spp.] **Canoparmelia** Elix & Hale
Literature: Elix (1994c)
- 72:** *Lower surface of lobes rhizinate to margins* 73
- 73** *Rhizines dichotomously branched.* Thallus loosely to tightly adnate, 2–10 (–13) cm wide. Lobes sublinear, rarely subirregular or linear-elongate, 0.5–5 (–6) mm wide; apices truncate, incised or rarely ±rounded. Upper surface whitish to grey, with or without maculae, soredia, pustules or isidia. Lower surface black, sometimes paler towards lobe apices; rhizines conspicuously projecting beyond margins, black. Apothecia sessile to subpedicellate, 2–10 mm diam.; disc brown to dark brown. Spores ellipsoidal, 6–16 × 3–10 µm. Conidia bifusiform. [Mainly tropical and subtropical Australia; on bark and rock, rarely on soil; 21 spp.] **Hypotrachyna** (Vain.) Hale
Literature: Elix (1994h, 1995, 2001c); Kurokawa & Moon (2000); Kantvilas *et al.* (2002)
- 73:** *Rhizines simple, but sometimes with tufted tips* 74
- 74** *Growing on dead wood.* Thallus adnate, to 2–5 cm wide. Lobes sublinear, 0.8–1.5 mm wide. Upper surface grey to whitish grey or grey-green, without maculae, with or without soredia and isidia. Lower surface whitish to pale brown; rhizines usually simple, sometimes tufted, concolorous. Apothecia not seen in Australia. [Southern W.A., N.S.W., Vic. and Tas.; 2 spp.]..... **Imshaugia** S.L.F.Mey.
Literature: Elix (1994i); Kantvilas *et al.* (2002)
- 74:** *Growing on bark or rock*..... 75

- 75 *Thallus on rock, never sorediate; lower surface of most species black; if predominantly pale brown, then usually darker brown towards lobe apices.* [Formerly *Paraparmelia*; see 33:]..... **Xanthoparmelia** (Vain.) Hale
- 75: *Thallus usually on bark, often sorediate; lower surface of most species white, pale pink, pale grey or pale brown; if dark grey to black, then usually paler towards lobe apices.* Thallus rounded or irregular, usually loosely adnate, 2–7 (–10 cm wide). Lobes short to elongate, radiating to overlapping, 0.5–2 (–5) mm wide; apices rounded or incised, sometimes ascending. Upper surface whitish, pale to dark grey, brownish or bluish grey, sometimes white-pruinose, often with a frosted appearance, with or without soredia, isidia or pustules. Lower surface with sparse to numerous simple or forked rhizines. Apothecia uncommon, sessile to short-stalked, to 3 mm diam.; disc brown to black, sometimes white-pruinose; thalline margin entire, scalloped or sorediate. Spores 1-septate, ellipsoidal, 16–33 × 6.5–14 µm, brown [Throughout Australia; 18 spp.]..... **Physcia** (Schreb.) Michx.
- Literature:* Moberg (1977, 2001)
- 76 Apothecia with a proper margin only 77
- 76: Apothecia with a distinct thalline margin, or thallus sterile 78
- 77 *Thallus loosely attached to the substratum; upper surface without pseudocyphellae; lower surface ecorticate.* Thallus intricately and deeply dissected, pale grey to green, forming rosettes to 6 cm wide or colonies to 30 cm wide, lacking soredia and isidia, corticate above. Lobes strongly convex, 0.4–1.5 mm wide, ±overlapping; sinuses deep; ultimate lobes short and broad; margins minutely scalloped to lobulate; apices recurved especially when fertile. Lower surface whitish brown with simple pale to medium brown rhizines, sometimes attached by a hyphal mat. Apothecia short-stalked, 0.7–1.8 mm diam.; stalk 0.25–0.5 mm long; disc ±strongly convex, ±proliferating, brown to black; margin ±darker than disc, becoming excluded. Spores simple, ovoid to narrowly ovoid, 10–15 × 5–7 µm. [Tropical Qld; on bark and rock; 2 spp.]..... **Myelorrhiza** Verdon & Elix
- Literature:* Verdon (1992a)
- 77: *Thallus usually very tightly attached to the substratum, lackin; upper surface with pseudocyphellae; lower surface corticate.* [See 68]..... **Pyxine** Fr.
- 78 Lobes pruinose (sometimes only the tips)..... 79
- 78: Lobes not pruinose..... 82
- 79 *Thallus lacking soredia and isidia; apothecia stalked; spores colourless; lower surface tomentose and rhizinate.* [See 61]..... **Solenospora elixiana** Verdon & Rambold
- 79: *Thallus sterile and sorediate or isidiate and/or with sessile apothecia; spores brown; lower surface lacking tomentum*..... 80
- 80 *Upper surface with pseudocyphellae.* [See 68] **Pyxine** Fr.
- 80: *Upper surface without pseudocyphellae* 81
- 81 *Thallus ±loosely or closely appressed to the substratum; rhizines dense, simple or squarrose, whitish, grey or black.* Thallus rounded or irregular, to 10 (–15) cm wide. Lobes short to elongate, separate or overlapping, 0.6–2 mm wide, pale grey-brown, grey or dark brown. Upper surface blue- or grey-pruinose at least at the lobe tips, with or without isidia and soralia; soralia discrete or forming a continuous crust in the thallus centre. Lower surface whitish to brown-black in the centre. Apothecia to 5 mm diam.; disc brown, but often pruinose; thalline margin lobulate or sorediate. Spores 1-septate, ellipsoidal, 25–38 × 12–20 µm, brown, minutely warted. [W.A., N.T., S.A., Vic. and Tas.; usually on nutrient-enriched bark; 2 spp., but records doubtful] **Physconia** Poelt
- Literature:* Moberg (1987); Purvis *et al.* (1992)

