

ERPODIACEAE

Ilma G. Stone†

Erpodiaceae Broth., *Nat. Pflanzenfam.* I, 3: 706 (1905).

Type: *Erpodium* (Brid.) Müll.Hal.

Autoicous. Plants creeping, forming loose or dense mats, irregularly to pinnately branched. Stems soft, terete or complanate; branches short, horizontal or semi-erect. Rhizoids smooth, clustered on underside of stems. Leaves glaucous or yellowish to brownish green, either dimorphic and 4-ranked, with 2 dorsal rows subdistichous and covering the 2 smaller ventral rows (amphigastria-like), or \pm uniform, densely inserted, erect-appressed when dry, sometimes loosely complanate when moist, occasionally secund, symmetrical or asymmetrical, oblong-lanceolate to oblong-ovate or elliptic, ecostate; apex rounded, obtuse, acute or acuminate, occasionally hairpointed; margin \pm entire; laminal cells hexagonal, quadrate or subquadrate, often oblate (especially at margins and basal angles), smooth or sometimes with a weak abaxial mammilla, with a primordial utricle, or pluripapillose.

Gametoecia terminal on short branches, or axillary. Perichaetial leaves usually erect, \pm sheathing. Calyptra scarcely covering the operculum or reaching to \pm mid-capsule, usually plicate, mitrate to cylindrical, rarely cucullate. Setae short, \pm straight; vaginula usually long. Capsules immersed to short-exserted, erect, symmetrical, ovoid to cylindrical; annulus usually persistent; operculum conical-apiculate to rostrate; stomata usually few. Peristome often lacking, if present either rudimentary or consisting of 16 lanceolate papillose teeth. Spores globose, 25–45 μ m diam., finely papillose, green.

A monotypic family of c. 24 species, comparatively rare but widely distributed and sometimes locally abundant; grows on bark and rock in tropical and subtropical regions, especially Africa, Australia and Central and South America. It is represented in Australia by six species and an additional variety; two species and a variety are endemic. The more mesophytic species occur in coastal rainforest and inland, monsoonal, gallery forest, the more xerophytic in drier, inland, deciduous vine thickets and *Eucalyptus* woodland.

In his worldwide review of the family Crum (1973) recognised five genera: *Erpodium*, *Aulacopilum*, *Wildia* and the extra-Australian *Venturiella* and *Microtheciella*. *Microtheciella* was subsequently accommodated in a family of its own (H.A.Miller & A.J.Harrington, *J. Bryol.* 9: 519–524, 1977). Stone (1997), in a detailed study of Australian species of *Erpodium*, *Aulacopilum* and *Wildia*, placed *Aulacopilum*, *Venturiella* and *Wildia* in the synonymy of *Erpodium*, thus rendering the Erpodiaceae monotypic.

References

- Brotherus, V.F. (1925), Erpodiaceae, *Nat. Pflanzenfam.*, 2nd edn, 11: 1–6 (1925).
Crum, H.A. (1973), A taxonomic account of the Erpodiaceae, *Nova Hedwigia* 23: 201–224.
Pursell, R.A. (1994), *Moss Fl. Mexico* 2: 581–588 (1994).

Cite as: I.G.Stone, *Australian Mosses Online*. 39. Erpodiaceae.

http://www.anbg.gov.au/abrs/Mosses_online/Erpodiaceae.pdf (2012)

Stone, I.G. (1997), A revision of Erpodiaceae with particular reference to Australian taxa, *J. Bryol.* 19: 485–502.

ERPODIUM

Erpodium (Brid.) Müll.Hal., *Bot. Zeitung (Berlin)* 1: 774 (1843); from the Greek *erpo* (creeping), in reference to the creeping habit of these mosses.

Type: *E. domingense* (Spreng.) Brid. ex Müll.Hal.

Anoetangium [subg.] *Erpodium* Brid., *Bryol. Univ.* 2: 167 (1827). T: *A. domingense* Spreng. [= *Erpodium domingense* (Spreng.) Brid. ex Müll.Hal.].

Aulacopilum Wilson, *London J. Bot.* 7: 90 (1848). T: *A. glaucum* Wilson [= *Erpodium glaucum* (Wilson) I.G.Stone].

