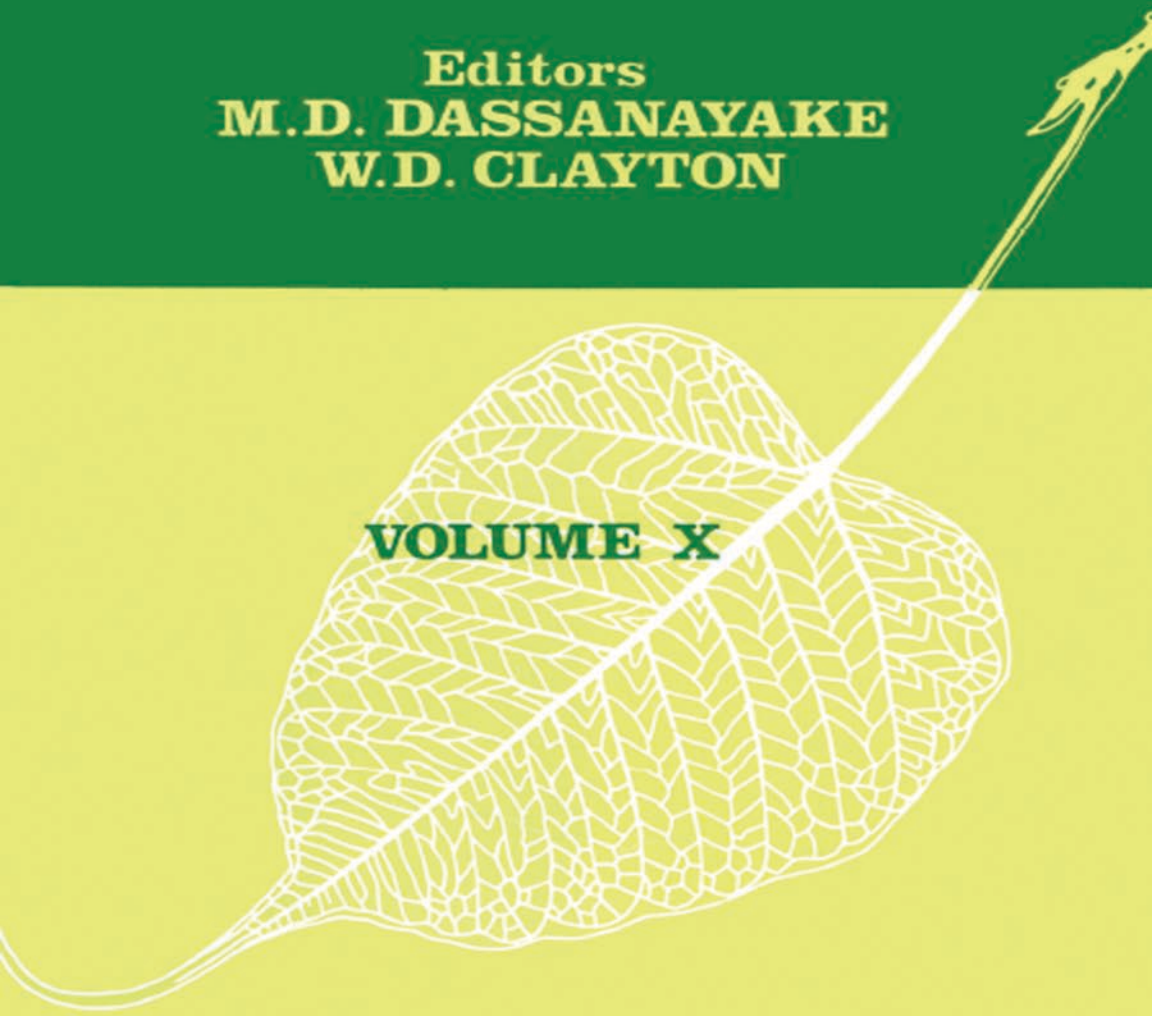
A REVISED HANDBOOK TO THE

FLORA OF CEYLON

Editors
M.D. DASSANAYAKE
W.D. CLAYTON



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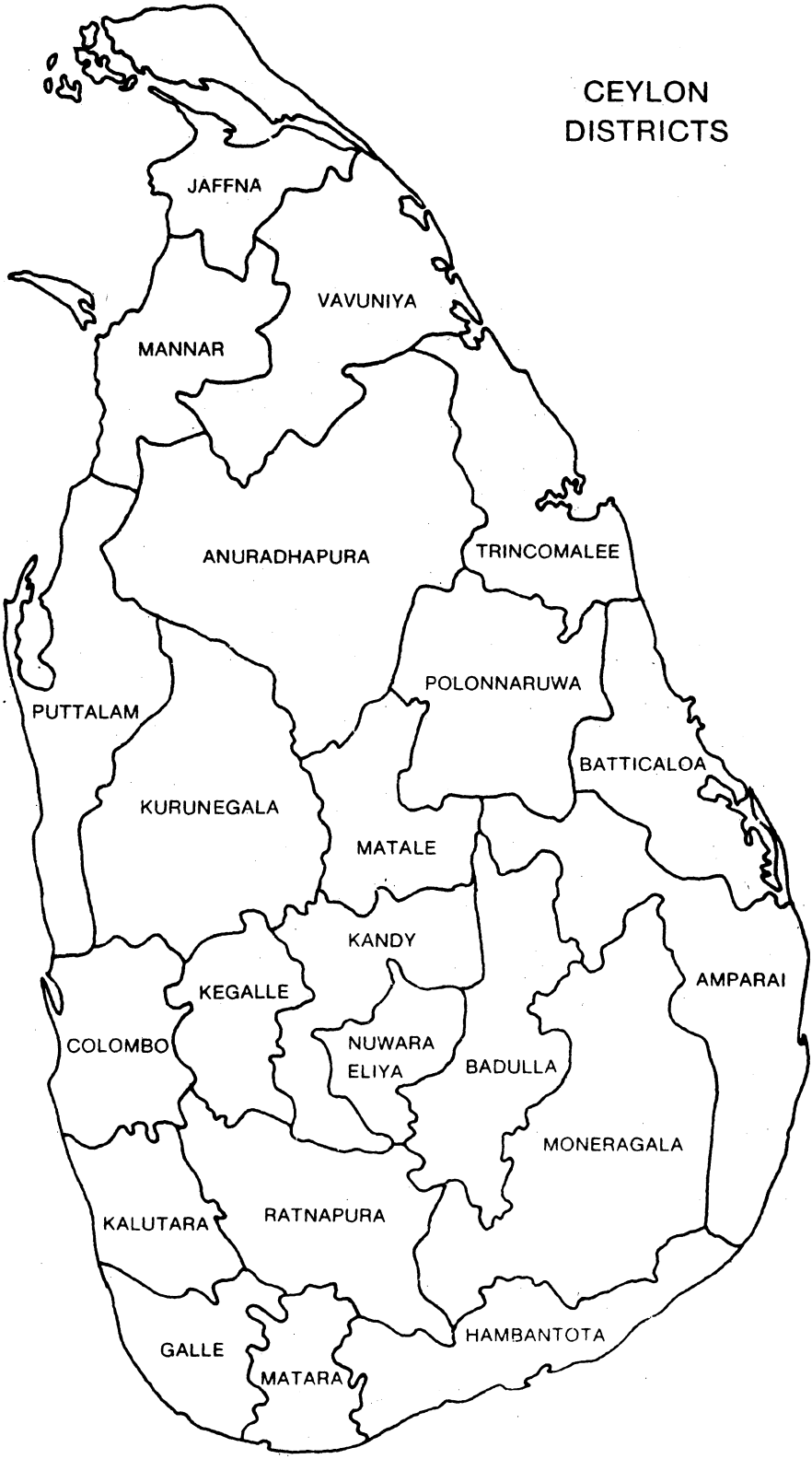
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A Revised Handbook to the FLORA OF CEYLON

VOLUME X

Sponsored by the
University of Peradeniya,
Department of Agriculture, Sri Lanka,
and the Overseas Development Administration, U.K.

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FOREWORD

In 1990 the Overseas Development Administration undertook to complete the Revised Handbook to the Flora of Ceylon by funding collaboration between Royal Botanic Gardens, Peradeniya and Royal Botanic Gardens, Kew, allowing a gradual withdrawal of the Smithsonian contribution. This volume is the first to be published wholly under the auspices of the new three-way partnership.

W.D. CLAYTON

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A Revised Handbook to the FLORA OF CEYLON

VOLUME X

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ARALIACEAE

(by David G. Frodin*)

Juss., Gen. Pl. 217. 1789 ("Araliae"). Type genus: *Aralia* L., Sp. Pl. 273. 1753.

Trees, shrubs, lianes, rhizomatous herbs or woody hemi-epiphytes, sometimes unbranched and palmlike and often armed, hermaphrodite, polygamous or dioecious; indumentum, when present, of simple or stellate hairs. Stems and branches mostly orthotropic, usually aromatic when cut or bruised and often quite pithy; shoots all alike or differentiated into long and short states (only the latter then being fertile); buds covered by the stipular sheaths of the leaves or by cataphylls. Foliage of juvenile plants or reversion shoots sometimes differing from that of adults, in certain species markedly so. Leaves often large, spirally arranged or alternate, rarely opposite or in whorls, simple or compound; petiole usually more or less clasping the stem; stipules absent or when developed distinct or united into a sometimes prominent ligule; blades when single entire or pinnately or palmately lobed, when multiple digitately or pinnately arranged, sometimes to the second or third degree; margins entire or variously toothed or slashed. Inflorescence terminal or pseudolateral, rarely lateral (and usually then as part of a sometimes very reduced short shoot), simple or, when (as is more often the case) compound, usually paniculate but sometimes more or less umbelliform, usually distinct from the foliage, naked (the bracts quickly falling) or with more or less persistent internal or external and sometimes leaf-like bracts; ultimate parts mostly umbellate, capitulate, racemose or spicate. Pedicel, when developed, continuous with the flower or articulated at its base. Flowers bi- or unisexual, sometimes with both in a single inflorescence (the unisexual ones then being male), actinomorphic, at anthesis generally epigynous or nearly so with the top of the ovary usually forming a distinct, fleshy, more or less nectariferous disk. Calyx lobes small or reduced to an entire or undulating rim or (rarely) absent. Petals 3 to many (most often 5), valvate or imbricate in bud, sometimes fused into a wholly or partly sutured calyptra, the base broad but in a few genera more or less narrowed below. Stamens usually as many as the petals and alternating with them or more numerous; filaments inserted at the edge of the disk, in one

* Royal Botanic Gardens, Kew.

or more whorls or, when numerous, in an indeterminate fashion; anthers linear to oblong, dorsifixed, introrse, with 4 (rarely 8) pollen sacs opening by longitudinal slits. Ovary syncarpous, wholly or partly inferior or (very rarely) superior, 1 to 75 (but most commonly 2–5, sometimes to 10–12)-celled; styles and stigmas as many as the cells, either free or wholly or more or less partly united; ovules solitary, pendulous, anatropous, the raphe ventral. Fruit drupaceous or baccate or (rarely) a schizocarp with persistent carpophore, in transverse section round or more or less compressed, in outline round or more or less elongate or flattened or even somewhat winged, the exocarp usually fleshy, the endocarp usually distinctly cartilaginous or membraneous. Seeds one per pyrene, the endosperm oily, smooth or more or less ruminate (the ruminations sometimes inclusive of the pyrene wall).

A family of 50 or so genera and at least 1400 species. Three genera are found in Ceylon, with six native species; two of the genera have additional species in cultivation. Much of the family is associated with the land masses and fragments associated with or derived from Gondwanaland; few genera (*Eleutherococcus* and its allies, *Hedera, Panax*) are largely associated with northern lands. Of the native genera, *Schefflera* is the most prominently represented.

Karyotypes: $x = 12$ (based on the $n = 12$ or $n = 24$ of most reliable reports). Figures of 9, 10, 11 and 13 have also been deduced or recorded; these should be viewed with caution.

Scattered polyploidy occurs although too little information has been gathered for useful arguments. No counts have been made of the species in Ceylon, save *Aralia leschenaultii* where from north Indian material a figure of $n = 12$ has been obtained.

Pollen: primitively spheroidal, the sexine undifferentiated, the tectum imperforate, non-sculptured; in more advanced types the tectum is variously perforate to even reticulate and in shape the grains may be subprolate to prolate. Specific studies of those in Ceylon have yet to be made.

Morphology: The presence of more than 10–12 stamens and/or ovary cells (beyond that, for example, represented by *Schefflera actinophylla*) is likely to represent secondary increase. Likewise, heteromery in the floral parts, in Ceylon seen in *Schefflera heterobotrya* (with ovary-cells more numerous than the petals and stamens) and the cultivated *Polyscias fruticosa* (with 5 petals and stamens but only 2 cells in the ovary) is very likely an advanced feature.

The three genera are mutually relatively easily recognized. *Schefflera* is characterized by digitately compound (or, in one species, simple) leaves and flowers with valvate petals and no articulation at the top of the pedicel. *Polyscias* has pinnately compound (or, in one cultivated species, sometimes simple) leaves; in the native species the leaflets are entire while those in

cultivation have the leaflets all more or less toothed or slashed. *Aralia* has pinnately compound leaves, an umbelliform inflorescence and flowers with imbricate petals.

