CELASTRACEAE—II (Ding Hou, Leyden)

The family Hippocrateaceae was established by A. L. de Jussieu (Ann. Mus. Hist. Nat. Paris 18, 1811, 486, as Hippocrateae) and three years later R. Brown created the family Celastraceae (in Flinders, Voy. Terra Austr. 2, 1814, 554, as Celastrinae). Brown was well aware that his new 'order' (family in our sense) closely approached Hippocrateaceae and hinted at the possibility that they might be fused later.

This was indeed effected by Hooker J. (in B. & H. Gen.: Pl. 1, 1862, 358), who reduced Hippocrateaceae to a tribe of the Celastraceae. Still up till the present there has been no unanimity of opinion on this question. Disagreement with Hooker's vision started with Miers (Trans. Linn. Soc. 38, 1873, 319–330) in his elaboration of the South American Hippocrateaceae; he reviewed the history of the two families and ably summarized their general characters. Basing himself on literature and new observations he put forward eleven points of difference for their distinction. However, many new genera and species have been described since 1873 which have obliterated many of Miers's arguments, and recent specialists agree that, if any, only few characters do hold.

Loeher, who kept the two families apart (in E. & P. Pfl. Fam. 3, 5, 1892, 189–230; ibid. ed. 2, 20b, 1942, 87–231), in discussing the African genus Campylostemon Welw. (Notizbl. Berl.–Dahl. 13, 1937, 563–577) remarked that the chief difference between the families would be: isomerous flowers in Celastraceae and anisomerous flowers in Hippocrateaceae. In passing it may be noted here that, in absence of fruit, he referred Campylostemon, which possesses 5 stamens, to the Celastraceae.

In his comprehensive work on the American Hippocrateaceae (Brittonia 3, 1940, 341–555) A. C. Smith found the isomery obviously not an absolutely discriminating character as he reduced Kippistia Miers (3 stamens) to Cheiloclinium Miers (with 5 stamens), stating that the combined genus is a very coherent one. In his opinion the most important characters separating Hippocrateaceae from Celastraceae would be: (i) stamens inserted within the disk (not outside it or fused with it), (ii) stamens 3, except in two species of Cheiloclinium (not 5 or 4), and (iii) anthers dehiscing by lateral, apical, or extorse clefts (never intorse).

In 1941, in connection with the publication of the new Hippocrateaceous genus Brassiantha A.C.Sm. from New Guinea, I. W. Bailey & A. C. Smith (J. Arn. Arb. 22, 389–394, t. 1) stated that properly the only differential character left seemed to be the place of insertion of the stamens and they added that if that were so, the separation of the two families should be considered artificial.

In this respect it is very interesting to note that the Indo-Malesian genus Kokoona Thw. was originally classified in Hippocrateaceae on account of its stamens which are inserted within the disk, and this was admitted also later by Miers, I.e. Later authors have arranged it, however, unanimously with the Celastraceae, because of its arboreous habit, capsular fruit, and isomerous stamens. Properly it should be marked as a transitional link.

The African genus Campylostemon has also proved to be such a link, since Lawlirée has described the structure of its fruit (Bull. Jard. Bot. Brux. 18, 1947, 250–254). Its flowers fit Celastraceae and are isomerous, but its capsular fruit is similar to that of the Hippocratea group. Lawlirée found the fruit characters more important than the isomerous stamens and preferred to arrange Campylostemon with Hippocrateaceae of which he broadened and redefined the family concept. He was aware, however, that all the differences listed in his diagnosis are only quantitative and needed further study.

From this succinct review it appears that Celastraceae and Hippocrateaceae are connected by several intermediate genera and species which obscure a sharp distinction. This is corroborated by the data which emerge from auxiliary data derived from palynological, anatomical, and chemotaxonomical observations.

(1) Part I was published in vol. 6 (1963) 227–291.
ERDTMAN stated that pollen grains ± similar to those of Hippocraeteaceae occur in Celastraceae (Pollen Morph. Pl. Tax. Angiosp. 1952, 105, fig. 52A and 204, fig. 121B).

METCALFE & CHALK found the anatomical characters of Hippocraeteaceae very similar to those of Celastraceae and concluded that the two families are very closely related (Anat. Dicot. 1, 1950, 387–404).

HEGNAUER concluded that as far as phytochemical characters are known the separation of Celastraceae and Hippocraeteaceae seems hardly justified from that point of view (this vol., p. 230).

Summarizing, it appears that the overwhelming evidence is in favour of accepting one natural family, Celastraceae, a name which has been proposed for conservation by BULLOCK (Taxon 7, 1958, 10, 18).

**Taxonomic position of the genus Siphonodon**

There is controversial opinion about the inclusion of Siphonodon in the family, largely because of the interpretation of the flower, and more in particular about the question whether the central appendage found in the apically hollow pistil represents the style which HOOKER doubted because of it being covered by a cuticle. On this question I have recently given a survey (Blumea 12, 1963, 36–37). CROIZAT raised it to the rank of subfamily (Lilloa 13, 1947, 41, 43) and GAGNEPAIN & TARDE-Blot to family rank (Nat. Syst. 14, 1951, 102). But this change of rank does not involve its exclusion from the Celastrales. In fact, HUTCHINSON retained it in close proximity to the Hippocraeteaceae. Wood-anatomical data do not provide specific clues as this anatomy is rather heterogenous in Celastraceae. Palynologically, ERDTMAN is inclined to support the creation of a new family, but it may be doubted whether sufficient data are available. It would seem to me that a consideration on the taxonomic position of Siphonodon cannot be divorced from a consideration of the Papuan Brassantha and the Australian genus Hedraianthera which also possess an apically hollow pistil. An apically hollow pistil occurs also in unrelated plants, *e.g.* in Erycibe (Convolvulaceae).

**Emendation of family circumscription**

In consequence of the considerations given above the provisional family description needs a few emendations, *viz*: add to the characters of the calyx:—‘in some Salacias slightly, irregularly 3–5-lobed in the apical part and then circumcissile at the base, or lengthwise splitting, or not lobed’; and add to the characters of the cotyledons:—‘or massive (Salacia), free or united’.

**Germination**. N. Hallé (Mém. Inst. Franç. Afr. Noire n. 64, 1962, 38–40, f. 22–24) made observations on seed germination of some species of the former Hippocraeteaceae. He found that species with wingless seed and massive cotyledons, or winged seed with united cotyledons and a thickened marginal ‘nerve’ have hypogaeal germination; he found this in Salacia (2 spp. observed), Cuervea (1 sp.), Simirestis (1 sp.) and Loeseneriella (1 sp.). Species with winged seed with a thin marginal ‘nerve’ and free cotyledons are epigaeal: Reissania (1 sp.), Apodostigma (1 sp.) and Campylodilea (1 sp.). The data of seed germination in the Celastraceae are still inadequate to be evaluated taxonomically at present.

**Generic delimitation in ‘Hippocraeteaceae’** as accepted here I have discussed in detail in a precursory paper (Blumea 12, 1963, 31–38).

**NEW KEY TO THE GENERA**

*(based on flowering material)*

1. Stamens 5 or 4.
2. Pistil not hollow in the apical part.
3. Leaves spirally arranged or alternate.
4. Leaves with cross-bar veins between the nerves. Petiole thickened at the apex beneath. Petals contorted. Styles 2, free or slightly united at the base. See vol. 6, p. 280 . . . 9.1 Bhesa

(1) The numbering of the genera in the key in part I, *l.c.* 231–232, was, unfortunately, erroneous.
5. Petals always larger than the calyx lobes and usually different in shape, imbricate. Overy 3-4-celled (2-celled in Maytenus diversifolia).
6. Ovary (2-)3-celled, each cell with two collateral ovules.
7. Ovary free from the disk. Ovules with a cup-shaped aril at the base. Scandent shrubs, always unarmed. See vol. 6, p. 233
8. Ovary usually partly immersed in the disk. Ovules without arillar cup at the base, though the seeds are arillate. Erect (sometimes scandent?) shrubs or small trees, sometimes spinous. See vol. 6, p. 238
9. Ovary 4-celled, each cell with c. 10 ovules arranged in two series. See vol. 6, p. 243. 3. Xylopyrum
10. Ovular usually similar to calyx lobes in size and shape, usually valvate. Ovary 2-celled.
11. See vol. 6, p. 288
12. Perrottetia
3. Leaves decussate or opposite.
8. Petals slightly united at the base (very rarely free, e.g. in Microtropis filiformis). Disk proper absent; filaments united at the base into a ring or short tube, by some interpreted to represent a disk, usually united with the petals. See vol. 6, p. 272
8. Petals free. Disk conspicuous, fleshy, cupular or flat (covering the ovary and coherent with it in Glycostepetalum sp.), free from the petals.
9. Ovary 3-, or 4-5-celled. Ovules 1-18 in each cell.
10. Ovary 4-5-celled.
11. Ovules 2 in each cell. See vol. 6, p. 245
12. Ovule 1 in each cell. See vol. 6, p. 254
13. Ovary 3-celled. Ovules (4-6)-8-18 in each cell.
14. Petals contorted, without appendage. See vol. 6, p. 258
15. Petals imbricate, usually with appendages on the inner side, very rarely naked. See vol. 6, p. 262
16. Ovary 2-celled, or 1-celled by abortion (Pleurostylia). Ovules 2 in each cell.
17. Disk more or less flat. Anthers subglobose and rounded at the apex, connective invisible on the dorsal side. See vol. 6, p. 284
18. Cassine
19. Disk cupular. Anthers ovoid and short-acute, connective distinct and broad on the dorsal side. See vol. 6, p. 287
20. Pleurostylia
2. Pistil hollow in the apical part (best observed in a longitudinal section of the flower).
15. The hollow cavity with a cylindric, style-like appendage arising from the bottom. Petals imbricate. Disk united with the ovary. Stamens inserted outside the disk.
14. Siphonodon
15. Calyx distinctly 5-lobed even at very young stage, spreading at anthesis.
16. Flowers in axillary fascicles. 17. Salacia
17. Flowers in axillary cymes, or terminal thyrses, or panicles.
18. Inflorescences with short, supplementary branchlets in the dichotomies or in the axes of branches. Disk inconspicuous. 16. Reissantia
20. Petals subglobose, dry, densely puberulous outside, subvalvate or the margins slightly overlapping. 15. Loesenerella
21. Petals thin, rarely slightly fleshy, glabrous, imbricate, the margins much overlapping. 17. Salacia
15. Calyx almost unlobed or slightly, irregularly lobed at the apex, during anthesis breaking transversely along an irregular line near its base, sometimes irregularly splitting lengthwise, rarely the whole calyx unlobed, saucer-shaped and persistent. 17. Salacia

NEW KEY TO THE GENERA
(based on fruiting material)

1. Fruits capsular, dehiscent.
2. Fruits with 3 divergent, follicle-like parts. Seed with a basal wing.
3. Cotyledons united, at least partly so. 15. Loesenerella
4. Cotyledons free. 16. Reissantia
2. Fruits otherwise. Seed wingless, or with an apical wing (Kokoona), or the wing surrounding the seed proper (Lophopetalum).
4. Leaves with crossbar-like veins between the nerves; petiole thickened at the apex beneath. See vol. 6, p. 280
5. Leaves with reticulate veins; petiole not thickened at the apex beneath.
6. Leaves spirally arranged, or alternate.
7. 1½ cm long, 3-celled (very rarely 2-celled).
7. Seeds completely enveloped by the aril. Scandent shrubs. See vol. 6, p. 233. 1. Celastrus
7. Seeds only at the lower half or at the base enveloped by the aril. Erect (sometimes scandent?) shrubs or small trees. See vol. 6, p. 238
6. Fruits 2½-6½ cm long, 4- or 5-celled.
8. Fruits oblong, 4-angular, 4-celled. Seeds c. 10 in each cell. See vol. 6, p. 243
5. Leaves deciduous or opposite.
9. Fruits 3-5-celled, loculicidally dehiscent, usually 3-5-valved, 3-6-lobed. 11. Pleurostyla
10. Fruits usually 4-5-angular or -lobed, 4-5-celled, occasionally 1-3-celled by abortion, each cell 1- or 2-seeded. Seeds not winged, completely or incompletely enveloped by aril.
11. When the fruit dehisces its axis splitting completely together with the valves, leaving no columella. Seeds usually 2 in each cell, attached to the top or base at the inner angle; raphe not branched. See vol. 6, p. 245
12. Fruits attached at their base, wing at the apical end. See vol. 6, p. 258
9. Fruits usually 1-celled, splitting on one side, usually 1-seeded. See vol. 6, p. 272.
8. Microtropis
1. Fruits drupaceous or berry-like, indehiscent.
13. Fruits with a lateral, persistent style. See vol. 6, p. 287
14. Leaves alternate; twigs zigzag. Fruit a small, globose berry. Seeds muricate-foveolate or tuberculate. See vol. 6, p. 288
15. Fruits subglobose, few- to many-seeded, sometimes 1-seeded in Salacia.
16. Leaves decussate or opposite (except in S. vimeria and sometimes in S. chinensis). Stamens 2 or 3, persistent or leaving distinct scars at the base of the fruit. Climbers, shrubs or rarely small trees
17. Salacia
16. Leaves spiral. Stamens 5, caducous, and their scars usually not distinct at the base of the fruit. Tall trees

13. BRASSIANTHA

A. C. SMITH, J. Arn. Arb. 22 (1941) 389.—Fig. 23.

Small tree. Stipules small, deltoid or ovate, caducous. Leaves alternate or spiral. Inflorescences axillary, paniculate, rarely cymose, few-flowered. Flowers 5-merous. Calyx lobes imbricate. Petals valvate. Disk extrastaminal, fleshy, annular-pulvinate or slightly cupular, composed of 5 pulvinate glands contiguous at the ends. Stamens 5, erect, inserted at the inner side of the notches of disk; anthers basifixed, dehiscing by a transverse slit, ± extrorse. Pistil hollow in the upper ½, apex truncate. Ovary 5-celled, short-conical, base confluent with the disk; style none; stigma inconspicuous. Ovules 2-5 in each cell, superposed or biseriate. Fruit capsular, subglobose, loculicidal, after dehiscing leaving a conspicuous, club-shaped columella. Seeds (1-2)-4-5(-6) in each cell, completely enveloped by an aril when young, leaving an opening on one side when ripe; albuminous; cotyledons flat, foliaceous.

