The Genus *Rhaphidophora* Hassk. (Araceae-Monsteroideae-Monstereae) in the Philippines

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Abstract

An alpha-taxonomic account of *Rhaphidophora* Hassk. in the Philippine Islands is presented as a precursor to the forthcoming Flora Malesiana *Araceae* treatment. Eleven species are recognized, of which *Rhaphidophora cretosa* is newly described and *R. banosensis* is proposed as a *nomen novum* for *R. saenophylla* Elmer non K. Krause. *R. basavanensis* is reduced to the synonymy of *R. monticola*, *R. rigida* is merged with *R. philippensis*, and *R. lagunensis* is synonymized with *R. acuminata*. A dichotomous key to species is provided. All species are illustrated.

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Introduction

*Rhaphidophora* Hassk. (including *Afrorhaphidophora* Engl.; c. 3 species in tropical Africa) comprises c.100 species of small to large, occasionally enormous, root-climbing lianes (*sensu* Schimper, 1903), rarely rheophytes, distributed from tropical West Africa eastwards to the western Pacific, north to southern Japan (Ryukyu Islands) and south to Northern Australia. *Rhaphidophora* is one of the largest aroid genera represented in tropical Asia and has several nodes of diversity; the Himalayas (SE Nepal to NE Vietnam, roughly 17°—23° N), West Malesia (including southernmost peninsular Thailand), the Philippines, and East Malesia.

The last complete revision of *Rhaphidophora* was that of Engler &
Krause (1908). A summary of the taxonomic and nomenclatural history of *Rhaphidophora* was presented in Boyce (1999).

This is the fourth in a series of papers intended to present a complete alpha-taxonomy of the genus *Rhaphidophora* in Asia. Accounts for Peninsular Malaysia and Singapore (Boyce, 1999) and the southern and western Indonesian archipelago have been published recently (Boyce, 2000), together with an account of neotenic species in New Guinea (Boyce & Bogner, 2000). Accounts for each of Borneo, Papuasia, the Himalayas, Thailand, and Indochina are being prepared and will be published separately. All morphological terms employed follow Stearn (1992).

**Endemism and Relationships**

Of the 11 Philippine species recognized, just four are recorded from outside the region. One of these is the widespread *Rhaphidophora korthalsii* Hassk.. Of the other three non-endemics, *R. minor* Hook.f. and *R. cornocephala* Alderw. are recorded in the Philippines only on Palawan, an island that while politically part of the Philippines has a flora with numerous Bornean elements, while *R. perkinsiae* Engl. has been found in Taiwan (Lanyu Islands) and in the Ryukyus. Lanyu is notable for having Philippine floristic elements.

Most of the seven endemic Philippine species, plus non-endemic *R. perkinsiae*, seem to be closely related to one another and considerably more distant to species in neighbouring countries. Certain species (e.g. *R. acuminata* Merr., *R. perkinsiae* and *R. philippinensis* Engl. & K. Krause, *R. elmeri* Engl. & K. Krause and *R. banosensis* P.C. Boyce) are so similar that it seems probable that these are of recent evolution. The paucity of collections and inadequacy of the specimens exacerbate the problem of separating these similar taxa and it is not yet clear whether more exhaustive fieldwork will reduce the number of recognized Philippine species or support recognizing a considerable number of further novelties.

A few Philippine endemics seem to be morphologically similar to species from neighbouring countries rather than to other Philippine species. Of these *R. cretosa* belongs to the Hongkongensis Group (see Boyce, 2000) and is morphologically most similar to the widespread *Rhaphidophora sylvestris* (Blume) Engl. and may represent a link to the Bornean flora. *R. todavensis* is unique in the Philippines by the pubescent abaxial surface of the leaf lamina and on the basis of this character is probably allied to *R. foraminifera* (Engl.) Engl. (Sumatera, Peninsular Malaysia and throughout Borneo). *R. puberula* Engl. (Peninsular Malaysia, Sumatera, Nusa Tenggara and throughout Borneo) and *R. hookeri* Schott (N. India to SW China).
which form the Hookeri Group (see Boyce, 2000). *R. monticola* is an enigma. In the fertile condition it is morphologically distinct from any other species of *Rhaphidophora*, while the leaf, especially in the lamina venation, resembles *R. philippinensis*. The extraordinarily long peduncle and the uniform pale yellow-brown colour of dried material renders it instantly recognizable and distinct.

**RHAPHIDOPHORA**


[Raphidophora Hassk., Cat. Hort. Bogor. (1844) 58. orth. var.]