KEY TO THE GENERA

1 Leaves palmately lobed, softly textured, white-hairy beneath. (Cultivated and possibly naturalized species.) ..... **2. Tetrapanax**
1 Leaves simple, trifoliolate, palmately or pinnately compound; texture more or less firm, the undersurface glabrous
2 Leaves simple or trifoliolate
3 Climbers or scramblers. Pedicels of flowers inarticulate. (Native species.) ..... **3. Schefflera**
3 Erect shrubs or treelets. Pedicels of flowers articulate. (Cultivated species.) ..... **4. Polyscias**
2 Leaves with 5 or more leaflets
4 Leaflets palmately compound. (Native and cultivated species.) ..... **3. Schefflera**
4 Leaflets pinnately compound, sometimes more than once so
5 Leaflets entire. (Native species) ..... **4. Polyscias**
5 Leaflets toothed or slashed
6 Leaves once-pinnate. Leaflets finely bristle-toothed. Petals in bud imbricate. (Native species.) ..... **1. Aralia**
6 Leaflets once- or twice-pinnate (or more finely divided). Leaflets repandly toothed or slashed or more or less pinnatifid. (Cultivated species.) ..... **4. Polyscias**

1. ARALIA

L., Sp. Pl. 273. 1753; L., Gen. Pl. ed. 5: 134. 1754. Type: *A. racemosa* L. (Wen 1992 in Taxon 41(2): 69–75).

Pentapanax Seemann, J. Bot. 2: 294. 1864; Harms in Pflanzenfam. III, 8: 55. 1897. Type: *Pentapanax leschenaultii* (DC.) Seemann.

Trees, shrubs or rhizomatous perennial herbs (rarely lianas), armed or unarmed. Shoot growth sympodial, undifferentiated or differentiated, the stems when erect sometimes stout. Leaves spirally arranged or alternate, once- to four times pinnately compound with terminal leaflets always present; stipules generally developed. Inflorescence terminal, distinct from the leaves or mixed with them, paniculate, compound-umbellate or corymbose but occasionally comprising a solitary umbel, the main axis elongate or not. Flowers 5–8-merous, the pedicels articulated just below; calyx mostly united with the ovary but manifest as a 5–8-toothed rim surrounding the petals and disk; petals 5–8, imbricate in bud, free, more or less spreading at anthesis; stamens 5–8; ovary wholly inferior with 5–8 cells (these sometimes reduced to 3 by abortion), surmounted by the disk and stylopodium; styles free to connate at the base to completely united. Fruit drupaceous, fleshy, more or less globose, the endocarp when mature crustose or somewhat hardened; seeds in pyrenes, with smooth endosperm.

A genus of some 50 species, primarily in E and SE Asia and in Malesia with also additional centres in the Americas. The single species in Ceylon belongs to the former *Pentapanax*, distinguished by Seemann and Harms mainly with reference to the styles being wholly or mostly united (in *Aralia* proper they are free or united only at the base).

Aralia leschenaultii (DC.) J. Wen, Brittonia 45(1): 53. 1993.

Hedera fragrans D. Don, Prod. Fl. Nepal. 187. 1825.
Panax leschenaultii DC., Prod. 4: 254. 1830. Type: India (Nilghiri Hills), *Leschenault s.n.* (G, holotype).
Hedera leschenaultii (DC.) Wight & Arn., Prod. 1: 377. 1834.
Pentapanax leschenaultii (DC.) Seemann, J. Bot. 2: 296. 1864; Seemann, Rev. Hed. 22. 1868; Clarke in Hook. f., Fl. Br. Ind. 2: 724. 1879; Trimen, Handb. Fl. Ceylon 2: 282. 1894; Brandis, For. Fl. 248. 1906.
Pentapanax fragrans (D. Don) T.D. Ha, Novost. Sist. Vyssh. Rast. 11: 227. 1974; T.D. Ha, Vopr. Sravnit. Morfol. Semenn. Rast. 77. 1975.

A tree to 15 m tall or a scandent shrub. Leaves imparipinnately compound with 3–5 leaflets (in Ceylon 5); stipules scarcely developed; petioles (inclusive of the rhachis) to 15 cm long; leaflets ovate or elliptic-ovate, chartaceous to subcoriaceous, 5–12 cm long, 2–6 cm wide, the apex acuminate, the base rounded, the margins bristly-serrate; petiolules 0.3–1 cm long. Inflorescence compound, corymbose-umbellate, 8–15 cm long with 5–10 rays; main axis very short, to 2 cm long; primary rays puberulent to glabrous, ascending to erect, each bearing a terminal umbellule and a verticil of 0–4 subsidiary umbellules at about 2/3 the length from the base; umbellules 2–2.5 cm across; peduncles of lateral umbellules 1.5–3 cm long. Flowers puberulent to glabrous on pedicels 0.5–1 cm long, elongate in bud to 3 mm; calyx-rim with 5 small teeth; petals 5, 2 mm long, cohering into a calyptra and soon falling; stamens 5; ovary 5-celled, the styles connate nearly to the apex. Fruit ovoid, 3–4 mm long, becoming slightly 5-angled when dried; stylar column 1.5 mm long.

Distr. Northern India along the Himalaya to Burma and SW China; also in southern India and Ceylon. In Ceylon only one confirmed collection has been seen, recorded as being in thickets in the central highlands.

Note. The presence of this species, and the genus, in Ceylon was long considered doubtful. Clarke included it for the island but 'I do not know on what authority. There are no specimens.' This statement is repeated by Trimen. The species is omitted from the checklists of Trimen, Willis, Abeyesundere and de Rosayro, and Abeywickrama, appearing only in that of Gunawardena. It can only be assumed that it is very local or rare; further records should be sought.

If *Pentapanax* is retained as a distinct genus, then the name of the species must be *P. fragrans*. If, however, a narrower view of taxa (for which there is in this instance not a good case) is once more adopted, that name is applicable only to the populations north of the Ganges (including *Pentapanax umbellatus* Seemann). *P. leschenaultii* would then be available for those in Ceylon and southern India.

Specimen Examined. NUWARA ELIYA DISTRICT: Horton Plains, Agrapatana Road, altitude not given, *Nowicke & Jayasuriya 258* (PDA).

2. TETRAPANAX

K. Koch, Wochenschr. Gärtnerei Pflanzenk. 2: 371. 1859. Type: *T. papyriferus* (Hook.) K. Koch.

Unarmed clonal evergreen shrubs or small trees, with successive initially rhizomatous stems (ramets) arising as underground branches. Shoot growth undifferentiated, sympodial; stems thick, pithy, rarely branching; young aerial parts covered with loose floss. Leaves arranged palm-like at the tops of stems, large, palmately lobed, toothed, softly textured, hairy; stipules conspicuous. Inflorescence terminal, paniculate, woolly, with conspicuous bracts. Flowers in small, round, racemosely arranged, pedunculate umbels, not jointed at the top of the pedicel and without a calyculus; calyx-rim almost obsolete; petals 4–5, valvate; stamens 4–5; ovary wholly inferior, 2-celled, styles free, initially erect and recurved in their upper parts but divergent after anthesis. Fruit almost globose, drupaceous, slightly laterally compressed; pyrenes 2; endosperm uniform.

A monotypic genus of east Asia; certainly native only in Taiwan, but widely introduced elsewhere, particularly in Asia, and here and there naturalised.

Tetrapanax papyriferus (Hook.) K. Koch, Wochenschr. Gärtnerei Pflanzenk. 2: 371. 1859; Seemann, J. Bot. 6: 58. 1868; Seemann, Rev. Hed. 88. 1868; Macmillan, Tropical Planting and Gardening, 6th edn. 236, 478. 1991.

Aralia (?) papyrifera Hook., Hooker's J. Bot. Kew Gard. Misc. 4: 53. 1852; Hook., Fl. Serres 8: pl. 806, 807. 1853; Hook., Bot. Mag. 82: pl. 4897. 1856.

Fatsia papyrifera (Hook.) Miquel ex Witte, Ann. Hort. Bot. 4: 93. 1861; Forbes and Hemsley, J. Linn. Soc. Bot. 23: 341. 1888 (ex Benth. and Hook. f.); Trimen, Hort. Zeyl. 40. 1888; Parsons. An alphabetical list of plants in the Royal Botanic Gardens, Peradeniya 70. 1926; Macmillan, Tropical Planting and Gardening, 5th edn. 200, 412. 1943.

Shrubs or trees to 7 m tall or so, the stems not or but few-branched, sympodial, to 2 cm in diameter. Leaves orbicular, to 50 cm or more across; stipules

2, awl-shaped; petiole to 60 cm, white-hairy when young, later rusty-hairy; primary segments 5–12, the central ones usually forming 2 secondary segments; under surface paler than the dull upper surface, the hairs persistent. Inflorescence three times compound, white, conspicuous, with age becoming crowded by renewed vegetative growth; main axis short; primary branches 3–4, elongate, radiating, with basal bracts and bearing numerous secondary branches each subtended by a conspicuous bract to 2 cm long; secondary branches each with 10–15 umbels about 12 mm in diameter on peduncles to 1.2 cm long, these latter subtended by bracts to 1.2 cm long. Umbels all alike; pedicels 4 mm long. Flowers yellowish-white; calyx wholly fused with the ovary, to 1 mm long; petals 2 mm long, tomentose outside, sometimes remaining together and falling as a calyptra; filaments 3 mm long. Fruit fleshy.

Distr. Taiwan. Introduced into Ceylon (1856, fide Trimen), initially grown in the Royal Botanic Gardens, Peradeniya, and now naturalized here and there in the highlands. In some countries a troublesome weed (Macmillan).

Vern. Rice-paper plant, Chinese rice-paper plant (E); Tung-tsau (Ch).

Uses. These plants, the pith of which has long been used in East Asia for the manufacture of rice paper and paper objects (particularly flowers), are also decorative and first were introduced to cultivation in Europe and elsewhere, including South and Southeast Asia, in the middle of the nineteenth century.

Note. In Ceylon *Tetrapanax papyriferus* performs best in 'up country', and by the second quarter of the twentieth century had become occasionally naturalized therein by roadsides. Balakrishnan's collection suggests that this spread has continued. More information is needed.

Variegated forms are also known.

Specimens Examined. NUWARA ELIYA DISTRICT: Foot trail from Ohiya to Pattipola, in forest edge, *Balakrishnan 481* (PDA). LOCALITY UNKNOWN: *s. coll. s.n.* (PDA).

3. SCHEFFLERA

J.R. & G. Forst., Char. Gen. 45, pl. 23. 1775, nom. cons. Type: *S. digitata* J.R. & G. Forst. (Harms 1894 in Pflanzenfam. III, 8: 39).

Heptapleurum Gaertn., Fruct. 2: 472, pl. 178. 1791. Type: *Heptapleurum stellatum* Gaertn. (= *Schefflera stellata* (Gaertn.) Baill.).

Brassaia Endl., Nov. Stirp., Dec. 1: 89. 1839. Type: *Brassaia actinophylla* Endl. (= *Schefflera actinophylla* (Endl.) Harms).

Agalma Miq., Bonplandia 4(9): 138. 1856 (1 May); Miq., Fl. Ind. Bat. 1(1): 751. 1856 (10 July). Type: *Agalma rugosum* (Blume) Miq. (= *Schefflera rugosa* (Blume) Harms).

Tupidanthus Hook. f. and Thoms., Bot. Mag. 82: pl. 4908. 1856. Type: *Tupidanthus calyptratus* Hook. f. and Thoms. (=*Schefflera pueckleri* (K. Koch) Frodin).

Unarmed glabrous or pubescent trees, shrubs, subshrubs or vines, very often epiphytic, occasionally also strangling host trees and becoming self-supporting. Shoot growth sympodial, almost always undifferentiated, rarely divided into long- and short shoots; stems sometimes pithy. Leaves generally once-palmately compound (rarely more than once palmately compound or unifoliolate or simple), petiolate; base more or less forming a sheath around the twig and commonly developing 2 stipules, these generally fused into a ligule sometimes up to 10 cm long. Leaflets 3–20 but in a few species reduced to 1 or further subdivided, developing in a single plane or occasionally fascicled, usually distinctly stalked. Juvenile leaves sometimes differing markedly from adults. Inflorescences compound, paniculate or umbellate, usually leafless, terminal or becoming falsely lateral but never on short shoots, generally solitary on any one branch but occasionally more numerous. Flowers in small umbels, heads, racemes or spikes; calyx-rim conspicuous to obscure, lobed, toothed, wavy or uniform; petals (4–) 5 or more, valvate, sometimes coherent and falling as a cap or even more or less fused; stamens as many as the petals or more numerous (up to 500); ovary (1–) 2–30(–75)-locular, wholly or largely inferior at anthesis, the styles free or variously united or entirely reduced. Fruit drupaceous, elongate, round or more or less compressed, inferior or up to 1/2 or more superior at maturity, the exocarp usually fleshy, the endocarp cartilaginous; seeds in pyrenes, the endosperm generally smooth.

