



The Bryophytes of Sabah (North Borneo) with Special Reference to the BRYOTROP
Transect of Mount Kinabalu. X. Hypnodendraceae (Bryopsida)

Author(s): Andries Touw

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ANDRIES TOUW

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X. *Hypnodendraceae* (*Bryopsida*)

Abstract

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General information and a key to the eight species of *Hypnodendron* found in Borneo are presented, as well as notes on the 1986 BRYOTROP collections and some additional new data. *H. vitiense* Mitt. is reported as new to the island.

Introduction

The *Hypnodendraceae* are a monotypic family of pleurocarpous mosses characterized by a more or less dendroid habit, a strong differentiation into stipe and frond, and predominantly basal innovations usually lacking a distinct creeping basal part. Their leaves show long, mostly prorate cells, thickened and often bistratose, coarsely serrate margins, and a long, abaxially toothed costa. The plants are dioicous and have long, often sulcate capsules provided with a complete, hypnoid peristome.

The tall and handsome *Hypnodendraceae* are among the mosses most often brought in from the Mallesian forests. The plants collected during BRYOTROP II largely confirm the information gathered from previous collections made in the comparatively well known area of Mount Kinabalu. Descriptions and illustrations of the species, as well as notes on their variability and ecology can be found in the revision of the family (Touw 1971). The information presented in this paper is largely restricted to a key, notes on the BRYOTROP collections, and some additional data that have become available after the preparation of the revision.

All species are rain forest plants. *H. beccarii*, *H. reinwardtii* and *H. subspininervium* grow on branches and stems of shrubs and trees from which their fronds are spreading horizontally. Far less often they are found on other substrates. *H. subspininervium* is the only species restricted to the lowland and colline zones, and has not been collected during BRYOTROP II. The remaining species grow erect, and can all be found growing on tree bases, decaying logs, humus covered rocks, and in terrestrial habitats, in places where humus accumulates. *H. dendroides* is by far the most common *Hypnodendron* species occurring in such situations in montane forests. *H. fusco-mucronatum* and *H. milnei* show a preference for boulders; *H. milnei* is mostly found growing in and along stream beds. *H. diversifolium* is a montane species more often found on the forest floor, and rarely growing as an epiphyte.

Key to the Bornean species of *Hypnodendron*

1. Stipe leaves appressed 2
 - Stipe leaves widely spreading to squarrose-recurved 3
2. Stipe tomentose; frond mostly dull, umbellate. Branches not or weakly complanate. Stipe leaves serrate *H. fusco-mucronatum*
 - Stipe naked or nearly so; frond very glossy, palmate or subumbellate. Branches strongly complanate. Stipe leaves entire or bearing a few teeth near the leaf apex *H. vitiense*
3. Branch leaves tristichous, those of the dorsal row much smaller than the laterally spreading ones *H. diversifolium*
 - Branch leaves arranged in more than three rows, isomorphous or nearly so 4
4. Plant growing erect; frond palmate or umbellate. Basal and alar cells of stipe leaves green . . . 5
 - Plant growing more or less horizontally; frond pinnate or bipinnate. Basal and alar cells of stipe leaves orange 6
5. Stipe tomentose at base only. Geminate teeth at leaf margin present. Stipe leaves gradually contracted at base *H. milnei*
 - Stipe bearing scattered tufts of tomentum or completely tomentose. Leaf margin bearing simple teeth only. Base of stipe leaves auriculate, cordate, or broadly rounded *H. dendroides*
6. Leaves of main branches less than three times as long as wide. Frond bipinnate (rarely pinnate); branchlets attenuate. Theca inclined to horizontal *H. subspiniervium*
 - Leaves of main branches more than three times as long as wide. Frond pinnate (rarely bipinnate); branchlets mostly rounded at their tips or weakly attenuate only. Theca erect or inclined 7
7. Marginal teeth of branch leaves up to 35(–65) μm long, geminate ones nearly always present. Theca erect or suberect, mostly shallowly to deeply sulcate *H. reinwardtii*
 - Marginal teeth of branch leaves ca. 40–75 μm long, geminate ones nearly always absent. Theca inclined, smooth or weakly angular below the orifice *H. beccarii*

Hypnodendron (C. Muell.) Lindb. ex Mitt. in Seem., Fl. Vit. 401 (1873).

Hypnodendron beccarii Hampe ex Jaeg. in Jaeg. & Sauerb. in Ber. Thätigk. St. Gallischen Naturwiss. Ges. 1877/78: 358 (1880).

= *Dendro-Hypnum beccarii* Hampe in Nuovo Giorn. Bot. Ital. 4: 289 (1872), comb. inval. – Typus: Borneo, Sarawak, Mt. Poe, 3000–5000 ft., *Beccari s.n.* (Holo–BM!, iso–Gro!, –L!).

Ic.: Touw 1971: 250, fig. 10.

Geographical range: Borneo (SAB, KIN, SAR, KBA, KTI).

Altitudinal range: (600–) 1100–2500 m.