Ecol. In lowland forests, sometimes found at 1800-1900 m.
Notes. A. C. SMITH & I. W. BAILEY (J. Arn. Arb. 22, 1941, 389-394) gave a full account of the mor-
Phological and anatomical characters and of the taxonomical affinities of this interesting genus. I can add that Brassiantha must be quite closely allied to the monotypic Australian genus Hedraianthera F. v. M. (Fragm. 5, 1865, 58) by the alternate or spirally arranged leaves, few-flowered, paniculate inflorescences, divaricate anther-cells, pistil hollow in the apical end, a 5-celled ovary of which each cell comprises several ascendent, superposed ovules, the sessile stigma, and capsular fruit which has evidently a columnella after dehiscing. The chief difference between these two genera is, as far as I know, found in the insertion of the stamens, and in the seed: in Brassiantha the disk is fleshy, composed of five pulvinate glands contiguous at the ends, the stamens are inserted at its inner side before the notches of the disk, and the seed is more or less completely enclosed by an aril; in Hedraianthera the disk is rather thin, annular, 5-notched, the stamens are inserted just beneath the outer margin of the disk, and the seed has a caterpillar-like aril attached on one side.

The type of Hedraianthera porphyropetala F. v. M. (Fragm. 5, 1865, 59; F. M. Bailey, Queensl. Fl. 1, 1899, 256; Compr. Cat. Queensl. Pl. 1913, f. 77) was collected by J. DALLACHY (s.n., type in MEL, isotypes in L & K) at Rockingham Bay, Queensland. I am very grateful to Messrs J. H. WILLIS and S. L. EVERIST, Australia, for kindly sending us the material of type and later collections together with valuable data of Hedraianthera. In a letter addressed to Dr VAN STEENIS, dated December 5th, 1963,
Mr Everist stated that Mr L. S. Smith after making a more detailed examination of the material of *Hedraianthera* and *Brassiantha* in Brisbane agrees that these two genera are distinct.

As to the fruit of *Hedraianthera*, von Mueller described it, from immature material, as smooth; however, it is corrugate outside. The mature seeds, from a detached open fruit of a subsequent collection made in the type locality, sent by Mr Willis, have along the raphe a most peculiar caterpillar-like thickening which is obviously the aril as described by Loesener (in E. & P. Fl. Fam. ed. 2, 20b, 1942, 125); they match with those of a young detached fruit of the type and are albuminous with two foliaceous cotedyloids. This rather surprising kind of aril is, so far, not known in any other species of the *Celastraceae*.

1. **Brassiantha pentamera** A. C. Smith, J. Arn. Arb. 22 (1941) 390, t. 1.—Fig. 23a-j.

Small tree or shrub up to 10 m by 20 cm φ. Branchlets terete, light to reddish brown. *Leaves* chartaceous to subcoriaceous, elliptic to elliptilanceolate, ovate, or obovate-oblong, 4–12 cm by 1½–3 cm; base cuneate to attenuate; apex acuminate; margin entire; nerves 4–9 pairs; petiole 3–10 mm. *Inflorescences* usually in many leaf axils, ½–2 cm long; rachises, peduncles and pedicels with elastic threads shown on breaking. Peduncle 0–1 cm. Bracts triangular, 1–1½ mm long. Pedicels 5–8 mm. *Flowers* red or purplish red. *Calyx* lobes triangular, ½–¾ mm long. *Petals* ovate, 1½–2½ by ¾–1½ mm, short-acuminate. *Disk* ½–1½ mm φ. *Stamens* very short; anthers ± triangular, cells separated by a conspicuous connective, slightly oblique when young. *Ovary* ½–1 mm long. *Fruit* subglobose, 2½–3½ cm φ, 5-sulcate, red. *Seeds* slightly falcate, or ± ellipsoid, sometimes slightly planoconvex, 12–15 by 7–10 mm; aril orange; hilum very long, along the whole length of the seed on the outer side.

**Distr. Malesia**: New Guinea (Hollandia and vicinity, and NE. New Guinea).

Ecol. In primary and secondary forests, in West New Guinea in lowland up to 100 m, in NE. New Guinea at 1800–1950 m.

**14. SIPHONODON**


Trees. Stipules minute. *Leaves* spiral or alternate. *Inflorescences* axillary, cymose, sometimes only one-flowered. Peduncles present or 0. *Flowers* 5-merous. *Calyx* lobes imbricate. *Petals* imbricate. *Stamens* 5, sometimes alternating with 5 staminodes; anthers latrorse, connective distinct and broad, separating the cells. *Pistil* half-immersed, adnate to the disk, the upper half hollow and with a style-like column rising from the bottom. *Ovary* many-celled, cells irregularly superposed. *Ovules* 1 in each cell, anatropous, attached towards the inner angle, oblique or pendulous. *Fruit* drupaceous, hard, with numerous bony, 1-seeded stones. *Seeds* flat, albuminous; testa membranous; cotedyloids flat, free.

**Distr. Species**: c. 7, distributed from SE. Asia through Malesia to Australia. Fig. 26.

Ecol. In forests from lowland up to 1375 m.

**KEY TO THE SPECIES**

1. Central column of the pistil obtuse at the top. *Calyx* lobes smaller than petals. *Stamens* with filaments united at the lower half or at the base 
   1. Central column of the pistil peltate at the top and covering the tips of the anthers. *Calyx* lobes larger than the petals. *Stamens* usually free
   2. *S. peltatus*

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Fig. 24. Siphonodon celastrineus Griff. a. Habit, × 2/3, b. opening bud, × 4, c. young flower, with petals removed, × 8, d. ditto, section, × 8, e. petal, × 8, f. stamen, × 8, g. fruit, × 2/3, h-l. ditto, longitudinal and cross-sections, × 2/3.—S. peltatus Ding Hou. j. Flower seen from the top, calyx lobes and petals removed, × 8, k. stamens, × 8, l. flower, in section, × 8 (a-f SAN 18729, g-l KOSTERMANS 5860, j-l CARR 13908).

Tree up to 35 m by 90 cm ø, very rarely with buttresses up to 1-1½ m high (fide KOSTERMANS 13472 & 13487). Leaves chartaceous to subcoriaceous, sometimes coriaceous, olivaceous or grey-greenish when dry, ovate-oblong or elliptic-oblong to lanceolate, 4-23 by 3½-9½ cm; base cuneate or round; apex acute to acuminate; margin usually crenate, sometimes remotely or obscurely crenulate, rarely entire; nerves 6-10 pairs; petiole ½-2 cm. Inflorescences cymose or umbelliform, (1-)few(-∞)-flowered. Peduncle ½-1½ cm. Pedicels 5-11 mm. Flowers cream-white; calyx and petals sometimes containing reddish brown cells or spots in the tissue. Calyx lobes reniform or subrotund, 1-2 mm long. Petals ovate, 2¼-3½ by 1¾-2½ mm, obtuse. Stamens c. 1 mm; filaments flat, united at the lower ½ or near the base; anthers usually perpendicularly bent inward in bud. Pistillar body usually ± semi-globose, sometimes ± short conical, occasionally with 3
radiating ridges on the upper surface. Fruit green or yellowish green, broad-ellipsoid, globose, sometimes slightly obovoid or ± pyriform, 3–6½ by 2–6 cm.

Fig. 26. Distribution of *Siphonodon celastrineus* Griff.

**Distr.** Widely distributed but scattered in India, Burma, Thailand, Indo-China, and throughout Malesia. Fig. 26.

**Ecol.** In forests, from the lowland up to 1375 m; found on limestone in E. Kutai and Java, also collected on level clay soil in W. New Guinea. In *Sula Sanana* I. (West Moluccas) it occurs on limestone slopes along the Wai Bussa near Fowata between 40–90 m as a dominant in forest, associated with *Vitex cofassus*, *Pangium edule*, *Intsia* (scattered), *Pometia*, *Ficus*, and *Nauclea* (Bloembergen, 1939).


**Notes.** The shape and size of leaves and fruits are very variable, even in the same collection. In the herbarium fruits are, in most cases, detached: some very large fruits show holes and are deformed by insects. Only few flowering specimens available; it seems that the flowers fall off easily after drying. It is desirable to have them in different stages of development, preserved in liquid for further study of their variability. There are three specimens cited in the original description of *S. pyriformis* Merr., i.e. Elmer 5985 (lectotype, US), FB 5141 (not seen), and BS 2875 (US). According to Merrill, it would differ from *S. celastrineus* by its pyriform fruit. However,
I have seen pyriform fruits in several specimens of *S. celastineus*, e.g. Koorders 11228 (BO) from Java. My hesitation to reduce *S. pyriformis* to *S. celastineus* was overcome by the examination of two flowers on Elmer 5985 which showed that the floral characters are exactly similar.

4. *Siphonodon peltatus* Ding Hou, Blumea 12 (1963) 38.—Fig. 24f-l.

Tree c. 27 m. Leaves chartaceous, olivaceous or light brown above, light brown beneath, oblong-ovate, 11–14½ by 5–6½ cm; base round or acute; apex (all damaged) probable acute; margin entire; nerves 6–8 pairs; petiole ½–1 cm. Inflorescences condensed. Peduncle very short or obscure, sometimes up to c. 5 mm. Pedicels c. 2 mm. Flowers cream-coloured. Calyx lobes very broad-ovate or suborbicular, c. 4 mm ø, ± entire, with 3 faint, slightly branched veins. Petals suborbicular, c. 3 mm ø, rather fleshy, the marginal part thin and transparent (when dry), wavy. Stamens ± free, or some of them slightly united at the base; filaments flat, broad-oblong, c. 1 mm long; anthers deltoid, perpendicularly bent inward, the tips under the peltate apex of the central column. Pistil flat, round, slightly concave near the center, the central column peltate at the apex. Ovules arranged on one level (?). Fruit unknown.

Distr. Malesia: SE. New Guinea (Lala River), once collected.

Ecol. In forest at c. 1650 m.

15. **LOESENERIELLA**


Liana, or scanty rarely erect shrubs. Stipules interpetiolar or sometimes ± intrapetiolar. Leaves decussate. Inflorescences axillary, dichotomously cymose. Calyx deeply 5-lobed. Petals 5, usually rather thick, subcoriaceous to coriaceous when dry, subvalvate or the margins slightly overlapping, usually acuminate, entire, puberulous on the outer surface, sometimes glabrescent. Disk extrastaminal, fleshy, simple and annular-pulvinate, rarely double with the outer part cupular and the inner part forming a kind of receptacular androgynophore (in extra-Mal. spp.). Stamens 3, inserted at the base of the free part of the pistil; filaments linear, reflexed at anthesis; anthers transversely dehiscent, extrorse. Ovary half-immersed, sometimes superior, 3-lobed; style distinct, slender; stigma obscure. Ovules 4–12 in each cell. Fruit capsular, consisting of 3 separate, divergent, dorsoventrally flattened ‘follicles’ each dehiscing along an inconspicuous median suture into 2 navicular valves. Seeds usually with a basal wing, the wing usually membranous, with 1 submedian (raphé) and 1 marginal ‘nervé’; endosperm 0; cotyledons completely, sometimes partly united.

Distr. About 26 spp., in tropical Africa, Asia and Malesia, southeastward as far as the New Hebrides; in Malesia 4 spp.

Ecol. In forests, in Malesia from the lowland up to c. 850 m.

**KEY TO THE SPECIES**

1. The upper ½–2½ of the petal on the inner surface and disk at the top distinctly pilose.

2. Pericarp usually thin-leathery, after dehiscence the subvalvar margins slightly reflexed. Seed proper very narrowly oblong-ellipsoid, 3–4½ by ½–3¼ cm; most part of the wing unilateral, 3–5½ by ½–3¼ cm, rather thick and not transparent when dry, the submedian and marginal nerves inconspicuous.

   1. L. macrantha

2. Pericarp rather woody, after dehiscence the subvalvar margins not reflexed. Seed proper very broadly-ellipsoid, 1–1½ by ¾ cm; wing ± at one end of the seed, c. 3 by 1½ cm, membranous and ± transparent, the submedian and marginal nerves conspicuous.

3. Leaves usually elliptic-oblong or -lanceolate; apex acuminate. Anthers and filaments glabrous.

   2. L. sorgenesis

3. Leaves broad-elliptic to rounded; apex obtuse or rounded. Inner surface of both the filaments at the apical part and the base of the anthers papillose or puberulous . . . .

   3. L. cunningii
1. Inner surface of the petals and disk glabrous. (Pericarp thin-leathery, after dehiscence the sutural margins slightly spreading. Seed proper elliptic- or ovate-oblong, 1–2 by 1/4–1/2 cm; wing at one end, membranous, ovate to ovate-oblong, or elliptic, 2–4 by 1/4–2 cm, with conspicuous submedian and marginal nerves.) ........................................... 4. L. pauciflora


Lianna. Stipules ± intrapetiolar, lanceolate, 1/4–1 mm long, the scars united in a ring on the older branchlets. Leaves chartaceous to thin-coriaceous, sometimes shining above, elliptic to elliptic-lanceolate, ovate-oblong to lanceolate, sometimes broad-elliptic or -ovate, rarely obovate, (5/4–1)–20 cm; base obtuse, cuneate; apex acute, short-acuminate to acuminate; margin subentire rarely slightly crenulate; nerves 6–8 pairs; petiole 1/2–1 cm. Inflorescences sometimes ramiflorous, 1–6 cm long, up to 5 times branched, usually glabrous rarely sparsely light yellowish puberulous; sometimes flowers on a young, axillary short-shoot with bracts or reduced leaves and such shoot resembling a thyrsiform inflorescence. Peduncle 1/4–3 cm. Bracts deltoid, c. 1/2 mm long. Pedicels 5–7 mm, the central one usually longer, up to 10 mm, sometimes with elastic threads shown on breaking. Flowers green or yellowish green, rarely yellowish. Calyx lobes deltoid, 1–1 1/2 mm long, puberulous outside. Petals ovate-oblong, 4 1/2–6 1/2 by 1 1/2–2 1/2 mm, densely pilose (uniseriate hairs) on the upper half or 1/2 inside and on the margins. Disk annular-pulvinulate, 1 1/2–3 mm ø, 1/2–2 1/2 mm high, the basal part before the calyx lobes slightly extended obliquely outward and downward, pilose (uniseriate hairs) at the top, very rarely glabrous when young. Stamens c. 2 mm. Pistil 1–2 mm emerging from the disk. Ovules 4–6 in each cell. Follicles ovate- or elliptic-oblong, obtuse at the apex, 5–8 by 2–3 1/2 cm. Seeds (incl. wing) obovate-oblong, 3/5–6 by 1/2 cm. 