A genus of 900 or more species, throughout warmer and more humid parts of the world (but not reaching the Mascarenes, the Society Islands, Hawaii, the Marianas and the Carolines); best represented in the Americas and in Malesia. Apart from the characteristically digitately compound leaves (manifest in most species, though not, for example, in *S. emarginata* where the leaves are most often unifoliolate), it is distinguished by the presence of some comparatively unspecialized features which set it apart from related genera such as *Cussonia* (Africa), *Fatsia* (Japan and other East Asian islands), *Macropanax* (East Asia to West Malesia and the Himalaya), and *Hedera* (temperate parts of Eurasia). Four species are native to Ceylon; three are endemic though closely related to those in southern India while *S. stellata* is presently considered to be in both Ceylon and southern India.

The Queensland Umbrella-tree, *S. actinophylla* (Endl.) Harms, an Australian and New Guinean species, was introduced to Ceylon in 1873 and is sometimes cultivated. It is distinguished from the native species by its leaves, which have more numerous leaflets, and particularly by the distinctive terminal inflorescences which comprise laterally radiating primary branches

bearing numerous heads of large red flowers. It is listed and illustrated in Macmillan, Tropical Planting and Gardening, 6th edn. (1991) and, as *Brassaia actinophylla,* in its predecessors.

KEY TO THE SPECIES

1 Leaves unifoliolate or trifoliolate. Plants differentiated into primary and secondary branches, the latter fertile ..... **4. S. emarginata**

1 Leaves with 5 or more leaflets

2 Leaflets with the widest point usually above the middle, obovate or narrowly obovate. Veins on under surface well-defined when blade dry. Climbers or scramblers, usually of 'low-country' ..... **3. S. stellata**

2 Leaflets with the widest point usually at or below the middle, more or less oblong-elliptic. Veins on under surface flush with mesophyll when blade dry. Trees or shrubs (sometimes epiphytic) of 'up-country'.

3 Small trees to 10 m or shrubs, sparsely-branched, sometimes epiphytic. Leaflets 5–10, 7.5–20 × 2.5–8 cm, 2–2.5 times as long as broad, usually narrowly oblong to oblong-ovate. Primary branches of inflorescence longer than its central axis. Stylopodium raised, but stigmata flush and stylar column absent. Juvenile leaves little different from adults, the leaflets without gashes ..... **2. S. exaltata**

3 Medium to large trees, 15–30 m and much-branched when fully grown. Leaflets (3–) 5–9, 4.5–13.5 × 2.5–6.5 cm, 1.5–2 times as long as broad, usually elliptic to oblong or oblong-ovate. Primary branches of inflorescence shorter than its central axis. Stylopodium remaining more or less flat, the stigmata at the tip of a stylar column to 1.5 mm long. Juvenile leaves distinct from adults, the leaflets commonly with 4 deep gashes ..... **1. S. heterobotrya**

1. Schefflera heterobotrya Frodin, sp. nov.

Hedera racemosa auct., non Wight; Thw., Enum. Pl. Zeyl. 132. 1864.

Heptapleurum racemosum auct., non (Wight) Bedd.; Bedd., Fl. Sylv. pl. 214. 1872; Clarke in Hook. f., Fl. Br. Ind. 2: 729. 1879; Trimen, Handb. Fl. Ceylon 2: 283. 1894.

Schefflera racemosa auct., non (Wight) Harms; Alston in Trimen, Handb. Fl. Ceylon 6: 139. 1931; Abeyesundere and de Rosayro, Draft of First Descriptive Checklist 8. 1939.

Schefflera wallichiana auct., non (Wight & Arn.) Harms; Worthington, Ceylon Trees 288, illus. 1959.

Arbor sempervirens magna vel mediocris *Schefflerae racemosae* peninsulae Indiae non dissimilis, foliolis juvenalibus vulgo profunde lobatis vel pinnatifidis, floribus interdum umbellatis interdum racemosis, petalis et staminibus plerumque 5–7, ovariis (5–) 6–8(–9)-loculatis, fructibus in statu sicco obtuse (5–)6–8(9)-costulatis. Partes juniores ultro plus minusve paullo rubiginose-puberulentes et venae laterales in foliolis plus numerosae.

Habitat in Zeylona in sylvis regionum superarum de 610 ad 1900 metros supra mare. Typus: *Thwaites C.P. 549,* "Pupillawa" (? Pussellawa) Regionis Centralis (K, holotypus; BM, CGE, Fl, GH, MEL, PDA, W, isotypi).

A shrub or tree to 30 m tall, much-branched when well-grown, the diameter at breast height 0.5–0.9 m. Twigs in first-year growth 6–8 mm in diameter, with leaves aggregated towards their ends; young parts closely though thinly covered with rusty or furfuraceous scurfy hairs, later wholly glabrous or nearly so. Outer bark light brown, thin, smooth; inner bark to 15 mm thick, pale brown with a resinous smell when cut. Foliage dimorphic; leaflets on juvenile or sucker shoots commonly larger than in adults, sometimes appearing fascicled on the verticil, the blades membraneous, up to 23 × 12 cm on petiolules 2–10 cm long, often with 1–3 (most commonly 2) deep gashes on each side with the resulting segments unequal, very acute and sometimes slightly curved; petioles up to 42 cm, the free portion of the stipular ligule up to 1 cm long. Adult leaves (3–)5–9-foliolate, the leaflets spreading in a single whorl; petioles 9.5–21 cm long, the free portion of the stipular ligule only 2–3 mm long; petiolules 1.5–3.4 cm long; blades elliptic to oblong-elliptic, oblong-ovate or oblong, 4.5–13.5 × 2.5–6.5 cm, widest at or a little below the middle, entire, moderately thick, the under surface distinctly paler than the upper; apex acute to obtuse, the tip to 10 mm, acuminate, sometimes funnel-like; base obtuse to rounded; main veins 7–9, somewhat brochidodromous, the venation slightly impressed above when dry and slightly but distinctly raised below; reticulation sometimes relatively conspicuous. Inflorescence developing from apex of previous year's wood and maturing in one season, terminal or pseudolateral, narrow in outline, erect or ascending at first but later drooping, usually ferrugineous-tomentose and also bearing small but persistent axillary bracts to 0.5 mm long on the main axis and primary branches; main axis elongate, to 32 cm long, with 18 or so primary branches arising throughout its length and at least sometimes ending in a single, early-developing and -maturing umbel. Primary branches 3.5–7.2 cm long, radiating in all directions. Flowers racemosely arranged, solitary or more or less in clusters or pseudowhorls or at branch ends in small umbels, those nearer the main axis often replaced by short, later-developing secondary peduncles bearing umbellules of male or fertile tertiary-level flowers; pedicels 3–7 mm (shorter in tertiary-level flowers). Buds ovoid, green. Calyx pale green, furfuraceous, the rim (limb) very narrow with 5–7 small teeth; petals 5–7, green to greenish-white to white, opening from apex and spreading before falling. Stamens as numerous as the petals. Ovary (5–)6–8(–9)-locular, 3–5 × 2.5 mm; disk flat, topped by a conical stylar column up to 1.5 mm long. Fruit remaining wholly inferior, initially green, ultimately black, globose or depressed-globose, to 5 × 5.5 mm, the pericarp shrinking around the (usually) 6–8 pyrenes on drying; disk 2–3 mm across, flat, sloping only into the stylar column; stylar column (except in the top terminal umbel) usually about 1.5 mm long, the stigmata forming a small boss at the apex.

Distr. Endemic.

Ecol. Forest in 'up-country' in central parts, sometimes by streams, 610–1900 m; reported at times as rather common. Fl. and fr. after monsoon, with full fruiting from October.

Vern. Itha (S).

Note. Beddome was the first to call attention to differences between these trees and *Schefflera racemosa* in south India. These distinctions have been observed in subsequent collections, and in addition the juvenile foliage of the Ceylon trees is distinguished by pinnatifid leaflets. There are also differences in inflorescence morphology and flower arrangement, notably the far greater incidence of umbellules in *S. heterobotrya.* With more abundant material now available, their recognition as a distinct species is justified which, in some respects, is more closely related to *S. micrantha* (Clarke) Gamble than *S. racemosa.*

New shoots begin development following the approximately mid-year emergence of the inflorescence from the wood of the previous cycle. Growth continues through the summer wet season with gradual maturation across the following winter and spring, the differentiation of new buds, and transformation of the shoot apex. The inflorescence develops over the next summer wet and begins flowering afterwards; fruit development and set follow during the latter part of the second season, tailing off by February/March. In *S. racemosa,* with greater seasonality in shoot development, the whole cycle is more prolonged.

Specimens Examined. MATALE DISTRICT: Laggala Estate of Brae Group, abandoned cardamom plantation, *Jayasuriya & Balasubramaniam 3474* (PDA). KANDY DISTRICT: ca. 2 miles N of Hunasgiriya near mile post 23, cardamom plantation, *Davidse 8563* (PDA); 3 mi. east beyond Madugoda, near road marker 29/17, *Jayasuriya 369* (K, POM, US); 'Kandy', *Moon s.n.* (BM); Rajamallay, forest patch in Moray Estate by stream, *Sohmer & Sumithraarachchi 9877* (GH, PDA); Imboolpitiya, Nawalapitiya, *Worthington 110* (K); Nawalapitiya, *Worthington 385* (BM, K); Kandy-Patiagama Road, road marker 19/20, *Worthington 1764* (K); Deltota Estate, Galaha, *Worthington 4971* (K); Moragolla, Patahewaheta, *Worthington 2887* (BM, K); Deltota, *Worthington 6590* (K, PDA). BADULLA DISTRICT: Madawelagama—at 6th mile post behind the pine nursery, along stream under shade, *Balakrishnan & Jayasuriya 823* (PDA, juvenile); Adisham forest near Haputale, *Kostermans 23425* (BO, K, L); Ohiya-Boralanda road, *Sohmer et al. 8550* (BISH, BM, GH, NY, PDA); Palugama, *s. coll. s.n.* (PDA); Craig Estate, Bandarawela, *A.M. Smith s.n.* (PDA, juvenile); Haputale, *A.M. Smith s.n.* (PDA); Glenanore Estate near Haputale, *Stone 11220* (BISH, KLU, L, PH, RSA). RATNAPURA DISTRICT: Adams Peak, from Carney, *Bernardi*

16085, 16087(?) (both PDA); Adams Peak trail, NE of Carney, *Davidse & Sumithraarachchi 8763* (PDA); Indikatupana, S slope of Peak Wilderness Sanctuary above Palabaddala, *Jayasuriya & Gunatilleke 3169* (BISH, GH, NY, PDA). NUWARA ELIYA DISTRICT: Moon Plains, Parawella, *St. John 24112* (BISH); portion of Sita-Eliya Forest Reserve, N side of Nuwara Eliya-Hakgala Rd., 52-mile, *Sohmer et al., 8461* (BISH, GH, NY); jungle margin, Hakgala, *N.D. Simpson 9036* (BM); Sita Eliya, along stream near highway A–5, *Theobald & Krahulik 2845* (PDA, US); Pidurutalagala, *Waas 172* (PDA); Hanguranketa, roadside near a stream, *Wirawan & Corner 772* (PDA); Hakgala Botanic Garden, Cultivated, *Meijer et al. C-610* (K), *Corner s.n.* (CGE, K, L). LOCALITY UNKNOWN: Central Province, without more precise locality, *Thwaites C.P. 0549* (BM, CGE, FI, GH, K, MEL, PDA,W); "Pupillawa", July 1846, *Thwaites C.P. 0549, 0559* (both K); *Macrae s.n.* (CGE); before 1844, *Walker ss.nn.* (E, E–GL, K, OXF).

2. Schefflera exaltata (Thw.) Frodin, comb. nov. Type: based on *Hedera exaltata* Thw.

Hedera exaltata Thw., Enum. Pl. Zeyl. 132. 1864. Type: Ceylon, without precise locality, *Thwaites C.P. 1633* (PDA, lectotype; BM, Fl, K, W, isotypes).

Heptapleurum exaltatum (Thw.) Seemann, J. Bot. 3: 80. 1865; Seemann, Rev. Hed. 44. 1868.

Heptapleurum wallichianum auct., non (Wight & Arn.) Seemann; Clarke in Hook. f., Fl. Br. Ind. 2: 730. 1879.

Schefflera wallichiana auct., non (Wight & Arn.) Harms; Alston in Trimen, Handb. Fl. Ceylon 6: 139. 1931; Abeyesundere and de Rosayro, Draft of First Descriptive Check-List 8. 1939; Holmes, Imperial Forestry Institute Paper 28: 53. 1951.

