

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. stenophylla* Elmer non K. Krause. *R. bitusanensis* is reduced to the synonymy of *R. monticola*, *R. rigida* is merged with *R. philippinensis*, 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. conocephala* 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. todayensis* 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

Rhaphidophora Hassk., Flora 25 (2) Beibl. 1 (1842) 11; Schott, Gen. Aroid. (1858) 77 & Prodr. Syst. Aroid. (1860) 377—388; Miquel, Ann. Mus. Bot. Lugd.-Bat. 3 (1867) 81—82; Engl. in A. & C. DC., Monogr. Phan. 2 (1879) 238—248; Engl. in Beccari, Malesia, vol. 1 (1882) 266—272, Tab. xix 6—9, xx 1—5; Benth. & Hook. f., Gen. Pl. 3(2) (1883) 993 - 993; Engl. & Prantl, Nat. Pflanzenfam. T. 2, Ab. 3 (1889) 119—120; Hook.f. in Hook.f., Fl. Brit. India, vol. 6 (1893) 543—548; Engl. & Prantl, Nat. Pflanzenfam. Nachtr. 1 (1897) 58; Ridl., J. Straits Branch Roy. Asiat. Soc. 44: 185—187 (1905) & Mat. Fl. Malay Penins. 3 (1907) 39—46; Engl. & K. Krause in Engl., Pflanzenr. 37 (IV.23B) (1908) 17—53; Engl. & Prantl, Nat. Pflanzenfam. Nachtr. 3 (1908) 29; Koorders, Exkursfl. Java, vol. 1 (1911) 253—255; Merr., J. Straits Branch Roy. Asiat. Soc., special number (1921) 88—90 & Enum. Philipp. Flower. Pl., vol. 1 (1923) 175—177; Ridl., Fl. Malay Penins., vol. 5 (1925) 120—124; Henderson, Malayan Wild Flowers, Monocots, (1954) 238—239, Fig. 142; Backer, Beknopte Fl. Java, vol. 17 (1957) 13—15; Backer & Bakh.f., Fl. Java, vol. 3 (1968) 106—107; Nicolson in A.C. Sm., Fl. Vitiensis Nova, vol. 1 (1979) 443—445, Fig. 88; Hay in R.J. Johns & Hay, Students' Guide Monocot. Papua New Guinea, Part 1 (1981) 68—72, Fig. 29; Schott, Icones aroideae et reliquiae (IDC Microfilm) (1983) fiche nos. 28—31, 121; Hay, Aroids of Papua New Guinea (1990) 83—87, Figs. 34, 35, Pl. XIVb, XV & Telopea 5 (1993) 293—300; Hay *et al.* Checklist & botanical bibliography of the aroids of Malesia, Australia and the tropical western Pacific. Blumea, suppl. 8 (1995) 111—127; Mayo *et al.*, Genera Araceae (1997) 118—121, Pl. 14, 109 D — *Scindapsus* Schott subgen. *Rhaphidophora* (Hassk.) Miq., Flora Ned. Indië 3 (1856) 185 — Type: *Rhaphidophora lacera* Hasskarl, *nom. illeg. pro. Pothos pertusus* Roxb. [= *Rhaphidophora pertusa* (Roxb.) Schott]

Scindapsus Schott subgen. *Pothopsis* Miq., Flora Ned. Indië 3 (1856) 187 — Type: *Scindapsus sylvestris* (Blume) Kunth [= *Rhaphidophora sylvestris* (Blume) Engl.]

[*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 \pm 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 ramentose (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; *claspng 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, \pm 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 \pm 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* \pm 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; *spathe* 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 rotting (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 \pm 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 \pm subaxile, partial septa variably intrusive; *stylar 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 stylar regions greatly enlarged, transversely dehiscent, the abscission developing at the base of the enlarged to massive stylar 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* dicolpate, 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 rhizophytes, 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 1cm long), needle-like unicellular trichoscleroids 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 \pm 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 discolourous,

- 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.

Rhaphidophora acuminata Merr., Philipp. J. Sci. 10 (1915) 265, Enum. Philipp. Flower. Pl., 1 (1923) 175 — Type: Philippines, Leyte, 10 Sept. 1914, C.A. Wenzel 1139 (PNH⁺, holo; BM, MO, US, iso).

Rhaphidophora lagunensis Elmer, Leaflet Philipp. Bot. 8 (1919) 3072, Enum. Philipp. Flower. Pl., 1 (1923) 175, **synon. nov.** — Type: Philippines, Luzon, Laguna, Los Baños (Mt Maquiling), June-July 1917, A.D.E. Elmer 17812 (PNH⁺, holo; BM, FI, K, L, MO, P, US, iso).

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; *clasp ing 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.

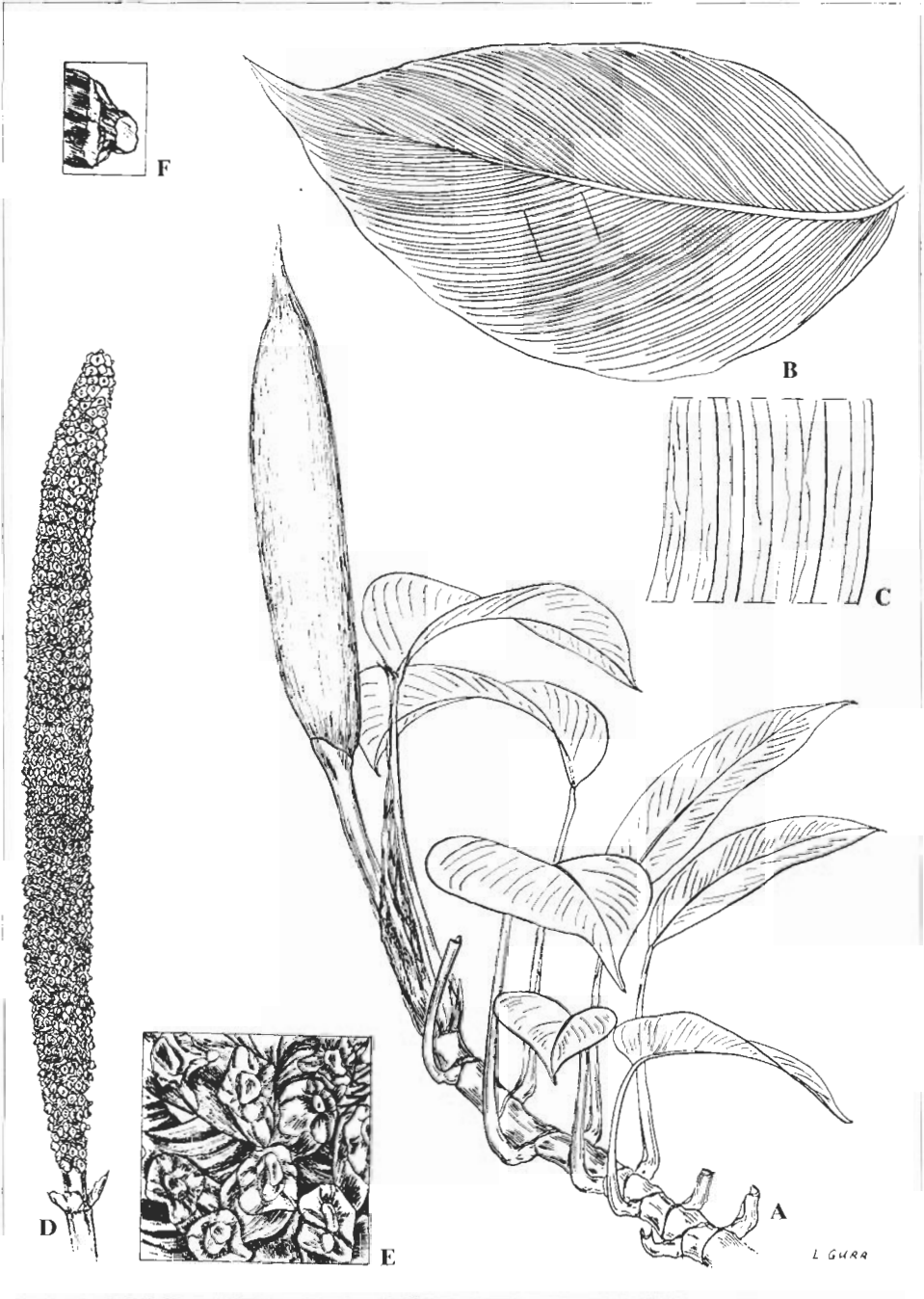


Figure 1. *Rhaphidophora acuminata* Merr.
A. flowering shoot x 1/2; B. leaf lamina x 2/3; C. venation detail x 3; D. inflorescence, spathe fallen x 1; E. spadix detail, post anthesis x 8; F. gynoecium, three quarter view x 8. A Wenzel & Mendoza 7857, B—C Mendoza 7859, D—F from Wenzel 1139.