Wildia Müll.Hal. & Broth., *Oefvers. Förh. Finska Vetensk.-Soc.* 33: 103 (1891). T: *W. solmsiellacea* Müll.Hal. & Broth. [= *Erpodium solmsiellaceum* (Müll.Hal. & Broth.) I.G.Stone].

Description as for the family.

- | | | |
|----|---|---|
| 1 | Leaves dimorphic, in 4 rows, the leaves in the 2 dorsolateral rows larger; plants complanate..... | 2 |
| 1: | Leaves uniform, densely arranged around the stem; plants terete-foliate or sometimes loosely complanate..... | 4 |
| 2 | Dorsal leaves obliquely ovate; apex acute or with a hyaline apiculus; ventral leaves slightly smaller, more symmetrical; apex acuminate, sometimes with a clear apical cell (1)..... | 4. E. glaucum |
| 2: | Dorsal leaves orbicular; apex rounded; ventral leaves smaller and narrower..... | 3 |
| 3 | Papillae on laminal cells of dorsal leaves distinctly compound, hollow, large, often C- to O-shaped; on ventral leaves different, mostly simpler, solid, smaller; peristome well developed; calyptra mitrate, plicate (2:)..... | 6. E. solmsiellaceum |
| 3: | Papillae on laminal cells similar on dorsal and ventral leaves, mostly solid, simple, some bifid or trifid; peristome absent; calyptra cucullate, not plicate..... | 2. E. biseriatum |
| 4 | Laminal cells pluripapillose (1:)..... | 1. E. beccarii |
| 4: | Laminal cells smooth (distal cells occasionally with a single weak mammilla on abaxial surface)..... | 5 |
| 5 | Mid-laminal cells mostly oblate; rhizoids usually white; calyptra short, just covering the operculum (4:)..... | 3. E. coronatum var. australiense |
| 5: | Mid-laminal cells mostly rhomboidal, longer than wide; rhizoids pale brown; calyptra long, reaching beyond the base of the capsule..... | 5. E. hodgkinsoniae |

1. *Erpodium beccarii* Müll.Hal. ex Venturi, *Nuovo Giorn. Bot. Ital.* 4: 18 (1872)

T: Abyssinia [Ethiopia], *O.Beccari*; holo: NY *n.v.*

Stems 10–20 mm long; branches horizontal, terete-foliate when dry. Leaves green to yellowish brown, erect-appressed when dry, spreading and loosely complanate when moist, subsymmetrical, concave-ovate to elliptic, 0.6–0.9 mm long, c. 0.4 mm wide; apex acute to acuminate or obtuse; hairpoint hyaline, distantly serrulate, broad at base with cells weakly papillose, often squarrose, 0.2–0.5 mm long; laminal cells bulging, hexagonal to ±isodiametric, c. 15 µm diam., pluripapillose; papillae simple or bifurcated, verrucose, very prominent, 3–5 per cell; alar cells oblate-hexagonal, pale, ±smooth.

Occurs in Africa, North and South America and Australia. There are two varieties.

Capsules ±sessile, immersed; calyptra mitrate, plicate, not reaching the base of capsule, less than 1 mm long; leaf hairpoints white, 0.25–0.50 mm long.....**1a.** var. **beccarii**

Capsules emergent; seta short; calyptra mitrate, plicate, twisted, reaching the base of capsule or below, 2.5–3.0 mm long; leaf hairpoints pale yellowish, 0.20–0.35 mm long.....**1b.** var. **longicalyptatum**

1a. *Erpodium beccarii* Müll.Hal. ex Venturi var. *beccarii*

Illustrations: V.F.Brotherus, *Nat. Pflanzenfam.*, 2nd edn, 11: 2, fig. 421K, L (1925), as *E. joannis-meyeri* Müll.Hal.; T.R.Sim, *Bryophyta of South Africa* 347 (1926), as *E. hanningtonii* Mitt.; I.G.Stone, *J. Bryol.* 19: 495, fig. 3a–e (1997).

Leaves deep green, with a white hairpoint 0.25–0.50 mm long. Perichaetia not seen in Australian material. Calyptra (in extra-Australian material) campanulate-mitrate, plicate, serrate on ribs, lobed at base, less than 1 mm long. Capsules immersed; annulus broad, 5–6-rowed. Peristome lacking.

