

## ISOPTERYGIUM

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*Isopterygium* Mitt., *J. Linn. Soc., Bot.* 12: 21 (1869); from the Greek *isos* (equal) and *pteron* (a wing), in reference to the delicate wing-like arrangement of the leaves.

Lecto: *I. tenerum* (Sw.) Mitt.

Autoicous (rarely dioicous). Plants small, slender, delicate to robust, green, whitish green, pale yellow or silvery green, glossy, forming thin mats. Stems reddish, prostrate, creeping, irregularly pinnately branched, with an epidermis of small cells; outer small thick-walled cortical cells forming a sclerodermis; central strand absent. Rhizoids smooth, rarely scabrous, orange-red, originating on the ventral surface of the stem between leaf insertions. not in axils. Pseudoparaphyllia filamentous. Branches suberect, simple or branched. Stem and branch leaves similar in most species, variably complanately leaved, rather lax, ovate to ovate-lanceolate,  $\pm$ abruptly tapered to a narrow  $\pm$ serrulate and acuminate apex; costa short and double or indistinct. Apical laminal cells short or long; upper and median cells smooth, linear or linear-rhomboid, usually not porose,  $\pm$ flexuose, unequally thick-walled, fusiform with a narrow lumina; lower laminal cells shorter and broader, with thicker walls; a row of cells across the leaf insertion rectangular, with thicker brownish walls; alar cells few, quadrate or irregular and thick-walled, well differentiated in only a few taxa. Vegetative propagules, when present, filamentous.

Perigonia scattered on stems and branches. Perichaetia lateral on stems at the bases of branches; inner perichaetial leaf apices piliferous. Calyptra cucullate, naked. Seta long-exserted, slender, smooth, pale red or reddish brown. Capsules oblong-ovoid, curved, horizontal or pendulous with an apophysis narrowing into the seta; annulus not differentiated; operculum conical, short-rostrate. Peristome double, diplolepidous; exostome teeth lanceolate-subulate, with long attenuate apices; endostome segments shorter, minutely papillose, with long filiform apices; cilia 1–3, as long as the segments. Spores spherical,  $\pm$ verrucose.

*Isopterygium* is a large cosmopolitan genus of more than 170 species. At least 30 species are found in Africa and Asia, and the genus also occurs in the Pacific region, North and South America and Europe. Only one species, *I. albescens*, is known from Australia. *Isopterygium* is usually epiphytic on tree trunks; it is rare on rocks.

Prior to 1970, the very heterogeneous *Isopterygium* had been variously placed in the Hypnaceae and Plagiotheciaceae. Iwatsuki (1970, 1987) transferred some taxa to genera such as *Pseudotaxiphyllum*, *Isopterygiopsis*, *Herzogiella* Broth., *Taxiphyllum* and elsewhere. While most are now assigned to the Hypnaceae, *Isopterygium* was included in the newly described Pylaisiadelphaceae by Goffinet & Buck (2004). As *Isopterygium* lacks the defined alar cells, rostrate operculum and other characters thought to be diagnostic for sematophyllaceous taxa (*sens. lat.*), Iwatsuki & Ramsay (2009) returned *Isopterygium* to the Hypnaceae. However, Buck (pers. comm.) considers that molecular data and the presence of filamentous pseudoparaphyllia are particularly significant in the genus, and he suggests that *Isopterygium* is best placed in the Pylaisiadelphaceae. Buck's opinion is accepted here.