A glabrous tree (recorded as 'large' by Thwaites and Trimen but more recent collections do not give a height of more than 10 m), sometimes a liana or an epiphyte. Twigs hollow, along with the leaves aromatic when cut or crushed (once reported with a mangiferous smell). Leaves palmately compound, the leaflets 5–10 in a single plane; petioles 12–23 cm, stout, cylindrical, the free part of the basal ligule small, to 6 mm or so with a broad base and acute tip; petiolules 1.3–3.5 cm long. Blades oblong-lanceolate, 7.5–20 × 2.5–8 cm (in young plants or reversion shoots somewhat larger), thinly coriaceous, entire, abruptly rounded or occasionally slightly cordate at base, the surfaces contrasting, the apex acute, the tip caudate-acuminate up to an extra 1.7 cm in length; midrib slightly raised below and recessed above when dry; lateral venation inconspicuous, the primary veins numerous, curving up near margin. Inflorescence terminal but by maturity becoming pseudolateral,

paniculate, the branches relatively stiff, any bracts early caducous; main axis to at least 12 cm long; primary branches 7–9, to 36 cm long but more usually not over 20 cm, the umbellules racemosely disposed along them; peduncles 1.3–3.2 cm (occasionally to 3.9 cm) long. Flowers in bud to 5 mm long or more, when expanded to 10 mm across, 12–20 on pedicels from 5–7 mm in bud to 8–12 mm at maturity; buds nearly globose; calyx-rim truncate; petals 7–10, linear-oblong, acute, thick; stamens as many as the petals, spreading at anthesis, the filaments flat, narrow; ovary 7–10-celled, half-inferior at anthesis; disk and stylopodium conspicuous, blunt, conical, the stigmata flush at the apex. Fruit initially green, then yellow orange, at maturity about half-inferior, globose, to 5(–7) mm across with when dry 7–10 blunt vertical ribs, the upper half above the calyx-rim and surmounted by the persistent, slightly raised stigmata; pyrenes 7–10.

Distr. Endemic.

Ecol. In moist closed forests or scrubland or in *Eucalyptus* plantations in the up-country, 1100–1600 m. Trimen noted that it was relatively rare.

Uses. None recorded.

Note. The union of this species with *S. wallichiana* was first made by Clarke in 1879. Several small but apparently constant differences, however, separate this from *S. wallichiana,* which thus is limited to South India. In *S. exaltata*, the leaflets tend to be narrowly oblong, the stigmata range from 7 to 10 (most commonly 8–9) in contrast to 5–6 in *S. wallichiana,* there are fewer umbellules per primary branch with their peduncles being somewhat longer. The leaves are moreover in the dry state exceptionally clearly lined on the under surface when compared with *S. wallichiana.* This feature, along with the comparatively small leaves in adult plants, has led to confusion with what is now *S. heterobotrya.* The leaflets in *S. exaltata* are, however, usually more than twice as long as broad; those in *S. heterobotrya*, less than twice as long as broad.

The distribution of the species appears well to correlate with desirable areas for cardamom cultivation. In addition, it reportedly is a colonizer of *Eucalyptus robusta* plantings originally established in dry patana, e.g. in Kinigama Reserve in the Uva basin (Holmes 1951); no voucher specimens have, however, so far been seen.

The *Smith* collection from Maturata has exceptionally large leaflets, inflorescence branches and fruits (to 7 mm across) when compared to most others. Some transitions to these states exist in *Thwaites C.P. 1633.* More collections are needed.

Specimens Examined. MATALE DISTRICT: Rattota-Ilukkumbura Road, mile 35, *Huber 0744* (PDA). KANDY DISTRICT: Hunasgiriya, *Alston s.n.* (PDA); Loolecondara Estate, 2 mi S of Deltota, [at] upper edge of

plantation, *Fosberg 57922* (NY); Midcar Estate, Knuckles, *Greller 810329–50* (BKL); Looloowatte near Knuckles, *Jayasuriya 945* (K, PDA, US); Knuckles, from Rangala to Looloowatte, *Nooteboom 3078* (KEP, L, PDA, US); locality not given (Hunasgiriya added on PDA sheet), *Thwaites C.P. 1633* (BM, FI, K, P, PDA, W), Nawanagalla Estate, Madugoda, *Worthington 1586* (K). BADULLA DISTRICT: Haputale, *Kostermans 23191* (L); Bandarawela, *Worthington 0584* (BM). NUWARA ELIYA DISTRICT: Maturata, high forest, *A. M. Smith s.n.* (PDA). RATNAPURA DISTRICT: Road Kalawana to Rakwana, mile 24/8, *S. Lucas 1141* (US). LOCALITY UNKNOWN: "Central Province", *Beckett 590* (MEL). Additional localities cited by Trimen are Pussellawe (Kandy District) and Ramboda (Nuwara Eliya District).

3. Schefflera stellata (Gaertn.) Baill., Hist. Pl. 7: 161. 1879; Harms in Pflanzenfam. III, 8: 39. 1894; Alston in Trimen, Handb. Fl. Ceylon 6: 139. 1931; Alston, Kandy Flora 44, fig. 234. 1938.

[Ittawael: arbor zeylanica *Itta* dicta, resinam Terebinthinae similem fundens Hermann, Mus. Zeyl. 50. 1717.]
[Arbor *Itta* dicta (etc.) Burm., Thes. Zeyl. 28. 1737.]
[Ittawel L., Fl. Zeyl. 249. 1747.]
Heptapleurum stellatum Gaertn., Fruct. 2: pl. 178, fig. 3. 1791; Seemann, J. Bot. 3: 80. 1865; Seemann, Rev. Heder. 45. 1868; Clarke in Hook. f., Fl. Br. Ind. 2: 730. 1879; Trimen, Handb. Fl. Ceylon 2: 283. 1894; Pearson, J Linn. Soc. Bot. 34: 343. 1899. Type: not yet established.
Heptapleurum acutangulum Gaertn., Frucht. 2: 472. 1791.
Hedera terebinthacea Vahl, Symb. Bot. 3: 42. 1794; Moon, Cat. 18. 1828; DC., Prod. 4: 265. 1830; Wall., Cat. no. 4920 in part, s. str. 1831–32. Type: Ceylon, c. 1777–1781, *Koenig s.n.* (BM, lectotype).
Paratropia terebinthacea Arn., Pugill. 20. 1836; Arn., Nova Acta Phys.-Med. Acad. Caes. Leop.-Carol. Nat. Cur. 18: 338. 1837; Walp., Rep. 2: 433. 1843. Type: Ceylon, 'Highlands', *Col. Walker 14* (K, lectotype).
Hedera vahlii Thw., Enum. Pl. Zeyl. 132. 1859. Type: based on *Hedera terebinthacea.*

A large, wholly glabrous shrub, climber or epiphyte, or a tree to 8 × 0.70 m branching from the base, or the whole plant sprawling among rocks; branches becoming stout and sometimes pendant; twigs about as thick as a swan's quill, along with the leaves strongly aromatic when bruised or cut, the odour reported as 'mangiferous'. Leaves palmately compound, the leaflets (3–)5–7 in a single plane; petioles 5.3–15 cm long, cylindrical, the base amplexicaul, the ligule mostly fused with its free part to 1 mm long, rounded or bluntly acute; petiolules 1.1–5 cm long. Blades obovate to narrowly obovate, nearly always widest distinctly above the middle, 4.5–12 × 1.9–6.8 cm,

coriaceous, entire, the base attenuate to acute, the apex broadly acute to obtuse with only a slightly developed tip; venation generally conspicuous when dry, the main lateral veins ascending, curving up near margin. Inflorescence terminal, paniculate, well distinct from leaves, bracteate when young but later naked, the bracts membraneous; main axis to at least 13.5 cm long with the branches diverging within the upper 7.5 cm or less; primary branches (–3)5–12, to 17 cm long, the umbellules racemosely and usually somewhat repandly disposed along them; peduncles 6–12 but sometimes to 21 cm long. Buds rather blunt, 2–3 × 1.5–2 mm, glabrous; flowers when expanded to 5–6 mm across, (3–) 5–8 on slender pedicels 2–9 mm long; calyx-rim truncate, without a rim; petals 6–9 (most commonly 8), acute with an inflexed point; stamens as many as the petals but shorter, spreading at anthesis; ovary 6–9 (most commonly 8)-celled, mostly inferior; disk and stylopodium conspicuous, blunt, conical, the stigmata flush at the apex. Fruit initially green, later yellow to orange but ripening black with the glaucousness of the disk eventually fading, subglobose (Trimen: clavate-ovoid), to 7 × 6 mm, about 4/5 inferior at maturity and surmounted by the persistent stigmata, when dry with 6–9 blunt vertical ribs; pyrenes 6–9.

Distr. Ceylon, southern India.

Ecol. In forest or other vegetation, sometimes growing over rocks, in the moist or intermediate zone to 1200(–1525) m. It enters the patanas region in Badulla District but there remains below 1220 m in sheltered areas (Pearson). Fl. and fr. May–July(–October).

Uses. The leaves are used as a cattle medicine (Trimen).

Vern. Itha, Itta, Ittaw[a]el, Maha-itta-waela (S). Gaertner listed 'Bukera' but without indication of a language.

Note. The Indian plants, including *Hedera obovata* Wight and probably also *Paratropia rotundifolia* Tenore, differ from those in Ceylon by having somewhat thinner leaflets which moreover are broader relative to their length; in addition, the ovary is 5–8-celled. Most records are from 600–1800 m, and in some at least the leaves are semi- or strongly deciduous. *S. venulosa* (Wight & Arn.) Harms, of the lower wet parts of the Western Ghats of India, differs in having more elliptic and ± acuminate leaflets; the ovary moreover is 5–6-celled. Basic relationships, however, are with those plants as well as *S. roxburghii* Gamble and *S. clarkeana* Craib.

The fruits studied by Gaertner had mostly 7 pyrenes, with a few 6-pyrened. This contrasts with the usual number of 8–9 as described by Arnott and most commonly observed in available Ceylon specimens. *Matthew RHT.49866* (K) from Dindigul in the Palni Hills (Tamilnadu, India) and identified as *S. stellata* is, however, 6–7-pyrened, a state also seen in a

number of other collections from southern India. It is thus possible that Gaertner's material came not from Ceylon, as stated by him, but from India. Further studies, and additional material from India, may show that the Indian plants are truly distinct from those in Ceylon. If *S. stellata* is then applied to Indian plants, the name *Hedera terebinthacea* would have to be revived, necessitating a new combination in Schefflera.

The illustration in De Wildeman, Ic. Sel. Hort. Then. 4: pl. 133. 1903, offered as this species, represents a form of *S. roxburghii.*

Specimens Examined. ANURADHAPURA DISTRICT: Andiyagala, *Amaratunga 931* (PDA); Ritigala S.N.R., summit, *Jayasuriya 0904* (PDA), *Willis s.n.* (PDA). KURUNEGALA DISTRICT: Dolukande, *Cramer 3050* (PDA, US). MATALE DISTRICT: Hill SE of Dambulla Rock; on south slope, *Balakrishnan 502* (CAS, K, PDA); Illukkumbura, *Jayasuriya & Bandaranayake 1773* (K, US); E slope of Lenadora Hill, mi. 38/9 on Dambulla to Nalanda Road, route A–9, *Nowicke & Jayasuriya 378* (NY, PDA); Wiltshire Forest, Kandegedara, *Sumithraarachchi 0395* (BISH, PDA); Mile 24/5, Palapathwela—Pallepola Rd, *Sumithraarachchi et al., 0726* (K, PDA, POM). POLONNARUWA DISTRICT: Western slope of Gunner's Quoin, forest edge, *Huber 0438* (HBG, PDA, US). KEGALLE DISTRICT: Bible Rock, *Sumithraarachchi & Fernando 0135* (K, PDA, POM). KANDY DISTRICT: Peradeniya, moist up-country, *Balasubramaniam 222* (NA); Hunasgiriya, on Mahiyangana—Teldeniya Rd., *Cooray 690801–12R* (K, NY, POM); Gannoruwa Mtn., Peradeniya, *Greller 810114–6* (BKL); Madugoda Forest, SE of Knuckles, *Greller s.n.* (BKL); Peradeniya, Royal Botanic Gardens, *Pearson 976* (CGE), *Hosseus 11* (M); near Corbet's Gap, *Kostermans 23510* (L, US); Rangale to Corbet's Gap, *Kostermans 23510* (A); Hunasgiriya, near rivulet, *Kostermans 25274* (K, L, US); near railroad tunnel above downgrade on Hwy. A–1 E of Kadugannawa, *Theobald & Grupe 2369* (US); Kandy catchment, *Worthington 7208* (K). BADULLA DISTRICT: Road edge, from Ohiya to Haldummulla, *Balakrishnan 535* (BISH, K); Bandarawela, in patana, *Pearson 871* (CGE); patana, Fort Macdonald valley, SW of Kirklees, *A.M. Smith s.n.* (PDA); the same, on rock, *A.M. Smith s.n.* (PDA), Haputale, Thotulagala Estate, *Werner 292* (K). AMPARAI DISTRICT: Potuvil-Moneragala Road, c. 196-mile marker, *D.B. and D. Sumithraarachchi 0887* (PDA). KALUTARA DISTRICT: Ad templum Kalugala Ahran, circa Pelawatta, *Bernardi 15751* (G not seen, PDA). RATNAPURA DISTRICT: above Belihul Oya, 900 m, 25 May 1969, *Kostermans 23630* (L, US); roadside, Balangoda to Maratenna, at culvert 7/11, *Lucas 1116* (US); Lankaberiya, *Waas 1395* (BISH, PDA). MONARAGALA DISTRICT: mile 137/4, W of Wellawaya, route A–4, *Meijer C–202* (K, L, PDA, US); Nagala, Bibile-Nilgala rd., 3rd mile marker, *Waas 0650* (NY, PDA). GALLE DISTRICT: Galle, scandens, 100–200 m, Pierre

[Coll. Zeyl.] *55* (P). LOCALITY UNKNOWN: Labelled only as "Itta-wel", *s. coll. s.n.* (BM); 1838–47, *Champion s.n.* (CGE); before 1847, *Gardner 0325* (K); "in sylvis et nemorosis Zeylonae", 1777–81, *Koenig s.n.* (BM); before 1864, *Thwaites C.P. 1632* (BM, BO, BR, FI, K, MEL, P, W); "Highlands", before 1844, *Col. Walker 14* (K).

