PORINA

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[From *Flora of Australia* volume 58A (2001)]

Porina Ach., *Kongl. Vetensk. Acad. Nya Handl*. 30: 158 (1809), *nom. cons. emend.*, from the Greek *poro-* and the diminutive of the Latin *porus* (a passage or hole), presumably in reference to the apical ostiole of the perithecia through which ascospores are released.

Porina Müll.Arg., *Flora* 66: 320 (1883). Lecto: *P. nucula* Ach., *typ. cons*.

Segestria Fr., *Syst. Orb. Veg.* 263 (1825). T: *S. lectissima* Fr. [= *Porina lectissima* (Fr.) Zahlbr.].

Clathroporina Müll.Arg., *Flora* 65: 517 (1882). T: *C. olivacea* Müll.Arg. [= *Porina eminentior* (Nyl.) P.M.McCarthy].

Phylloporina (Müll.Arg.) Müll.Arg., *Lich. Epiphylli Novi* 20 (1890); *Porina* sect. *Phylloporina* Müll.Arg., *Flora* 66: 331 (1883). Lecto: *Phylloporina epiphylla* (Fée) Müll.Arg. [= *Porina epiphylla* (Fée) Fée].

Pseudosagedia (Müll.Arg.) M.Choisy, *Bull. Mens. Soc. Linn. Soc. Bot. Lyon* 18: 107 (1949). Lecto: *Arthopyrenia carpinea* (Pers. ex Ach.) Müll.Arg. [= *Porina aenea* (Wallr.) Zahlbr.].

Zamenhofia Clauzade & Cl.Roux, *Bull. Soc. Bot. Centre-Ouest*, n.s., numéro spécial 7: 824 (1985). T: *Z. coralloidea* (P.James) Clauzade & Cl.Roux [= *Porina coralloidea* P.James].

Thallus corticolous, saxicolous or foliicolous (rarely bryophilous or terricolous). Algae *Trentepohlia* (mainly in corticolous and saxicolous spp.) or *Phycopeltis* (in most foliicolous spp.). Perithecia immersed in the thallus or in thallus-dominated verrucae, or superficial on the thallus. Involucrellum vestigial to well-developed and almost completely enclosing the exciple, pale to dark orange-brown, red-brown, brown, green-black, purple-black or jet-black; surface smooth to uneven, lacking whorls of stiff subapical setae (rarely with a more uniformly distributed and delicate pilose or ±tomentose covering). Ascospores with 3 or more transverse septa, or submuriform to muriform.

A genus of c. 320 species which is especially diverse in rather shaded habitats in tropical and subtropical regions. Seventy-four species (with two additional varieties and one forma) are known from Australia, most being confined to a coastal strip up to 200 km wide from Cape York in north-eastern Queensland to southern Tasmania. Moreover, species distribution tends to be stratified in relation to latitude. Thus, although diversity is greatest in north-eastern and south-eastern Queensland, north-eastern New South Wales and Tasmania, there is very little overlap in species composition between the northern and southern floristic extremes (McCarthy & Kantvilas, 2000).

G.O.A.Malme, *Porinae* et *Phylloporinae* in itinere Regnelliano primo collectae, *Ark. Bot*. 29A(1): 1–37 (1929); R.Santesson, Foliicolous lichens I. A revision of the taxonomy of the obligately foliicolous, lichenized fungi, *Symb. Bot. Upsal.* 12(1): 1–590 (1952); T.D.V.Swinscow, Pyrenocarpous lichens: 3. The genus *Porina* in the British Isles, *Lichenologist* 2: 6–56 (1962); J.Poelt & A.Vězda, *Porina*. *In* Bestimmungsschüssel europäischer Flechten. Ergänzungsheft I, *Biblioth. Lichenol*. 9: 193–203 (1977); R.Lücking, Foliicolous lichens – a contribution to the knowledge of the lichen flora of Costa Rica, Central America, *Beih. Nova Hedwigia* 104: 1–179 (1992); P.M.McCarthy, Saxicolous species of *Porina* Müll.Arg. (Trichotheliaceae) in the Southern Hemisphere, *Biblioth. Lichenol.* 52: 1–134 (1993); P.M.McCarthy & G.Kantvilas, New species of *Porina* Müll.Arg. (Trichotheliaceae), mainly from Tasmanian rainforest, *Lichenologist* 25: 137–146 (1993); A.Aptroot & H.J.M.Sipman, Trichotheliaceae (lichens), *Fl. Guianas*, Ser. E, 2: 1–57 (1993); P.M.McCarthy, Corticolous species of *Porina* (lichenized Ascomycotina: Trichotheliaceae) in Australia. I, *Nova Hedwigia* 58: 391–403 (1994); P.M.McCarthy, Corticolous species of *Porina* (lichenized Ascomycotina: Trichotheliaceae) in Australia. II, *Nova Hedwigia* 59: 509–516 (1994); U.Makhija, B.Adawadkar & P.G.Patwardhan, The lichen genus *Porina* (family Trichotheliaceae) from India, *J. Econ. & Taxon. Bot.* 18: 521–545 (1994); P.M.McCarthy, A reappraisal of *Clathroporina* Müll.Arg. (Trichotheliaceae), *Lichenologist*