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- Isopterygium albescens*** (Hook.) A.Jaeger, *Ber. Thätigk. St. Gallischen Naturwiss. Ges.* 1876–77: 433 (1878)
- Hypnum albescens* Hook., *Sp. Musc. Frond.*, Suppl. 3, 1(2): 226b (1828). T: Nepal; holo: BM-Hooker.
- Hypnum minutirameum* Müll.Hal., *Syn. Musc. Frond.* 2: 689 (1851); *Isopterygium minutirameum* (Müll.Hal.) A.Jaeger, *Ber. Thätigk. St. Gallischen Naturwiss. Ges.* 1876–77: 434 (1878); *Taxiphyllum minutirameum* (Müll.Hal.) H.A.Mill. & D.R.Sm., *Micronesia* 4: 225 (1968). T: Java, [Indonesia], *Blume*; holo: L or Z (Herb. A.Braun).
- Hypnum candidum* Müll.Hal., *Linnaea* 35: 624 (1868); *Isopterygium candidum* (Müll.Hal.) A.Jaeger, *Ber. Thätigk. St. Gallischen Naturwiss. Ges.* 1876–77: 437 (1878) [Ad. 2: 503]. T: Ash Is., Hunter R., N.S.W., Mrs E.Ford; holo: B (probably destroyed, 1943); iso: MEL.
- Hypnum austropusillum* Müll.Hal., *Linnaea* 37: 159 (1872); *Isopterygium austropusillum* (Müll.Hal.) A.Jaeger, *Ber. Thätigk. St. Gallischen Naturwiss. Ges.* 1876–77: 435 (1878) [Ad. 2: 501]. T: Brisbane River, Qld, A.Dietrich; holo: B (probably destroyed, 1943); iso: BRI.
- Hypnum norfolkianum* Müll.Hal., *Linnaea* 37: 160 (1872); *Isopterygium norfolkianum* (Müll.Hal.) A.Jaeger, *Ber. Thätigk. St. Gallischen Naturwiss. Ges.* 1876–77: 435 (1878). T: Norfolk Island, F.Mueller; holo: BM-Hampe; iso: NY.
- Isopterygium baileyianum* Müll.Hal. ex F.M.Bailey, *Syn. Queensland Fl.* Suppl. 2: 71 (1888), *nom. nud.* in synon. Based on: Kedron Brook and Port Curtis, Qld, F.M.Bailey (BRI).
- Isopterygium amoenum* Broth., *Öfvers. Förh. Finska Vetensk.-Soc.* 42: 112 (1900). T: Richmond River, N.S.W., W.W.Watts 888; lecto: H-BR, *fide* Z.Iwatsuki & H.P.Ramsay, *op. cit.* 374; isolecto: NSW; syn: H-BR, *loc. id.*, W.W.Watts 802; isosyn: MEL, NSW.
- Isopterygium latifolium* Broth., *Öfvers. Förh. Finska Vetensk.-Soc.* 42: 114 (1900). T: Alstonville road, Ballina, N.S.W., W.W.Watts 211; holo: NSW; iso: H-BR, MEL.
- Isopterygium howeanum* Broth. & Watts, *Proc. Linn. Soc. New South Wales* 40: 380 (1915). T: hillside, back of Johnsons, Lord Howe Island, 8 July 1911, W.W.Watts 112; holo: NSW; iso: H-BR.
- Isopterygium sublatifolium* Broth., *Proc. Linn. Soc. New South Wales* 43: 564 (1918), *nom. nud.* in synon. Based on: Mt Bartle Frere, Qld, July 1913, W.W.Watts 299 & 305 (HBR); W.W.Watts 305 [type card with H-BR specimen] (NSW); Watts 299 (299).
- Isopterygium viridepallens* Müll Hal. ex Burges, *Proc. Linn. Soc. New South Wales* 60: 93 (1935), *nom. nud.* Based on: Gosford, N.S.W., 19 Sept. 1891, W.Forsyth 442; Lane Cove, N.S.W., W.Forsyth 497; “National Park”, N.S.W., W.Forsyth 492 (NSW).
- Isopterygium austrosulcatum* Müll Hal. ex Burges, *Proc. Linn. Soc. New South Wales* 60: 93 (1935), *nom. nud.* in synon. Based on: W.W.Watts 1586 : NY n.v. (Buck, pers. comm.).
- Isopterygium novae-valesiae* Broth., *Öfvers. Förh. Finska Vetensk.-Soc.* 42: 113 (1900); *Taxithelium novae-valesiae* (Broth.) Broth., in H.G.A.Engler & K.A.E.Prantl, *Nat. Pflanzenfam.* I, 3: 1091 (1908). T: Fernleigh, Richmond R., N.S.W., W.W.Watts 1902; lecto: H-BR, *fide* Z.Iwatsuki & H.P.Ramsay, *op. cit.* 375; isolecto: NSW; residual syntypes: Fernleigh, Richmond R., N.S.W., W.W.Watts 1384, 1399, 1403, 1900 (NSW); Pearces Ck, N.S.W., W.W.Watts 1408 (NSW); Teven, N.S.W., W.W.Watts 1430 (NSW); Alstonville, N.S.W., W.W.Watts 470 (NSW); Uralba, N.S.W., W.W.Watts 1801 (H-BR).