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* canoe-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 exerted at anthesis; *infructescence* 10–17 x 2–4 cm.

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

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.

Other specimens seen: LUZON. Sierra Madre Mountains, NNW of Dingalan, *Jacobs* 7857 (K, L, PNH); Batangas, *Ramos & Deroy* BS 22669 (K, P, US). MINDANAO. Bukidnon, Mt Katanglad, south slope of south peak, So. Calambra, Bo Kibangay, *Sulit* PNH 10042 (L, PNH).

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

[*Rhaphidophora stenophylla* Elmer, Leafl. Philipp. Bot. 8 (1919) 3073; Merr., Enum. Philipp. Flower. Pl., 1 (1923) 176, *nom. illeg.*; *non R. stenophylla* K. Krause, Bot. Jahrb. Syst. 49 (1912) 94 — Type: Philippines, Luzon, Laguna, Los Banos (Mt. Maquiling), June – July 1917, *A.D.E. Elmer* 18449 (PNH†, holo; MO, iso)]

Figure 2

Medium to large, moderately robust, semi-pachycaul homeophyllous liane

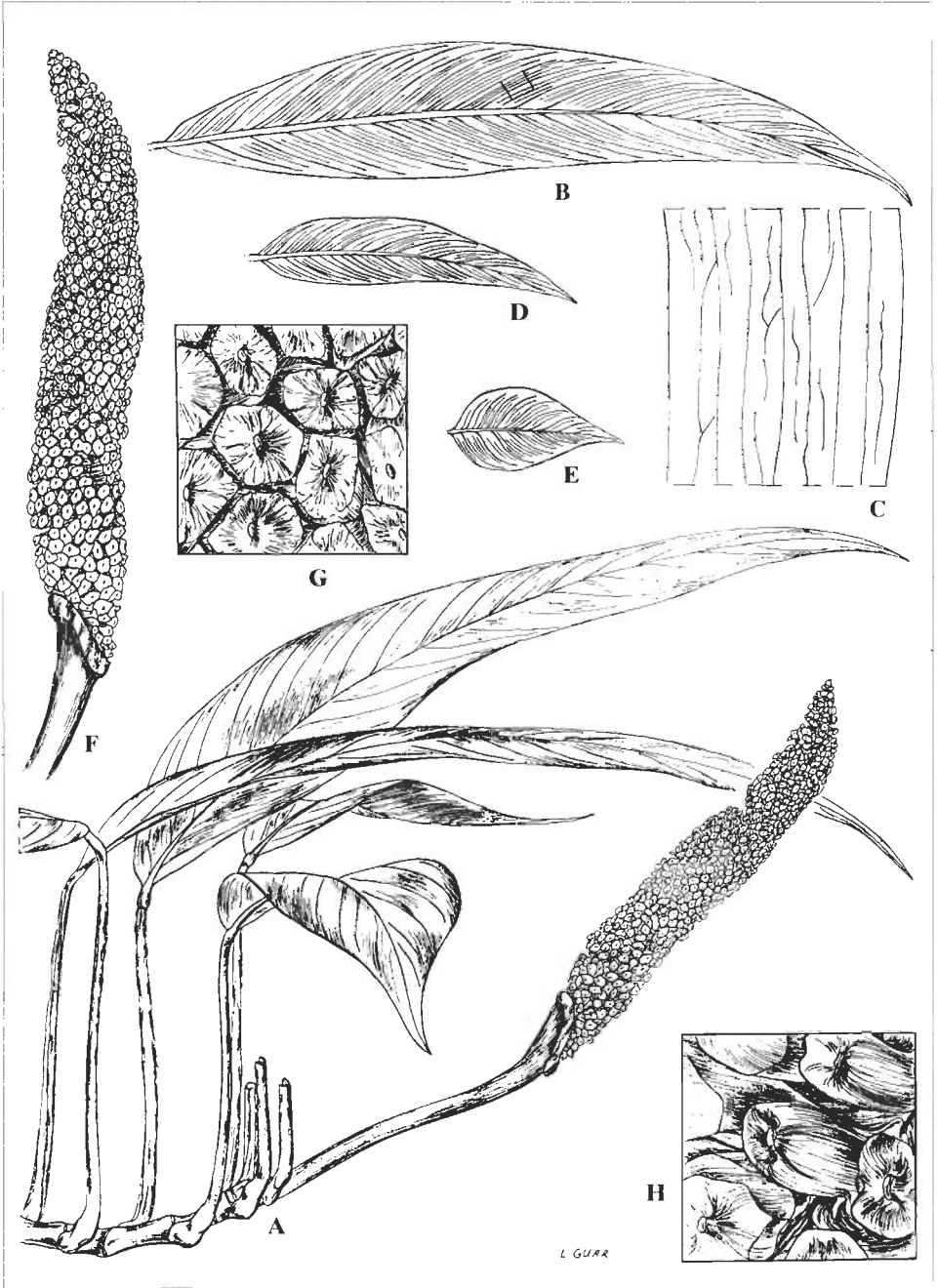


Figure 2. *Rhaphidophora banosensis* P.C. Boyce

A. flowering shoot $\times \frac{2}{3}$; B. leaf lamina $\times \frac{1}{3}$; C. venation detail $\times 4$; D. leaf lamina $\times \frac{1}{3}$; E. leaf lamina $\times \frac{1}{3}$; F. inflorescence, spathe fallen $\times \frac{2}{3}$; G. spadix detail, post female receptivity $\times 6$; H. spadix detail, early fruiting $\times 6$. A–E. G & H from Ramos & Edaño BS 75472; E from Elmer 839858.

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-oblongate, 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-cylindric, 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; *stilar region* well developed, rhombohexagonal, 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.

Distribution: Philippines (Catanduanes, Luzon). Endemic.

