"It will flourish, if naturalists, chemists, antiquaries, philologers, and men of science in different parts of Asia, will commit their observations to writing, and send them to the Asiatic Society at Calcutta. It will languish, if such communications shall be long intermitted; and it will die away, if they shall entirely cease." —Sir WM. Jones.
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LIST OF PLATES.

No.    I.—Indo and
      II.—Austro-
      III.—Malayan Butterflies.
      IV.—Malayan Butterflies.

No. 9.

With the last part of these Materials the account of the Discifloræ of the Malayan Peninsula was concluded; and in the present part that of the Calycifloræ is begun. My progress has (owing to the press of official and of other work) been even slower than I anticipated when I began the publication of these Materials now more than seven years ago. I therefore invoked the aid of my excellent friend and colleague Dr. D. Prain, and he, in response to my appeal, generously undertook the elaboration of the important family of Leguminosæ which forms so large a portion of the present paper. It is hoped that one more contribution similar in size to the present one will suffice to complete the account of the Calycifloræ, and so to bring the whole series about half way towards completion.

Order XXXVII. CONNARACEÆ.

Erect or climbing shrubs or trees. Leaves alternate, exstipulate, 1-3-foliolate or unequally-pinnate; leaflets quite entire. Flowers in racemes panicles or cymes, regular or subregular, usually bisexual. Calyx 5-lobed or -partite, usually persistent, imbricate or valvate. Petals
5, usually narrow, free or slightly cohering, very rarely valvate. *Stamens* perigynous or hypogynous, sometimes decline, 5 or 10, those opposite the petals often shorter and imperfect; filaments often connate at the base. *Disc* 0 or small, annular or incomplete. *Pistils* 5, rarely 1–3 or 6–7, ovoid, hirsute, 1-celled; styles subulate or filiform, stigmas capitellate, simple or 2-lobed; ovules 2, collateral, ascending, orthotropous. *Fruit* usually of 1, rarely 2–3, sessile or stalked, 1- rarely 2-seeded follicles. *Seed* erect, usually arillate, testa thick, usually more or less covered by an arillus which is often very thin; cotyledons fleshy in the exalbuminous, leafy in the albuminous seeds; radicle superior, rarely ventral.—*Distrib.* 14 genera, all tropical.

Seeds exalbuminous, arillate.

Pistils solitary.

Leaves pinnate, leaflets 3 to 11; trees or scandent shrubs ...

Leaflet solitary, small trees or shrubs, never scandent

Pistils 5 but usually only 1 perfect; leaves pinnate,

(leaflet solitary in one species of *Rourea*).

Flower-pedicels ebracteolate; follicle curved; lobes of calyx persistent, slightly accrescent, imbricate and forming a cup at the base ...

Flower-pedicels with persistent bracteoles at their bases, follicle not curved; calyx-lobes persistent, but neither accrescent nor imbricate ...

Pistils 2 to 5, perfect.

Calyx imbricate; follicles rugose, laminate or tubercled

Calyx valvate; follicles neither rugose laminate nor tubercled ...

Seeds albuminous, pistils 5 to 7, follicles 1 to 3, arillus thin

1. *Connarus*, Linn.

Trees or (usually scandent) shrubs. Leaves unequally pinnate; leaflets 5, rarely 3 or more, quite entire. *Panicles* axillary and terminal, branched. *Flowers* small. *Sepals* 5, deciduous or persistent and clasping the pedicel of the capsule but not accrescent, imbricate. *Petals* 5, linear or slightly dilated upwards. *Stamens* 10, 5 shorter and sometimes without anthers. *Ovary* 1, densely pubescent, style slender, stigma capitellate. *Capsule* oblique, stipitate, inflated, broader upwards; valves glabrous or pubescent within. *Seeds* arillate, testa shining, albumen 0; cotyledons amygdaloid.—*Distrib.* Species about 80, all tropical.

*Petals* minute, much shorter than the sepals ...

*Petals* longer than the sepals.

Under surfaces of the leaflets and the follicles externally densely rusty-pubescent, upper surfaces of leaflets sparsely pubescent ...

1. *C. Minorayi*.

