

## MITTHYRIDIDIUM

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*Mitthyridium* H. Rob., *Phytologia* 32: 432 (1975); combining the first part of the surname of British bryologist William Mitten (1819–1906) with the name *Thyridium*, *hom. illeg.* Mitten originally described the genus as *Thyridium*, but he did not explain his choice of name. The Greek prefix *thyr-* can refer to a door or shield, while *thyri-* refers to a window; *thyra* means door, doorway or gate. The Greek suffix *-idium* means small. Perhaps Mitten made up the name to call attention to the window-like appearance of the prominent cancellinae.

*Thyridium* Mitt., *J. Linn. Soc., Bot.* 10: 188 (1869), *hom. illeg. non Thyridium* Nitschke, *Pyrenomycetes German.* 110 (1867).

Lecto: *M. fasciculatum* (Hook. & Grev.) H. Rob.

Plants commonly yellowish green, mat-forming or tufted. Stems prostrate, bearing erect-ascending or assurgent irregular branches. Rhizoids glossy dark reddish brown to purple. Leaves lanceolate to acuminate or oblong-linear; conspicuously bordered, at least below, with unistratose often broad bands of hyaline cells; cells thick-walled, isodiametric. Gemmae scarce, inconspicuous, fusiform-clavate, on leaf tips.

Sporogones rarely produced, terminal at branch tips but often overtopped and appearing lateral. Calyptra cucullate, deciduous. Seta elongate. Capsules exserted, cylindrical; operculum with long slender rostrum. Peristome present.

Except for the prostrate stems with erect-ascending branches, and a broad unistratose leaf border of hyaline cells, *Mitthyridium* is otherwise similar to *Syrrhopodon*. Some species are uncomfortably close to one another and difficult to circumscribe satisfactorily, but others are quite distinct. A paucity of “good” taxonomic characters makes taxonomy of the genus difficult. An added complication is that species of *Mitthyridium* can grow intermingled, weaving their stems and branches together to form a single carpet of moss. The principal reason for taxonomic difficulty seems to arise from the lack of sharp morphological discontinuities among the species. Instead of the notable character states or suites of states that distinguish most species in *Calymperes* and *Syrrhopodon*, in *Mitthyridium* the taxa appear to blend almost imperceptibly with one another. Intensive study of numerous specimens is required to formulate species concepts that can be successfully applied repeatedly.

A genus of approximately 15–20 species; mostly confined to the Palaeotropics, but with a single dubious historical record from the west coast of South America, perhaps based on mislabeled specimens. Nine species in Australia, all in north-eastern Queensland.

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### Key

- 1 Tips of at least some leaves tubular or funnel-shaped .....2  
 1: Tips of leaves plane or with erect margins, or  $\pm$ involute, but neither tubular nor funnel-shaped .....3  
     2 Tips of at least some leaves funnel-shaped, lacking a coarsely mammillose tubular portion; leaf border very broad at the shoulders, mostly 100–150  $\mu$ m wide..... **9. M. constrictum**  
     2: Tips of at least some leaves tubular, the tubular portion often coarsely mammillose; leaf border narrower at the shoulders, mostly 60–70  $\mu$ m wide..... **8. M. crassum**  
 3 Leaves with conspicuously flaring shoulders .....4  
 3: Leaves lacking conspicuously flaring shoulders (leaves mostly broadest at the shoulders, but the latter not prominently expanded) .....5  
     4 Leaves narrowly acuminate, mostly 2.0–2.5 mm long; plants  $\pm$ glossy when dry, mostly slender; leaf tips very narrow with the costa appearing nearly excurrent, with narrow wings of lamina, commonly with conspicuous gemmae..... **5. M. perundulatum**  
     4: Leaves broadly pointed, mostly 3–4 mm long; plants dull, coarse; leaf tips broad; costa not appearing excurrent, lacking conspicuous gemmae ..... **1. M. fasciculatum**  
 5 Plants small; leaves mostly tightly crispate when dry, oblong, mostly less than 2 mm long, sharply toothed at the shoulders and above with spreading teeth ..... **7. M. repens**  
 5: Plants small to large; leaves variously contorted when dry but not crispate, lanceolate to linear, mostly more than 2 mm long, margins toothed or entire, if toothed the teeth not spreading .....6  
     6 Leaves long relative to wide; limb of most leaves 2 or more times the length of the sheath .....7  
     6: Leaves short relative to wide; limb of most leaves only c. 1.0–1.5 times the length of the sheath .....9  
 7 Leaf margins entire (rarely weakly denticulate); limb  $\pm$ involute..... **2. M. leucoloma**  
 7: Leaf margins regularly denticulate to serrate; limb plane .....8  
     8 Limb oblong-acuminate, tapering abruptly distally into an acute apex; most leaves c. 0.5 mm wide at mid-limb ..... **3. M. papuanum**  
     8: Limb long-acuminate, tapering gradually into an acute apex; most leaves c. 0.25 mm wide at mid-limb ..... **6. M. subluteum**  
 9 Leaves narrowly acuminate ..... **5. M. perundulatum**  
 9: Leaves oblong, with a short point..... **4. M. flavum**

