

**THE TUBEROUS EPIPHYTES OF THE RUBIACEAE 3:
A REVISION OF MYRMEPHYTUM TO INCLUDE MYRMEDOMA**

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SUMMARY

Myrmedoma Becc. is sunk into *Myrmephytum* Becc. on account of floral and inflorescence characters. *Myrmephytum* is revised to contain eight species, of which one is new and four are little known.

Beccari (1884) described *Myrmephytum* and *Myrmedoma*, each with one species. They are both tuberous epiphytes of the Malesian Archipelago (fig. 1), closely related to *Myrmecodia* Jack and *Hydnophytum* Jack, and members of the Hydnophytinae (Huxley & Jebb, 1990, 1991a). Like the other genera of the Hydnophytinae they have a chambered tuber, which is usually inhabited by ants.

Both genera have 6-merous flowers, in contrast to the rest of the Hydnophytinae with 4-merous flowers, and the solitary inflorescences are surrounded by prominent bracts. Vegetative differences between the two genera (e.g. presence of spines, condensed stems) parallel variation found within the genus *Anthorrhiza* (Huxley & Jebb, 1991b), and between *Myrmecodia* and *Hydnophytum*. Specimens are now available which are intermediate between *Myrmephytum* and *Myrmedoma* indicating an evolutionary continuity and blurring the distinction between them.

Myrmedoma with its condensed stem, dense branched spines, and differentiated tuber cavities is seen as a more specialized 'ant-house' development of *Myrmephytum* and not as an evolutionary line separate to it. By recognizing these two as a single monophyletic genus their position becomes analogous to that of *Anthorrhiza* (Huxley & Jebb, 1991b). *Anthorrhiza* is restricted to south eastern Papua New Guinea, and has a series of species from those which resemble *Hydnophytum* in vegetative characters to those which resemble *Myrmecodia*. It is interesting that in both *Myrmephytum* and *Anthorrhiza* the lowland species resemble *Hydnophytum* while the higher altitude (1600–2500 m) species have more *Myrmecodia*-like vegetative characters.

The revised single genus contains four reasonably known species, three species known from single collections and one species of which only a description and photograph survive. In general little is known about *Myrmephytum*; fewer than 20 specimens exist and only one species has been studied in the field. All specimens are cited, marked 'n.v.' if not seen. The figure in square brackets after 'Flower' in the description shows the number of flowers dissected.

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MYRMEPHYTUM

Myrmephytum Becc., *Malesia* 2 (1884) 92, tabs. 8 & 9 = *Myrmecodia selebica* Becc., *Nuov. Giorn. Bot. Ital.* 6 (1874) 195. — Type species: *Myrmephytum selebicum* (Becc.) Becc.

Myrmedoma Becc., *Malesia* 2 (1884) 94, tab. 10. — Type species: *Myrmedoma arfakiana* Becc.

Epiphytic or terrestrial shrubs. *Tuber* unknown for several species, where known more or less spherical to conical. A layer of reticulated tissue sometimes present on the inner surface of the outer wall. Spines present or not, simple or branched. Entrance holes scattered, sometimes basal, only rarely apical. Pores present or not. *Stems* one to several, branched or not; internodes condensed or not; sometimes with a few simple or branched spines. *Leaves* leathery. Stipules splitting irregularly between the petioles. *Inflorescence* solitary, distant or contiguous, sessile, surrounded by prominent triangular bracts which are leathery to fleshy, and interspersed with more or less prominent, papery, hairy bracts. *Flowers* sometimes heterostylous. Corolla 6-lobed, blue, usually with a ring of hairs. Anthers 6, at apex of tube. Pollen 3- or rarely 4-colporate, 70–160 μm ; reticulation medium to coarse. Ovules 4–8. Fruit ovoid to cylindrical, pinkish or yellowish red.

Distribution — Philippines, Sulawesi, and Irian Jaya (fig. 1).

Ecology — Epiphytic or terrestrial, 0–2500 m, usually inhabited by ants.