Medium-sized to very large, occasionally enormous, slender to robust, leptocaul or pachycaul, homeophyllous or heterophyllous, rarely neotenic (not in the Philippines), root-climbing lianes, very seldom clustering and rheophytic (not in the Philippines) and then always with a creeping juvenile stage: cut surfaces producing clear, odourless sticky juice either drying invisibly or coagulating into yellowish, translucent jelly and eventually hardening to an brittle amber-like mass: seedling stage mostly not observed but where known either leafy at germination and skototropic (see Strong & Ray, 1975) by an alternating series of congested leafy and elongated leafless shoots (not in the Philippines) or germinating to give rise to a non-skototropic shingling juvenile shoot (e.g., R. korthalsii); pre-adult plants often forming modest to extensive terrestrial colonies of varying morphological and physiological form such that descriptive generalizations are nearly impossible. Largest terrestrial colonies generally occurring in places of less than optimum adult growth potential (e.g., depauperate tree canopy, dry, exposed sites); adult shoot architecture broadly divisible into three types: i. physiognomically monopodial clinging non-flowering stems rooting along their entire length giving rise to variously elaborated free sympodial lateral flowering stems (e.g., R. minor), or ii. all stems physiognomically monopodial clinging and flowering (e.g., R. korthalsii), or iii. physiognomically monopodial and sympodial lateral stems clinging but only sympodial lateral stems flowering (e.g., R. acuminata); stems with internodes of various lengths separated by variously prominent leaf scars, smooth or asperous or densely pubescent to ramose (the last not in the review area). Older stems subwoody or somewhat corky or with distinctive matt to sublustrous pale brown papery epidermis, with or without variously textured prophyll, cataphyll and petiolar sheath fibre either at the apices or along the newer sections, rarely with cataphylls and prophylls deliquescing to black mucilage later drying to leave fragmentary parchment-like remains on petioles, developing laminas, inflorescences: flagellate foraging stems occurring in some species, often exceedingly long, reaching the ground then rooting, variously foraging and climbing again: claspers roots sparsely to densely arising from the nodes and internodes, strongly adherent to substrate: feeding roots rare to abundant, smooth pubescent or prominently scaly, later often becoming woody, strongly adherent to substrate or free; leaves distichous or weakly spiralled, evenly distributed or scattered or clustered distally: cataphylls and prophylls subcoriaceous to membranous, either soon drying and falling or degrading or deliquescing to variously textured sheaths and fibres, these where present variously clothing upper stem before eventually decaying and falling; petiole
canaliculate to weakly carinate, smooth or pubescent, with variously prominent apical and basal genicula: *petiolar sheath* prominent, extending either partly to or fully to or overtopping the geniculum, occasionally one side greatly expanded and auriculate, especially in juvenile plants, at first membranous to coriaceous, soon completely or along the margins drying chartaceous, sometimes degrading to untidy variously netted or simple fibres and later variously falling to leave a scar or disintegrating marginally or completely; *lamina* submembranous to stiffly chartaceous or coriaceous, lanceolate or oblong, ± oblique, base decurrent to unequal or cordate, apex acute to acuminate, entire to regularly pinnatifid or perforated, if pinnate then divisions pinnatifid to pinnatisect (Stearn, 1992: 324), midrib often ± naked between segments, lamina occasionally with small to well developed perforations adjacent to the midrib and primary veins, these sometimes extending to lamina margin (fenestrations then occasionally additional to fully developed pinnae), rarely abaxially pubescent when expanding, rarely strongly concolorous at maturity; *midrib* usually prominent raised abaxially and prominently sunken, sometime flush, rarely slightly raised adaxially: *primary venation* ± pinnate; *interprimaries* mostly present, subparallel to primaries and sometimes indistinguishable from them (e.g., *R. monticola*) but usually less prominent and often drying paler, usually glabrous, occasionally pubescent with domatia in the axils of the primary and secondary veins: *secondary venation* striate (e.g., *R. monticola*) to reticulate (e.g., *R. korthalsii*), variously prominent, often very difficult to distinguish from primary venation (e.g., *R. monticola*); *tertiary venation* where visible reticulate to tessellate: *inflorescences* solitary to several together, first inflorescence subtended by a (usually fully developed) foliage leaf and/or a very swiftly disintegrating cataphyll, subsequent inflorescences usually each subtended by a prophyll and cataphyll, more rarely by a prophyll and partially to almost fully formed foliage leaf (but not in West Malaysia), inflorescences at anthesis naked by disintegration of subtending cataphyll or partially to almost completely obscured by netted and sheet-like fibres; *peduncle* terete to laterally compressed; *spathé* ovate to narrowly or broadly canoe-shaped, stoutly to rather weakly beaked, barely gaping to opening almost flat at anthesis and then usually deciduous before anthesis is complete, occasionally persisting into the early stages of infructescence development and then rosetting (i.e., *R. elmeri*) rarely persistent through to fruit maturity (i.e., *R. monticola*), stiff to rather soft- or stoutly coriaceous, dirty-white, greenish, cream or yellow; *spadix* subglobose to clavate-cylindrical, cylindrical or fusiform, sessile or stipitate, often obliquely inserted on peduncle, tapering towards the apex; *flowers* bisexual, naked; *ovary* 1- to partially 2-locular, lower part ± bilaterally compressed, upper part variously cylindrical and variously angled, most often
rhombohexagonal, those upper- and lowermost on the spadix often sterile and bereft of stigma, those uppermost frequently either scattered or partially fused to each other and forming a appendix; ovules few to many, anatropous, funicle long, placentae parietal to basal, sometimes ± subaxile, partial septa variably intrusive; styrler region well developed, usually broader than ovary, usually truncate apically, rarely elongate-conic; stigma sticky at female anthesis, punctiform, broadly elliptic or oblong, orientation circumferential or longitudinal; stamens 4—6; filaments strap-shaped; anthers usually prominently exerted from between ovaries at male anthesis, rarely not exerted and pollen extruded from between ovaries, dehiscing by a longitudinal slit; infructescence with styrler regions greatly enlarged, transversely dehiscent, the abscission developing at the base of the enlarged to massive styrler region and this falling to expose the ovary cavity with the many seeds embedded in variously coloured sticky pulp; seeds oblong, testa thin, smooth, embryo axile, straight, endosperm copious; pollen decolpate, extended monosulcate to fully zonate, ellipsoid or hamburger-shaped, medium-sized (mean 33 μm, range 24—55 μm), exine foveolate, subreticulate, rugulate, fossulate, scabrate, retiscabrate, verrucate, or psilate; chromosomes 2n = 60, 120 (42, 54, 56).

Distribution: About 100 species from tropical Africa, South and South East Asia, Australia and the Pacific with extensions into the subtropical Himalayas, southern China and the southernmost islands of Japan.

Habitat: Lianescent bole-climbers, lithophytes, rarely rheophytes, usually in well drained subtropical and tropical wet, humid, or seasonally moderately dry primary and established secondary evergreen forest at low to mid-montane elevations.

Etymology: Greek rhaphis, rhaphidos (needle) and pherô (I bear); refers to the macroscopic (to 1 cm long), needle-like unicellular trichosclereids present in tissues.

Key to Adult Flowering Rhaphidophora in the Philippine Islands

1a. Leaf lamina variously pinnately divided and perforated. Stem apices with copious netted fibres. Juvenile plant shingling..............................

......................................................................................................................... 6. R. korthalsii

1b. Leaf lamina entire. Stem apices without netted fibres. Juvenile plant not shingling ........................................................................................................ 2
2a. Abaxial surface of lamina and apical geniculum minutely pubescent .......................................................... 11. R. todayensis
2b. Lamina and apical geniculum glabrous .............................................. 3

3a. Leaf lamina stiffly coriaceous .............................................................. 4
3b. Leaf lamina thinly coriaceous or chartaceous ..................................... 7

4a. Leaf lamina falcate to falcate-oblong, stiffly coriaceous. (Palawan) ........................................................................................................ 3. R. conocephala
4b. Leaf lamina oblong to ovate-oblong or ovate, never falcate, variously thick-textured ............................................................... 5

5a. Flowering shoots free ................................................................. 10. R. philippinensis
5b. Flowering shoots clinging .................................................................. 6

6a. Petiole 5—11 cm; leaf lamina oblong to oblong-lanceolate, up to 23 x 8 cm. Entire plant drying dark brown. Peduncle 7—26 x 0.3—0.6 cm; spathe falling (at female receptivity ?) .................. 1. R. acuminata
6b. Petiole 30—108 cm; leaf lamina ovate to ovate-oblong, up to 80 x 41 cm. Entire plant drying pale yellow-brown. Peduncle 30—117 x 1.5—2 cm. Spathe persistent though to maturation of fruit ...................... ........................................................................................................................................ 8. R. monticola

7a. Flowering shoots clinging ........................................................................ 8
7b. Flowering shoots free .............................................................................. 9

8a. Primary lateral veins on the abaxial leaf surface significantly more visible than interprimaries and never less than 5 mm apart. Spathe persistent during fruit development, eventually rotting away. Spadix 14—17 cm long .......................................................... 5. R. elmeri
8b. Primary lateral veins on the abaxial leaf surface ± indistinguishable from interprimaries, hence with the appearance of being less than 2 mm apart. Spadix 10—12 cm long. Spathe shed during anthesis ..... ................................................................................................................................. 9. R. perkinsiae

9a. Spadix more than 10 cm long (10—13 x 1—2 cm). Leaf lamina falcate-lanceolate to falcate oblong, up to 32.5 x 7 cm .......................... 2. R. banosensis
9b. Spadix no more than 7 cm long. Leaf lamina ovate to falcate-elliptic, up to 16 x 3 cm ............................................................... 10

10a. Leaf lamina non-falcate, 5.5—16 x 2—5 cm, thinly coriaceous with veins not particularly prominent. Leaves drying strongly discolorous.
dark above, pale below ................................................... 4. R. cretosa

10b. Leaf lamina falcate. 2.5—16 x 1.2—3 cm, thinly coriaceous to chartaceous with veins prominent. Leaves drying pale straw-coloured ................................................................. 7. R. minor

The Species

1. Rhaphidophora acuminata Merr.


Figure 1

Moderately robust, semi-pachycaul homeophyllous liane to 4 m: seedling stage and pre-adult plants not observed; adult shoot architecture comprised of elongated, clinging, physiognomically monopodial, leafy, non-flowering stems and shorter, clinging, sympodial, densely leafy, flowering stems: stems smooth, terete in cross-section, with briefly persistent cataphyll remains at the apices of active shoots, internodes to 6 x 1 cm on adherent shoots, usually shorter and less stout on free shoots, drying very dark brown, separated by large oblique leaf scars; flagellate foraging stems not observed; clasping roots densely arising from the nodes and internodes of stems. pubescent; feeding roots not observed; leaves distichous; cataphylls and prophylls large and conspicuous, membranous, very quickly drying and falling; petiole deeply channelled adaxially. 5—11 x 0.2—0.3 cm. smooth. apical and basal genicula weakly defined; petiolar sheath very prominent, extending to overtopping the apical geniculum. ligulate, clasping the newly emerged leaf or inflorescence, swiftly drying and soon falling whole to leave a conspicuous scar: lamina entire. oblong to oblong-lanceolate. slightly oblique. 6—23 x 2—8 cm. coriaceous to stiffly coriaceous. drying discolorous, base subacute. apex caudate-acuminate with a slightly prominent apiculate tubule: midrib raised abaxially, slightly sunken adaxially: primary venation densely pinnate, slightly raised abaxially and adaxially; interprimaries parallel to primaries and only slightly less prominent, very slightly raised abaxially and adaxially; secondary venation ± obscure in fresh material,
Figure 1. *Rhaphidophora acuminata* Merr.