Specimens examined:

BRYOTROP: XV: 3497, 3522, 3566. – XVIIa: 4598, 4621, 4760. – XIX: 3098. – XIXb: 4719. – XXI: 3259. – XXV: 3648, 3650, 3673.

Hypnodendron dendroides (Brid.) Touw in Blumea 19: 320 (1971).

= *Bryum dendroides* Swartz ex Brid., Muscol. Recent. 2(3): 20 (1803), exclud. spec. Tasm. Typus: Java, *Thunberg s.n.* (Holo–UPS!, iso–H!).

= *Hypnum divaricatum* Reinw. in Reinw. & Hornsch. in Nova Acta Phys.-Med. Acad. Caes. Leop.-Carol. Nat. Cur. 14: 723 (1829) = *Mniodendron divaricatum* (Reinw.) Lindb. in Dozy & Molk., Bryol. Jav. 2: 136 (1866). – Syntypi: Java, G. Gedeh, *Reinwardt s.n.* (Lecto-L, isosyn-GRO, H); Celebes, G. Klabat, *Reinwardt s.n.* (L) – cf. Touw 1971.

= *Mniodendron mittenii* Salm. ex Par., Index Bryol. Suppl. 250 (1900) = *M. microloma* Mitt. in Mitt. & Wright in Stapf in Trans. Linn. Soc. London, Bot. 4: 259 (1894), comb. inval. = ? *M. microloma* Mitt. ex Geh. ex Par., Index Bryol., ed. 2, 3: 263 (1905), comb. inval. – Typus: Borneo, Mt. Kinabalu, 6000 ft., *Burbridge s.n.* (Holo-NY!); cf. Touw 1971.

= *Mniodendron aristinerve* Mitt. ex Par., Index Bryol., ed. 2, 3: 262 (1905); Mitt. in J. Linn. Soc. Bot. 13: 322 (1873), comb. inval. – Typus: Borneo, top of Mt. Kinabalu, *Low s.n.* (Holo-NY!, iso-H!) – cf. Touw 1971.

Ic.: Touw 1971: 322, fig. 37, 324: fig. 38.

Geographical range: Sri Lanka, Vietnam, Thailand, Malesia, Solomons, New Hebrides, Ile des Pins, Fiji. Known from all parts of Borneo except KTE.

Altitudinal range (Borneo): (300–) 600–3050 m.

Specimens examined:

BRYOTROP: XI: 4337, 4338. – XV: 3505, 3520. – XVIa: 3583, 3609. – XVII: 3439. – XIX: 3147, 3152. – XIXb: 4746. – XXVII: 3749, 3779. – XXX: 4065.

Hypnodendron diversifolium Broth. & Geh. in Broth. in Oefvers. Förh. Finska Vetensk.-Soc. 40: 191 (1898).

Typus: New Guinea, Mt. Dayman, up to 9000 ft., *Armit 628* (Holo-H!, iso-S-PA!).

= *Hypnodendron copelandi* Broth. var. *latifolium* Dix. in J. Linn. Soc. Bot. 50: 96 (1935) – Typus: Borneo, Mt. Kinabalu, near Lumu-Lumu, 5000 ft., on ground, *Enriquez SFN 18146* (Holo-BM!, iso-SING!) – cf. Touw 1971.

Ic.: Touw 1971: 294, fig. 27.

Geographical range: Vietnam, Malesia, Solomons (Borneo: SAB, KIN, SAR, KTI).

Altitudinal range (Borneo): 1000–2500 m.

Specimens examined:

BRYOTROP: XV: 3502, 3504. – XVa: 4656. – XVIIa: 4613. – XIXb: 4706.

Additional Bornean collection not listed in the revision: KIN: near Power Station, 1800–1900 m, *Frey M-34* (B, BSB, DUIS, L). – SAR: G. Mulu, 1320 m, *Touw 20830* (L).

Hypnodendron fusco-mucronatum (C. Muell.) Jaeg. subsp. *fusco-mucronatum*

= *Hypnum fusco-mucronatum* C. Muell. in Bot. Zeitung (Berlin) 20: 393 (1862).

Syntypi: Luzon, Mariveles, *Semper s.n.* (Lecto- BM!, isosyn- GRO!, -H!, -L!); Philippines, *Cuming 2205 p.p.* (BM!, FH!, GRO!, H!, NY!, S-PA!, W!).

= *Hypnodendron brevifolium* Mitt. in Mitt. & Wright in Stapf in Trans. Linn. Soc. London, Bot. 4: 259 (1894) = *Mniodendron brevifolium* (Mitt.) Geh. ex Broth. in Nat. Pflanzenfam., T. 1, Abt. 3, 1172 (1909) – Typus: Borneo, Mt. Kinabalu, *Burbridge s.n.* (Holo-NY!, iso- BM!, -FH!, -GRO!, -H!) – cf. Touw 1971.

Ic.: Touw 1971: 334, fig. 40.

Geographical range of subsp. *fusco-mucronatum*: Philippines, Borneo (SAB, KIN); subsp. *chalmersii*

(Mitt.) Touw has a more eastern distribution (Flores, Celebes, Ceram, New Guinea, the Bismarcks, the Solomons, and the New Hebrides).