#### **1. *Mitthyridium fasciculatum* (Hook. & Grev.) H. Rob., *Phytologia* 32: 433 (1975)**

*Syrrhopodon fasciculatus* Hook. & Grev., *Edinburgh J. Sci.* 3: 225 (1825); *Calymperes fasciculatum* (Hook. & Grev.) Mitt., *J. Linn. Soc., Bot.*, Suppl. 1: 41 (1859); *Thyridium fasciculatum* (Hook. & Grev.) Mitt., *J. Linn. Soc. Bot.* 10: 189 (1869). T: Ternate, [Maluku Islands (Moluccas), Indonesia], *Dickson*; lecto: BM; isolecto: E, FH, G, GL, NY; Singapore, 1822, *Wallich* 2270; syn: BM, BR, GL, NY.

Illustrations: H.Nowak, *op. cit.* 105, Abb. 10; 107, Abb. 11; 167, Taf. 1A; 175, Taf. 5C–D; 202, Taf. 19; 204, Taf. 21; W.D.Reese, T.Koponen & D.H.Norris, *op. cit.* 191, fig. 81; W.D.Reese, H.Mohamed & A.D.Mohamed, *op. cit.* 52, figs 17–20.

Plants robust, dull green to yellowish green, forming tangled mats; branches elongate. Leaves 3–4 mm long, acuminate from a broad base with flaring shoulders; margins denticulate, with broad borders of hyaline cells at the shoulders, the border mostly c. 90 µm wide; cells of the limb thick-walled, minutely papillose on both surfaces; cancellinae large, broadly truncate distally. Gemmae rare, sparse, pale, warty, fusiform, abaxial and adaxial on leaf tips. Sporogones not seen in Australian material.

Often common and conspicuous in north-eastern Qld from the Iron Range as far S as Fraser Is.; on trees, logs and rocks in wet forests to c. 1000 m elevation. This widespread eastern Palaetropical species occurs from Mauritius and Seychelles, through Malesia, SE Asia and from the Philippines to Samoa.

Qld: Mossman Gorge, *I.G.Stone 25408* (MELU); The Boulders, Babinda, *D.H.Norris 41877* (HSC, LAF); Johnstone R., Dec. 1882, *Berthoud* (MEL, NY); *loc. id.*, 13 July 1888, *H.Tryon* (BRI, MEL); Fraser Is., 29 Aug. 1986, *G.A.M.Scott* (MELU).

Its large size, dull aspect and sprawling habit make it easy to recognise in the field. The broadly flaring leaf shoulders with wide borders, and the large, conspicuously truncate cancellinae are distinctive under the microscope.