A. Flowering shoot x ½; B. Leaf lamina x ½; C. Venation detail x 3; D. Inflorescence, spathe fallen x 1; E. Spadix detail, post-anthesis x 8; F. Gynoeceum, three quarter view x 8. A Westerl & Mendoza 7857, B–C Mendoza 7809, D–F from Westerl 1139.
visible as a faint reticulum in dried specimens; inflorescence solitary, subtended by a fully developed foliage leaf and several degraded cataphylls; peduncle slightly compressed-cylindric. 7—26 x 0.3—0.6 cm; spathe canoc-shaped, stoutly short-beaked. 8—14 x 1.2—5 cm, stiff-fleshy, green, falling (at female receptivity ?); spadix cylindrical, sessile to short stipitate, inserted obliquely on peduncle or stipe, 5—12 x 1—2 cm, white; stylar region weakly rhombohexagonal, often barely angled. 0.9—1.2 x 1—1.1 mm, weakly conical; stigma cylindrical, raised, c. 0.2 mm diam.; anthers strongly exserted at anthesis; infructescence 10—17 x 2—4 cm.


Habitat: Remnants of primary forest, invaded by secondary elements, 110—700 m altitude.

Notes: 1. Very similar to R. perkinsiae but distinguished by the stiffer, smaller leaves, the denser primary lateral and interprimary venation, the wide ligulate petiolar sheath, the semi-persistent cataphylls at the active shoot tips and the prominent cylindrical style.

2. Rhaphidophora lagunensis is treated here as a synonym of R. acuminata. It differs primarily in its smaller stiffer leaves. However, all specimens pertaining to R. lagunensis are in mature ripe fruit and have lost much of their pre-fertilization detail in the preserving process, thus it is not possible to say whether the distinctive stigma of typical R. acuminata is present in R. lagunensis. Placing it in synonymy is provisional.


2. Rhaphidophora banosensis P.C. Boyce. nom. nov.


Figure 2

Medium to large, moderately robust, semi-pachycaul homeophyllous liane
Figure 2. Raphidophora banosensis P.C. Boyce

A. flowering shoot x 1/2; B. leaf lamina x 1/2; C. venation detail x 4; D. leaf lamina x 1/2; E. leaf lamina x 1/2; F. inflorescence; spathe fallen x 1/2; G. spadix detail, post female receptivity x 6; H. spadix detail, early fruiting x 6. A–E, G & H from Ramon & Edadto BS 75472; E from Ebner 839658.
to unknown ultimate height; seedling stage and pre-adult plants not observed; adult shoot architecture comprised of elongated, clinging, physiognomically monopodial, leafy, non-flowering stems and simple to slightly elaborated, free, sympodial, moderately leafy, flowering stems: stems smooth, climbing stems terete in cross-section, free stems more or less terete to very weakly four-angled in cross-section, without prophyll, cataphyll and petiolar sheath fibre. internodes to 2.5 x 0.75 cm free shoots, separated by prominent oblique leaf scars: flagellate foraging stems not observed; roots not observed; leaves scattered-distichous on flowering shoots: cataphylls and prophylls membranous, very quickly drying and falling; petiole very shallowly canaliculate adaxially. 9—10 x 0.3—0.4 cm, smooth, with a slight apical and prominent basal geniculum; petiolar sheath prominent, extending to and encircling the apical geniculum, very swiftly drying and falling to leave a thin continuous scar from the petiole base, around the top of the apical geniculum and back to the base; lamina entire, falcate-lanceolate to falcate-oblancoate, 13.5—32.5 x 2.5—7 cm, thinly coriaceous, base to acute or slightly rounded, apex acuminate with a prominent apiculate tubule; midrib raised abaxially, almost flush adaxially; primary venation pinnate, raised abaxially and slightly less so adaxially; interprimaries parallel to primaries, less prominent, slightly raised abaxially and adaxially; secondary venation weakly reticulate, slightly raised abaxially and adaxially, but not at all prominent; inflorescence solitary, subtended by a fully developed foliage leaf and one or more soon-falling cataphylls; peduncle compressed-cylindrical, swollen at insertion of spadix. 9 x 0.7 cm; spathe not observed; spadix cigar shaped, sessile, inserted obliquely on peduncle, c. 10 x 1 cm; stylar region well developed, rhombobhexagonal, 1.5—2 x 1.5—2 mm. truncate; stigma slightly raised-punctiform, c. 0.3 mm diam.; anthers not exerted at anthesis; infructescence stoutly cylindrical, c. 13 x 2 cm.


Habitat: Margins of forests.

Notes: 1. Immediately identifiable by the long, narrow falcate leaf lamina and relatively short petiole.

2. Elmer published the name R. stenophylla for this species apparently unaware that name was already occupied for a species described by Krause from New Guinea.

Other specimens seen: CATANDUANES, Catanduanes. Ramos & Edaño
Figure 3. Rhaphidophora conocephala Alderw.
A. flowering shoot x \( \frac{1}{2} \); B. inflorescence, spathe fallen x \( \frac{1}{10} \); C. spadix detail, female receptivity x 10; D. gynoecium, three quarter view x 6; E. spadix detail, post anthesis x 10; F. portion of preadult sterile shoot x \( \frac{1}{2} \); G. leaf lamina x \( \frac{1}{2} \); H. venation detail x 3. A–E, G & H from Nut SFN 7399; F from Lörzing 11750.


**Figure 3**

Large, moderately robust, semi-pachycaul homeophyllous liane to 15 m; seedling stage a non-skototropic shingling shoot; pre-adult plants forming small terrestrial colonies of appressed shingling shoots; adult shoot architecture comprised of elongated, clinging, physiognomically monopodial, leafy, non-flowering stems and moderately elaborated, free, sympodial, moderately leafy, flowering stems: stems smooth, climbing stems rectangular in cross-section, free stems more or less terete to very weakly four-angled in cross-section, larger shoot systems pendent under their own weight, without prophyll, cataphyll and petiolar sheath fibre, internodes to 7 x 1.5 cm on adherent shoots, shorter and less stout on free shoots, separated by prominent oblique leaf scars, older stems woody: flagellate foraging stems absent: clasping roots densely arising from the nodes and internodes of clinging stems, densely pubescent; feeding roots rare, adherent, pubescent; leaves weakly spiralled on adherent shoots, slightly scattered-distichous on flowering shoots; cataphylls and prophylls membranous, very quickly drying and falling: petiole shallowly canaliculate adaxially, 4—7 x 0.1—0.2 cm, smooth, with a slight apical and rather prominent basal geniculum; petiolar sheath prominent, extending to and encircling the apical geniculum, very swiftly drying and falling to leave a thin continuous scar from the petiole base, around the top of the apical geniculum and back to the base, occasionally youngest leaves with parchment-like sheath remains briefly adherent: lamina entire, falcate-lanceolate to falcate-oblong or falcate-oblancoate, 10—29.5 x 1.5—7 cm, stiffly coriaceous, upper surfaces slightly glossy, lower surfaces less so, base minutely cordate to subovate to acute or briefly decurrent, apex subacute with a prominent apiculate tubule, margins slightly revolute in dried material: midrib raised abaxially, very slightly sunken adaxially; primary venation pinnate, raised abaxially and adaxially; interprimaries parallel to primaries, slightly raised abaxially and adaxially; secondary and tertiary venation slightly raised in dried specimens: inflorescence solitary, subtended either by a fully developed foliage leaf or by one or more subfoliar (i.e., developed petiole but atrophied lamina) cataphylls: peduncle slightly compressed-cylindric, 3—6 x 0.3—0.5 cm: spathe
Figure 4. *Rhaphidophora crotosa* P.C. Boyce