Altitudinal range (Borneo): 550–1400 m.

Specimens examined:

BRYOTROP: V: 4518. – VII: 4448, 4461.

Hypnodendron milnei Mitt. subsp. *korthalsii* (Bosch & Sande Lac. ex Par.) Touw in Blumea 19: 302 (1971).
 = *Mniodendron korthalsii* Bosch & Sande Lac. ex Par., Index Bryol., ed. 2, 3: 263 (1905); Bosch & Sande Lac. in Dozy & Molk., Bryol. Jav. 2: 139 (1866), comb. inval. – Typus: Java, Mt. Gedeh, 6000 ft., *Kubl & van Hasselt s.n.* (Lecto- L!, iso- BM!, -GRO!, -MEL!, -S-SPA!).

Ic.: Touw 1971: 300, fig. 30 q, r.

Note: *Menzel et al.* 4685 contains the first plants of the subspecies found growing as epiphytes, a condition found sporadically in subsp. *parvum* as well.

Geographical range: Philippines, Borneo (SAB, KIN, SAR, KBA), Sumatra, Java, Celebes, Batjan, Buru, Ceram; subsp. *parvum* (C. Muell.) Touw is endemic to New Guinea; subsp. *milnei* has been found in the Solomons, the New Hebrides and Ile des Pins.

Altitudinal range (Borneo): 150–1500 m.

Specimens examined:

BRYOTROP: IX: 4385, 4396. – XII: 4685.

Hypnodendron reinwardtii (Schwaegr.) Lindb. ex Jaeg. subsp. *caducifolium* (Herz.) Touw in Blumea 19: 245 (1971).

= *Hypnodendron caducifolium* Herz. in Hedwigia 61: 292 (1919).

Typus: Central Buru, 1700 m, *Deninger 101* (Holo- JE!, iso- GR!, -H!).

Ic.: Touw 1971: 242, fig. 7 c, h, i, q, r.

Geographical range of subsp. *caducifolium*: Philippines, Borneo (SAB, KIN, KSE), Flores, Celebes, Buru, Ceram, New Guinea; subsp. *reinwardtii* occurs in the Malay Peninsula, Sumatra, and Java. The specimen of *H. reinwardtii* reported from KBA by Brotherus (1928) and listed in Touw (1978) belongs to *H. beccarii*.

Altitudinal range (Borneo): 1250–2100 m.

Specimen examined:

BRYOTROP: XV: 3549 (identification to subspecies not certain, as the plants lack sporophytes).

Hypnodendron subspiniervium (C. Muell.) Jaeg. subsp. *arborescens* (Mitt.) Touw in Blumea 19: 237 (1971).

= *Trachyloma arborescens* Mitt. in J. Proc. Linn. Soc., Bot. Suppl. 1: 91 (1859).

Typus: Sri Lanka, *Gardner 1016* (Holo- NY!, iso- BM!, -H!).

= *Hypnodendron pseudo-arborescens* Fleisch., Musci Fl. Buitenzorg 4: 1607 (1923) – Typus: Borneo, Bukit Milie, *Amdjah s.n.* (Holo- FH!) – cf. Touw 1971.

Ic.: Touw 1971: 234, fig. 4g, k.

Geographical range of subsp. *arborescens*: Sri Lanka, India (Khasi Hills), Malesia (Borneo: SAB, KIN, SAR, KBA, KSE, KTI).

Altitudinal range (Borneo): 0–750 (–1000) m.

Additional Bornean collection not listed in the revision: KSE: G. Serempaka, 450 m, *Kuswata* 976 (L), new to KSE.

Hypnodendron vitiense Mitt. subsp. *vitiense*

≡ *Hypnodendron vitiense* Mitt. in Seem., Fl. Vit. 401 (1873).

Typus: Fiji, *Seemann* 842 (Holo- NY!, iso- FH!, -BM-K!).

Ic.: Touw 1971: 280, fig. 23a, b, f-i, m-o, q, s, u.

Note: not previously reported from Borneo (but Nootboom's collection was mapped already in Touw 1971: 284, fig. 24).

Geographical range of subsp. *vitiense*: Ryukyus, Taiwan, Vietnam, Philippines, Borneo (SAB, SAR), Celebes, Batjan, Ceram, New Guinea, Bismarcks, Solomons, New Hebrides, New Caledonia, Fiji, Samoa, Queensland; subsp. *australe* Touw occurs in Australia and Tasmania.

Altitudinal range (Borneo): 150–1675 m; elsewhere collected from sea level up to 2400 m, but most often between 900 and 2200 m.

Specimens examined: SAB: G. Lumaku, 300 m, *Nootboom* 1127B (L). – SAR: G. Mulu, 150 m, *Touw* 20676 (L); *ibid.*, 1320–1420 m, *Touw* 20896 (L); *ibid.*, 1675 m, *Touw* 21073 (L).

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Address of the author:

Dr. Andries Touw, Rijksherbarium, P.O. Box 9514, 2300 RA Leiden, The Netherlands.