27: 321–350 (1995); P.M.McCarthy, (1236) Proposal to amend the entry for the name *Porina*, *nom. cons.* (lichen-forming fungi) by changing the date and place of publication, while conserving the listed type, *Taxon* 45: 533–534 (1996); R.Lücking, Taxonomic studies in foliicolous species of the genus *Porina* I. The *Porina rufula* aggregate, *Bot. Acta* 109: 248–260 (1996); R.Lücking & A.Vězda, Taxonomic studies on foliicolous species in the genus *Porina* (lichenized Ascomycotina: Trichotheliaceae) – II. The *Porina epiphylla* group, *Willdenowia* 28: 181–225 (1998); P.M.McCarthy, Key to the saxicolous taxa of *Porina*, *Lichenologist* 32: 1–13 (2000); P.M.McCarthy & G.Kantvilas, A new bryophilous *Porina* from Tasmania, and notes on the diversity, habitats and biogeographical affinities of Tasmanian *Trichotheliaceae*, *Lichenologist* 32: 247–256 (2000).

Biogeographical Affinities

Most Australian species of *Porina* can be accommodated with ease in one of the following biogeographical categories. Thus, approximately half of the Australian species are essentially temperate in distribution and half are broadly or more locally tropical. Note, however, the very small antitropical component (in contrast with that of *Verrucaria*, below).

Cosmopolitan (2): *guentheri* (±), *chlorotica* (±)

Antitropical (2): *aenea*, *leptalea*

Pantropical (22): *africana*, *atriceps*, *atrocoerulea*, *atropunctata*, *distans*, *eminentior* f. *eminentior*, *epiphylla*, *farinosa*, *fulvella*, *limbulata*, *lucida* var. *lucida*, *malmei*, *mastoidea*, *mirabilis*, *nigrofusca*, *nitidula*, *nucula*, *nuculastrum*, *octomera*, *rubentior*, *rufula*, *tetracerae* var. *tetracerae*

Palaeotropical/Pacific (17): *albicera*, *aluniticola*, *bellendenica*, *chrysophora*, *conica*, *corruscans*, *exocha*, *internigrans*, *limitata*, *longispora*, *minutissima*, *semecarpi*, *sphaerocephala*, *subnucula*, *tetracerae* var. *persimilis*, *ulceratula*, *virescens*

Southern Pantemperate (1): *corrugata*

Southern Australasian (10): *aptrootii*, *constrictospora*, *decrescens*, *elegantula*, *exacta*, *kantvilasii*, *rhaphidiophora*(?), *silvatica*, *subapplanata*, *subargillacea*

Endemic ±tropical (13): *athertonii*, *bacillifera*, *canthicarpa*, *chloroticula*, *crassa*, *eminentior* f. *sorediifera*, *fulvula*, *impolita*, *impressa*, *lucida* var. *australiensis*, *similis*, *terrae-reginae*, *tolgensis*

Endemic ±temperate (8): *blechnicola*, *bryophila*, *heterocarpa*, *hyperleptalea*, *meridionalis*, *riparia*, *tasmanica*, *whinrayi*

Anomalous (1): *leptosperma* (a predominantly tropical species that, in Australia, is known only from Tasmania)