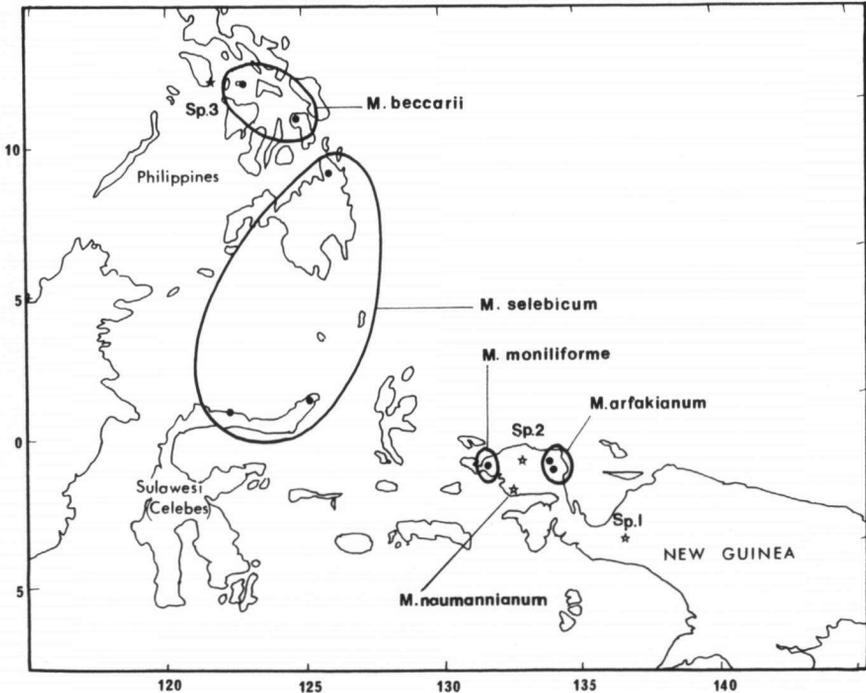


Fig. 1. Distribution of *Myrmephytum* Becc. in Malesia.

Morphology

Fresh material of one species, *Myrmephytum arfakianum*, has now been studied, and the inflorescence and tuber structures which have been identified make it possible to interpret the other species to some extent. In *M. arfakianum* the youngest inflorescence consists of a pair of large leathery bracts enclosing a single flower (fig. 4c) These bracts tear apart and a further pair of bracts arise in the axils of the first pair. These bract pairs lie in a plane perpendicular to the first bract pair. Further bract pairs arise similarly in the axils of previous bracts, and as this process continues the inflorescence becomes a large area with the bracts completely obscuring the stem.

In other species the inflorescences do not grow so large, and the internodes may be elongate, so the inflorescences are well separated. In some cases the inflorescence appears to consist of two separate peduncular patches, but this results from the first branching of the inflorescence becoming obscure, so that only the second set of bracts are conspicuous.

The tuber of *Myrmephytum arfakianum* has a structure with features resembling those of *Hydnophytum*. The initial cavity is warted and grows to several centimetres long and wide, the second cavity also grows and opens close to the first, often appearing to be a branch of the first. Later cavities are added all over the tuber, overlying former cavities. Later cavities interconnect laterally to one another. Each is a repeat unit, with warted tunnels apically and smooth walled inner chambers. This arrangement resembles that in some *Hydnophytum* and *Anthorrhiza* species. *Myrmephytum arfakianum* also has a reticulated layer on the outer surface of the later cavities, which is similar to that found in *Myrmecodia*.

KEY TO THE SPECIES OF MYRMEPHYTUM

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| 1a. Lamina long and narrow, c. 44 × 4 cm | 5b. <i>M. species 1</i> |
| b. Leaves to 26 cm long, and relatively broader. | 2 |
| 2a. Inflorescences contiguous, stem more or less concealed | 3 |
| b. Inflorescences scarcely touching, or contiguous at apex; base of stem readily visible | 4 |
| 3a. Spines branched | 4. <i>M. arfakianum</i> |
| b. Spines simple | 5c. <i>M. species 2</i> |
| 4a. Petiole 3–5 cm | 2. <i>M. beccarii</i>
and 5a. <i>M. naumannii</i> |
| b. Petiole shorter, < 3 cm | 5 |
| 5a. Inflorescence elongate along stem, tapered at each end, bracts densely rufous hairy | 3. <i>M. moniliforme</i> |
| b. Inflorescence ± circular, bracts dull brown, not densely hairy. | 6 |
| 6a. Leaves small, to 8 × 2.2 cm | 5d. <i>M. species 3</i> |
| b. Leaves larger, > 9 cm long | 1. <i>M. selebicum</i> |