## 2. *Mitthyridium leucoloma* (Müll.Hal.) H.Rob., *Phytologia* 32: 433 (1975)

*Syrrhopodon leucoloma* Müll.Hal., *Bot. Jahrb.* 5: 86 (1883); *Thyridium leucoloma* (Müll.Hal.) Broth., in H.G.A.Engler & K.A.E.Prantl, *Nat. Pflanzenfam.*, 2nd edn, 10: 236 (1924). T: New Guinea, *Naumann*; lecto: FH; isolecto: BM.

Illustrations: H.Nowak, *op. cit.* 82, Abb. 7; 171, Taf. 3C–D; 195, Taf. 15; A.Eddy, *op. cit.* 142, fig. 256.

Plants robust, green, glossy, forming loose soft tangles. Stems and branches elongate. Leaves mostly c. 4 mm long, acuminate; limb involute when wet or dry; margins entire except at the extreme apex, rarely with weak denticulations, broadly bordered, the border c. 70 µm wide at the shoulders; cells of limb smooth to finely papillose; cancellinae large and conspicuous, distally truncate; distal cells commonly interlocking with adjacent green cells of limb. Gemmae very sparse, pale green to brownish, abaxial and adaxial on leaf tips.

Sporogones frequent. Calyptra c. 3 mm long. Seta 5–6 mm long, red. Capsules exerted, 1.5–2.0 mm long; operculum 1.0–1.5 mm long. Peristome teeth reddish yellow, slender, c. 300 µm tall, papillose, with transverse sutures. Spores 15–21 µm diam., papillose.

Occurs in far-north Qld near the tip of Cape York Peninsula and in Cairns; grows on palms and *Melaleuca* trunks in monsoon forest and mangrove swamp; also in the Philippines (Mindanao), the Maluku Islands (Indonesia), New Guinea and New Britain.

Qld: 7 km S of Cape York, *I.G.Stone 25579* (MELU); Maloneys Springs, Cook District, *P.I.Forster PIF5252* (BRI, MO); Cairns Botanical Garden Jungle Walk, *I.G.Stone 25399* (BM, BRI, DNA, LAF, MEL, MELU, NSW); *loc. id.*, *F.Cook 4024* (LAF).

This moss resembles *M. fasciculatum* at first glance, but the glossy appearance, entire margins, and lack of flaring shoulders are diagnostic. The leaves are involute when wet or dry, and the distal cells of the cancellinae usually interlock with adjacent green cells of the limb, as in *Calymperes taitense*. This species was treated by Reese *et al.* (1986a, b) as a synonym of *M. obtusifolium* (Lindb.) H.Rob. Further study has led us to agree with Eddy (1990) and Nowak (1980) who recognise *M. leucoloma* as a distinct species. It is well established on palm stems along the Jungle Walk in the Cairns Botanical Garden.

## 3. *Mitthyridium papuanum* (Broth.) H.Rob., *Phytologia* 32: 434 (1975)

*Syrrhopodon papuanum* Broth., *Öfvers. Förh. Finska Vetensk.-Soc.* 37: 156 (1895); *Thyridium papuanum* (Broth.) M.Fleisch., *Musci Fl. Buitenzorg* 1: 232 (1904). T: New Ireland, [Papua New Guinea], Oct. 1893, *Micholitz 94*; lecto: H; isolecto: BM, FH, S.

Illustrations: H.Nowak, *op. cit.* 131, Abb. 13; 179, Taf. 7C–D; 212, Taf. 24; 215, Taf. 25.

Plants in loose soft tangles, yellowish green, somewhat glossy, profusely branched. Branches short or long, often curved near the tips. Leaves mostly 3–4 mm long, broadly acuminate to broadly linear from a slightly broader base, abruptly narrowed to an acute apex, lacking flaring shoulders; margins denticulate almost to the leaf tip; border of hyaline cells mostly 30–40 µm wide at the shoulders; cells of the limb smooth or minutely papillose; cancellinae rounded distally or truncate. Gemmae not seen. Sporogones not seen in Australian material.

Rather rare in north-eastern Qld as far south as Tully; on tree trunks and twigs in rainforest, from sea level to c. 900 m. Also in Malesia (including Papua New Guinea), the Philippines and Oceania.