- 81:** *Thallus very closely appressed to the substratum; rhizines sparse and black, or absent.* Thallus usually rounded, sometimes \pm crustose in the centre, to 2 cm wide. Lobes 0.2–1 (–1.5) mm wide, pale grey-brown to dark brown. Upper surface pruinose, with or without soralia; soralia discrete or forming a continuous crust in the thallus centre, grey-green to dark red-brown. Lower surface black in the centre, paler towards the margin. Apothecia to 1 mm diam.; disc brown to blackish; thalline margin weakly scalloped or sorediate. Spores 1-septate, ellipsoidal, $15\text{--}22 \times 7\text{--}11 \mu\text{m}$, brown. [All States and Territories except W.A.; usually on nutrient-enriched bark; 3 spp.]..... **Hyperphyscia** Müll.Arg.
Literature: Moberg (1987); Purvis *et al.* (1992)
- 82:** Most lobes 0.3–1 mm wide 83
82: Most lobes 1–2.5 (–4) mm wide 86
- 83:** *Thallus on rock or soil; thallus centre distinctly wrinkled, fissured or areolate; lobe apices smooth, sometimes glossy, often paler.* Thallus loosely to very tightly adnate, or crust-like or cushion-forming, 1–12 cm wide. Lobes slightly concave to plane or convex, short and rounded to irregular, sublinear or linear-elongate. Upper surface brown or olive-brown to brown-black or grey-black, N+ blue-green (rarely N+ pale blue and partly negative), with or without maculae and isidia, lacking pseudocyphellae and soredia. Lower surface ivory or pale tan to black; rhizines simple, rarely tufted or clustered, pale tan to black. Apothecia immersed, sessile or short-pedicellate, 0.3–1.2 mm diam.; disc concave to convex or undulate, pale brown to red-brown or black-brown. Spores ellipsoidal or bean-shaped, $7\text{--}13 \times 3.5\text{--}7 \mu\text{m}$. Conidia usually bifusiform. [Mainly southern Australia; 40 spp.]..... **Neofuscelia** Essl.
Literature: Elix (1994m, 1996b, 1997a, b, 1999, 2003b); Kantvilas *et al.* (2002)
- 83:** *Thallus usually on bark or wood; thallus centre not distinctly wrinkled, fissured or areolate* 84
- 84:** *Growing on dead wood.* Thallus grey, otherwise very similar to *P. ambigua* (see 40). [Tas.]..... **Parmeliopsis hyperopta** (Ach.) Arnold
Literature: Kantvilas *et al.* (2002)
- 84:** *Growing on bark and rock, especially in nutrient-enriched habitats* 85
- 85:** *Rhizines sparse or absent; thallus very closely appressed to the substratum.* Thallus usually rounded, sometimes \pm crustose in the centre, to 2 cm wide. Lobes 0.2–0.5 (–1) mm wide, pale grey-brown to dark brown. Upper surface with soralia that are discrete or form a continuous crust in the thallus centre. Lower surface black in the centre, paler towards the margin. Apothecia very rare, sessile, to 1 mm diam.; disc brown to blackish; thalline margin smooth. Spores 1-septate, ellipsoidal, $13\text{--}22 \times 7\text{--}11 \mu\text{m}$, brown. [N, E and SE Australia; usually on bark] **Hyperphyscia adglutinata** (Flörke) H.Mayrhofer & Poelt
Literature: Moberg (1987); Purvis *et al.* (1992)
- 85:** *Rhizines numerous, black, simple; thallus closely to \pm loosely appressed to the substratum.* Thallus rounded to irregular, to *c.* 5 cm wide. Lobes short to elongate, usually separate, sometimes overlapping, 0.2–1.5 mm wide. Upper surface pale greyish brown to brown or dark brown, sometimes greenish (especially when wet), with or without discrete or confluent soralia. Lower surface usually dark brown to black; rhizines sometimes projecting beyond lobe margins. Apothecia sessile, 0.5–3 mm diam.; disc brown to black; thalline margin smooth or lobulate, occasionally with rhizines on the underside. Spores 1-septate, ellipsoidal, $16\text{--}27 \times 6\text{--}12 \mu\text{m}$, brown. [All States and Territories except N.T.; usually on bark; 5 spp.]... .. **Phaeophyscia** Moberg
Literature: Moberg (1977); Purvis *et al.* (1992)
- 86:** *Thallus pale greenish grey to pale grey-brown.* Thallus loosely appressed. Lobes 1–4 (–6) mm wide; apices truncate, incised. Upper surface with or without coarse soredia. Lower surface black, densely rhizinate; rhizines simple to squarrose, often projecting beyond lobe margins. Apothecia rare, sessile, 1–3 mm diam.; disc dark brown to black; thalline margin lobulate or with a fringe of rhizines. [Qld, N.S.W. and A.C.T.; on bark] **Phaeophyscia hispidula** (Ach.) Essl.

- Literature:* Brodo *et al.* (2001)
- 86:** *Thallus olive-brown, brown, brown-black or grey-black*..... 87
- 87** *Growing on bark, very rarely on rock; medulla C+ rose-pink.* Thallus loosely to tightly adnate, 1.5–5 (–7) cm wide. Lobes irregular to sublinear, 0.5–4 (–6) mm wide. Upper surface brown to brown-black, N– or N+ pale red, without maculae, with or without pseudocyphellae, isidia and soredia. Lower surface pale tan to black; rhizines mostly simple, rarely forked, tan to black. Apothecia usually sessile, 0.5–1.5 mm diam.; disc concave to plane, red-brown to brown-black. Spores ellipsoidal, 10–20 × 7–10 µm. Conidia fusiform to weakly bifusiform. [SE Australia; 4 spp.]..... **Melanelia** Essl.
- Literature:* Elix (1994k); Kantvilas *et al.* (2002)
- 87:** *Growing on rock, rarely on soil and very rarely on wood; medulla usually C–, rarely C+ yellow or rose-pink.* [See **83**] **Neofuscelia** Essl.

KEY C: SQUAMULOSE GENERA

- 1** Fruiting structure a perithecium, or an apothecium with a pore-like or minute and deeply sunken disc..... 2
- 1:** Fruiting structure an apothecium; disc open, not pore-like or minute and deeply sunken, or thallus sterile 10
- 2** Thallus gelatinous when wet, brownish black to black; photobiont a cyanobacterium ... 3
- 2:** Thallus not gelatinous when wet, variously coloured (usually not blackish); photobiont a green alga 5
- 3** *Squamules firmly attached by hyphae of the medulla, minute and rounded or angular, aggregated into a ±continuous crust.* Apothecia with a pore-like or minute and deeply sunken red-brown to blackish disc; thalline margin prominent; proper margin poorly developed. Spores simple, globose to ellipsoidal. [Vic. and Tas.; on rock and soil; 3 spp.] **Pyrenopsis** Nyl.
- Literature:* Purvis *et al.* (1992)
- 3:** *Squamules more loosely attached by an umbilicus or by rhizoidal strands, robust, solitary and rosette-forming, or squamules aggregated* 4
- 4** *Thallus 4–5.5 mm wide, epruinose.* Squamules solitary, plane, rosette-forming, smooth or radially furrowed, attached by aggregated rhizoidal strands. Lobes 0.6–1.8 mm long, 0.3–0.7 mm wide, lacking soredia. Apothecia immersed, crowded, 0.1–0.3 mm diam.; disc dark brown. Spores simple, broadly ellipsoidal, 16–18 × 11–12 µm. [NE Qld; on coastal rocks]..... **Paulia aldabrensis** Henssen
- Literature:* Henssen (1986)
- 4:** *Thallus 8–20 mm wide, often bluish white-pruinose.* Squamules solitary or aggregated, umbilicate, brownish black, with or without granulose soredia. Apothecia very rare, resembling perithecia, 0.1–0.3 mm diam. Spores simple, ellipsoidal, 8–12 × 6–7 µm. [Qld, N.S.W. and Vic.; on calcareous rocks] **Thyrea girardii** (Durieu & Mont.) Bagl. & Car.
- Literature:* Clauzade & Roux (1985)
- 5** *Perithecia containing elongate to globose or cuboid algae (thin section).* Thallus minutely squamulose (squamules 0.5–2 mm wide) to large-squamulose (3–15 mm wide). Squamules rounded to deeply lobate, discrete to contiguous or overlapping, corticate, concave to convex, yellow-brown to grey-brown, red-brown or dark olive-brown. Lower surface pale brown to brown-black, attached by stout rhizines, delicate rhizohyphae or holdfasts. Perithecia immersed to semi-immersed, 0.1–0.5 mm diam., usually ±pyriform, lacking an involucrellum; apex concolorous to brown or black. Spores muriform, thin-walled, colourless to dark brown, 1 per ascus and 60–170 × 20–70 µm, or 2 per ascus and 20–70 × 9–24 µm. [Throughout temperate and arid Australia; mainly on soil (also on rock), often forming extensive colonies; 11 spp.] **Endocarpon** Hedw.
- Literature:* McCarthy (2001b)