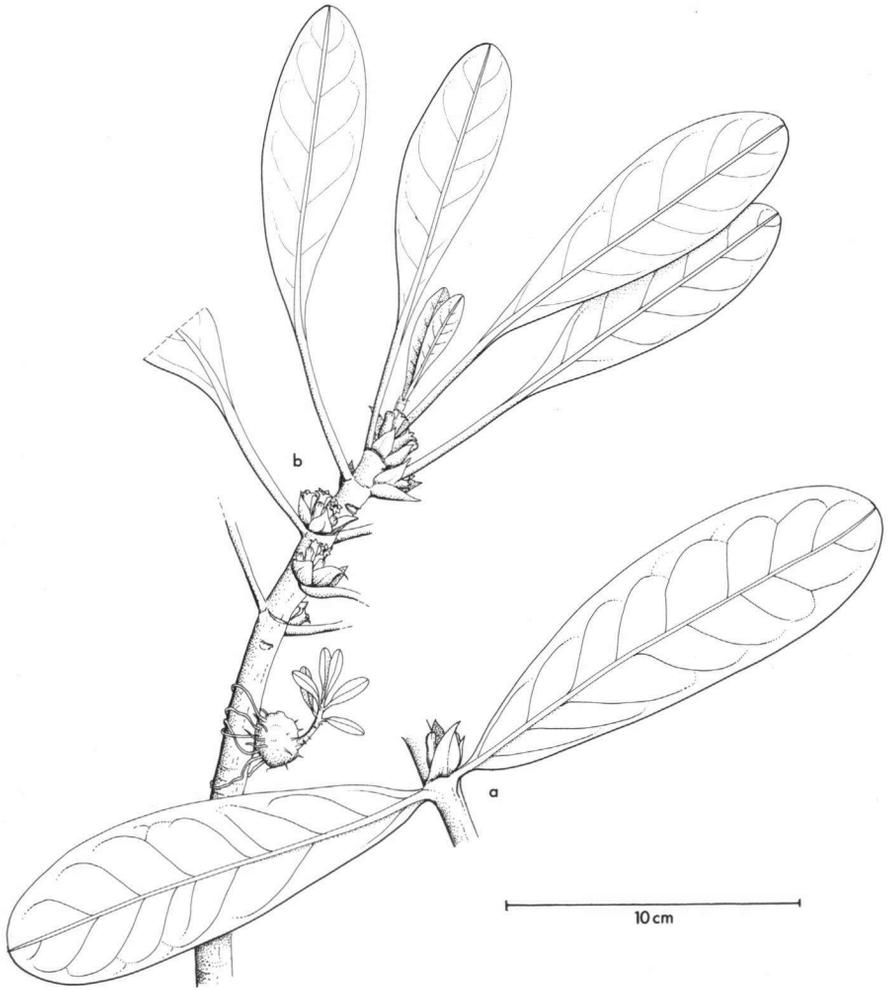


Fig. 2. a. *Myrmephytum selebicum* (Becc.) Becc. (Koorders 18622b); b. *M. beccarii* Elmer (Sulit PNH 21513). Drawn by Rosemary Wise.

1. *Myrmephytum selebicum* (Becc.) Becc. — Fig. 2a.

Myrmephytum selebicum (Becc.) Becc., Malesia 2 (1884) 93, tabs. 8 & 9. — *Myrmecodia selebica* Becc., Nuov. Giorn. Bot. Ital. 6 (1874) 195. — Type: Sulawesi, Beccari s.n., 11.1873 (FI lectotype selected here; K).

Tuber spines rather slender, simple or branched. *Stems* sometimes with a few simple spines. *Leaves*: lamina 11 × 3 – 22 × 6 cm, broadest above the middle, leath-

ery; apex rounded; base tapering. Lateral nerves 6–9. Petiole 0.2–0.5 cm. *Inflorescence*: each flower surrounded by large, acutely tapered, leathery bracts, 2 cm long, 1 cm wide at base. Inner bracts shorter, thinner, and rufous hairy. *Flowers* [1]. Corolla lobes acuminate; tube with a dense ring of hairs at base. Stamens at the apex of tube. Pollen unknown. *Fruit* c. 2.4 cm long, cylindrical, pinkish red. Pyrenes 6, truncate above, narrowed gradually at base.

Ecology – Primary forest, 0–300 m.

Note – The specimen from the Philippines differs in its longer narrower internodes and thinner smaller leaves; its flowers have not been seen.

Collections – PHILIPPINES. NE 9° 00' 125° 30' Mindanao, Butuan, Agusan Prov., Florida SO, San Mateo BO, *Mendoza PNH 42302* (L).