Very rare in Australia, and recorded only from west of Mackay, Qld where it grows in monsoon forest on a vertical sandstone rockface. Also in Central and South America and Africa.

Qld: L. Elphinstone, W of Mackay, 54 km NNE of Moranbah, *R.J.Fensham* 46 (CANB).

Although there is some doubt regarding its identity, the Queensland record has been retained here as the leaves are a deeper green with a longer, strongly contrasting, white hairpoint.

1b. *Erpodium beccarii* var. *longicalyptratum* I.G.Stone, *J. Bryol.* 19: 495 (1997)

T: Mickeys Ck, Carnarvon Gorge Natl Park, Qld, 27 Aug. 1982, *I.G.Stone* 20430; holo: MEL.

Illustrations: I.G.Stone, *op. cit.* 498, figs 5a–j, 6m (1997).

Plants glaucous green. Stems subterete, 10–30 mm long. Rhizoids pale red-brown. Leaves appressed when dry, loosely complanate when moist, \pm uniform, 0.75–1.00 mm long, mostly broadly elliptic; apex acute to acuminate; hairpoint hyaline or yellowish, 0.20–0.35 mm long; laminal cells 5–6-sided, \pm isodiametric, 12.5–16.0 μ m diam., pluripapillose; papillae warty, 2–5 per cell.

Perichaetia on decumbent branches, 1.5–2.0 mm long; perichaetial leaves to 3 mm long (including long hairpoint). Calyptra mitrate, plicate, 2.5–3.0 mm long, ridged, twisted, with 1–8 splits, persistent; basal lobes clasping seta. Setae 0.6–1.0 mm long. Capsules emergent, \pm cylindrical, contracted to the mouth, 1.5–1.9 mm long; annulus consisting of 6–8 cell rows; operculum 0.4–0.5 mm. Spores 20–30 μ m diam.

Endemic to southern Qld; rare on rough bark of *Casuarina*.

Qld: type locality, *I.G.Stone* 20420, 20459 (MEL); near Angiopteris Ravine, Carnarvon Gorge Natl Park, *I.G.Stone* 20250 (MEL).

Erpodium beccarii var. *longicalyptratum* differs from *E. hodgkinsoniae* in having pluripapillose laminal cells. Vegetatively it is almost indistinguishable from var. *beccarii*, although the leaves of the latter are a darker green to yellowish green, and most have a longer, contrasting, white hairpoint. The calyptra and sporophyte, however, are significantly different, and this might warrant recognition as a distinct species.

2. *Erpodium biseriatum* (Austin) Austin, *Bot. Gaz. (Crawfordsville)* 2: 142 (1877)

Lejeunea biseriata Austin, *Proc. Acad. Nat. Sci. Philadelphia* 21: 225 ('1869') [1870]. T: near Augusta, Georgia, U.S.A., 1845, W.S.Sullivan; holo: NY *n.v.*

Illustrations: V.F.Brotherus, *Nat. Pflanzenfam.*, 2nd edn, 11: 6, fig. 424H–L (1925), as *Solmsiella paraguensis* Broth.; Z.Iwatsuki & A.J.Sharp, *J. Hattori Bot. Lab.* 30: 162, fig. 7 (1967), as *Solmsiella biseriata*; I.G.Stone, *J. Bryol.* 19: 490, fig. 1k–n (1997).

Branches flattened. Leaves strongly complanate, dimorphic, 4-ranked; dorsolateral leaves asymmetrical, oblong-orbicular, c. 0.5 mm long and 0.3 mm wide; ventral leaves \pm lingulate, rounded-obtuse, c. 0.35 mm long and 0.15 mm wide; mid-laminal cells mostly 5–6-sided, near margin quadrate to oblate for a few rows, in dorsolateral leaves c. 15–24 \times 10–14 μ m, in ventral leaves 15–20 \times 8 μ m, pluripapillose; papillae solid, simple, bifid or trifid, similar on dorsal and ventral leaves.

Calyptra cucullate, non-plicate, c. 0.5 mm long, not reaching below mid-capsule. Setae c. 0.6–0.8 mm long. Capsules exserted; theca oblong, 0.55–0.85 mm long; annulus consisting of a single row of cells. Peristome lacking. Spores c. 21–31 μ m diam.