Qld: Frenchmans Ck, July 1913, *W.W.Watts* (H, NSW, *vide* Nowak, 1980); lower E slope, Bellenden Ker Ra., *W.D.Reese, I. & A.Stone 17144* (LAF, MELU); 8 km W of Babinda, *W.D.Reese & I.G.Stone 17054* (LAF, MELU); Downey Ck, W of Innisfail, *I.G.Stone 24726* (MELU); Lower Tully R., *M.Thorsborne & I.G.Stone 19076* (BRI, LAF, MELU).

The long broad leaves lacking flaring shoulders, abruptly pointed leaf tips, and denticulate margins, are distinctive. This species is somewhat similar to *M. leucoloma*, but leaves of the latter have a broader border which is usually entire, the limb is ±involute, in contrast to the plane limb of *M. papuanum*, and they lack abruptly narrowed leaf tips. *Mitthyridium papuanum* is also similar to *M. flavum*; see comments under the latter for differentiation.

Reese *et al.* (1986a b) incorrectly placed *M. papuanum* in the synonymy of *M. luteum* (Mitt.) H.Rob., which is a close relative. The latter has not been found in Australia, and previous reports (Reese *et al.*, 1986a, b) are in error. Eddy (1990) also treated *M. papuanum* as a synonym of *M. luteum*.

#### 4. *Mitthyridium flavum* (Müll.Hal.) H.Rob., *Phytologia* 32: 433 (1975)

*Syrrhopodon flavus* Müll.Hal., *Bot. Zeitung (Berlin)* 13: 763 (1855); *Thyridium flavum* (Müll.Hal.) M.Fleisch., *Musci Fl. Buitenzorg* 1: 232 (1904). T: Java, [Indonesia], “inter alios muscos specimina pauca manca inveni”, *coll. unknown; n.v.*

Illustrations: H.Nowak, *op. cit.* 154, Abb. 16; 177, Taf. 6C–D; 221, Taf. 28 [all as *M. vriesii* (Sande Lac.) H.Rob.] (1980); W.D.Reese, H.Mohamed & A.D.Mohamed, *op. cit.* 50, figs 1–4; W.D.Reese, T.Koponen & D.H.Norris, *op. cit.* 187, fig. 77.

Plants small, green to yellowish green, forming thin straggling (occasionally dense) mats. Branches mostly short, often appearing uncinatate at the tips. Leaves 1.5–3.0 mm long, broad, oblong or somewhat acuminate, rather abruptly narrowed to an acute apex, not or only slightly broader at the shoulders; margins ±entire to denticulate, entire in the upper part; border at the shoulders of hyaline cells mostly 40–50 µm wide; cells of limb smooth or finely papillose; cancellinae large, irregularly broadly rounded to truncate distally. Gemmae sparse, pale, warty, abaxial and adaxial on leaf tips. Sporogones not seen in Australian material.

Occurs in northern N.T., and north-eastern Qld as far south as Proserpine; grows on palms, trees and vines in forest, mostly at low elevations; also in SE Asia, the Philippines and Papua New Guinea.

N.T.: Melville Is., *J.Russell-Smith 1300* (DNA, MELU). Qld: Bloomfield Rd, 2–4 km N of Cape Tribulation, *W.D.Reese 17377* (LAF, MELU); nr ferry, Daintree R, *I.G.Stone 23816* (MELU); Babinda, Russell R, *W.W.Watts Q293* (NSW); Conway S.F., 18 km ENE of Proserpine, *H.Streimann 37346* (B, CANB, NY).