4. Schefflera emarginata (Moon) Harms in Pflanzenfam. III, 8: 38. 1894; Alston in Trimen, Handb. Fl. Ceylon 6: 139. 1931.

Hedera emarginata Moon, Cat. 18: 1824; Linden, Cat. 12: 18. 1857; Thw., Enum. Pl. Zeyl. 132. 1864. Type: Sabaragamuwa, Ceylon, *Moon s.n.* (not located).

Paratropia emarginata (Moon) Regel, Gartenfl. 13: 305. 1865. Type: as above.

Heptapleurum emarginatum (Moon) Seemann, J. Bot. 3: 80. 1865; Seemann, Rev. Heder. 44. 1868; Clarke in Hook. f., Fl. Br. Ind. 2: 729. 1879; Trimen, Handb. Fl. Ceylon 2: 284. 1894, Atlas, pl. 64. 1895. Type: as above.

A glabrous epiphytic or terrestrial shrub, sometimes climbing or creeping but often dwarf and bushy; bark silvery grey; branches dimorphic, with stout primary runners to 7 mm in diameter from which develop numerous lateral secondary shoots. Leaves numerous, usually closely spaced, 1(–3)-foliolate, the petiole slender, 7–20(–50) mm long, jointed at the top and with the base forming a sheath around the twig, the free portion of the stipular ligule to 1 mm long; leaflets pseudopetiolate, 22–50(–80) × 7–23(–38) mm, cuneate to oblong-cuneate, narrowing into a point about 3–8 mm above the base and then gradually tapering downwards, entire, the apex rounded to truncate and emarginate or shallowly 2-lobed at apex, thick when fresh but shrinking markedly on drying, the steeply sloping veins becoming prominent on the under surface. Inflorescences mostly developing on secondary shoots, terminal, small, quite lax, any bracts quickly falling during development; main axis very short or obscure; primary branches rather slender, 1–3, to 50 mm long but usually smaller, when multiple sometimes widely divaricating; peduncles up to 5 but often solitary or in pairs at branch ends, up to 23 mm long but usually short. Flowers very small, white with a red tinge, solitary or in clusters of 2–6(–7), the pedicels slender, 6–8 mm; calyx-rim absent; petals 5, spreading at anthesis but quickly falling; stamens as many as but longer than the petals; ovary largely inferior, with (4–) 5 cells and a prominent disk surmounted by the almost sessile stigmata; fruit fleshy, smooth, red to purple and finally black, broadly ovoid, to 3 × 3 mm at maturity, truncate, the pyrenes not becoming conspicuous on drying.

Distr. Endemic.

Ecol. In wet forest in moist country (generally with little or no seasonal water deficit) up to 1220 m, reportedly rather rare (Trimen) but best represented in the SW districts. Fl. May–June. As a shrub it has been said often to be dwarf and bushy, but also 'able to climb the largest trees'. It can also be a creeper spreading on the ground of wet primary forest or a climber or weak-stemmed treelet, and in the Knuckles area it can get into laurel-forest (Greller). In *Jayasuriya 2907* it is described as a large, hemi-epiphytic shrub climbing to 6 m with horizontal branches.

Uses. None recorded. It was, however, introduced into horticulture in Europe in the 1850s and there enjoyed a brief vogue, remaining in collections through the 1880s (e.g. at the Royal Botanic Gardens, Kew and the Botanic Garden, Liverpool, UK).

Vern. none recorded.

Note. A 'curious', delicate climbing species, with unifoliolate or rarely 3-foliolate leaves with obovate, emarginate leaflets. Most nearly related to *S. bourdillonii* (leaves 5-foliolate) and *S. chandrasekharanii* (leaves with 1–2 acute leaflets), both in southern India. The reportedly greenish-pink (Trimen) or white, pink-tipped (Thwaites) flowers suggest a further relationship with *S. pubigera* and its allies in northern India, the Himalayan states and adjacent areas. Pritzel, in the first edn. of his Thesaurus (1851), noted Moon's catalogue as being 'liber perrarus'. The species is missing from de Candolle's Prodromus and G. Don's General System.

Specimens Examined. KEGALLE DISTRICT: Allagalla Mt., the ridge, *Worthington 0297* (K). KANDY DISTRICT: Hantane Hill, *Burtt & Townsend [C]50* (K), in 1900s, *J.M. de Silva s.n.* (PDA), *Thwaites C.P. 0655* (K); Midcar Estate, Knuckles, *Greller 810329–51* (BKL). KALUTARA DISTRICT: Denihena, *Waas 1887* (E, GH, K, L, PDA, POM, US). RATNAPURA DISTRICT: Gilimale F.R., *Jayasuriya (apud Meijer) C–917* (PDA, RSA, US), trail to Gongala above Longford Div. of Hayes Group, *Jayasuriya 2907* (A, BISH, PDA not seen); Gilimale F.R., logging area, *Meijer C–406* (K, US); Sri Palabaddala, Mapulana ella, *Waas 0436* (PDA); Mannikkawatta Forest (S of Sinharaja primary forest) via Deniyaya, *Waas 1772* (K, PDA). GALLE DISTRICT: Haycock (Hinidumkande), near summit, *Kostermans 25514* (PDA, US). LOCALITY UNKNOWN: [1838–47], *Champion s.n.* (CGE); given only as 'Central Province' [before 1864], *Thwaites C.P. 0655* (CGE, FI, P, W); [before 1844], *Walker s.n.* (E, K, OXF); *Walker 158* (K).

Additional localities cited by Trimen are Hunasgiriya and Peradeniya (Kandy District), Kuruwita Korale (Ratnapura District), 'Sabaragamuwa' (from Moon), and Kukul Korale.

4. POLYSCIAS

J.R. & G. Forst., Char. Gen. 64, pl. 32. 1775. Type species: *P. pinnata* J.R. & G. Forst., Vanuatu (generally now united with *P. scutellaria* (Burm. f.) Fosberg).

Eupteron Miq., Pl. Jungh. 3: 420. 1855; Miq., Bonplandia 4(9): 139. 1856; Miq., Fl. Ind. Bat.1(1): 762. 1856. Type: *E. nodosum* (Blume) Miq., Indonesia (= *Polyscias nodosa* (Blume) Harms).

Unarmed shrubs or trees, glabrous or pubescent, sometimes strongly aromatic. Leaves 1–3 times compound and imparipinnate, rarely unifoliolate, with a short or elongated sheathing base; rhachis articulated, it and the petiole terete. Leaflets when present in pairs, entire, crenate or dentate. Inflorescence terminal, often large, usually compound and forming a panicle, corymb or umbel, rarely reduced to a simple umbel. Flowers racemosely arranged along primary inflorescence branches or more commonly in umbellules or capitula so disposed; pedicels articulated below the ovary. Calyx-rim sometimes well-developed, with a undulating or toothed margin. Petals valvate, 4–5(–8 or more). Stamens as many as the petals. Ovary inferior, 2–5(–8 or more)-celled, the disk fleshy; styles either free and recurved (at least in fruit) or joined into a beak-like stylopodium with the stigmata then flush. Fruit drupaceous, globose or ovoid, sometimes slightly or strongly compressed, topped by the persistent calyx-rim and styles or stylopodium; exocarp usually fleshy; endocarp chartaceous; endosperm ruminate, with an uneven surface or fissured, rarely smooth.

A genus of some 100 species, in Africa, SW Indian Ocean Islands, S Asia, Ceylon, and in Malesia from Java, NE Borneo and the Philippines eastwards to New Guinea; also in Australia and the Pacific Islands to the Marianas and the Societies. It is most highly developed in Madagascar, Papuasia and New Caledonia. The single native species is conventionally referred to sect. Eupteron (Miq.) Philipson; the commonly cultivated 'fancy' species and forms are all in sect. Polyscias. Miquel (1856) included *Polyscias acuminata* in his concept of *Eupteron* but further study may show that an alternative infrageneric disposition is necessary.

The classification of the many cultivated forms in sect. Polyscias is difficult and no satisfactory treatment has yet been published. They are not 'biological' species, being always associated with man. Any taxonomy which may be developed will naturally depend upon the proponent's species philosophy, but a conventional framework may not be suitable. The erect shrub or small tree forms have had a long history in the Indo-Pacific region, with two at least already described and figured by Rumphius in the seventeenth century. Another, in Vanuatu, was the basis for the Forsters' genus. Others, usually low-growing shrubs, may be chimaeras and, if allowed to grow

up, become the same as or similar to the well-known shrubby or small tree forms. They have long been, and remain, fine useful and ornamental plants for all tropical homes and gardens. The more important are *Polyscias balfouriana* (Sander ex André) L.H. Bailey, *P. filicifolia* (C. Moore ex E. Fournier) L.H. Bailey, *P. fruticosa* (L.) Harms, *P. guilfoylei* (W. Bull) L.H. Bailey and *P. scutellaria* (Burm. f.) Fosberg. *P. fruticosa* was listed by Trimen (and by Abeywickrama), and all but *P. scutellaria* are listed, and the first three illustrated, in Macmillan, Tropical Planting and Gardening (6th edn. 1991) as well as in earlier editions under *Aralia* and *Panax*.

The ruminations of the endosperm are inclusive of the pyrene wall through inversion (in *P. ornifolia* and *P. australiana*; Harms 1894). *P. acuminata* in Ceylon, however, lacks ruminations (Trimen).

Polyscias acuminata (Wight) Seemann, J. Bot. 3: 181. 1865; Seemann, Rev. Hed. 56. 1868; Clarke in Hook. f., Fl. Br. Ind. 2: 727. 1879; Trimen, Handb. Fl. Ceylon 2: 282. 1894.

Hedera acuminata Wight, Ic. Pl. Ind. Or. 1062. 1850; Thw., Enum. Pl. Zeyl. 131. 1859, excl. synon. Type: India (Nilghiri Hills), *Wight s.n.* (K, lectotype).

Eupteron acuminatum (Wight) Miq., Bonplandia 4: 139. 1856; Miq., Fl. Ind. Bat. 1(1): 762. 1856.

A glabrous small tree or scandent shrub to 5 m. Leaves once pinnately compound, with 5–11 leaflets (in Ceylon 5–7), the rhachis 15–23 cm long; leaflets narrowly oblong to lanceolate, 9–12 cm long, entire, the apex acute, the tip caudate-acuminate, the base acute to rounded and abruptly recurving into the petiolule, the veins ascending, slender, fairly numerous, scarcely raised on drying, the midrib somewhat prominent on the under surface; petiolules 0–6 mm long. Inflorescence terminal, leaf-opposed, soon bypassed by subsequent growth and appearing pseudolateral; main axis thickened, 13–14 cm; primary branches 2–5 or more, usually all springing from apex but occasionally one arising from along the axis, to 23 cm long but usually less (in Ceylon only to 13 cm); umbellules developing in the upper part of the branches, racemosely arranged, the spreading peduncles 0.6–1 cm long. Flowers pale green, 3–5 in an umbellule, the pedicels thickened, 2.5–4 mm long, articulate at each end; bracts linear, setaceous; calyx-lobes acute; petals 5, very thick, acute; stamens 5, small; ovary wholly inferior, 4–5-celled, the disk broad, fleshy, the styles short, erect, blunt. Fruit initially green, later red before turning black, broadly ovoid, obscurely ribbed when dry, topped by the calyx-rim and the persistent, spreading styles.

Distr. South India and Ceylon.

Ecol. In forest along streams, 1220–1525 m, evidently very local in the central highlands. Fl. Feb–May.

Vern. not recorded.

Note. Ceylon specimens are more depauperate than those from India, with fewer leaflets (5–7 as opposed to 7–11) and weaker inflorescences with fewer primary branches. In addition, in India the species is always erect. More material is required, however, to assess whether these distinctions are worthy of formal recognition.

Specimens Examined. KANDY DISTRICT: Adam's Peak, *Thwaites C.P. 4* (BM, K); 4 mi. SW of Maskeliya (straight line), fishing hut area on margin of Moray Group Tea Estate, at SE base of Adam's Peak, *Davidse & Sumithraachchi 8711* (PDA); Maskeliya, *Kostermans 24244A* (K).

Trimen has cited in addition Bogawantalawa (Nuwara Eliya District).

