

LEEACEAE (C. E. Ridsdale¹, Leyden)

The monogeneric family is placed in the *Rhamnales* in the system of ENGLER and is closely allied to the *Vitaceae*, sometimes considered as a subfamily or tribe of that family. Distinguished from the *Vitaceae* by the development of a complex staminodial tube, by the presence of one ovule in each locule of the ovary. Pollen is also distinct from that in *Vitaceae*, supporting the segregation into a separate family. Seed and embryo features and the presence of pearl glands on the vegetative organs indicate a very close affinity with the *Vitaceae* but not to other families.

LEEA

VAN ROYEN *ex* LINNÉ, Syst. Nat. ed. 12, 2 (1767) 627 & Mantissa 1 (1767) 17, 124, *nom. cons.*; CLARKE, J. Bot. 19 (1881) 101–138; GAGNEP. Bull. Soc. Bot. Fr. 57 (1910) 331–336; SUESSENGUTH in E. & P. Nat. Pfl. Fam. ed. 2, 20d (1953) 382; RIDSDALE, Blumea 22 (1974) 57–100, with full synonymy and typification. — *Nalagu* ADANS. Fam. Pl. 2 (1763) 445, 581, *nom. rej.*; DENNST. Schlüssel Hort. Mal. (1818) 13, 27. — *Aquilicia* LINNÉ, Mantissa 2 (1771) 146, 211. — *Otillis* GAERTN. Fruct. 1 (1788) *icon. tab. 57 f. 7, nom. inval.* — *Ticorea* BLANCO, Fl. Filip. (1837) 85. — Fig. 1–24.

Trees, erect or creeping shrubs, scramblers, or herbaceous plants with a woody base; stems noded, unarmed, rarely with rows of spines. *Leaves* distichous, 1-foliolate, 3-foliolate, or 1- to 4-pinnate, usually imperfectly imparipinnate. Petiole or base of petiole expanded to form at both margins a stipular structure surrounding the stem apex, stipules narrowly sheathing and somewhat persistent or large, obovate and caducous. Leaflets opposite on noded rachis, glabrous or pubescent with hairs simple; pearl glands usually present on the undersurface, globular or stellate; margins crenate to serrate-dentate, lobes glandular. *Inflorescences* in leaf-opposed cymes, lax or condensed by reduction of inflorescence branches, or peduncle, or both, erect or pendulous. *Flowers* bisexual, actinomorphic, 4- or 5-merous, rarely both in the same inflorescence. *Calyx* campanulate with triangular lobes, lobes glandular at the apex. *Corolla* lobes valvate in the bud cohesing by an apical keel, reflexed at maturity; basal portion choripetalous, adnate to androecium. *Staminodial tube* joined to the corolla at one point dividing the structure into an upper and lower portion. Upper portion of 4 or 5 thickened lobes connate to each other by thinner tissues which form sinuses over which the filaments pass; lobes retuse, retusely apiculate to bifid at apex. Lower portion forming a free collar, sometimes extending as far as the ovary. *Filaments* arising from a basal portion of the upper part of the staminodial tube and extending over the sinuses; anthers introrse, usually syngenesious and detaching as a unit by breakage at the base of the filaments, rarely free, sometimes becoming extrorse by inflexion. *Ovary* discoidal, 4–8-celled, each cell with 1 ovule; style short, entire; stigma slightly thickened, glabrous; ovules anatropous, basally attached. *Fruit* a berry, depressed-subglobose; seeds triangularly ovate in section, endosperm ruminant. Embryo linear.

(1) B. A. KRUKOFF botanist of Malesian Botany.

Distribution. A genus of 34 *spp.* of which 25 *spp.* are endemic in Malesia (with a few species extending to Queensland, Micronesia, and Fiji), 6 in SE. Asia (from Ceylon to S. China), 1 being widely distributed from tropical Africa and Madagascar through SE. Asia and Malesia to Taiwan and Micronesia, 1 *sp.* endemic in Madagascar and 1 *sp.* in the isle of Sao Tomé (W. Africa). Fig. 1.

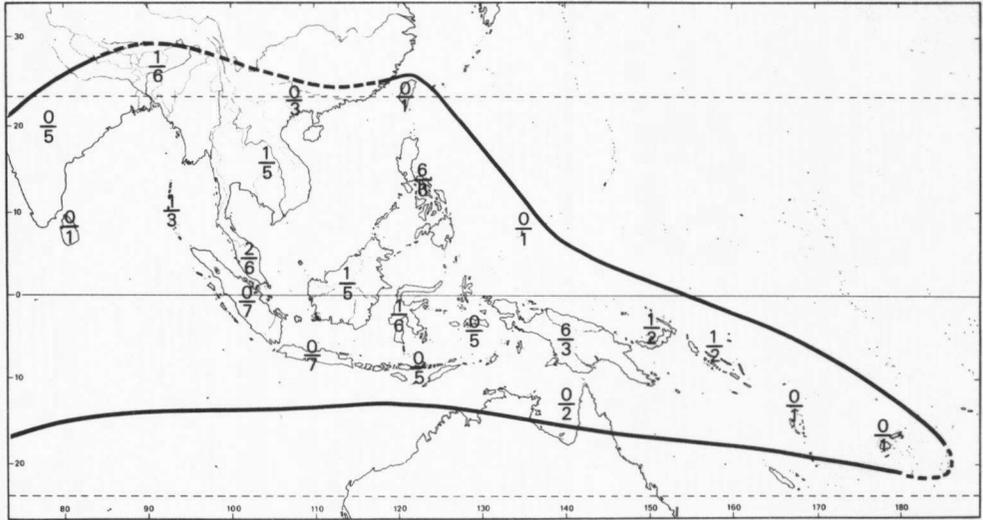


Fig. 1. Range of *Leea* in Indo-Pacific (Africa and Malagasy omitted); numbers above the hyphen indicate endemic species for each area or inland group, those below the hyphen the other non-endemic species.

The occurrence of *L. philippinensis* in the island of Botel Tobago, near Taiwan, is plant-geographically interesting as this is not collected in the mainland of Taiwan.

Fossil species have been described (fossil wood) from the Tertiary in Japan and Nagpur (India).

Ecology. The majority of the wide-spread species is limited to secondary vegetation, particularly riverine forest, some extending into areas with a temporary dry, seasonal climate. Species with limited distributions tend to be confined to the understorey of primary forest, and are also frequently found along streams.

Most Malesian species are found below 1000 m, but there are a few ascending somewhat higher and occasionally to 1500 m (*L. coryphantha*, *L. guineensis*) or even to 1700 m (*L. indica*); it is noteworthy that *L. guineensis* and *L. indica* find their highest stations in the Himalayan range, at 2250 and 2500 m respectively.

Little is known about the flower biology but Dr M. A. LIEFTINCK assured us that the inconspicuous scentless flowers of the greenish-white flowered species are frequented by short-tongued bees and sylphids. It should be added that in the flowers no disk is found; it might occur that honey is produced by receptacular tissue or that the insects are attracted by the conspicuous glandular tissue on the (dorsal) connective; field observations are needed.

Taxonomy. CLARKE, *l.c.*, has proposed a subdivision of series and sections, but I found them unreliable and refrain from any subdivision.

Some species appear to be very variable, while no tangible infraspecific subdivision can be made on the basis of herbarium specimens.

In many species the degree of pinnation of the leaf is exceedingly variable. Recognition of species differentiated solely on whether the leaves are 1-foliolate, 3-foliolate, or pinnate is abandoned. This is also the developmental sequence of leaves in growing seedlings. In such variable species flowering of plants with 1- or 3-foliolate leaves is considered to be precocious. These observations have led to a considerable reduction in the number of species.

Morphology. Habit. Most species are smallish shrubs, some only woody at the base. Several may, however, attain some 10 m in height (*L. aequata*, *L. aculeata*) and four are even recorded to 15 m tall (*L. angulata*, *L. indica*, *L. macropus*, *L. tetramera*).

Two Malesian species are armed with spines (enations), viz *L. aculeata* (mostly on trunk and main branches) and *L. angulata* (from trunk to ultimate branches). Fig. 3 (17').

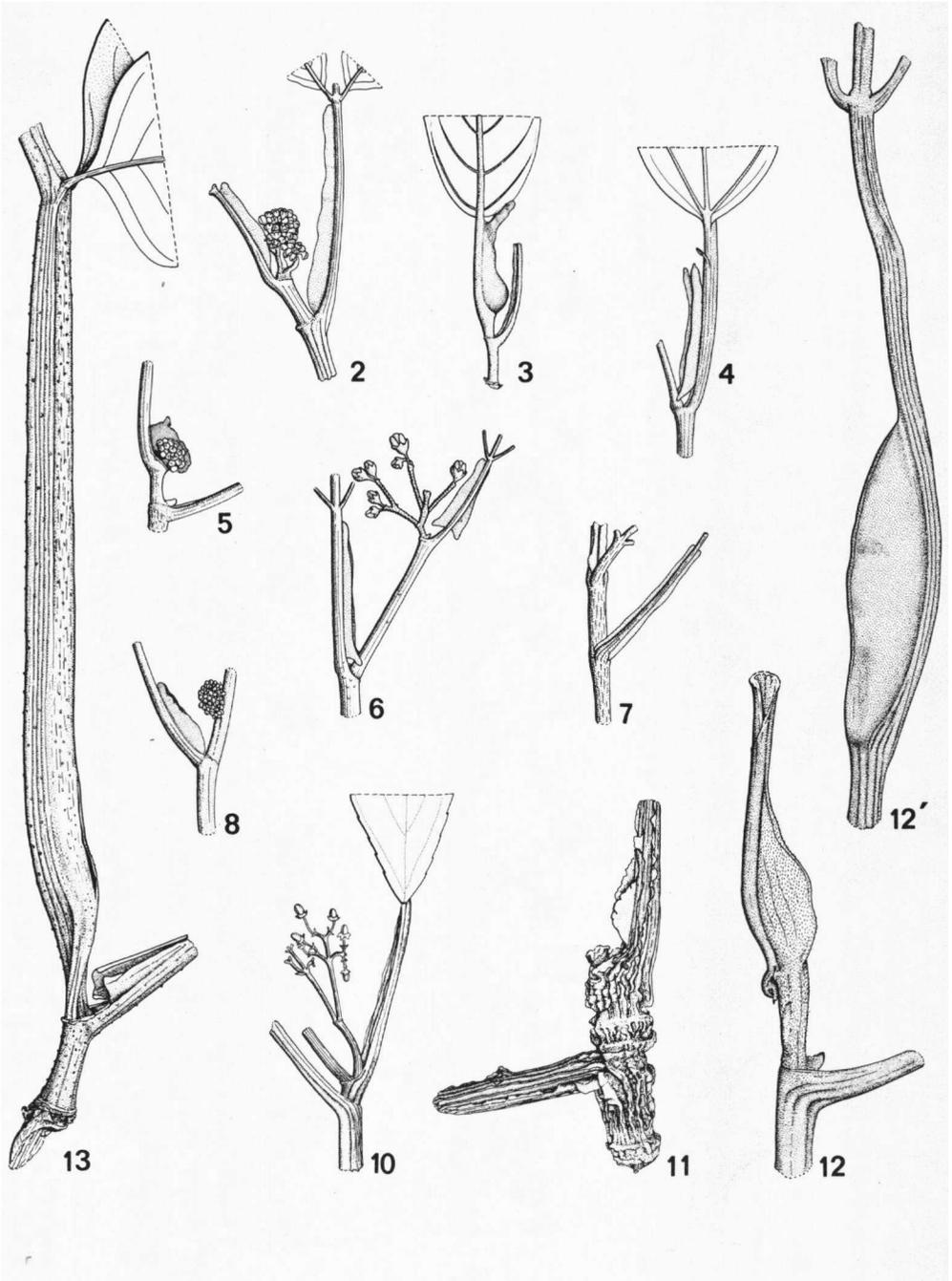


Fig. 2. Shapes of stipules in *Leea* species, the numbers corresponding with the species numbers in the text: 2. LOHER 352; 3. JACOBS 7803; 4. BS 33633; 5. VIDAL 1027; 6. PNH 21592; 7. HALLIER 2462; 8. KERR 7535; 10. VAN ROYEN & SLEUMER 7270; 11. BW 3405; 12. DOCTERS VAN LEEUWEN 9333, 12'. NGF 31590; 13. PULLEN 5436. All $\times \frac{1}{2}$.

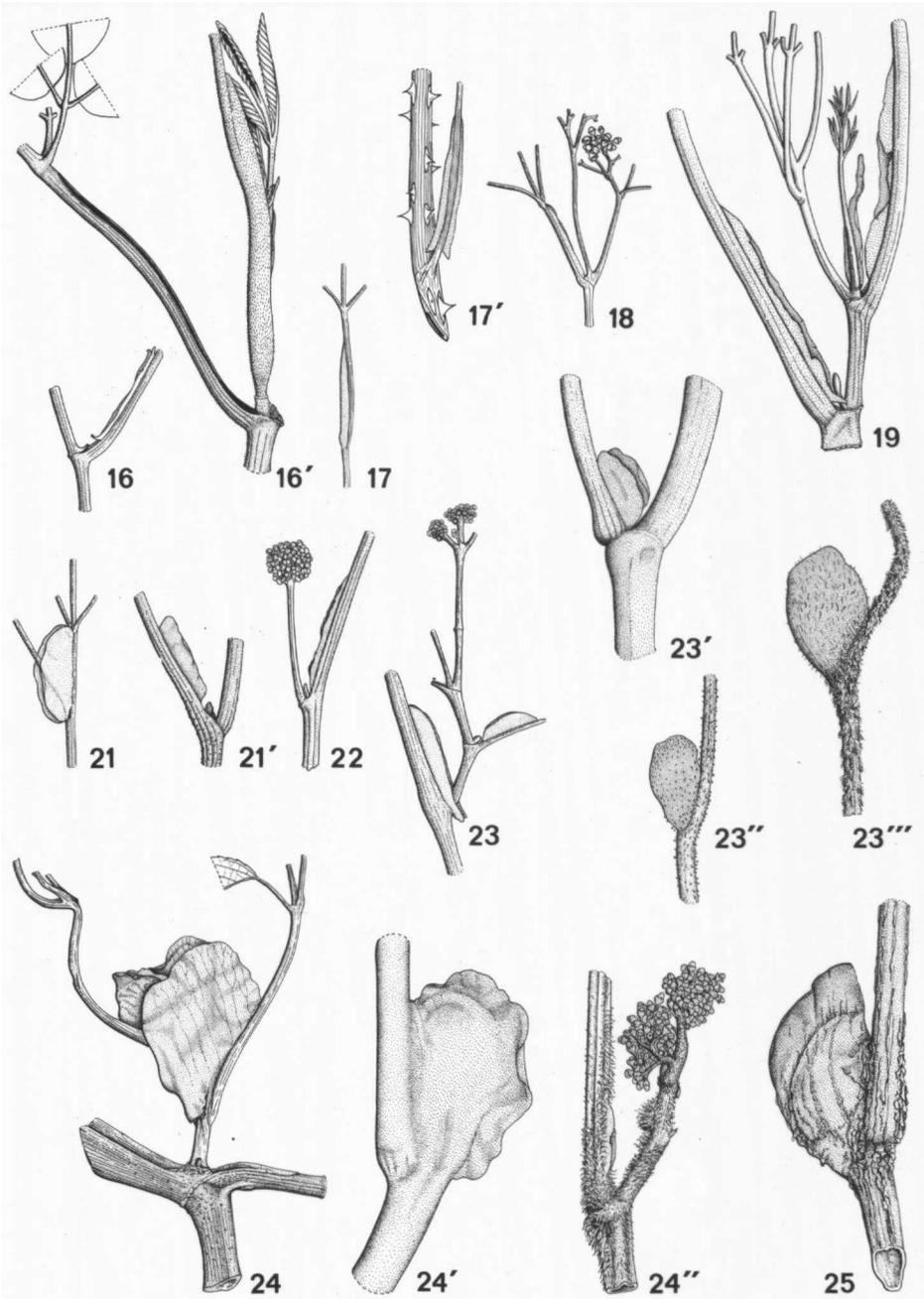


Fig. 3. Shapes of stipules in *Leea* species, the numbers corresponding with the species numbers in the text: 16. BSIP 11244, 16'. NGF 31590; 17. Ja. 3742, 17'. VAN STEENIS 5333; 18. MERRILL 1825; 19. KREMPF *s.n.*; 21. KERR 21534, 21'. SPECHT 1305; 22. RIDLEY 305; 23. HAINES 4755, 23'. BS 31254, 23''. BS 30338, 23''', BS 41900; 24. JACOBS 7945, 24'. RUTTEN *s.n.*, 24''. BSIP 5371; 25. KOORDERS 15876. All $\times \frac{1}{2}$.

Two species are occasionally recorded to be stilt-rooted, at least in large specimens, viz *L. indica* and *L. macropus*, while *L. tetramera* is said to have buttresses.

Seedlings. Leaf development is from 1- to 3-foliolate and pinnate. See for further details BURGER (Seedlings of some tropical trees and shrubs, mainly of S.E. ASIA, 1972, 379-383, fig. 154, 155).

Stipules. The stipular structures of the distant leaf are adpressed to form together a sheath surrounding the apex of the stem. As the latter continues growth the stipules are forced apart and drop off or remain as torn structures. There are basically two types, the long, narrow wing type which is usually semi-persistent and, when caducous, leaving but a thin scar, and the obovate type which is rapidly caducous and leaves a broad triangular scar. Some intermediate forms are sometimes encountered. See fig. 2, 3, and also 5 and 18.

Floral morphology. The conspicuous feature of the flowers is the presence of a staminodial tube within the whorl of stamens. Fig. 23 c-f. Basipetally the staminodial tube continues beyond the insertion, thus dividing the staminodial tube into an upper free part and a lower collar-like part which is usually free. Fig. 5f. The upper part of the staminodial tube is composed of 4 or 5 lobes divided from each other by sinuses over which the filaments pass. The apex of the lobes of the staminodial tube is usually retusely notched (fig. 9b) but in some cases may be deeply bifid. The lower portion of the staminodial tube is usually a free collar of varying length. It may also be adnate to the lower part of the corolla tube, from which it may be differentiated by the presence of a large number of raphids. The corolla tube itself is a composite structure composed of corolla and staminodial elements. In the descriptions the length of the 'corolla tube + staminodial lobes' is given, being the length from the base of the composite corolla tube to the tip of the lobes of the upper part of the staminodial tube. The length of the free corolla lobes is given separately. Distally from the line of insertion of the staminodial tube on the corolla tube the tissues often form a small rim on which the stamens are inserted. The filaments pass over the sinus of the staminodial tube. The anthers are basically dorsifixed. The connective is well developed on the dorsal side of the anthers and is purple-black in colour and conspicuously glandular. Filament-like tissue continues over the connective acropetally and basipetally beyond the point of insertion.

In most taxa the anthers in the bud and newly opened flowers are strongly syngenesious. At anthesis the anthers bend outwards and backwards, the movement causes the anthers to gradually be elevated and pulled out of the staminodial tube. For the stamens to actually elevate a degree of breakage of the tissue holding the anthers together is required. If this is slight or non-existent then only partial movement can occur, the anthers remain together in a cylinder and usually a number of the filaments break. The unit then moves out of the staminodial tube and soon detaches from the flower. A high degree of rupture of the tissue enables the anthers to leave the staminodial tube completely. They then sit as a star-shaped plate above the tube (fig. 23a). Complete breakage of the tissue will cause the anthers to complete reflex and to appear seemingly introrse.

Seeds. Endosperm ruminant, basically with 5 ingrowths, one along the median plane, two from the raphe, and one at each lateral face. The latter ingrowths leave a pattern on the outer surface of the seed, referred to as the 'ruminant outline'. Fig. 5g. The ingrowths are produced by meristematic activity of the middle layers of the outer integument which causes the inner layers to be intruded. Extra ingrowths may also occur on the lateral faces. The ingrowths themselves may also become much branched and reticulate, either the median plate alone, the ingrowths of the lateral faces alone, or both lateral face and median plate. Fig. 4.

