

## PYRENULA

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*Pyrenula* Ach., *Syn. Meth. Lich.* 125 (1814), *nom. cons.*; from the Greek *pyren* (a nut or hard seed), possibly in reference to the hard, carbonised ascomatal wall.

Type: *P. nitida* (Weigel) Ach., *typ. cons.*

*Pyrenastum* Eschw., *Syst. Lch.* 16 (1824). T: *P. septicollare* Eschw. [= *Pyrenula septicollaris* (Eschw.) R.C.Harris]

*Parmentaria* Fée, *Essai Crypt. Écorc.* 70 (1825). T: *P. astroidea* Fée [= *Pyrenula astroidea* (Fée) R.C.Harris]

*Melanotheca* Fée, *Essai Crypt. Écorc.*, Suppl. 70 (1837). T: *M. achariana* Fée [= *P. anomala* (Ach.) Vain.]

Thallus lichenised (in Australian species), corticate or not, with or without whitish pseudocyphellae, usually surrounded by a black hypothallus. Ascomata perithecioid, solitary or with fused walls and/or ostioles. Ascomatal wall usually completely carbonised, with a distinct clypeus, with or without cysts. Hamathecium inspersed with oil droplets or not, IKI– or IKI+ blue or orange. Asci without an ocular chamber. Ascospores 2–8 per ascus, pale to dark brown or grey, distoseptate but with at least some indication of eusepta in most transverse distosepta, with at least 3 transverse septa, with or without longitudinal septa, if present, the ascospores submuriform to densely muriform. Conidiomata pycnidial, rare. Microconidia filiform, usually straight, occasionally curved.

Chemistry: Lichexanthone or anthraquinones occasionally present.

About 200 species are accepted in *Pyrenula*, and most are tropical epiphytes; 28 species are known from Australia, including six endemic taxa. Many of the species now united in this genus were initially distributed among several schematic genera characterised by combinations of the following characters: ascospore septation (muriform or transverse), ostiole orientation (vertical or lateral) and ascoma aggregation (simple or with fused ostioles and/or walls). Although these can be valuable characters for delimiting species, the genera on which they were based did not bring together closely related taxa (Harris, 1989).

R.C.Harris, A sketch of the family Pyrenulaceae (Melanommatales) in eastern North America, *Mem. New York Bot. Gard.* 49: 74–107 (1989); A.Aptroot, P.Diederich, E.Sérusiaux & H.J.M.Sipman, Lichens and lichenicolous fungi of Papua New Guinea, *Biblioth. Lichenol.* 64: 1–220 (1997); D.K.Upreti, A key to the lichen genus *Pyrenula* from India, with nomenclatural notes, *Nova Hedwigia* 66: 557–576 (1998).

1	Ascospores submuriform to muriform.....	2
1:	Ascospores with transverse septa only.....	12
2	Thallus and/or ascomata with yellow to orange or rust-coloured K+ purple pigments (1).....	17. <b>P. ochraceoflava</b>
2:	Thallus and ascomata without K+ purple pigments.....	3
3	Ascospores irregularly submuriform; terminal locules non-septate, only a few medial locules longitudinally septate (2: ).....	4
3:	Ascospores fully muriform; terminal locules with transverse septa.....	5
4	Ostioles lateral, often fused; ascospores 24–32 × 10–13 µm (3).....	25. <b>P. subumbilicata</b>
4:	Ostioles apical, not fused; ascospores 34–72 × 15–33 µm.....	26. <b>P. subvariolosa</b>
5	Ostioles lateral, often fused (3: ).....	6
5:	Ostioles apical, not fused.....	7
6	Ascospores 35–45 × 12–18 µm (5).....	3. <b>P. astroidea</b>
6:	Ascospores 45–70 × 18–28 µm.....	21. <b>P. ravenelii</b>

7	Ascospores < 25 µm long, usually with 4 rows of locules (5:)	8
7:	Ascospores > 35 µm long, with more than 4 rows of locules	9
8	Thallus UV+ yellow, at least in part (7)	<b>6. P. confinis</b>
8:	Thallus UV-	<b>18. P. parvinnuclea</b>
9	Old ascospores containing globules of an orange oily substance (7:)	<b>11. P. macularis</b>
9:	Old ascospores not containing globules of an orange oily substance	10
10	Ascospores 33–45 × 11–16 µm (9:)	<b>27. P. thelemorpha</b>
10:	Ascospores mostly > 50 µm long	11
11	Ascospores 8 per ascus, 45–65 µm long (10:)	<b>19. P. pyrenuloides</b>
11:	Ascospores 2 per ascus, 80–140 µm long	<b>15. P. neoculata</b>
12	Ascospores with tapering 'tails' at both ends (1:)	<b>4. P. bicuspidata</b>
12:	Ascospores without 'tails' (not to be confused with germ tubes of old spores)	13
13	Thallus white, evanescent, not corticate (12:)	<b>14. P. microcarpa</b>
13:	Thallus brownish to olive, usually corticate	14
14	Thallus and/or ascomata with red K+ purple pigment (13:)	<b>7. P. cruenta</b>
14:	Thallus and ascomata without red K+ purple pigment	15
15	Ascomata laterally grouped, with shared or separate ostioles (14:)	16
15:	Ascomata mostly solitary	17
16	Ascomata mostly in groups of 2–6; ostioles lateral, fused (15:)	<b>10. P. laureriformis</b>
16:	Ascomata laterally fused into dense groups; ostioles apical or skewed, remaining separate	<b>1. P. anomala</b>
17	Old ascospores containing globules of an orange oily substance; ascospores 3–5-septate (15:)	<b>5. P. concatervans</b>
17:	Old ascospores not containing globules of an orange oily substance; ascospores 3-septate	18
18	Hamathecium densely interspersed with oil droplets (17:)	19
18:	Hamathecium not or only partly interspersed with oil droplets	21
19	Ascospores with the terminal lumina lying directly against the exospore (18:)	<b>24. P. subcongruens</b>
19:	Terminal lumina separated from the exospore by an endospore layer	20
20	Ascospores 15–20 × 4.5–7.5 µm (19:)	<b>12. P. mamillana</b>
20:	Ascospores 18–25 × 6–9 µm	<b>13. P. massariospora</b>
21	Ascospores 21–38 µm long (18:)	22
21:	Ascospores mostly < 21 µm long	23
22	Ascospores usually with rounded ends, 8–15 µm wide; hamathecium IKI- (21:)	<b>20. P. quassiaecola</b>
22:	Ascospores fusiform, with pointed ends (least one acuminate), 7–10 µm wide; hamathecium IKI+ orange	<b>9. P. finitima</b>
23	Ascospores with terminal lumina lying directly against the exospore (21:)	<b>16. P. nitidula</b>
23:	Terminal lumina separated from the exospore by an endospore layer	24
24	Ascomata at least partly immersed in the thallus; thallus often UV+ yellow (23:)	25
24:	Ascomata completely exposed; thallus UV-	26
25	Ascospores 9–11 µm long (24:)	<b>28. P. xanthominuta</b>
25:	Ascospores 14–20 µm long	<b>8. P. dermatodes</b>
26	Ascospores 15–19 µm long; ascomata c. 0.7–1.0 mm diam. (24:)	<b>22. P. santensis</b>
26:	Ascospores 12–15 µm long; ascomata 0.3–0.7 mm diam.	27
27	Ascospores 4–6 µm wide, fusiform; medial lumina ±isodiametric (26:)	<b>2. P. aspistea</b>
27:	Ascospores 6–8 µm wide, ellipsoidal; medial lumina much wider than long	<b>23. P. shirleyana</b>