CALLITRICHACEAE

(by M.D. Dassanayake*)

Link, Enum. Hort. Berol. Alt. 1: 7. 1821 ("Callitrichinae"). Type genus: *Callitriche* L.

Small glabrous herbs, aquatic and submerged or emergent, or terrestrial in wet places, Stems slender and tufted, with small, decussate, entire, exstipulate leaves. Flowers unisexual, solitary in leaf axils (rarely two flowers, a staminate and a pistillate, in the same axil), very small, without perianth. Bracteoles two, opposite, caducous or persistent. Staminate flowers of usually a single stamen with a 2-celled anther dehiscing by lateral and longitudinal apically confluent slits. Pistillate flower of a single pistil. Ovary of two carpels, syncarpous, laterally 4-lobed, each carpel divided into 2 loculi by 'false' septa. One ovule in each loculus, pendulous, on axile placenta, unitegmic, anatropous, with ventral raphe. Styles 2, free, filiform, papillose. Fruit a schizocarp, splitting at maturity into four one-seeded mericarps; lobes winged or keeled. Seed minute, with straight embryo and oily endosperm.

One genus, *Callitriche.*

CALLITRICHE

L., Sp. Pl. 969. 1753; L., Gen. Pl. ed. 5. 5. 1754. Type species: *C. palustris* L.

Characters of the family.

About 17 species, almost all cosmopolitan.

Callitriche stagnalis Scop., Fl. Carniol. ed. 2, 2: 251. 1772; Trimen, Handb. Fl. Ceylon 2: 149. 1894. Type: from Europe.

Much-branched flaccid herb rooting at the nodes. Stems glabrous, 1–2 mm thick, green. Leaves broadly ovate- to very broadly ovate-spathulate, obtuse and rounded at the apex, tapering to the petiole, 2–15 mm long including the petiole, 1–9 mm broad, fleshy, glabrous, with 3 veins, dark green. Flowers mostly in only one axil of a pair of leaves. Bracts c. 1 mm long, falcate, white. Staminate flower: filament erect, filiform, 3–4 mm long, white. Anther c. 0.75 mm long, pale yellow. Pistillate flower: Ovary c.

* Flora of Ceylon Project, Peradeniya.

0.5 mm long, pale green. Styles 3–5 mm long, white, at first semierect, later divergent, minutely papillose, withering in fruit. Fruit on c. 1 mm long stalk, compressed, with rounded sides and depressed at the apex, c. 2 mm long and 2.5 mm broad, glabrous, each lobe with a wing c. 0.5 mm broad round the back. Seed ellipsoid, c. 1 mm long, 0.5 mm broad.

Distr. Throughout the old world: Indian mountains, the Himalayas to the Deccan, in Europe, northern Asia, tropical Africa, Australia, New Zealand.

Ecol. Upper montane zone. In stagnant or slow-moving water or on damp ground. Flowering throughout the year.

Specimens Examined. NUWARA ELIYA DISTRICT: Talawakelle, St. Coombes, 5 Nov 1940, *Eden s.n.* (PDA); Horton Plains, *Gardner in C.P. 303* (PDA); Maturata, Apr 1859, *s. coll. C.P. 3636* (PDA); stream on Albion Estate, 14 Mar 1906, *J.C. (Willis) s.n.* (PDA); Condegalla Estate, 18 Sept 1927, *Alston 1859* (PDA).

CAPPARACEAE

(by D. Philcox*)

Juss., Gen. Pl. 242. 1789 ("Capparides"). Type genus: *Capparis* L.

Herbs, shrubs or trees, erect or sometimes scrambling or climbing. Leaves alternate, petiolate, simple or palmately divided, entire or rarely denticulate, pinnately veined. Stipules thorny, minute or wanting. Inflorescence usually terminal or lateral, racemose, corymbose or umbellate, but flowers occasionally solitary-axillary. Flowers bisexual, actinomorphic or zygomorphic. Sepals 4, free, rarely connate into tube, equal or in 2 series with outer pair slightly different from inner. Petals 4, rarely 2, free, usually clawed. Stamens 4 to indefinite, hypogynous or perigynous, or inserted at base of, or midway on, gynophore. Ovary on long gynophore, rarely sessile, 1-celled; ovules numerous, usually on 2, rarely more, parietal placentas. Fruit capsular, 2-valved, or berry. Seeds many, mostly curved-reniform, testa in seeds from dry fruits variously sculptured or smooth.

Family of about 45 genera containing approximately 675 species, from tropical and subtropical regions.

KEY TO THE GENERA

1 Herbs ..... **1. Cleome**
1 Trees or shrubs
2 Sepals connate at base ..... **2. Maerua**
2 Sepals free
3 Sepals biseriate
4 Stamens 4–6, inserted midway on gynophore ..... **3. Cadaba**
4 Stamens indefinite, inserted at base of gynophore ..... **4. Capparis**
3 Sepals equal, inserted on edge of large disk ..... **5. Crateva**

1. CLEOME

L., Gen. Pl. ed. 5. 302. 1754. Lectotype species: *Cleome ornithopodioides* L. (see M.L. Green, Prop. Brit. Bot. 172. 1929.)

Annual herbs, glabrous to hairy, or at times glandular-hairy. Leaves simple or compound, petiolate. Flowers pedicellate, terminally racemose or

* Royal Botanic Gardens, Kew.

paniculate. Sepals 4, free. Petals usually 4, quite or nearly regular. Stamens 6—indefinite, inserted on receptacle or at base of gynophore. Ovary sessile or with short gynophore, 1-celled; ovules numerous on 2 parietal placentas. Capsule linear, 2-valved, beaked. Seeds reniform.

Genus of 150 species from the tropics, subtropics and warmer temperate regions.

KEY TO THE SPECIES

1 Leaves simple ..... **1. C. monophylla**
1 Leaves compound
2 Stamens 20 or more
3 Stamens 20–30, filaments not thickened at top; stems glandular-pubescent, viscid; flowers yellow ..... **2. C. viscosa**
3 Stamens more than 30, filaments thickened at top; stems hirsute with pale, stiff, bulbous-based hairs; flowers rose to purple ..... **3. C. chelidonii**
2 Stamens 6
4 Leaflets linear ..... **4. C. tenella**
4 Leaflets not linear
5 Gynophore 1–4 mm long in flower, extending to 2–2.5 cm in fruit ..... **5. C. gynandra**
5 Gynophore minute or lacking
6 Petals pink to pale purple; fruit narrowing into stalk-like base above pedicel; seeds with open cleft ..... **6. C. rutidosperma**
6 Petals white to dull yellow; fruit terminating abruptly at base above pedicel; seeds with closed cleft ..... **7. C. aspera**

1. Cleome monophylla L., Sp. Pl. 672. 1753; DC., Prod. 1: 239. 1824; Wight & Arn., Prod. 21. 1834; Thw., Enum. Pl. Zeyl. 14. 1858; Hook. f. & Thoms. in Hook. f., Fl. Br. Ind. 1: 168. 1872; Trimen, Handb. Fl. Ceylon 1: 55. 1893. Type: from India.

Annual, 30–60 cm tall, erect, simple to much-branched above; stems strongly patent, glandular-pubescent. Leaves simple, slender petiolate, passing into bracts above; lamina 2–5 (–7.5) × 0.4–1.4 (–2) cm, lanceolate, acute, entire, rounded to cordate at base, finely glandular-pubescent on both surfaces; petiole 1–2.5 (–4) cm long. Flowers pale violet-pink, solitary in axils of leafy bracts, forming erect raceme 30–40 cm long; pedicels 0.7–1 cm long, slender, shorter than bracts. Sepals 3.5 × c. 1 mm, oblong, drying dull purplish, densely, shortly glandular-pubescent without. Petals c. 9 × 1.5 mm including 4 mm long slender claw. Stamens 6; filaments c. 9 mm long; anthers 1.5 × c. 0.2 mm, linear, greatly curved. Ovary 3.5 × 0.3 mm, narrowly ellipsoid, densely glandular. Capsule up to 8–9.5 × 0.2 cm, linear, straight, cylindrical, pubescent, prominently parallel veined. Seeds c. 1.5 mm diameter, laterally compressed-globose, strongly ribbed on back, drying dark brown to black, cleft more or less closed.

Distr. Ceylon and southern India; tropical and subtropical Africa, from the Somali Republic to South Africa.

Ecol. Weed of waste and cultivated ground in the lowlands; also in rocky areas in the dry districts.

Specimens Examined. ANURADHAPURA DISTRICT: Dambulla to Anuradhapura road, S of mile-marker 52/5, 4 Oct 1973, *Sohmer 8078* (PDA). POLONNARUWA DISTRICT: Polonnaruwa Rest House, 8 Jan 1970, *Fosberg 51908* (PDA). KURUNEGALA DISTRICT: Kurunegala, Mag Hill, 4 Sept 1962, *Amaratunga 312* (PDA). MATALE DISTRICT: Dambulla, 180 m, 2 Dec 1970, *Cramer 3283* (PDA), 335 m, 6 Oct 1970, *Dassanayake 529* (K); Dambulla Rock, 16 May 1931, *Simpson 8131* (BM); Dambulla Rock, 17 Nov 1961, *Amaratunga 22* (PDA), March 1868, *Thwaites s.n.* in *C.P. 2792*, p.p. (PDA), 20 Dec 1881, *s. coll. s.n.* (PDA). BADULLA DISTRICT: Badulla, Jan 1888, *s. coll. s.n.* (PDA), *s. coll.* in *C.P. 2792*, p.p. (HAK); Bintenna, 24 Apr 1923, *de Silva s.n.* (PDA). KANDY DISTRICT: Peradeniya, in 1860, *Thwaites s.n.* in *C.P. 2792*, p.p. (BM). KEGALLE DISTRICT: Galpitamade, 22 Aug 1966, *Amaratunga 1124* (PDA). LOCALITY UNKNOWN: *Walker 1007* (E), *s. coll. s.n.* (K).

2. Cleome viscosa L., Sp. Pl. 672. 1753; Hook. f. & Thoms. in Hook. f., Fl. Br. Ind. 1: 170. 1872; Trimen, Handb. Fl. Ceylon 1: 57. 1893. Type: Ceylon, Herb. *Hermann 241* (BM–SL, lectotype).

Polanisia viscosa (L.) DC., Prod. 1: 242. 1834.

Herb, annual, erect up to 0.4–1.5 m tall, widely branched, unarmed; stems yellowish hirsute, viscid, foetid. Leaves 3–5-foliolate; leaflets (0.8–) 2–3 × (0.25) 0.8–1.3 cm, oblanceolate-elliptic, acute or obtuse, cuneate to attenuate at base, densely glandular-pubescent, becoming glabrescent with age, but maintaining pubescence especially on major veins beneath, petiolule 0.5–1.5 mm long, densely glandular-pubescent; petiole c. 0.4–3.75 cm long, densely glandular-pubescent. Flowers pedicellate, various shades of yellow (white to pink or purple—*Wirawan 1220, 1222*), in corymbose racemes with flowers solitary in axils of reduced, leaf-like bracts. Sepals 0.5 × 0.15 cm, oblong, acute, obtuse or rounded, glandular-pubescent without, free. Petals 0.9–1 × 0.35 cm, oblong, rounded at apex, cuneate at base into short claw, glabrous. Stamens c. 20 or more, included; filaments 5–8 mm long; anthers 1.25 × 0.25 mm, linear, curved. Ovary 5 × 1.5 mm, densely glandular-hairy, included, style 1–1.5 mm long, glabrous. Fruit up to 8 × 0.35 cm, linear-cylindric, subdensely glandular-pubescent, prominently parallel-veined, beak 3–5 mm long; fruiting pedicel 1.2–2.2 cm long. Seeds c. 1 mm diameter, 0.6 mm thick, circular, prominently transversely ridged, cleft closed, orange-red.

Distr. Native of the Old World tropics, occurring from southern Arabia and tropical Africa, through tropical Asia including Malaysia, to Australia.

Ecol. Rocky and sandy places, roadsides and cultivated ground.

Vern. Wal-aba, Ran-manissa (S).