Chemotaxonomy. Detailed chemical investigations are lacking. Most species of *Leea* seem to be non-toxic and mucilaginous (see for Indian species: The Wealth of India, Raw Materials, vol. 6, New Delhi 1962, 56-57). Medicinal uses of roots, stems and leaves in India and Africa seem to be connected mainly with an abundance of phenolic constituents. Flavonols, p-hydroxybenzoic acid, syringic acid and gallic acid and flavan-3, 4-diols (= leucoanthocyanidins) were demonstrated to be present in leaves of *L. guineensis* G. DON (= *L. coccinea* PLANCH.), *L. indica* MERR. (= *L. sambucina* WILLD.), and *L. rubra* BL. ex SPRENG. Tannins may also be present in appreciable amounts in some species. At present it is still impossible to appreciate the chemistry of *Leeaceae* from a systematic point of view, because too little information is available. The type of polyphenolic constituents known to be present and the fact that oxalate of lime occurs in the form of raphids, however, point to an affinity with *Vitaceae* (for references see: R. HEGNAUER, Chemotaxonomie der Pflanzen, vol. 6, Birkhäuser-Verlag, Basel, 1973). — R. HEGNAUER.

Anatomy. For general surveys also covering the older literature see SOLEREDER, Syst. Anat. Dicot. Stuttgart (1899) 251-257 and *ibid.* (1908) 103-104, METCALFE & CHALK, Anat. Dicot. Oxford (1950) 413-419, and SUESSGUTH in E. & P. Nat. Pl. Fam. ed. 2, 20d (1953) 375. Selected references: DEN BERGER, Determinatietabel Malesië, Veenman, Wageningen (1949) (wood identifications); DESCH, Mal. For. Rec. 15 (1941) 5 (wood); JANSSONIUS, Blumea 6 (1950) 430 (wood anatomical affinities); JANSSONIUS, Key to Javanese woods, Leyden (1952); JUTTE, Nova Guinea n.s. 10 (1959) 272 (wood anatomy); MOLL & JANSSONIUS, Mikr. 2 (1911) 303-316 (wood anatomy); RACIBORSKI, Flora 85 (1898) 358-361 (glands, 'food-bodies', hairs); ZUBKOVA, Bot. J. USSR 50 (1965) 1556-1567 (petiole).

The wood of *Leea* is characterized by diffuse solitary and grouped vessels with scalariform inter-vessel pits, large and simple vessel-ray pits and simple perforations. Scalariform perforations have been noted

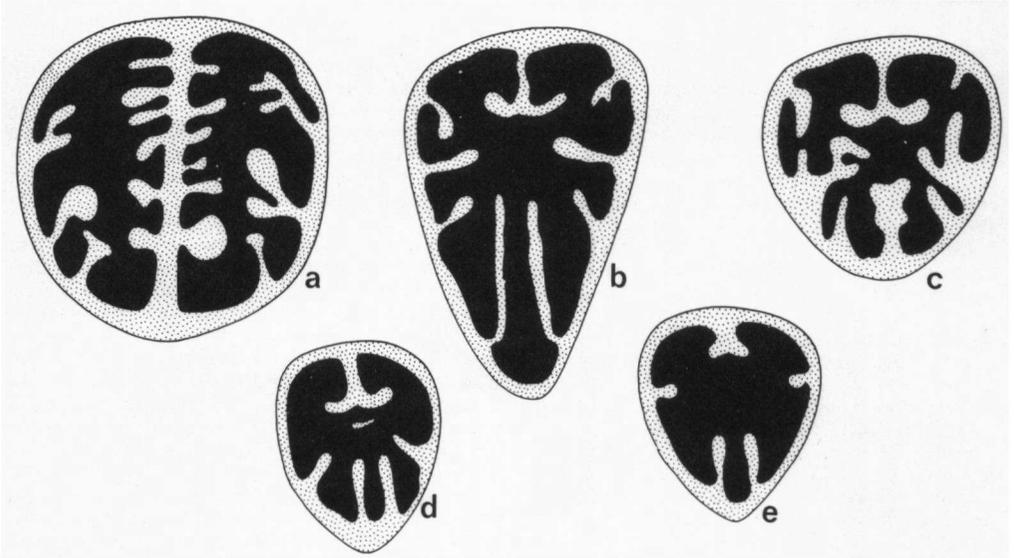


Fig. 4. Different types of ruminated endosperm in seeds of *Leea*, all in section. a. *L. acuminatissima*, b. *L. coryphantha*, c. *L. magnifolia*, d. *L. compactiflora*, e. *L. indica*.

near the primary xylem of a few species only. The septate fibres are provided with minutely bordered pits. Parenchyma is scanty paratracheal, and the rays are usually of two distinct sizes. Broad heterogeneous rays are always present. The occurrence of raphides in the ray cells of most species is one of the outstanding characters. Solitary crystals may also occur.

The young stem is characterized by many raphide-cells also containing mucilage in the gland tissue, broad primary rays, fibre bundles near the primary phloem and superficial cork.

Characters of the leaves include globular glands, which possess a stoma more or less in apical position (fig. 19), and of which the anatomy seems to differ slightly from the 'classical' pearl glands of *Vitaceae sens. str.* Simple uniseriate hairs also occur, and according to RACIBORSKI the petiole may be clad with 'Ameisenfutterkörper' (food-bodies for ants), the anatomy of which recalls Vitaceous pearl glands but which lack stomata. The stomata are recorded to be anomocytic, but are in need of further studies.

Raphides and large druses occur in the mesophyll in varying frequencies. The petiole is supplied with a closed ring of vascular tissue, whether or not with an extra dorsal 'cortical' bundle.

In spite of some wood anatomical differences, which may be interpreted as due to different habits (tree versus liane), *Leea* shares many characters with *Vitaceae sens. str.* in which it was formerly included. The wood anatomy bears also strong resemblance to that in *Arthrophyllum* of the *Araliaceae*, but this seems due to convergent evolution in the absence of other evidence supporting mutual affinities. — P. BAAS.

Note. Identification of fruiting material without stipules present on the material is difficult; good flowering material with adequate field notes is required. Distinguishing some forms of *L. indica* from *L. guineensis* without some knowledge of flower colour is difficult.

KEY TO THE SPECIES

1. Leaves 1-foliolate (or rarely 3-foliolate).
2. Flowers 4-merous. Fruit usually 4-seeded. Philippines.
3. Leaflets obovate, pair of foliar outgrowths (rarely seen as reduced leaflets) above the stipular wing 1. *L. magnifolia*
3. Leaflets elliptic or ovate, foliar outgrowths absent.
4. Seeds complexly ruminated (fig. 4a). Leaflets up to 22 by 9 cm 3. *L. acuminatissima*
4. Seeds simply ruminated (compare fig. 4d-e). Leaflets usually over 22 by 9 cm 4. *L. unifoliata*
2. Flowers 5-merous. Fruits usually 6-seeded (sometimes less by abortion). Not in Philippines.
5. Corolla tube + staminodial lobes less than 3 mm long, lower free part of staminodial tube up to 1/2 mm. Fruit usually up to 10 mm \varnothing . Malaya, Sumatra, Java 8. *L. simplicifolia*
5. Corolla tube + staminodial lobes over 3 mm long, lower free part of staminodial tube over 1/2 mm. Fruit usually over 10 mm \varnothing . New Guinea.

- 6. Corolla tube + staminodial lobes less than 4¹/₂ mm. Leaflet base subauriculate. 9. *L. gonioptera*
- 6. Corolla tube + staminodial lobes over 4¹/₂ mm. Leaflet base cuneate to truncate 10. *L. zippeliana*
- 1. Leaves 1-4-pinnate.
- 7. Stipule a narrow wing, somewhat persistent, scar long and thin. Compare fig. 2 (4, 7, 13).
- 8. Flowers 4-merous. Fruits usually 4-seeded (if 6-seeded then fruit over 20 mm \varnothing).
- 9. Staminal tube over 5 mm long. Fruits over 20 mm \varnothing , 6-seeded. New Guinea and Solomon Is.
- 10. Lobes of staminodial tube strongly bifid. Inflorescences condensed, erect. Flowers orange-yellow. Mainland of New Guinea 13. *L. papuana*
- 10. Lobes of staminodial tube retuse. Inflorescences lax, pendulous. Flowers white. Solomon Is. 16. *L. tetramera*
- 9. Staminal tube less than 5 mm. Fruit less than 20 mm \varnothing , 4-seeded. Philippines.
- 11. Style over 3 mm long; staminodial tube 4-5 mm long; filaments over 2 mm. Inflorescence generally condensed, 3-branched, peduncle usually up to 3 cm. Young parts sometimes fulvously pubescent. Leaflets usually elliptic to elliptic-lanceolate, over 7 cm wide; ultimate venation distinct. Rumination outline in seed simple to slightly branched. 2. *L. quadrifida*
- 11. Style up to 2 mm long; staminodial tube 2¹/₂-4 mm; filaments up to 2 mm. Inflorescence generally lax and multi-branched, peduncle over 3 cm. Young parts never fulvously pubescent. Leaflets generally ovate to ovate-lanceolate and less than 7 cm wide; ultimate venation indistinct. Rumination outline in seed complexly reticulate 6. *L. philippinensis*
- 8. Flowers 5-merous. Fruit usually 6-seeded.
- 12. Stems spiny.
- 13. Leaves 1-pinnate 18. *L. aculeata*
- 13. Leaves 2- or 3-4-pinnate. 17. *L. angulata*
- 12. Stems not spiny or information lacking.
- 14. Corolla tube + staminodial lobes 6 mm or more and staminodial tube over 5¹/₄ mm long. Fruit where known over 20 mm \varnothing . New Guinea and Solomon Is.
- 15. Leaves 3- or 4-pinnate, leaflets up to 14 by 5 cm. Flowers pink. Mainland New Guinea 14. *L. krukoffiana*
- 15. Leaves 1- or 2-pinnate, leaflets mostly over 14 by 5 cm. Flowers not pink.
- 16. Lobes of staminodial tube strongly bifid. Inflorescence condensed, erect. Flowers orange-yellow. Mainland New Guinea. 13. *L. papuana*
- 16. Lobes of staminodial tube retuse. Inflorescence lax, pendulous. Bismarck Archipelago and Solomon Is.
- 17. Inflorescence usually glabrous. Corolla tube + staminodial lobes 8-11 mm, filaments 5-7 mm, anthers 3-5 mm. Young parts not fulvously pubescent. Bismarck Archipelago 15. *L. macropus*
- 17. Inflorescence usually fulvously pubescent. Corolla tube + staminodial lobes 6-8 mm, filaments 3 mm, anthers 2 mm. Young parts usually fulvously pubescent. Solomon Is. 16. *L. tetramera*
- 14. Corolla tube + staminodial lobes up to 6 mm or staminodial tube less than 5¹/₄ mm long. Fruit less than 20 mm \varnothing . Not in New Guinea except for *L. gonioptera* and *L. aculeata*.
- 18. Leaves 1-pinnate.
- 19. Corolla tube + staminodial lobes up to 2¹/₂ mm, staminodial tube up to 1¹/₂ mm long. Small shrubs with creeping rootstock 8. *L. simplicifolia*
- 19. Corolla tube + staminodial lobes over 2¹/₂ mm; staminodial tube over 1¹/₂ mm. Shrubs or trees.
- 20. Flowers red 22. *L. saxatilis*
- 20. Flowers green or white.
- 21. Calyx \pm inflated around the corolla tube, completely enclosing the corolla in the bud. Corolla tube + staminodial lobes over 5 mm, staminodial tube over 4 mm. Fruit c. 20 mm \varnothing 7. *L. amabilis*
- 21. Calyx not enclosing the corolla in the bud, not so inflated. Corolla tube + staminodial lobes less than 5 mm, staminodial tube less than 4 mm. Fruit usually less than 15 mm (rarely to 20 mm) \varnothing .
- 22. Leaflet base subauriculate. Stem smooth. Staminodial tube up to 3 mm long, lower free part up to 1¹/₄ mm long. New Guinea 9. *L. gonioptera*
- 22. Leaflet base rounded to cuneate. Stem spiny. Staminodial tube 3-3¹/₂ mm long, lower free part over 1¹/₄ mm long. Scattered throughout Malesia, except Malaya, very rare in W. New Guinea 18. *L. aculeata*
- 18. Leaves 2- to 4-pinnate.
- 23. Staminal tube up to 2¹/₄ mm long. Stipules up to 6 cm long. Petiole generally less than 10 cm.
- 24. Corolla tube + staminodial lobes over 3¹/₄ mm, sinuses of staminodial tube shallow. Flowers greenish white. Fruit greyish blue. Stems and ultimate branches spiny. 17. *L. angulata*

24. Corolla tube + staminodial lobes at least $2\frac{1}{4}$ mm long, sinuses of staminodial tube shallow. Flowers red. Fruit red. Stems and branches not spiny 21. *L. rubra*
23. Staminodial tube at least $2\frac{1}{2}$ mm long. Stipules usually over 6 cm long. Petiole generally over 10 cm 19. *L. curtisii*
7. Stipule obovate, caducous, leaving a broad scar. Compare fig. 3 (21, 23, 24).
25. Flowers 4-merous. Fruits usually 4-seeded. Philippines. 5. *L. congesta*
25. Flowers 5-merous. Fruits usually 6-seeded.
26. Leaves 1-pinnate.
27. Flowers red to orange-yellow 23. *L. guineensis*
27. Flowers greenish white.
28. Corolla tube + staminodial lobes over 4 mm, staminodial tube over $2\frac{3}{4}$ mm. Fruit c. 20 mm \varnothing .
29. Sinuses of staminodial tube deep, c. 1 mm. Leaflets generally over 30 cm long. 12. *L. coryphantha*
29. Sinuses of staminodial tube shallow to $\frac{1}{2}$ mm. Leaflets generally but not exclusively up to 30 cm long. 11. *L. heterodoxa*
28. Corolla tube + staminodial lobes less than 4 mm, staminodial tube less than $2\frac{3}{4}$ mm. Fruit up to 15 mm \varnothing 24. *L. indica*
26. Leaves 2-4-pinnate.
30. Corolla tube + staminodial lobes over 4 mm, staminodial tube over 3 mm. Fruit at least 20 mm \varnothing . New Guinea.
31. Sinuses of staminodial tube deep, c. 1 mm. Leaflets generally over 30 by 9 cm, nerves usually over 10 pairs. Stipular scar generally over 4 cm long 12. *L. coryphantha*
31. Sinuses of staminodial tube shallow, less than $\frac{1}{2}$ mm. Leaflets generally less than 30 by 9 cm, nerves generally less than 10 pairs. Stipular scar up to 4 cm long. 11. *L. heterodoxa*
30. Corolla tube + staminodial lobes less than 4 mm, staminodial tube less than 3 mm. Fruit less than 20 mm \varnothing .
32. Inflorescence and leaflets with large, discoidal, pallid brown pearl glands. Bracts of inflorescence large, conspicuous, up to 8 by 5 mm 20. *L. aequata*
32. Pearl glands inconspicuous, or absent. Bracts smaller, inconspicuous.
33. Petiole, rachis, and costa with crisped fluted emergences. Leaflets large, 30-40 by 10-17 cm. Celebes 25. *L. smithii*
33. Emergences absent. Leaflets usually, but not exclusively, smaller.
34. Flowers greenish-white 24. *L. indica*
34. Flowers red to orange-yellow.
35. Corolla tube + staminodial lobes generally over 3 mm, staminodial tube over 2 mm, sinuses of staminodial tube shallow 23. *L. guineensis*
35. Corolla tube + staminodial lobes up to 3 mm, staminodial tube less than 2 mm, sinuses of staminodial tube deep 21. *L. rubra*

1. *Leea magnifolia* MERR. Publ. Govt. Lab. Philip. 35 (1906) 37; En. Philip. 3 (1923) 12; SUESSING. in E. & P. Nat. Pfl. Fam. ed. 2, 20d (1953) 386; RIDSDALE, *Blumea* 22 (1974) 79, f. 2/7, 5, 6/4, 8/3. — *L. banahaensis* ELM. Leaf. Philip. Bot. 1 (1908) 318; MERR. En. Philip. 3 (1923) 11; SUESSING. *l.c.* — *L. pycnantha* QUIS. & MERR. Philip. J. Sc. 37 (1928) 166; SUESSING. *l.c.* — *L. catanduanensis* QUIS. Philip. J. Sc. 76 (1944) 203 (erroneously numbered as pt 3 page 47). — Fig. 4c, 5.

Small treelet 1-3 m, stem often corrugated to fluted. *Leaves* usually appearing as 1-foliolate by reduction of the lowest pair of leaflets of a 3- or 5-foliolate leaf to structureless foliar outgrowths. Petiole 1-12 cm; *stipules* a narrow wing, 3-11 mm broad, along the entire length of the petiole, scars similarly long, narrow. Leaflets broadly obovate to obovate (-oblong), (18-) 25-60 (-75) by (10-) 15-25 (-30) cm (lateral leaflets if present to 6 by 4 cm), glabrous, subcoriaceous; pearl glands numerous, black, stellate; margin toothed; apex acuminate; base rounded to obtuse; nerves 12-20 pairs, veins minutely pubescent. *Inflorescences*

3-9 (-14) cm long, condensed, glabrous; bracts narrowly triangular up to 5 by 3 mm; peduncle up to 4 cm long, usually bearing 3 main branches, ultimate branches highly condensed. *Flowers* 4-merous, creamy white. Calyx c. 4 by 4 mm, lobes 2 by 2 mm. Corolla tube + staminodial lobes 5 mm; corolla lobes 3 by 2 mm. Staminodial tube c. 4 mm long; upper free part $2\frac{1}{2}$ -3 mm, lobes shallowly retuse, somewhat fleshy, sinuses shallow; lower free part $\frac{1}{2}$ mm. Filaments 2 mm, anthers 2 mm. Ovary 4-celled, style 3 mm. *Fruit* 10-12 mm \varnothing , yellow to orange-brown; seeds usually 4, c. 7 by 7 mm, rumination outline complexly reticulate, endosperm complexly ruminate.

Distr. *Malesia*: Philippines: Luzon (Aurora, Nueva Vizcaya, Rizal, Tayabas), Alabat, Catanduanes, Mindoro (Orient.). Fig. 8.

Ecol. Primary lowland and foothill forest, to 1500 m, particularly along streamsides.

2. *Leea quadrifida* MERR. Philip. J. Sc. 5 (1910) Bot. 196; En. Philip. 3 (1923) 14; SUESSING. in E. & P. Nat. Pfl. Fam. ed. 2, 20d (1953) 388; RIDSDALE, *Blumea* 22 (1974) 80, f. 2/6. — *L.*



Fig. 5. *Leea magnifolia* MERR. a. Habit, b. ditto, c. leaf, d. inflorescence and stipules, all $\times \frac{1}{3}$, e. flower, f. ditto in LS, both $\times 5$, g. embryo, $\times 2$ (a PNH 18176, b, e-f JACOBS 7946, c JACOBS 7734, d BS 40670, g ELMER 14692).

agusanensis ELM. Leaff. Philip. Bot. 8 (1915) 2881; MERR. En. Philip. 3 (1923) 10; SUESSENG. *l.c.* 386. — *L. platyphylla* MERR. Philip. J. Sc. 17 (1920) 280; En. Philip. 3 (1923) 14; SUESSENG. *l.c.* 386. — Fig. 2.