- 5: *Perithecia not containing algae* 6
- 6 *Thallus on limestone*, crustose-areolate to minutely squamulose, dark olive-green, dark brown or greenish black, ±smooth, 0.2–0.3 (–0.5) mm thick, corticate. Squamules plane to convex, usually contiguous, 0.1–1 mm wide, often slightly attenuated at the base. Perithecia ±immersed, 1–3 per squamule, to 0.25 mm diam.; apex rounded or a little flattened; involucrellum absent. Spores simple, subglobose to globose, 8–13 × 8–11 μm. [S.A.] **Verrucaria compacta** (A.Massal.) Jatta
Literature: McCarthy (2001c)
- 6: *Thallus on soil or overgrowing mosses, rarely on bark*..... 7
- 7 *Perithecia appearing to grow between squamules; spores muriform, 65–135 × 30–50 μm, 1 or 2 per ascus*. Squamules rounded, elongate or sparingly lobed, crowded to overlapping, prostrate to erect, 0.1–0.8 mm long, (0.05–) 0.2–0.5 mm wide, pale to medium grey-brown or olive-green, dark green when wet; uppermost cells often with minute papilla-like projections (thin section). Perithecia semi-immersed to superficial, black, subovate, 0.25–0.4 (–0.5) mm diam.; surface minutely wrinkled to longitudinally folded, especially near apex. Spores broadly to elongate-ellipsoidal, colourless to pale brown (darkening with age). [SE N.S.W.; on montane soil and mosses].....
..... **Agonimia tristicula** (Nyl.) Zahlbr.
Literature: McCarthy (2001a)
- 7: *Perithecia immersed in squamules; spores simple, 11–22 × 5.5–9 μm, 8 per ascus* 8
- 8 *Asci cylindrical (at least when immature), with spores in a single row; upper cortex 30–100 μm thick, sharply delimited from the algal layer, with the hyphal walls gradually thickening towards the surface (thin section)*. Squamules scattered, contiguous or overlapping, loosely attached or tightly appressed to the substratum, rounded, irregular or deeply lobed, 2–8 mm wide, pale to dark brown, rich red-brown or orange-brown. Lower surface usually pale, rarely blackish, attached by pale rhizohyphae or rhizines. Perithecia subglobose or pyriform, to 0.7 mm diam., lacking an involucrellum, dark above, paler below. Spores simple, 12–17 × 5.5–7.5 μm. Pycnidia often visible as minute black laminal or marginal dots. [Throughout Australia; usually on soil or humus, rarely on bark; 3 spp.]..... **Placidium** A.Massal.
Literature: Breuss (2001c)
- 8: *Asci club-shaped, with spores in ±2 rows; upper cortex with the hyphal walls not gradually thickening towards the surface* 9
- 9 *On alpine soil; upper cortex 10–20 μm thick, indistinctly delimited from the algal layer (thin section)*. Squamules scattered, contiguous or overlapping, closely appressed to the substratum, 1–3 mm wide, finely incised, sometimes subgranular, whitish-pruinose or epruinose and grey-brown. Lower surface ±black, anchored by delicate dark rhizohyphae. Perithecia subglobose, 0.2–0.25 mm diam., blackish, lacking an involucrellum. Spores 17–22 × 6–9 μm. [N.S.W.]
..... **Catapyrenium cinereum** (Pers.) Körb.
Literature: Breuss (2001a)
- 9: *On semi-arid lowland soil; upper cortex > 25 μm thick, sharply delimited from the algal layer*. Squamules scattered, contiguous or slightly overlapping, sometimes subascending, plane, rounded or lobate, 1–3 mm wide, pale to medium brown. Lower surface pale brown, anchored by colourless rhizohyphae. Perithecia subglobose, to 0.4 mm diam., rather pale, lacking an involucrellum. Spores 11–15 × 6–7.5 μm. [S.A.]
..... **Heteroplacidium** Breuss
Literature: Breuss (2001b)
- 10 *Thallus yellow, yellow-green or yellow-orange* 11
- 10: *Thallus whitish or shades of grey, green, brown or blackish* 15