Specimens Examined. JAFFNA DISTRICT: Punkudutivu, 15 Nov 1970, *Kundu & Balakrishnan 668* (PDA). ANURADHAPURA DISTRICT: Anuradhapura, 17 Mar 1927, *Alston 1118* (PDA); Anuradhapura to Trincomalee road, near mile-marker 65/4, 5 Oct 1973, *Sohmer 8147* (PDA); Nuwara Wewa, 4 May 1931, *Simpson 8043* (BM); Vavuniya to Kebithigollewa road, 24 Jun 1975, *Sumithraarachchi & Sumithraarachchi 830* (PDA); Rajangana Reservoir, 1 Sept 1978, *Wirawan 1214* (PDA); margin of Hunuwillagama Wewa, 31 Aug 1978, *Wirawan 1210* (PDA). TRINCOMALEE DISTRICT: Harbour, York Island, 27 Aug 1860, *Dubuc s.n.* (E); Kantalai, S end of tank, 6 Oct 1973, *Sohmer 8185* (PDA), *8187* (PDA); c. 3 km N of Adampane, c. 16 km SW of Kuchchaveli, 1 Dec 1977, *Fosberg & Jayasinghe 57113* (K, PDA). KURUNEGALA DISTRICT: Athagala Rock, Kurunegala, 23 Sept 1978, *Wirawan 1231* (PDA); Nikaweratiya, 4 Sept 1962, *Amaratunga 322* (PDA). MATALE DISTRICT: Dambulla Rock, 29 Nov 1926, *Silva s.n.* (PDA); Sigiriya Wewa, 11 Nov 1973, *Sohmer 8643* (PDA). POLONNARUWA DISTRICT: Polonnaruwa, 1 Sept 1978, *Wirawan 1215* (PDA), Rest House, 7 Oct 1973, *Sohmer 8228* (PDA), Sacred Area, 61 m, 18 Dec 1970, *Ripley 308* (PDA); Minneriya Tank, 6 Oct 1973, *Sohmer 8194* (PDA), *8199* (PDA); c. 5 km SW of Elahera near mile-marker 12/5, c. 120–150 m, 10 Oct 1974, *Davidse 7326* (K, PDA). BATTICALOA DISTRICT: Tiruperumdurai, sea-level, 5 Dec 1976, *Cramer 4784* (K, PDA). COLOMBO DISTRICT: Colombo, Government Farm, 15 Dec 1926, *Alston 1119* (PDA); Minuwangoda, 16 Apr 1962, *Amaratunga 1272* (PDA); Negombo, 18 Nov 1969, *Amaratunga 1840* (PDA). KANDY DISTRICT: Kandy, Royal Palace Park, 16 Sept 1978, *Wirawan 1220* (K), *1221* (PDA), *1222* (K, PDA). BADULLA DISTRICT: Mahiyangana to Bibile road, c. 8 km W of Bibile, 11 Oct 1973, *Sohmer 8315* (PDA). AMPARAI DISTRICT: Gal Oya Reservoir, 270 m, 13 Nov 1967, *Comanor 564* (E, K); E side of Ulpasse Wewa, c. 3 km N of Panama, 26 Nov 1970, *Fosberg & Sachet 52974* (K, PDA). KALUTARA DISTRICT: Kalutara, Nov 1920, *de Alwis s.n.* (PDA). RATNAPURA DISTRICT: surrounds of sports pitch, Tunkama, c. 25 km NE of Ambalantota, 25 Feb 1994, *Philcox et al., 10676* (K, PDA). HAMBANTOTA DISTRICT: Ruhuna National Park, Sithul Pahuwa, 25 Nov 1970, *Fosberg & Sachet 52914* (PDA), Block I, Bambawa, near Guards' Hut, 17 Nov 1969, *Cooray 69111706R* (K, PDA). LOCALITY UNKNOWN: *Brodie 125* (E); in 1860, *Dubuc s.n.* (E); *Walker 1014* (E), *s. coll. s.n.* (E); *Thwaites s.n.* in *C.P. 1073*, p.p. (BM, PDA).

3. Cleome chelidonii L. f., Suppl. Pl. 300. 1782; Hook. f. & Thoms. in Hook. f., Fl. Br. Ind. 1: 170. 1872; Trimen, Handb. Fl. Ceylon 1: 56. 1893. Type: from India.

Polanisia chelidonii (L. f.) DC., Prod. 1: 242. 1824; Wight & Arn., Prod. 22. 1834.

Herb, annual, erect, to 0.8 m tall; stems angular with sparse, pale, stiff, bulbous-based hairs. Leaves (1–3–) 6–7-foliolate, with fewest leaflets towards top; leaflets 1–2.25 (–5.5) × 0.25–0.4 (–1.2) cm, obovate, usually densely appressed-hairy, apex rounded, subacuminate to acute, base cuneate, petiolules 0.1–0.25 cm long, appressed-hairy; petiole 1–5 (–10) cm long or almost wanting, indumentum as stem. Flowers rose to pinkish-purple, pedicellate, in corymbose racemes, bracteate with each flower subtended by small leaf-like bracts comprising 1–3 bractlets. Pedicels 1–2.5 cm long, sparsely hairy to subglabrous. Sepals 0.2–0.3 × 0.1–0.15 cm, elliptic to obovate, shortly acuminate, sparsely hairy without. Petals 4, 0.9–1.2 × 0.3–0.5 cm, obovate, rounded at apex, narrow at base. Stamens many, up to 65, 7–8 mm long, glabrous; filaments thickened at top; anthers c. 1 mm long. Ovary c. 7 × 1 mm, linear, glabrous. Fruit 8–9.5 × 0.2 cm including 0.5 cm long beak, cylindrical, glabrous, prominently parallel-veined. Seeds c. 1.5 mm diameter, 1 mm thick, somewhat reniform with open cleft, warty, not ribbed.

Distr. India and Ceylon; Burma and Thailand; Central and East Java.

Ecol. Dry low country.

Vern. Wal-aba (S).

Specimens Examined. MANNAR DISTRICT: Giant's Tank, 14 Mar 1932, *Simpson 9332* (BM, PDA), Murunkan, 12 Nov 1970, *Kundu & Balakrishnan 601* (PDA), Mannar, sea-level, 24 Mar 1970, *Cramer 2886* (PDA). ANURADHAPURA DISTRICT: between Dambulla and Habarana, 21 Oct 1973, *Jayasuriya 1341* (K, PDA). TRINCOMALEE DISTRICT: Kantalai Tank, 7 Oct 1978, *Wirawan 1244* (PDA). MATALE DISTRICT: Ereula Tank, c. 8 km ESE of Dambulla, c. 215 m, 11 Oct 1974, *Davidse 7389* (PDA). COLOMBO DISTRICT: Siduwa, 10 Sept 1967, *Jayasuriya 2642* (PDA). HAMBANTOTA DISTRICT: Tissamaharama, 12 Aug 1932, *Simpson 9933* (BM, PDA); Bundala Sanctuary, 9 Apr 1985, *Jayasuriya et al., 3301* (PDA); Ruhuna National Park, Andunoruwa Wewa, 16 Dec 1969, *Cooray 69121618R* (PDA), Block I, 1 Jun 1968, *Cooray 68060102R* (PDA). ANURADHAPURA OR KURUNEGALA DISTRICT: Migas Wewa, 4 Oct 1931, *Simpson 8708* (BM, PDA). POLONNARUWA DISTRICT: Mineri Lake, 6 Sept 1885, *s. coll.* (PDA).

4. Cleome tenella L. f., Suppl. Pl. 300. 1782; DC., Prod. 1: 240. 1824; Wight & Arn., Prod. 21. 1834; Hook. f. & Thoms. in Hook. f., Fl. Br. Ind. 1: 169. 1872; Trimen, Handb. Fl. Ceylon 1: 55. 1893. Type: from India.

Herb, annual, erect, 8–12 (–25) cm tall, much branched; branches spreading, very slender, glabrous. Leaves 3-foliolate; leaflets 0.6–2 × 0.02–0.04 cm, narrowly linear to filiform, glabrous, petiolule minute or lacking; petiole 0.5–1.2 cm long, appearing somewhat flattened, glabrous. Flowers white or yellowish with purple veined petals. Pedicel 1.5–5 mm long, slender, glabrous. Sepals c. 0.8 × 0.5 mm, oblong-ovate or elliptic, glabrous, solitary in axils of upper leaves. Petals 2.75–3 × 1 mm, including c. 0.5 mm long claw. Stamens 6; filaments 2 mm long, slender; anthers c. 0.5 mm long. Ovary 2–2.5 × 0.4 mm. Fruit 1.5–4.5 × 0.08–0.15 cm, linear-cylindric, faintly but prominently, parallel-veined, glabrous; fruiting pedicel 0.8–1 cm long. Seeds c. 0.5 mm diameter, suborbicular, black or blackish-brown, densely, minutely muricate, not ribbed, cleft not tightly closed, slightly open.

Distr. Southern India and Ceylon; Mali and Senegal, Ethiopia, Eritrea and the Sudan and Somali Republics.

Ecol. In Ceylon only recorded from coastal areas in Puttalam and Batticaloa Districts.

Specimens Examined. PUTTALAM DISTRICT: Chilaw, Nov 1881, *Ferguson s.n.* (BM, K, PDA). BATTICALOA DISTRICT: S of Batticaloa Lagoon, 28 Jun 1931, *Simpson 8303* (BM, PDA).

5. Cleome gynandra L., Sp. Pl. 671. 1753. Type: cultivated plant (BM-CLIFF, holotype).

Cleome pentaphylla L., Sp. Pl. ed. 2. 938. 1763, nom. illegit.
Gynandropsis pentaphylla (L.) DC., Prod. 1: 238. 1824.
Gynandropsis gynandra (L.) Briq., Annuaire Conserv. Jard. Bot. Geneve Annuaire 17: 382. 1914.

Herb, annual, 0.3–1 m tall, erect, widely branched; stems glandular-pubescent to long, patent, shaggy-pilose, or subglabrous, unarmed. Leaves long-petiolate, palmately (3–) 5 (–7)-foliolate; leaflets 1.2–7.5(–10) × 0.8–3 cm, terminal longest, shortly petiolulate to subsessile, thinly herbaceous, lanceolate to obovate-lanceolate or rhombic, acute, shortly acuminate, acute to subobtuse at base, ciliate to denticulate, minutely pubescent on both surfaces, glabrescent; petiolules 1–3 mm long, webbed at base, glandular-pubescent; petiole 2.5–10 cm long, densely glandular-pubescent, occasionally with short prickles. Flowers white, yellowish, pink or pale purplish, pedicellate in long corymbose racemes, bracteate with bracts composed of 3 palmately arranged bractlets. Pedicels 1.5–2 cm long, slender, glandular-pubescent. Sepals 2.5–3 (–5) mm

long, c. 0.5 mm wide, linear, acute, glandular-pubescent. Petals 0.9–1.6 × 0.2–0.4 cm overall, rotund, slender-clawed. Stamens 6. Gynophore 1–4 mm long above point of insertion of sepals, slender, glabrous, extending to 2–2.5 cm long in fruit, slightly curved upwards; ovary c. 4 × 0.5 mm, linear-oblong-cylindric, glandular-pubescent. Fruit 6.5–8 × 0.3–0.35 cm, linear-cylindric, somewhat compressed, slightly curved. Seeds c. 1.3 mm diameter, helicoid-reniform, black, rough.

Distr. Most of Africa to the Seychelles and Madagascar; tropical Asia and America.

Ecol. Disturbed, waste or cultivated ground.

Vern. Wela (S), Tayirvalai (T).

Note. The closely allied *Cleome speciosa* Raf., a native of the New World, is frequently encountered in Ceylon, where it is cultivated as an ornamental. The two species are easily distinguished by way of the gynophore, which in *C. speciosa* reaches about 6 cm in length, and by the pink petals which are almost twice as large in that species, measuring 25–35 mm long.

Specimens Examined. MANNAR DISTRICT: Vankalai, 12 Nov 1970, *Kundu & Balakrishnan 625* (PDA). ANURADHAPURA DISTRICT: Anuradhapura, 25 Sept 1969, *Beusekom & Beusekon 1600* (PDA). TRINCOMALEE DISTRICT: Trincomalee, 30 Aug 1860, *Dubuc s.n.* (E). KURUNEGALA DISTRICT: near Nikaweratiya Rest House, 12 Oct 1978, *Wirawan 1256* (K, PDA). POLONNARUWA DISTRICT: Minneriya, roadside from Polonnaruwa, 2 Sept 1978, *Wirawan 1217* (K, PDA). MATARA DISTRICT: Polhena, 8 Oct 1971, sea-level, *Cramer 3444* (PDA). BATTICALOA DISTRICT: Kennedy Estate, Kalkudah, sea-level, *Cramer 2758* (PDA). HAMBANTOTA DISTRICT: Hambantota, 31 Dec 1926, *Alston 1120* (PDA); Hambantota to Tissamaharama road, mile marker 152/4, 19 Jun 1973, *Sohmer et al., 8844* (BM); Ruhuna National Park, Block I, Patanagala, 2–3 m, 6 Apr 1968, *Fosberg 50349* (BM, K, PDA), 24 May 1968, *Cooray 68052405R* (PDA), 22 Oct 1968, *Cooray 68102210R* (K, PDA), 3 Dec 1969, *Cooray 69120301R* (K, PDA), 25 Aug 1967, *Mueller-Dombois 67082508* (PDA). LOCALITY UNKNOWN: *s. coll.* in *C.P. 2460* (PDA).

6. Cleome rutidosperma DC., Prod. 1: 241. 1824; Iltis, Brittonia 12: 290. 1960. Type: presumably from West Africa, by an unknown collector, possibly *H. Smeathman* (G–DEL).

Cleome burmannii Wight & Arn., Prod. 22. 1834; Hook. f. & Thoms. in Hook. f., Fl. Br. Ind. 1: 170. 1872. Type: from India.

Cleome aspera sensu Trimen, Handb. Fl. Ceylon 1: 56. 1893, p.p., non Koen., 1824.