A. fertile shoot x 1/2; B. flowering shoot x 1/2; C. leaf lamina x 1/2; D. venation detail x 2; E. inflorescence; spathe fallen x 3; F. spadix detail; pre-anthesis x 20. All from Wenzl/ZS2.
cigar-shaped prior to expanding, stoutly short-beaked, 7—9.5 x 2—3.5 cm, thickly fleshy, exterior light yellow, interior darker, swiftly (?) falling at female receptivity; spadix cylindrical to slightly clavate, very shortly stipitate, light yellow. 4—5.3 x 1.2—1.5 cm; stipe c. 2 mm long; stylar region well developed, mostly rounded to rhombohexagonal. 1.2—1.3 x c. 1.2 mm. conical; stigma conspicuously raised-punctiform, c. 0.2 mm diam.; anthers slightly exserted at anthesis; infructescence stoutly cylindrical, 6.5—7.5 x 1.8—2 cm.

*Distribution:* Sumatera, Kalimantan and the Philippines (Palawan).

*Habitat:* Damp primary, old secondary and montane forest. 450—1000 m altitude.

*Note:* Close to *Rhaphidophora sylvestris* but consistently different in the conical style topped with a prominent, raised, button-like stigma. *R. conocephala* has much more coriaceous leaves compared with *R. sylvestris*.

Confusion is possible with *R. crassifolia* (Peninsular Malaysia and southern Thailand), which differs in the considerably thicker, almost succulent leaves, and the prominently angled and elaborately twisted adherent stems.

*Other Philippine specimens seen:* PALAWAN. Mt Beaufort. NNW spur. west side. Podzorski SMH 624 (BO. GH, K, KEP, L).


**Figure 4**

Small slender leptocaul homeophyllous liane to 8 m; seedling and pre-adult plants unknown; adult shoot architecture comprised of greatly elongated, strongly clinging, physiognomically monopodial, leafy, non-flowering stems and long, greatly elaborated, free, sympodial, densely leafy, flowering stems later pendent under their own weight but with active tips ascending; stems
smooth, climbing stems terete in cross-section, often crooked at points where new lateral branches arise, free stems terete in cross-section, glaucous green, without prophyll, cataphyll and petiolar sheath fibre, internodes to 8 cm long on adherent shoots, less on free shoots, separated by well defined, straight leaf scars, older stems woody, whitish; flagellate foraging stems absent; roots not observed; leaves weakly spiro-distichous on adherent and free shoots; cataphylls and prophylls membranous, very quickly drying and falling; petiole grooved adaxially, 2—4 x 1.5—2 cm, smooth, apical and basal genicula well defined; petiolar sheath not prominent, extending to and encircling the apical geniculum, very briefly ligulate, soon drying and falling by peeling from the base to leave a conspicuous continuous scar from the petiole base, around the top of the apical geniculum and back to the base; lamina entire, lanceolate to ovate-lanceolate, very slightly oblique, 5.5—16 x 2—5 cm, thinly coriaceous, upper surfaces very slightly glossy, lower surfaces semi-matt, drying strongly discolorous, dark above very pale brown beneath, base subacute to rounded, occasionally slightly unequal, apex acuminate and turned to one side, with a prominent apiculate tubule; midrib slightly raised abaxially, slightly sunken adaxially, drying black and contrasting with the discolorous abaxial lamina surface; primary venation pinnate, very slightly raised adaxially, almost invisible abaxially; interprimaries parallel to primaries and only slightly less prominent, very slightly raised abaxially and adaxially; secondary and tertiary venation ± obscure in dried specimens; inflorescence solitary, subtended by a fully developed foliage leaf; peduncle slender-cylindric, c. 10 x 1 mm; spathe slender boat-shaped, stoutly short-beaked, 3—5 x c. 1 cm, thinly stiff-fleshy, dull yellow, paler internally, swiftly falling at female receptivity; spadix cylindrical, stipitate, c. 4 x 1.25 cm, chalky white when fresh; stipe terete, c. 3 mm long, spadix inserted slightly obliquely, stylar region mostly rhombohexagonal, 1—1.2 x 1.2—1.3 mm, truncate; stigma disciform, slightly raised, c. 0.20—0.25 mm diam.; anthers not observed; infructescence unknown.


Habitat: Gravelly ground of jungles along creeks. 250 m altitude.

Notes: I. Invalidly published by Elmer in Scindapsus, this species belongs in Rhaphidophora; dissection of a mature gynoecium reveals two intrusive placentae bearing numerous ovules. R. cretosa seems closest morphologically to R. sylvestris (Peninsular Malaysia, Sumatera, Java, Nusa Tenggara, throughout Borneo and Maluku) but differs in the terete stems (not rectangular in cross-section) and in the stipitate spadix.
2. The type was chosen on the basis of its fertility. None of the extant collections seen of *Elmer 13658* (the intended type of Elmer's abortive *Scindapsus fragilis*) are fertile.

3. The specific epithet is derived from *creta*, the Latin word for chalky, in allusion to the white spadix of the fresh plant.

*Other specimens seen:* MINDANAO. Agusan. Cabadbaran (Mt Urdaneta), along the Patangan creek. *A.D.E. Elmer 13658* (BM, FI, L, K, MO, US)


**Figure 5**

Moderately robust, semi-pachycaul homeophyllous liane to unknown ultimate height; *seedling stage* not observed; *pre-adult plants* forming small terrestrial colonies; *adult shoot* architecture comprised of elongated, clinging, physiognomically monopodial, leafy, non-flowering stems and shorter, clinging, sympodial, densely leafy, flowering stems; *stems* smooth, slightly compressed-terete in cross-section. Without cataphyll remains at the apices of active shoots. Internodes to 2—8 x 1 cm on free shoots, up to 2.5 cm on adherent shoots, separated by large slightly oblique leaf scars: *flagellate foraging stems* not observed; *clasping roots* densely arising from the nodes and internodes of stems, pubescent; *feeding roots* not observed: *leaves* distichous: *cataphylls and prophylls* large and conspicuous, membranous, quickly drying and falling; *petiole* channelled adaxially, slightly carinate abaxially, 13—25 x 0.4—0.7 cm, smooth, apical and basal genicula well defined; *petiolar sheath* very prominent, extending to and surrounding the apical geniculum, swiftly drying and soon falling ± whole to leave a conspicuous scar extending around the apical geniculum: *lamina* entire, oblong to oblong-lanceolate to lanceolate, slightly to rather markedly oblique, 16—34 x 8—14 cm, thinly coriaceous, base rounded to sub-truncate and very slightly decurrent, apex rounded-acuminate to acuminate with a slight apiculate tubule; *midrib* wide, prominently raised abaxially, especially proximally, slightly sunken adaxially; *primary venation* pinnate, slightly raised abaxially, densely pinnate and raised adaxially; *interprimaries* parallel to primaries and much less prominent abaxially, about as prominent as primary laterals abaxially, slightly raised abaxially and adaxially; *secondary
Figure 5. Rhaphidophora elmeri Engl. & K. Krause
A. flowering shoot x 1/2; B. mature stem detail x 1/2; C. leaf lamina x 1/2; D. venation detail x 3; E. inflorescence, spathe fallen x 1; F. spadix detail, female receptivity x 4; G. spadix detail, post-anthesis x 4. A, E-G from Rumos BS 23006; B-D from Ehmer 15116.
venation ± obscure in fresh material, visible as a very faint weak reticulum in dried specimens; inflorescence solitary, subtended by a large briefly persistent cataphyll; peduncle often very stout, compressed-cylindric. 13—22 x 0.7—2 cm; spathe not observed in entirety, seemingly persistent into fruiting and then rotting away at infructescence maturity; spadix stoutly tapering-cylindrical, often markedly curved, sessile, inserted strongly-obliquely on peduncle. 14—17 x 1—2.5 cm; stylar region rhombohexagonal, 0.9—1.2 x 1—1.1 mm. truncate; stigma cylindrical, raised, c. 0.15 mm diam.; anthers exerted at anthesis; infructescence 16 x 2.5 cm.