Distr. From New Ireland (W. coast), the Solomon Is. (New Georgia group), and the New Hebrides (Santa Cruz group) to Ceylon; in Maleasia: Sumatra (Indragiri, Palembang), Riauw (P. Durian), Malay Peninsula (Perak, Selangor, Pahang, Johore, Singapore), Banka, Central Java (Kediri and Kinnerzee), Borneo (North Borneo, Banjermasin, and Sarawak), SE. and Central Celebes (Kendari and Latoa), Moluccas (Sula Is.) and New Guinea (throughout but scattered). Fig. 27.

Ecol. In lowland forests and along mangrove swamp.

Notes. The type of L. sopheresis is FORBES 440 (BM, L); its flowers are quite similar to those of L. macrantha. BAKER stated it to differ from the latter by the shape of the leaves and the colour of the flowers. Besides, the leaves are usually smaller and distinctly crenulate, the inflorescences are densely rusty puberulous, the pericarp rather woody, and the seeds possess a prominent membranous wing attached at one end.

The number of ovules per cell is quite variable in this species and is sometimes found to vary in

Fig. 27. Distribution of Loeseneriella macrantha (KORTH.) A. C. SMITH

Vern. Malay Peninsula: akar bintong, akar china, akar mata pklondak, gambir ayer, M; North Borneo: bohan kutongan, Bajo Sporna.


Lianna. Stipules triangular or deltoid, c. 1 mm long, ± intrapetiolar, the scars forming ± a ring on the older branches. Leaves subcoriaceous to coriaceous, elliptic, elliptic-oblong or lanceolate, rarely ovate-oblong, 5 1/2–11 by 2 1/2–4 1/2 cm; base cuneate; apex acuminate; margin crenulate; nerves 5–9 pairs; petiole 1/2–1 cm. Inflorescences 3 or 4 times branched, 1 1/2–2 1/2 cm long, densely puberulous, ferrugineous. Peduncle 1–2 cm. Bracts triangular, 1–1 1/2 mm long. Pedicels 1–3 mm. Flowers yellowish. Calyx lobes semiorbic or triangular, 3/4–1 mm long, puberulous on the outside. Petals ovate-oblong to lanceolate, 4–5 by 1 1/2–1 1/4 mm, pilose on the upper 1/2–3/4 inside and on the margins. Disk annular-pulvinate, 1 1/2–1 1/2 mm high, 1 1/2–2 mm ø, short-pilose at the top. In the basal part before to the calyx lobes slightly extended outward and downward. Stamens c. 1 1/2 mm. Pistil 1–1 1/2 mm emerging from the disk. Ovules 6–10 in each cell. Follicles obovate, c. 4 1/2 by 2 1/2 cm, pericarp woody. Seeds (incl. wing) ovate-oblong or lanceolate, 3/4–4 by 1 1/2 cm.


Ecol. In lowland forests and along mangrove swamp.
On a specimen, or even in one flower.


Scandent shrub. Stipules triangular or lanceolate, ½—1 mm long, spreading. Leaves coriaceous, broad-elliptic or round, sometimes ovate, 3–11 cm by 2½–7⅓ cm; base rounded, obtuse, rarely cuneate; apex obtuse, rounded, rarely emarginate; margin crenulate; nerves 5–8 pairs; petiole 3–4 cm. Inflorescences 2–4 times branched, ½–4 cm long, light brownish puberulous, sometimes glabrescent especially on the peduncles. Peduncle 1½–2½ cm. Bracts deltoid, c. 1 mm long. Pedicels 3½–4⅔ mm. Flowers greenish yellow, or green. Calyx lobes triangular, c. ½ mm long, puberulous outside. Petals lanceolate, 4½–5 by 1½–1½ cm, pilose on the upper ½–½ inside and on the margins. Disk annular-pulvinate, c. 1 mm high, 1½–2 mm wide, pilose at the apex, slightly 5-notched at the base. Stamens c. 2 mm, the inner surfaces of both the filament at the apical part and the base...
of the anther papillose. **Pistil** c. 1 mm emerging from the disk, sparsely pilose towards the base. **Ovules** 8–10 in each cell. **Follicles** oblong, 6½ by 2½ cm. **Seeds** (incl. wing) lanceolate, 4½–5 by 1½–1½ cm.

**Distr. Malesia:** W. Sumatra (Batu Is.), Malay Peninsula (Selangor and Malacca), and Philippines (Luzon, Samar, and Panay).

Ecol. In lowland forests along streams and on limestone.

Notes. **Lawson** in the original description of his new species *Hippocratea cumingii* cited only 'Malacca, GRIFFITH.—Distr. Philippine.' This refers to *Hippocratea* 906 (K) from Malacca and CUMING 1725 (K) from the Philippines, which I could examine at Kew. Since then, additional material has been available from the Malay Peninsula, Sumatra, and the Philippines.

The fruit characters are derived from a collection of *Boerlage* (s.n., L), from the Horts. Bog. of unknown provenance; it bears both flowers and mature fruits. The flowers of this specimen are similar to those of other specimens.


Liana, or shrubby creeper. Stipules triangular, or a series of filaments, c. 1 mm long. Leaves subcoriaceous or chartaceous, ovate-oblong, ovate, broad-elliptic to elliptic-lanceolate, 3½–16 by 2–9 cm; base obtuse, cuneate; apex acute to acuminate, sometimes obtuse and slightly apiculate; margin crenate to subentire; nerves 5–8 pairs; petiole 3–7 mm. **Inflorescences** axillary and extra-axillary, 1–4 times branched, few-flowered, densely reddish brown puberulous, 1½–4 cm long, sometimes very short. Pseudoele ½–2 cm. **Bracts** triangular, c. 1 mm long. **Pedicles** 2–5 mm. **Flowers** yellowish, or green. **Calyx** lobes semi-orbicular, or deltoid, ½–1 mm long, brownish puberulous outside. **Petals** ovate-oblong, 3–5 by 1½–2 mm. **Disk** annular-pulvinate, 1½–2½ mm s, c. 1 mm high, sometimes the basal part slightly extended upwards or downward and slightly 5-angular. **Stamens** 1½–2 mm. **Pistil** ½–2 mm emerging from the disk. **Ovules** (5–)6–8 in each cell. **Follicles** obovate to obovate-elliptic-oblong, ½–7½ by 1½–3 cm, emarginate or obtuse at the apex; pericarp thin-leathery, the margins of suture slightly spreading after dehiscence. **Seed** proper-elliptic or ovate-oblong, 1–2 by ½–¾ cm; wing ovate or ovate-oblong, or elliptic, 2–4 by ½–2 cm.

**Distr. Thailand** (scattered) and **Malesia:** NW. Sumatra (Simalur 1.), Malay Peninsula (Perlis, Perak, Kelantan, Trengganu, Pahang, Selangor, and Penang), Java (Bantam, Preanger, Nusa Kembangan, Banjumas, and Kangean), Lesser Sunda Is. (Timor), Borneo (Sarawak), Philippines (Luzon, Sibuyan, and Masbate 1.), Celebes (Gorontalo, M. Muna, and Pangkadjene), Moluccas (Talaud and Sula Is.), and New Guinea (Aru, Vogelkop, Sorong, Wakoli, and Radjah Ampat Is.).

Ecol. In forests from the lowland up to c. 840 m, sometimes found on limestone rocks.

**Vern. Sumatra:** olor balijan dotan, Simalur; Malay Peninsula: akar china; Borneo: bohan kutongan, Bajau E.C.; Moluccas: poencitang, Nenusa.

16. REISSANTIA


Lianas, scendent or sometimes erect shrubs, rarely small trees. **Leaves** decussate very rarely associated with some subopposite ones. **Inflorescences** axillary, sometimes crowded on short shoots, dichotomously cymose, or rarely paniculate, usually with supplementary branchlets in the dichotomies or in the axils of branchlets. **Flowers** small. **Calyx** lobes 5, imbricate. **Petals** 5, imbricate, erect or
suberect at anthesis. Disk extrastaminal, inconspicuous, most of it usually united with the ovary, the uppermost part slightly extended outward ± like a rim. Stamens 3, inserted at the base of the free part of the pistil; anthers transverse-oblong, extrorse. Ovary 3-celled, its free part globose or obscurely 3-sulcate; style short; stigma obscure. Ovules usually 2, rarely 4–8 in each cell. Fruit capsular, consisting of 3 divergent, separate ‘follicles’ which dehisce along an inconspicuous median suture into 2 navicular valves. Seeds with a basal, ± transparent, membranous wing, the latter with a distinct submedian and a thick marginal ‘nerve’; endosperm 0; cotyledons free (always?).

Distr. Species 7, in the Old World tropics of Central and West Africa, and Indo-Malesia; 4 of them in Malesia.

Ecol. In Malesia chiefly found in lowland forests, sometimes up to 700 m.

KEY TO THE SPECIES


Distr. Widely distributed but scattered in India, Ceylon, Burma, Thailand, Indochina, S. China (Yunnan and Hainan), and Malesia: Sumatra (Taliabu and Mangoli), Malay Peninsula (Perlis, Pahang, Penang, and Singapore), Java (throughout), Lesser Sunda Is. (Lombok, Sumbawa and Timor), Borneo (Bundu and Tarat),

Aug. 1964] Celastraceae—II (Ding Hou) 401.
Philippines (Luzon, Lubang I., San Mateo, and Mindanao), and Celebes (Gorontalo, Kendari, Pangkajene, Bonthain, and Lelewa). 

Ecol. In rain- and monsoon-forests, on ridges, in secondary forests, sometimes found on limestone, from the lowland up to 630 m. 

Uses. According to HEYNE (Nutt. Ph. 1927, 985) the sap of the stem is drunk for treating fever. The leaves, slightly scorched and seasoned with sambal, are given to eat to women in childbed, and compounded with adas-pulsaari (Alyxia sp.) are used for poultice in treating rheumatism. 

Vern. Java: (areu) mangêndèh, hóëh tûtung, ojot tja-tja-rián, S; Borneo: saripangil, tutok atik, Dusun. 

Notes. Hippocratea volubilis described by BLANCO was not a new species as MERRILL erroneously concluded, but merely the identification of a Philippine plant as Hippocratea volubilis, as indicated by the reference 'Lin. ibid.' at the end of BLANCO's description (1845). MERRILL referred this record with doubt to Hippocratea indica, and though the inflorescences are described as racemose and the fruit as obliquely cordate I agree this is probably the best disposition of it. 

Under the vernacular names of Alor sata (SF 10416) and Serapat akar (SF 13405), BURKILL & HANIFF (Gard. Bull. S.S. 6, 1930, 184) identified these two collections as Hippocratea ?indica and derived the information of medicinal uses. I examined the collection SF 13405 (Sing) which is a sterile young shoot and may belong to Rubiaceae. The identity of the other specimen, SF 10416, which has not yet been found, is still doubtful. 


Liana. Stipules ± intrapetiolar, triangular, 3-lobed, or lanciate, c. 1/2 mm long. Branchlets occasionally producing rootlets, sometimes with 2 buds in a leaf axil. Leaves chartaceous to subcoriaceous, elliptic- or ovate-oblong, sometimes broad-elliptic, 7–15 by 3–8 cm; base obtuse or cuneate; apex acuminate, sometimes apiculate; margin entire, or remotely, slightly crenulate; nerves 4–6 pairs; petiole 8–13 mm. Inflorescences dichotomously-cymose, 4½–8½ cm long, usually with short, supplementary branchlets in the dichotomies. Peduncle 3–4½ cm. Bracts triangular or deltoid, c. 1 mm long. Flowers pale yellow or yellowish green, almost sessile. Calyx fleshy, divided almost to the base, lobes deltoid, ½–1 mm long, slightly erose at the margin. Petals fleshy, broad-elliptic, obtuse, 2½–3 by 1½–2½ mm, with slightly inflexed margin, densely papillose on both surfaces. Free part of disk slightly 5-angular. Stamens ½–1 mm; filaments densely covered with papilla-like hairs. Pistil 3½–1 mm emerging from the disk; stigma obscurely 3-lobed. Ovules 4–8 in each cell. Follicles ovate to elliptic-oblong, 6½–8½ by 2½–3½ cm, the valves rather woody, c. ½ mm thick. Seeds (incl. wing) 6–7 by 1½–2½ ½ cm, seed proper ellipsoid, ½–2½ by 1½–1 cm. 

Distr. South Peninsular Thailand (Nakawa Sritamarat) and Malesia: S. Sumatra (Palembang), Banka, W. Java (Mt Salak), Lesser Sunda Is. (Timor), and Borneo (North Borneo and Sarawak). 

Ecol. In lowland forests up to 480 m. 

Vern. Java: (areu) mangêndèh. 

Note. I have seen only 3 collections with fruits, in 2 of which the follicle is elliptic-oblong, 6½–8½ by 2½–3 cm, and c. 2½ times as long as wide; in the type of Hippocratea beccarii it is ovate, 7½ by 5 cm; this is not correlated with floral differences. 