Small treelet up to 5 m, stem up to 4 cm \varnothing . Leaves 1-pinnate, 5–9 crowded at the apex of the stem; leaflets (5–) 7–11 (–13). Petiole 5–25 cm; *stipules* a narrow wing 5–12 mm broad, along the whole length of the petiole, scars similarly long, narrow; rachis (8–) 11–30 (–45) cm long. Leaflets elliptic to elliptic-oblong (–lanceolate), (7–) 15–30 (–35) by (3–) 8–12 (–16) cm, glabrous to sparsely fulvously pubescent, (sub)coriaceous; pearl glands sometimes dense and conspicuous, stellate; margin repand to shallowly dentate; apex acuminate; base obtuse to cuneate; nerves 8–16 pairs; petiolules 5–20 mm. *Inflorescences* 2–12 (–20) cm long, condensed, glabrous to densely fulvously pubescent; bracts deltoid to narrowly triangular, up to 4 by 2 mm; peduncle 1–3 (–6) cm long, usually bearing 3 branches, ultimate branches highly condensed. *Flowers* 4-merous, white. Calyx 4 by 4 mm, lobes $1\frac{3}{4}$ by 2 mm. Corolla tube + staminodial lobes 5–6 mm long; corolla lobes 3–4 by 2–2 $\frac{1}{2}$ mm. Staminodial tube 4–5 mm long; upper free part 3–3 $\frac{1}{2}$ mm, lobes shallowly retuse, sinuses shallow; lower free part 1 mm. Filaments 2–2 $\frac{1}{2}$ mm, anthers 1–2 mm. Ovary 4-celled; style 2–4 mm. *Fruit* 15 mm \varnothing , orange-brown; seeds usually 4, c. 7 by 5 mm, rumination outline simple or slightly branched.

Distr. *Malesia*: Philippines: Luzon (Benguet, Cagayan, Ilocos Norte, Isabela, Laguna, Nueva Ecija, Nueva Vizcaya, Pampanga), Biliran, Bohol, Mindanao (Agusan, Davao, Surigao). Fig. 13.

Ecol. Primary rain forest to 1000 m, often on ridges.

Note. In general the material previously included in taxa other than *L. quadrifida* has a tendency to have larger, more glabrous leaves and a seed with a simpler rumination outline. Material corresponding to that described as *L. quadrifida* tends to occur more commonly on ridges, particularly those bearing mossy forest.

3. *Leea acuminatissima* MERR. Philip. J. Sc. 12 (1917) Bot. 281; En. Philip. 3 (1923) 10; SUESSENG. in E. & P. Nat. Pfl. Fam. ed. 2, 20d (1953) 386; RIDSDALE, *Blumea* 22 (1974) 80, f. 2/5, 8/1. — Fig. 2, 4a.

Treelet up to 3 m. Leaves 1-foliolate, 7–9 clustered at the apex of the stem. Petiole 2–6 cm; *stipules* a narrow wing c. 5 mm broad along the entire length of the petiole. Leaflets elliptic to elliptic-oblong or ovate-oblong, 13–22 by 4–9 cm, glabrous, coriaceous; pearl glands sparse, stellate; margin crenately lobed; apex acuminate; base subcordate; nerves c. 14 pairs. *Inflorescences* c. 5 cm long, condensed, few-flowered, \pm glabrous; bracts triangular, up to 5 by 3 mm; peduncle 1–3 cm, usually with 3 short main branches, ultimate branches few. *Flowers* 4-merous, only fragments seen. Calyx c. 2 $\frac{1}{2}$ by 2 $\frac{1}{2}$ mm, lobes

triangular, 1 by 1 $\frac{1}{2}$ mm. Corolla tube + staminodial lobes c. 3 mm; corolla lobes c. 2 mm long. Staminodial tube: upper free part c. 1 $\frac{1}{2}$ mm, lobes slightly cleft, sinuses shallow; lower free part indiscernible. Filaments 1 $\frac{1}{4}$ mm, anthers 1 mm. Ovary appearing 4-celled; style c. 1 mm. *Fruit* 15 mm \varnothing , red; seeds usually 4, c. 6 by 6 mm, rumination outline complexly reticulate, endosperm complexly ruminate.

Distr. *Malesia*: Philippines: Luzon (Aurora–Sierra Madre Mts, Nueva Ecija), only 2 collections. Fig. 6.

Ecol. Primary lowland and foothill forest to 1250 m.

Note. The status of this species is uncertain and further collections and field observations are required. It may only be a precociously flowering, 1-foliolate form of a pinnately leaved species.

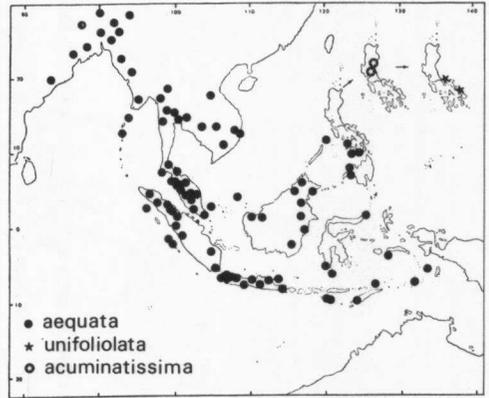


Fig. 6. Range of three *Leea* species; of *L. aequata* L. the localities from the western part of India are omitted.

4. *Leea unifoliolata* MERR. Philip. J. Sc. 11 (1916) Bot. 193; En. Philip. 3 (1923) 14; SUESSENG. in E. & P. Nat. Pfl. Fam. ed. 2, 20d (1953) 383, 390; RIDSDALE, *Blumea* 22 (1974) 80, f. 2/4. — *L. longipetiolata* MERR. Philip. J. Sc. 17 (1920) 282; En. Philip. 3 (1923) 12; SUESSENG. *l.c.* 386. — Fig. 2.

Small treelet, young parts rusty pubescent. Leaves 1-foliolate. Petiole 3–7 cm; *stipules* a narrow wing c. 5 mm broad along the entire length of the petiole, scar similarly long. Leaflets elliptic-oblong, 22–30 by 9–13 cm, sparsely pubescent, chartaceous to subcoriaceous; pearl glands sparse, sphaeroid-depressed; margin shallowly toothed; apex acuminate to cuspidate; base acute; nerves 10–14 pairs, rusty pubescent. *Inflorescences* c. 3 cm, condensed, few-flowered, rusty pubescent; bracts narrowly triangular up to 5 by 2 mm; peduncle short, c. 1 cm, with 3 short main branches, ultimate branches few, condensed. *Flowers* 4-merous, immature. Calyx c. 4 by 4 mm,

lobes triangular, 1 by $1\frac{1}{2}$ -2 mm. Lobes of staminodial tube shallowly retuse, sinuses shallow. *Fruit* c. 20 mm \varnothing ; seeds usually 4, c. 7 by 5 mm, ruminatum outline simple, endosperm simply ruminatum.

Distr. *Malesia*: Philippines: Luzon (Camari-nes), Samar, only 2 collections. Fig. 6.

Ecol. Lowland primary forest, particularly often along stream-sides.

Note. From the collections available this species appears to be distinct from *L. acuminatis-sima*. However, it could well represent a precociously flowering 1-foliolate form of one of the pinnately leaved species, particularly of *L. quadrifida*. Further collections and field observations are required.

5. *Leea congesta* ELM. Leaff. Philip. Bot. 1 (1908) 318; C. B. ROB. Philip. J. Sc. 6 (1911) Bot. 209; MERR. En. Philip. 3 (1923) 11; SUESSING, in E. & P. Nat. Pfl. Fam. ed. 2, 20d (1953) 386; RIDSDALE, Blumea 22 (1974) 80, f. 4/1. — *L. capitata* MERR. Philip. J. Sc. 17 (1920) 281; En. Philip. 3 (1923) 11; SUESSING, l.c. — Fig. 2.

Treelet 1-5 (-8) m high, c. 1 cm \varnothing . *Leaves* 1-pinnate, 3-5 clustered at the apex of the stem; leaflets 5-13. Petiole $2\frac{1}{2}$ -11 cm; *stipules* obovate, up to $2\frac{1}{2}$ by $\frac{1}{2}$ cm, scar broadly triangular of similar length; rachis 13-30 cm. Leaflets elliptic to elliptic-oblong, (12-) 15-30 (-40) by (2-) 4-10 (-14) cm, glabrous, coriaceous; pearl glands sparse, globular-depressed; margin crenately toothed; apex acuminate; base obtuse to subcordate; nerves 10-14 pairs, sometimes pubescent. *Inflorescences* 3-5 cm long, condensed, glabrous; bracts deltoid to obtuse, inconspicuous; peduncle to $1\frac{1}{2}$ cm, main branches short usually, 3 ultimate branches highly condensed. *Flowers* 4-merous, greenish white. Calyx c. 5 by 5 mm, somewhat inflated around the corolla tube, lobes 1 by 2 mm. Corolla tube + staminodial lobes 6 mm long; corolla lobes $3\frac{1}{2}$ by $2\frac{1}{2}$ mm. Staminodial tube 5 mm long; upper free part $2\frac{1}{2}$ -3 mm, lobes shallowly retuse, sinuses shallow; lower free part 2 mm. Filaments 2 mm, anthers 2 mm. Ovary 4-celled, style 2 mm. *Fruit* 10-15 mm \varnothing , orange; seeds usually 4, 5-7 by 5 mm, ruminatum outline reticulate, endosperm complexly ruminatum.

Distr. *Malesia*: Philippines: Luzon (Apayao, Aurora, Benguet, Laguna, Nueva Ecija, Tayabas), Polillo, Samar. Fig. 21.

Ecol. Primary lowland rain-forest to 500 m.

6. *Leea philippinensis* MERR. Philip. J. Sc. 1 (1906) Suppl. 89; *ibid.* 3 (1908) Bot. 419; En. Philip. 3 (1923) 13, *incl. var. pauciflora* (ELM.) MERR. l.c.; SUESSING, in E. & P. Nat. Pfl. Fam. ed. 2, 20d (1953) 387; LIU, SASAKI & KENG, Quart. J. Taiw. Mus. 8 (1955) 306; HATUSIMA, Mem. Fac. Agr. Kagosh. Un. 5 (1966) 39; RIDSDALE, Blumea 22 (1974) 80, f. 2/3. — *L. pauciflora* ELM. Leaff. Philip. Bot. 8 (1919) 3103, *non* KING, 1896. — *L. nitida* MERR. Philip. J. Sc. 20 (1922) 406; En. Philip. 3 (1923) 13; SUESSING, l.c. — Fig. 2.

Tree up to 10 m high. *Leaves* 1- (rarely 2- to 3-) pinnate; leaflets 5-15 (- ∞). Petiole (2-) 3-8 (-11) cm; *stipules* a narrow wing (2-) 3-6 (-8) by $\frac{1}{4}$ - $\frac{1}{2}$ cm; rachis $2\frac{1}{2}$ -10 (-18) cm. Leaflets ovate to ovate-lanceolate or elliptic to elliptic-lanceolate, (3-) 6-20 (-30) by ($1\frac{1}{2}$ -) 2-6 (-11) cm, glabrous, chartaceous to subcoriaceous; pearl glands stellate and globose, infrequent; drying colour often bluish grey-green above; margin shallowly crenate to repand, rarely dentate; apex acuminate; base rounded to acute; nerves 4-14 pairs; ultimate venation immersed and indistinct; petiolules 2-20 mm. *Inflorescences* 3-15 (-25) cm long, somewhat lax, glabrous or minutely pubescent particularly at the nodes; bracts deltoid to ovate, inconspicuous; peduncle 2-8(-14) cm, main branches numerous, laxly branched, ultimate branches reduced. *Flowers* 4-merous, cream. Calyx 3-4 by 4-5 mm, glabrous, lobes 1-2 by 2-3 mm. Corolla tube + staminodial lobes 5-6 mm; corolla lobes 3-4 by 2-3 mm. Staminodial tube $2\frac{1}{2}$ -4 mm long; upper free part $1\frac{3}{4}$ -3 mm long, lobes shallowly retuse, sinus shallow to $\frac{1}{2}$ mm; lower free part $\frac{3}{4}$ -1 mm. Filaments 1- $1\frac{3}{4}$ mm, anthers 1.7-2 mm. Ovary 4-celled, style 1-2 mm. *Fruit* 10-15 mm \varnothing , orange-brown; seeds usually 4, c. 6 by 6 mm, dark brown, ruminatum outline reticulate, endosperm complexly ruminatum.

Distr. *Malesia*: Philippines: Batan Is., Luzon (Apayao, Aurora, Bataan, numerous collections from Lamao River, Benguet, Cagayan, Laguna, numerous collections from Mt Makiling, Nueva Ecija, Pangasinan, Rizal, Tayabas, Zambales), Mindoro (Occid., Orient.), Mindanao (Davao, Surigao, Zamboanga de Norte); Taiwan: Botel Tobago (= Orchid I.). Fig. 16.

Ecol. Primary rain-forest to 750 m.

7. *Leea amabilis* VEITCH [Catalogue (1882) 19, *nom. nud.*] ex MASTERS, Gard. Chron. 27 (1882) 492, f. 77; W. ROB. Garden 21 (1882) 352; LINDEN & RODRIGAS, Ill. Hort. 31 (1884) 59, t. 518, *incl. var. splendens*; HALL, f. Ann. Jard. Bot. Btzg 14 (1897) 241; ANON. Kew Bull. Add. Ser. IV (1900) 234; MERR. En. Born. (1921) 368; C. BONSTEDT, Parey's Blumengart. (1931) 895; SUESSING, in E. & P. Nat. Pfl. Fam. ed. 2, 20d (1953) 385; RIDSDALE, Blumea 22 (1974) 80, f. 2/2, 5/8-10. — Fig. 2, 7.

Treelet up to 2 m high. *Leaves* 1-pinnate, leaflets 7-9. Petiole 8-16 cm; *stipules* a narrow wing 3-5 mm broad, 3-8 cm long, scar narrow, similarly long; rachis 10-25 cm. Leaflets elliptic to elliptic-lanceolate, (10-) 15-25 (-30) by (3-) 5-9 (-12) cm, glabrous; pearl glands globular-depressed, sparse; margins shallowly serrately toothed; apex acuminate; base cuneate; nerves 8-13 pairs, midrib conspicuously constricted at point of junction of lateral nerves; lamina pallid in region of midrib in some collections; petiolules up to 25 mm. *Inflorescences* 4-8 cm long, somewhat contracted, few-flowered, pubescent; bracts deltoid to narrowly triangular, up to 5 by 2 mm, early caducous; peduncle up to 2 cm, main branches 3-6, ultimate branches reduced in number. *Flowers* 5-merous,

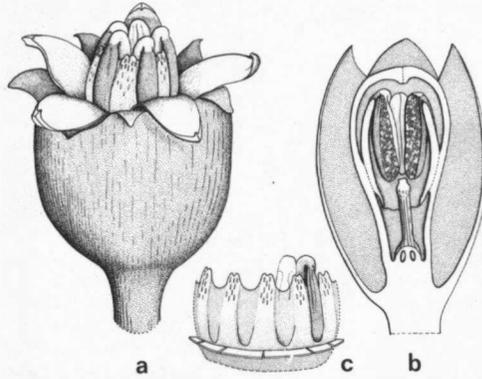


Fig. 7. *Leea amabilis* VEITCH ex MASTERS. a. Flower, b. ditto in LS, c. staminodial tube, the calyx, corolla, and stamens removed, all $\times 5$ (a-c KOSTERMANS 10605).

white. Calyx 4 by 6 mm, conspicuously inflated around the corolla tube, in young flowers enclosing the corolla, lobes c. 2 by 2 mm, often ill defined. Corolla tube + staminodial lobes 6 mm; corolla lobes 3-4 by $2\frac{1}{2}$ -3 mm. Staminodial tube $4\frac{1}{2}$ -5 mm long; upper part joined to corolla for $1\frac{1}{2}$ - $2\frac{1}{4}$ mm, free part $1\frac{3}{4}$ -2 mm long, lobes shallowly retuse, sinuses shallow; lower free part 1 mm. Filaments $2\frac{1}{2}$ mm, anthers $2\frac{1}{2}$ mm. Ovary usually 6-celled, style 2 mm. *Fruit* 15-20 mm \varnothing , deeply grooved between segments; seeds usually 6, 6 by 5 mm, rumination outline simple, endosperm simply ruminant.

Distr. *Malesia*: West Borneo (Sarawak: ?Kuching area; Kalimantan: E. Kutei). Fig. 8.

Ecol. Primary lowland rain-forest, apparently rare.

Note. Originally described from a plant introduced into cultivation by VEITCH & Sons from a collection of CURTIS in Borneo. Independently collected by TEUSCHER and introduced into cultivation in Belgium via Comp. Contin. d'Hort. à Gand. No longer known to be cultivated in Europe.

8. *Leea simplicifolia* ZOLL. & MOR. Nat. Geneesk. Arch. N. I. 2 (1845) 578; MIQ. Fl. Ind. Bat. 1, 2 (1859) 612; Ann. Mus. Bot. Lugd.-Bat. 1 (1863) 101; CLARKE, J. Bot. 19 (1881) 166; KING, J. As. Soc. Beng. 65, ii (1896) 411; BACKER, Schoolfl. Java (1911) 254; RIDL. Fl. Mal. Pen. 1 (1922) 483; SUESSING, in E. & P. Nat. Pfl. Fam. ed. 2, 20d (1953) 393; BACKER & BAKH. f. Fl. Java 2 (1965) 93; RIDSDALE, Blumea 22 (1974) 81, f. 1/8, 10. — *L. pauciflora* KING, J. As. Soc. Beng. 65, ii (1896) 412; RIDL. Fl. Mal. Pen. 1 (1922) 483; CRAIB, Fl. Siam. En. 1 (1926) 319, incl. var. *ferruginea* CRAIB, l.c.; SUESSING, l.c. 385. — *L. forbesii* BAKER f. J. Bot. 62 (1924) Suppl. 24; SUESSING, l.c. 385. — Fig. 2.

Woody shrub up to 1 m, rootstock creeping. *Leaves* 1-foliolate, 3-foliolate or pinnate, leaflets 1-7. Petiole 4-18 cm; *stipules* a narrow wing 2-5 mm broad, 2-4 cm long; scar narrow, similarly long; rachis up to 25 cm. Leaflets, in 1-foliolate examples: elliptic to elliptic-oblong or obovate, (6-) 12-24 (-28) by (3-) 8-12 (-14) cm, in 3-foliolate and pinnate examples: elliptic to elliptic-lanceolate or ovate to ovate-lanceolate, (8-) 10-20 (-24) by (3-) 4-8 (-12) cm, glabrous, chartaceous to subcoriaceous; pearl glands stellate, infrequent; margin repand to dentate; apex acuminate; base rounded to cordate; nerves 9-14 pairs, usually 5-nerved at the base; petiolules up to 25 mm. *Inflorescences* up to 5 cm long, condensed, glabrous to sparsely pubescent; bracts deltoid to triangular, inconspicuous; peduncle 1-2 cm, main branches usually 3, ultimate branches condensed. *Flowers* 5-merous, white. Calyx c. $2\frac{1}{2}$ by $2\frac{1}{2}$ mm, lobes 1 by $1\frac{1}{2}$ -2 mm. Corolla tube + staminodial lobes $1\frac{3}{4}$ -2 (- $2\frac{1}{2}$) mm; corolla lobes 2- $2\frac{1}{2}$ by 1 mm. Staminodial tube 1- $1\frac{1}{4}$ mm long; upper free part 1 mm, lobes retuse, sinuses shallow; lower free part 0.3-0.5 mm. Filaments 1 mm, anthers $\frac{1}{2}$ -1 mm. Ovary 4-6-celled, style 1 mm. *Fruit* c. 10 mm \varnothing ; seeds frequently only 1-3 by abortion, 6 by 4 mm, rumination outline simple, endosperm simply ruminant.

Distr. Thailand (Peninsular: Pattani); *Malesia*: Malaya (Kelantan, Perak), Sumatra (Atjeh, Tapanuli, Lampung), West and East Java. Fig. 8.

Ecol. Primary lowland forest to 800 m, particularly streamsides. Apparently rather rare.