Habitat: Steep forested valley, shaded vertical rock faces, cut-over forest on slopes near ridges. 100—1200 m altitude.

Notes: 1. Very similar to Rhaphidophora perkinsiae but distinguishable by the primary lateral veins much less prominent than the interprimarics on the abaxial leaf surface, and by the longer (14—17 cm vs. 10—12 cm) spadix. Based on material seen it appears that the spathe persists into fruiting before eventually rotting away. The spathe of R. perkinsiae falls early on during anthesis.

2. Confusion with R. philippinensis is possible, although R. elmeri differs by flowering on clinging stems, in the proportionally narrower leaves (oblong rather than ovate), in the primary lateral veins much less densely arranged on the abaxial leaf surface, and in the large rhombohexagonal (rather than small ± circular) stylar region.


6. Rhaphidophora korthalsii Schott


Rhaphidophora korthalsii Schott var. angustiloba Ridl. ex Engl. & K. Krause in Engler, Pflanzenr. 37 (IV.23B) (1908) 49 — Type: Malaysia, Sarawak, Matang, July 1903, Ridley s.n. (SING, lecto, selected by Boyce, 1999).


Figure 6 & 7

Very large. occasionally enormous. slender to rather robust. pachycaul. heterophyllous liane to 20 m: seedling stage a non-skototropc shingling juvenile shoot: pre-adult plants never forming terrestrial colonies: adult shoot architecture comprised of greatly elongated. clinging. physiognomically monopodial. densely leafy. flowering stems: stems smooth. bright green. with sparse to copious prophyll. cataphyll and petiolar sheath fibre. especially at the stem apices. internodes to 15 x 3.5 cm. separated by prominent oblique leaf scars. older stems subwoody: flagellate foraging stems absent: clasping roots densely arising from the nodes and internodes. prominently pubescent: feeding roots abundant. adherent and free. very robust. densely ramentose-scaly: leaves distichous: cataphylls and prophylls membranous. soon drying degrading to intricately reticulate fibres. these only very slowly falling: petiole shallowly grooved. upper part ± terete. (1—) 9—65 x 0.2—1.5 cm. smooth. apical and basal genicula prominent: petiolar sheath prominent. membranous. strongly to slightly unequal on one side. extending almost to or reaching the apical geniculum. of ± short-duration. soon degrading into persistent netted fibres. these eventually falling to leave a prominent. slightly corky scar: lamina of seedlings
Figure 6. Rhaphidophora korthalsii Schott
A. pre-adult shoot x \( \frac{1}{2} \); B. pre-adult shingling shoot x \( \frac{1}{2} \); A from Bayne 679; B from Nichols 1712.
overlapping in the manner of roof shingles, entire, lanceolate, 5—11 x 3.5—6 cm, base slightly cordate. lamina of pre-adult and adult plants free, entire, pinnatifid, pinnatisect or pinnatifid. 10—44 x 14—94 cm, broadly oblong-elliptic to oblong lanceolate, slightly oblique, membranous to chartaceous or subcoriaceous, base truncate and very briefly decurrent, apex acute to acuminate. individual pinnae 1—10 cm wide, frequently perforated basally adjacent to the midrib, thus appearing stilted; midrib very prominently raised abaxially, slightly sunken adaxially; primary venation pinnate, raised abaxially, somewhat impressed adaxially, 2—4 primary veins per pinna; interprimaries subparallel to primaries, slightly raised abaxially, slightly impressed adaxially; secondary venation strongly reticulate, slightly raised; tertiary venation invisible; inflorescence solitary to several together, first inflorescence subtended by a membranous prophyll and one or more cataphylls, these swiftly degrading to netted fibres, subsequent inflorescences subtended by one or more swiftly degrading cataphylls, the whole forming a mass of developing and open inflorescences and developing infructescences partially concealed by persistent netted cataphyll and prophyll remains; peduncle slightly laterally compressed to terete, 6—26 x 1—1.5 cm; spathe narrowly canoe-shaped, stoutly beaked, 10—30 x 3—5 cm, stiffly fleshy, greenish to dull yellow, gaping wide at female receptivity and then swiftly falling to leave a large straight scar at the base of the spadix; spadix cylindrical, sessile, inserted ± level on peduncle, 9—26 x 1.5—2 cm, dull green to dirty white; styrar region rather well developed, mostly rhombohexagonal, 1.5—2 x c. 2 mm, slightly conical; stigma punctiform to slightly elliptic, if the latter then mostly longitudinally orientated. c. 0.3—0.5 x 0.2—0.4 mm; anthers barely exserted at anthesis; infructescence 14—27 x 3—3.5 cm, dark green ripening to dull orange, styrar tissue abscissing to reveal orange ovary cavity pulp.

Distribution: Widespread in south tropical Asia from Sumatera and southern Thailand to Borneo and the Philippines eastwards through the tropical western Pacific.

Habitat: Disturbed lowland primary or secondary dipterocarp forest, lower and upper hill forest, wet pre-montane and montane forest, on granite, sandstone, clay and limestone, occasionally in freshwater swamp forest. 10—1700 m altitude.

Notes: 1. Rhaphidophora korthalsii is a very widespread and variable species, and has extensive synonymy throughout Malesia. However, as with Epipremnum pinnatum (L.) Engl. (Boyce, 1998) there are several geographical elements that, given more intensive study, might warrant
Figure 7. Rhaphidophora korthalsii Schott

A. flowering shoot, leaves removed x 1/2; B. leaf lamina x 1/2; C. venation detail x 2; D. inflorescence, spathe removed x 1; E. spadix detail, post floral x 8. All from Kerr 13652.
formal taxonomic recognition. Unfortunately current herbarium material is inadequate to confirm these plants’ status and more field observations are needed.

2. Sterile herbarium material lacking the pre-adult stage may prove difficult to distinguish from the *Epipremnum pinnatum*. Mature leaves of ‘typical’ *E. pinnatum* never have more than one primary lateral vein per pinna, and the stems of *R. korthalsii* lack the prominent irregular whitish longitudinal crests and older stems the distinctive matt to sublustrous pale brown papery epidermis typical of *E. pinnatum*. The feeding roots of *R. korthalsii* are prominently scaly while those of *E. pinnatum* are lenticellate-corky. The pre-adult stage of *R. korthalsii* is a shingle climber with oblong-elliptic to ovate, slightly falcate upwards pointing leaves overlapping in the manner of roof tiles.

3. Fertile material of *Rhaphidophora korthalsii* and *Epipremnum pinnatum* is readily separated by the shape of the style apex (round vs. trapezoid) and the shape and orientation of the stigma (± punctiform and circumferential vs. strongly linear and longitudinal) and, if fruits are mature, by seed characters. Each fruit of *R. korthalsii* contains many small ellipsoid seeds with a brittle, smooth testa whereas *E. pinnatum* has fruits with two large, strongly curved seeds with a bony and ornamented testa.