Liana up to 20 m. Stipules triangular, c. ½ mm long. Leaves chartaceous, ovate, oblongate, or elliptic, 7–10½ by 3½–5 cm; base cuneate; apex acute, obtuse; margin entire; nerves 4–7 pairs; petiole 6–8 mm. Inflorescences paniculate, sometimes ramiflorous, up to 5 cm long, densely covered with rust-coloured papillae or uniseriate hairs. Peduncle 1½–2½ cm. Bracts ½ mm long. Pedicels 1½–1½ mm. Flowers light greenish yellow. Calyx lobes triangular or ovate, c. ½ mm long, margin laciniate or short-fimbriate. Petals spatulate, 3–3½ by c. ½ mm, usually boat-shaped, with erose margin. Free part of disk wavy or slightly 5-angular. Stamens c. ½ mm; filaments densely covered with papillae or uniseriate hairs especially on the outer surface. Pistil c. ½ mm emerging from the disk. Ovules 6 in each cell. Fruit unknown.

Distr. Malesia: Malay Peninsula (Penang) and SE. Borneo (W. Kutai). 

Ecol. Lowland forests, up to 450 m. 

Liana or scandent shrub, up to 25 m. Stipules triangular, c. ½ mm long. Leaves subcoriaceous to coriaceous, broad-elliptic, elliptic, elliptic- or obovate-oblong, slightly obovate, or suborbicular, (5-)8–19½ by (2½-)5-10 cm; base cuneate or rounded; apex short-acuminate, sometimes obtuse or rounded; margin entire or remotely crenulate; nerves 3-6 pairs; petiole ½-1¼ cm. Inflorescences paniculate or thyrsiform, (3½-)10-14 cm long, many-flowered. Peduncle (1-)5-5½ cm. Bracts deltoid, ½-1½ mm long, laciniate. Pedicels ½-1¾ mm. Flowers pale yellowish green. Calyx almost divided to the base, lobes suborbicular, rarely deltoid, ½-1 mm long, erose or laciniate. Petals obovate-oblong or oblanceolate, 2½-3 by 1 mm, usually with inflexed margin, slightly curved inward at anthesis, erose. Disk sometimes slightly angular and the angles alternate with the petals.

Stamens c. ½ mm; filaments usually papillose on the outer and sometimes also the inner surface. Pistil c. ½ mm emerging from the disk, triangular, c. ¾ mm Ø at the base. Ovules (4-)6(-7) in each cell. Follicles obovate-oblong, 9-13 by 3½-4½ cm; pericarp ± woody, valves c. 1½ mm thick. Seeds (incl. wing) oblong-lanceolate, 6-10 by 1½-2½ cm; seed proper elliptic- or ovate-oblong, 2-2½ by ¾-1½ cm.

Distr. India (Concan, Sylhet, and S. Andaman), Upper Burma (Mingin), Thailand (N. Song, Makum, Muang Pua and Watana) and Malesia: West Central Sumatra (Mt Singalang), E. Java (Besuki and Kediri), Borneo (Kapuas), Philippines (Palawan, Mindoro, Luzon, and Mindanao), Moluccas (Kai Is.), and New Guinea (Sorong, Ramoi, and Milne Bay).

Ecol. Lowland forests, sometimes up to 700 m,
once found on limestone.

Note. In the original description of *Hippocratea salacioides* the number of ovules in each cell was recorded as 2. However, I have dissected some flowers of the type specimen and found mostly 6, sometimes 4, 5, or 7 in each cell.

17. SALACIA


Lianas, scandent or sometimes erect shrubs, rarely small trees. Twigs usually terete and greyish. Leaves decussate, sometimes subopposite, rarely spiral. Flowers axillary, fascicled, or in cymes, thyrsiform or paniculiform. Calyx deeply 5-lobed, or in some species slightly irregularly 3-5-lobed in the apical part and then circumscissile at the base or lengthwise splitting, or not lobed. Petals (4–)5(-7), sometimes the innermost 1 or 2 slightly irregularly cleft or lobed in the upper half. Disk intrastaminal, fleshy, annular-pulvinate, sometimes truncate-conical or flattened, rarely cupular. Stamens 3 or (in *S. erythrocarpa* and *S. forsteniana*) 2, inserted at the base of the free part of the pistil, usually reflexed at anthesis; filaments subulate, usually broadened towards the base; anthers transversely oblong or ellipsoid, or ± reniform, sometimes ovoid, transversely or rarely lengthwise to obliquely extrorse, or apical-dehiscent. Ovary partly or completely immersed in the disk, the free part conical or triangular, 3- or (in *S. erythrocarpa* and *S. forsteniana*) 2-celled, gradually narrowed into a distinct or obscure style; stigma obscure. Ovules 2–8 in each cell, axile. Fruit drupaceous, subglobose, 1-3-celled; pericarp coriaceous when dry. Seeds 1 to several, embedded in mucilaginous pulp; cotyledons massive, free or united.

Distr. Pantropic. It is very difficult to estimate the number of species in this genus because of the different opinions regarding the generic delimitation. A. C. Smith (1940, p. 424) recorded 29 species for the New World. There are about 90 species in Africa (cf. Hallé, l.c.). In Malesia 29 species are known. Fig. 30.

![Distribution of Salacia in Malesia](image)

Fig. 30. Distribution of *Salacia* in Malesia. Species density indicated in each subarea, endemics above the hyphen, non-endemic below it.

Ecol. In Malesia in forests and thickets, sometimes found on limestone, occasionally in freshwater swamps, from sealevel up to 1800 m.

Uses. The fruits of some species are edible, a little flesh coating the seeds. A decoction from the roots of a few species is used for medicinal purpose (cf. Burkill, Dict. 1935, 1942–1943; Heyne, Nutt. Pl. 1927, 985).

Morph. The morphological status of the edible flesh coating the seeds (actually the endocarp), here
designated as 'pulp', is not known to me. It could be tissue from either mesocarp or endocarp, or from both of them. The peculiar thing is that in herbarium material it forms thin loose lamella-like appendages attached to both exocarp and endocarp. Under the microscope the lamellae appear parenchyma-like cells, e.g. in S. leucocladia (CLEMENS 29599). It has been well observed in S. leucocladia, S. laurifolia, and S. oblongifolia. This uncertainty can only be verified in fresh material at various stages of development.

In some species, e.g. S. oblongifolia, the floral parts contain sulphur-yellow particles in the tissue; a Papuan species, Salacia crenata glandulosa, is even named after this property (see under 6. S. papuana). I am grateful to Dr Maas Geesteranus who has examined the material; he said that the sulphur-yellow particles are dried latex dissolving completely in KOH (10% solution) and are obviously a kind of haustorium.

Note. The fruits of several species are unknown; this made it difficult to frame the key.

**KEY TO THE SPECIES**

1. Flowers in distinctly peduncled cymes.
2. Calyx distinctly 5-lobed even in very young stage.
3. Cymes lax, rachises or internodes distinct.
   1. S. korthalsiana
5. Disk flat, 3-4 times as wide as high. Bracts with colleters inserted at the base inside.
6. Calyx without colleters on the inner base, lobes always distinctly imbricate, apex obtuse or round, very rarely slightly acute.
   6. Calyx lobes ± reniform, entire. Disk with a thin, rim-like extension at the base. Ovules 4 in each cell .
   2. S. cymosa
   6. Calyx lobes very broad-ovate or -obovate, erose or slightly laciniate. Disk without such extension. Ovules 2 in each cell. Fruits globose, 4-5 cm ø . 
   3. S. subaltermifolia
   6. Calyx with fimbriate colleters attached on the inner base and protruding from the margins, lobes separate from each other at least in open flowers, apex acute .
   4. S. blepharophora
3. Cymes condensed, rachises or internodes invisible. Disk orbicular, usually flat, sometimes slightly convex in the central part, 1/2-1½ mm high, 1⅛ mm ø. Fruits subglobose or very broadly obovoid, 4-8(-12) cm long, slightly contracted at the base .
5. S. oblongifolia
6. Calyx almost unlobed, or slightly, irregularly lobed at the apex, breaking away transversely along an irregular line near its base during anthesis, sometimes irregularly, longitudinally splitting.
7. Calyx dehiscing transversely near its base, the upper part calyptra-like, and the basal part ± like a narrow ring remaining below the petals, very rarely associated with some longitudinally splitting ones.
8. Flowers with 3 stamens and ovary 3-celled. Anthers obliquely dehiscent.
9. Flower-buds broad-ovoid, or ovoid, or conical, 2½-5 by 2½-3½ mm. Calyx thickened in the apical part (c. 1 mm in length) seen on a longitudinal section.
10. Calyx with free membranous tissue or in a mass at the apical end inside . 6. S. papuana
10. Calyx without such free tissue as above .
   7. S. sororia
9. Flower-buds subglobose, c. ⅛-⅝ mm ø. Calyx evenly thick on a longitudinal section .
   8. S. ledermannil
   9. S. forsteniana
7. Calyx not lobed, or splitting irregularly lengthwise, and persistent at the base of a flower.
11. Cymes lax, rachises or internodes distinct. Calyx splitting at anthesis and remaining at the base of a flower. Anthers slightly obliquely dehiscent .
   10. S. intermedia
   11. S. wenzeli
1. Flowers in fascicules, or on a very short, axillary, bracteate tuberle or peduncle.
12. Calyx in the mature flower erose but not lobed, saucer-shaped .
   11. S. wenzelli
12. Calyx distinctly 5-lobed.
   12. S. erythrocarpa
14. Disk in mature flowers thin, cupular, sometimes stamens inserted on the ovary at some distance above this disk, the interval resembling a short "gynandrophore". Ovules (2-4) in each cell.
   Leaves large, yellowish when dry. Fruits broadly ovoid or subglobose, usually 5½-6½ by 5-5½ cm .
   13. S. macrophylla
14. Disk rather fleshy, flat, discoid, or annular-pulvinate, no interval between disk and insertion of stamens. Ovules usually 2 in each cell (4-5 in each cell in S. marginata).
15. Disk flat, slightly concave or discoid, or slightly convex towards the center, 4-7 times as wide as high.
   15. Disk large, 3½-5 mm ø.
17. Pedicels 1½–2 cm. Calyx lobes slightly erose. Disk suborbicular, sometimes obscurely 5-lobed. **S. longipedicellata**

18. Branchlets sharply 4-angular. Leaves distinctly serrate-crenate. Petals suborbicular or broad-elliptic, 3½–4 by 2¾–3¾ mm. Ovules 2 in each cell. **15. S. castanefolia**

19. Disk rather small, usually less than 2 mm. **16. S. marginata**

19. Disk medium, slightly more than 2 mm. **17. S. grandiflora**


21. Disk annular-pulvinate, usually higher than wide, rarely twice as wide as high or less. **19. S. ovalis**

22. Disk ½–1½ mm wide. Petals usually oblong or elliptic, 1½–3½ by ½–¾ mm. **20. S. leucocladia**

22. Disk 3½–1½ mm wide. Petals usually oblong or elliptic, ½–¾ by ½–¾ mm. **21. S. leucocladia**

23. Leaves always distinctly acuminate, brownish when dried, upper surface smooth. **22. S. maingayi**

24. Ovules attached at the central part of the axis. Fruits 2½–4½ mm or (not known in **S. nitidissima**).

25. Flower-buds broad-oblong, usually angular. Petals slightly keeled. **26. S. latiflora**

27. Leaves especially the old ones with elastic threads shown on breaking. Calyx entire. **27. S. larrifolia**

28. Leaves without elastic threads shown on breaking. Calyx glandular. Fruits broad-obovoid, c. 4½ by 3½ cm, contracted at the base. **28. S. exsculpata**

29. Disk without the rim-like extension as above. Fruit smooth. Leaves usually distinctly crenulate. **29. S. euphlebia**

30. Flower-buds globose, not angular. Petals smooth. Disk 1 mm high, 1½ mm wide, at base, gradually narrowed upwards. **30. S. nitidissima**

31. Ovules attached at the top of the axis. Fruits small, 1–1½ cm or. **27. S. viminea**

32. Leaves subopposite. Flowers sometimes subopposite. **28. S. virgata**

33. Leaves decussate, rarely associated with some subopposite ones. **29. S. chinensis**

34. Petals distinctly yellowish marginate, 3–4 by 2½–4 mm. Disk 1 mm high, 1–1½ mm wide. **35. S. kalahiensis**
floral parts containing sulphur-like particles. Calyx lobes deltoid or suborbicular, \( \frac{3}{4} \)-1 mm long, obtuse, margin slightly erose, laciniate or short-fimbriate. Petals broad-elliptic, -ovate, ob-ovate, or oblong, 2½-4½ by 1½-2¼ mm, obtuse or rounded, entire. Disk annular-pulvinate, ½-1 mm high, c. 1½ mm φ, usually covered with fine papillae, truncate at the apex, the tissue opposite the calyx lobes slightly extended outward and downward. Stamens 3, 1-1½ mm; anthers ± transversely dehiscent. Pistil ½-1 mm emerging from the disk. Ovary 3-celled. Ovules 2(-3) in each cell, attached at the upper inner angle. Fruit subglobose, 2-3 cm φ. Seed 1, subglobose, 1½-2 cm φ.

Distr. Peninsular Thailand (Talang) and Malaysia: Sumatra (Palembang), Malay Peninsula (Pahang, Johore, and Singapore), Java (through-out), Lesser Sundas Is. (Bali), Borneo (Kuching, N. Borneo, Kutai, Blu-u, and Mt Medadam), Philippines (Palawan, Luzon, Romblon, Bohol, Biliran, Cebu, Panay, and Mindanao). Fig. 31.

Fig. 31. Distribution of Salacia korthalsiana Miq.

Ecol. In forests and thickets, sometimes occurring on limestone rocks, in E. Java found in tea forest, 50-1400 m.

Galls. Leaves with insect galls.

Uses. The plant under the name 'akar biting' (S. 17583, Sing) was identified as Hippocratea sp. by Burkill & Haniff (l.c.). It is said to be used for cracked lips. An extract from the root with water is drunk (cf. Burkill, Dict. 1935, 1177). Vern. Pêtja pinygan, Palembang; Mal. Pen.: akar biting, akar ménjala; M; Java: a’roy kuluk ‘ökük, S; tjenêt_backend_wel, J; Philippines: aropit, Tag., bagi, balagin, Tagb.

Notes. Miquel cited the collections of Korthals (s.n., L) and Junghuhn (s.n., L) with the original description. Since the epithet is 'korthal-siana', I have chosen the Korthals collection as the lectotype.