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 & Edaña

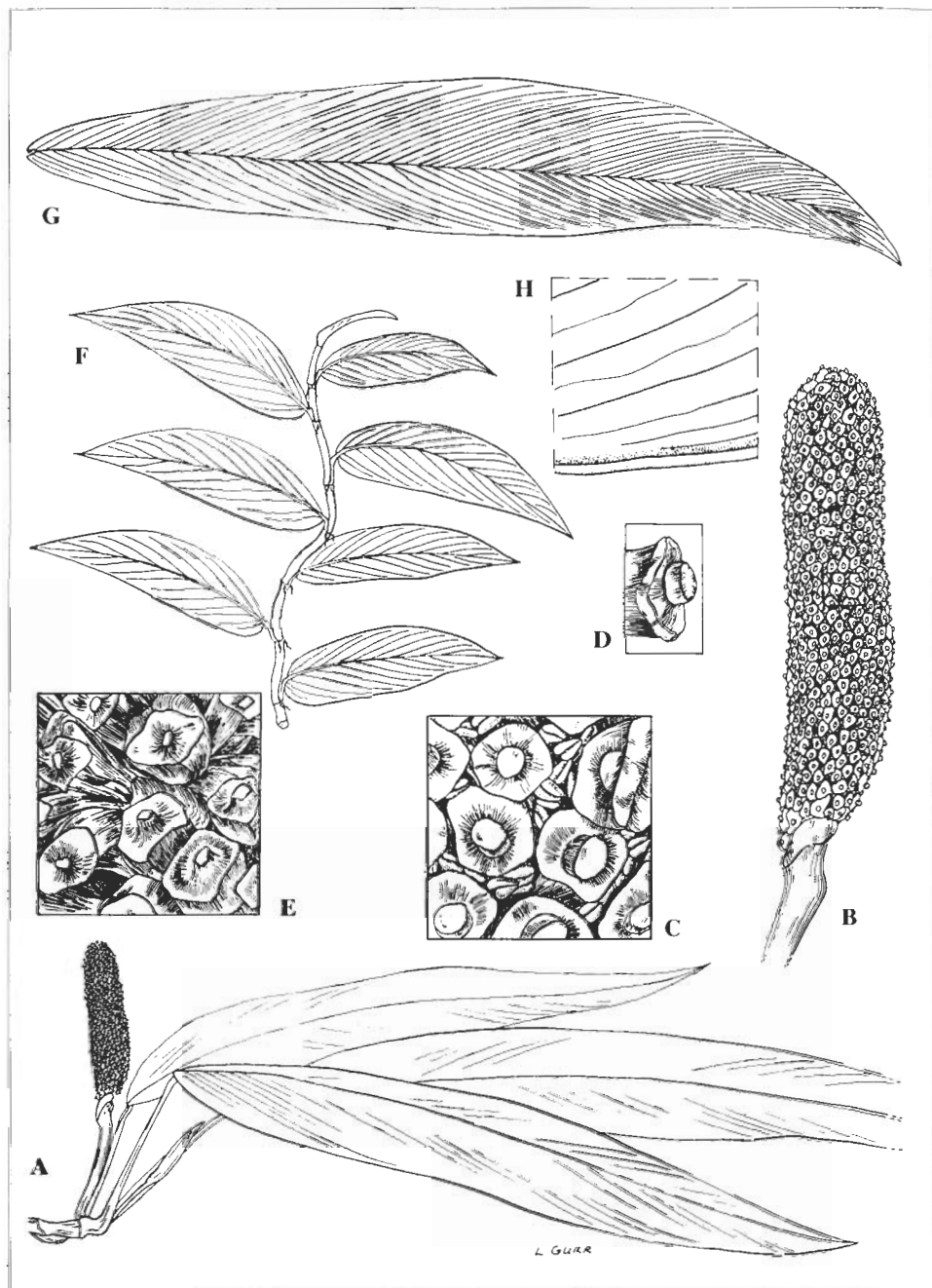


Figure 3. *Rhaphidophora conocephala* Alderw.

A. flowering shoot $\times \frac{1}{2}$; B. inflorescence, spathe fallen $\times 1\frac{1}{2}$; C. spadix detail, female receptivity $\times 10$; D. gynoecium, three quarter view $\times 6$; E. spadix detail, post anthesis $\times 10$; F. portion of preadult sterile shoot $\times \frac{1}{3}$; G. leaf lamina $\times \frac{1}{2}$; H. venation detail $\times 3$. A–E, G & H from *Nur SFN 7369*; F from *Lörzing 11750*.

BS 75472 (SING). LUZON. Bulacan Province, Angat, Ramos & Edaño
BS 34035 (US); Zambales Mts. Pinaglubo, Loher 7050 (K).

3. *Rhaphidophora conocephala* Alderw.

Rhaphidophora conocephala Alderw., Bull. Jard. Bot. Buitenzorg III, 1 (1920) 384 — Type: Indonesia, Sumatera, Sibolangit, 10 May 1917. *Lörzing* 5137 (BO, holo; K, L, iso).

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-oblongate, 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*

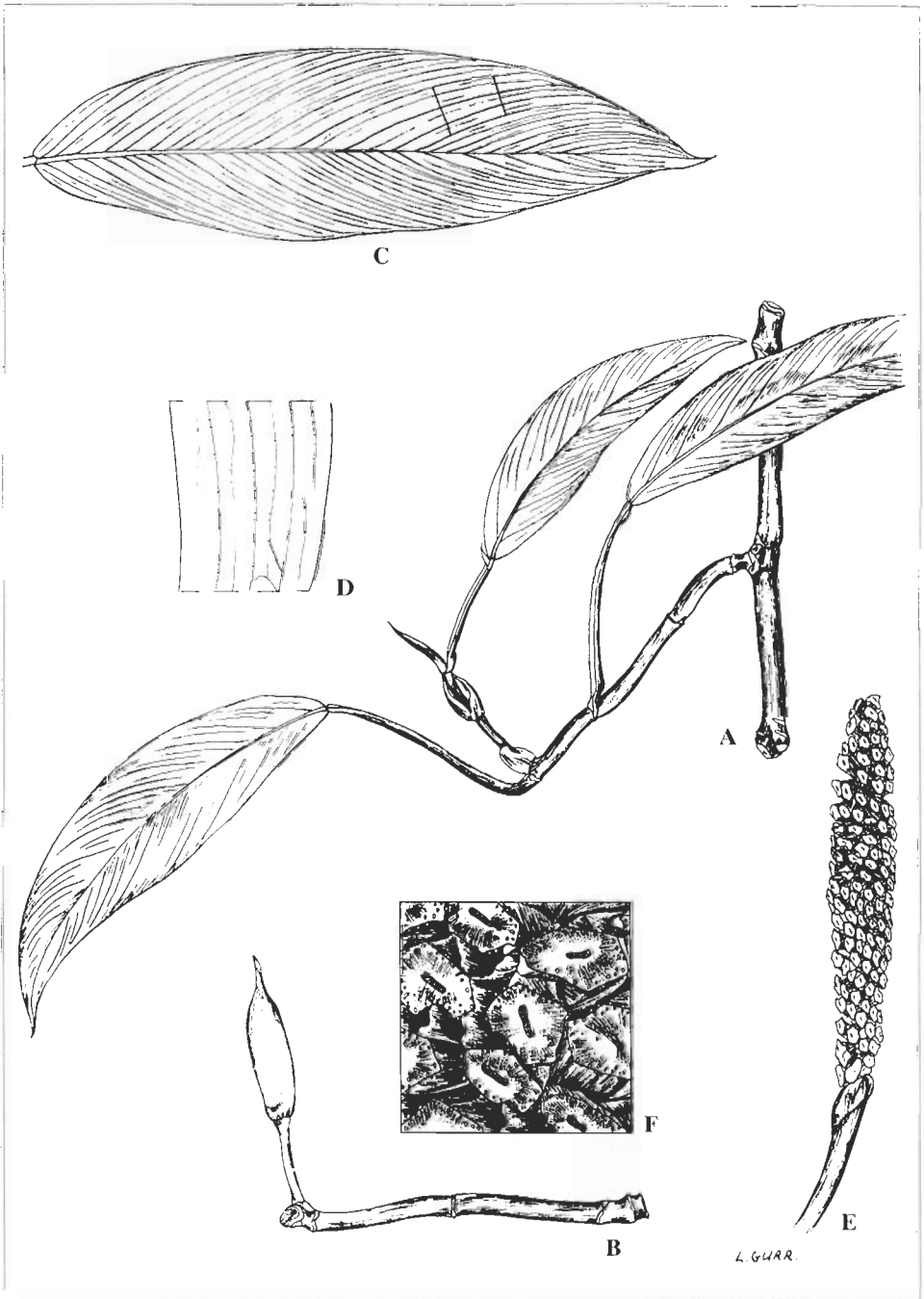


Figure 4. Rhaphidophora cretosa P.C. Boyce
A. fertile shoot x $\frac{1}{2}$; B. flowering shoot x $\frac{1}{2}$; C. leaf lamina x $\frac{1}{2}$; D. venation detail x 2; E. inflorescence, spathe fallen x 3; F. spadix detail, pre-anthesis x 20. All from Wenzel 2982.

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 exerted 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 SMHI 624* (BO, GH, K, KEP, L).

4. *Rhaphidophora cretosa* P.C. Boyce, *sp. nov.*

Rhaphidophora cretosa morphologicè *R. sylvestri* proxima videtur sed caulibus teretibus nec in sectione transversali rectangularibus atque spadice stiptato differt. Ab omnibus speciebus aliis Philippinarum spadice in vivo albo cretaceo facile distinguibilis — TYPUS: Philippines, Mindanao, Agusan, Surigao, 28 July 1927, C.A. Wenzel 2982 (K, holo; MO iso).

[*Scindapsus fragilis* Elmer, Leaflet Philipp. Bot. 10 (1939) 3702, *nom. inval. descr. Angl.*]

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, \pm 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* \pm 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.

Distribution: Philippines (Mindanao). Endemic.

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

Notes: 1. Invalidly published by Elmer in *Scindapsus*, this species belongs in *Rhapidophora*; dissection of a mature gynocium 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)

5. *Rhaphidophora elmeri* Engl. & K. Krause

Rhaphidophora elmeri Engl. & K. Krause, Bot. Jahrb. Syst. 44, Beibl. 101 (1910) 11; Merr., Enum. Philipp. Flower. Pl., 1 (1923) 175; Elmer, Leaff. Philipp. Bot. 10 (1938) 3631—3632 — Type: Philippines, Luzon, Tayabas, Lucban, May 1907, *A.D.E. Elmer 9268* (PNH[†], holo; E, L, US, iso).