- 11 *Squamules bullate, folded or umbrella-like, sometimes partly or completely sorediate.* Squamules and soredia bright yellow to brownish yellow or greenish yellow; medulla solid or hollow. Apothecia between squamules or separated from the thallus, usually sessile or clustered in stalked clumps, 0.3–1.5 mm diam.; disc weakly concave, plane or convex, black; margin at first thick and prominent, sometimes \pm excluded. Spores 7–14-septate, long-acicular, 40–90 \times 2.5–4 μ m. [Alpine Tas.; on soil and decaying mosses] ...
Literature: Obermayer (2001) **Arthrorhaphis citrinella** var. **catolechioides** Obermayer
- 11: *Squamules not bullate, folded or umbrella-like* 12
- 12 *Apothecia \pm immersed.* Thallus areolate to squamulose, yellow to greenish yellow and white-pruinose, or cream-coloured, grey-brown, reddish brown to dark brown, \pm epruinose. Squamules scattered or forming a continuous crust, rounded to angular; margins entire or incised. Apothecia 1–3 (–4) per squamule, 0.2–0.8 (–1.5) mm diam.; thalline margin prominent or thin and indistinct; proper margin absent. Spores 50–100 or more per ascus, simple, globose to ellipsoidal, 2–6 (–8) \times 1–2 (–3) μ m. [Throughout Australia; on rock and soil; 11 spp.]..... **Acarospora** A.Massal.
Literature: Magnusson (1929, 1956); Weber (1968); Filson & Rogers (1979); Purvis *et al.* (1992)
- 12: *Apothecia sessile* 13
- 13 *Squamule margins with lip-like soralia; soredia spreading onto lower surface; thallus growing on bark or rock.* [See Key B: 14]..... **Candelaria** A.Massal.
- 13: *Squamules lacking soralia/soredia; thallus growing on soil* 14
- 14 *Thallus K– or K+ red-brown; surface smooth and glossy; apothecia with a cup-like proper margin (thin section); thalline margin prominent early, becoming excluded.* Thallus crustose to subsquamulose or squamulose, never placoid, epruinose, yellowish green. Squamules to 1.5 mm wide, initially convex, becoming incised and with wavy margins. Apothecia 0.4–2.5 mm diam.; disc plane to convex, orange-brown, slightly grey-pruinose. Spores simple, ellipsoidal, 8.5–12 \times 5–7 μ m. [E Qld; on sandy soil]
..... **Ramalinora glaucolivida** (Müll.Arg.) Lumbsch, Rambold & Elix
Literature: Lumbsch *et al.* (1995)
- 14 *Thallus K+ purple; surface powdery, granulate or pruinose; apothecia with a thalline margin only.* Thallus of dispersed or placoid squamules, orange-yellow, often with \pm peeling scales. Apothecia 0.5–1.5 mm diam.; disc concave to convex, orange-brown. Spores ellipsoidal to pyriform, 0 (–1)-septate, 9–13 \times 3.5–7 μ m. [Southern Australia; on calcareous soil; 3 spp.]..... **Fulgensia** De Not.
Literature: Filson & Rogers (1979); Purvis *et al.* (1992); Westberg & Kärnefelt (1998)
- 15 Thallus gelatinous and often swollen when wet, papery, leathery or cartilaginous when dry and bluish grey, lead-grey, brownish grey or dark grey; photobiont a cyanobacterium..... 16
- 15: Thallus not gelatinous or noticeably swollen when wet, often paler or brighter; photobiont a green alga or a cyanobacterium..... 17
- 16 *Thallus bright bluish grey, to 5 cm wide.* Squamules closely appressed, rosette-like, to 3 mm wide. Apothecia immersed to sessile, to 2 mm diam.; disc plane to convex, pink; thalline margin inconspicuous or absent; proper margin whitish. Spores simple, ellipsoidal, 12–15 \times 6–7 μ m. [SE N.S.W.; on bark and moss in rainforest]
..... **Santessoniella pulchella** P.M.Jørg.
Literature: Jørgensen (1998)
- 16: *Thallus dull to dark grey or somewhat brownish.* Thallus closely appressed, 2–30 mm wide. Lobes rounded to narrowly oblong, concave to plane, 0.3–2 (–3) mm wide, rarely with isidia; margins entire to lobulate. Lower surface naked or with minute rhizines. Apothecia 0.3–2 mm diam.; disc concave to convex, pale yellow, pale orange or pale brown to brown; thalline margin whitish to cream or grey. Spores becoming muriform, ellipsoidal, 17–34 \times 6–12 μ m. [Most diverse in E and SE Australia; mainly on bark, also on rock, mosses and soil; 35 spp.]..... **Leptogium** (Ach.) S.F.Gray
Literature: Verdon (1992b, 2001)

- 17 Apothecia immersed or with a raised margin, or adnate, never sessile or stalked 18
- 17: Apothecia sessile to short-stalked, or thallus sterile..... 21
- 18 Squamules attached by a mat of delicate rhizohyphae, or directly by the ecorticate lower surface, lacking rhizines or rhizoidal strands or stalks 19
- 18 Squamules attached by a central rhizoidal stalk or by rhizoidal strands or rhizines 20
- 19 *Squamules firmly attached by the ecorticate lower surface, lacking rhizohyphae; spores 32–100 or more per ascus.* Thallus areolate to squamulose, cream-coloured, grey-brown, reddish brown to dark brown, epruinose. Squamules scattered or forming a continuous crust, rounded to angular; margins entire or incised; photobiont a unicellular green alga. Apothecia 1–3 (–4) per squamule, 0.2–0.8 (–1.5) mm diam.; thalline margin prominent or thin and indistinct; proper margin absent. Spores 50–100 or more per ascus, simple, globose to ellipsoidal, 2–6 (–8) × 1–2 (–3) µm. [Throughout Australia; on rock and soil; 11 spp.]..... **Acarospora** A.Massal.
- Literature:* Filson & Rogers (1979); Purvis *et al.* (1992)
- 19: *Squamules attached by a mat of rhizohyphae, corticate; spores 8 per ascus.* Thallus grey to olive-brown, sometimes forming a rosette. Squamules rounded to elongate, to 8 mm wide; margins raised, sometimes sorediate; photobiont a unicellular cyanobacterium. Apothecia immersed, 1–many per squamule, to 1 mm diam.; disc concave or plane, pale reddish brown; margin indistinct. Spores 8 per ascus, simple, ellipsoidal, 15–30 × 6–13 µm. [Mainly in arid and semi-arid regions; on rock and soil; 2 spp.]..... **Heppia** Naeg.
- Literature:* Filson (1988)
- 20 *Asci producing 8 (–12) spores; squamules attached by a central rhizoidal stalk; lower surface ecorticate.* Squamules aggregated, 1–6 mm wide, brown, smooth, with internal cavities; margin entire or incised; photobiont a unicellular cyanobacterium. Apothecia immersed to adnate, 1–many per squamule, 0.2–0.8 mm diam.; disc deeply concave, dark brown to black. Spores simple, ellipsoidal, 10–14 × 6–8 µm. [NW W.A.; on rock] .
..... **Gloeoheppia turgida** (Ach.) Gyeln.
- Literature:* Henssen (1995)
- 20: *Asci producing 32–100 or more spores; squamules anchored by rhizines or by a rhizoidal strand from the corticate lower surface.* Thallus crustose-squamulose or of peltate squamules. Squamules solitary, aggregated or overlapping, 0.5–5 (–12) mm wide, olive-green to dark brown, rarely blackish, with or without soredia, rarely isidiate; ecorticate above; medulla with numerous air spaces. Apothecia completely immersed or with a raised rim, (1–) 2–5 (–20) per squamule; disc punctiform or open and to 1.5 mm diam. Spores simple, globose, ellipsoidal or bacilliform, 3–12 × 2–6 µm. [Throughout Australia (mainly arid and semi-arid regions); on rock and soil; 15 spp.]....
..... **Peltula** Nyl.
- Literature:* Büdel (2001)
- 21 Photobiont a filamentous cyanobacterium; thallus often greyish blue when wet; lower surface cobwebby-tomentose or anchored by blue-black rhizohyphae; apothecial disc usually orange-brown or red-brown..... 22
- 21: Photobiont a unicellular green alga or cyanobacterium (or with cephalodia containing cyanobacteria); thallus usually shades of grey, green or brown, but sometimes tinted yellow, orange or reddish, usually anchored by white, grey or brown tomentum or rhizohyphae or, when very tightly appressed, by medullary hyphae of the thallus; apothecial disc variously coloured 26