4. Confusion is possible between *Rhaphidophora korthalsii* and *Amygdrium zippelianum* (Schott) Nicolson, although there is a suite of characters that distinguish them. The leaflet tips of the *Amygdrium* species are acute to acuminate, those of *R. korthalsii* are truncate, the petiolar sheath in *R. korthalsii* extends to the apical geniculum while in *Amygdrium* the sheath only reaches to the top of the basal geniculum, the remainder of the petiole being terete with two sharply defined low keels running its length to merge with the base of the leaf lamina. The feeding roots of *R. korthalsii* are prominently scaly while those of *A. zippelianum* are smooth. Fruiting material of *R. korthalsii* has the stylar region abscissing to reveal a pulp cavity with numerous, small, ellipsoid seeds whereas *A. zippelianum* has one or two large reniform to ovoid seeds in each indehiscent fruit.

*Other Philippine specimens seen:* LEYTE. Dagami area, lumber camp near Putok Barrio, Nicolson 825 (US). LUZON. Quezon, Quezon N.P., Croat 52993 (MO) Laguna - Tayabas prov., Paete - Piapi Curran FB 10137 (K, US); Benguet, Baguio, A.D.E. Elmer 8730 (K); Benguet, Baguio, A.D.E. Elmer 8754 (E, FI, K, L, LE, US); Aurora subprovince. Casiguran, Gonzales 11 (K); Claveria, Gonzales 4 (K); Camarines Sur. Pili, Mt Izarog, Gonzales

7. Rhaphidophora minor Hook.f.


[Rhaphidophora palawanensis Furtado. nom. nud. in sched., non. Merr. (1925)]

Figure 8

Small to moderate, slender, leptocaul. homeophyllous liane to 6 m; seedling not observed: pre-adult plants forming diffuse terrestrial colonies. adult shoot architecture comprised of greatly elongated. clinging. physiognomically monopodial. leafy. non-flowering stems and long moderately elaborated. free. sympodial. densely leafy. flowering stems: stems smooth. flexuous. climbing stems ± terete. occasionally weakly 4-angled in cross-section. free stems somewhat laterally compressed in cross-section. often branching extensively. growing to considerable lengths and pendent under their own weight with flowering tips upturned. without prophyll. cataphyll and petiolar
Figure 8. *Rhaphidophora minor* Hook.f.

A. Portion of adult, sterile shoot x 1/2; B. Flowering shoot x 1/2; C. Leaf lamina x 1; D. Venation detail x 2; E. Inflorescence: spadix just beginning to abscise x 1/2; F. Spadix detail, post-female receptivity, pre-anthesis x 8; G. Spadix detail, early fruiting x 5. A, C-F from Kerr 14700; B, G from Wymardham et al. 1962.
sheath fibre, internodes to 13 x 1.2 cm on adherent and free shoots, flowering shoots with much shorter internodes, separated by weak straight leaf scars. older stems woody: flagellate foraging stems absent; clumping roots arising sparsely or singly from the clinging stems, pubescent: feeding roots solitary from nodes. free. stout. slightly pubescent: leaves weakly distichous and sparsely arranged on adherent and proximal portions of free shoots, moderately densely distichous distally on flowering shoots; cataphylls and prophyls membranous. very quickly drying and falling: petiole grooved adaxially. 3—6 x 0.1—0.25 cm, smooth, with a slight apical and prominent basal geniculum: petiolar sheath slightly prominent, extending beyond the apical geniculum by two small ligules, very swiftly drying and falling in strips to leave a continuous scar from the petiole base. around the top of the apical geniculum and back to the base; lamina entire. narrowly falcate-elliptic to falcate-lanceolate or falcate-oblanccolatc. 2.5—16 x 1.2—3 cm, thinly coriaceous to chartaceous, drying pale straw-coloured, base cuneate to acute or subovate. apex acute with a prominent tubule: midrib raised abaxially, slightly raised adaxially; primary venation pinnate, slightly raised on both surfaces prominent (raised) in dried material; interprimaries subparallel to, but much less distinctive than. primaries, sometimes degrading into weakly reticulate venation. very slightly raised abaxially: secondary and tertiary venation ± invisible in fresh material, barely visible in dried specimens. reticulate: inflorescence solitary, subtended by a fully developed foliage leaf and a very quickly falling cataphyll: peduncle compressed-cylindric. 3—4 x 0.3—0.5 cm; spathe cigar-shaped. stoutly long-beaked. 3—9 x 1—1.5 cm, thin. dull green to dull yellow. swiftly falling at female receptivity to leave a large, straight, scar; spadix slender cylindrical, sessile, inserted level on peduncle. 2.5—7 x 0.5—0.6 cm, dull yellow-white; styler region rather well developed, mostly rhombohexagonal. 1.4—2 x c. 2 mm. truncate: stigma punctiform. c. 0.3 mm diam., slightly prominent in dried material; anthers well-exserted at anthesis: inflocctescence oblong-cylindric. 4.5—7 x 1—2.5 cm.

Distribution: Southern Thailand, Peninsular Malaysia, Singapore, Sumatera, throughout Borneo, Sulawesi and into the Philippines (Palawan).

Habitat: Lowland forest, along stream margins, sometimes in swampy soil. 10—100 m altitude.

Notes: 1. In the fresh state confusion with (non-Philippine) Rhaphiophora sylvestris is possible. Merrill cited Palawan R. minor as R. sylvestris (Merr. 1925: 452) although the thinner, more prominently veined leaf and longer spathe beak of R. minor are diagnostic. Dried material of R. minor is
notable for the uniformly pale straw coloured leaves.

2. *Rhaphidophora cretosa* is similar to *R. sylvestris* but readily distinguishable by the smoother, less prominently veined leaves that dry strongly discolorous.

*Other Philippine specimens seen:* PALAWAN. Candaoaga, *Fenix BS 15527* (P. US).


**Figure 9**

Very robust, pachycaul, homeophyllous liane to 15 m; *seedling stage and pre-adult plants* not observed; *adult shoot* architecture comprised of elongated, clinging, physiognomically monopodial, densely leafy, non-flowering (always?) stems and clinging, sympodial, densely leafy, flowering stems; *stems* smooth, with cataphylls and prophylls degrading into robust simple fibres and then falling quickly, internodes to 15 x 5 cm, separated by large straight to slightly oblique leaf scars; flagellate *foraging stem* not observed; *roots* not observed; *leaves* spiro-distichous; *cataphylls and prophylls* subcoriaceous, degrading into robust simple fibres and then falling; *petiole* deeply canaliculate, 30—108 x 1.4—4.5 cm, smooth for the most part apical and basal geniculi very large but not especially prominent; *petiolar sheath* very prominent, extending to between c. 6 cm from or reaching to the apical geniculum in largest leaves. long-persistent, eventually falling to leave a large, corky scar; *lamina* entire, ovate to oblong-ovate, 24—80 x 14—41 cm, stiffly coriaceous to subsucculent, semi-glossy above, matt beneath, drying pale yellow-brown like all other vegetative parts, base broadly rounded to shallowly cordate, apex acute to acuminate with a stout apical tubule; *midrib* very prominently raised and abaxially, ± impressed adaxially; *primary venation* densely pinnate, raised abaxially and adaxially; *interprimaries* parallel to primaries, more identically
Figure 9. *Rhaphidophora monticola* Engl. & K. Krause

A. Flowering shoot x 1/2; B. Leaf lamina x 1/2; C. Venation detail x 3; D. Inflorescence, spathe partly opened x 1/3; E. Spadix detail, pre-anthesis x 8. A, compiled from Croat 580.3.3. Eller 10098 & Ramon BS 23455; D & E from Croat 580.33. B & C from Eller 10098.
prominent; secondary venation reticulate, barely visible; inflorescence subtended by a partially developed foliage leaf and large cataphylls; peduncle terete, exceptionally long, 30—117 x 1.5—2 cm; spathe slender canoe-shaped, very stoutly beaked, 21—32.5 x 3.5—5 cm, stiffly thin-fleshy, dull greenish white to yellowish green, slightly tinged purple on the inside surface, persistent though maturation of fruit; spadix slender tapering-cylindrical, stipitate but stipe long decurrent (to 6 cm) on peduncle/spathe insertion, 17—22 x 1.3—1.5 cm, greenish, later pale yellow; stylar region moderately developed, rhombohexagonal, 1—2 x 1—1.5 mm, truncate; stigma vertically elongated to (lowermost pistils) punctiform, slightly raised at anthesis, c. 0.25 mm diam.; anthers not exserted at anthesis; infructescence to 28 x 3 cm.