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 1cm 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 \pm 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 adaxially, slightly raised abaxially and adaxially; *secondary*

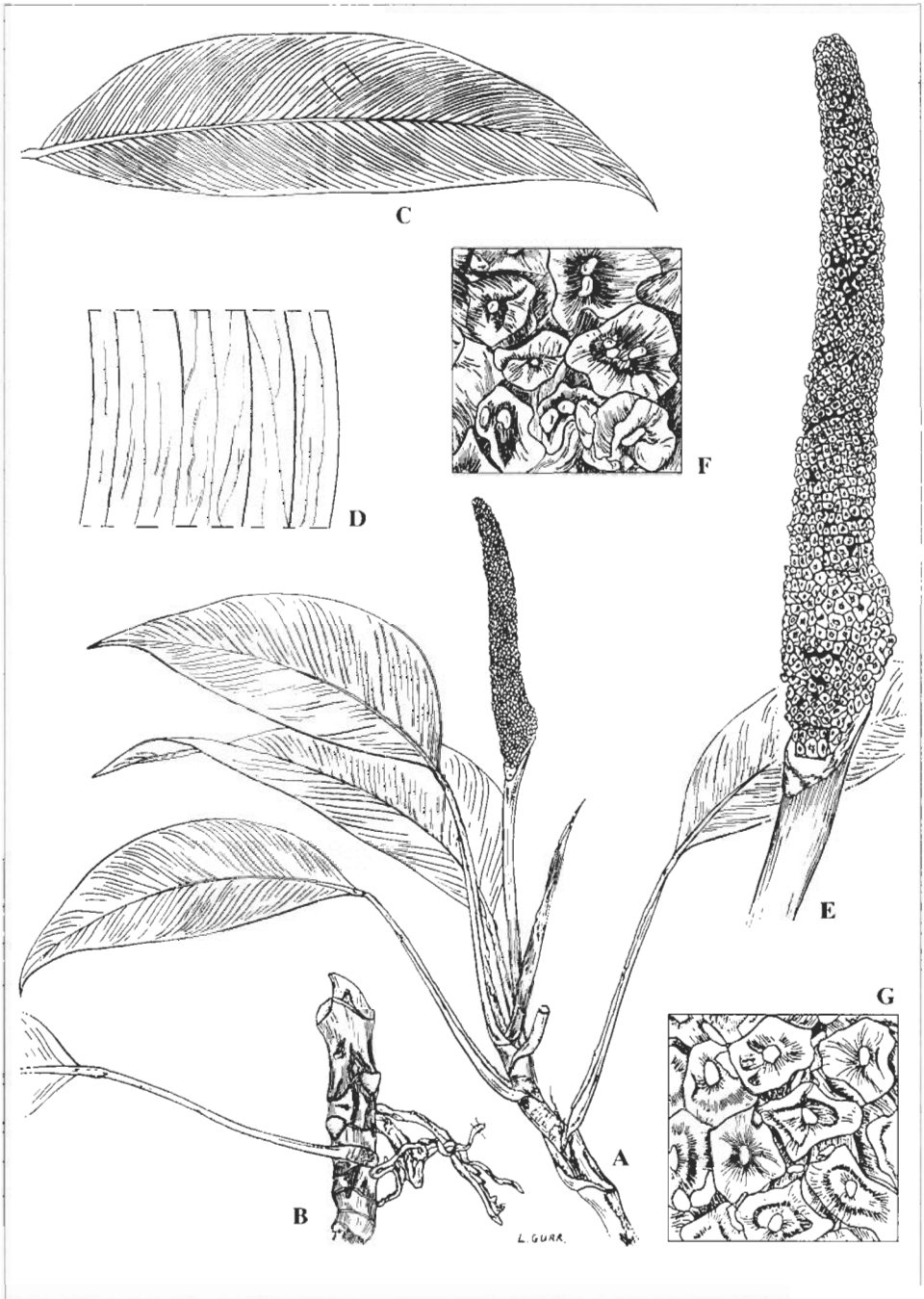


Figure 5. *Rhaphidophora elmeri* Engl. & K. Krause
A. flowering shoot x 1/2; B. mature stem detail x 1/2; C. leaf lamina x 1/3; D. venation detail x 3; E. inflorescence, spathe fallen x 3; F. spadix detail, female receptivity x 4; G. spadix detail, post-anthesis x 4. A, E-G from Ramos BS 23300; B-D from Elmer 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.

Distribution: Philippines (Luzon, Mindoro, Negros, Samar). Endemic.

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 interprimaries 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.

Other specimens seen: LUZON. Quezon N.P., *Croat 53006* (MO); Sorsogon, Irosin (Mt Bulusan), *Elmer 15116* (B, FI, K, L, MO, P, US); Sorsogon, *Ramos BS 2330* (P). MINDORO. North coast, Subaan River inland from San Teodoro, *Coode & Ridsdale 5379, 5556* (K, L); Mt Yagaw, SE slope, *Conklin 369 sub. PNII 18647* (L, PNH); Mt Yagaw, S slope, *Conklin 540 sub. PNII 18998* (PNH); Paluan, *Ramos BS 39735* (K, US). NEGROS. Negros Orientale, Dumaguete (Cuernos Mts), *A.D.E. Elmer 10135a* (K, L, MO, US). SAMAR. Loquilocan Barrio, about 15 km west of Wright, *Nicolson 809* (US).

6. *Rhaphidophora korthalsii* Schott

Rhaphidophora korthalsii Schott, Ann. Mus. Bot. Lugd.-Bat. 1(1863) 129; Engl. in A. & C. DC., Monogr. Phan. 2 (1879) 246; Hook.f., Fl. Brit. India

6 (1893) 548; Ridl., Mat. Fl. Malay Penins. 3 (1907) 45; Engl. & K. Krause in Engl., Pflanzenr. 37 (IV.23B) (1908) 49—51, Fig. 21; Koorders, Exkursfl. Java, vol. 1 (1911) 255; Alderw., Bull. Jard. Bot. Buitenzorg III, 4 (1922) 341; Ridl., Fl. Malay Penins. 5 (1925) 123; Henderson, Malayan Wild Flowers, Monocots, (1954) 238—239, Fig. 142 B; Backer, Beknopte Fl. Java, vol. 17 (1957) 15; Backer & Bakh.f., Fl. Java 3 (1968) 107 — Type: Indonesia, Java, *P.W. Korthals s.n.* (L. holo; L, P, iso).

Pothos celatocaulis N.E. Br., Gard. Chron. 13 (1880) 200 — *Rhaphidophora celatocaulis* (N.E. Br.) Alderw., Bull. Jard. Bot. Buitenzorg III, 1 (1920) 382 & Bull. Jard. Bot. Buitenzorg III, 4 (1922) 198 — Type: Malaysia, Sabah, *Burbridge s.n.*, Hort. Veitch no. 215 (K, holo; K, iso).

Rhaphidophora maxima Engl., Bull. Soc. Tosc.ortic. 4 (1879) 269 & in Beccari, Malesia 1 (1882) 271, Tab. xx 1—5; Engl. & K. Krause in Engl., Pflanzenr. 37 (IV.23B) (1908) 48—49; K. Krause & Alderw., Nova Guinea 14 (1924) 214 — Type: Sarawak, Gunung Gading, July 1866, *O. Beccari p.b.* 2314 (FI, lecto, selected by Boyce, 1999).

Rhaphidophora tenuis Engl., Bot. Jahrb. Syst. 1 (1881) 181 & in Beccari, Malesia 1 (1882) 271—272; Engl. & K. Krause in Engl., Pflanzenr. 37 (IV.23B) (1908) 53 — Type: Malaysia, Sarawak, *O. Beccari p.b.* 1977 (FI lecto; B isolecto; lecto; selected by Boyce, 1999).

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).

Rhaphidophora copelandii Engl., Bot. Jahrb. Syst. 37 (1905) 115; Engl. & K. Krause in Engl., Pflanzenr. 37 (IV.23B) (1908) 49 — Type: Philippines, Mindanao, Davao, Mt Apo, April 1904, *Copeland 1193* (PNH, holo†; B iso).

Rhaphidophora grandifolia K. Krause, Bot. Jahrb. 44, Beibl. 101 (1910) 11. Type: Philippines, Negros, Negros Orientale, Dumaguete (Cuernos Mts), March 1908, *A.D.E. Elmer 9464* (PNH, holo†; B, E, K, L, LE, MO, US, iso).

Rhaphidophora trinervia Elmer, Leaflet Philipp. Bot. 8 (1919) 3073 — Type: Philippines, Laguna, Los Banos (Mt Maquiling), June—July 1917, *A.D.E. Elmer 18057* (PNH, holo†; FI, K, L, MO, P, US, iso).