Illustrations: E.B.Bartram, *Mosses of the Philippines* pl. 27, fig. 474 (1939); H.C.Gangulee, *Mosses of Eastern India and Adjacent Regions* 3: 1960, fig 1007 (1980); A.Noguchi, *Illustrated Moss Fl. of Japan* 5: 1051, fig. 462A (1994); H.Streimann, *The Mosses of Norfolk Island* 100, fig. 46 (2002), as *I. minutirameum*; P.-C.Wu, M.R.Crosby & S.He (eds), *Moss Flora of China* (English version) [Hypnaceae]. 8: 206, pl. 690 [as *I. albescens*]; 209, pl. 692 [as *I. minutirameum*] (2005).

Autoicous. Plants forming pale yellow-green to green glossy mats. Stems to 6 cm long. Rhizoids red, sparsely developed. Branches short, simple or with branchlets 10–15 mm long. Leaves slightly concave, erecto-patent, 0.6–1.2 mm long, 0.28–0.35 mm wide, asymmetrical; margins entire or obscurely serrate or denticulate above; apex gradually acuminate to a slender tapering acumen, slightly falcate towards the branch tips. Laminal cells in midleaf 70–100 × 4–8 µm, linear to vermicular; apical cells short-rhomboidal [L:W 4:1]; alar region consisting of 2 or 3 small thick-walled short-rectangular or irregular hyaline cells; basal row of subrectangular cells. Vegetative propagules occasional, filamentous, axillary in apical leaves, mixed sizes in the same group, short (5 or 6 cells) or long (to 10–15 cells).

Perigonia rounded, bud-like. Perichaetia with inner perichaetial leaves gradually piliferous. Calyptra c. 1 mm long. Seta 6–12 mm long, pale red. Capsules common; operculum bluntly curved-rostrate. Peristome: exostome teeth 16; cells thick-walled, papillose; endostome segments 16; cilium 1, the same length as the exostome. Spores 9–13 µm diam. Chromosome number not known.

Occurs in northern W.A., N.T. and Qld and south along the east coast to N.S.W. and Vic.; previous records from Tas. cannot be confirmed. Also in tropical and subtropical Asia and north to Malesia, Japan, Pacific islands (including Lord Howe Island and Norfolk Island) and New Zealand.

W.A.: Galvin Gorge, *K.E.Kantak & S.P. Churchill 687* (NSW, NY). N.T.: Butterfly Springs, *J.Russell-Smith 6200* (CANB); Walker Ck, 68 km SSW of Darwin, *H.Streimann 8814* (CANB). Qld: Upper Mowbray R., *Mrs Sparvell (H.Flecker 5879)* (CANB); Cairns, *W.W.Watts Q235* (NSW); Malanda, *W.W.Watts Q577* (NSW). N.S.W.: Alstonville road, Alstonville, *W.W.Watts 612* (NSW); Wardell Rd, Richmond R., *W.W.Watts 687* (NSW); Nimbin, *A.J. & K.D.Downing N.Osborne*. (MQU 72001827) [with filamentous gemmae]. Vic.: Dandenong Ra., *E.Ronfield s.n.* (MEL).

Iwatsuki & Ramsay (2009) observed that while the recognition and separation of Australian and Asian specimens identified as *I. minutirameum* and *I. albescens* was usually based on leaf shape, this character was complicated by the extreme variability of the two taxa. As the differences were not found to be consistent within and between specimens, they combined the two entities as the single species *I. albescens*. The report here of axillary filamentous propagules is the first for this species.

#### Excluded Name

*Isopterygium umbilicatum* Mitt., *Trans. & Proc. Roy. Soc. Victoria* 19: 86 (1882), *nom. nud.*

This is a species of *Ectropothecium* (Hypnaceae).