KEY TO SAXICOLOUS SPECIES

1 Ascospores submuriform to fully muriform.....2

1: Ascospores with transverse septa only 3

2 Perithecia black, superficial; ascospores submuriform, 40–54 × 8–12 µm; thallus pale to dark grey-brown or olive-brown*(1)* .....**74. P. whinrayi**

2: Perithecia immersed in thallus-dominated verrucae; ascospores muriform, 42–109 × 13–29 µm; thallus pale olive-brown, pale yellowish green or creamy buff.....**26. P. eminentior**

3 Perithecia immersed in the thallus or in thallus-dominated verrucae*(1:)* 4

3: Perithecia semi-immersed to superficial, orange, orange-brown, dark brown or black, not immersed in the thallus or in thallus-dominated verrucae.....12

4 Most or all ascospores 3-septate*(3)* 5

4: Ascospores with 5 or more septa 6

5 Perithecia convex to hemispherical, 0.23–0.36 mm diam.; north-eastern Australia*(4)* **72. P. ulceratula**

5: Perithecia ±globose, 0.4–1.4 mm diam.; coastal areas of southern Australia ..... **20. P. corrugata**

6 Ascospores (9–) 11–13 (–15)-septate, 32–56 × 3–5 µm*(4:)* ..... **11. P. bellendenica**

6: Ascospores 5–7 (–9)-septate 7

7 Perithecia immersed directly in the thallus, not in thallus-dominated verrucae; thallus 0.15–0.6 mm thick; ascospores 18–29 × 4–6 µm*(6:)* ..... **22. P. crassa**

7: Perithecia immersed in ±prominent thallus-dominated verrucae; thallus usually less than 0.2 mm thick; most or all ascospores more than 30 µm long 8

8 Perithecial verrucae 0.24–0.4 mm diam.*(7:)* 9

8: Perithecial verrucae 0.35–0.85 mm diam. 10

9 Ascospores 5 (–7)-septate, 20–33 × 5–8.5 µm; conidia 2–6 µm long*(8)* ..... **34. P. heterocarpa**

9: Ascospores 7 (–9)-septate, 40–66 × 4–5.5 µm; conidia 4–10 µm long ..... **57. P. riparia**

10 Ascospores 24–44 × 3.5–7 µm*(8:)* ..... **69. P. tetracerae** var. **tetracerae**

10: Ascospores 32–66 (–83) × (6–) 8–18 µm 11

11: Perithecial verrucae convex to hemispherical, usually with a blackish periostiolar cap; ascospores 6–13 µm wide*(10:)* ..... **47. P. mastoidea**

11: Perithecial verrucae hemispherical to subglobose, lacking a blackish periostiolar cap; ascospores 10–18 µm wide ..... **53. P. nucula**

12 Perithecia yellow-orange, orange, orange-brown or red-brown*(3:)* 13

12: Perithecia ±black 17

13 Ascospores 7 (–9)-septate, 33–62 × 2–4.5 µm*(12)* ..... **39. P. kantvilasii**

13: Ascospores 3-septate, 15–37 µm long 14

14 Perithecia 0.4–0.62 mm diam.; conidia 5–9 µm long*(13:)* ..... **67. P. tasmanica**

14: Perithecia 0.14–0.45 mm diam.; conidia 1–3 µm long 15

15 Perithecia 0.23–0.45 mm diam.; ascospores 24–37 µm long*(14:)* ..... **35. P. hyperleptalea**

15: Perithecia 0.14–0.28 mm diam.; ascospores 15–25 µm long 16

16 Ascospores 2.5–4 (–5) µm wide; south-eastern Australia*(15:)* ..... **40. P. leptalea**

16: Ascospores 4.5–6.2 µm wide; north-eastern Qld ..... **32. P. fulvula**

17 Ascospores 3-septate*(12:)* 18

17: Ascospores with 5 or more septa 20

18 Involucrellum uniformly black in thin section, not enclosing algae*(17)* ..... **15. P. chlorotica**

18: Involucrellum outwardly black, internally much paler, or only slightly paler *but* enclosing algae (thin section) 19

19 Thallus filmy, 15–30 µm thick; perithecia 0.14–0.26 mm diam.; conidia 2–3 µm long*(18:)* ..... **16. P. chloroticula**

19: Thallus well-developed, 0.15–0.75 mm thick; perithecia 0.2–0.44 mm diam.; conidia 3–7 µm long ..... **51. P. nigrofusca**