Rhaphidophora ridleyi Merr., J. Str. Br. Roy. As. Soc. Special Edition (Enum. Pl. Borneo) (1921) 90 — [*Rhaphidophora grandis* Ridl., J. Straits Branch Roy. Asiat. Soc. 49 (1907) 51, *nom. illeg., non* Schott 1858 (India)] — Type: Malaysia, Sarawak, Tambusan, Sept. 1905, *Ridley 12414* (SING, holo).

Rhaphidophora latifolia Alderw., Bull. Jard. Bot. Buitenzorg III, 4 (1922) 341; K. Krause & Alderw., Nova Guinea 14 (1924) 213 — Type: Indonesia, Irian Jaya, Pionierbivak, 23 July 1920, *Lam 711* (BO, holo; L, iso).

Rhaphidophora palawanensis Merr, Philipp. J. Sci. 26 (1925) 451 — Type: Philippines, Palawan, Malampaya Bay, Oct. 1922, *Merrill BS 11570* (PNH, holo[†]; B, K, P, US, iso).

Rhaphidophora trukensis Hosok., J. Jap. Bot. 13 (1937) 195 — Type: Federated States of Micronesia, Chuuk (Truk) Island, near Orrip, 29 July 1939, *Hosokawa 8334* (TI, holo).

[*Epipremnum multicephalum* Elmer, Leafl. Philipp. Bot. 10 (1938) 3624, *nom. inval., descr. Angl.* — Based on: Philippines, Luzon, Sorsogon, Trosin (Mt Bulusan), May 1916, *A.D.E. Elmer 16061* (FI, GH, K, L, MO, P, PNH[†])].

Figure 6 & 7

Very large, occasionally enormous, slender to rather robust, pachycaul, heterophyllous liane to 20 m; *seedling stage* a non-skototropic 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; *clasp ing 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 Boyce 679; B from Nicolson 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, pinnatipartite, 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 \pm level on peduncle, 9—26 x 1.5—2 cm, dull green to dirty white; *stylar 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 exerted at anthesis; *infructescence* 14—27 x 3—3.5 cm, dark green ripening to dull orange, stylar tissue abscising 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

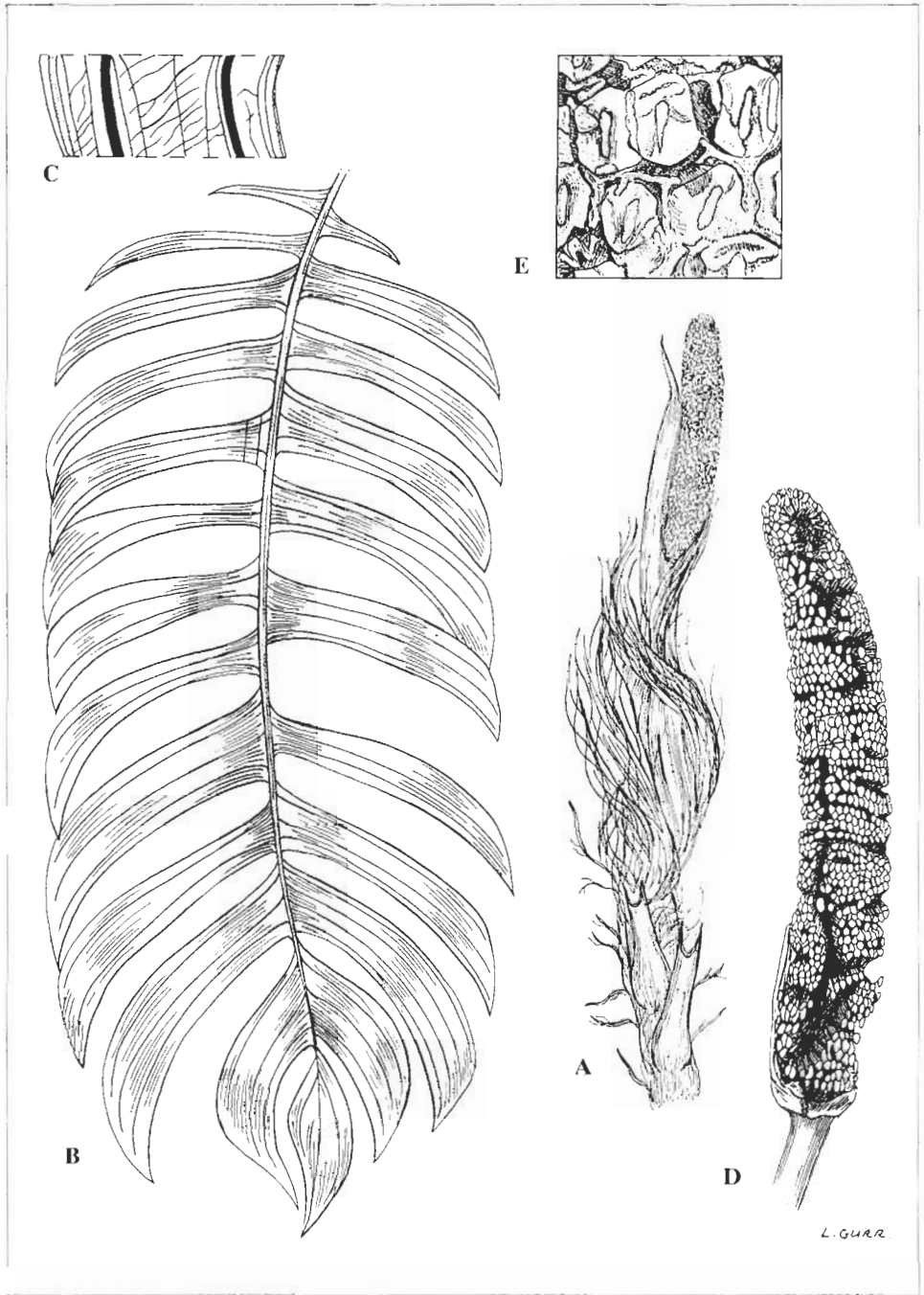


Figure 7. *Rhaphidophora korthalsii* Schott

A. flowering shoot, leaves removed x $\frac{1}{2}$; B. leaf lamina x $\frac{1}{2}$; C. venation detail x 2; D. inflorescence, spathe removed x 1; E. spadix detail, post floral x 8. All from *Kerr 15051*.

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 (\pm 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 *Amydrium zippelianum* (Schott) Nicolson, although there is a suite of characters that distinguish them. The leaflet tips of the *Amydrium* species are acute to acuminate, those of *R. korthalsii* are truncate, the petiolar sheath in *R. korthalsii* extends to the apical geniculum while in *Amydrium* 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 styler region abscising 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

38 (K); Benguet, *Loher 2456* (K, US); Ifugao, Mt Polis, *McGregor BS 19706* (US); Quezon, Quezon N.P., *Nicolson 798* (PNH, US); Sorsogon, Mt Bulusan, above lake, *Nicolson 781* (US); Camarines, Guinobatan, *Palma FBN 27244* (K, US); Labuna, Los Baños, *Steiner 601* (PNH 33171). MINDANAO. South Cotabato, Koronadakal, Lamlisi village, Miasong, Tupi, Mt Matutum, *Gaerlan, Fuentes & Romero PPI 5330* (US); Davao Norte, Compostela, *Gonzales 32* (K); Marinduque, Tawiran Santa Cruz, *Gonzales 39* (K); Davao, Compostela, Barrio Maparat, *Nicolson 697, 700* (US). NEGROS. Angilog, *Loher 7051* (K, US); Davao, Baracatan, base of Mt Apo, *Nicolson 726* (US). PALAWAN. Pagdanan Range, Ibangley Brookside Hill, *Podzorski SMHI 964* (L). PANAY. Capiz, Mt Timbaban, *Edaño BS 42487* (BO). SAMAR. Mt Capotoan, *Edaño PNH 15567* (L, SING); Pamamayaon, Mt Sohoton, *Gutierrez PNH 117551* (PNH); Bagacay Barrio, c. 15 km west of Wright, *Nicolson 803, 807* (L, US). TAWITAWI. Sanga Sanga island, Lapidlapid, *Olsen 823* (L).

7. *Rhaphidophora minor* Hook.f.

Rhaphidophora minor Hook.f., Fl. Brit. Ind. 6 (1893) 544; Ridl., Mat. Fl. Malay Penins. 3 (1907) 41; Engl. & K. Krause in Engl., Pflanzenr. 37 (IV.23B) (1908) 21, Fig. 4; Merr. Philipp. J. Sci. 26 (1925) 452 (as *R. sylvestris*); Ridl., Fl. Malay Penins. 5 (1925) 121—122; Henderson, Malayan Wild Flowers, Monocots. (1954) 238, Fig. 142 A — Type: Malaysia, Malacca, *Griffith 5988* (K, lecto; K, P, isolecto, selected by Boyce, 1999).