SULAWESI. NE 01° 28' 125° 13' nr Bituangus, *Jones s.n.*, 3-8-1977. 01° 10' 121° 50' Bool Prov., Palele, *Koorders 18622* (BO). 01° 23' 125° 05' Kema, *Beccari s.n.*, 11-1873 (type). SE 02° 45' 121° 35' Tourveti Meer, *Kjellberg 2295* (BO).

2. *Myrmephytum beccarii* Elmer – Fig. 2b.

Myrmephytum beccarii Elmer, Leafl. Philipp. Bot. 3 (1911) 1037. — Type: Philippines, *Elmer 11467a* (A lectotype, selected here; BM, BO, FI, G, K, L, P, W, WRSL).

Tuber dark brown; spines root-like, weak and simple or absent, c. 0.5 cm. Stems 1 to few, little branched. *Leaves*: lamina 8–11 × 2.5–5 cm, broadest above the middle; apex rounded; base tapered. Petiole 3–5 cm. *Inflorescence* discrete to contiguous. Bracts to 1.5 cm, leathery, broadly triangular. *Flowers* [1]. Corolla 12 mm; lobes acuminate; tube with a ring of hairs near base. Anthers at apex of tube. Pollen 3-colporate, 70–85 µm; 3 vesicles slightly protruding; reticulation medium. Stigma entire or with a few shallow lobes. *Fruit* c. 1 cm, ovoid or ellipsoid, yellowish red. Pyrenes 6, apex ± acute, base rounded.

Ecology – Montane forest.

Note – This species is closely related to *M. selebicum*.

Collections – PHILIPPINES. NE 12° 20' 122° 35' Sibuyan, Capiz, Magallanes, Mt Gitting Gitting, *Elmer 11467a* (type). 11° 30' 124° 32' Biliran Is., Mt Surio, *Sulit PNH 21513* (L).

3. *Myrmephytum moniliforme* Huxley & Jebb, *spec. nov.* – Fig. 3.

Ab aliis *Myrmephytis* inflorescentia densa rufa massa bractearum pilorumque bractealium obtecta differt. — Typus: Irian Jaya, *van Royen 3417* (holo L; iso A, K).

Tuber up to 60 by 30 cm, brown. Spines scattered, blackish brown, to 4 mm long. Entrance holes numerous. *Stems* several, unbranched, to 50 cm long; vascular tissue forming a cylinder. Adventitious roots in small clusters at the inflorescence base. *Leaves*: lamina 11 × 4 – 15 × 5 cm, ± elliptical, broadest just above the middle; base acute, apex blunt. Petiole c. 1 cm. Stipules triangular, to 0.5 cm. *Inflorescence* elongate, displaced in axil, and enclosed by two triangular bracts with long bases running up the stem. Bracts and their rufous hairs forming a dense mass. *Flowers* [2]. Corolla 18 mm; lobes 6 mm, finely tapered, lobe tips 5 mm; unci 1 mm. Ring of hairs 2 mm