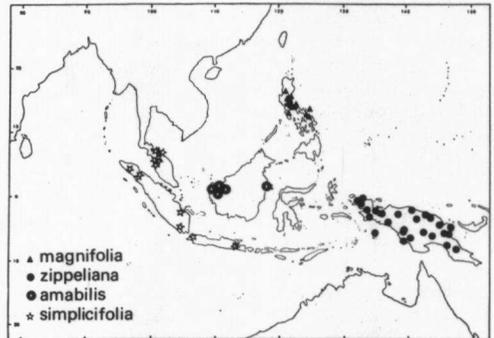


Fig. 8. Range of four *Leea* species.

9. *Leea gonioptera* LAUT. Nova Guinea 8 (1912) 832; *ibid.* 14 (1924) 138; Bot. Jahrb. 59 (1925) 529; SUESSING, in E. & P. Nat. Pfl. Fam. ed. 2, 20d (1953) 388; RIDSDALE, Blumea 22 (1974) 81.

Undershrub up to 3 m. Young parts sometimes rusty pubescent. *Leaves* 1-foliolate or pinnate, leaflets 1-9. Petiole up to 6 cm long; *stipules* a narrow wing 2-5 mm wide, in 1-foliolate examples extending the length of the petiole, in pinnate examples 2-3 cm long; scar narrow, similarly long. Leaflets elliptic to elliptic-oblong, (3-) 8-27 (-35)

by (1½-) 2-5 (-9) cm, glabrous to sparsely pubescent, chartaceous; pearl glands black, globular-depressed, sometimes frequent; margin shallowly crenate to repand; apex (long-) acuminate; base subauriculate; nerves 6-20 pairs, glabrous to pubescent. *Inflorescences* to 4 cm, condensed, pubescent; bracts narrowly triangular, inconspicuous; peduncle to 1 cm, main branches usually 3, ultimate branches short, few-flowered. *Flowers* 5-merous, greenish white. Calyx 2½ by 2½ mm, pubescent, lobes 1 by 1½ mm. Corolla tube + staminodial lobes 3-4 mm; corolla lobes 2-3 by 1-1½ mm. Staminodial tube 2-2½ mm; upper free part 1-1½ mm, lobes shallowly retuse, sinuses shallow; lower free part ¾-1 mm. Filaments 1½ mm, anthers 1 mm. Ovary 4- or 5-celled, style 1-2 mm. *Fruit* 9-12 mm Ø; seeds usually (2) 3-5, c. 5 by 5 mm, rumination outline simple, endosperm simply branched.

Distr. *Malesia*: New Guinea (Vogelkop, Mimika and Digul Districts).

Ecol. Primary rain-forest to 500 m.

Note. A little known species represented by scant herbarium material. Unifoliolate specimens can not easily be distinguished from *L. zippeliana*, differing chiefly in the tapering leaflets with subauriculate base. Further collections are required to establish the species limits as the flowers in most of available material are immature.

10. *Leea zippeliana* MIQ. Ann. Mus. Bot. Lugd.-Bat. 1 (1863) 101; SCHEFF. Ann. Jard. Bot. Bizg 1 (1876) 16; F. v. M. Pap. Pl. 1 (1876) 37; CLARKE, J. Bot. 19 (1881) 166; LAUT. Bot. Jahrb. 59 (1925) 529, incl. var. *ornata* LAUT. l.c.; SUESSING. in E. & P. Nat. Pfl. Fam. ed. 2, 20d (1953) 384, 388; RIDSDALE, Blumea 22 (1974) 81, f. 1/3. — *L. micholitzii* SANDERS, Cat. (1889) 20, nom. nud. — *L. monophylla* LAUT. Nova Guinea 8 (1910) 302; *ibid.* (1912) 832, *pro parte*; *ibid.* 14 (1924) 137; Bot. Jahrb. 59 (1925) 529; SUESSING. l.c. 388. — Fig. 2.

Slender shrub or tree up to 7 m. Young parts sometimes rusty pubescent. *Leaves* 1-foliolate. Petiole 3-6 cm; *stipules* a narrow wing 3-5 mm wide extending the length of the petiole. Scar narrow, similarly long. Leaflets elliptic to elliptic-oblong, (10-) 14-25 (-38) by (3-) 7-10 (-13) cm, glabrous, chartaceous to subcoriaceous; pearl glands black, stellate, infrequent; margin shallowly toothed; apex acuminate; base narrowly cuneate to truncate; nerves 10-20 pairs, slightly pubescent. *Inflorescences* 2-6 cm, condensed, pubescent; bracts deltoid, inconspicuous; peduncle to 1½ cm, main branches usually 3, ultimate branches few-flowered. *Flowers* 5-merous, greenish yellow. Calyx 4 by 4 mm, lobes 1½ by 2 mm. Corolla tube + staminodial lobes 5 mm; corolla lobes 3½ by 2 mm. Staminodial tube 3-3½ mm; upper free part 2-2½ mm, lobes shallowly retuse, sinuses shallow; lower free part ¾-1 mm. Filaments 2 mm, anthers 2 mm. Ovary 4-6-locular, style 3-4 mm. *Fruit* 10-15 mm Ø, reddish orange; seeds usually 6, 8 by 5 mm, rumination outline slightly branched, endosperm simply ruminant.

Distr. *Malesia*: New Guinea (not yet recorded from Central, Northern and Milne Bay Districts). Fig. 8.

Ecol. Primary rain-forest from the lowland up to 1300 m, frequently in riverine forest, occasional in foothill forest, rare in savannah gallery forest.

11. *Leea heterodoxa* K. SCH. & LAUT. Fl. Schutzgeb. (1900) 431, *ex char.*; LAUT. Bot. Jahrb. 59 (1925) 530; RIDSDALE, Blumea 22 (1974) 81, f. ½. — *L. gigantea* K. SCH. & LAUT. Fl. Schutzgeb. (1900) 433, *non* GRIFF. 1864. — *L. tuberculata* LAUT. Nova Guinea 8 (1912) 832; Bot. Jahrb. 59 (1925) 533; SUESSING. in E. & P. Nat. Pfl. Fam. ed. 2, 20d (1953) 388. — *L. rodatzii* LAUT. Bot. Jahrb. 59 (1925) 533; SUESSING. l.c. — Fig. 2.

Treelets up to 3 m, stem and petiole base often ribbed and fluted. *Leaves* clustered at the stem apex, 1- to 3-pinnate. Petiole 6-35 cm; *stipule* half elliptic, c. 2-4 by 2 cm, glabrous, scar narrowly triangular, 2-3½ cm long; rachis 5-40 cm. Leaflets elliptic to elliptic-lanceolate or ovate to ovate-lanceolate, (8-) 14-28 (-38) by (4-) 5-8 (-12) cm, glabrous, chartaceous to coriaceous; pearl glands globose, infrequent; margin shallowly sinuate; apex acuminate; base rounded to cuneate, sometimes attenuate; nerves 6-8 on each side; petiolules 3-15 mm. *Inflorescences* to 5 cm long, condensed, glabrous or pubescent; bracts deltoid to triangular, up to 3 by 2 mm; peduncle to 2 cm long, main branches usually 3, short, ultimate branches reduced, often few-flowered. *Flowers* 5-merous, white. Calyx 3 by 4 mm, glabrous to pubescent; lobes 1 by 2 mm. Corolla tube + staminodial lobes 5 mm; corolla lobes 4 by 2 mm. Staminodial tube 3-4 mm long; upper free part 2-3 mm, lobes shallowly retuse, sinuses shallow, c. 0.3 mm; lower free part c. 1 mm. Filaments 1½ mm, anthers 3 mm. Ovary 6-celled, style 3 mm. *Fruit* c. 25 mm Ø, orange-brown; seeds usually 6, c. 10 by 7 mm, rumination outline complexly branched, endosperm semi-complex with an extra outgrowth on the lateral face.

Distr. *Malesia*: New Guinea (Vogelkop, Jayapura, West & East Sepik and Madang Districts). Fig. 13.

Ecol. Lowland rain-forests, often in ridge forest.

Notes. From the description and key of LAUTERBACH I cannot see sufficient characters to separate *L. heterodoxa* from *L. tuberculata*, an opinion inferred by LAUTERBACH himself (Bot. Jahrb. 59, 1925, 530 *in nota*). No extant type material of *L. heterodoxa* has been traced. Both taxa were only known from single collections at the time of LAUTERBACH.

12. *Leea coryphantha* LAUT. Nova Guinea 8 (1912) 832; Bot. Jahrb. 59 (1925) 530; SUESSING. in E. & P. Nat. Pfl. Fam. ed. 2, 20d (1953) 388; RIDSDALE, Blumea 22 (1974) 81, f. 1/4-5, 8/2. — Fig. 2, 4b.

Understorey tree up to 7 m, stem often ribbed and fluted. *Leaves* clustered at the apex of the stem,



Fig. 9. *Leea papuana* MERR. & PERRY showing its unbranched habit (L. J. BRASS 7325, the type specimen — Photogr. L. J. BRASS).

(?1-) 2-pinnate. Petiole 10-50 cm; *stipules* half elliptic (3-) 5-9 by $1\frac{1}{2}$ - $2\frac{1}{2}$ cm, scar narrowly triangular, similarly long; rachis 20-50 cm (or more). Leaflets ovate to ovate-oblong, (12-) 30-40 (-50) by (6-) 11-20 cm, glabrous, chartaceous to subcoriaceous; pearl glands globular, black, sparse; margin shallowly serrulate; apex acuminate; base obtuse, rarely cuneate; nerves (8-) 14-18 pairs; petiolules up to 2 cm, often winged and fluted. *Inflorescences* up to 25 cm long, then lax with few branches, usually to 6 cm and highly condensed, rusty pubescent when young; bracts deltoid to triangular; peduncle up to 13 cm, main and ultimate branches usually condensed, rarely with 3 main branches. *Flowers* 5-merous, white. Calyx $3\frac{1}{2}$ -5 by $3\frac{1}{2}$ -5 mm, lobes 1 by 2 mm. Corolla tube + staminodial lobes 5 mm; corolla lobes 3-4 by 2 mm. Staminodial tube $3\frac{1}{2}$ - $5\frac{1}{2}$ mm; upper free part $2\frac{1}{2}$ - $3\frac{1}{2}$ mm, lobes shallowly retuse, sinuses c. 1 mm deep; lower free part 1-2 mm. Filaments $1\frac{1}{2}$ -2 mm, anthers $2\frac{1}{2}$ -3 mm. Ovary 6-10-celled, style 3-4 mm. *Fruit* 20-25 (-40) mm \varnothing , red with thick fleshy skin; seeds usually 6, 6-10 by 4-5 mm, rumination outline simple, endosperm semi-complex with an extra ingrowth on the lateral face.

Distr. *Malesia*: New Guinea (Vogelkop, West & East Sepik and Morobe Districts). Fig. 21.

Ecol. Primary rain-forest to 1500 m, often in riverine forest.

13. *Leea papuana* MERR. & PERRY, J. Arn. Arb. 22 (1941) 382; RIDSDALE, Blumea 22 (1974) 81, f. 1/1, 6/8-9. — *L. macropus* (non K. SCH. & LAUT.) BAKER f. J. Bot. 61 (1923) Suppl. 11; *ibid.* 62 (1924) 54. — Fig. 2, 9, 10.

Treelet up to 5 m, single- or multi-stemmed, ultimate parts of the stem glabrous to pubescent, sometimes slightly ribbed. *Leaves* 1- (or 2-) pinnate, clustered at the apex of the stem. Petiole 15-30 cm; *stipules* a narrow wing, 17-25 by $\frac{3}{4}$ -1 cm, scar broad, similarly long; rachis 30-80 cm. Leaflets ovate-oblong to ovate-lanceolate, less frequently elliptic-oblong to elliptic-lanceolate, (15-) 20-30 (-45) by 6-20 cm, glabrous to densely pubescent; pearl glands depressed-globular, black, numerous; margin sinuate to shallowly dentate; apex acuminate; base obtuse to cuneate; nerves 8-20 pairs; petiolules up to 4 cm. *Inflorescences* 4-8 cm long, condensed, glabrous to pubescent; bracts narrowly triangular up to 8 by 3 mm; peduncle up to 2 cm, main branches short, ultimate branches few-flowered. *Flowers* 5-merous, orange-yellow. Calyx c. 7 by 7 mm, somewhat inflated around the corolla tube, glabrous, lobes $1\frac{1}{2}$ -2 by 2-3 mm. Corolla tube + staminodial lobes 7-8 mm; corolla lobes 5-6 by $1\frac{1}{2}$ - $2\frac{1}{2}$ mm. Staminodial tube 7-8 mm long; upper free part 3-4 mm, lobes deeply (1- $1\frac{1}{2}$ mm) strongly bifid, sinuses deep, c. 2 mm; lower part $2\frac{1}{2}$ - $3\frac{1}{2}$ mm, appearing fused with corolla tube in material available. Filaments 3-4 mm, anthers 3- $3\frac{1}{2}$ mm. Ovary 6-8-celled, style 4-5 mm. *Fruit* 25-40 mm \varnothing , orange-red; seeds usually 6, c. 15 by

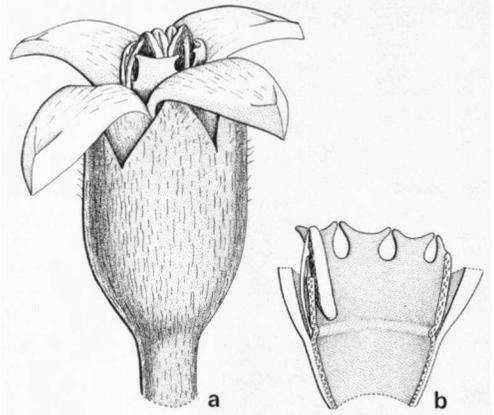


Fig. 10. *Leea papuana* MERR. & PERRY. a. Flower, b. LS showing interior of staminodial tube and insertion of one stamen, both $\times 5$ (a-b FORBES PP 95).

6 mm, rumination outline complexly branched, endosperm semi-complex with extra ingrowth on the lateral face.

Distr. *Malesia*: New Guinea: Papua (Western, Central, Northern, and Milne Bay Districts). Fig. 17.

Ecol. Lowland rain-forest to 1200 m, often in shaded riverine gullies.

14. *Leea krukoffiana* RIDSDALE, Blumea 22 (1974) 83, f. 7/4-7. — Fig. 11, 12.

Small tree up to 3 m. *Leaves* unequally 3-4-pinnate, leaflets numerous. Petiole 35 cm; *stipules* not seen, assumed to be a narrow wing, scar 20 cm long; rachis 55 cm. Leaflets ovate to ovate-oblong (4-) 8-14 by (2-) 3-5 cm, glabrous, chartaceous; pearl glands globular, sparse; margin sinuately toothed; apex acuminate; base obtuse to acute, sometimes unequal; nerves 4-9 pairs; petiolules 2-5 mm. *Inflorescences* multibranched, up to 10 cm long, lax, pubescent; bracts small, deltoid up to 2 mm long; peduncle 1 cm, main branches compact, ultimate branches short. *Flowers* 5-merous, pink. Calyx glabrous, 4 by 4 mm, lobes $1\frac{1}{2}$ by 2- $2\frac{1}{2}$ mm. Corolla tube + staminodial lobes $6\frac{1}{2}$ - $7\frac{1}{2}$ mm; corolla lobes 5-6 by 2 mm. Staminodial tube $5\frac{1}{2}$ mm long; upper free part $3\frac{1}{2}$ mm, lobes shallowly retuse, sinuses shallow; lower free part 2 mm. Filaments 3 mm, anthers $2\frac{1}{2}$ mm. Ovary 6-celled, style 3 mm. *Fruit* unknown.

Distr. *Malesia*: New Guinea (Morobe Distr.: Kassar Pass), one collection. Fig. 13.

Ecol. Shaded forest gully, 1200 m.

Note. Named in honour of Dr B. A. KRUKOFF for his enthusiastic support of and interest in Malesian botany.

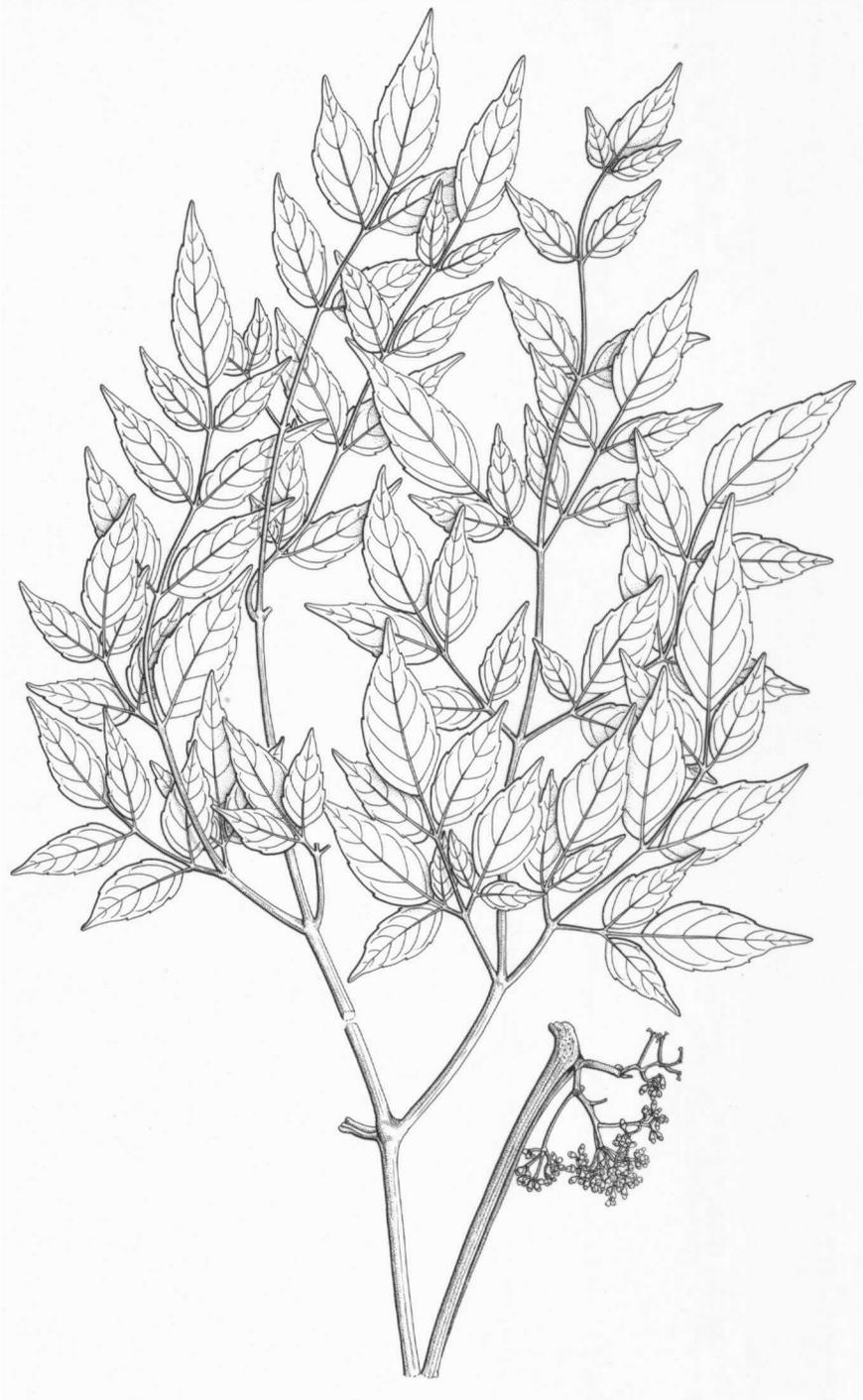


Fig. 11. *Leea krukoffiana* RIDSDALE. Habit, $\times \frac{1}{3}$, (NGF 37403).