Hasskarl, l.c., attributed S. radula to 'A. DTR. II.691.3'. He might have intended to ascribe the species to D. Dietrich (Synopsis Plantarum, 1839, in which there is no such name as S. radula), or refer to the name S. radula G. Don (Gen. Syst. 1, 1831, 628). I have not seen any specimen annotated by Hasskarl as S. radula, but from his detailed description there is no doubt about its identity. Backer, l.c., rightly reduced it to the present species.

2. Salacia cymosa Elmer, Leaf. Philip. Bot. 5 (1913) 1792; Merr. En. Philip. 2 (1923) 486.—Fig. 36i.

Climbing and sprawling shrub. Stipules triangular, c. ½ mm long, entire. Leaves subcoriaceous, shining above and rather dull beneath, elliptic or slightly ovate-oblong, 8-15 by 3-7 cm; base cuneate, slightly obuse, or rarely rounded; apex acuminate; margin subentire, sparsely and slightly crenulate; nerves 5-6 pairs; petiole 1-1½ cm. Inflorescences paniculate-cymose, on axillary brachyblasts, up to 2 cm long. Peduncle obscure. Bracts deltoid or ± reniform, 1-1½ mm long, with laciniate or subulate colleters inserted at the base on the inner side, margin laciniate or fimbriate. Pedicels 3-4 mm. Calyx lobes ± reniform, ½-1 mm long, entire. Petals broad-elliptic, or oblong, 3-3½ by 2-2½ mm, entire, slightly contracted at the base. Disk fleshy, orbicular, flattened, ± convex at the central part, ½-2 mm φ. Ovary 3-celled. Ovules 4 in each cell, attached at the top inner angle.

Distr. Malesia: Philippines (Palawan), once collected.

Ecol. In thickets at low altitudes.

3. Salacia subalternifolia Merr. & Perry, J. Arn. Arb. 20 (1939) 236.—Fig. 36d.

Liana. Stipules laciniate, inserted obliquely on the branchlets just below the articulation of the petiole. Leaves sometimes also associated with subopposite or even subalternate ones, shining on the upper surface, elliptic to elliptic-oblong, 9-15 by 4½-8 cm; base cuneate; apex acute, sometimes obtuse; margin remotely crenulate; nerves 5-7 pairs; petiole 4-6 mm. Inflorescences axillary, paniculate-cymose, sometimes branched from the very base and then seemingly more than one in a leaf-axil. Peduncles usually short. Bracts triangular, c. 1 mm long, laciniate, short-fimbriate, or erose on the margin, with filiform or laciniate colleters inserted at the base inside. Pedicels 5-6 mm, with elastic threads shown on breaking. Flowers greenish yellow. Calyx almost divided to the base, lobes very broad-ovate or -obovate, ½-1 mm long, obtuse or rounded, or slightly acute at the apex, erose or slightly laciniate at the margin. Petals elliptic, oblong, or obovate-oblong, 3 by 1½-1¾ mm, obtuse, ± entire, with distinct 5 or more longitudinal veins slightly elevated on the outer surface when dry. Disk fleshy, flat, suborbicular, slightly concave at the central part, c. ½ mm φ, c. ½ mm high, the
basal part slightly extended outward into a narrow, thin rim. Stamens 3, c. 1/2 mm; anthers transversely dehiscent. Pistil slightly emerging from the disk. Ovary 3-celled. Ovules 2 in each cell. Fruit globose, 4–5 cm Ø, pericarp 31/2 mm thick, the inner surface with irregular meshes. Seeds suborbicular, ± planoconvex, c. 21/2 mm Ø.

Distr. Malesia: New Guinea (Lower Fly R. and Middle Tor R.), twice collected.

Ecol. In lowland forests.

Notes. This species is very closely related to S. cymosa of the Philippines especially in the characters of the disk. However, the ovules are two in each cell in the present species, being 4 in S. cymosa.

The phyllotaxy of the present species is not constantly subalternate or subopposite. The duplicate of the type (Brass 8066, BO, L) in the Bogor Herbarium and a specimen collected by Gjellered (731, L) have opposite or decussate leaves associated with some subopposite ones on the same branch.


Low liana. Branchlets verrucose. Stipules deltoid, c. 1 mm long. Leaves subcoriaceous, shining above, elliptic to elliptic-oblong, rarely obovate-oblong, 4–13 by 2–5 cm; base cuneate; apex obtuse, acute, or short-acuminate; margin ± entire, or obscurely crenulate; nerves 4–8 pairs; petiole 5–7 mm. Inflorescences axillary, short, paniculate-cymose, or on an axillary brachyblast, 1–2 cm long. Peduncle very short (up to 3 mm) or 0. Bracts triangular, 1/2–31/2 mm long, lacerate, with fimbriate colleters inside. Pedicels c. 5 mm. Calyx short-cupular, with fimbriate colleters attached at the base on the inner side and protruding beyond its margin, lobes spreading and separate from each other at anthesis, triangular, 1/2–1 mm long, acute, ± entire. Petals persistent (?), broad-oblong, rarely broad-elliptic, obtuse, entire or slightly erose, 2–21/2 by 11/2–11/2 mm. Disk fleshy, flat, orbicular, c. 2 mm Ø and c. 1 mm high, the tissue at the base slightly protruding outward like a thin rim. Stamens 3, c. 1/2 mm; anthers transversely dehiscent; free part of the pistil pyramidal, c. 1/2 mm high. Ovary 3-celled. Ovules 2 in each cell, attached at the upper inner angle. Immature fruit slightly triangular.

Distr. Malesia: Central Celebes (Matana Lake), once collected.

Ecol. In thickets along a lake, 400 m.


Liana up to c. 30 m. Stipules triangular, laciniate. Leaves chartaceous to subcoriaceous, elliptic-oblong to lanceolate, broad-elliptic, or obovate, 6–17½ by 2½–7 cm; base cuneate, or obtuse; apex short-acuminate to cuspidate; margin crenulate or subentire; nerves 5–10 pairs; petiole 8–17 mm. Inflorescences axillary, condensed cymes, very short, usually less than 1½ cm long, internodes of the rachises invisible, few-flowered, usually appearing as a very short or obscure peduncle bearing 2 or 3 slender bracteole branches. Bracts deltoid, c. 1 cm long, slightly erose at the margin. Pedicels 3–4 mm. Flowers yellowish or yellowish green, floral parts usually with abundant sulphur-yellow particles in the tissue. Calyx lobes ± erect at anthesis, triangular, or ± semi-orbicular, 1/2–1 mm long, erose or glanduliform at the margin. Petals unequal, the inner one or 2 smaller than the others, rather fleshy, ± oblong, or broad-obovate, 2½ by 1–2½ mm, obtuse, margin thin and slightly erose. Disk usually ± flat, orbicular, the outer margin thin and sometimes turning upward, rarely convex at the central part caused by the abundant sulphur-like particles, 1–1½ mm Ø, ½–1½ mm high. Stamens 3, ½–1½ mm. Pistil ½–1 mm emerging from the disk. Ovary 3-celled. Ovules (3–4–6) in each cell, in two series. Fruit subglobose, or very broad-obovoid, 4–6 by (12) by 3½–4½ (7–7) cm, slightly contracted at the base, pinkish or red. Seeds ± ellipsoid or subglobose, 1½–2½ by 1½ cm, covered with dried pulp.

Distr. Central and Peninsular Thailand, and Malesia: West Central Sumatra (Asahan, Siberut I., and Taram), Malay Peninsula (Perak, Penang, and Johore), North and West Borneo, and Java (West, part, Maduran, and Besuki).

Ecol. In forests from the lowland up to 1000 m, sometimes found on sandstone (Taram), in swampy forest (Johore) and in peat forest (Borneo).

Vern. Java: areu langari, ki-hapet, kikopi, manggong, tujun-kankan or tujun-kauten, ireng langari, S.

Galls. Docters van Leeuwen (Zoöcœidia 1926, 329, f. 591 & 592) recorded two kinds of leaf-galls found in the present species: (i) disk-like swellings 1½–2 mm Ø, caused by an unknown animal, developed on both surfaces of the leaves and (ii) the leaf-blade carved and rolled up, caused by thrips, so that the margins touch each other. I have also seen these two kinds of galls occurring on some specimens.

Note. Blume erroneously described the flowers having 5 stamens, as already pointed out by Miqel (i.e. 1869, 151).

Scandent shrub. Stipules triangular, sometimes obliquely inserted just below the articulation of the petiole. Leaves subcoriaceous, elliptic- or ovate-oblong to lanceolate, 7-20 by 2½-8½ cm; base obtuse, acute; apex acuminate; margin entire but undulate, sometimes sparsely crenulate; nerves 6-8 pairs; petiole ¾-1½ mm. Inflorescences axillary, dichotomously cymose, 3½-5 cm long, eduncle ⅓-3 cm. Bracts ovate, 2-3 mm long, obtuse. Pedicels 2-5 mm. Flower-buds broad-ovoid, 3-5 by 2½-3½ mm, gradually narrowed towards the obtuse top. Flowers yellowish green. Calyx calyptriform, splitting transversely near the base. Petals 5(-7), ovate to ovate-oblong, or oblong, 3-6½ by 2-2½ mm, entire, or the innermost one or two slightly irregularly lobed at the upper half. Disk annular-pulvinate, 2½-3 mm, 1½-1¾ mm high, slightly broader at the base. Stamens 3, 1-3 mm, slightly apiculate, erect at anthesis; anthers obliquely dehiscent. Pistil c. 1½ mm emerging from the disk. Ovary 3-celled. Ovules 2 in each cell. Fruit globose, c. 2½ cm ø, 1-seeded (always?). Seed subglobose, c. 2 cm ø, with reticular meshes on the rather smooth inner surface of the pericarp.


Ecol. In the Lorentz R. region in riverine forests, in the Morobe District in hill forests at 1500-1800 m.

Note. A. C. SMITH derived the epithet glandulosa from the gland-like occurrence of the sulphur-yellow kautchuk particles in the floral parts.

Fig. 32. Salacia sororia Miq. a. Habit, × ½, b. flower-bud, showing calyptriform calyx, × 4, c. ditto, showing calyx transversally splitting near base, × 4, d. petal, × 4, e. exterior and interior view of stamen, × 8, f. flower, after calyx split circumsissile near base, petals removed, × 8, g. ditto, in section, × 8.

—S. papuana (Loes.) DING HOU. h. Flower-bud, × 4 (a–g BRASS 28536, h RÖMER 86).
chartaceous to subcoriaceous, elliptic- or ovate-oblong, sometimes broad-elliptic, 3½-11(-27) cm by 1¾-8(-12) cm; base cuneate; apex short-acuminate; margin ± entire, sometimes obscurely repand with sparse, callosely-tipped obsolete crenations; nerves 2(-3)-6-8 pairs; petiole 6-14 mm. Inflorescences axillary, cymose, dichotomously 1-3-branched, 2-4 cm long. Peduncle 1-2½ cm. Bracts deltoid or triangular, ½-1 mm long. Pedicels 4-11 mm, with elastic threads shown on breaking. Flower-buds broad-ovoid, or rarely subglobose, (2½-3)½-2 by 2½-3 mm, acuminate or rarely obtuse. Flowers green. Calyx calyptriform, transversely splitting near the base, sometimes longitudinally splitting. Petals 4(-5)-(6), ovate, 3-4 by 1½-2½ mm, ± entire. Disk annular-pulvinate, 1-1½ mm high, 2-2½ mm ø, slightly 5-angular at the base. Stamens 3, c. 1-1½ mm; anthers obscurely apiculate, slightly obliquely dehiscent. Pistil c. 1 mm emerging from the disk. Ovary 3-celled. Ovules 2 in each cell. Immature fruit globose.

Distr. Malesia: Moluccas (Sula Is.), New Guinea (Normanby, Aru Is., Hollandia, Sepik and Sogeri region), and Louisiades (Sudest Is.).

Ecol. Forests and thickets, from the lowland up to 950 m.


Liana. Branchlets usually angular. Stipules deltoid or triangular, c. ½ mm long. Leaves subcoriaceous, elliptic to elliptic-oblung, 3½-17½ by 2-7 cm; base cuneate to attenuate; apex short-acuminate; margin crenulate, rarely subentire; nerves 6-9 pairs; petiole 3-8 mm. Inflorescences axillary, dichotomously cymose, 1½-3 cm long, the flowers usually crowded at the end of the first fork, sometimes an axillary flowering branch with reduced leaves or bracts resembling a thrysiform inflorescence. Peduncle ½-1½ cm long. Bracts triangular, ½-1 mm long, erose, with collars at the base inside. Pedicels 4-6 mm. Flower-buds subglobose, 1½-2 mm ø. Flowers green. Calyx calyptriform, pointed at the apex, splitting transversely near the base, rarely associated with some flowers in which the calyx is longitudinally dehiscent. Petals 3 (or 6), ovate, 2-4 by 1½-2½ mm. Disk annular-pulvinate, c. ¾ mm high and 1½ mm ø. Stamens 3, c. ¾-1 mm; anthers obliquely dehiscent, obscurely apiculate. Pistil c. ¾ mm emerging from the disk. Ovary 3-celled. Ovules 2 in each cell. Fruit globose, c. 2½ cm ø, dark olive green. Seed 1, globose, c. 1½ cm ø.

Distr. Solomon Is. (Owa Raha I.) and Malesia: Celebes (Buton I., Kabaena I.; and Loka, scc. Harms) and New Guinea (Jappen, Lala R., Isuara, Western Highlands, Morobe Distr., and New Hebrides Div.).

Ecol. Rain-forests, sometimes in thickets and secondary forest, from the lowland up to 1500 m. Vern. New Guinea: korowa, Orokaiva lang., warren, Papua.

Note. The type of Salacicatea sarasinorum Harms was collected by SARASIN (1267, not seen) near Loka, Celebes; this was lost at Berlin during the war. From the description, locality and some collections from that area, I have concluded to its reduction.