- 22: *Apothecia with a distinct pale proper margin and a crown-like or squamulose secondary thalline margin.* Thallus tightly to loosely attached, sometimes crustose in the centre, 2–6 cm wide. Squamules plane to slightly concave, often overlapping, broadly wedge- to fan-shaped, deeply incised, 0.2–3 mm wide; margins sometimes lobulate or isidiate, with or without a blue-black prothallus. Upper surface smooth or faintly ridged, pale grey-blue to lead-grey or pale brown when dry, blue-grey when wet; photobiont *Scytonema*, not penetrating the apothecial hymenium. Lower surface corticate or not, whitish to pale yellow-brown, usually with white or blue-black rhizohyphae. Apothecia sessile, 0.2–1.5 mm diam.; disc concave to convex, reddish brown to blackish. Spores simple, ellipsoidal, 8–15 × 5–8 µm. [Southern Australia; on rock and bark; 9 spp.] **Degelia** Arv. & D.J.Galloway
Literature: Jørgensen & Galloway (1992); Kantvilas & Jarman (1999); Jørgensen *et al.* (2000); Jørgensen (2001)
- 22: *Apothecia with only the thalline or proper margin visible; sometimes the proper margin partly overgrown by thalline squamules* 23
- 23: *Apothecia with a thalline margin, at least when immature* 24
- 23: *Apothecia with a proper margin only* 25
- 24: *Thalline margin ±excluded at maturity; hymenium I+ green-blue → red-brown; asci with amyloid apical structures.* Thallus rounded to irregularly spreading, forming crusts, rosettes or cushions, to 8 cm wide; prothallus distinct, blue-black. Squamules 0.2–3 mm wide, plane to convex, separate or overlapping; margins scalloped-incised, becoming lobulate or granulose-sorediate. Upper surface greyish, grey-blue to olive-brown; margin often paler; photobiont *Nostoc*. Lower surface pale at margins, whitish to blue-black in the centre. Apothecia sessile, to 2 mm diam.; disc plane to convex, brown to brown-black. Spores ellipsoidal to subglobose, 10–18 × 5–13 µm. [E and SE Australia; on bark, rock or soil; 5 spp.] **Fuscopannaria** P.M.Jørg.
Literature: Jørgensen & Galloway (1992); Jørgensen (1999, 2001)
- 24: *Thalline margin prominent and scalloped at maturity; hymenium I+ dark blue; asci without amyloid apical structures.* Thallus firmly to ±loosely attached, 3–5 (–10) cm wide; prothallus conspicuous and blue-black or indistinct. Squamules contiguous or overlapping, plane to concave, 0.1–2 mm wide, greyish blue to brownish; margins ±entire or incised, sometimes isidiate or lobulate. Upper surface smooth to scabrid or ridged, greyish to dark brown; photobiont *Nostoc*. Lower surface whitish or yellowish to pale buff, with dense blue-black rhizohyphae. Apothecia sessile, 0.5–1.5 mm diam.; disc plane to convex, smooth to gyrose or deformed, yellowish, orange-brown or brown to dark brown; thalline margin minutely scalloped. Spores ellipsoidal, rarely subglobose, 10–18 × 5–10 µm. [E and SE Australia; on bark, rock and moss in lowland forest; 25 spp.] **Pannaria** Delise
Literature: Jørgensen & Galloway (1992); Jørgensen (2001, 2003)
- 25: *Apothecia brown to red-brown, rarely dark brown or blackish; prothallus distinct, of felted silky blue-black to black rhizohyphae, often projecting beyond margin; hymenium I+ blue.* Thallus rounded to spreading, loosely or firmly attached, to 6 cm wide. Squamules plane to convex, separate to overlapping or densely clustered, 1–4 mm wide, sometimes lobulate. Upper surface smooth, scabrid or wrinkled, with or without isidia, greyish white, pale to dark blue-grey, pale brown, grey-brown, olivaceous or blackish; margins entire to phyllidiate or sorediate or incised-scalloped; photobiont usually *Nostoc*. Lower surface usually pale, tomentose or with rhizohyphae. Apothecia sessile, to 1.5 mm diam.; disc concave to plane or convex; proper margin often paler, usually prominent and persistent, sometimes obscured by thalline squamules. Spores ellipsoidal, 10–15 (–25) × 6–9 µm. [E and SE Australia; on mossy bark and rock, also on bark; 17 spp.] **Parmeliella** Müll.Arg.
Literature: Jørgensen & Galloway (1992); Jørgensen (2001)