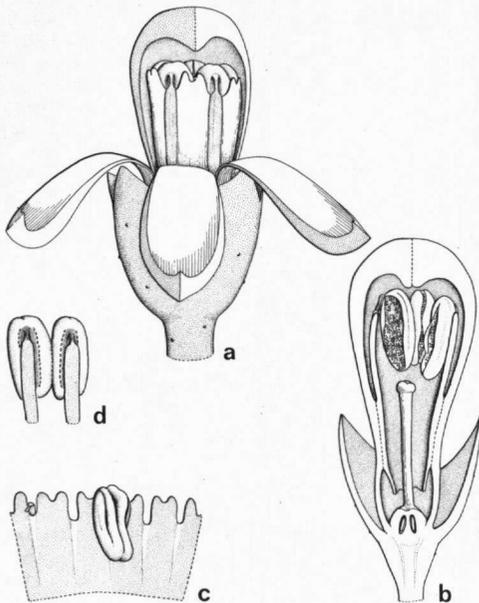


Fig. 12. *Leea kruckoffiana* RIDSDALE. a. Flower, b. ditto in LS, c. inside of staminodial tube with one anther, d. two stamens, all $\times 5$ (a-d NGF 37403).

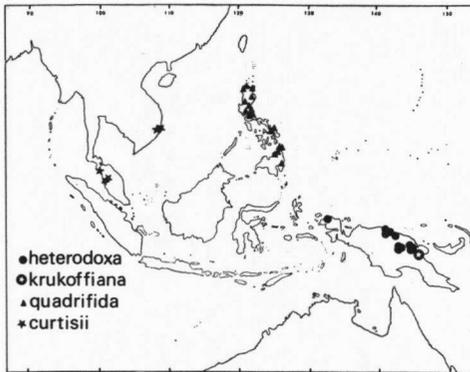


Fig. 13. Range of four species of *Leea*.

15. *Leea macropus* K. SCH. & LAUT. Notizbl. Berl.-Dahl. 2 (1898) 130; Fl. Schutzgeb. (1900) 430; Nachtr. (1905) 313; VAL. Ic. Bog. 3 (1908) 147, t. 258; LAUT. Bot. Jahrb. 59 (1925) 530; KANEH. & HATUS. Bot. Mag. Tokyo 52 (1938) 415; MERR. & PERRY, J. Arn. Arb. 22 (1941) 382; SUESSENG. in E. & P. Nat. Pfl. Fam. ed. 2, 20d (1953) 388, f. 104; RIDSDALE, Blumea 22 (1974) 83, f. 7/1-3. — Fig. 14.

Tree up to 15 m, often stilt-rooted. Leaves 1-pinnate, leaflets (5-) 7 (-9). Petiole 5-10 cm; stipules a narrow wing 3-5 mm broad extending the whole length of the petiole; scar narrow; rachis up to 50 cm. Leaflets elliptic to elliptic-

-oblong (-lanceolate or ovate-lanceolate), (8-) 15-30 (-35) by (5-) 7-12 (-15) cm, usually glabrous, rarely with sparse coarse hairs, subcoriaceous to coriaceous; pearl glands black, globose; margin sinuate to repand; apex acuminate; base rounded to obtuse; nerves 6-20 pairs; petiolules 5-25 mm long. Inflorescences (20-) 30-70 cm long, usually glabrous, (if pubescent then coarsely so and not fulvous), pendulous, lax; bracts deltoid, up to 2 mm long, inconspicuous; peduncle 5-20 cm, lateral branches of inflorescence long, ultimate branches somewhat spreading. Flowers 5-merous, cream. Calyx glabrous to sparsely pubescent, 3 by 4 mm, lobes $\frac{1}{2}$ -1 mm. Corolla tube + staminodial lobes 8-11 mm long; corolla lobes 7-8 by 2 mm, usually glabrous. Staminodial tube 6-10 mm long; upper free part 6-9 mm, lobes retuse, sinuses shallow; lower free part $\frac{1}{2}$ -1 mm. Filaments 5-7 mm, anthers 3-5 mm. Ovary 6-celled, style 4-6 mm. Fruit c. 30 mm \varnothing , red-orange; seeds usually 6, 10 by 5 mm, rumination outline simple, endosperm simply ruminate.

Distr. *Malesia*: Bismarck Archipelago (New Britain, New Ireland, Manus I.). Fig. 15.

Ecol. Understorey tree of primary forest, coastal plains and foothills to 500 m.

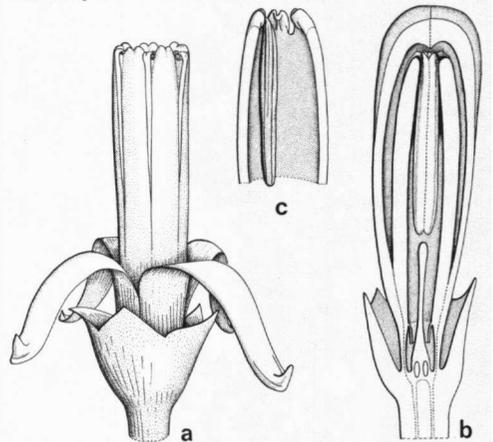


Fig. 14. *Leea macropus* K. SCH. & LAUT. a. Flower, b. ditto in LS, c. inside staminodial tube with one stamen, all $\times 5$ (a KOSTERMANS 11199, b-c NGF 32599).

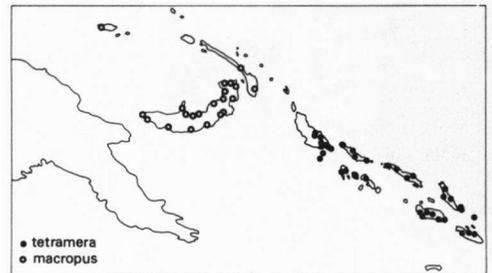


Fig. 15. Range of two species of *Leea*.

16. *Leea tetramera* BURTT, Kew Bull. (1935) 304; SUESSING, in E. & P. Nat. Pfl. Fam. ed. 2, 20d (1953) 390; RIDSDALE, Blumea 22 (1974) 83, f. 1/6-7. — *L. solomonensis* MERR. & PERRY, J. Arn. Arb. 22 (1941) 380. — *L. suaveolens* MERR. & PERRY, l.c. 381. — Fig. 3.

Tree up to 15 m, flying buttresses sometimes present, up to 1½ m high. Twigs and young parts usually minutely fulvously pubescent. *Leaves* 1- (or 2-)pinnate, leaflets 7-15. Petiole (3-) 5-10 cm; *stipules* a narrow wing 5-10 mm broad extending the length of the petiole; scar narrow; rachis (5-) 8-20 (-30) cm. Leaflets elliptic or narrowly ovate, (6-) 14-22 (-30) by (3-) 5-9 (-11) cm, usually glabrous, sometimes finely fulvously pubescent or with indumentum of coarse hairs, subcoriaceous to coriaceous; pearl glands globose, black, sometimes conspicuous; nerves 8-16 pairs; petiolules 5-25 mm. *Inflorescences* 13-35 cm long, when young usually finely fulvously pubescent, glabrous when older, pendulous, lax; bracts deltoid, up to 2 mm long, inconspicuous; peduncle 4-10 cm, main branches long, numerous, ultimate branches somewhat compact. *Flowers* 4- or 5-merous, sometimes both in one inflorescence, creamy white. Calyx usually pubescent, 4 by 4 mm, lobes 1½-2 by 1½-2 mm. Corolla tube + staminodial lobes 6-8 mm; corolla lobes 6 by 2 mm, usually pubescent. Staminodial tube c. 6 mm long; upper free part 4-4½ mm, lobes shallowly retuse, sinuses shallow; lower free part 1½-2 mm. Filaments 3 mm, anthers 2 mm. Ovary 6-celled, style 3-4 mm, anthers 2 mm. Ovary 6-celled, style 3-4 mm. *Fruit* c. 30 mm Ø, red-orange; seeds usually 6, c. 15 by 10 mm, rumination outline complexly branched, endosperm semi-complex with extra ingrowths on the lateral face.

Distr. Solomon Islands (Bougainville, Choiseul, New Georgia, Santa Isabel, Guadalcanal, Malaita, San Cristobel). Fig. 15.

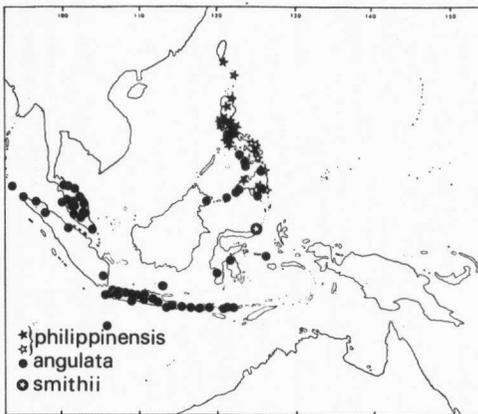


Fig. 16. Range of three species of *Leea*. Of *L. philippinensis* MERR. the solid stars refer to localities of specimens with 1-pinnate leaves, the open stars to those with 2-pinnate leaves.

Ecol. Understorey tree of primary forest; coastal plains, foothills, and ridges up to 600 m.

17. *Leea angulata* KORTH. ex MIQ. Ann. Mus. Bot. Lugd.-Bat. 1 (1863) 97; CLARKE, J. Bot. 19 (1881) 166; KING, J. As. Soc. Beng. 65, ii (1896) 414; K. & V. Bijdr. 9 (1903) 9; BACKER, Schoolf. Java (1911) 255; RIDL. Fl. Mal. Pen. 1 (1922) 485; MERR. En. Philip. 3 (1923) 11; BURK. Dict. (1935) 1326; CORNER, Ways. Trees 1 (1940) 97; SUESSING, in E. & P. Nat. Pfl. Fam. ed. 2, 20d (1953) 384, 385; BACKER & BAKH. f. Fl. Java 2 (1965) 94; RIDSDALE, Blumea 22 (1974) 84, f. 3/2-3, with full synonymy. — *L. horrida* T. & B. Cat. Hort. Bog. (1866) 169, *nom. nud.*; CLARKE, J. Bot. 19 (1881) 166; CERON, Cat. Pl. Herb. Manila (1892) 51. — *L. aculeata* (non BL.) KURZ, J. As. Soc. Beng. 45, ii (1876) 124; CLARKE, J. Bot. 19 (1881) 105. — *L. sambucina* (non WILLD.) BAKER f. in Andrews, Monogr. Christmas I. (1900) 176. — *L. sambucina* var. *intermedia* RIDL. J. Str. Br. R. As. Soc. 45 (1906) 185. — Fig. 3.

Weak straggler, bushy shrub or tree up to 15 m, frequently multi-stemmed and suckering; trunk, main and ultimate branches with triangular thorns. *Leaves* 2- or 3-pinnate, leaflets numerous. Petiole 3-6 cm long; *stipules* a narrow wing 2-5 mm by 2½-5 cm, usually extending the whole length of the petiole, scar narrow, similarly long; rachis (5-) 12-20 (-25) cm. Leaflets elliptic to elliptic-lanceolate or ovate to ovate-lanceolate, (2½-) 8-12 (-15) by (1½-) 2½-3½ (-5) cm, glabrous; pearl glands globular, rarely seen; margin crenate, less frequently shallowly serrate; apex acuminate; base rounded to cuneate; nerves 4-10 pairs, often with hairy domatia, rarely sparsely pubescent along the whole length; petiolules up to 10 mm. *Inflorescences* up to 25 cm long, broad, multi-branched, pubescent; bracts triangular to narrowly triangular up to 3 by 2 mm; peduncle 4-10 cm long, main branches long, ultimate branches lax. *Flowers* 5-merous, greenish white. Calyx 2½ by 2½ mm, pubescent; lobes 1 by 1 mm. Corolla tube + staminodial lobes 3½-4 mm long; corolla lobes 2-3 by 1-1½ mm. Staminodial tube 1¾-2¼ mm long; upper free part 1¼-1½ mm, lobes retuse, sinuses shallow; lower free part ½-¾ mm, conspicuously thickened. Filaments 1½ mm, anthers 1½ mm. Ovary 6-celled, style 2 mm. *Fruit* 7-10 mm Ø, greyish blue; seeds usually 6, c. 5 by 3 mm, rumination outline simple, endosperm simply ruminant.

Distr. Nicobar Is., Thailand (Peninsular: Songkhla, Pattani, Narathiwat); *Malesia*: Malaya (Kedah, Penang, Perak, Kelantan, Pahang, Selangor), Singapore, Sumatra (Atjeh, E. Coast, Lampong), Java (common, incl. Bawean and Christmas I.), Lesser Sunda Is. (Bali, Lombok, Sumbawa, Flores), N. Borneo (Sabah, Tawau), Philippines (Negros, Panay, Mindanao, Basilan, Sulu Is.), Celebes (SE. and SW. Peninsula), Moluccas (Sula Is.: Sanana). Fig. 16.

Ecol. Secondary vegetation, particularly sandy heaths and riverine forest, up to 1500 m.

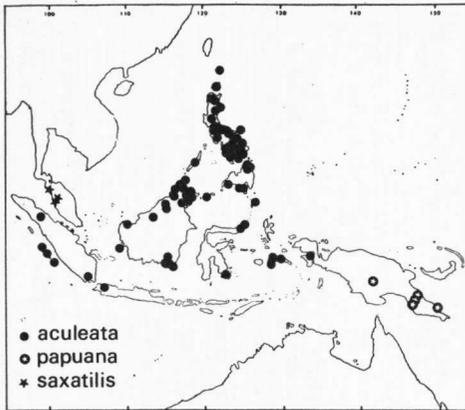


Fig. 17. Range of three species of *Leea*.

18. *Leea aculeata* BL. ex SPRENG. Syst. Veg. 1 (1824) 670; BL. Bijdr. 1 (1825) 197; SPRENG. Syst. Veg. 4, 2 (1827) Cur. post. 70; G. DON, Gen. Hist. 1 (1831) 713; STEUD. Nom. Bot. ed. 2, 2 (1840) 21; HASSK. Cat. Hort. Bog. (1844) 167; MIQ. Ann. Mus. Bot. Lugd.-Bat. 1 (1863) 99, incl. var. *moluccana* MIQ. l.c.; KOORD. Minah. (1898) 397; MERR. Philip. J. Sc. 2 (1907) Bot. 280; *ibid.* 3 (1908) Bot. 419; WINKLER, Bot. Jahrb. 44 (1910) 537; BACKER, Schooffl. Java (1911) 254; MERR. Int. Rumph. (1917) 347; Sp. Blanc. (1918) 247; En. Born. (1921) 368; BROWN, Min. Prod. Philip. For. 3 (1921) 206; MERR. En. Philip. 3 (1923) 10; SUESSENG. in E. & P. Nat. Pfl. Fam. ed. 2, 20d (1953) 383; BACKER & BAKH. f. Fl. Java 2 (1965) 93; RIDSDALE, Blumea 22 (1974) 85, f. 3/5. — [*Frutex aquosus mas* RUMPH. Herb. Amb. 4 (1743) 102, t. 44.] — *Ticorea aculeata* BLANCO, Fl. Filip. (1837) 85. — *L. aculeata* (BLANCO) BLANCO, Fl. Filip. ed. 2 (1845) 127, non BL. ex SPRENG. 1824; NAVES, *ibid.* ed. 3, 1 (1877) 227, t. 306. — *L. serrulata* MIQ. Ann. Mus. Bot. Lugd.-Bat. 1 (1863) 99. — *L. angulata* (non KORTH.) KURZ, J. As. Soc. Beng. 45, ii (1876) 124; CLARKE, J. Bot. 19 (1881) 105. — *L. biserrata* (non MIQ.) NAVES in Blanco, Fl. Filip. ed. 3 (1877) t. 306. — *L. javanica* (non BL.) KOORD. Minah. (1898) 398. — *L. sandakanensis* RIDL. Kew Bull. (1931) 499; SUESSENG. in E. & P. Nat. Pfl. Fam. ed. 2, 20d (1953) 386. — Fig. 3.

Shrub to small tree up to 10 m, trunk and main branches with spines. Leaves 1-pinnate, leaflets (5-) 7 (-9). Petiole 2-6 cm; stipules a narrow wing, c. 1/2 by (1-) 2-3 (?-4) cm, scar of similar length; rachis (3-) 6-12 (-15) cm. Leaflets elliptic to elliptic-oblong, occasionally ovate to ovate-oblong, (6-) 10-20 (-25) by (2 1/2-) 4-6 (-10) cm, glabrous, subcoriaceous; pearl glands globose, black, infrequent; margin serrulate; apex long-acuminate; base rounded to cuneate; mature leaves with a characteristic yellowish-grey reticulate drying pattern; nerves 6-12 pairs; petiolules up to 2 cm. Inflorescences 7-20 cm long, broad and multi-

-branched; bracts deltoid to narrowly triangular up to 3 by 1 1/2 mm; peduncle 0-10 cm. Flowers 5-merous, greenish white. Calyx 3 by 3 mm, glabrous; lobes 2 by 1 mm. Corolla tube + staminodial lobes 4 mm long; corolla lobes 3 by 1 1/2-2 mm. Staminodial tube 3-3 1/2 mm long; upper free part 1 1/2 mm, lobes slightly cleft, sinuses shallow; lower free part 1 1/2-1 3/4 mm, extending downwards to the ovary (the upper portion of this lower part often thickened to form a conspicuous rim). Filaments 1 1/4 mm, anthers 1 1/4 mm. Ovary 4-6-celled, style 2 mm. Fruit 10-15 (-20) mm Ø, shallowly grooved, blue-black; seeds usually 6, 6-12 by 3-6 mm, often less by abortion, rumination outline simple, endosperm simply ruminant.

Distr. *Malesia*: N. Sumatra (East Coast Res., Lampung, Mentawai and Nassau Is.), W. Java (rare; Karimata Is.), Borneo (SE. Kalimantan; Sarawak, 4 records; common in Sabah), Philippines (common), Celebes (N. and SE. Peninsulas), Moluccas (Talaud Is., Ceram, Ambon), New Guinea (Fakfak). Fig. 17.

A rather interesting distribution pattern with the species exceedingly common in the Philippines and Sabah but apparently very rare over the southwestern part of its range to Sumatra.

Ecol. Wide-spread component of mainly secondary vegetation, particularly riverine areas, up to 1300 m, usually at lower altitudes.

Note. Unlike *L. angulata*, the spines in this species are found only on the trunk and main branches and are lacking on fertile shoots.

19. *Leea curtisii* KING, J. As. Soc. Beng. 65, ii (1896) 416; RIDL. Fl. Mal. Pen. 1 (1922) 485; BURK. Dict. (1935) 1326; SUESSENG. in E. & P. Nat. Pfl. Fam. ed. 2, 20d (1953) 385; RIDSDALE, Blumea 22 (1974) 85, f. 2/1. — *L. stipulosa* GAGNEP. Fl. Gén. I.-C. Suppl. (1950) 849, t. 106, *nom. inval.*; SUESSENG. l.c. 387. — Fig. 3.

Erect shrub, 1-4 m. Leaves 2-pinnate, leaflets numerous. Petiole c. 22 cm; stipules a narrow elongated wing 1/4-1/2 by 5-10 (or more?) cm, scar of similar length; rachis c. 60 cm. Leaflets elliptic, 7-15 by 3-6 cm, glabrous; margins shallowly lobed to dentate; apex acuminate; base cuneate; nerves 4-10 pairs; petiolules 4-10 mm. Inflorescences 18-25 mm long, finely sparsely pubescent, lax, multi-branched; bracts deltoid, small; peduncle 6-9 cm. Flowers 5-merous, yellowish white. Calyx 3-4 by 3-5 mm, pubescent; lobes 1 by 2 mm. Corolla tube + staminodial lobes 3 1/2-4 1/2 mm long. Staminodial tube 2 1/2-4 1/4 mm; upper free part 1 1/2-2 1/4 mm, lobes shallowly retuse, sinuses shallow; lower free part 1-2 mm. Filaments 1 1/2-2 1/4 mm, anthers 1 1/2-2 mm. Ovary 6-celled, style 2 mm. Fruit unknown.

Distr. N. Vietnam (Nhatrang); *Malesia*: Malaya (Pahang, Perak). Only 4 collections. Fig. 13.

Ecol. Primary lowland forest.