Rare in Australia and found as an epiphyte in a sheltered ravine in evergreen monsoon forest in northern N.T. and on the bark and fine roots of a large strangler fig in north-eastern N.S.W. Widespread in the tropics; known from U.S.A., Mexico, the Caribbean, South America, Africa, India, Thailand, Taiwan, the Philippines and Java.

N.T.: Nourlangie, Kakadu Natl Park, *J.Russell-Smith 106* (CANB). N.S.W.: Victoria Forest Reserve, Lismore, *D.H.Vitt 28255* (ALTA).

This species closely resembles *E. solmsiellaceum* in its vegetative characters, but the ventral leaves are more lingulate, and the laminal cells differ in having solid, undivided papillae on both the dorsal and ventral leaves. The cucullate, weakly papillose, non-plicate calyptra is also diagnostic.

3. *Erpodium coronatum* (Hook. & Wilson) Mitt., *J. Linn. Soc., Bot.* 12: 403 (1869)

var. **australiense** (I.G.Stone) I.G.Stone, *J. Bryol.* 19: 488 (1997)

Erpodium australiense I.G.Stone, *J. Bryol.* 12: 191 (1982). T: Mungana, near Chillagoe, Qld, 19 Aug. 1979, *I.G.Stone 15928*; holotype: BRI; isotype: MEL.

Illustrations: I.G.Stone, *J. Bryol.* 12: 193, fig. 1a–j; 194, fig. 2a–k; pl. 1 (1982), as *E. australiense*; I.G.Stone, *J. Bryol.* 19: 495, fig. 3f–l (1997).

Stems terete-foliate, often secund where rooting; branches very short, horizontal or semi-erect. Rhizoids white. Leaves ±uniform, erect-appressed when dry, patent when moist, hyaline-awned, symmetrical or subsymmetrical, ovate to oblong-lanceolate, 0.8–1.0 mm long, 0.25–0.45 mm wide; laminal cells smooth (occasionally with a single abaxial mammilla), bulging, hexagonal or rounded, in mid-leaf oblate, c. 20 × 30 µm.

Perichaetial leaves transparent, appressed to capsule, 1.4–1.7 mm long, 0.65–0.80 mm wide, ending in a long twisted squarrose hyaline hairpoint. Calyptra mitrate, with serrate crests on ridges, c. 0.5 mm long, barely covering the operculum. Setae extremely short or absent. Capsules immersed to sessile, pale, decumbent when dry, suberect when moist; theca ovoid-cylindrical, c. 1.0–1.2 mm long, 0.75–0.80 mm wide; operculum 0.25–0.30 mm long. Peristome rudimentary, white; teeth papillose, c. 200 µm long. Spores 40–45 µm diam.

Endemic to north-western W.A., N.T and Qld; grows appressed to the bark of trees, usually in rather dry, semideciduous, monsoon forest, in sheltered gorges or in *Eucalyptus* woodland.

W.A.: Wonjarring Gorge, Carson Escarpment, 35 km E of New Theda HS, *G.Butler 144A* (CANB); Winjana Gorge, Lennard R., Napier Ra., West Kimberley, 25 July 1974, *J.H.Willis* (MEL). N.T.: 18 km ENE of Jabiru, Arnhem Land, *H.Streimann 42222* & *J.A.Curnow* (B, CANB, NAM, NY). Qld: Lawn Hill Gorge Natl Park, *I.G.Stone 23278* (MEL); junction of Burke Rd and Blackdowns Rd, *H.Streimann 46456* (CANB, COLO, KRAM, MO, NY, PRE, S).

This variety differs from the widespread, extra-Australian var. *coronatum* mainly in the long-awned, vegetative and perichaetial leaves (sometimes appearing almost hoary when dry) and much smaller leaves, laminal cells, capsules and calyptra. The gametophore closely resembles that of *E. hodgkinsoniae*.

4. *Erpodium glaucum* (Wilson) I.G.Stone, *J. Bryol.* 19: 487 (1997)

var. **glaucum**

Aulacopilum glaucum Wilson, *London J. Bot.* 7: 90 (1848). T: New Zealand, 1843, *W.Colenso 3668a*; lectotype: BM, *vide* I.G.Stone, *loc. cit.*; isotype: BM.