20 Involucrellum with only a thin blackish outer layer, internally much paler and enclosing algae*(17:)* ... . **39. P. kantvilasii**

20: Involucrellum ±uniformly black in thin section, sometimes containing a few algal cells near the base (thin section) 21

21 Ascospores usually constricted in the middle, 2–3.5 µm wide*(20:)* ..... **19. P. constrictospora**

21: Ascospores not constricted in the middle, mostly or always more than 3.5 µm wide 22

22 Perithecia (0.17–) 0.22 (–0.28) mm diam.; ascospores 18–30 µm long*(21:)* ..... **46. P. malmei**

22: Perithecia (0.19–) 0.25–0.4 (–0.66) mm diam.; most or all ascospores 25–40 (–50) µm long 23

23 Ascospores 5 (–7)-septate*(22:)* ..... **34. P. heterocarpa**

23: Ascospores (5–) 7 (–11)-septate 24

24 Perithecia 0.46–0.66 mm diam.; conidia 3–7 µm long*(23:)* ..... **5. P. aptrootii**

24: Perithecia 0.2–0.48 mm diam.; conidia 2–3 µm long 25

25 Ascospores (3–) 5–7 (–9)-septate, 3.5–6.5 µm wide; thallus not filmy or gelatinous when wetted*(24:)* ..... **33. P. guentheri**

25: Ascospores 7–9 (–11)-septate, 5.5–8 µm wide; thallus filmy and gelatinous when wetted ..... **4. P. aluniticola**

KEY TO CORTICOLOUS AND BRYOPHILOUS SPECIES

1 Ascospores submuriform to fully muriform 2

1: Ascospores with transverse septa only 5

2 Ascospores with (9–) 11 (–12) transverse septa; each transverse loculus with (0–) 1 (–2) longitudinal septa*(1)* ..... **54. P. nuculastrum**

2: Ascospores with (12–) 14–22 (–30) transverse septa; each transverse loculus with (1–) 2–3 (–5) longitudinal septa 3

3 Ascospores (42–) 72 (–109) × (13–) 20 (–29) µm*(2:)* ..... **26. P. eminentior**

3: Ascospores 58–168 × 18–45 µm 4

4 Perithecial verrucae 0.5–1 mm diam.; centrum 0.35–0.67 mm wide; mature ascospores lacking hyaline apical caps*(3:)* ..... **30. P. farinosa**

4: Perithecial verrucae 0.7–1.5 mm diam.; centrum 0.55–1 mm wide; mature ascospores with hyaline apical caps ..... **29. P. exocha**

5 Perithecia immersed in the thallus or in thallus-dominated verrucae*(1:)* 6

5: Perithecia semi-immersed to superficial, orange, orange-brown, dark brown or black, not immersed in the thallus or in thallus-dominated verrucae 15

6 Most or all ascospores 3-septate*(5)* 7

6: Ascospores with 5 or more septa 8

7 Perithecial verrucae strongly convex, 0.32–0.54 mm diam.; thallus continuous, pale khaki-grey to pale grey-brown; northern Australia*(6:)* ..... **10. P. bacillifera**

7: Perithecial verrucae ±globose, 0.4–1.4 mm diam.; thallus rimose to areolate, pale grey, greenish white or grey-green; coastal areas of southern Australia ..... **20. P. corrugata**

8 Ascospores (9–) 11–13 (–15)-septate, 32–56 × 3–5 µm*(6:)* ..... **11. P. bellendenica**

8: Most or all ascospores with 7 or 9 septa, or with (7–) 9 (–13) septa and 6–18 µm wide 9

9 Ascospores (7–) 9 (–13)-septate*(8:)* ..... **38. P. internigrans**

9: Most or all ascospores 7-septate 10

10 Ascospores to 6 (–7) µm wide, usually without a perispore*(9:)* 11

10: Ascospores 6–18 µm wide, often with a distinct perispore 12

11 Perithecial verrucae 0.36–0.8 mm diam.; centrum 0.2–0.35 mm wide; ascospores 24–44 µm long*(10)* ..... **69. P. tetracerae**

11: Perithecial verrucae 0.58–1 mm diam.; centrum 0.3–0.42 mm wide; ascospores 36–56 µm long ..... **2. P. africana**