- 25 *Apothecia dark brown to black; prothallus not apparent; hymenium 1+ red-brown.* Thallus small-squamulose, often appearing \pm coralloid or papillate, in dense compact firmly attached mats to 15 cm wide. Squamules 1–3 mm wide, smooth, often cracked to roughened at lobe apices, yellowish brown, olive-brown to \pm blackened, with or without blue-grey soralia that can form a continuous sorediate crust; photobiont *Scytonema*. Lower surface pale brown or tan, with some black rhizohyphae. Apothecia sessile, to 1.5 mm diam.; disc \pm plane, dark brown to black; proper margin persistent and slightly raised or becoming excluded. Spores ellipsoidal, 10–15 \times 6–9 μ m. [Subalpine and alpine Tas.; on moss; 2 spp.]..... **Siphulastrum** Müll.Arg.
Literature: Jørgensen & Galloway (1992)
- 26 Apothecia with a thalline margin at least when immature 27
- 26: Apothecia lacking a thalline margin, or thallus sterile 30
- 27 *Lobes anchored in arid soil by thick hyphal cords penetrating deep into the substratum.* Thallus closely appressed, to 10 mm wide. Lobes overlapping, concave, to 0.7 mm wide, olive-green, sometimes pale yellow- or white-pruinose; margins entire, olive-brown, slightly raised. Lower surface pale pink to pinkish brown. Apothecia sessile, to 1 mm diam.; disc reddish brown. Spores more than 100 per ascus, ellipsoidal, 6–7 \times 3 μ m. [Central Australia]..... **Peltula imbricata** Filson
Literature: Büdel (2001)
- 27: *Lobes never anchored by thick hyphal cords; thallus not growing on soil* 28
- 28 *Thallus with cephalodia on upper or lower surface, these sometimes prominent on the prothallus.* Thallus 2–5 (–10) cm wide. Squamules dispersed, \pm crowded, ascending or almost areolate, 0.1–1 (–2) mm wide; margins entire to incised or lobulate. Upper surface smooth to wrinkled, sometimes silky-hairy, scabrid or tomentose, yellowish white, greenish, grey-green, yellow-green or yellow-brown, with or without soredia, isidia or phyllidia; photobiont a green alga. Lower surface with sparse to dense rhizohyphae, these tangled, sometimes projecting beyond lobe margins as a black prothallus. Cephalodia (containing *Nostoc*) pale grey-blue to blue-brown or purple-brown, to 3 mm wide, occasionally sorediate, simple to globose or squamulose, smooth or wrinkled. Apothecia sessile, 0.1–2.5 (–5) mm diam.; disc deeply concave to \pm convex, smooth, contorted, etched or with concentric rings of thalline tissue, pale yellow-orange, pale red-brown, dark brown or blackish; thalline margin entire, scalloped or squamulose, sometimes hairy. Spores \pm ellipsoidal to subglobose, 12–28 \times 6–14 μ m. [Mainly SE Australia; on bark, moss and litter; 10 spp.] **Psoroma** Michx.
Literature: Jørgensen & Galloway (1992); Jørgensen & Wedin (1999)
- 28: *Thallus lacking cephalodia* 29
- 29 *Thallus Pd–, pale grey, yellowish white, greenish yellow or yellow brown; lobes and squamules \pm smooth; spores simple.* Thallus crustose-squamulose to peltate or placoid, sometimes forming rosettes, glossy and epruinose or whitish-pruinose, lacking soredia and isidia. Lower surface without rhizines. Apothecia becoming sessile, 0.5–1.8 mm diam.; disc yellow-brown to reddish brown; thalline margin thick, \pm warted or wavy. Spores ellipsoidal, 9–16 \times 4.5–7 μ m. [S.A. and N.S.W.; on rock; *L. muralis* and *L. contractuloides*]..... **Lecanora** Ach.
Literature: Lumbsch & Elix (2004)
- 29: *Thallus Pd+ orange, whitish or pale grey, of crowded nodular squamules that become \pm coralloid-isidiate; spores 1-septate.* Thallus to 5 cm wide. Squamules separate, contiguous or overlapping, to 0.5 mm wide, sometimes pruinose; apices often disintegrating into granular soredia. Lower surface without rhizines. Apothecia uncommon, sessile, 0.3–0.6 mm diam.; disc convex or subglobose, pinkish brown to red-brown; thalline margin thin, becoming excluded. Spores 9–14 \times 4.5–6 μ m. [W.A.; on rock]..... **Solenopsora vulturiensis** A.Massal.
Literature: Purvis *et al.* (1992)

- 30 *Squamules ear-shaped, with raised margins, often delicately and concentrically ridged, sometimes with concolorous or greenish soredia, 1–2 mm wide. Thallus pale grey, bluish grey or grey-green. Lower surface white-tomentose. Apothecia absent. [All States and Territories except N.T.; on mosses or other lichens on bark and rock].....*
Normandina Nyl.
Literature: Purvis *et al.* (1992); Kantvilas & Jarman (1999)
- 30: *Squamules not ear-shaped* 31
- 31 *Apothecia ivory to rose-pink, often clustered, sessile to very short-stalked. Thallus squamulose to foliose, forming patches to 8 cm wide. Lobes/squamules discrete to overlapping, 0.5–5 mm wide, pale grey-green when dry, pale to bright green when wet. Apothecia 0.3–5 mm diam., plane to slightly concave, becoming undulate; proper margin concolorous or paler. Spores becoming 1-septate, ellipsoidal to narrowly ovoid, 12–20 × 3–7 µm. [Vic. and Tas.; usually on soil, peat or litter]*
Icmadophila splachnirima (Hook.f. & Taylor) D.J.Galloway
Literature: Johnston (2001b)
- 31: *Apothecia not ivory to rose-pink* 32
- 32 *Thallus with rosette-like cephalodia 0.5–3 mm wide, marginal on squamules or on prothallus, dark bluish grey when wet. Thallus firmly attached, forming minute growths or colonies to 10 cm wide. Squamules rosette-forming to irregular, 0.1–0.5 (–2) mm wide, plane to convex, discrete or crowded, matt or glossy, pale greenish yellow to brownish or greyish when dry, bright green when wet, without soredia or isidia; margins entire, crenate or lobulate; prothallus thick and black or thin and pale grey; photobiont a green alga. Apothecia sessile, to 2.5 mm diam.; disc concave to convex, red-brown; proper margin prominent, flesh-coloured. Spores ellipsoidal to fusiform, 10–14 × 4–9 µm. [Vic. and Tas.; on bark, wood and rock; 2 spp.]*
Psoromidium Stirt.
Literature: Jørgensen & Galloway (1992)
- 32: *Thallus lacking cephalodia* 33
- 33 *Growing on mosses over siliceous alpine rocks. Thallus squamulose to small-foliose, forming rosettes to 4 cm diam., corticate above. Squamules to 2.5 mm wide, dark blue-green to brown (reddish brown when wet), spreading or overlapping, ascending to suberect, broader and incised at apices; margins with peg-like or scale-like isidia; photobiont *Nostoc*. Lower surface with sparse brownish rhizohyphae and slender rhizines. Apothecia sessile to short-stalked, 0.4–1 mm diam.; disc ±plane, red-brown to dark brown; proper margin paler, entire or scalloped. Spores 1 (–2)-septate, narrowly ellipsoidal, 17–24 × 5–8 µm. [N.S.W., Vic. and Tas.]*
Massalongia carnosa (Dicks.) Körb.
Literature: Jørgensen & Elix (1988); Purvis *et al.* (1992)
- 33: *Growing on bark, wood, soil or rock* 34
- 34 *Lower surface of squamules yellow or orange, K+ crimson. Thallus to 8 cm wide, pale bluish grey to dark lead-grey, C+ red. Squamules convex, often overlapping, 1–2 mm wide, with or without marginal soralia. Apothecia sessile, clustered, 1–1.5 mm diam.; disc convex, red-brown to dark brown or purplish black; proper margin becoming excluded. Spores ellipsoidal, 11–14 × 5–7 µm. [W.A., Vic. and Tas.; on bark, soil and peat]*
Trapeliopsis colensoi (C.Bab.) Gotth.Schneid.
Literature: Galloway (1985)
- 34: *Lower surface of squamules not yellow, orange or K+ crimson* 35
- 35 *Apothecia pale brown, orange, orange-brown or brick-red*..... 36
- 35: *Apothecia brown-black to black*..... 37