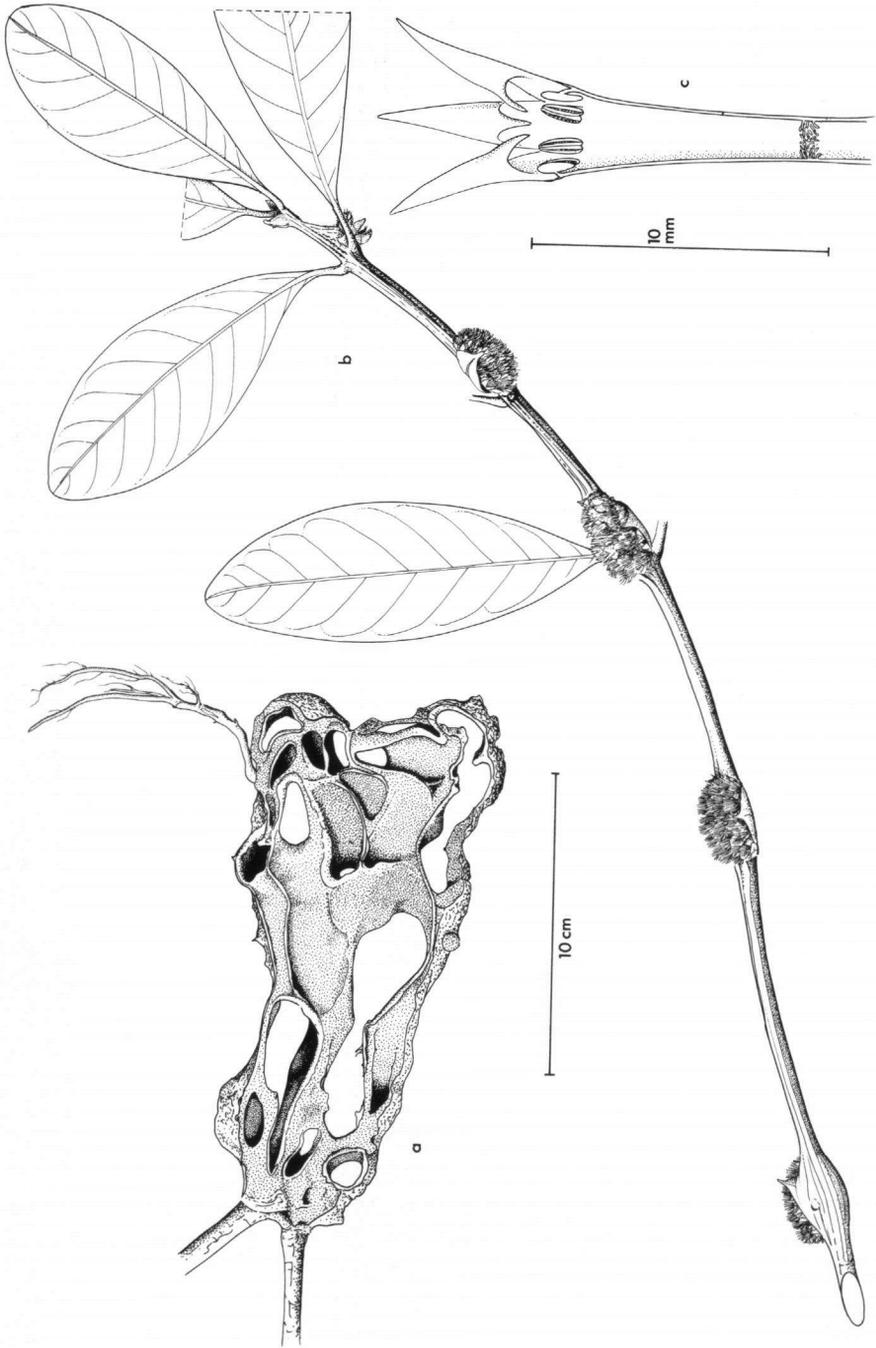


Fig. 3. *Myrmephytum moniliforme* Huxley & Jebb. a. Tuber; b. stem; c. corolla (all *Jebb 5*). Drawn by Rosemary Wise.

from corolla base. Anthers at tube apex. Stigma 3- or 4-fid. Ovules unknown. Fruit unknown.

Ecology – At 100 m in primary forest.

Collections – IRIAN JAYA. SE 00° 53' 131° 15' Sorong, Mlasoen Hill, E of town, *van Royen 3417* (type). Sorong, *Jebb 5* (LAE).

4. *Myrmephytum arfakianum* (Becc.) Huxley & Jebb, *comb. nov.* – Fig. 4.

Myrmephytum arfakianum (Becc.) Huxley & Jebb. — *Myrmedoma arfakiana* Becc., *Malesia* 2 (1884) 94, tab. 10. — Type: Irian Jaya, *Beccari 5499* (FI).

Terrestrial or epiphytic. *Tuber* to 50 × 30 cm, oval to conical. Stellate spines dense, with long, 1–1.5 cm, central branches, and shorter, 0.5–1 cm, laterals. The outer cavities with a reticulated outer surface. *Stems* solitary or rarely several, unbranched, to 50 cm long, 1.5–2 cm across. *Leaves*: lamina 12 × 3.8 – 26 × 6 cm, elliptic, glossy above, dull below, undulate; base tapered to and decurrent along the petiole. Lateral nerves 10–13. Petiole 2–3 cm, triangular. *Inflorescence* a dense mass covering the stem. Bracts narrowly acuminate, 1.2–2 cm long, drying black, with a scarious margin, rufous hairy within. *Flowers* heterostylous, hairs absent, corolla lobes 7 mm, uncus prominent, lobe tips 3.5 mm; lobes strongly recurved at anthesis. In longistyle flowers corolla widening sharply 3 mm below apex of tube; stamens within tube apex; stigma at unci. In brevistyle flowers tube widening gradually to apex; stamens exserted at tube apex. Pollen 3- or 4-colporate, 100–160 µm; reticulations very coarse. Stigma at base of anthers. Fruit unknown. Pyrenes unknown.