12 Perithecial verrucae usually subglobose; ascospores 10–18 µm wide*(10:)* ..... **53. P. nucula**

12: Perithecial verrucae usually applanate, convex or hemispherical; ascospores (6–) 8–10 (–12.5) µm wide 13

13 Centrum 0.15–0.26 mm wide; space between involucrellum and exciple occupied by a loose reticulum of hyphae; algae *Phycopeltis*-like*(12:)* ..... **64. P. subapplanata**

13: Centrum 0.2–0.44 mm wide; space between involucrellum and exciple not occupied by a loose reticulum of hyphae; algae *Trentepohlia* 14

14 Perithecial verrucae 0.38–0.68 mm diam., concolorous with thallus or with a pale to medium brown periostiolar cap; ascospores 7–9-septate*(13:)* ..... **43. P. limitata**

14: Perithecial verrucae 0.36–0.9 mm diam., usually with a blackish periostiolar cap; ascospores 7 (or 8)-septate ..... **47. P. mastoidea**

15 Perithecia yellow-orange, orange, orange-brown or reddish brown*(5:)* 16

15: Perithecia ±black 22

16 Ascospores 3-septate*(15)* 17

16: Most or all ascospores with 5 or more septa 18

17 Perithecia 0.14–0.28 mm diam.; ascospores 15–25 × 2.5–5 µm*(16)* ..... **40. P. leptalea**

17: Perithecia 0.23–0.45 mm diam.; ascospores 24–37 × 4–7 µm ..... **35. P. hyperleptalea**

18 Ascospores 2–6 µm wide*(16:)* 19

18: Ascospores 6–9.5 µm wide 21

19 Ascospores 23–46 µm long, (3–) 5–7 (–9)-septate*(18)* ..... **23. P. decrescens**

19: Ascospores 42–97 µm long, 11–21-septate 20

20 Ascospores 42–65 × 2–3 µm, (11–) 13–19 (–21)-septate*(19:)* ..... **25. P. elegantula**

20: Ascospores 58–97 × 4–6 µm, 15-septate ..... **28. P. exacta**

21 Ascospores 7-septate, 25–60 µm long; perithecia 0.22–0.4 (–0.68) mm diam.*(18:)* ..... **36. P. impolita**

21: Ascospores (7–) 9–11 (–15)-septate, 54–88 µm long; perithecia 0.43–0.72 mm diam. ..... **61. P. silvatica**

22 Ascospores 3-septate*(15:)* ..... **1. P. aenea**

22: Ascospores with 7 or more septa 23

23 Ascospores 7-septate*(22:)* 24

23: Ascospores 9–21-septate 26

24 Perithecia 0.14–0.25 mm diam.; thallus growing on corticolous bryophytes*(23)* ..... **13. P. bryophila**

24: Most or all perithecia greater than 0.25 mm diam.; thallus growing directly on bark 25

25 Perithecia 0.22–0.39 mm diam.; ascospores 28–57 × 2.5–5.5 µm, elongate-cylindrical to elongate-fusiform*(24:)* ..... **65. P. subargillacea**

25: Perithecia 0.32–0.56 mm diam.; ascospores 40–59 × 2–3.5 µm with a medial constriction ..... **19. P. constrictospora**

26 Ascospores 9–11 (–15)-septate, 2–4 µm wide*(23:)* ..... **56. P. rhaphidiophora**

26: Ascospores (11–) 17 (–21)-septate, 6–9.5 µm wide ..... **48. P. meridionalis**

KEY TO FOLIICOLOUS SPECIES

1 Thallus comparatively thick and glossy, with a broad bluish black to grey-black prothallus; algae *Trentepohlia*; cells ±angular-rounded, solitary or in short filaments 2

1: Thallus thin, matt to slightly glossy, lacking a broad bluish black to grey-black prothallus; algae *Phycopeltis*; cells narrow and irregular to elongate-rectangular, forming extensive colonies 3

2 Thallus sterile, but with abundant cylindrical to coralloid isidia*(1)* ..... **24. P. distans**

2: Thallus fertile, lacking isidia ..... **43. P. limitata**

3 Perithecia usually markedly applanate; asci growing ±horizontally only from the lower corners of the centrum, not from the base*(1:)* ..... **71. P. tolgensis**