This moss is quite common and often abundant in northern Queensland. Its straggly habit, short branches, and broad, short, oblong or somewhat acuminate, abruptly pointed leaves are distinctive. Specimens of *M. perundulatum* with short, broad leaves can be quite similar to *M. flavum*, but leaves of the former have undulate margins that are sharply toothed above, and in most specimens at least the upper leaves (usually most leaves) are narrowly acuminate, not merely abruptly short-pointed as in *M. flavum*. *Mitthyridium papuanum* is also similar, primarily because of its abruptly short-pointed leaves, and it can intergrade with *M. flavum*. However, the leaves of *M. papuanum* are usually much longer than those of *M. flavum*, linear rather than merely oblong, and have a narrower border at the leaf shoulders. In *M. flavum* the leaf margins just below the apex are entire, but in *M. papuanum* the margins

are usually  $\pm$ serrate to the leaf tip. *Mitthyridium flavum* consistently has very short branches whereas those of *M. papuanum* are often elongate.

#### 5. *Mitthyridium perundulatum* (Broth.) H.Rob., *Phytologia* 32: 434 (1975)

*Syrrhopodon perundulatus* Broth., *Fl. Schutzgeb. Südsee* 83 (1900); *Thyridium perundulatum* (Broth.) M.Fleisch., *Musci Fl. Buitenzorg* 1: 232 (1904). T: Wald am Gogol-Mittellauf, Kaiser Wilhelmland, [Papua New Guinea], *Lauterbach 970b*; lecto: H, *vide* Nowak (1980); isolecto: BM, FH.

Plants small, green or yellowish green, with short stems and branches, usually in compact sods or tufts. Leaves mostly 2.0–2.5 mm long, commonly very narrowly acuminate from a broad base; apex very narrow, commonly consisting of a costa with mere wings of lamina, but slightly expanded at the tip; leaf margins serrate, at least distally; cells of limb smooth to minutely papillose; cancellinae narrowly to broadly scalariform distally. Gemmae frequent, but usually inconspicuous, adaxial on narrow tips of leaves. Sporogones not seen in Australian material.

Occurs in north-eastern Qld from the Daintree River to south of Cardwell; grows on trees and vines in rainforest, mostly at low elevations but occasionally up to c. 400 m. Also in Papua New Guinea.

Qld: Daintree R., *Pentzke s.n.* (LAF, NY); Oliver Ck (Arsenic Ck), Cape Tribulation Natl Park, *I.G.Stone 19385* (BRI, LAF, MELU); lower E slope, Mt Bellenden Ker, *W.D.Reese 17137* (LAF, MELU); Josephine Falls, *W.D.Reese 17073*, *I.G. & A.Stone* (LAF, MELU, NY); 11 km S of Babinda, *G.E.Kantak & S.P.Churchill 900* (CANB, LAF, NY).

Reese *et al.* (1986a, b) treated *M. perundulatum* as a synonym of *M. jungquilianum* (Mitt.) H.Rob., and they were followed in that concept by Eddy (1990) and Menzel & Schultze-Motel (1990). However, *M. perundulatum* is a distinct species, and while Australian specimens of this species had previously been misidentified as *M. jungquilianum* and *M. undulatum* (Dozy & Molk.) H.Rob., neither one actually occurs in Australia.

Under the microscope, leaves of this little moss can appear similar to those of *M. subluteum*, but they differ in being shorter and more narrowly acuminate. The tips of upper leaves of *M. perundulatum* are mostly very narrow with only wings of lamina along the costa, and they are typically slightly expanded at the apex, a good character for recognition. A greater contrast is provided by the gross aspect of the plants as seen under the dissecting microscope. The stems and branches of *M. perundulatum* are often very short and compact as opposed to the conspicuously elongate stems and branches of *M. subluteum*. Further, the dry leaves of the former are straight or curved, not loosely curled as in the latter, and the very narrow and commonly gemmiferous leaf tips are usually conspicuous in Australian specimens. *Mitthyridium perundulatum* can be thought of as a small version of the related *M. adpressum* (Broth.) H.Rob. and *M. undulatum* (Dozy & Molk.) H.Rob. The plants of some of the Australian specimens of *M. perundulatum* are smaller than those of the type material from Papua New Guinea, but do not differ in other ways.

Brotherus cited two collections (syntypes), both from New Guinea, when he described *Syrrhopodon perundulatus*: *Lauterbach 970b*, designated by Nowak (1980) as lectotype for the name, and *Micholitz 134*, determined by Nowak to be *M. subluteum*, with which we agree.