Rhaphidophora celebica K. Krause, Notizbl. Bot. Gart. Berlin-Dahlem. 11 (1932) 331 — Type: Indonesia, Sulawesi, northwest of the island, near Toli-Toli, Jan. 1910, *Schlechter 20698* (B, holo).

[*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 \pm 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

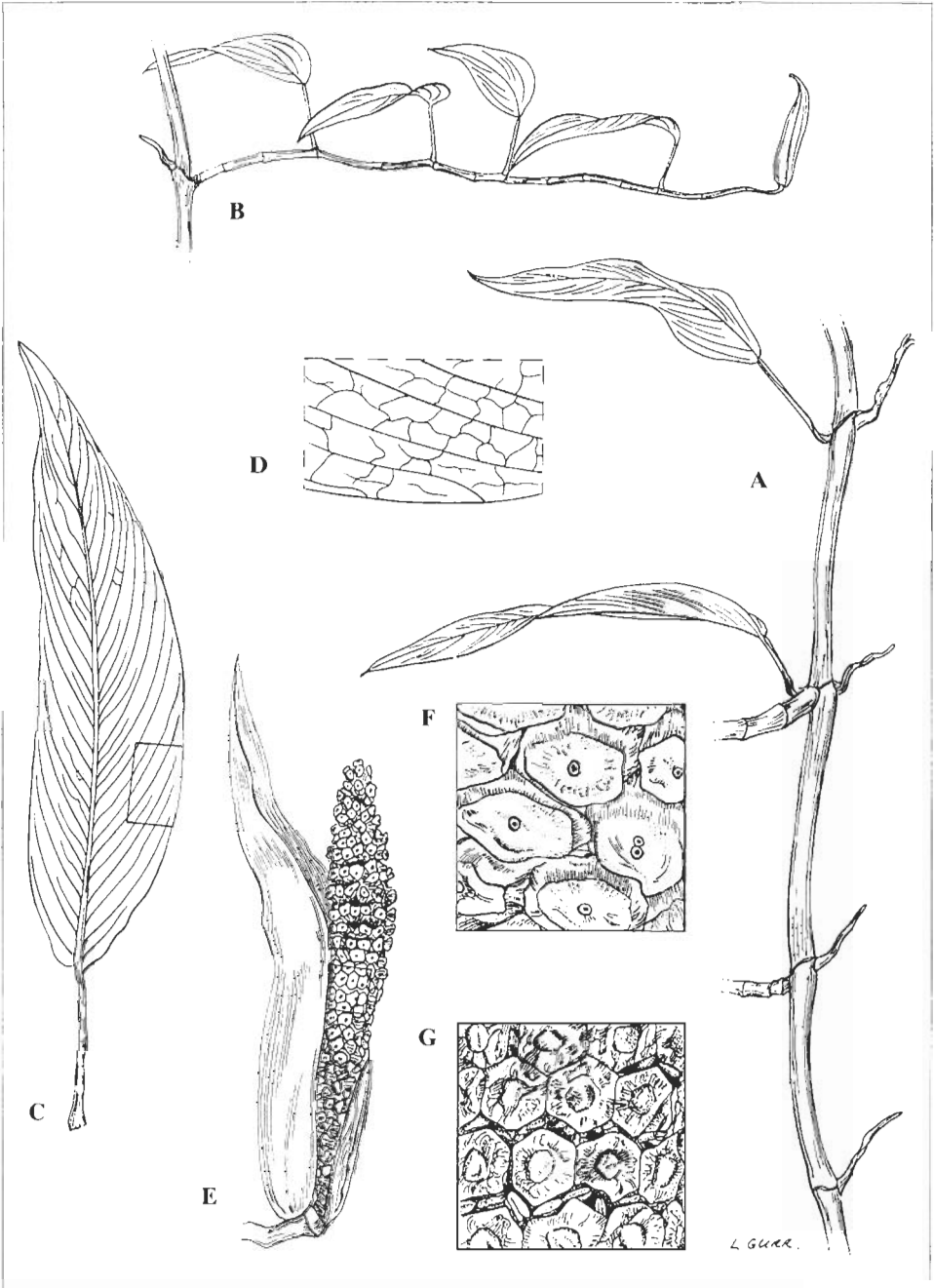


Figure 8. *Rhapsiphora minor* Hook.f.

A. portion of adult, sterile shoot $\times \frac{1}{2}$; B. flowering shoot $\times \frac{1}{2}$; C. leaf lamina $\times \frac{2}{3}$; D. venation detail $\times 2$; E. inflorescence, spathe just beginning to abscise $\times 1\frac{1}{2}$; F. spadix detail, post female receptivity, pre-anthesis $\times 8$; G. spadix detail, early fruiting $\times 5$. A, C—F from *Kerr 14700*; B, G from *Niyomdham et al. 1062*.

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; *clinging 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 prophylls* 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-oblanccolate, 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; *stylar 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; *infructescence* 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 discolourous.

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

8. *Rhaphidophora monticola* K. Krause

Rhaphidophora monticola K. Krause. Bot. Jahrb. Syst. 44, Beibl. 101 (1910) 12; Merr., Enum. Philipp. Flower. Pl., 1 (1923) 176 — Type: Philippines, Negros, Negros Oriental, Dumaguete (Cuernos Mts), June 1908. *A.D.E. Elmer 10098* (B, holo \dagger ; BM, E, FI, L, LE, K, MO, PNH \dagger , US, iso).

[*Rhaphidophora bulusanensis* Merr. ex Elmer, Leaflet. Philipp. Bot. 10 (1938) 3630, *nom. inval.*, *descr. Angl.*, **synon. nov.** — Based on: Philippines, Luzon, Sorsogon, Irosin (Mt Bulusan), July 1916. *A.D.E. Elmer 16790* (BO, FI, K, L, MO, P, PNH \dagger , 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, \pm impressed adaxially; *primary venation* densely pinnate, raised abaxially and adaxially; *interprimaries* parallel to primaries, more identically