- 36 *Prothallus web-like or forming a distinct marginal fringe; squamules C-*. Thallus squamulose to subfoliose, sometimes forming extensive colonies. Squamules adnate to ascending, plane to convex, 0.1–1 mm wide, rounded or deeply incised, pale grey, greenish grey, blue-grey to pale brown, yellow-brown or reddish brown, often densely lobulate or dominated by isidia, naked, pubescent or fibrillose. Apothecia sessile, laminal, solitary or clustered, to 1.5 mm diam.; disc plane to convex, pale brown to dark reddish brown; proper margin often slightly raised, concolorous with or darker than the disc, sometimes with white projecting fibrils. Spores simple or 1-septate, ovoid, ellipsoidal to fusiform, $4.5\text{--}12 \times 2\text{--}5 \mu\text{m}$. [E and SE Australia; on bark and rock; 5 spp.] **Phyllopsora** Müll.Arg.
Literature: Brako (1989, 1991)
- 36: *Prothallus absent or indistinct; squamules C+ red*. Squamules crowded or overlapping, pale grey-green to yellow-green or olive-brown, sometimes forming extensive colonies. Apothecia sessile, forming clusters 1–3 (–5) mm wide; disc convex to hemispherical, orange to brick-red; proper margin thin, paler, undulate, becoming excluded. Spores simple, ellipsoidal, $10\text{--}12 \times 3.5\text{--}5 \mu\text{m}$. [Vic. and Tas.; on bark, rotting logs and soil]..... **Trapeliopsis congregans** (Zahlbr.) Brako
Literature: Kantvilas & Jarman (1999)
- 37 *Thallus growing on burnt wood or on bark*. Squamules scattered, contiguous or overlapping, adnate to ascending, weakly concave to strongly convex, 0.4–1 (–1.5) mm wide, sometimes with a central depression, usually smooth, often glossy, pale grey-green, yellowish brown, greenish brown to dark brown, with or without lip-like marginal soralia, sometimes forming extensive colonies. Lower surface corticate or not, attached to substratum by hyphae. Apothecia sessile or seemingly immersed between squamules, marginal or laminal, 0.3–1.5 (–2.5) mm diam.; disc dark olive-brown to black, plane to convex or hemispherical, with or without pruina; proper margin persisting and often wavy, or becoming excluded. Spores 0 (–3)-septate, narrowly ellipsoidal to fusiform, $(4.5\text{--}) 6\text{--}13 \times 1.5\text{--}2.5 \text{ (–}3.5) \mu\text{m}$. [Eastern and southern Australia; 5 spp.] **Hypocenomyce** M.Choisy
Literature: Timdal (1984); Thor & Timdal (1995)
- 37: *Thallus growing on soil or rock* 38
- 38 *Apothecia short-stalked, initially globose, becoming convoluted and subdivided*. Thallus squamulose to almost foliose. Squamules dispersed to overlapping, plane to convex or with raised margins, 4–12 (–15) mm wide, olive-brown to blackish; upper cortex strongly gelatinised (thin section). Lower surface brownish, attached by a holdfast and rhizoidal hyphae. Apothecia marginal, to 5 mm diam.; stalk to 1.5 mm tall and wide. Spores simple, fusiform, $9\text{--}16 \times 3\text{--}4.5 \mu\text{m}$. [Tas.; on alpine soil]..... **Austropeltum** Henssen, Döring & Kantvilas
Literature: Henssen *et al.* (1992)
- 38: *Apothecia sessile, not becoming convoluted and subdivided* 39
- 39 *Spores simple*. Squamules scattered, contiguous or overlapping, sometimes lobate, weakly concave to convex, 1–5 (–7) mm wide, smooth, uneven or cracked into \pm pyramidal polygons, pink-brown to grey-brown or yellowish green or pale to medium brown, occasionally white-pruinose, sometimes forming extensive colonies to 10 cm wide. Lower surface white to pale brown, attached by hyphae of lower cortex. Apothecia sessile, marginal or laminal, 0.5–1.5 mm diam.; disc plane to convex or subglobose, with or without pruina; proper margin becoming excluded. Spores ellipsoidal, $10\text{--}18 \times 5\text{--}8 \mu\text{m}$. [Throughout Australia; especially on soil in arid regions; 4 spp.] **Psora** Hoffm. emend. Göth.Schneid.
Literature: Schneider (1979); Lumbsch (1988)

- 39:** *Spores (0–) 1–3 (–7)-septate.* Squamules scattered, contiguous or overlapping, weakly concave to strongly convex, bullate or columnar, 0.5–3 (–5) mm wide, smooth, wrinkled or fissured, pale grey, grey-green or pale to dark brown, with or without white or grey pruina, rarely pseudocyphellate. Lower surface pale grey to pale brown, attached to substratum by hyphae of medulla or lower cortex. Apothecia 0.5–3 (–5) mm diam.; disc weakly concave to convex, with or without pruina; proper margin thin, pale brown to red-brown or dark brown, often becoming excluded. Spores narrowly ellipsoidal, fusiform or acicular, 10–25 (–56) × 3–6 µm. [Mainly southern Australia; on soil or rock, sometimes parasitic on other lichens; 6 spp.] **Toninia** A.Massal.

Literature: Timdal (1992)

GLOSSARY

- acicular:** needle-shaped.
- adnate:** *of a thallus*, attached to the substratum.
- amyloid:** giving a blue-black reaction with iodine.
- anastomosing:** joined together to form a network.
- apothecium:** a discoid sexual fruiting body in which the hymenium is exposed at maturity. pl.
apothecia, adj. **apothecial**.
- areola:** a discrete or irregularly defined area of a thallus separated by fissures from adjacent **areolae**.
adj. **areolate**.
- articulated:** jointed.
- ascus:** a sexual spore-producing structure within which a specific number of spores, usually eight, are formed. pl. **asci**.
- bacilliform:** elongate-cylindrical, rod-shaped.
- basidioma:** a sexual fruiting structure producing basidiospores that are external on basidia.
- biatorine:** *of an apothecium*, lecideine but usually pale, soft, strongly convex and lacking a proper margin at maturity.
- bifusiform:** fusiform, but constricted in the middle.
- bulbate:** with a swollen base.
- bullate:** blistered or puckered.
- cephalodium:** a discrete and often distinctly shaped and coloured area containing cyanobacteria on an otherwise green alga-containing lichen thallus. pl. **cephalodia**.
- cerebriform:** having a convoluted or brain-like surface.
- cilium:** a usually short hair, especially on the lobe margins of some foliose lichens. pl. **ilia**, adj. **ciliate**.
- concolorous:** having the same colour.
- conidium:** a minute asexual spore produced in a pycnidium. pl. **conidia**.
- contiguous:** *of lobes or squamules*, touching but not fused.
- coralloid:** coral-like.
- cortex:** an external cellular or hyphal and variably pigmented layer of a thallus. adj. **corticate**.
- crustose:** *of a thallus*, crust-like and very firmly attached to the substratum; lacking a lower cortex and rhizines, rhizohyphae etc.
- cyanobacterium:** a blue-green alga.
- cyphella:** a small well defined pore in the lower cortex of *Sticta* spp. adj. **cyphellate**.
- decorticate:** *of a thallus*, losing the cortex through e.g. peeling or abrasion.
- disc:** the surface of an apothecium exclusive of any margin present.
- eciliate:** lacking **ilia**.
- ecorticate:** lacking a **cortex**.
- effigurate:** *of pseudocyphellae and maculae*, having a definite form or pattern.
- emaculate:** lacking **maculae**.
- entire:** *of a thallus, lobe or apothecial margin*, being continuous and undivided.
- epruinose:** lacking **pruina**.
- esorediate:** lacking **soredia**.
- faveolate:** honey-combed.
- fenestrate:** having window-like openings or slits.