#### 6. *Mitthyridium subluteum* (Müll.Hal.) H.K.Nowak, *Bryophyt. Biblioth.* 20: 144 (1980)

*Syrrhopodon subluteus* Müll.Hal., *J. Mus. Godeffroy* 3: 67 (1874); *Thyridium subluteum* (Müll.Hal.) A.Jaeger, *Ber. Thätigk. St. Gallischen Naturwiss. Ges.* 1877–78: 415 (1880). T: Upolu et Savaii, Samoa, *Graeffe*; lecto: H; isolecto: BM, NY, S.

Illustrations: H.Nowak, *op. cit.* 145, Abb. 15; 177, Taf. 6A–B, 219, Taf. 27; W.D.Reese, H.Mohamed & A.D.Mohamed, *op. cit.* 54, figs 33–36; W.D.Reese, T.Koponen & D.H.Norris, *op. cit.* 191, fig. 85.

Plants green or yellowish, forming loose soft tangles or thin spreading mats. Stems and branches elongate. Leaves 3.0–3.5 mm long, characteristically loosely curled when dry, narrowly linear; sheath not or scarcely broader than the limb; leaf tips gradually acuminate,

with a distinct lamina, not expanded at the apex; margins toothed, especially above, typically undulate, strongly bordered almost to the leaf tip; cells of the limb thick-walled and with small lumina, smooth to finely papillose; cancellinae narrowly to broadly scalariform distally to  $\pm$ truncate. Gemmae inconspicuous, scanty, abaxial and adaxial on leaf tips. Sporogones not seen in Australian material.

Occurs in north-eastern Qld from the Daintree River to south of Cardwell; grows on trees, vines, rarely on rock, in rainforest up to 1000 m. Also in Malesia, the Philippines and east to Samoa.

Qld: Big Tableland, 26 km S of Cooktown, *H.Streimann* (CANB, NY); lower E slope, Mt Bellenden Ker, *W.D.Reese 17112* (LAF, MELU); Frenchmans Ck, *W.W.Watts 361 p.p.* (MEL); Palmerston [Wooroonooran] Natl Park, *I.G.Stone 24095* (MELU); 36 km WNW of Ingham, *H.Streimann 28782* (CANB).

The elongate stems and branches and the curled, undulate, linear leaves make this species easy to recognise. See comments under *M. perundulatum* for distinctions. Eddy (1990), and Menzel & Schultze-Motel (1990), included the non-Australian *M. jungquilianum* (Mitt.) H.Rob. in their concept of this species, but our treatment of *M. subluteum* excludes *M. jungquilianum*.

### 7. *Mitthyridium repens* (Harv.) H.Rob., *Phytologia* 32: 434 (1975)

*Syrrhopodon repens* Harv., in W.J.Hooker, *Icon. Pl. Rar.* 1, tab. 22 (1836); *Calymperes repens* (Harv.) Müll.Hal., *Syn. Musc. Frond.* 1: 526 (1849); *Thyridium repens* (Harv.) Mitt., *J. Linn. Soc., Bot.* 10: 188 (1868). T: Penang, [Malaysia], on the bark of trees, over which it creeps in wide patches, *Wallich(?)*; n.v.

*Syrrhopodon undulatulus* Broth. & Geh., in V.F.Brotherus, *Öfvers. Förh. Finska Vetensk.-Soc.* 42: 96 (1900); *Thyridium undulatulum* (Broth. & Geh.) M.Fleisch., *Musci Fl. Buitenzorg* 1: 236 (1904); *Mitthyridium undulatulum* (Broth. & Geh.) H.Rob., *Phytologia* 32: 434 (1975). T: Bellenden Ker Range, Qld, *Gribble* in herb. Melbourne; holotype: H; isotype: S.

*Syrrhopodon humile* Watts & Whitel., *Proc. Linn. Soc. New South Wales* 27(Suppl.): 60 (1902), *nom. nud.* Based on: Johnstone R., Qld, Dec. 1882, *Berthaud*; BM, MEL, NY.