**Distribution:** Philippines (Leyte, Luzon, Mindanao, Negros). Endemic.

**Habitat:** Primary dipterocarp forest, mossy forest. 140—1200 m altitude.

**Notes:** 1. A species of extraordinary appearance immediately recognizable by the texture and dense venation of the leaf laminas and by the remarkably elongated and robust peduncle, the latter being unique in the genus. It is not at all clear to what *Rhaphidophora monticola* is related.

2. There is nothing in the Philippines with which to confuse *R. monticola* either in the fertile state, when the very long peduncle is diagnostic, or when sterile, in which instance the unique leaf venation is unmistakable. Herbarium specimens habitually dry a peculiar pale yellow-brown, a characteristic otherwise found only in the vegetatively distinct *R. minor*.

**Other specimens seen:** LEYTE. Putok Barrio, c. 22 km SW of Tacloban, Putok River. Nicolson 820 (PNH, US); Wenzel 1160 (BM). LUZON Bicol, 21 km S of Daet, Bicol N.P., Croat 53033 (MO); Laguna, Mt Maquiling. Merrill BS 7154 (B, US); Laguna, along path from College of Agriculture to top of Mt Maquiling. Nicolson 685 (PNH, US); Laguna, near summit of Mt Maquiling along path from College of Agriculture. Nicolson 686 (US); Sorsogon, Ramos BS 23455 (K, P, US). MINDANAO. Surigao Sur. Bislig. Gonzales 19 (K). NEGROS. Angilog (Rizal). Loher 7042 (K).


US isolecto, selected here). Engler cites four conspecific syntypes (the others are Loher 2458, 2459 and 2460). All collections are fertile. That chosen as the lectotype is represented in more herbaria.

**Figure 10**

Moderately robust, semi-pachycaul homeophyllous liane to unknown ultimate height; *seedling stage and pre-adult plants* not observed; *adult shoot* architecture comprised of elongated, clinging, physiognomically monopodial, leafy, non-flowering stems and shorter, clinging, sympodial, densely leafy, flowering stems; *stems* smooth, terete in cross-section, without cataphyll remains at the apices of active shoots, internodes to 2—5.5 x 1 cm on free shoots, up to 2 cm on adherent shoots, separated by large almost straight leaf scars; *flagellate foraging stems* not observed; *clasping roots* densely arising from the nodes and internodes of stems, pubescent; *feeding roots* not observed; *leaves* distichous; *cataphylls and prophyllys* large and conspicuous, membranous, very quickly drying and falling; *petiole* channelled adaxially, 8—16 x 0.5—0.5 cm, smooth, apical and basal genicula weakly defined; *petiolar sheath* very prominent, extending to overtopping the apical geniculum, ligulate, clasping the newly emerged leaf or inflorescence, swiftly drying and soon falling ± whole to leave a conspicuous scar; *lamina* entire, oblong to oblong-lanceolate, slightly oblique, 12—20 x 7.5—14 cm, mostly thinly coriaceous, base rounded, apex falcate-acuminate with a prominent apiculate tubule; *midrib* raised abaxially, slightly sunken adaxially; *primary venation* pinnate, slightly raised abaxially and adaxially; *interprimaries* parallel to primaries and usually hardly less prominent, slightly raised abaxially and adaxially; *secondary venation* ± obscure in fresh material, visible as a faint reticulum in dried specimens; *inflorescence* solitary, subtended by a fully developed foliage leaf; *peduncle* compressed-cylindric, 6—16 x 0.4—0.6 cm; *spathe* slender cane-shaped, stoutly short-beaked, 11—16 x 1.2—3 cm, stiff-fleshy, green, turning almost black prior to falling; *spadix* cylindrical, sessile, inserted obliquely on peduncle. 10—12 x 1.7—2.5 cm; *stylar region* weakly rhombohexagonal, often barely angled, 0.9—1.2 x 1—1.1 mm, weakly conical; *stigma* cylindrical, prominently raised, c. 0.15 mm diam.; *anthers* exserted at anthesis; *inflorescence* 13—15 x 1.5—3 cm.

**Distribution:** Philippines (Leyte, Luzon, Mindanao, Negros), Taiwan (Lanyu Island), Japan (Ryukyus: Iriomote-Jima)

**Habitat:** Primary to disturbed forest, areas with scattered trees, mossy forest, 100—1030 m altitude.
Figure 10. Rhaphidophora perkinsiae Engl.
A. flowering shoot x \( \frac{1}{5} \); B. leaf lamina x \( \frac{1}{5} \); C. venation detail x 6; D. inflorescence, spathe removed x 1; E. spadix detail, anthesis x 8; F. gynoecium, three quarter view; G. gynoecium, side view, anthesis x 12. All from Loher 2459.
Notes: 1. Very similar to *Rhaphidophora elmeri* but distinct in the primary lateral veins being barely distinguishable from the interprimaries, the whole primary and interprimary venation appearing densely pinnate on the abaxial leaf surface, and by the shorter (10—12 cm vs. 14—17 cm) spadix. The spathe falls early in anthesis, contrasting with *R. elmeri* in which it appears that the spathe persists into fruiting, before eventually rotting away.

2. *Rhaphidophora perkinsiae* is similar to *R. acuminata* but distinguishable by the larger, thinner leaf lamina and the lack of cataphyll remains at the tip of the active shoots.

3. Lanyu Island less than 400 km north of Luzon and Iriomote-Jima, the southernmost of the Ryukyus, is only a further 350 km northwest of Lanyu. The presence of several Philippine species, including the aroids *Pothoidium lobbianum* Schott and *Epipremnum pinnatum* (L.) Engl., is recorded for Lanyu, and *E. pinnatum* (recorded as *Rhaphidophora liukiuensis* Hatus.) is known from Iriomote-Jima. *Rhaphidophora liukiuensis* may be a synonym of either *R. perkinsiae* or *Epipremnum pinnatum* but this requires further investigation. The problem lies with interpretation of the type. The isotype (*Hatusima 23199*) in Leiden is conspecific with *R. perkinsiae*. The diagnosis of Hatusima (1962) also applies to *R. perkinsiae*. However, the holotype, pictured with the diagnosis appears to have pinnately divided leaf laminae and may be referable to the widespread *Epipremnum pinnatum*. This question will remain unresolved until I have seen the holotype.