Illustrations: G.O.K.Sainsbury, *Bull. Roy. Soc. New Zealand* 5: 194, fig. 2 (1955); I.G.Stone, *J. Bryol.* 19: 493, figs 2a–g, 5 (1997).

Plants slender, glaucous green. Stems to 10 mm long. Rhizoids red-brown. Leaves erecto-patent and loosely complanate when moist, appressed and overlapping when dry, dimorphic, 4-ranked; dorsolateral leaves asymmetrically ovate, 0.35–0.70 mm long, 0.25–0.35 mm wide; apex acute, with or without a clear papillose uniseriate apiculus; ventral leaves smaller, lanceolate, sometimes with an acuminate apical cell; laminal cells pluripapillose, rounded-hexagonal or quadrangular, c. 12–15 µm diam., in mid-leaf c. 25 µm long, near margins more isodiametric, at basal angles somewhat oblate.

Perichaetial leaves c. 0.6–0.9 mm long, broadly ovate, acute to acuminate. Calyptra large, cylindrical, plicate, twisted, covering the entire capsule, usually with a single split, often clasping the seta below, 1.35–1.70 mm long. Setae 0.5–1.0 mm long. Capsules emergent to exerted, ovoid; annulus absent or vestigial; stomata lacking; operculum c. 0.25 mm tall. Peristome lacking. Spores 25–30 µm diam.

Occurs in south-eastern Qld and north-eastern N.S.W.; grows on rock and tree trunks. Also in New Zealand and South America.

Qld: Rifle Bird Ck, Binna Burra, *I.G.Stone 12893* (MEL). N.S.W.: Possum Shoot, Richmond R., 1902, *W.W.Watts* (NSW); Terania Creek Rd, Whian Whian, *I.G.Stone 13573* (MEL).

Erpodium glaucum var. *glaucum* differs from other taxa with a long calyptra (*E. beccarii* var. *longicalyptratum* and *E. hodgkinsoniae*) in the much smaller size and the 4-ranked leaves lacking a strong, hyaline hairpoint. It differs from *E. solmsiellaceum* and *E. biseriatum* in having leaves that are not as strongly dimorphic or obviously complanate. *Erpodium glaucum* var. *trichophyllum* (Ångstr. ex Müll.Hal.) I.G.Stone, from Africa and Asia, has leaves with a longer hairpoint and capsules with a 3-rowed annulus (Stone, 1997).

5. *Erpodium hodgkinsoniae* Hampe & Müll.Hal., *Flora* 70: 448 (1887)

Aulacopilum hodgkinsoniae (Hampe & Müll.Hal.) Broth., *Nat. Pflanzenfam.* I, 3: 711 (1905). T: Richmond R., N.S.W., 1879, *Mrs Hodgkinson*; holo: *n.v.*

Illustrations: V.F.Brotherus, *Nat. Pflanzenfam.*, 2nd edn, 11: 4, fig. 423E–K (1925); I.G.Stone, *J. Bryol.* 19: 493, fig. 2h–k (1997).

Stems to 30 mm long; branches short, erect or ascending. Rhizoids pale brown. Leaves green to yellowish, ±uniform, often secund, ±erect when dry, spreading when moist, 1.1–1.5 mm long, ovate-lanceolate; apex acute, tapering to a short or long smooth hyaline hairpoint; laminal cells smooth or occasionally with a single abaxial mammilla, ±rhomboidal in mid-leaf and 20–30 × 15–20 µm, ±quadrate at margin and alar region.

Perichaetial leaves pale, to 3 mm long, ovate-acuminate, hyaline-awned. Calyptra c. 2.5 mm long; basal lobes split almost to apex into 8 laciniae, reaching to below the capsule. Setae c. 1.5 mm long. Capsules emergent, ±cylindrical, narrowed to the mouth, 1.3–1.5 mm long. 0.65–0.75 mm wide; annulus 4–6-rowed; operculum 0.3–0.4 mm. Peristome absent. Spores 25–35 µm diam.