Illustrations: H.Nowak, *op. cit.* 97, Abb. 9; 169, Taf. 2C; 199, Taf. 17; 201, Taf. 18 [all as *M. louisidum* (Broth.) H.K.Nowak]; 89, Abb. 8; 169, Taf. 2D; 197, Taf. 16 [all as *M. parvifolium* (E.B.Bartram) H.Rob.]; W.D.Reese, H.Mohamed & A.D.Mohamed, *op. cit.* 51, figs 9–12; W.D.Reese, T.Koponen & D.H.Norris, *op. cit.* 187, fig. 79.

Plants small, yellowish green, forming low compact mats or dense sods; branches very short. Leaves tightly crispate when dry, oblong from a broader base, 1–2 mm long; margins conspicuously toothed with divergent teeth where bordered; border widest at the shoulders; cells of limb thick-walled, finely papillose; cancellinae large, somewhat truncate distally. Gemmae sparse, inconspicuous, green, 100–150  $\mu$ m long, on both sides of the leaf tips.

Sporogones uncommon. Calyptra 1.0–1.5 mm long. Seta reddish, 3–5 mm long. Capsules exserted, 1.0–1.5 mm long; operculum c. 1 mm long, falling with the calyptra. Peristome teeth yellowish, c. 160  $\mu$ m tall, with transverse bars, slightly papillose. Spores 15–18  $\mu$ m diam., papillose.

Occurs in north-eastern Qld from Cape York to Ingham, on trees, vines, shrubs, stumps, dead wood and on rock in rather open forest, mostly at or near sea level but, occasionally, to c. 500 m. Also in Sri Lanka, the Andamans Islands, Burma, Thailand, the Philippines (Luzon), Indonesia, Papua New Guinea and Fiji.

Qld: 7 km S Cape York, *I.G.Stone 25600* (MELU); Cape Tribulation Natl Park, 70 km S of Cooktown, *W.D.Reese 17355, 17359* (LAF, MELU); Cairns, July 1890, *C.Wild* (BRI); Malbon Thomson Ra., 10 km NE of Gordonvale, *H.Streimann 27524* (CANB, H, L, NICH, NY); The Haven, Hinchinbrook Is., *I.G.Stone 15006* (MELU).

This is perhaps the most distinctive Australian species of *Mitthyridium* due to its small stature, short oblong leaves that are crispate when dry, and leaf margins with a broad border bearing sharp, spreading teeth.

## 8. *Mitthyridium crassum* (Broth.) H.Rob., *Phytologia* 32: 432 (1975)

*Syrrhopodon crassus* Broth., *Öfvers. Förh. Finska Vetensk.-Soc.* 40: 166 (1898); *Thyridium crassum* (Broth.) M.Fleisch., *Musci Fl. Buitenzorg* 1: 228 (1904). T: in montibus prope Mita, 2,000', Milne Bay, British New Guinea [Papua New Guinea], *Micholitz* 133; lecto: H; iso: BM, FH, S, W.

Illustrations: H.Nowak, *op. cit.* 53, Abb. 2; 168, Taf. 2B; 185, Taf. 10; W.D.Reese, H.Mohamed & A.D.Mohamed, *op. cit.* 56, figs 47–52; W.D.Reese, T.Koponen & D.H.Norris, *op. cit.* 195, figs 89–90; A.Eddy, *op. cit.* 148, fig. 261.

Plants small, glossy, pale green, usually with short stems and branches, gregarious or in compact sods or tufts. Leaves mostly 2–3 mm long, lanceolate-acuminate from a broad base; leaf margins weakly denticulate above shoulders; border of hyaline cells c. 58–77 µm wide at the shoulders; cells of limb very thick-walled, smooth to weakly papillose except in the tubular upper part of the limb where they are often conspicuously papillose-bulging; cancellinae broadly scalariform to almost truncate distally. Gemmae inconspicuous, emergent from the tubular tips of gemmiferous leaves; cell walls very thick. Sporogones unknown.