Ecology – At 1600–2500 m, terrestrial or epiphytic in scrubby vegetation on poor white sand soil, locally abundant (Gibbs, 1917). Always inhabited by *Iridomyrmex* ants.

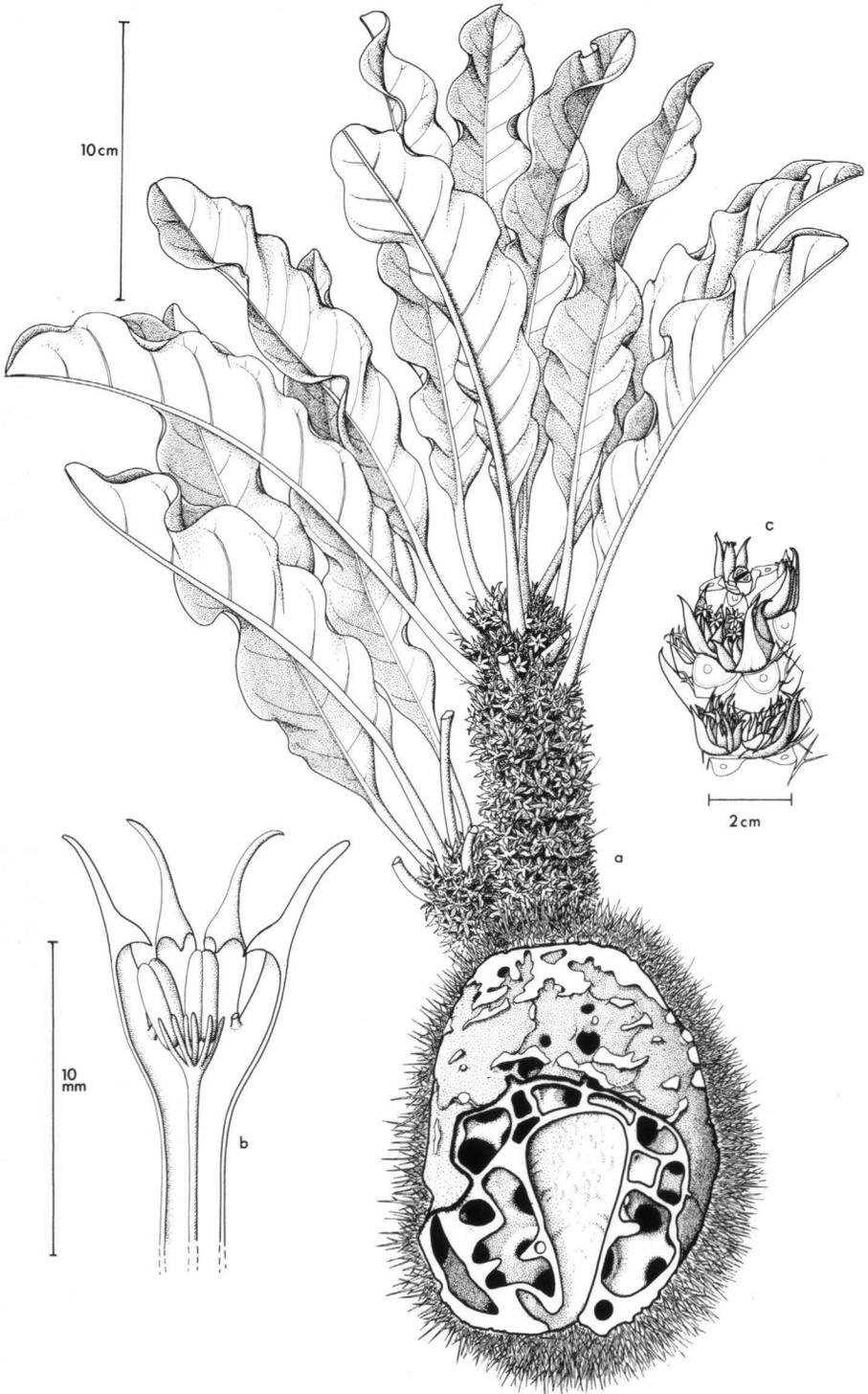
Collections – IRIAN JAYA. Vogelkop: SE 01° 20' 133° 50' Anggi Lakes, above Testega, Mt Kobreimot, *Sleumer & Vink BW 14163* (L, LAE); Anggi Gita Lake, Mt Tembruk, *Sleumer & Vink BW 15411* (L, LAE); Anggi Gita Lake, *Kostermans 2406* (BO, L); Anggi, *Kanehira & Hatusima 13714* (A, BO). 01° 23' 133° 55' On ridge between Anggi Gigi and Anggi Gigi Lake, above forest, *Jebb 889* (LAE). Locality uncertain: Arfak Mts, *Gjellerup 1178* (L); Arfak Mts, Hatam, *Beccari 5499* (type).