Note. CURTIS noted: 'Leaves of very young plants partly masked with silvery grey variegation down either side of the midrib'. Introduced and cultivated in Penang Botanic Gardens, but has not



Fig. 18. *Leea aequata* L. a. Habit, b. young leaf with stipules, both $\times \frac{1}{3}$, c. venation with hairs and pearl glands, $\times 10$ (a, c SCHIFFNER 2190, b BAKHUIZEN VAN DEN BRINK f. 4865).

been traced in the last 33 years and Mr K. C. CHANG considers it unlikely that it survives.

20. *Leea aequata* L. Syst. Nat. ed. 12, 2 (1767) 627 & Mantissa 1 (1767) 124; W. AIT. Hort. Kew. 1 (1789) 283; LAMK, Encycl. Méth. 3 (1792) 460; ROEM. & SCHULTES, Syst. Veg. 4 (1819) 705; SPRENG. Syst. Veg. 1 (1824) 670; G. DON, Gen. Hist. 1 (1831) 713; STEUD. Nom. Bot. ed. 2, 2 (1840) 21; KURZ, J. As. Soc. Beng. 44, ii (1875) 180; HEMSLEY, Rep. Chall. Exp. 1 (1885) 134; VIDAL, Rev. Pl. Vasc. Filip. (1886) 93; KING, J. As. Soc. Beng. 65, ii (1896) 419; COOKE, Fl. Pres. Bomb. 1 (1902) 261; PRAIN, Beng. Pl. (1903) repr. (1963) 239; USTERI, Beitr. Kenntn. Philip. Veg. (1905) 114; BRANDIS, Ind. Trees (1906) 179; TALBOT, For. Fl. Bomb. Pres. 1 (1909) 330; WINKLER, Bot. Jahrb. 44 (1910) 537; BACKER, Schooffl. Java (1911) 256; GAGNEP. Fl. Gén. I.-C. 1 (1912) 940; GAMBLE & FISCH. Fl. Pres. Madras 1 (1918) 240; MERR. En. Born. (1921) 368; En. Philip. 3 (1923) 10; RIDL. Fl. Mal. Pen. 1 (1922) 486; HAINES, Bot. Bihar & Orissa 1 (1925) 209; COWAN & COWAN, Trees N. Beng. (1929) 40; BURK. Dict. (1935) 1326; KANJILAL & DAS, Fl. Assam 1 (1936) 307; CORNER, Ways. Trees 1 (1940) 97; GAGNEP. Fl. Gén. I.-C. Suppl. (1950) 848; SUESSING. in E. & P. Nat. Pfl. Fam. ed. 2, 20d (1953) 385, 387, 388; HUNDLEY & U CHIT Ko Ko, List Tr. Shr. Herbs & Climb. Burma (1961) 54; BACKER & BAKH. f. Fl. Java 2 (1965) 94; HARA, Fl. E. Himal. (1966) 200; SUWAL, Med. Pl. Nepal (1970) 22; BURGER, Seedl. Trop. Tr. Shr. SE. Asia (1972) 379, f. 154; RIDSDALE, Blumea 22 (1974) 90, f. 3/12. — *Frutex aquosus femina* RUMPH. Herb. Amb. 4 (1743) 107, t. 45. — *L. hirta* ROXB. ex HORNEM. Hort. Hafn. 1 (1813) 231; ROXB. Hort. Beng. (1814) 18; Fl. Ind. ed. 1, 2 (1824) 469; DC. Prod. 1 (1824) 635; SPRENG. Syst. Veg. 1 (1824) 670; BL. Bijdr. 1 (1825) 196; G. DON, Gen. Hist. 1 (1831) 713; ROXB. Fl. Ind. ed. 2, 1 (1832) 656; DECNE, Nouv. Ann. Mus. Hist. Nat. Paris 3 (1834) 446; STEUD. Nom. Bot. ed. 2, 2 (1840) 21; HASSK. Cat. Hort. Bog. (1844) 168; VOIGT, Hort. Sub. Calc. (1845) 30; MIQ. Fl. Ind. Bat. 1, 2 (1859) 612; DRURY, Handb. Fl. Ind. 1 (1864) 34; WATT, Dict. Ec. Prod. India 4 (1890) 617; HUNDLEY & U CHIT Ko Ko, List Tr. Shr. Herbs & Climb. Burma (1961) 55. — *L. scabra* ROXB. ex ROEM. & SCHULTES, Syst. Veg. 4 (1819) 814; STEUD. Nom. Bot. ed. 2, 2 (1840) 21. — *L. hirsuta* BL. ex SPRENG. Syst. Veg. 1 (1824) 670; BL. Bijdr. (1825) 197; HASSK. Cat. Hort. Bog. (1844) 167; MIQ. Fl. Ind. Bat. 1, 2 (1859) 612. — *L. anacolona* MIQ. Fl. Ind. Bat. 1, 2 (1859) 611; Sum. (1861) 202. — *L. kurzii* CLARKE, J. Bot. 19 (1881) 165; SUESSING. l.c. 385. — *L. hispida* GAGNEP. Not. Syst. 1 (1910) 229; Fl. Gén. I.-C. 1 (1912) 939; *ibid.* Suppl. (1950) 847, pl. 25 f. 1-8; SUESSING. l.c. 387. — Fig. 18, 19.

Shrub, treelet or less frequently small tree up to 10 m, young branches usually densely hairy. Leaves 1-3-pinnate, leaflets 5 to numerous. Petiole (5-) 8-14 (-20) cm; stipules oblong-obovate, $1\frac{1}{2}$ -4 $\frac{1}{2}$ by 3-6 (-10) cm, pubescent to densely hairy, scar

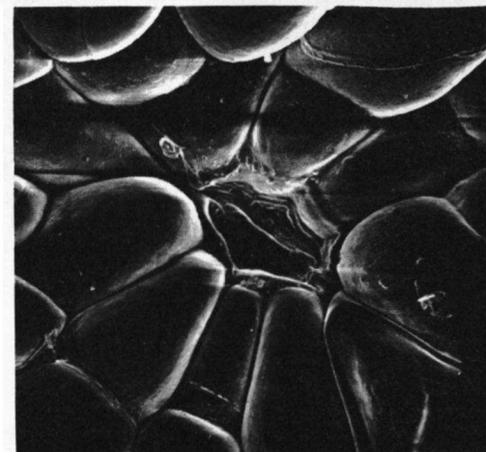
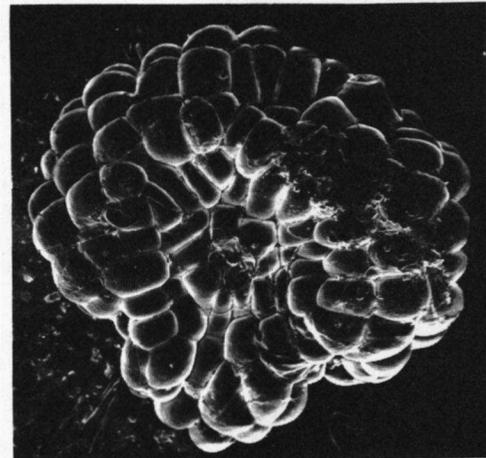
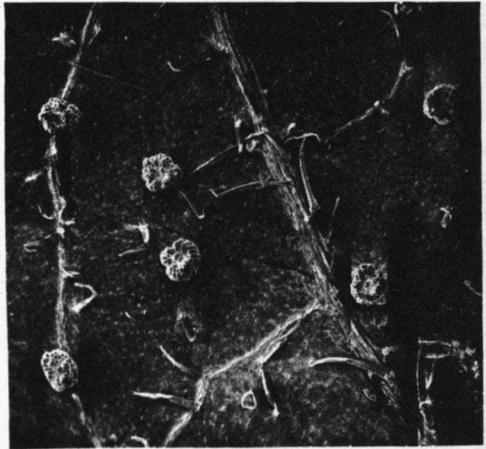


Fig. 19. *Leea aequata* L. Pearl glands on underside of leaf, stereoscan photographs, from top to bottom $\times 40$, $\times 125$, $\times 500$ (SCHIFFNER 2190).

$1\frac{1}{2}$ - $2\frac{1}{2}$ (-4) cm long, slightly shorter than the stipule; rachis 7-20 (-25) cm, petiole and rachis usually hairy. Leaflets ovate to ovate-lanceolate or elliptic to elliptic-lanceolate, (3-) 10-22 (-30) by ($1\frac{1}{2}$ -) 4-8 (-12) cm, above glabrous to hairy, particularly over the nerves, below sparsely to densely hairy, chartaceous; pearl glands globular to discoidal, brown, large and conspicuous to naked eye (in rare cases absent from the leaflets); margins serrate; apex acuminate to long acuminate; base cuneate to truncate, sometimes subcordate or unequal; nerves (5-) 8-14 (-18) pairs, usually densely hairy; petiolules 5-15 (-25) mm, hairy. *Inflorescences* 4-14 (-20) cm long, rusty pubescent to hairy; bracts ovate, up to 8 by 5 mm, conspicuous; peduncle 1-4 (-8) cm, lateral and ultimate branches rather short, sometimes condensed. *Flowers* 5-merous, greenish white. Calyx 3-4 by 3-4 mm, glabrous to densely pubescent, usually with pearl glands; lobes 1 by 2 mm. Corolla tube + staminodial lobes $2\frac{1}{2}$ - $4\frac{1}{2}$ mm; corolla lobes 2- $3\frac{1}{2}$ by 1- $1\frac{1}{2}$ mm. Staminal tube $1\frac{3}{4}$ - $2\frac{1}{4}$ mm long; upper free part $1\frac{1}{2}$ -2 mm, lobes deeply notched, sinuses shallow, to $\frac{1}{2}$ mm; lower free part 0.2-0.4 mm. Filaments 1- $1\frac{1}{4}$ mm, anthers 1- $1\frac{1}{4}$ mm. Ovary 4-7-celled, style $1\frac{1}{2}$ - $2\frac{1}{2}$ mm. *Fruit* 8-15 mm \varnothing , orange-red, often drying pallid; seeds usually 5 or 6, 4-6 by 4-6 mm, rumination outline simple, endosperm simply ruminant.

Distr. India (Bombay, Mysore, Madras, Central Prov., Orissa, Bihar, Bengal, United Prov., Sikkim, Assam), Bhutan, Nepal, Bangladesh, Andaman Is., Upper & Lower Burma, Thailand, Cambodia, Laos, N. & S. Vietnam; *Malesia*: Malaya, Singapore, Sumatra, Java (also Madura I.), Lesser Sunda Is. (Sumba, Timor, Wetar), Borneo (Kalimantan: Banjermasin, Butungan, W. Kutai; Sarawak; Sabah), Philippines (Bohol, Coron I., Negros, Panay, Mindanao), Celebes (NE. & SW.), Moluccas (Tanimbar, Kai). Fig. 6.

Ecol. Wide-spread, but scattered, in secondary vegetation, apparently rather rare in Malaya and Borneo, up to 1400 m but usually at lower altitudes.

21. *Leea rubra* BL. ex SPRENG. Syst. Veg. 1 (1824) 670; BL. Bijdr. (1825) 197; G. DON, Gen. Hist. 1 (1831) 712; DECNE, Nouv. Ann. Mus. Hist. Nat. Paris 3 (1834) 445; STEUD. Nom. Bot. ed. 2, 2 (1840) 21; HASSK. Cat. Hort. Bog. (1844) 167; Pl. Jav. Rar. (1848) 453; MIQ. Fl. Ind. Bat. 1, 2 (1859) 610; Ann. Mus. Bot. Lugd.-Bat. 1 (1863) 96, *incl. var. polyphylla* (MIQ.) MIQ. *et var. apiifolia* ZIPP. ex MIQ. l.c. 97; KURZ, J. As. Soc. Beng. 44, ii (1875) 180; Fl. Burma 1 (1877) 279; CLARKE, J. Bot. 19 (1881) 104; ENGL. Bot. Jahrb. 7 (1886) 465; KING, J. As. Soc. Beng. 65, ii (1896) 416; KOORD. Minah. (1898) 398, *incl. forma celebica* KOORD. *nom. nud.*; PRAIN, Beng. Pl. (1903) repr. (1963) 239; VAL. Bull. Dép. Agr. Ind. Néerl. 10 (1907) 31; LAUT. Nova Guinea 8 (1910) 302; GAGNEP. Fl. Gén. I.-C. 1 (1912) 939; MERR. En. Born. (1921) 396; RIDL. Fl. Mal. Pen. 1 (1922) 485; CRAIB, Fl. Siam. En. 1 (1926) 320; BURK. Dict. (1935)

1327; CORNER, Ways. Trees 1 (1940) 97; GAGNEP. Fl. Gén. I.-C. Suppl. (1950) 846; SUESSENG. in E. & P. Nat. Pl. Fam. ed. 2, 20d (1953) 383, 387, 388; DUONG, Fl. Vietnam (1960) 266; BACKER & BAKH. f. Fl. Java 2 (1965) 94; CORNER & WATANABE, Ill. Guide Trop. Pl. (1969) 454; RIDSDALE, Blumea 22 (1974) 91, f. 3/10-11, 6/6-7. — *L. polyphylla* MIQ. Fl. Ind. Bat. 1, 2 (1859) 610. — *L. sanguinea* (non WALL.) KURZ, J. As. Soc. Beng. 42, ii (1873) 66, *pro parte*. — *L. coccinea* (non PLANCH.) KURZ, *ibid.* 44, ii (1875) 179. — *L. brunoniana* CLARKE, J. Bot. 19 (1881) 166; BAILEY, Queensl. Fl. 1 (1899) 284; SUESSENG. l.c. 383, *pro parte*; SPECHT, Rec. Am.-Austr. Sc. Exp. Arnheim Land 3 (1958) 257. — *L. linearifolia* CLARKE, J. Bot. 19 (1881) 165; GAGNEP. Fl. Gén. I.-C. 1 (1912) 943; *ibid.* Suppl. (1950) 851; SUESSENG. l.c. 383, 387. — Fig. 3, 20.

Small semi-herbaceous shrub up to 3 m. *Leaves* 2- to 4-pinnate, leaflets numerous. Petiole 2-8 (-15) cm long; *stipules* a narrow wing, 2-4 by 0.3-0.5 cm, scar rather broad, similarly long; rachis ($2\frac{1}{2}$ -) 5-25 (-42) cm. leaflets ovate to ovate-oblong, less frequently elliptic to elliptic-lanceolate or linear-lanceolate, (2-) 4-8 (-14) by (0.3-) 1.5-4 (-6) cm, glabrous, or less frequently with small hairs along the nerves, chartaceous; pearl glands apparently absent from the leaflets; margin crenate to shallowly serrate; apex acute to shortly acuminate; base rounded to acute; nerves 5-10 pairs, sometimes with minute hairs; petiolules 2-5 (-10) mm, often winged. *Inflorescences* (4-) 8-14 (-16) cm long, rusty pubescent, generally compact; bracts deltoid-triangular, inconspicuous; peduncle 3-8 (-16) cm, main branches numerous, ultimate branches short. *Flowers* 5-merous, bright red. Calyx 2- $2\frac{1}{2}$ by $1\frac{1}{2}$ - $2\frac{1}{2}$ mm, glabrous; lobes 1 by 1 mm. Corolla tube + staminodial lobes 2-3 mm; corolla lobes $1\frac{1}{2}$ - $2\frac{1}{2}$ by $1\frac{1}{2}$ mm.

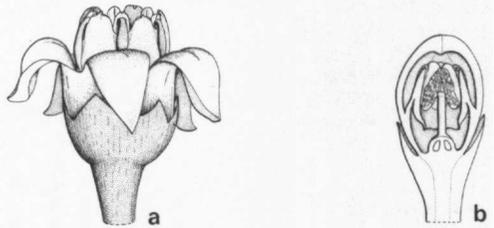


Fig. 20. *Leea rubra* BL. ex SPRENG. a. Flower, b. ditto in LS, both $\times 5$ (a-b PULLEN 6703).

Staminodial tube 1.2-2 mm long; upper free part 1- $1\frac{1}{4}$ mm, lobes shallowly retuse or cleft, sinuses deep $\frac{1}{2}$ - $\frac{3}{4}$ mm; lower free part 0.3-0.5 mm. Ovary 4-6-celled, style 1-2 mm. Filaments 1 mm, anthers 1 mm. *Fruit* 8-10 mm \varnothing , dark red; seeds c. 4 by 4 mm, usually 6, rumination outline simple, endosperm simply ruminant.

Distr. India (Assam, Khasia, Bengal), Bangladesh, Burma, Thailand, Cambodia, Laos, N. & S.

Vietnam; *Malesia*: Malaya (incl. Penang), Singapore, S. Sumatra (Palembang), Java (incl. Madura I.), Lesser Sunda Is. (Sumbawa, Flores, Sumba, Timor), Borneo (SE. Kalimantan, Sabah), Philippines (Palawan), Celebes, Moluccas (Tanimbar, Kai), New Guinea (Papua: Western & Central Distr.); N. Australia. Fig. 21.

Ecol. Dry monsoon forest, savannah, and secondary vegetation, up to 500 m.

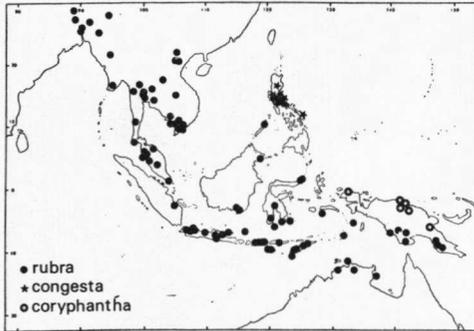


Fig. 21. Range of three *Leea* species.

22. *Leea saxatilis* RIDL. J. Str. Br. R. As. Soc. 75 (1917) 26; Fl. Mal. Pen. 1 (1922) 486; CRAIB, Fl. Siam. En. 1 (1926) 320; SUESSENG. in E. & P. Nat. Pfl. Fam. ed. 2, 20d (1953) 385; RIDSDALE, Blumea 22 (1974) 92, f. 3/4. — Fig. 3.

Small shrub up to 2 m. *Leaves* 1-pinnate, leaflets 9–13. Petiole (6–) 14–30 (–45) cm long; *stipules* a narrow wing 3–9 by 0.3–0.5 cm, scar narrow, similarly long; rachis 15–30 (–48) cm, ferruginously pubescent. Leaflets elliptic to elliptic-oblong, basal leaflets occasionally ovate, (10–) 15–21 (–25) by (3–) 5–7 (–9) cm, glabrous, chartaceous; pearl glands not seen; margin serrate to biserrate; apex acuminate; base obtuse to rounded (sometimes cuneate in apical leaflets); nerves (8–) 10–13 pairs, ferruginously pubescent; petiolules 3–15 mm. *Inflorescences* up to 8 (–12) cm long, condensed, ferruginously pubescent; bracts narrowly triangular up to 5 by 2 mm; peduncle up to 8 cm, lateral and ultimate branches of inflorescence highly condensed. *Flowers* 5-merous, red. Calyx 2 by 2 mm, pubescent; lobes 1 by 1 mm. Corolla tube + staminodial lobes 3 mm; corolla lobes 2 by 1½ mm. Staminodial tube 3 mm long; upper free part 1¼–1½ mm, lobes retusely apiculate, sinuses shallow, to ½ mm; lower free part 1½ mm. Filaments 1 mm, anthers 1 mm. Ovary 6-celled, style 2 mm. *Fruit* c. 12 mm Ø, red; seeds usually 6, c. 5 by 4 mm, rumination outline simple, endosperm simply ruminant.

Distr. *Malesia*: Malaya (Perak, Selangor). Fig. 17.

Ecol. Shaded rocks and riverine areas, up to 500 m.

Note. A rarely collected species most probably related to *L. setuligera* CLARKE; further collections and field observations required.