Endemic from north-eastern Qld to north-eastern N.S.W.; usually on the bark of native or exotic trees, sometimes on basaltic rock; often locally common.

Qld: Ingham, *I.G.Stone 14683* (MEL); 8 km E of Mt Morgan, *H.Streimann 52409* (CANB, NY). N.S.W.: Brunswick R., Myocum, *W.W.Watts 1600* (NSW); Victoria Forest Reserve, *D.H.Vitt 29264* (CANB); Victoria Park Nature Reserve, 17 km SE of Lismore, 11 Oct. 1996, *H.S.Curtis* (BRI, MEL).

Erpodium hodgkinsoniae differs from *E. coronatum* var. *australiense* in the more elongated, upper laminal cells and the coloured rhizoids, as well as in the calyptra and sporophyte. The gametophore superficially resembles that of *E. beccarii*, but the leaf cells are smooth rather than pluripapillose.

6. *Erpodium solmsiellaceum* (Müll.Hal. & Broth.) I.G.Stone, *J. Bryol.* 19: 487 (1997)

Wildia solmsiellacea Müll.Hal. & Broth., *Oefvers. Förh. Finska Vetensk.-Soc.* 33: 103 (1891). T: Woolston Scrub, Qld, Nov. 1888, *C.Wild 18*; holo: H-BR.

Aulacopilum wildii Broth., *Oefvers. Förh. Finska Vetensk.-Soc.* 33: 103 (1891), *nom. nud.* (in synon.).

Illustrations: V.F.Brotherus, *Nat. Pflanzenfam.*, 2nd edn, 11: 6, fig. 421A–F (1925), as *Aulacopilum wildii*; I.G.Stone, *J. Bryol.* 19: 490, fig. 1a–j (1997).

Stems 10–30 mm long, irregularly branched, strongly complanate. Rhizoids smooth, reddish brown. Leaves dimorphic, 4-ranked; dorsolateral leaves oblong-orbicular, with a rounded apex, 0.65–0.75 mm long, 0.35–0.40 mm wide; ventral leaves lanceolate to narrowly lanceolate, with a rounded apex, 0.50–0.65 mm long, c. 0.15 mm wide; margin finely papillose; cells of dorsal leaves mostly 5–6-sided, 20–25 × 15–20 µm, smaller at the margin and often quadrate in alar regions, often elongated centrally near base, densely papillose; papillae compound, hollow,

in C-shapes or circles, 6–12 per cell; cells of ventral leaves rhomboidal, to $50 \times 10\text{--}12 \mu\text{m}$, pluripapillose; papillae simple, some solid.

Perichaetial leaves ovate, c. 1 mm long; apex acute or obtuse and short-acuminate; laminal cells rhomboidal, to $70 \times 10\text{--}12 \mu\text{m}$, pluripapillose; papillae smaller, simple and more distant than in vegetative leaves. Calyptra mitrate, plicate, covering at least half of the capsule, 0.8–1.0 mm long. Setae transparent, c. 1.0 mm long. Capsules c. 0.75 mm long and 0.5 mm wide; annulus c. 3-rowed; operculum c. 0.4 mm tall (including erect beak). Peristome present; teeth 120–160 μm long, narrowly lanceolate, densely papillose on both surfaces. Spores 20–30 μm diam.

Occurs in eastern Qld; epiphytic on trees and palm trunks near streams in rainforest subject to inundation during the wet season. Also in New Caledonia.

Qld: Mulgrave R., Lower Mulgrave, *I.G.Stone 26230* (MEL); Mooloolah Natl Park, *I.G.Stone 20730* (MEL); Tully R., Mrs Henry's property, Euramo, *I.G.Stone 18610* (MEL); Paynter Ck, Nambour, *I.G.Stone 13291* (MEL); River Rd, Indooroopilly, June 1900, *F.Whitteron* (NSW).

In *E. solmsiellaceum*, which closely resembles a leafy liverwort, the dorsal leaves, like those of *E. biseriatum*, are inflexed on the lower margin. The principal difference is in the type of papilla on the laminal cells; these differ on dorsal and ventral leaves of *E. solmsiellaceum* but are \pm uniform in *E. biseriatum*. *Erpodium solmsiellaceum* also differs in the presence of a peristome and a mitrate calyptra.