5. Little known species – Four other collections of *Myrmephytum* appear to represent distinct taxa.

a. *Myrmephytum naumannii* (Warb.) Huxley & Jebb, *comb. nov.*

Myrmedoma naumanni Warb., *Bot. Jahrb.* 18 (1894) 111. — Type: Irian Jaya, MacCluer Gulf, Sigar, *Naumann s.n.* (B†, L photo lectotype selected here).

Tuber unknown. *Stem* unbranched, 15 cm long, c. 5 mm diameter; spines few, short simple. *Leaves* 9–11 × 3 cm; petiole 3–4 cm. *Inflorescences* starting 10 cm from stem base, ± contiguous, enclosed by leathery broadly triangular bracts, c. 1.5



cm long. Calyx 1.5 mm. Corolla 8 mm, dense white hairs at base of tube; lobe tips 1.5–2 mm. Anthers 3 mm, at corolla mouth. Fruit unknown.

Note – The leaves and arrangement of the inflorescence resemble those of *M. beccarii* more than those of other *Myrmephytum* species from New Guinea.

b. *Myrmephytum* species 1

Tuber not known. *Stem* unbranched. *Leaves* to 44 × 4 cm, linear, apex acute, base tapered; up to 16 lateral nerves; petiole 6–8 cm. *Inflorescence* contiguous on apical part of stem. Flowers not known.

Note – Only a single specimen is known from Bogor, and it cannot be determined whether a duplicate exists in Tokyo. It is readily distinguished from other species by its very long, narrow leaves. The specimen bears the legend *Myrmedoma longissima*, but no publication has been traced.

Collection – IRIAN JAYA. Dalman, Nabire, *Kanehira & Hatusima 12302* (BO).

c. *Myrmephytum* species 2

Tuber ovoid; spines to 1.2 cm long, stout, simple, black. *Stem* unbranched. *Leaves* c. 5 × 1.5 cm, narrowly elliptic, apex acute, base tapered. Petiole 1.5 cm. *Inflorescences* slightly parted, appearing paired, overlapping, but stem readily visible. Flowers and fruit not known.

Note – This collection from the centre of the Vogelkop Peninsula is distinguished by its stout, simple, black spines.

Collection – IRIAN JAYA. Vogelkop, Nettoti Ra., Wekari R. Camp, *van Royen & Sleumer 8088* (K, L).

d. *Myrmephytum* species 3

Tuber globose, spines numerous, simple. *Stem* narrow. Internodes 0.5–3 cm long, not markedly condensed. *Leaves*: lamina not exceeding 8 × 2.2 cm. *Inflorescence* ± globular, discrete. Calyx 1.5 mm, with a membranous margin. Corolla 5 mm; lobes 2.5 mm; unci 1.5 mm; ring of hairs 1.5 mm wide at base of corolla. Anthers 1.5 mm. Pollen 90 µm, pores large, vesicles not extruded, reticulation medium. Stigma immediately above anthers, 6-lobed. *Fruit* 4 × 3 mm. Pyrenes 5, tetragonal, truncate at apex, 2 × 1.5 mm.

Collection – PHILIPPINES. NE 13° 20' 121° 20' Mindoro, Calpan, *Mangubat BS 925* (K).

Fig. 4. *Myrmephytum arfakianum* (Becc.) Huxley & Jebb. a. Habit; b. flower; c. stem apex showing young inflorescences (a, b: *Kanehira & Hatusima 13714*; c: *Jebb 889*). Drawn by Rosemary Wise.

EXCLUDED SPECIMEN

Bremekamp (1942) says that the specimen *Lam 3602* from Morotai is probably a new species of *Myrmephytum*; however, it belongs in *Hydnophytum*.

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