23. *Leea guineensis* G. DON, Gen. Hist. 1 (1831) 712; HOOK. f. Niger Fl. (1849) 268; HUTCH. & DALZ. Fl. W. Trop. Afr. 1 (1928) 479; Appendix (1937) 304; SUESSENG. in E. & P. Nat. Pfl. Fam. ed. 2, 20d (1953) 388; RIDSDALE, Blumea 22 (1974) 92, f. 4/2–5, with full synonymy. — *L. arborea* TELF. ex W. & A. Prod. (1834) 132. — *L. manillensis* WALP. Nov. Act. Ac. Caes. Leop.-Car. 19 (1843) Suppl. 1: 314; Repert. 5 (1845) 378; VIDAL, Phan. Cuming. (1885) 104; Rev. Pl. Vasc. Filip. (1886) 94; MERR. Philip. J. Sc. 1 (1906) Suppl. 89; *ibid.* 3 (1908) Bot. 419; Fl. Manila (1912) 312; Sp. Blanc. (1918) 247; BROWN, Min. Prod. Philip. For. 3 (1921) 206; MERR. En. Philip. 3 (1923) 12; SUESSENG. in E. & P. Nat. Pfl. Fam. ed. 2, 20d (1953) 383; LIU, Illustr. Nat. Introd. Lign. Pl. Taiwan (1962) 851; LI, Woody Fl. Taiwan (1963) 524, f. 203. — *L. staphylea* (non ROXB.) WIGHT, Ill. Ind. Bot. 1 (1845) t. 58; Ic. Pl. As. 1 (1854) t. 78. — *L. aurantiaca* ZOLL. & MOR. Nat. Geneesk. Arch. N. I. 2 (1851) 577; MIQ. Fl. Ind. Bat. 1, 2 (1859) 612; BACKER & BAKH. f. Fl. Java 2 (1965) 94; BANERJEE & BABU, Ind. For. 97 (1971) 19. — *L. javanica* (non BL.) MIQ. Ann. Mus. Bot. Lugd.-Bat. 1 (1869) 100; VIDAL, Rev. Pl. Vasc. Filip. (1886) 93; MERR. Philip. Bur. For. Bull. (1903) 36; En. Born. (1921) 369; En. Philip. 3 (1923) 12. — *L. laetae* WALL. [Cat. (1832) n. 6831; STEUD. Nom. Bot. ed. 2, 2 (1849) 21; all *nom. nud.*] ex KURZ, J. As. Soc. Beng. 42, ii (1873) 65; *ibid.* 44, ii (1875) 179; Fl. Burma 1 (1877) 278; CLARKE, J. Bot. 19 (1881) 163; SUESSENG. in E. & P. Nat. Pfl. Fam. ed. 2, 20d (1953) 383. — *L. sanguinea* WALL. [Cat. (1832) n. 6824; Boj. Hort. Maurit. (1837) 61; all *nom. nud.*] ex KURZ, J. As. Soc. Beng. 42, ii (1873) 66, *pro parte*. — *L. acuminata* WALL. [Cat. (1832) n. 6830; STEUD. Nom. Bot. ed. 2, 2 (1840) 21; KURZ, Rep. Veg. And. Isl. (1870) 34; all *nom. nud.*] ex CLARKE, J. Bot. 19 (1881) 141; J. Linn. Soc. Bot. 25 (1889) 13; KING, J. As. Soc. Beng. 65, ii (1896) 415; BRANDIS, Ind. Trees (1906) 179; BACKER, Schoolfl. Java (1911) 256; GAGNEP. Fl. Gén. I.-C. 1 (1912) 941; CRAIB, Aberd. Univ. Stud. 57 (1912) 43; HAINES, Bot. Bihar & Orissa 1 (1925) 207; CRAIB, Fl. Siam. En. 1 (1926) 316; COWAN & COWAN, Trees N. Beng. (1929) 40; KANJILAL & DAS, Fl. Assam 1 (1936) 304; GAGNEP. Fl. Gén. I.-C. Suppl. (1950) 851; SUESSENG. in E. & P. Nat. Pfl. Fam. ed. 2, 20d (1953) 383, 387; HUNDLEY & U CHIT KO KO, List Tr. Shr. Herbs & Climb. Burma (1961) 54; HARA, Fl. E. Himal. (1966) 199; Fl. E. Himal. 2nd Rep. (1971) 78. — *L. cumingii* CLARKE, J. Bot. 19 (1881) 166; ROLFE, J. Bot. 23 (1885) 211; VIDAL, Phan. Cuming. (1885) 104; Rev. Pl. Vasc. Filip. (1886) 94; MERR. En. Philip. 3 (1923) 11; SUESSENG. in E. & P. Nat. Pfl. Fam. ed. 2, 20d (1953) 383. — *L. wightii* CLARKE, J. Bot. 19 (1881) 105; JACKSON, Ind. Kew. 2 (1895) 48 ('*wrightii*'); BRANDIS, Ind. Trees (1906) 179; GAMBLE & FISCH. Fl. Pres. Madras 1 (1918) 239;

SUESSENG. *l.c.* 383. — *L. parva* ELM. Leaflet. Philip. Bot. 1 (1908) 317; C. B. ROB. Philip. J. Sc. 6 (1911) Bot. 210; MERR. En. Philip. 3 (1923) 13; SUESSENG. *l.c.* 387. — *L. negrosense* ELM. Leaflet. Philip. Bot. 2 (1908) 494; C. B. ROB. Philip. J. Sc. 6 (1911) Bot. 209; MERR. En. Philip. 3 (1923) 13; SUESSENG. *l.c.* 386. — *L. palawanensis* ELM. Leaflet. Philip. Bot. 5 (1913) 1851. — *L. euphlebica* MERR. Philip. J. Sc. 9 (1915) Bot. 453; En. Philip. 3 (1923) 13; SUESSENG. *l.c.* 386. — *L. parvifoliola* MERR. Philip. J. Sc. 11 (1916) Bot. 145; En. Philip. 3 (1923) 13; SUESSENG. *l.c.* 386. — *L. papillosa* MERR. Philip. J. Sc. 13 (1918) Bot. 307; En. Philip. 3 (1923) 13; SUESSENG. *l.c.* 386. — *L. luzonensis* ELM. Leaflet. Philip. Bot. 8 (1919) 3104. — *L. robusta* (non ROXB.) RIDL. Fl. Mal. Pen. 1 (1922) 486; CRAIB, Fl. Siam. En. 1 (1926) 320. — *L. dentata* CRAIB, Kew Bull. (1926) 357; Fl. Siam. En. 1 (1926) 317; GAGNEP. Fl. Gén. I.-C. Suppl. (1950) 846; SUESSENG. *l.c.* 386, 387. — *L. schomburgkii* CRAIB, Kew Bull. (1926) 358; Fl. Siam. En. 1 (1926) 321; GAGNEP. Fl. Gén. I.-C. Suppl. (1950) 855; SUESSENG. *l.c.* 387. — *L. brunoniana* (non CLARKE) LAUT. Bot. Jahrb. 63 (1930) 277; KANEHIRA, Bot. Mag. Tokyo 45 (1931) 295; Fl. Micronesia (1933) 208; J. Dep. Agr. Kyushu Imp. Univ. 4 (1936) 362. — *L. pallidifolia* KANEHIRA, Bot. Mag. Tokyo 49 (1935) 354; SUESSENG. *l.c.* 388. — *L. bulusanensis* ELM. Leaflet. Philip. Bot. 10 (1939) 3801. — Fig. 3.

Shrub, sometimes with a creeping rootstock, or ± herbaceous branches, or tree 1-5 (-10) m; branches usually glabrous or finely pubescent, rarely densely hairy, villose or papillose. *Leaves* (1-) 2- or 3 (-4)-pinnate, leaflets numerous. Petiole (5-) 10-20 (-25) cm; *stipule* obovate, 2-4 (-6) by (1-) 1½-3 cm, early caducous, glabrous, sparsely pubescent to woolly; scar broadly triangular (1-) 2-3 (-4) cm long, slightly shorter than the stipule; rachis (10-) 25-75 (-100) cm. Leaflets (broadly) ovate to ovate-lanceolate or (broadly) elliptic to elliptic-lanceolate, (3-) 8-20 (-30) by (1½-) 3-8 (-14) cm, rarely irregularly incised, above usually glabrous, rarely sparsely hairy to hispid, below glabrous to sparsely pubescent, rarely densely pilose or hispid, chartaceous to subcoriaceous; pearl glands globoid, small, rapidly caducous; margin repand to denticulate; apex (long-)acuminate; base cuneate to rounded, less frequently truncate or unequal; nerves (4-) 6-10 (-18) pairs, often with hairy domatia; petiolules (2-) 6-12 (-20) mm, glabrous or pubescent. *In-florescences* (3-) 10-25 (-40) cm long, compact to lax, less frequently condensed, rusty pubescent, less frequently glabrous or hairy, rarely woolly; bracts ovate to deltoid to narrowly triangular, up to 3 mm long; peduncle (1-) 3-10 (-25) cm, lateral and ultimate branches long and spreading, or ultimate branches condensed. *Flowers* 5-merous, red to reddish orange, staminal tube red to citrous white. Calyx 1-3 by 2-4 mm, glabrous or pubescent; lobes 1-2 by 1-2 mm. Corolla tube + staminodial lobes (2-) 3-5 mm long; corolla lobes 2-4 by 1-2½ mm. Staminal tube (1½-) 2-3 mm long; upper free part (1-) 1½-2½ mm,

lobes shallowly retuse, notched or cleft, sometimes continuing growth to appear apiculate, sinuses thin, shallow 0.2-0.6 mm; lower free part (0.2) 0.5-1.25 mm. Filaments ½-1¼ mm, anthers ¾-2 mm. Ovary (4-) 6 (-8)-celled, style 1-2½ mm. *Fruit* 5-15 mm Ø, red; seeds usually 6, c. 5 by 4 mm, ruminant outline simple, endosperm simply ruminant.

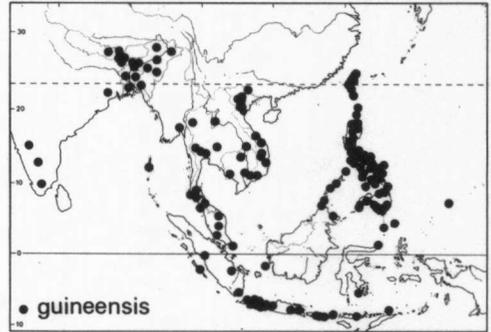


Fig. 22. Range of *Leea guineensis* G. DON in Indo-Malesia; the localities in Africa and the Malagasian area are omitted.

Distr. Tropical Africa; Madagascar, Bourbon, Mauritius; Asia: India (Madras to Assam), Burma, Thailand, Cambodia, Laos, Andaman Is., southwards becoming very rare; in *Malesia*: Malaya, Sumatra, Java, Lesser Sunda Is. (apparently absent from Borneo), Philippines (common), N. Celebes (rare); further in Taiwan and Micronesia (Palau). Fig. 22.

Ecol. In the Philippines, Taiwan and Micronesia replacing *L. indica* as the wide-spread component of secondary regrowth vegetation, but also found in primary forest; throughout the remainder of Malesia, a rather rare shrub of primary forest and shaded localities, in the area India to Vietnam and also in Africa it is once more a common component of secondary vegetation. From sea-level up to 1500 m, in the Himalayas ascending to 2250 m.

Notes. In the present circumscription the species shows a wide range of variability, both geographically and ecologically. It is undoubtedly a complex species composed of overlapping entities which cannot be satisfactorily delimited from each other, these entities sometimes having different ecological preferences. Previous workers, particularly in the Philippines have created many small segregate species, which can no longer be maintained as with increased material available all degrees of intermediates are found to exist. Most of these taxa were separated only by minor vegetative differences. The conclusion that there is but one variable species in Asia and Malesia independently concurs with that reached by GAGNEPAIN (1910) in his essay on the classification of the Asiatic species of *Leea* and that of BANERJEE

& BABU (1971) on the conspecificity of *L. aurantiaca* and *L. acuminata*. Comparison of the African and Asiatic material of '*L. guineensis*' and '*L. manillensis sensu lato*' showed that no clear cut differences could be found in herbarium material other than vague suggestions from the field notes that the colour of the staminodial tube might be different in living material; morphological characters of the leaves and flowers completely overlap.

Within the Asiatic perimeters of the variability there are clearly two ecological forms, one of shaded forest occurring in Malaya, Sumatra and Java, the other of secondary vegetation occurring in mainland Asia and in the Philippines. Within the latter area a vast range of forms is encountered and here the taxon appears to replace *L. indica* as a member of secondary vegetation.

Several morphological trends are apparent but none is clearly demarcated from the parent stock. Of these the entity '*L. manillensis*' commonly occurs from Taiwan to the Philippines. It is characterized by small leaf dimensions and usually by the presence of hairy domatia. However, all degrees of intermediates are to be found between this entity and '*L. negrosense*' with leaflets which are larger and somewhat coriaceous, or glabrous or sparsely pubescent. The most distinctive entity has woolly hairy stems and setaceous to hispid hairs on the upper leaf surface, this may be a semi-stable form within the Philippines, but again intermediates exist with the parent population. Previously this entity was given specific rank as '*L. cumingii*'. There is a parallel form from the Solomon Islands in the *L. indica* complex. The Indian material shows a less wide range of variation, but in the area Thailand to Vietnam a further morphological leaf form occurs which may well be an expression of an edge of range effect. The interrelationships of these different leaf forms can only be further resolved by ecological and population studies.

24. *Leea indica* (BURM. f.) MERR. Philip. J. Sc. 14 (1919) 245; En. Born. (1921) 368; En. Philip. 3 (1923) 11; CRAIB, Fl. Siam. En. 1 (1926) 318; CORNER, Ways. Trees 1 (1940) 97, Atlas pl. 1; MERR. & PERRY, J. Arn. Arb. 22 (1941) 380; SANTAPAU, Rec. Bot. Surv. Ind. 16 (1953) 56; PARHAM, Pl. Fiji Isl. (1964) 154; BANERJEE, Rec. Bot. Surv. Ind. 19 (1965) 33; CORNER & WATANABE, Ill. Guide Trop. Pl. (1969) 454; RIDSDALE, Blumea 22 (1974) 95, f. 4/6-8, 5/1-7, 8/5. — *Staphylea indica* BURM. f. Fl. Ind. (1768) 75, t. 23, f. 2. — *Aquilicia sambucina* L. Mantissa 2 (1771) 211; CAV. Dissert. 7 (1789) 372, t. 218 — *Aquilicia otilis* GAERTN. Fruct. 1 (1788) 275. — *Otilis zeylanica* GAERTN. l.c. t. 57, nomen. — *L. sambucina* WILLD. Sp. Pl. 1 (1789) 1177; ROXB. Hort. Beng. (1814) 18; ROEM. & SCHULTES, Syst. Veg. 4 (1819) 705; DC. Prod. 1 (1824) 635; SPRENG. Syst. Veg. 1 (1824) 670; ROXB. Fl. Ind. ed. 1, 2 (1824) 470; G. DON, Gen. Hist. 1 (1831) 712; ROXB. Fl. Ind. ed. 2, 1 (1832) 657; HASSK. Cat. Hort. Bog. (1844) 168; VOIGT, Hort. Sub. Calc. (1845) 30; HASSK. Pl. Jav. Rar. (1848) 453; A. GRAY, Bot. Wilkes U.S. Expl.

Exp. (1854) 274; GRIFF. Not. Pl. As. 4 (1854) 698; Ic. Pl. As. 4 (1854) t. 644; MIQ. Fl. Ind. Bat. 1, 2 (1859) 611; Sum. (1861) 202; Ann. Mus. Bot. Lugd.-Bat. 1 (1863) 99, incl. var. *sumatrana* (MIQ.) MIQ., var. *biserrata* (MIQ.) MIQ., var. *heterophylla* MIQ., var. *robusta* MIQ. et var. *simplex* MIQ. l.c.; BENTH. Fl. Austr. 1 (1863) 451; SEEM. Fl. Vit. (1865) 44; KURZ, Rep. Veg. And. Isl. (1870) 34; BRANDIS, For. Fl. (1874) 102; LAWS. Fl. Br. Ind. 1 (1875) 666, pro parte; KURZ, J. As. Soc. Beng. 44, ii (1875) 179; SCHEFF. Ann. Jard. Bot. Btzig 1 (1876) 15; F. v. M. Descr. Not. 1 (1876) 36; KURZ, J. As. Soc. Beng. 45, ii (1876) 124; Fl. Burma 1 (1877) 279; F.-VILL. Nov. App. (1880) 50; CLARKE, J. Bot. 19 (1881) 139, incl. var. *occidentalis* CLARKE, l.c. 140; HOME, Year in Fiji (1881) 264; VIDAL, Sinopsis (1883) 21, t. 33, f. 1; Phan. Cuming. (1885) 104; Rev. Pl. Vasc. Filip. (1886) 94; K. SCHINZ, Bot. Jahrb. 9 (1888) 208; WARB. Bot. Jahrb. 13 (1891) 368; TRIM. Fl. Ceyl. 1 (1893) 297; K. SCHINZ, Notizbl. Berl.-Dahl. 1 (1895) 53; HEMSL. Kew Bull. (1895) 134; KING, J. As. Soc. Beng. 44, ii (1896) 414; BAILEY, Queensl. Fl. 1 (1899) 284; K. SCH. & LAUT. Fl. Schutzgeb. (1900) 430; COOKE, Fl. Bomb. 1 (1902) 260; TALBOT, Trees Shrubs Bomb. Pres. ed. 2 (1902) repr. (1949) 154; PRAIN, Beng. Pl. (1903) repr. (1963) 239; K. & V. Bijdr. 9 (1903) 8; DUTHIE, Upper Gangetic Pl. 1 (1903) 176; WILLIAMS, Bull. Herb. Boiss. II, 5 (1905) 217; BRANDIS, Ind. Trees (1906) 179; MERR. Philip. J. Sc. 1 (1906) Suppl. 89; VAL. Bull. Dép. Agr. Ind. Néerl. 10 (1907) 31; MERR. Philip. J. Sc. 3 (1908) Bot. 80; WINKLER, Bot. Jahrb. 44 (1909) 537; TALBOT, For. Fl. Bomb. Pres. 1 (1909) 327; HAINES, For. Fl. Chota Nagpur (1910) 280; LAUT. Nova Guinea 8 (1910) 302; BACKER, Schoolfl. Java (1911) 256; RIDL. J. Str. Br. R. As. Soc. 59 (1911) 87; *ibid.* 61 (1912) 51; GAGNEP. Fl. Gén. I.-C. 1 (1912) 941; LAUT. Nova Guinea 8 (1912) 831; RECHINGER, Denkschr. Kais. Ak. Wiss. Wien 89 (1914) 574; GIBBS, J. Linn. Soc. Bot. 42 (1914) 65; SCHMIDT, Bot. Tidsskr. 32 (1915) 330; GAMBLE & FISCH. Fl. Pres. Madras 1 (1918) 240; RIDL. Fl. Mal. Pen. 1 (1922) 484, non fig. 48; WHITE, Proc. R. Soc. Queensl. 34 (1923) 43; LAUT. Nova Guinea 14 (1924) 138; Bot. Jahrb. 59 (1925) 531; HAINES, Bot. Bihar & Orissa 1 (1925) 208; WHITE, J. Arn. Arb. 10 (1929) 237; COWAN & COWAN, Trees N. Beng. (1929) 40; KANJILAL & DAS, Fl. Assam 1 (1936) 307; GAGNEP. Fl. Gén. I.-C. Suppl. (1950) 848; CHITTENDEN, Dict. Gard. 3 (1951) 1143, incl. var. *roehrsiana* (SANDERS) CHITTENDEN; SUESSENG, in E. & P. Nat. Pfl. Fam. ed. 2, 20d (1953) 384, 385, 387, 388; BACKER & BAKH. f. Fl. Java 2 (1965) 94; BURGER, Seedl. Trop. Tr. Shr. SE. Asia (1972) 381, f. 155. — *L. sambucifolia* SALISB. Prod. (1796) 317. — *L. staphylea* ROXB. [Hort. Beng. (1814) 18, nom. nud.] Fl. Ind. ed. 1, 2 (1824) 471, nom. illeg.; SPRENG. Syst. Veg. 1 (1824) 670; *ibid.* 4, 2 (1827) Cur. post. 70; G. DON, Gen. Hist. 1 (1831) 712; ROXB. Fl. Ind. ed. 2, 1 (1832) 658; W. & A. Prod. (1834) 132; GRAHAM, Cat. Pl. Bomb. Vic. (1839) 33; VOIGT, Hort. Sub. Calc. (1845) 30; THW. En. Pl. Zeyl. (1859) 64; DALZ. & GIBS. Bomb. Fl.