3: Perithecia moderately applanate, convex, hemispherical, wart-shaped or subglobose; asci growing ±vertically from the base of the centrum 4

4 Perithecia immersed in thallus-dominated verrucae; verrucae mainly pale grey-green, pale yellowish green or pale greyish brown*(3:)* 5

4: Perithecia ±superficial, orange, orange-brown, dark brown or black, not immersed in thallus-dominated verrucae 20

5 Ascospores 3-septate; perithecial verrucae 0.15–0.2 mm diam.*(4)* ..... **3. P. albicera**

5: Ascospores with more than 3 septa; perithecial verrucae usually at least 0.3–0.5 mm diam. 6

6 Ascospores with 9–17 septa*(5:)* 7

6: Ascospores mostly or exclusively 7-septate 8

7 Perithecial verrucae convex (to hemispherical), usually with a dense pilose covering; ascospores 45–74 × 4–7 µm*(6)* ..... **73. P. virescens**

7: Perithecial verrucae hemispherical to subglobose, glabrous; ascospores 84–108 × 6–9 µm ..... **44. P. longispora**

8 Perithecial verrucae usually pilose; ascospores 45–74 µm long*(6:)* ..... **73. P. virescens**

8: Perithecial verrucae glabrous; most or all ascospores less than 50 µm long 9

9 Ascospores 6–10 µm wide; walls of perithecial verrucae not containing colourless crystals; space between base of involucrellum and the exciple occupied by a loose reticulum of hyaline hyphae*(8:)* ..... **64. P. subapplanata**

9: Ascospores (2.5–) 3.5–6 µm wide; walls of perithecial verrucae packed with colourless crystals; space between base of involucrellum and the exciple not occupied by a loose reticulum of hyaline hyphae 10

10 Thallus with whitish short-stalked deeply concave disciform isidia to 0.1 (–0.15) mm diam.*(9:)* ..... **50. P. mirabilis**

10: Perithecia lacking isidia 11

11 Perithecial verrucae subconical to conical; apex with a short flat-topped cylindrical extension*(10:)*..... ..... **18. P. conica**

11: Perithecial verrucae usually applanate, convex or hemispherical, less commonly subconical to conical; apex lacking a short flat-topped cylindrical extension 12

12 Thallus distinctly verruculose*(11:)* 13

12: Thallus smooth to minutely uneven, but not distinctly verruculose 14

13 Perithecial verrucae 0.25–0.42 mm diam., hemispherical or wart-shaped to subglobose; ascospores 30–40 × 5–6 µm*(12)* ..... **66. P. subnucula**

13: Perithecial verrucae 0.33–0.6 (–0.8) mm diam., convex, hemispherical or wart-shaped; ascospores 29–50 × 3–5.5 µm ..... **62. P. similis**

14: Perithecial verrucae with a blackish apical spot or a brownish apical cap*(12:)* 15

14: Perithecial verrucae with a concolorous or pale reddish brown apex 17

15 Ascospores 35–48 × 4–5.5 µm*(14)* ..... **45a. P. lucida** var. **lucida**

15: Ascospores 20–35 × 3–5 µm 16

16 Perithecial verrucae 0.2–0.35 (–0.4) mm diam.; immature verrucae convex, with a periostiolar area that becomes darker with age*(15:)* ..... **7. P. atriceps**

16: Perithecial verrucae 0.32–0.55 mm diam.; immature verrucae conical, with a minute discrete blackish periostiolar area that becomes paler and diffuse with age ..... **9. P. atropunctata**

17 Perithecial verrucae 0.35–0.6 (–0.7) mm diam.*(14:)* 18

17: Perithecial verrucae 0.2–0.4 (–0.5) mm diam. 19

18 Ascospores ±bacilliform, 35–48 × 3–4.5 µm*(17)* ..... **50. P. mirabilis**

18: Ascospores oblong and 35–48 × 4–5.5 µm (var. *lucida*) or fusiform and 29–38 × 5–6 µm (var. *australiensis*) ..... **45. P. lucida**

19 Ascospores 18–25 (–30) × 2–3.5 µm; perithecial verrucae 0.2–0.3 (–0.35) mm diam.*(17:)* .... **49. P. minutissima**

19: Ascospores 25–35 × 3–4.5 µm; perithecial verrucae 0.25–0.4 (–0.5) mm diam. ..... **27. P. epiphylla**