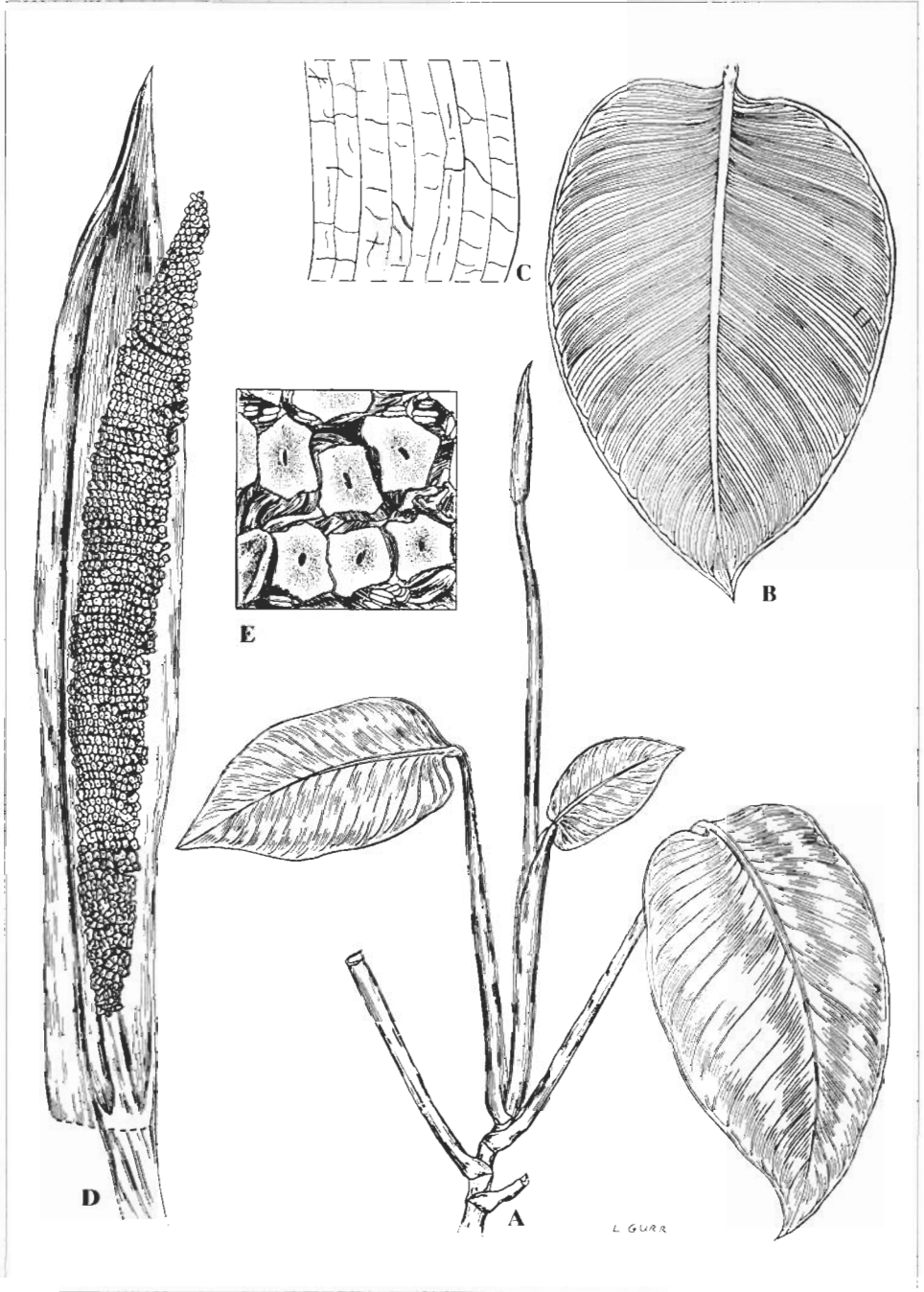


Figure 9. Rhaphidophora monticola Engl. & K. Krause
A. flowering shoot $\times \frac{1}{12}$; B. leaf lamina $\times \frac{1}{4}$; C. venation detail $\times 3$; D. inflorescence, spathe partly opened $\times \frac{2}{3}$; E. spadix detail, pre-anthesis $\times 8$. A. compiled from Croat 58033, Elmer 10098 & Ramos BS 23455; D & E from Croat 58033; B & C from Elmer 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 exerted 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 laminae 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).

9. *Rhaphidophora perkinsiae* Engl.

Rhaphidophora perkinsiae Engl., Bot. Jahrb. Syst. 37 (1905) 115; Merr., Enum. Philipp. Flower. Pl., 1 (1923) 176 — Type: Philippines, Luzon, Benguet, Banguio, May 1904, *A.D.E. Elmer BS 6305* (PNH, lecto; K, P,

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 prophylls* 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 canoe-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; *infructescence* 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.

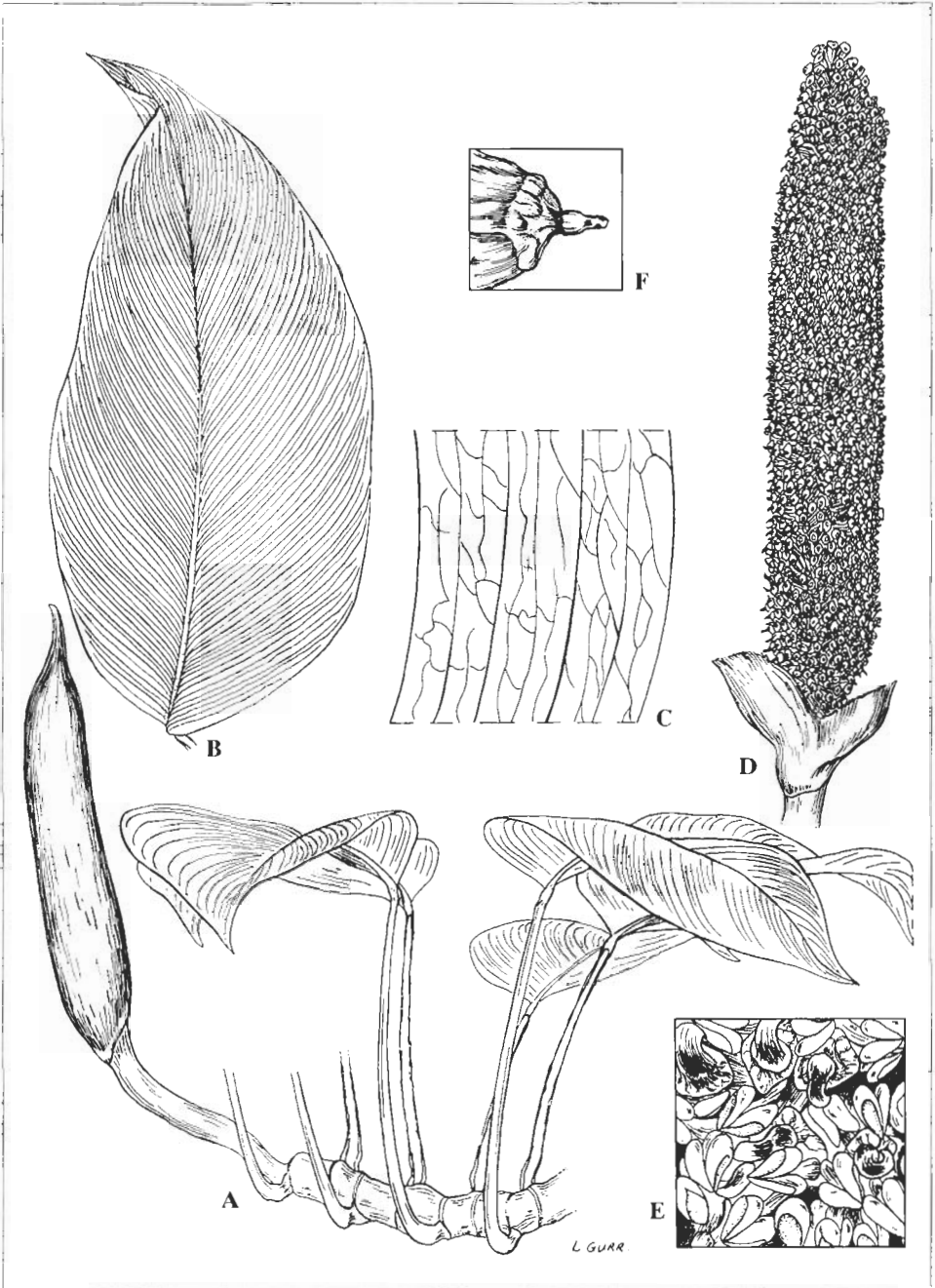


Figure 10. *Rhapsidophora perkinsiae* Engl.

A. flowering shoot x $\frac{1}{2}$; B. leaf lamina x $\frac{1}{2}$; C. venation detail x 6; D. inflorescence, spathe removed x 1; E. spadix detail, anthesis x 8; F. gynoecium, three quarter view, anthesis x 12; 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 Philippines species, including the aroids *Pothodium lobbianum* Schott and *Epipremnum pinnatum* (L.) Engl., is recorded for Lanyu, and *E. pinnatum* (recorded as *Rhaphidophora liukiensis* Hatus.) is known from Iriomote-Jima. *Rhaphidophora liukiensis* 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, Baguio, *A.D.E. Elmer* 8732 (BO, E, FI, 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).

10. *Rhaphidophora philippinensis* Engl. & K. Krause

Rhaphidophora philippinensis Engl. & K. Krause, *Pflanzenr.* (IV.23B) (1908) 137; Merr., *Enum. Philipp. Flower. Pl.*, 1 (1923) 176 — Type: Philippines, Mindanao, Lake Lawao, Camp Keithly, March 1907, *Mary S.*

Clemens BS 1299 (B, holo; PNH[†], iso).

Rhaphidophora rigida K. Krause, Bot. Jahrb. Syst. 45 (1911) 657; Merr., Enum. Philipp. Flower. Pl., 1 (1923) 176; Elmer, Leaflet Philipp. Bot. 10 (1938) 3632, **synon. nov.** — Type: Philippines, Negros, Negros Oriental, Dumaguete (Cuernos Mts), May 1908, *A.D.E. Elmer 10220* (B, holo; K, L, MO, PNH[†], US, iso).

Figure 11

Robust, semi-pachycaul homeophyllous 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; *flagellate foraging stems* not observed; *roots* not observed; *leaves* spiro-distichous, laminas descending; *cataphylls and prophylls* 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; *petiolar 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 scattered-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 exerted at anthesis; *infructescence* not observed.

Distribution: Philippines (Luzon, Mindanao, Negros, Samar). Endemic.



Figure 11. *Rhaphidophora philippinensis* Engl. & K. Krause
A. flowering shoot x $\frac{1}{3}$; B. leaf lamina x $\frac{2}{5}$; C. venation detail x 3; D. inflorescence, spathe fallen x $\frac{2}{3}$; E. spadix detail, post anthesis x 8. All from *Clemens 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.