Scandent shrub or liana. Stipules triangular or lanceolate, ¾-1 mm long. Leaves subcoriaceous, ovate to oblong-oblong, elliptic or broad-elliptic, 6½-15½ by 3-9 cm; base cuneate, rarely obtuse; apex short-acuminate; margin entire; nerves 6-8 pairs, petiole ½-2 cm. Inflorescences axillary, cymose, 1½-6½ cm long, usually 2-4 times dichotomously branched, sometimes an axillary shoot with reduced leaves or bracts resembling a thrysiform inflorescence. Peduncle 3½-6 cm. Bracts triangular, c. ½ mm long, entire or slightly erose. Pedicels ½-1 cm. Flower-buds broad-ovoid or subglobose, 2-4½ by 1½-2 mm, apiculate or sometimes obtuse. Flowers light green or yellowish green. Calyx calyptriform, narrowed towards the apex, transversely dehiscent near the base, rarely irregularly lengthwise splitting into 2 segments. Petals 5(-7), ovate or oblong, 2-4 by 1½-2½ mm, entire or wavy. Disk annular-pulvinate, 3½-1½ mm high, 1½-2 mm ø, slightly broader and 5-angular at the base, finely papillose. Stamens 2, very rarely associated with some flowers containing 3 stamens, ½-1 mm, short-apiculate, erect at anthesis, the connective usually separating the thecae; anthers dehiscent transversely or ± at the top. Pistil c. ¾ emerging from the disk. Ovary 2-celled. Ovules 2 in each cell. Fruit globose, c. 2-2½ cm ø, 1-seeded (al­ways?). Seeds globose, 1½-1¾ cm ø, rather smooth on the surface.

Distr. Micronesia (Palau Is.) and Malesia: Central Celebes (Malili), Moluccas (Ternate, Ambon, and Morotai) and New Guinea (Waiygo I. and Normanby I.).

Ecol. Forests, from the lowland up to 0.700 m, once found on limestone cliffs.


Note. LOESENER cited two collections in the original description of Salacicatea kraemeri from Palau Is., viz KRAEMER s.n. and LEPDERRANN 14096. These specimens were lost during the war and I have not seen any duplicate of them. From the detailed description, this species is clearly conspecific with S. diandra, and in 1942 LOESENER himself reduced his own species to the latter. Because S. diandra Miq. is a later homonym MIQUEL proposed a new name.
Salacia intermedia DING HOU, Blumea 12 (1963) 34.—S. diandra Miq. f. lanceolata Miq. Ann. Mus. Bot. Lugd.–Bat. 4 (1869) 151, non S. lanceolata TAYS. & BINN. 1863.—Fig. 33.

Shrub (taken from cultivated plant). Stipules triangular, c. ½ mm long, slightly erose. Leaves chartaceous, lanceolate to narrow-lanceolate, sometimes narrow-elliptic, 12½-17½ by 3½-4½ cm; apex acuminate; base cuneate, or obtuse; margin subentire or faintly and sparsely crenulate; nerves 6-9 pairs; petiole ½-1 cm. Inflorescences axillary, cymost, 2-4½ cm long, 2-4 times dichotomously branched. Peduncle ½-2½ cm. Bracts triangular, ½-1 mm long, glanduliform at the margin, with colleters at the base inside. Pedicels 4-7 mm. Floral parts with sulphur-yellow particles in the tissue. Calyx ½-1 mm long, when young almost globular and undivided, the apical margin ± glandular and sometimes irregularly slightly 3-5-lobed, the lobes bent inward, later irregularly slightly splitting or deeply divided. Petals yellow, broad-elliptic or ovate, 3-3½ by 1½-2 mm, obtuse or acute, entire or slightly erose. Disk annular-pulvinate, ½-1 by 1½-1½ mm, slightly 5-angular. Stamens 3, c. 1 mm erect; anthers obscurely apiculate, slightly obliquely dehiscent. Pistil c. ½ mm emerging from the disk. Ovary 3-celled. Ovules 2 in each cell. Very immature fruit globose.

Distr. Malesia: Celebes (Gorontalo, Bontain and Pangkadjene).

Ecol. No data available.


Liana up to 20 m, rarely small shrub or tree up to 6 m. Stipules triangular, c. ½ mm long. Leaves chartaceous, elliptic, broad-elliptic, elliptic-or obovate-oblong, 3½-13 by 2½-5½ cm; base cuneate; apex acuminate, short-cuspidate; margin

coriaceous, rather shining when dry, elliptic or broad-elliptic, or ovate, 8½-14(-20½) by 4½-7 (-11½) cm; base rounded; apex short acuminate; margin entire; nerves 5-7 pairs; petiole 8-15 mm. Inflorescences cymost or umbelliform, 2½ cm long. Peduncle 4-10 mm, sometimes obscure, the flowers appearing in fascicles on very short, densely bracteolate brachyblasts. Bracts triangular, ½-1 mm long, slightly erose. Pedicels 6-14 mm. Calyx slightly concave at the base outside, enveloping the floral parts except the top at very young stage, saucer-shaped at the base of the mature flower, 2½-3 mm, margin ± truncate, slightly erose or short-fringed, rarely irregularly lobed and reflexed. Petals ovate or broad-elliptic, 3-4 by 2-2½ mm, slightly erose. Disk fleshy, annular-pulvinate, 1½-2 mm, c. 1 mm high, slightly contracted at the middle, papillose. Stamens 3, ¾-2 mm; anthers transversely dehiscent. Pistil 1-1½ mm emerging from the disk. Ovary 3-celled. Ovules 2 in each cell, pendulous. Fruit depressed-globose, c. 3 cm. Seeds subglobose, c. ½ cm. Distr. Malesia: Philippines (Luzon, Leyte, Cebu and Mindanao).

Ecol. In forests at low altitudes.
crenulate; nerves 6–8 pairs; petiole 3–8 mm. Flowers dull or greenish yellow, axillary, fascicled, or on short bracteate tubercles. Bracts triangular, ½–1 mm long, short-fimbriate. Pedicels 2–6 mm. Calyx lobes triangular, c. ½ mm long, short-fimbriate. Petals broad-obovate, 1½–2 by 1–1½ mm, sometimes slightly keeled outside, with reddish brown pigment in the tissue, sometimes slightly contracted at the base and with one or 2 depressions near the apex inside, margin erose. Disk fleshy, annular-pulvinate, slightly broader at the base (in young flowers the disk slightly, gradually narrowed towards the apex of the pistil), ½–1 mm high, 1–1½ mm φ. Stamens 2 (once found a flower with 3), c. ½ mm; anthers ± transversely dehiscent. Pistil c. ½ mm emerging from the disk, compressed. Ovary 2-celled. Ovules 2 in each cell. Fruit globose, 1–1½ cm φ, bright red or orange, usually 1-seeded. Seed globose, ¾–1½ cm φ.


Ecol. Forests, from the lowland up to 900 m, also found on limestone.

Vern. SW. Celebes: ampaêræ, Watten Sopeng.


Liana, sometimes scrambling or in shrubby creeper. Stipules triangular or reniform, ¼–½ mm long, erose or lacinate. Leaves subcoriaceous, sometimes shining, elliptic to narrow elliptic-lanceolate, obovate-oblong, broad-ovate, lanceolate to narrow-lanceolate, 7½–34 by 4½–13½ cm (on sterile branches up to 43 by 16½(–20) cm); base cuneate, attenuate, obtuse or rounded; apex acuminate, cuspidate, rarely acute or obtuse; margin entire or rarely remotely crenulate; nerves 7–14 pairs; petiole ¼–2½ cm. Bracts triangular, c. 1 mm long, slightly erose. Pedicels 6–10 mm. Flowers greenish yellow or pale yellow, or whitish, sometimes light rose, pink or red, in fascicles, on very short axillary bracteate tubercles, sometimes ramiflorous. Calyx lobes triangular, c. 1 mm long, acute or obtuse, slightly erose, rarely lacinate. Petals ± erect at anthesis, broad-elliptic, elliptic-oblong, ovate, broad-ovate, 1–3 by ½–2 mm, acute or obtuse. Disk thin; roundish, developing from discoid to cupular, 1½–2 mm φ. Stamens 3, 1–1½ mm. Pistil c. ½ mm emerging from the disk, pyramidal at the base and narrowed into a cylindrical style. Ovary 3-celled. Ovules (2–)4 in each cell. Fruit broad-ellipsoid or subglobose, 5½–6½ by 5–5½ cm, sometimes up to 8 cm φ. (cf. Heyne, i.c.), orange or red. Seeds 3 or more in each fruit, white, ellipsoid, 2–3 by 1–2 cm.

Distr. Widely distributed but scattered in India (Concan and Andamans), Burma (Tenasserim), Peninsular and SE. Thailand, Indo-China (Cambodia), Hainan, through Malesia: Sumatra, Malay Peninsula, Borneo, Java, Lesser Sunda Is, and Celebes to New Britain (Massawa). Fig. 34.

Fig. 34. Distribution of Salacia macrophylla Bl.

Liana. Stipules triangular, c. 1 mm long. Leaves chartaceous to thin-coriaceous, elliptic-oblong, 15–24 by 6–10 cm; base cuneate or obtuse; apex acuminate; margin ± entire or slightly crenulate; nerves 6–9 pairs; petiole 8–10 mm. Bracts triangular, c. 1 1/2 mm long. Pedicels 1 1/2–2 cm. Flowers green, in axillary fascicles. Calyx lobes suborbicular or sometimes triangular, 2–2 1/2 by 2–3 mm, slightly erose. Petals rather fleshy, suborbicular, or broad-ovate, 4–6 by 4–6 mm, slightly contracted at the base; margin rather thin, yellowish (when dry), wavy. Disk fleshy, flat, suborbicular, sometimes slightly 5-lobed, 3 1/2–4 1/2 mm, c. 1 1/2 mm high. Stamens 3, c. 2 mm; anthers transverse-dehiscent. Pistil c. 1 mm emerging from the disk. Ovary 3-celled. Ovules 2 in each cell.

Distr. Malesia: Borneo (Sandakan and W. Kutai).


Branchlets sharply 4-angular. Stipules triangular, c. 1 mm long, laciniate. Leaves subcoriaceous, elliptic-lanceolate, or lanceolate, 14–19 by 4 1/2–6 1/2 cm; base cuneate to attenuate; apex acuminate; margin serrate-crenate; nerves 12 pairs; petiole 1–1 1/2 cm. Flowers fascicled, a few in a leaf axil. Pedicels 2–5 mm. Calyx lobes (from flower-bud) deltoid or triangular, 1/2–1 mm long, short-fimbriate. Petals green, fleshy, subround, or broad-elliptic, 3 1/2–4 by 2 3/4–3 1/2 mm; margin thin, yellowish and transparent (after boiling), entire or slightly erose. Disk round, flat, 3–4 mm, slightly convex near the central part (1/2–1/2 mm high) and gradually, slightly thinner towards the margin. Stamens 3, c. 1 mm; anthers slightly obliquely dehiscing. Pistil c. 1 mm emerging from the disk. Ovary 3-celled. Ovules 2 in each cell, pendulous.

Distr. Malesia: Borneo (Sarawak), once collected.


Liana. Stipules triangular, c. 1 1/2–2 mm, erose or laciniate. Leaves coriaceous, rather shining above, ovate to ovate-oblong, elliptic-oblong, rarely obovate-oblong, 9–19 by 5 1/2–8 1/2 cm; base obtuse or cuneate; apex acute; margin entire; nerves 6–9 pairs; petiole ± terete, 1 1/2–2 cm. Flowers greenish, a few on an axillary brachyblast or short peduncle (c. 1 1/2 mm). Bracts triangular or deltoid, c. 1 mm long. Pedicels 2 1/2–4 mm. Calyx lobes ovate, 2–3 mm long, short-fimbriate. Petals ± oblong, thin coriaceous when dry, 6 by 4 mm, obtuse; margin rather thin, yellowish when dry. Disk fleshy, flat, c. 5 mm, 1/2–1 1/2 mm high, 5-lobed. Stamens 3, c. 2 mm long; anthers transversely dehiscent. Free part of the pistil pyramidal, c. 1 mm high. Ovary 3-celled. Ovules 4–5 in each cell.


Ecol. Lowland forests, from sea-level up to 100 m.


Liana or scandent shrub, rarely small tree. Branchlets sometimes puberulous, usually whitish when dry. Stipules triangular, c. 1/2 mm long. Leaves sometimes spiral, subcoriaceous to coria-
ceous, usually shining on both surfaces, elliptic-oblong, or lanceolate, narrow oblong-lanceolate, ovate to ovate-oblong, oblong, very rarely obovate-oblong, 7–34½ by 2½–11½ cm; base obtuse, cuneate; apex acuminate, short-acuminate, or acute, very rarely rounded; margin entire, sometimes sparsely, slightly crenate; nerves 6–12 pairs; petiole 6–15 mm. Bracts triangular, c. 1 mm long, laciniate at the margin. Pedicels 3–6 mm. Flowers whitish or yellowish, 3–6 or rarely more on very short, axillary or extra-axillary, bracteolate tubercles, sometimes ramiflorous. Outer 2 sepals smaller, deltoid or ovate, 1½–2 mm long, the inner 3 suborbicular, sometimes slightly subreniform, 2–4 mm long, short-fimbriate. Petals spreading at anthesis, obovate, or obovate-elliptic, 4–7 by 3–6 mm. Disk brown when fresh, suborbicular, ½–1½ mm high, ½–3 mm wide, fleshy, flat, convex in the central part, thin and rim-like towards the margin. Stamens 3, VS-2½–3 mm; anthers transverse-oblong. Pistil c. ½ mm emerging from the disk. Ovary 3-celled. Ovules 2 in each cell. Fruit orange pink, ½–5 cm wide, rugose, subtended by the persistent calyx lobes and petals. Seeds 2 or more in each fruit, broad-ellipsoid, 1½–2 by 1–1½ cm.

Distr. India (Andamans), Burma (Mergui), Peninsular Thailand (Nan Chut), and Malesia: Sumatra (Tapanuli), Malay Peninsula (throughout but scattered), and E. Borneo (W of Samarinda).

Ecol. In forests from lowland up to 750 m.