Other specimens seen: LEYTE. Dagami area, lumber camp near Putok Barrio, Nicolson 826 (US). LUZON. Benguet, Baguioy, A.D.E. Elmer 8732 (BO, E, Fl, L, LE, K); Benguet, Merrill BS 9667 (K, P, US); Central Luzon, Loher 2458 (K); Benguet, Loher 2459 (K); Manila, Macaharing (Montalban), Loher 2460 (K, US); Laguna, Mabesa FBN 26747 (US); Laguna, near summit of Mt Maquiling, along path from College of Agriculture, Nicolson 687 (US); Albay, west side of Mt Mayon, near resthouse, Nicolson 786 (PNH, US). MINDANAO. Agusan, Esperanza, Sianib, along Labao Creek, Nicolson 734 (US). NEGROS. Angilog (Rizal), Loher 7035 (K, US); Negros Oriental. Mt Canlaon, near Canlaon, Nicolson 834 (US).


Clemens BS 1299 (B. holo: PNH‡, iso).


Figure 11

Robust, semi-pachycaul homoeophyllous liane to unknown ultimate height; seedling stage & pre-adult plants not observed; adult shoot architecture comprised of elongated, clinging, physiognomically monopodial, leafy, non-flowering stems and stout, elaborated free, sympodial, densely leafy, flowering stems; stems smooth, slightly terete in cross-section, with very slight cataphyll remains at the apices of active shoots but mostly naked, internodes to 2—4.5 x 1 cm on free shoots, separated by large very slightly oblique leaf scars; flagellae foraging stems not observed; roots not observed; leaves spiro-distichous, laminas descending; cataphylls and prophyls large and conspicuous, membranous, very quickly drying and mostly falling although patchy remains sometimes present at active shoot apices; petiole channelled adaxially. 10—22.5 x 0.3—0.5 cm, smooth, apical and basal genicula poorly defined; petiolal sheath prominent, extending to the apical geniculum, swiftly drying and soon falling ± whole to leave a conspicuous scar extending around the apical geniculum; lamina entire, ovate, slightly to rather markedly oblique, 13—33 x 5.5—18 cm, very coriaceous, dull olive green above, yellow green below, base broadly rounded to subtruncate to sub-cordate, apex strongly recurved, acuminate to a short, stout apiculate tubule; midrib wide, prominently raised abaxially, especially proximally, sunken adaxially; primary venation densely pinnate abaxially and scaterred-pinnate abaxially, raised on both surfaces; interprimaries parallel to primaries and less prominent abaxially, as prominent as primary laterals adaxially, giving the leaf a densely pinnate appearance abaxially; secondary venation visible as a very faint weak reticulum in dried specimens; inflorescence solitary; peduncle stout, slightly compressed-cylindric. 14 x 1.5 cm; spathe not observed; spadix stoutly cylindrical, sessile, inserted very strongly-obliquely on peduncle, 15 x 2 cm; stylar region weakly angled, often appearing almost circular. 0.4—0.5 x 0.4—0.5 mm, slightly conical, truncate; stigma circular, prominently raised, almost obscuring the top of the style. c. 0.4 mm diam.; anthers not exserted at anthesis; infructescence not observed.

Figure 11. *Rhaphidophora philippinensis* Engl. & K. Krause

A. flowering shoot x 1/2; B. leaf lamina x 1/2; C. venation detail x 3; D. inflorescence, spathe fallen x 1/2; E. spadix detail, post-anthesis x 8. All from Cimmeno BS 1299.
Habitat: Secondary dipterocarp forest, damp primary forest. 100—1295 m altitude.

Notes: 1. Immediately recognizable by the large, circular, raised stigma almost concealing the stylar region, and by the prominently decurrent spadix. Confusion is possible with Rhaphidophora monticola, which has similar leaf lamina texture and venation but may readily be distinguished by flowering on clinging stems, in the flat stigmas, and in drying pale yellow-brown.

2. Elmer 13776 comprises specimens with typical broad leaf laminas (FI, K, L, P, US duplicates) and specimens with much narrower lanceolate laminas (BM, MO). Further, the narrow-leaved specimens lack the well-defined primary lateral veins on the abaxial surface. It is not clear if this is a mixed collection or whether this collection contains juvenile material (the juvenile of R. philippinensis is unknown) and for this reason the data from the BM and MO sheets is excluded from the description above.


11. Rhaphidophora todayensis K. Krause


Figure 12
Moderate to large, rather robust, semi-pachycaul homeophyllous liane of unknown ultimate height; seedling stage and pre-adult plants not observed; adult shoot architecture not completely known but based on available material seemingly comprised of clinging, elongated, branched, non-flowering stems with scattered leaves and short, free, sympodial, apically densely leafy flowering stems; stems terete in cross-section, with prophyll, cataphyll and petiolar sheath fibre, internodes up to 4 cm diam., leaf scars large, straight; flagellate foraging stems not observed; roots not observed:
Figure 12. Rhoalophora todayensis K. Krause
A. flowering shoot x 1/2 B. leaf lamina x 1/2 C. venation detail x 3 D. inflorescence spathe taken x 2 E. Spadix detail.
leaves spiro-distichous on free shoots; cataphylls and prophylls thickly soft-coriaceous, quickly drying and degrading into dense fibres, these soon falling (?); petiole deeply grooved, 31.5—45 x 0.5—1.5 cm, minutely pubescent and appearing greyish in nature, apical and basal geniculum moderately prominent, apical geniculum minutely pubescent; petiolar sheath moderately prominent, extending to the apical geniculum, swiftly drying and degrading into sparse fibres; lamina entire, minutely pubescent abaxially, especially along the primary veins when young, 31.5—51 x 14.7—20 cm, thinly coriaceous to subchartaceous, base oblique, major side obtuse, minor side acute, slightly decurrent, apex acute to acuminate; midrib prominently raised and pubescent abaxially, ± sunken adaxially; primary venation pinnate, raised abaxially and slightly raised adaxially, pubescent in younger leaves, indumentum mostly shed in older leaves; interprimaries subparallel to primaries, much less prominent, slightly raised abaxially and adaxially; secondary venation reticulate, slightly raised abaxially, ± invisible adaxially; inflorescence 3 to 5 together, the whole subtended by a fully developed foliage leaf and each inflorescence subtended a large swiftly degrading fibrous cataphyll; peduncle terete, 11—15 x 0.5—1.2 cm; spathe canoe-shaped, stoutly long reflexed-beaked, 25 x 5 cm, fleshy, creamy white, falling at female receptivity to leave a large, straight scar; spadix cylindrical, obtuse, sometimes slightly curved, sessile, inserted ± level on peduncle, 9—10 x 1—1.2 cm, creamy white; stylar region weakly hexagonal, often almost round, c. 1.5 mm diam., truncate; stigma elongate, prominently raised, c. 0.5—0.75 x 0.3—0.4 mm; anthers exserted at anthesis; infructescence stoutly oblong-cylindrical, 4.5—14 x 1.5—2 cm, greenish yellow.


Habitat: Humid riverine forest. 810—850 m.

Note: Distinct from other species in the Philippines by the pubescent abaxial surface of the leaf lamina and by the clusters of inflorescences subtended by and interspersed with thick fibrous cataphyll remains. The leaf pubescence recalls R. foraminifera Engl. (Sumatera, Peninsular Malaysia and throughout Borneo), R. puberula Engl. (Peninsular Malaysia, Sumatera, Nusa Tenggara and throughout Borneo) and R. hookeri Schott. (N. India to SW China). In the leaf venation and especially the marked obliqueness of the lamina base, R. todaysensis strongly resembles R. hookeri.

Raphidophora todaysensis differs from R. foraminifera by flowering on free lateral shoots and in not having perforated leaves. It may be separated from R. puberula by the clusters of inflorescences interspersed with fibrous cataphyll remains and in the very much smaller stylar region
with a comparatively large stigma. From *R. hookeri*, *R. todayensis* may be
distinguished in bearing erect clusters of inflorescences rather than a
nodding solitary inflorescence.

*Other specimens seen:* MINDANAO. Davao, Baguio, Mr Onglionto’s land.
Nicolson 712 (US).

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