Other specimens seen: LUZON. Sorsogon, Irosin (Mt Bulusan), *A.D.E. Elmer 15056* (BO, FI, K, L, MO, P, US). MINDANAO. Agusan, Cabadbaran (Mt Urdanetta), *A.D.E. Elmer 13776* (BM, FI, K, L, MO, P, US); Surigao del Sur, Bislig, *Gonzales 19* (K); Surigao del Sur, Aras-asan logging area, *University of San Carlos 881* (L). SAMAR. Catubig River, *Ramos BS 24405* (US).

11. *Rhaphidophora todayensis* K. Krause

Rhaphidophora todayensis K. Krause, Bot. Jahrb. Syst. 45 (1911) 658; Merr., Enum. Philipp. Flower. Pl., 1 (1923) 176 — Type: Philippines, Mindanao, Davao, Todaya (Mt Apo), along the Baruring River, June 1909, *A.D.E. Elmer 10849* (B, holo; BM, FI, K, L, MO, P, PNH, US, iso).

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;

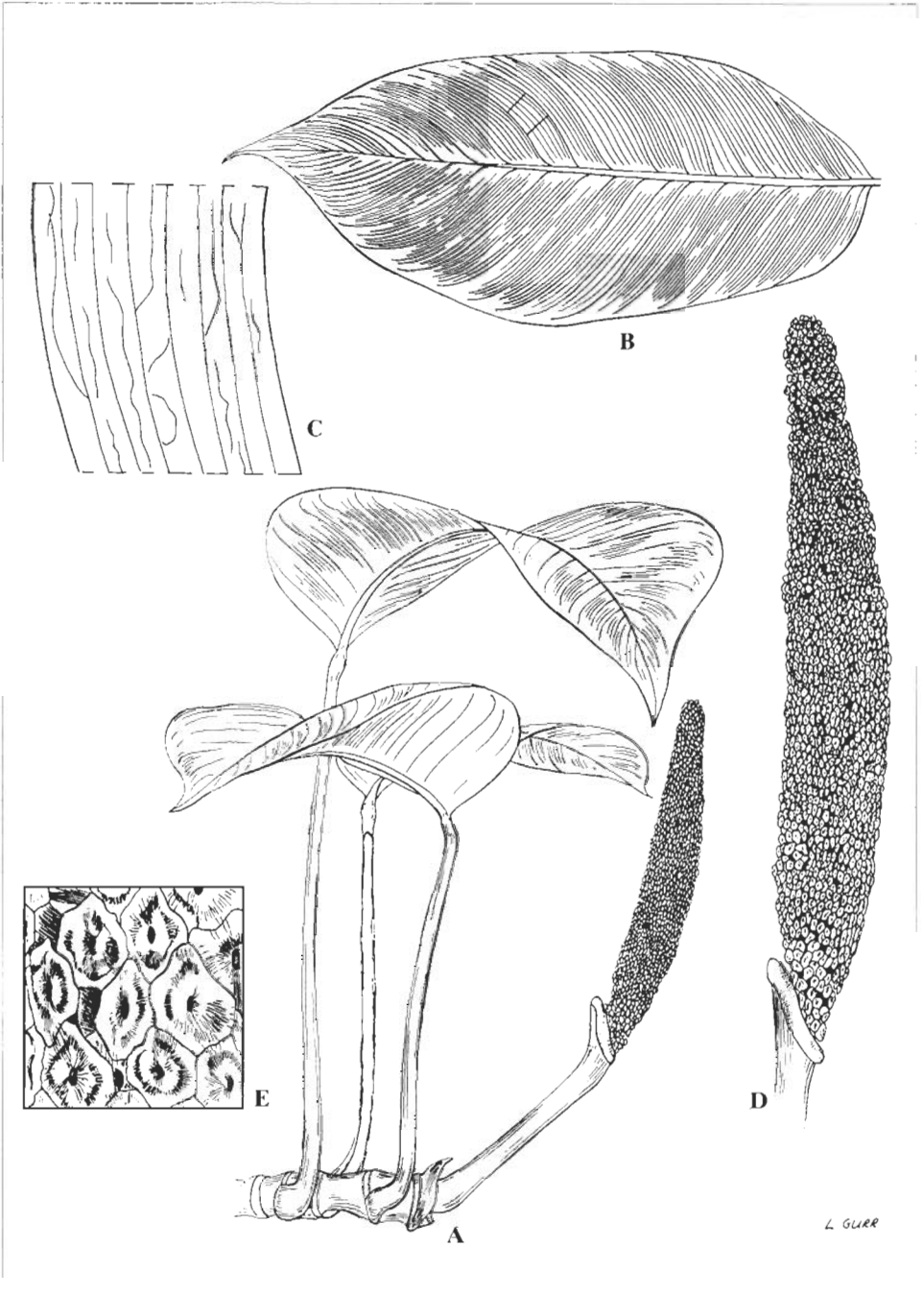


Figure 12. *Rhaphidophora todayensis* K. Krause

A. flowering shoot x 1/2; B. leaf lamina x 1/2; C. venation detail x 3; D. inflorescence, spathe fallen x 2/3; 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, \pm 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, \pm 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 \pm 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* exerted at anthesis; *infructescence* stoutly oblong-cylindrical, 4.5—14 x 1.5—2 cm, greenish yellow.

Distribution: Philippines (Mindanao). Endemic.

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. todayensis* strongly resembles *R. hookeri*.

Rhaphidophora todayensis 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 Onglonto's land, Nicolson 712 (US).

Acknowledgements

Thanks are due to Linda Gurr for skilfully executing the illustrations that accompany this article and A. Radcliffe-Smith, Kew, for providing the Latin translation of the diagnosis. Thanks also to A. Hay (NSW) and D. Nicolson (US) for critically reviewing the manuscript and offering critical advice.

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<i>acuminata</i> = 1	<i>minor</i> = 7
<i>banosensis</i> = 2	<i>monticola</i> = 8
<i>conocephala</i> = 3	<i>perkinsiae</i> = 9
<i>cretosa</i> = 4	<i>philippinensis</i> = 10
<i>elmeri</i> = 5	<i>todayensis</i> = 11
<i>korthalsii</i> = 6	

Clemens BS 1299 = **10**; *Conklin 369 sub. PNH 18647, 540 sub. PNH 18998* = **5**; *PNH 18998* = **8**; *Coode & Ridsdale 5379, 5556* = **5**; *Copeland 1193* = **6**; *Croat 52993* = **6**; *53006* = **5**; *53033* = **8**; *Curran FB 10137* = **6**

Edaño BS 42487; PNH 15567 = **6**; *Elmer BS 6305* = **9**; *8730* = **6**; *8732* = **9**; *8754* = **6**; *9268* = **5**; *9464* = **6**; *10098* = **8**; *10135a* = **5**; *10220* = **10**; *10849* = **11**; *13658* = **4**; *13776, 15056* = **10**; *15116* = **5**; *16061* = **6**; *16790* = **8**; *17812* = **1**; *18057* = **6**; *18449* = **2**

Fenix BS 15527 = **7**

Gaerlan, Fuentes & Romero PPI 5330 = **6**; *Gonzales 4, 11* = **6**; *19* = **6** & **10**; *32, 38, 39* = **6**; *Gutierrez = PNH 117551* = **6**

Jacobs 7857 = **1**

Loher 2456 = **6**; *2458, 2459, 2460, 7035* = **9**; *7042* = **8**; *7050* = **2**; *7051* = **6**

Mabesa FBN 26747 = **9**; *McGregor BS 19706* = **6**; *Merrill BS 7154* = **8**; *BS 9667* = **9**; *BS 11570* = **6**

Nicolson 685, 686 = **8**; *687* = **9**; *697, 700* = **6**; *712* = **11**; *726; 734* = **9**; *781* = **6**; *786* = **9**; *798, 803, 807* = **6**; *809* = **5**; *820* = **8**; *825* = **6**; *826, 834* = **9**

Olsen 823 = **6**

Palma = FBN 27244 = **6**; Podzorski SMHI 624 = **3**; SMHI 964 = **6**

Ramos BS 23300 = **5**; BS 23455 = **8**; BS 24405 = **10**; BS 39735 = **5**; *Ramos & Deroy* BS 22669 = **1**; *Ramos & Edaño* BS 34035, BS 75472 = **2**

Steiner 601 = **6**; *Sulit* PNH 10042 = **1**

University of San Carlos 881 = **9**

Wenzel 1139 **1**; 1160 = **8**; 2982 = **4**

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