Occurs in north-eastern Qld from Mossman south to Tully; grows on tree trunks and logs in complex mesophyll forest at elevations to c. 700 m. Also in Sumatra, the Maluku Islands (Moluccas), peninsular Malaysia and New Guinea.

Qld: Mossman Gorge, just W of Mossman, *W.D.Reese 17405* (LAF, MELU); 2 miles [c. 3.2 km] W of Mossman, *D.H.Norris 42597* (HSC, LAF); Rex Ck, Mossman Gorge, *H.Streimann 45816* (CANB); Macnamee Natl Park, W of Innisfail, *I.G.Stone 18246* (MELU); El Arish S.F., *I.G.Stone 19891* (MELU).

This species is easy to recognise by its glossy aspect (due to highly reflective abaxial surfaces of the costae in the dried state), broad leaf border, and often tubular leaf tips usually heavily beset with large, prominent, blunt papillae. It is a relative of *M. constrictum*, but differs in having a narrower border and in lacking a funnel-shaped leaf tip, among other traits. The often very long, cylindrical, and often heavily papillose tips of the gemmiferous leaves are diagnostic when present, and different from the leaf tips of the related *M. wallisii* (Müll.Hal.) H.Rob., which does not occur in Australia. Although Menzel & Schultze-Motel (1990) treated this moss as a taxonomic variety of *M. wallisii*, we prefer to retain it at the specific level, recognising the distinctive feature of the tubular tips of the gemmiferous leaves, often quite elongate and heavily beset with protruding cells.

## 9. *Mitthyridium constrictum* (Sull.) H.Rob., *Phytologia* 32: 432 (1975)

*Calymperes constrictum* Sull., *U. S. Explor. Exped. Musci* 6 (1860); *Thyridium constrictum* (Sull.) Mitt., *J. Linn. Soc., Bot.* 10: 188 (1868). T: Hawaii, 1838–1842, Wilkes Expedition No. 39; lecto: FH; isolecto: H, NY, S.

Illustrations: H.Nowak, *op. cit.* 43, Abb. 1; 169, Taf. 2A; 181, Taf. 8; 183, Taf. 9; W.D.Reese, H.Mohamed & A.D.Mohamed, *op. cit.* 55, figs 42–46; W.D.Reese, T.Koponen & D.H.Norris, *op. cit.* 195, figs 87–88; A.Eddy, *op. cit.* 147, fig. 259.

Plants robust, glossy, yellowish green above, rich brown in older parts, forming loose tangles; branches often greatly elongate. Leaves mostly 2–3 mm long, oblong-acuminate, the tips mostly constricted just below the flaring funnel-shaped apex that forms the gemma receptacle; leaf margins mostly denticulate; border of hyaline cells mostly 150–300 µm wide; cells of limb very thick-walled, finely papillose; cancellinae broadly rounded above to almost truncate. Gemmae scarce, barely emergent from the funnel-shaped gemma receptacle at the leaf tips. Sporogones not seen in Australian material.

Occurs in rainforest in north-eastern Qld between Mossman and Babinda; grows on tree trunks and logs up to c. 1000 m. Also in Cambodia, Malesia (including Papua New Guinea), the Philippines and Oceania.

Qld: Rex Ck, Mossman Gorge, *I.G.Stone 24561* (MELU); Goldsborough Track, saddle between Mt Bellenden Ker and Mt Bartle Frere, *I.G.Stone 24574* (MELU); The Boulders, 6 km W of Babinda, *H.Streimann 45663* (CANB); *loc. id.*, *D.H.Norris 41969* (HSC, LAF).

This widespread species is quite rare, but sometimes locally abundant, in Australia. It is easily recognised by its loose, straggly habit, conspicuously broad border of hyaline cells,

and the peculiar funnel-shaped gemma receptacles. Although most leaves bear gemma receptacles at their tips, only some of the receptacles actually produce gemmae, and then only a few.