Vern. Sumatra: andor solpu, Tapanuli; Mal. Pen.: (akar) mēmpēdal ayam, akar pudal ayam, ampēdal ayam, hēmpēdal ayam, mēmbatu pastir, mēriku, māsi sējuk, pēdal ayam, tērapat.

Uses. A decoction from the roots is used after childbirth. The fruits have a sweetish pulp round the seeds which can be eaten (cf. BURKILL, Diet. 2, 1935, 1943; HEYNE, Nutt. Fl. 1927, 985).

Notes. I have chosen MAINGAY 400/2 from Malaya as the lectotype (in K, isotype in L). The type of S. scortechinii was cited by KING as SCORTECHINI 1848 (BM, SING). There is one collection of SCORTECHINI in the Kew Herbarium with the same field label and KING's annotation as the above mentioned two specimens but bearing the number '848'.

Liana, sometimes erect shrub, rarely a small tree up to 6 m. Branchlets usually densely covered with lenticels, rarely rather smooth. Stipules deltoid, c. 1 mm long, erose. Leaves sometimes associated with some spirally arranged ones, characeaeus, shining above, elliptic to elliptic-lanceolate, broad-elliptic, or obovate, 8–18½ by 4–6 cm (on sterile branches up to 24 by 12 cm); base cuneate, obtuse; margin crenulate or sub-entire; nerves 6–10 pairs; petiole 3–10 mm. Bracts deltoid, c. 1½ mm long, short-fimbriate. Pedicels 9–14½ mm. Flowers pale dull green, or greenish yellow, many on a short, axillary, bracteate tubercle. Calyx divided almost to the base, lobes deltoid, or suborbicular, c. 1 mm long, obtuse, slightly erose or short-fimbriate. Petals broad-elliptic, or obovate, 2–3 by 1½–2 mm, rather fleshy, obtuse, entire, with obscure, longitudinal veins. Disk suborbicular, flat, slightly concave in the central part, 1½–1⅓ mm ø, c. ½ mm high, the tissue at the base slightly extended outward into a narrow membranous rim. Pistil c. ½ mm emerging from the disk, pyramidal. ovary 3-celled. Stamin 3, ½–1½ mm; anthers brown coloured at the base. ovules 2, inserted near the inner angle at the base. Fruit subglobose, c. 2½ cm ø, red. Seeds slightly planoconvex, 1½–1⅔ by 1½–1½ cm.

Distr. India (Assam & Khasia Hills), Thailand (southern), Burma (Tenasserim and Mergui), Indo-China (Laos and Cochinchina) and Malaysia: Sumatra (Indragiri, also in Banka and Billiton), Malay Peninsula (Perak, Kelantan, Pahang, and Langkawi Is.), Borneo (Sarawak, North Borneo, O. Pamattan, Martapura and P. Lampei), Philippines (Luzon), and Celebes (Gorontalo).

Ecol. In forests from lowland up to 920 m. Verna. Akr pélutang tanga, Banka.

Note. According to Merrill (i.e.), Ceron (Cat. Pl. Herb. Manila 1892, 48) recorded the occurrence of S. verrucosa Wall. in the Philippines, on the strength of Vidal 2402, 2403, and 2405 (K) from Luzon. I have not seen Ceron's publication, but these collections of Vidal are correctly identified.


Liana. Branchlets slightly whitish or light brown when dry. Stipules triangular, c. 1 mm long, slightly erose. Leaves chartaceous to subcoriaceous, rather shining on both surfaces, elliptic-oblong to -lanceolate, 4½–20 by 1½–6 cm; base cuneate; apex acuminate, apiculate; margin entire or sometimes slightly crenulate; nerves 3–7 pairs; petiole 2–3 mm. Bracts triangular, c. 1½ mm long, short-fimbriate. Pedicels 1½–4 mm, with elastic threads shown on breaking. Flowers yellowish (once noted), several in fascicles on axillary, short, condensed bracteate tubercles. Calyx lobes triangular or deltoid, ½–¾ mm long, laciniate or short-fimbriate. Petals suborbicular, or broad elliptic, 1½–2½ by 1½–2½ mm, slightly erose, slightly contracted at the base. Disk discoid, 1–1½ mm ø, c. ¼ mm high, sometimes slightly 5-angular. Stamin 3, c. ¾ mm; anthers transverse-dehiscens. Pistil c. ½ mm emerging from the disk. ovary 3-celled. ovules (1–2) in each cell. Fruit subglobose, 2–3 cm ø.

Distr. Malesia: Sumatra (East Coast), Java (Jakarta, Pasuruan, Kedungjati, Besuki), Philippines (Mindoro, Luzon, Panay and Mindanao), Celebes (Pangkadjiene, Menado, Ko-Walowa, and Malilili), and Moluccas (Sula Is.).

Ecol. In thickets and forests from lowland up to 1200 m. Vern. Sumatra: gurach batu, Asahan; Philippines: matang olang; Tag.
Fig. 36. Salacia maingayi Laws. a. Habit, × 1/3, b. flower, × 4, c. ditto, in section, × 8.——S. subalpifolia Merr. & Perry. d. Flower, in section, × 16.——S. macrophylla Bl. e. Flower, in section, × 16.——S. ovalis Korth. f. Flower, × 8, g. ditto, in section, petals removed, × 16.——S. wenzelii Merr. h. Flower, petals removed, × 8.——S. cymosa Elmer. i. Exterior and interior view of bract, × 8 (a–e Curtis 3288, d Gjellerup 731, e Dillewijn 606, f–g Koorders 28743β, h Wenzel 1534, i Elmer 12997).
very young flower-buds or detached flowers with pedicels broken off.


Scandent shrub. Stipules triangular. Leaves thin-coriaceous, rather shining, elliptic-oblong, 6–13 by 2 1/2–5 cm; base cuneate to attenuate; apex bluntish, sometimes acute; margin entire; nerves 5–8 pairs; petiole 3–7 mm. Bracts triangular c. 1 mm long, short-fimbriate or erose. Pedicels c. 6 mm, with elastic threads shown on breaking. Flowers green, few in axillary fascicles. **Calyx** lobes triangular, 1/2–1 mm long, obtuse, short-fimbriate. Petals broad-ovate, -elliptic, or suborbicular, 3/4–4 by 3–4 mm, entire. **Disk** annular-pulvinate, c. 1 mm high, c. 2 mm ø, slightly narrower and truncate at the apex. **Stamens** 3, c. 1/2 mm; anthers ± transversely dehiscent. Pistil c. 2 mm emerging from the disk. **Ovary** 3-celled. **Ovules** 2 in each cell.

**Distr. Malesia:** Philippines (Luzon: Prov. of Zambales; Sibuyan; Leyte).

Ecol. In lowland forests and in sandy gravelly ground along the wooded banks, up to 225 m.

**Note.** From the floral structure of the type (ELMER 12551, BO, K, L) and the characters of the distinctive flowers of **MERRILL 2401** (K), it is clear that this species belongs to *Salacia*. Its leaves resemble those of *Hippocratea lawsonii* ELMER (= *Loeseneriella pauciflora*), based on ELMER 12241 (BO, BM, K, L, P), in shape and densely reticulate venation, and **MERRILL** erroneously reduced it to that species; this mistake was perpetuated by **JACOBS** in this *Flora*, vol. 5, p. 136.


Shrubby creeper. Stipules deltoid or triangular, 1/2–1 1/2 cm long. Leaves subcoriaceous, shining, elliptic-oblong, sometimes broad-elliptic, rarely obovate-oblong, (4–)7–16 1/2 by (2 1/2–)3 1/2–7 cm; base cuneate, or obtuse; apex acuminate to short-cuspitate; margin subentire; nerves 5–8 pairs; petiole 3–7 mm. Bracts triangular, c. 1/2 mm long, slightly erose, with filiform or laciniate colleters attached on the inner surface. Pedicels rather stout, 6–13 mm, with elastic threads shown on breaking. Flowers waxy pale green, or ochraceous-yellow, sometimes greenish yellow, usually 1 or 2 in a leaf axil. **Calyx** lobes fleshy, triangular or semi-orbicular, c. 1 mm long, slightly erose. Petals rather fleshy, ovate, broad-ovate, or elliptic, 4 1/2–6 by 2 1/2–4 mm, obtuse, entire. **Disk** conical-pulvinate, c. 3 mm ø, 1 1/2–2 mm high, truncate at the apex. **Stamens** 3, 1–1 1/2 mm; anthers transversely dehiscent. Pistil 1 1/2–1 1/2 mm emerging from the disk, pyramidal. **Ovary** 3-celled. **Ovules** 2 in each cell, attached at the central part of the axis.

**Fruit** (only a piece of cross-section seen) c. 4 cm ø (c. 6 cm long, *fide* **RIDLEY**). **Seeds** several in each fruit, ± oblong, c. 3 cm long, ± triangular on cross-section, c. 2 cm wide.

**Distr. Malesia:** Malay Peninsula (Perak, Malacca, Penang and Singapore) and Borneo (Sarawak and North Borneo).

Ecol. Lowland forests, in ravines, sometimes on hilly rocks, up to 300 m.

**Note.** The type of *S. maingayi*, MAINGAY 398 (K), has rather young branchlets, smaller ovate leaves (4–5 by 2 1/2–3 1/2 cm) while the type of *S. lobbia*, LOBB s.n. (K), has older branchlets, elliptic to elliptic-oblong leaves (7–11 by 3–5 cm). This may be the reason why **LAWS** described them as two distinct species at the same time. Additional collections show that these characters are variable, but that the floral characters are constant. **Ridley** (1922, i.c.) already reduced *S. lobbia* as a synonym.


Liana. Branches light greyish, terete sometimes 4-angular. Stipules triangular, c. 1/2 mm long, laciniate. Leaves chartaceous to subcoriaceous, usually the old leaves with elastic threads shown on breaking, elliptic-oblong, -lanceolate, and lanceolate, rarely obovate-oblong, 6 1/2–18 1/2 by 2 1/4–8 cm; base cuneate to attenuate, sometimes obtuse; apex acuminate to cuspidate; margin subentire, or remotely, slightly crenulate; nerves 6–8 pairs; petiole 1/4–1 1/2 cm. Bracts fleshy, deltoid, or ovate, c. 1 mm long, short-fimbriate. Pedicels 2–3 mm. Flowers greenish, or dull yellow, in fascicles on short, axillary, bracteate tubeckes. **Calyx** lobes fleshy, deltoid, 1/2–3/2 mm long, erect, obtuse and entire. Petals slightly spreading at anthesis, fleshy, thinner near the margin, slightly varying in size, oblong, 2 1/2–2 3/4 by 3/4–1 1/4 mm, entire, obtuse, slightly keeled, sometimes slightly triangular in cross-section, the overlapping margins pressed on the ones below, or fitting in a shallow groove on the dorsal surface of the ones below. **Disk** broad-oblong, 1 1/4–1 1/4 mm high, 3/4–1 mm ø, obtuse at the apex, the base slightly extended outward and forming a narrow rim. **Stamens** 3, c. 1/2 mm; anthers slightly obliquely dehiscent. Pistil c. 1/2 mm emerging from the disk. **Ovary** 3-celled. **Ovules** 2 in each cell, attached at the central part of the axis. **Fruit** globose or sub-globose, 2 3/4–3 3/4 cm ø, rugose outside. **Seeds** subglobose, 1 1/2–2 cm ø, densely covered with pulex.

**Distr. Malesia:** Borneo (Sarawak, Mt Kinabalu, Sandakan, Batu Mili, and W. Kutai).

Ecol. Primary forests, from the lowland up to 1500 m.

Liana. Stipules small, triangular, c. ½ mm long. Leaves chartaceous to subcoriaceous, rather shining above, elliptic-oblong, or elliptic, rarely ovate-oblong, 5⅓–14 by 2½–6½ cm; base cuneate; apex acuminate; margin entire or subentire; nerves 5–9 pairs; petiole ½–⅔ cm. Bracts triangular, ½–⅔ mm long, short-fimbriate. Pedicels 2½–3 mm. Flowers yellow, axillary, fascicled. Calyx lobes deltoid, c. ½ mm long, fleshy, glandular on the margin. Petals ovate-oblong, 1½–2 by ¾–1 mm, slightly keeled outside, obtuse or acute, rarely slightly erose. Disk round, short-cylindric, c. ½–⅔ mm high, ⅔–1 mm ø, with a narrow rim at the base, truncate or slightly concave at the apex. Stamens 3, c. ½ mm; anthers transversely dehiscent. Pistil c. ½ mm emerging from the disk. Ovary 3-celled. Ovules 2 (3–3) in each cell, inserted at the middle of the axis. Fruits broad-obovoid, c. 4½ by 3½ cm, ± stalk-like, contracted at the base, rugose.
Distr. Malesia: Sumatra (Asahan and Singalang) and Malay Peninsula (Perak, Malacca, Penang, and Singapore).
Ecol. In forests, from the lowland up to 1000 m. Vern. Sumatra: kaju baringin, Asahan; Mal. Pen.: akar mata kuching, M.
Notes. In the original description of S. rubra, Lawson cited only ‘Malacca, Maingay’. There are two sheets of Maingay’s under that name in the Kew Herbarium; Maingay 1525 (lectotype) has two small branches and one of them bears a detached fruit mounted near the pedicel from which it obviously broke off; Maingay 398/2 has three branches with some detached leaves. Each of these two specimens has a small package containing fruits under the number Maingay 3407 mounted on the sheet.
The type of S. wrayi, Wray Jr 2542 (K), has both flowers and fruit; the fruits, which are distinctly rugose, broad-ovoid and contracted at the base, and the leaves are similar to those of S. rubra. The flowers of S. wrayi very well match those of the present species, the type of which has no fruit.
25. Salacia euphlebia Merr. Philip. J. Sc. 13 (1918) Bot. 22; En. Philip. 2 (1922) 486. Scandent shrub. Young branches slightly angular. Stipules triangular, ½–½½ mm long. Leaves chartaceous, elliptic-oblong and lanceolate; 10–21 by 4–6½ cm; base cuneate,evanescent or rounded; apex acuminate to acuminate-caudate; margin distinctly or rarely obscurely apiculate-crenulate; nerves 6–8 pairs; petiole 3–8 mm. Bracts triangular, c. ¾ mm long, slightly short-fimbriate. Pedicels 1–3 mm. Flowers greenish yellow, in axillary fascicles on a very short bracteolate brachyblast. Calyx lobes triangular or deltoid, c. ½ mm long, slightly erose at the margin. Petals rather fleshy, oblong, 1½–2 by ½–1 mm, rounded. Disk short cylindric, c. 1 mm high, c. ⅔ mm ø. Stamens 3, ½–1 mm; anthers transversely or sometimes slightly obliquely dehiscent. Pistil c. ½ mm emerging from the disk. Ovary 3-celled. Ovules 2 in each cell, attached at the central part of the axis. Fruit (broken) subglobose, c. 2½ cm ø, smooth.
Distr. Malesia: Malay Peninsula (Perak and Selangor) and Philippines (Mindoro and Mindanao).
Ecol. In thickets and forests at low altitude up to 150 m.