(1861) 41; DRURY, Handb. Ind. Fl. 1 (1864) 181. — *L. oitillis* (GAERTN.) DC. Prod. 1 (1824) 636; MOON, Cat. Pl. Ceyl. (1824) 18. — *L. robusta* BL. Bijdr. (1825) 198, non ROXB. ex HORNEM. 1813; SPRENG. Syst. Veg. 4, 2 (1827) Cur. post. 70; HASSK. Cat. Hort. Bog. (1844) 168. — *L. gigantea* GRIFF. Not. Pl. As. 4 (1854) 697; Ic. Pl. As. 4 (1854) t. 645, f. 2; KURZ, J. As. Soc. Beng. 42, ii (1873) 65; *ibid.* 44, ii (1875) 178; Fl. Burma 1 (1877) 280; CLARKE, J. Bot. 19 (1881) 140; KING, J. As. Soc. Beng. 65, ii (1896) 412; BRANDIS, Ind. Trees (1906) 179; RIDL. Fl. Mal. Pen. 1 (1922) 484, f. 48; CRAIB, Fl. Siam. En. 1 (1926) 317; SUESSING, in E. & P. Nat. Pfl. Fam. ed. 2, 20d (1953) 384, 385; HUNDLEY & U CHIT KO KO, List Tr. Shr. Herbs & Climb. Burma (1961) 55. — *L. viridiflora* PLANCH. Hort. Donat. (1854) 6; SUESSING, *l.c.* 384. — *L. sundaica* MIQ. Fl. Ind. Bat. 1, 2 (1859) 610; Ann. Mus. Bot. Lugd.-Bat. 1 (1863) 96, *incl. var. fuliginosa* (MIQ.) MIQ., *var. subsessilis* MIQ. *et. var. pilosiuscula* MIQ. *l.c.*; F.v.M. Descr. Not. 1 (1876) 37; SCHEFF. Ann. Jard. Bot. Btzg 1 (1876) 15; WARB. Bot. Jahrb. 13 (1891) 369; BACKER, Schooifl. Java (1911) 256; RIDL. Trans. Linn. Soc. Lond. II, Bot. 9 (1916) 32; MERR. En. Born. (1921) 369; RIDL. Fl. Mal. Pen. 1 (1922) 485; LAUT. Bot. Jahrb. 59 (1925) 534; SUESSING, in E. & P. Nat. Pfl. Fam. ed. 2, 20d (1953) 385, 388; BACKER & BAKH. f. Fl. Java 2 (1965) 94. — *L. sumatrana* MIQ. Fl. Ind. Bat. 1, 2 (1859) 611; Sum. (1861) repr. (1862) 202. — *L. divaricata* T. & B. Cat. Hort. Bog. (1860) 388, *nom. nud.* — *L. biserrata* MIQ. Sum. (1861) repr. (1862) 518. — *L. fuliginosa* MIQ. *l.c.* 518. — *L. palembanica* MIQ. *l.c.* 203, 519. — *L. pubescens* ZIPP. ex MIQ. Ann. Mus. Bot. Lugd.-Bat. 1 (1863) 97; WARB. Bot. Jahrb. 13 (1891) 369; LAUT. Bot. Jahrb. 59 (1925) 534; SUESSING, *l.c.* 388. — *L. celebica* CLARKE, J. Bot. 19 (1881) 166; SUESSING, *l.c.* 384. — *L. umbraculifera* CLARKE, J. Bot. 19 (1881) 141; BRANDIS, Ind. Trees (1906) 179; COWAN & COWAN, Trees N. Beng. (1929) 40; KANJILAL & DAS, Fl. Assam 1 (1936) 306; SUESSING, *l.c.* 384; HARA, Fl. E. Himal. (1966) 200; *ibid.* 2nd Rep. (1971) 79. — *L. brunoniana* (non CLARKE) ENGL. Bot. Jahrb. 7 (1886) 460; K. SCH. Bot. Jahrb. 9 (1888) 208; K. SCH. & LAUT. Fl. Schutzgeb. (1900) 430; LAUT. Bot. Jahrb. 59 (1925) 530. — *L. naumannii* ENGL. Bot. Jahrb. 7 (1886) 466; K. SCH. Bot. Jahrb. 9 (1888) 208; Notizbl. Berl.-Dahl. 2 (1898) 130; SUESSING, *l.c.* 388. — *L. javanica* (non BL.) KING, J. As. Soc. Beng. 65, ii (1896) 418; K. & V. Bijdr. 9 (1903) 12; BACKER, Schooifl. Java (1911) 255; CRAIB, Aberd. Univ. Stud. 57 (1912) 43; RIDL. Fl. Mal. Pen. 1 (1922) 486; CRAIB, Fl. Siam. En. 1 (1926) 318; GAGNEP. Fl. Gén. I.-C. Suppl. (1950) 853; BACKER & BAKH. f. Fl. Java 2 (1965) 94. — *L. roehrsiana* SANDERS [Cat. (1899) 21, *nom. nud.*] ex MASTERS, Gard. Chron. III, 23 (1898) 242, f. 92; BONSTEDT in Parey's Blumengart. (1931) 895. — *L. novoguineensis* VAL. Bull. Dép. Agr. Ind. Néerl. 10 (1907) 31; LAUT. Bot. Jahrb. 59 (1924) 534; SUESSING, *l.c.* 388. — *L. ramosii* MERR. Philip. J. Sc. 17 (1920) 282; En. Philip. 3 (1923) 14; SUESSING, *l.c.* 386. — *L. gracilis* LAUT. Bot. Jahrb.

59 (1925) 532; SUESSING, *l.c.* 388. — *L. expansa* CRAIB, Kew Bull. (1926) 358; Fl. Siam. En. 1 (1926) 317; GAGNEP. Fl. Gén. I.-C. Suppl. (1950) 852; SUESSING, *l.c.* 386, 387. — *L. longifoliola* MERR. Lingn. Sc. J. 14 (1935) 33, f. 11; GAGNEP. Fl. Gén. I.-C. Suppl. (1950) 853; SUESSING, *l.c.* 387. — Fig. 3, 4e, 23.

Shrub, treelet or small tree, 2–10 (–16) m, multi- or single stemmed, frequently stilt-rooted; stems glabrous to pubescent, rarely woolly or scabrously hairy or papillose or bristly. *Leaves* (1-) 2- or 3-pinnate, leaflets 7–∞. Petiole (6-) 10–25 (–35) cm long; *stipules* obovate, up to 6 by 4 cm, early caducous, usually glabrous to sparsely pubescent, rarely densely soft or bristly hairy, scar broadly triangular, 2–3½ (–5) cm long; rachis (6-) 10–35 (–60) cm, glabrous to pubescent, rarely soft or bristly hairy, or papillose. Leaflets (broadly ovate to ovate) ovate-oblong to ovate-lanceolate or (broadly) elliptic to elliptic-lanceolate, (4-) 10–24 (–45) by (1-) 3–12 (–20) cm, glabrous to hairy, rarely densely so, or woolly, chartaceous to subcoriaceous; pearl glands angular to somewhat globose, small, rapidly caducous; margins (crenate to) serrate to shallowly dentate; apex acute to acuminate; base cuneate to rounded (to subcordate); nerves (5-) 6–16 (–20) pairs; petiolules up to 25 mm, glabrous to hairy. *Inflorescences* (5-) 10–25 (–40) cm long, usually broad and lax,

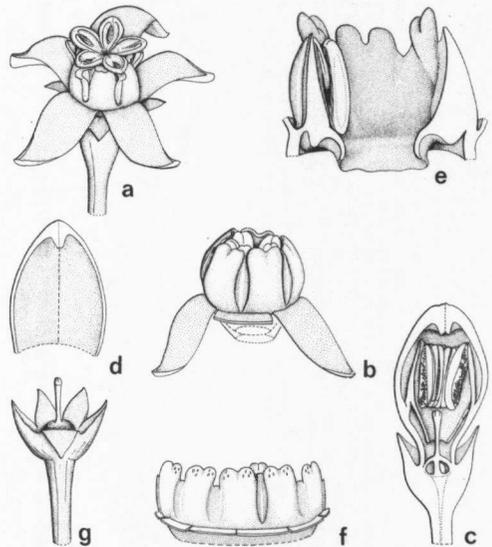


Fig. 23. *Leea indica* (BURM. f.) MERR. a. Flower, with elevated anthers, b. staminal tube, filaments and apices of anthers, two petals, rest removed, c. flower in LS, d. corolla lobe from inside, e. staminal tube from inside with one anther, f. ditto from outside with one stamen, g. calyx and pistil, all $\times 5$ except e $\times 10$ (a GEESINK 5946, b-g BSIP 14885).

rarely condensed, glabrous to pubescent, rarely soft or bristly hairy or papillose; bracts deltoid to narrowly triangular (to linear), up to 4 (-8) mm long; peduncle up to 15 cm, lateral and ultimate branches numerous and spreading, rarely highly condensed. *Flowers* 5-merous, greenish-white. Calyx ($1\frac{1}{2}$ -) 2-3 by (2-) 3-4 mm, glabrous to pubescent, lobes 1-2 by 1-2 mm. Corolla tube + staminodial lobes $2\frac{1}{2}$ - $3\frac{1}{2}$ mm; corolla lobes $2\frac{1}{2}$ - $3\frac{1}{2}$ by $1\frac{1}{2}$ - $2\frac{1}{2}$ mm. Staminodial tube ($1\frac{1}{2}$ -) 2- $2\frac{1}{2}$ mm long; upper free part $1\frac{1}{4}$ -2 mm; lobes shallowly retuse, notched (or cleft), sinuses shallow to 0.4 mm, rarely deep $\frac{3}{4}$ - $1\frac{1}{4}$ mm; lower free part 0.2-0.5 mm. Filaments $\frac{3}{4}$ - $1\frac{1}{2}$ mm, anthers 1- $1\frac{1}{2}$ mm. Ovary (4-) 6 (-8)-celled, style 1- $1\frac{1}{2}$ mm. *Fruit* 5-10 (-15) mm ϕ , purple-black; seeds usually 6, c. 5 by 4 mm, rumination outline simple, endosperm simply ruminant.

Distr. Ceylon, India (from Madras and Bombay northwards to Punjab, Sikkim, Assam), Nepal, Bangladesh, Burma, Thailand, Cambodia, Laos, N. & S. Vietnam, China (Yunnan, Kwangsi, Hainan), Andaman and Nicobar Is.; in *Malesia*: Malaya, Singapore, Sumatra, Java, Lesser Sunda Is., Borneo, Philippines, Celebes, Moluccas, New Guinea (incl. Bismarck Archipelago); N. Australia, Solomon Is., Santa Cruz Is., New Hebrides (Espiritu Santo), Fiji (Vanau, Levu, Ovalau, Viti Levu, Kandavu, Moala), ?Tonga Is. Fig. 24.

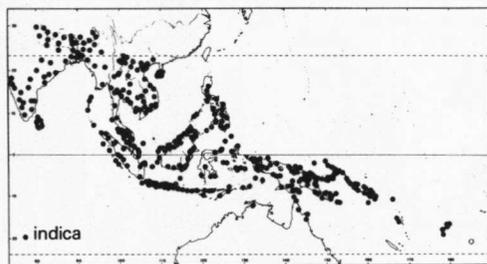


Fig. 24. Range of *Leea indica* (BURM. f.) MERR.; the locality of the Tonga Is. is uncertain.

Ecol. Wide-spread and common throughout the area, secondary forest and villages (often coppiced), primary forest, wet areas to ridges up to 1700 m, in the Himalayas ascending to 2500 m.

Notes. Many attempts have been made to segregate this common wide-spread species into smaller taxonomic units, particularly by MIQUEL who studied plants from the area where the greatest morphological diversity occurs. The majority of these segregates have been established on leaflet characters. One entity, somewhat distinctive in flower by the deep sinuses of the staminodial tube, occurs from Burma to Malaya together with the normal form of *L. indica*, overlapping in vegetative and other characters. It was considered to be specifically distinct by GRIFFITH, who described it as *L. gigantea*. The situation closely parallels that

found in the Madagascan material of *L. guineensis* where the same deep sinuses occur. In *L. guineensis* this character occurs allopatrically in an insularly isolated population whilst in '*L. gigantea*' the character occurs sympatrically within the range of *L. indica*.

The remainder of the material shows rather interesting trends, particularly in leaf vestiture and dimensions. Within the area from India across to China and southward to Java the leaflets tend to be more or less glabrous and apparently have a trend to increase in size, culminating in large leaflet forms in Java. In the herbarium leaflets of all size classes may be found on plants from Java whilst, as far as can be ascertained, large leaflet forms do not occur in India. This trend is particularly apparent in the dimensions of the terminal leaflets. Eastwards across the Lesser Sunda Islands leaf pubescence tends to increase, culminating in very pubescent forms in New Guinea and the Bismarck Archipelago. The Solomon Islands have been very intensively collected and are relatively over-represented in the collections compared to other areas, but here all but two collections are more or less glabrous. Further eastwards to Fiji both pubescent and glabrous forms occur, but there is a decrease in the leaf size so that the glabrous form cannot be separated from the material from India or Ceylon.

The two specimens from the Solomon Is., BSIP 5371 (Rob Roy I.) and NGF 16378 (Bougainville), are unusual in having very large leaflets (c. 25 by 12 cm) which are hairy on the nerves, whilst the remainder of the Solomon Islands material is glabrous. Furthermore the stem, rachises, stipules and inflorescences are covered with bristle-like hairs, a feature somewhat paralleling the condition found in '*L. cumingii*' of the *L. guineensis* complex.

However, although certain general trends in leaf dimension and vestiture can be recognized, random exceptions occur in all areas and no absolute trends can be delimited. So within New Guinea occasional glabrous leaved species occur which cannot be separated from material from normal populations in Malaya. The problem is to obtain uniform comparable samples from the wide-spread populations of a species common in populated areas and frequently subjected to cutting and coppicing.

25. *Leea smithii* KOORD. Minah. (1898) 398, 622; Fl. N. O. Celebes, Suppl. 2 (1922) pl. 59; *ibid.* Suppl. 3 (1922) 29; KOORD.-SCHUM. Syst. Verz. 3 (1914) 79; SUESSENG. in E. & P. Nat. Pfl. Fam. ed. 2, 20d (1953) 386; RIDSDALE, Blumea 22 (1974) 96, f. 4/9. — *L. boerlageana* KOORD. Minah. (1898) 68, *nomen*. — Fig. 3.

Small tree up to 3 m. *Leaves* 1- or 2-pinnate. Petiole over 30 cm (c. 40 cm in plate); *stipules* 6 by 3 cm, scar 4 cm; rachis 60-?120 cm. Petiole, rachis and costa with crisped fluted emergences. Leaflets elliptic-oblong, (13-) 30-40 by (7-) 10-17 cm, glabrous, chartaceous; pearl glands subglobose, black; margins shallowly denticulate; apex acuminate; base rounded; nerves 10-18 pairs, slightly pubescent and with small emergences;

petiolules 5–15 mm. *Inflorescences* c. 5 cm overall. *Flowers* unknown. *Fruit* c. 10 mm \varnothing ; seeds 6.

Distr. *Malesia*: NE. Celebes (Minahassa). Fig. 16.

Ecol. Understorey treelet of primary forest, 650 m.

Note. In absence of flowers the taxonomic status and position remains in doubt. The fluted stems and the structure of the epidermis and cuticle are very distinctive. However, there is a possibility that the taxon represents an extreme variation of *L. indica* (BURM. f.) MERR.

Dubious species

Leea erecta VOLL. & BRADE, *Rodroguesia* 1 (1935) 59, *nom. nud.*

An invalid horticultural name entered in a seed list.

Leea humilis HASSK. *Cat. Hort. Bog.* (1844) 169, *descr. in nota*; MIQ. *Fl. Ind. Bat.* 1, 2 (1859) 611 = probably *L. aequata*.

Leea javanica BL. *ex* SPRENG. *Syst. Veg.* 1 (1824) 670; BL. *Bijdr.* (1825) 197; SPRENG. *Syst. Veg.* 4, 2 (1827) *Cur. post.* 70; G. DON, *Gen. Hist.* 1 (1831) 712; STEUD. *Nom. Bot. ed.* 2, 2 (1840) 21; HASSK. *Cat. Hort. Bog.* (1844) 168; MIQ. *Fl. Ind. Bat.* 1, 2 (1859) 610.

BLUME's description reads: 'L: caule tereti punctato-scabro, foliis bipinnatis, foliolis infimis saepe geminis, oblongis acute serrulatis glabris'.

No authentic specimen of this species has been traced, a situation which was also reported by KOORDERS & VALETON (*Bijdr.* 9, 1903, 13). From the description it can be seen that the taxon has bipinnate leaves with glabrous leaflets. Thus, if it is a *Leea*, by elimination of other possibilities, the description must apply to either *L. guineensis* G. DON or *L. indica* (BURM. f.) MERR.

It has variously been interpreted as one or the other by most authors except KOORDERS who, in earlier years, in part identified plants of *L. aculeata* BL. *ex* SPRENG. with this taxon. This clearly is an error as the leaves in this species are always 1-pinnate.

KING, RIDLEY, and BACKER & BAKH. f., interpreted it to have green flowers and thus representing a form of *L. indica*.

On the other hand, MIQUEL, and MERRILL, considered that it represented a red flowering taxon.

This latter view would seem more probable, as BLUME also described two forms of *L. indica* under *L. sambucina* WILLD. and *L. robusta* BL. the remaining possible entity of this species likely to be distinguished would be *L. sundaica* MIQ., but this has pubescent leaves.

If it can be shown conclusively that it represents a red flowered species then clearly this name will take priority over *L. guineensis*.

Excluded species

Leea cordata WALL. *Cat.* (1832) n. 6819; STEUD. *Nom. Bot. ed.* 2, 2 (1840) 21; KURZ, J. As. Soc. *Beng.* 42, ii (1837) 66, *in nota*, all *nom. nud.* = *Vitis* sp. (*Vitaceae*), cf. LAWSON, *Fl. Br. Ind.* 1 (1875) 668.

Leea laevis HEYNE *ex* WALL. *Cat.* (1829) n. 1258, *nom. nud.*; HOOK. & JACKSON, *Ind. Kew.* 2 (1895) 48, *pro syn.* of *Heynea trijuga* ROXB. = *Trichilia connaroides* (W. & A.) BENTV. (*Meliaceae*), cf. BENTV. *Act. Bot. Neerl.* 11 (1962) 13.

Leea odontophylla WALL. *Cat.* (1832) n. 6820, *nom. nud.* = *Ampelopsis latifolius* (WALL.) PLANCH. (*Vitaceae*), cf. LAWSON, *Fl. Br. Ind.* 1 (1875) 668.

Leea spinosa SPRENG. *Syst. Veg.* 1 (1825) 670 = *Aralia chinensis* L. (*Araliaceae*). MERRILL (*Int. Rumph.* 1917, 347) has pointed out that SPRENGEL apparently intended only to transfer to *Leea* the plant depicted by RUMPHIUS (*Herb. Amb.* 4, 1743, t. 44). LINNAEUS (*Syst. Nat. ed.* 10, 1759, 967) included this plate in the synonymy of *Aralia chinensis* following the interpretation of STICKMAN (*Herb. Amb.* 1754, 16; LINNÉ, *Amoen. Acad.* 4, 1759, 127). Unfortunately SPRENGEL's good intentions went astray as he effectively renamed *Aralia chinensis* L. (*Sp. Pl.* 1753, 273) and did not name the plant from Ambon.