Herb, annual, erect or spreading, up to 50 cm tall; stems weak, sparsely hairy with simple mixed with stipitate glandular hairs, otherwise subglabrous. Leaves 3-foliolate; leaflets 0.8–2.5 × 0.4–1.4 cm, ovate, ovate-elliptic to rhombic, acute to acuminate, occasionally rounded, minutely mucronate, attenuate to cuneate at base, serrulate, minutely ciliolate, sparsely glabrous to glandular-pilose, petiolules 0–0.5 mm long; petiole 0.5–2.25 cm long, slender, indumentum as for stem. Flowers pink to pale purple, or white, pedicellate, solitary in axils of slightly reduced leaves. Pedicels 1–2 cm long, filiform. Sepals 2 × 0.5 mm, ovate or acute, shortly ciliate, obtuse, slightly pubescent. Petals c. 6 mm long, including 2.5 mm long claw. Stamens 6; filaments 7–8 mm long; anthers c. 2 mm long, linear, strongly curved. Ovary 5–8(–12) mm long, including 1.5 mm long style, linear-cylindric, glabrous. Fruit 3–5 × 0.3 cm, linear-cylindric, narrowing into stalk-like base before junction with pedicel, prominently longitudinally parallel-veined; fruiting pedicel up to 2.5 cm long. Seeds 1.5–1.75 mm diameter, deeply laterally ribbed, dark brown, cleft semi-open.

Distr. West tropical Africa; introduced into the New World and recorded from Florida, through Honduras and Panama to one collection in Brazil and then recorded widely from the Caribbean. Again widely reported from tropical Asia from Burma, Thailand and Ceylon, through to Sumatra and the Philippines.

Ecol. Waste land and sites of old cultivation; roadsides, gardens etc.

Note. Great confusion has been caused by the fact that De Candolle (1834) considered *C. rutidosperma* to possibly have originated from "Tabago" [? Tobago]. This confusion has been studied in great detail by Iltis and is well documented by him. (in Brittonia 12: 290–294. 1960.) As is to be seen above, the type of the name is a specimen housed in Geneva and presumably collected from Sierra Leone and then probably by H. Smeathman.

Several collections exist in various herbaria under the name *Cleome graveolens* Raf. On study these have been found to be more correctly placed here under *Cleome rutidosperma*. The basis of Rafinesque's name was from his earlier *Polanisia graveolens*, a plant described as being glandular-pilose and having 8–12 stamens and further localized from North America. A. De Candolle cited this latter name in his treatment of the family for his Prodromus, keeping it under *Polanisia*. However, in this same work he described *C. rutidosperma*, a plant which he considered to be glabrous and having six stamens. The present author has not seen the type of this name in Geneva, but seriously doubts that it would be totally glabrous. Every single specimen of this taxon seen for this work, which otherwise fits the original description, is glandular-pilose, albeit, in some cases, sparsely so. There is no hesitation about including the *'C. graveolens'* material from our area here, but

the possible inclusion of the name in synonymy is left to later authors who should have access to a wider range of material for reference.

Specimens Examined. MANNAR DISTRICT: Illupaikadavai, Feb 1890, *s. coll. s.n.* (PDA). PUTTALAM DISTRICT: Lunuwila, Bandirippuwa Estate, 21 Jan 1949, *Child s.n.* (PDA). ANURADHAPURA DISTRICT: Ritigala, 10 Jan 1974, *Waas 322* (PDA). KURUNEGALA DISTRICT: Kurunegala, 23 Sept 1978, *Wirawan 1234* (K); Athagala Rock, 23 Sept 1978, *Wirawan 1230* (K); Bakmigalle, c. 9 km from Kurunegala on road to Dambulla, 7 Oct 1978, *Wirawan 1242* (K). POLONNARUWA DISTRICT: Polonnaruwa Rest House, 2 Sept 1978, *Wirawan 1216* (K). COLOMBO DISTRICT: Colombo, 22 Oct 1928, *de Alwis s.n.* (PDA), near Lake Lodge Hotel, 28 Mar 1973, *Bremer et al., 60* (K); Urapola, 10 Dec 1968, *Amaratunga 1684* (PDA); Pasyala, 18 Apr 1968, *Amaratunga 1597* (PDA); Veyangoda, 9 Oct 1969, *Amaratunga 1878* (PDA). KEGALLE DISTRICT: Noori Estate, Deraniyagala, 10 Aug 1940, *Estate Superintendent s.n.* (PDA). KANDY DISTRICT: Royal Palace Park, Kandy, 16 Sept 1978, *Wirawan 1221* (PDA), *1222* (PDA); Peradeniya, University campus, 10 Nov 1970, *Fosberg 52706* (K, PDA), 5 July 1975, *Jayasuriya & Premadasa 2234* (PDA); Peradeniya Botanic Gardens, April 1938, *de Silva 731* (PDA); Akkarawatta, Galagedera, 180 m, 18 Feb 1994, *Philcox et al., 10613* (K, PDA). BADULLA DISTRICT: Alawatugoda, 27 May 1967, *Amaratunga 1307* (PDA). AMPARAI DISTRICT: Pottuvil Circuit Bungalow, S point of Arugam Bay, 26 Nov 1970, *Fosberg & Sachet 53025* (PDA). HAMBANTOTA DISTRICT: Ruhuna National Park, Patanagala, 9 Nov 1969, *Cooray 69110901R* (K), below Palatupana Wewa, 5 Dec 1973, *Sohmer 9013* (PDA), Block I, Rakinawala, 7 Dec 1969, *Cooray 69120713R* p.p. (PDA), 22 Oct 1968, *Mueller-Dombois 68102208* (PDA), mile 11, Yala road, 18 Oct 1968, *Mueller-Dombois 68101827* (PDA); Kirinda, December 1882, *s. coll.* (PDA). LOCALITY UNKNOWN: *s. coll.* in *C.P. 1068,* p.p. (PDA).

7. Cleome aspera Koen. ex DC., Prod. 1: 241. 1824; Wight & Arn., Prod. 22. 1834; Thw., Enum. Pl. Zeyl. 14. 1858; Hook. f. & Thoms. in Hook. f., Fl. Br. Ind. 1: 169. 1872; Trimen, Handb. Fl. Ceylon 1: 56. 1893, p.p.; Alston in Trimen, Handb. Fl. Ceylon 6: 12. 1931. Type: from India.

Herb, annual, 15–40 cm tall, erect, diffusely branched; branches glabrous except for very occasional short, pale, patent or antrorse, soft prickles. Leaves 3 (–5)-foliolate, short petiolate; leaflets 0.5 × 0.1 × 1.75–0.5 cm, oblong to obovate, sparsely short, appressed, hispid-hairy, entire, ciliolate, shortly petiolulate with petiolules up to 0.8 mm long; petiole 0.15–0.8 cm long. Flowers dull-yellow to white, slender-pedicellate, solitary in axils of small leaf-like bracts, racemose. Pedicels 0.5–1.5 cm long, filiform. Sepals 2–3 ×

0.25–0.5 mm, acute or obtuse. Petals 3 × 1 mm, obovate, narrowed at base but not clearly clawed. Stamens 6; filaments 2.5–2.75 mm long, shorter than petals; anthers c. 0.5 mm long. Ovary c. 3 × 0.5 mm, including 0.5 mm long style, linear, glabrous. Gynophore c. 1 mm long or much less. Fruit 3 × 0.2 cm, including 2.5 mm long beak, cylindrical, narrowing abruptly at base at junction with pedicel, valves prominently parallel-veined. Seeds c. 1.3–1.5 mm diameter, compressed-suborbicular, finely longitudinally ridged, not markedly transversely so, cleft closed, dark orange-brown.

Distr. India and Ceylon; Malesia.

Ecol. Low country and dry districts, especially near the sea.

Specimens Examined. JAFFNA DISTRICT: Jaffna, in 1846, *Gardner s.n.* in *C.P. 1068*, p.p. (PDA). ANURADHAPURA DISTRICT: Puttalam road, 10 Oct 1970, *Kundu 301* (PDA). BATTICALOA DISTRICT: Batticaloa, Mar 1865 (?), *Thwaites s.n.* in *C.P. 1068*, p.p. (PDA). COLOMBO DISTRICT: Colombo, 6 Jun 1926, *Ball s.n.* (PDA). AMPARAI DISTRICT: E side of Ulpasse Wewa, c. 3 km N of Panama, 26 Nov 1970, *Fosberg & Sachet 52961* (K, PDA). HAMBANTOTA DISTRICT: Ruhuna National Park, Patanagala, 30 Nov 1969, *Cooray 69113002R* (PDA), Block I, Buttawa Plain, 2 Dec 1969, *Cooray 69120218R* (PDA), Rakinawala, 7 Dec 1969, *Cooray 69120713R*, p.p. (PDA). LOCALITY UNKNOWN: 1853, *Thwaites s.n.* in *C.P. 1068*, p.p. (BM, K); *s. coll.* in *C.P. 1068* p.p. (PDA).

2. MAERUA

Forssk., Fl. Aegypt.-Arab. 104. 1775. Type species: *Maerua crassifolia* Forssk.

Shrubs, straggling or climbing. Leaves simple, alternate. Flowers usually in terminal or lateral corymbose racemes or at times solitary in axils of upper leaves. Sepals 4, connate at base into slender tube half length of lobes or less. Petals 4, smaller than calyx lobes, ovate, inserted on rim of disk. Stamens numerous, free. Ovary 1-celled, ovules many. Fruit elongate, moniliform, soft. Seeds large.

Genus of about 50 species, from tropical and South Africa to India and Ceylon.

Maerua arenaria Hook. f. & Thoms. in Hook. f., Fl. Br. Ind. 1: 171. 1872; Trimen, Handb. Fl. Ceylon 1: 58. 1893. Type: from India.

Maerua oblongifolia sensu Thw., Enum. Pl. Zeyl. 15. 1858, non A. Rich. 1847.

Shrub, scrambling to 2 m or more; stems slender. Leaves: lamina 2–5 × 1.25–3 cm, elliptic to broadly ovate-elliptic, entire, apex obtuse, retuse or

minutely apiculate, base obtuse, glabrous; petiole 0.4–1 cm long, glabrous. Flowers pedicellate in terminal corymbose racemes or solitary axillary, white becoming pale greenish-white, sweet-scented. Calyx-tube 2–2.5 mm long, lobes 10–13 × 3.5–4.5 mm, ovate to oblong-ovate, acute, mucronate, glabrous except minutely pubescent on margins. Petals c. 6 × 3 mm, ovate, markedly veined. Stamens up to c. 30 or more, spreading; filaments 2–2.5 cm long, white; anthers c. 1.5–2 mm long, green. Gynophore 2–4 mm long. Ovary 2–4 mm long, cylindric, glabrous. Fruit 3–5 cm long, up to 12-seeded, irregularly constricted between seeds, smooth, obscurely verrucose, greenish-yellow when mature.

Distr. India and Ceylon.

Ecol. Dry country, especially dry, stony, sandy areas near the coast.

Note. Our species differs from the African *Maerua oblongifolia* (Forssk.) A. Rich. only in the relative size of the calyx tube compared with its lobes. Both Hook. f. & Thoms. and Ellfers doubted whether this justified their continued separation. The limited material available for the present study was insufficient to decide the issue, and *M. arenaria* is provisionally maintained as distinct.

Specimens Examined. JAFFNA DISTRICT: Pallavarayankaddu, Feb 1890, *s. coll. s.n.* (PDA); Elephant Pass, Jaffna Lagoon, 10 Dec 1970, *Fosberg et al., 53564* (K, PDA); Vaddukoddai, 12 Apr 1971, *Balasubramaniam 188* (K). PUTTALAM DISTRICT: Puttalam, July 1883, *s. coll. s.n.* (PDA); near Chilaw, 11 Sept 1931, *Simpson 8570* (BM); Wilpattu National Park, Maduru Odai, 30 Jun 1969, *Wirawan et al., 925* (PDA). ANURADHAPURA DISTRICT: near Kudagama, between Ratmalagahawewa and Medawachchiya, 8 Oct 1978, *Wirawan 1246* (K, PDA); road to Talava, 15 Jun 1969, *Read 2173* (PDA). TRINCOMALEE DISTRICT: Trincomalee, in 1846, *Gardner s.n.* in *C.P. 1064,* p.p. (PDA). KURUNEGALA DISTRICT: 49 mile-marker on Kurunegala to Puttalam road, just after Deduru Oya bridge, 29 Aug 1978, *Wirawan 1200* (E, K, PDA), *1202* (K, PDA). BATTICALOA DISTRICT: Batticaloa, in 1856, *Glenie s.n.* in *C.P. 1064,* p.p. (PDA). RATNAPURA DISTRICT: Madampe road from south, 16 Sept 1931, *Simpson 8641* (BM). HAMBANTOTA DISTRICT: Hambantota, Dec 1882, *s. coll.* (PDA); Mandagala Tank, between Nonagama and Hungama, 16 Sept 1978, *Wirawan 1261* (K, PDA); between Tissamaharama and Ruhunu National Park, 22 Apr 1969, *Cooray 69042202R* (PDA). LOCALITY UNKNOWN: *Thwaites s.n.* in *C.P. 1064,* p.p. (BM, PDA).

3. CADABA

Forssk., Fl. Aegypt. Arab. 67. 1775. Type species not designated.