20 Perithecia yellow-orange, orange, orange-brown, reddish brown or dark cherry-red (superficially and/or in thin section); involucrellum often containing or enclosing algae*(4:)* 21

20: Perithecia superficially ±black, in thin section with shades of grey, brown, violet or purple; involucrellum not or rarely containing or enclosing algae 30

21 Ascospores 3-septate*(20)* 22

21: Ascospores with more than 3 septa 29

22 Perithecia convex to subconical*(21)* 23

22: Perithecia hemispherical to ±globose 26

23 Thallus predominantly grey; perithecia pale yellowish orange or yellow-brown*(22)* ..... **31. P. fulvella**

23 Thallus predominantly green; perithecia medium yellowish orange, orange-brown, or pale to dark cherry-red 24

24 Perithecia 0.2–0.4 mm diam.*(23:)* ..... **42. P. limbulata**

24: Perithecia 0.13–0.26 (–0.3) mm diam. 25

25 Perithecia 0.13–0.21 mm diam.; ascospores 13–21 × 2–3 µm*(24:)* ..... **58. P. rubentior**

25: Perithecia 0.15–0.26 (–0.3) mm diam.; ascospores 17–26 × 2.5–4.5 µm ..... **59. P. rufula**

26 Perithecia 0.23–0.4 mm diam.*(22:)* ..... **6. P. athertonii**

26: Perithecia 0.13–0.26 mm diam. 27

27 Perithecia medium to dark orange-red*(26:)* ..... **41. P. leptosperma**

27: Perithecia pale to medium orange-green to pale orange-brown, or pale yellowish or greyish orange 28

28 Perithecia convex, hemispherical or wart-shaped, slightly spreading at the base; sides smooth; involucrellum containing, not enclosing, algae*(27:)* ..... **12. P. blechnicola**

28: Perithecia subglobose, constricted at the base; sides often with a slightly rough covering of thallus material; involucrellum enclosing a thin layer of algae ..... **60. P. semecarpi**

29 Thallus smooth; perithecia medium orange-brown, smooth to finely and sparsely pilose*(21:)*..... ..... **55. P. octomera**

29: Thallus with branched ±radiating ridges; perithecia pale yellowish to pale orange-brown, rough, glabrous ..... **63. P. sphaerocephala**

30 Ascospores 3-septate*(20:)* 31

30: Ascospores with more than 3 septa 34

31 Perithecia almost completely covered by a broad pale spreading thalline rim, to 0.82 mm diam.; perithecial apex ±black, concave*(30)* ..... **37. P. impressa**

31: Perithecia lacking a broad pale thalline rim, c. 0.1–0.4 mm diam.; perithecial apex rounded or slightly pointed, never concave 32

32 Perithecia applanate towards the margins, but usually with a conical to hemispherical centre, 0.2–0.41 mm diam.*(31:)* ..... **17. P. chrysophora**

32: Perithecia hemispherical, subglobose or globose, usually less than 0.22 mm diam. 33

33 Perithecia covered by a thin well-defined layer of thallus almost to the apex, 0.11–0.17 mm diam., lacking a basal rim of thallus*(32:)* ..... **70. P.** *aff.* **thaxteri**

33: Perithecia not covered by a layer of thallus, 0.14–0.25 mm diam., with a distinct basal rim of thallus ..... **14. P. canthicarpa**

34 Perithecia convex to hemispherical; base usually spreading*(30:)* 35

34: Perithecia subglobose to globose and attenuated at the base 36

35 Perithecia overgrown almost to the apex by a thin layer of thallus; ascospores mostly 5-septate, 20–32 × 4–5 µm*(34)* ..... **21. P. corruscans**

35: Perithecia not overgrown by the thallus; ascospores mostly 7-septate, 29–47 × 4.5–7 µm ..... **68. P. terrae-reginae**

36 Ascospores 5-septate, 20–32 × 3.5–6 µm; perithecia 0.14–0.25 mm diam.*(34:)* ..... **52. P. nitidula**

36: Ascospores mostly 7-septate, 22–42 × 3.5–7 µm; perithecia 0.16–0.31 mm diam. **8. P. atrocoerulea**