Scandent or rarely erect shrub, or vine. Stipules small, triangular. Leaves chartaceous, usually spirally arranged, sometimes also associated with opposite or subopposite ones, elliptic to elliptic-lanceolate, sometimes ovate-oblong, 5–14 by 2½–6½ cm; base attenuate; apex acuminate; margin slightly crenulate to subentire; nerves 5–9 pairs; petiole 3–5 mm. Bracts triangular, c. ½½ mm long, slightly erose. Pedicels 4–9 mm. Flowers in fascicles on axillary, bracteate brachyblasts. Calyx lobes triangular, ½½ mm long, glandular or erose on the margin. Petals broad-elliptic, or ovate, 1½–2½ by ⅓½–½½ mm, obtuse. Disk annular-pulvinate, ½–⅔ mm thick, c. 1 mm ø, slightly broader at the base, papillose. Stamens 3, ½½ mm; anthers transversely dehiscent. Pistil c. ½½ emerging from the disk. Ovary 3-celled. Ovules 2 in each cell. Fruit globose, c. 2 cm ø, 1-seeded. Seeds globose, c. 1½ cm ø, covered with dried pulp.
Distr. Burma (Mergui), Siam, Indo-China (Cambodia), and Malesia: Sumatra (Siberut, Sibо-
Ecol. Lowland forests, up to 350 m.


**Tonsella chinensis** (L.) SPRENG. Syst. 1 (1824) 177.

—S. prinoidea DC. Prod. 1 (1824) 571; Bt. BIDJR. (1825) 22; W. & A. Prod. 1 (1834) 105; SPAN. LINNEA 15 (1841) 179, incl. var. timorensis SPAN.; KORTH. KRUIDK. (1842) 184; HASK. TJJD. Nat. Gesch. Phys. 11 (1844) 190; Pl. Jav. RAR. (1843) 233; MIQ. Fl. Ind. Bat. 1, 2 (1859) 597; ANN. MUS. BER. LUGD.-BAT. 4 (1869) 148; LAWS. in Hook. f. Fl. Br. Ind. 1 (1875) 626; KURZ, J. AS. SOC. BENG. 44, ii (1875) 163; FOR. FL. BURMA 1 (1877) 260; —VILL. Nov. Ann. (1880) 47; VITAL, SINOPSIS 1883, 20, t. f. E. PHAN. CUMING. (1885) 103; K. SCH. & HOLL. FL. KIAS. WILL. Land. 1890 70; KING, J. AS. SOC. BENG. 65, ii (1896) 366, incl. var. macrophylla Quao specimina; non quod nomen; K. SCH. & LAUT. FL. SCHUTZPEL. (1901) 413; LOES. NOVA GUINEA 8 (1910) 281; KOORD.-SCHUM. SYST. VERZ. (1911) Fam. 159, 2; BACK. SCHOOLF. (1911) 237; KOORD. EXK. FL. JAVA 2 (1912) 527; MERR. FL. MANILA (1912) 303; PHILIP. J. SC. 11 (1916) Bot. 286; SP. BLANC. (1918) 236; EN. BORN. (1921) 355; RIDL. FL. MAL. PEN. 1 (1922) 459; MERR. EN. PHILIP. 2 (1923) 487; RENDLE. J. BOT. 62 (1924) Suppl. 23; MERR. PHILIP. J. SC. 29 (1926) 388; LOES. IN E. & P. PFL. FAM. ED. 2, 20b (1942) 228.—S. patens DECNE, NOUV. ANN. MUS. HIST. NAT. PARIS 3 (1834) 441; HERB. TIMOR. DESC. (1835) 113, non TRIANA & PLANCH. 1872; STEUD. NOM. ED. 2, 2 (1844) 492; MIQ. FL. IND. BAT. 1, 2 (1859) 598.—

**Comocladia serrata** BLANCO. FL. FILIP. (1837) 30.—S. evonymiflora ZIPP. EX MIQ. ANN. MUS. BOT. LUGD.-BAT. 4 (1869) 149.—S. latifolia WALL. [CAT. (1831) n. 4222] EX LAWS IN HOOK. F. FL. BR. IND. 1 (1875) 629; KING, J. AS. SOC. BENG. 65, ii (1896) 366; RIDL. J. FED. MAL. ST. MUS. 10 (1920) 85; FL. MAL. PEN. 1 (1922) 459; AMHOF. BIUME 4 (1945) 518.—S. naumannii ENGL. BOT. JAHRB. 7 (1886) 464; FORSCHUNGS. GAZETTE 4 (1886) PHEMER. 36, t. 13, EX DESC. & PL.; KANEHARA, FL. MICRONES. (1933) 195, f. 82; LOES. IN E. & P. PFL. FAM. ED. 2, 20b (1942) 228.—S. littoralis BACK. FL. MAL. PEN. 1 (1907) 305.—S. ovalis (non KORTH.) KOORD.-SCHUM. SYST. VERZ. (1911) Fam. 159, 2; BACK. SCHOOLF. (1911) 237; KOORD. EXK. FL. JAVA 2 (1912) 527.—S. socia CRAIB, KEW BULL. (1926) 352.—**Salacriarata kraemerii** (non LOES.) KANEHARA, FL. MICRONES. (1933) 196, f. 83.

29. Liana, scandent shrub, or rarely a small tree. Stipules deltoid or reniform, 1/2-1/2 mm long. Leaves subcoriaceous, rather discolorous, ovate, broad-elliptic, elliptic to elliptic-lanceolate, obovate, rarely suborbicular, or obovate-oblong, 4-17 by 1/4-11/2 cm; base cuneate; apex acute, short-acuminate to acuminate, sometimes obtuse; margin entire, or slightly crenulate; nerves 4-10 pairs; petiole 1-11/2 cm. Bracts triangular, slightly erose. Pedicels 5-10(-18) mm. Flowers yellowish or yellowish green, few to many in fascicles on axillary bracteate tubercles, sometimes ramentous. Calyx lobes triangular, semi- orbicular, 1/2-1/2 mm long, obtuse or rounded, slightly erose. Petals broad-elliptic, -ovate, obo vate, or suborbicular, 3-4 by 2-1/2 mm, obtuse, with reddish brown pigment in the tissue of the central part, the marginal part yellowish white, when the marginal part at the base reflexed and the petals seemingly uguiluce. Disk annular pulvinate, 1/2-2 mm, c. 1 mm high, slightly contracted at the central part, narrower at the upper part, slightly lobed and extended downward at the base, usually papillose especially at the lower half. Stamens 3, c. 1/2 mm; anthers transversely dehiscent, slightly oblique at young. Pistil c. 1 mm emerging from the disk, triangular. Ovary 3-celled. Ovules 2 in each cell, inserted at the upper inner angle. Fruit globose, sometimes broad-ellipsoid, 1/2-2 cm, red or orange-red when ripe, usually 1-seeded. Seeds globose, 1-1/2 cm.

Distr. Widely distributed but scattered in India, Ceylon, Burma, Thailand, Indo-China, China (Hainan), and throughout Malesia to the Carolines (Yap and Palau), N. Queensland (Cape York Peninsula), New Britain, Solomon Is., and as far as Fiji. Fig. 37.

Fig. 37. Distribution of *Salacia chinensis* LINN., also in Fiji.

Ecol. In forests along the seashore and sandy river banks, in lowland primary forests up to 450 m, once recorded at 900 m in Ceylon.


Galls. A leaf-gall is caused by an aphid. The leaf blade is rolled or folded up (DOCTERS VAN LEEUWEN, Zooeccidia 1926, 330, f. 593).

Notes. The epithet *chinensis* was changed into
Flora Malesiana

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Scandent shrub. Stipules lanceolate, $\frac{1}{2}$–1 mm long, sometimes laciniate or short-fimbriate at the margin. Leaves elliptic to elliptic-lanceolate, or ovate-oblong, 6–14 mm by $\frac{1}{2}$–5 cm; base cuneate; apex short-acuminate to apiculate; margin crenulate; nerves 4–7 pairs; petiole 3–7 mm. Bracts triangular, obtuse, c. $\frac{1}{4}$ mm long. Pedicels 4–4½ mm. Flowers several in fascicles on an axillary, short, simple or sometimes once branched, bracteate brachyblast. Calyx lobes deltoid or suborbicular, c. $\frac{1}{4}$ mm long, glandular or short-ciliolate at the margin. Petals broad-elliptic, 1½–2½ mm by $\frac{1}{2}$–1 mm, obtuse, slightly contracted at the base, margin lengthwise reflexed at anthesis, with 5–8 longitudinal veins elevated on the outer surface when dry. Disk fleshy, annular-pulvinate, c. $\frac{1}{2}$–1 mm $\phi$, c. $\frac{1}{2}$ mm high. Ovary 3-celled. Stamens 3, c. 1 mm. Pistil c. $\frac{1}{2}$ mm emerging from the disk. Ovules 2–1 in each cell. Fruit subglobose, c. 1½ mm $\phi$, red. Seeds broad-ellipsoid, c. 9 by 7 mm, slightly planoconvex.

Distr. Malesia: Java (Palabuhanratu, Banjumas, G. Gombong, and Banjuwangi), Borneo (Sarawak, Kalahien and Mt. Kinabalu), and Philippines (Palawan, Mindoro, Luzon, Samar, Guimaras, and Mindanao).

Ecol. In forests from the lowland up to c. 1200 m.

Vern. Java: areuj kamander koneng, S.

Dubious and Excluded


This species was erroneously listed in Ind. Kew. as from 'Malacc.'. It is an African (Madagascar) species (cf. H. Perrier de la Bâthie, Fl. Madagascar, Fam. Hippocretiaceae, 1946, 22).

Kurrimia pulcherrima (non Wall.) Baker f. J. Bot. (1924) Suppl. 22, a record from West Java, based on Formosae 566 = Elaeocarpus oxyypren K. & V. (Elaeocarpaceae).

Salacia bartlettii Ridl. Kew Bull. (1938) 239, is according to kind information of Mr L. L. Forman, Kew = Anacolosa frutescens Bl. (Oleaceae).


The two collections cited above were destroyed at Berlin and I have not seen any duplicate of them. The characters indicated in the original description are too concise to place this species. It may be related to Salacia sororia Miq. or even be conspecific with it.

Harms mentioned also an Australian collection: Queensland, Cooktown, on the way to Herberton, Warburg 19049. Because of the insufficient flowering material, he could not identify it with certainty.

I have not seen the specimen or any duplicate of it. So far, there is only one species of Salacia, S. dissecta (C. T. White) Ding Hou, known from Queensland bearing a calyptra-like calyx. The specimen mentioned above may belong to it.


Gymnospora neglecta Wall.; F.-Vill. l.c.; Merr. l.c. 483.

Hippocretia arborea Roxb.; F.-Vill. l.c.; Merr. l.c. 487.

Salacia oblonga Wall.; F.-Vill. l.c.; Merr. l.c.

Salvia roxburghii Wall. ex Laws.; F.-Vill. l.c.; Merr. l.c.

The five names listed above are evidently misapplied for the Philippines by F.-Villar. There is neither description nor specimen cited for any one of them.
Nomina nuda

For reference these unvalidly published names, which have been mentioned in literature, are listed here instead of placing them in the synonymy of species concerned.

Hippocratea timorensis Span. Linnaea 15 (1841) 178.—This name was listed in the Ind. Kew. but does not occur in the cited work.

Hypsagyne Jack ex Burkill, J. Str. Br. R. As. Soc. 73 (1916) 219, 221, 247.—This name was mentioned by Jack in a letter to N. Wallich. According to Merrill, J. Arn. Arb. 33 (1952) 227, it is Salacia L.

Johnia sumatranana Jack ex Burkill, J. Str. Br. R. As. Soc. 73 (1916) 221.—This name was mentioned by Jack in a letter to N. Wallach. According to Merrill, J. Arn. Arb. 33 (1952) 228, it is Salacia prinoides (Willd.) DC. = S. chinensis L.

Salacia alternifolia Scort. MSS. in Herb. Calc., non Hochst. 1844.—King, J. As. Soc. Beng. 65, ii (1896) 362, cited this name in the synonymy of Salacia vimeina Wall. ex Lams.


Salacia triplinervi Llanos, Mem. Acad. Cienc. Madr. 3, 4 (1880) 101; Merrill, Sp. Blanc. (1918) 236; En. Philip. 2 (1923) 487.—I agree with Merrill (I.c. 1923) that from the specific name Llanos’s plant can not have been a representative of the Hippocrateaceae.

Macanea arborea Blanco, Fl. Filip. (1837) 431, according to Merrill, Philip. J. Sc. 10 (1915) Bot. 233; Sp. Blanc. (1918) 146; En. Philip. 2 (1923) 165 = Alphonsea arborea (Blanco) Merrill (Annonaceae).

Addendum

Some additional collections have caused a slight extension of the generic range of the genus Glyptopetalum, see p. 256, and Blumea 12 (1963) 65.

P. 256 line 5 from top add to Hainan: and Kweichow, and add to line 6: Lesser Sunda Is. (Timor).

G. marivelense (Elm.) Merrill. A new collection has been made in Timor by Cinatti (n. 340 in L), but the material is in fruit and therefore only tentatively referred to this species.