fibril: delicate outgrowths of a thallus.
fibrillose: having fibrils.
filiform: thread-like.
foliose: ±horizontally leaf-like or lobate in appearance.
fruticose: ±shrubby in appearance.
fusiform: spindle-shaped, broader in the middle and becoming gradually narrower towards the ends.
gyrose: *of an apothecial disc*, with concentric, horse-shoe-shaped or sinuous folds or ridges.
holdfast: an often disc-like basal part of a thallus adapted for attachment.
hymenium: the spore-producing layer of an apothecium, comprising asci and sterile hyphae.
hypha: a microscopic fungal filament. pl. **hyphae**.
hypothallus: an often dense, usually dark, layer of woolly or spongy hyphae beneath a thallus lacking algae and attaching it to the substratum.
hypotheecium: a tissue of colourless or pigmented hyphae subtending the hymenium.
immarginate: *of an apothecium*, without a margin.
incised: *of a lobe or apothecial margin*, cut or torn.
involucrellum: tissue covering the upper part of a perithecium, often thick and dark, sometimes appearing carbonised.
involute: rolled upwards.
isidium: a simple or branched propagative outgrowth from the margin or upper surface of a thallus or from the margin of a lecanorine apothecium. pl. **isidia**, adj. **isidiate**.
lacinate: *of a lobe or branch*, being narrow and elongate.
laminal: on the upper surface.
lecanorine: *of an apothecium*, having a thalline margin containing photobiont cells.
lecideine: *of an apothecium*, having a proper margin lacking photobiont cells.
leprose: having an ecorticate loosely-structured thallus that is ±completely sorediate.
lobulate: having small lobes.
macula: a minute pale area of the upper cortex above a discontinuity of the photobiont layer. pl. **maculae**, adj. **maculate**.
medulla: the ±loose tissue of a lichen thallus subtending the photobiont layer. adj. **medullary**.
muriform: *of a spore*, having numerous transverse, oblique and longitudinal septa.
papilla: a usually small and simple non-propagative outgrowth from a thallus. pl. **papillae**, adj. **papillate**.
pedicellate: stalked.
peltate: *of a squamule*, shaped like a plate and attached to the substratum by a short ±central stalk.
perforate: pierced with holes.
perithecium: a flask-shaped fruiting body that opens to the exterior by means of an apical or lateral pore. pl. **perithecia**, adj. **perithecial**.
photobiont: the photosynthetic component of a lichen, i.e. a green alga or a cyanobacterium.
phyllidium: a dorsiventral leaf-like outgrowth that is constricted at the base. pl. **phyllidia**, adj. **phyllidiate**.
phyllocladium: a granular, wart-like, coralloid or squamule-like outgrowth from the thallus of *Stereocaulon* spp. pl. **phyllocladia**.
placoid: *of a thallus*, ±crustose in the centre, but with distinct radiating and very closely attached marginal lobes.
podetium: a hollow apothecium-bearing stalk characteristic of the certain genera of the family Cladoniaceae. pl. **podetia**, adj. **podetial**.
polarilocular: a spore type with two cells separated by a broad septum pierced by a canal (in *Teloschistes* and *Xanthoria*).
proper margin: *of a lecideine apothecium*, sterile tissue adjacent to the hymenium, and sometimes the hypotheecium, lacking photobiont cells.
prothallus: fungal hyphae at the margin of a thallus which lack photobiont cells.
pruina: a white, bluish, grey or purple frost-like covering on the upper surface of a thallus or an apothecial disc. adj. **pruinose**.
pseudocyphella: a minute cortical aperture, analagous to a cyphella, but lacking the clear delimitation of the latter. pl. **pseudocyphellae**, adj. **pseudocyphellate**.

pseudopodetium: a ±solid vegetative stalk bearing one or more apothecia in the family Stereocaulaceae and in certain genera of the Cladoniaceae. pl. **pseudopodetia**, adj. **pseudopodetial**.

pubescent: covered in soft fine hairs.

punctiform: dot-like.

pycnidium: a minute, usually perithecium-shaped, structure in which conidia are produced. pl. **pycnidia**.

pyriform: pear-shaped.

recurved: curved or curled downwards or backwards.

reticulate: forming a net-like pattern.

rhizine: a tuft of laterally fused, usually dark, hyphae growing from the lower surface of a thallus and attaching it to the substratum. adj. **rhizinate**.

rhizohypha: a fungal hypha growing from the lower surface of the thallus and attaching it to a substratum. pl. **rhizohyphae**.

scabrid: rough-textured.

septum: of a spore, a transverse, diagonal or longitudinal wall. adj. **septate**.

sessile: of an apothecium, attached to the surface of the thallus, but neither immersed nor stalked.

simple: of thallus branches, rhizines, spores, etc., not branched or otherwise subdivided.

sinus: the gap between two lobes of a foliose thallus.

soralium: a discrete area of a lichen thallus where soredia are produced. pl. **soralia**, adj. **soraliate**.

soredium: a non-corticate lichen propagule comprising fungal hyphae and algal cells. pl. **soredia**, adj. **sorediate**.

squamule: a scale-like thallus or portion of a thallus which is usually corticate at least on the upper surface. adj. **squamulose**.

squarrose: branching at right-angles to the main axis.

stipitate: stalked.

substratum: the surface (bark, rock, soil etc.) on which a lichen grows.

terete: circular in cross-section.

thalline margin: of a lecanorine apothecium, containing fungal and photobiont cells, and usually having the same colour and consistency as the thallus.

thallus: a vegetative structure that results from the symbiotic association of a fungus with a green alga or a cyanobacterium. pl. **thalli**, adj. **thalline**.

tomentum: a covering of usually short matted hairs. adj. **tomentose**.

truncate: usually of a lobe apex, abruptly blunt, as if cut off.

umbilicus: a short ±central stalk anchoring a thallus to the substratum. adj. **umbilicate**.

undulate: wavy.

vermiform: worm-like in shape.

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