2. *C. ferrugineus*.
Under surfaces of leaflets pubescent, upper surfaces and adult follicles externally glabrous

Both surfaces of the leaflets quite glabrous.

Leaflets ovate-lanceolate or elliptic-lanceolate, acuminate, 2 to 4 in. long.

Follicles sub-cylindric, tapering at the ends, not compressed, minutely sericeous inside

Follicles compressed, sparsely stellate-hairy inside

Leaflets broadly ovate with very rounded bases; petals pubescent; follicles 1·5 in. long, pubescent inside

Leaflets elliptic-oblong or elliptic, 3 to 12 in. long; petals glabrous.

Main nerves of leaves 6 or 7 pairs; follicles 1·25 to 1·4 in. long, sericeous inside

Main nerves of leaves 9 or 10 pairs; follicles 1·5 to 1·75 in. long, sericeous inside

Main nerves of leaves 5 pairs; follicles 2·5 in. long, pubescent inside

... ... 3. *C. semidecanirns*.

... ... 4. *C. oligophyllus*.

... ... 5. *C. hebephyllus*.

... ... 6. *C. nicobaricus*.

... ... 7. *C. gibbosus*.

... ... 8. *C. grandis*.

... ... 9. *C. ellipticus*.

1. **Connarus Maingayi**, Hook. fil. Fl. Br. Ind. II, 53. A small tree; young branches minutely rusty-tomentose. *Leaves* 6 to 8 in. long, their rachises densely and minutely tomentose; leaflets 7 to 9, coriaceous, elliptic-oblong, obtusely and shortly acuminate, the base rounded or sub-cuneate, both surfaces distinctly reticulate when dry, the upper glabrous, the lower paler and sparsely adpressed-pubescent, the midrib tomentose; main nerves 7 to 11 pairs, spreading, faint; length 2·25 to 3·25 in., breadth 1 to 1·35 in., petiolules '1 to '15 in. *Panicles* axillary and terminal, longer than the leaves, densely and minutely rusty-tomentose; the branches short, spicate, with the flowers clustered near the apexes. *Flowers* about '15 in. long, and the same in diameter, on pedicels shorter than themselves. *Sepals* oblong, laterally inflexed at the apex, hoary-pubescent outside, glabrous inside, connivent. *Petals* minute, much shorter than the sepals and shorter than the stamens, pale-pubescent in front. *Stamens* 10; the anthers almost sessile, broadly ovate, glabrous. *Pistil* solitary, the ovary sericeous like the disc, the style short and stout. *Fruit* not seen.

Perak; King’s Collector, No. 3106.

This is readily distinguished from every *Connarus* described here by its very minute petals. In leaves it approaches *C. oligophyllus*, but is distinguished from that by its pinnate nervation.

2. **Connarus ferrugineus**, Jack in Mal. Misc. 2, VII, 37. A sarmentose shrub or powerful woody climber as much as 80 feet long; young branches, petioles, rachises, under-surfaces of leaves and inflorescence densely rusty-tomentose. *Leaves* 8 to 16 in. long; leaflets 5 to 11, coriaceous, oblong-lanceolate or oblong-oblancoate, shortly acumi-
nate, narrowed in the lower fourth to the rounded or sub-cordate base; upper surface rugose and, even when adult, clothed with sparse thin hairs; when old glabrous, the midrib and nerves depressed and tomentose; under-surface rusty-tomentose; main nerves 6 or 7 pairs, oblique, curved, prominent beneath; length 3 to 6 in., breadth 1·25 to 2 in., petiolules '1 to '15 in. Panicles terminal, shorter or longer than the leaves; the branches rather short, stout. Flowers crowded, '3 in. long, on pedicels much shorter than themselves. Sepals oblong-ovate, tomentose outside, glabrous inside. Petals linear-oblong, glabrous. Stamens 10, alternately long and short, the filaments glabrous. Ovary oblong, tomentose, style short. Follicle obovoid-oblong, shortly apiculate, tapering to the base, red when ripe, densely rusty-tomentose, 1·75 to 2·25 in. long and '8 to 1·25 in. broad; pericarp woody, densely sericeous inside. Seed narrowly oblong, 1 in. long and '6 in. broad, black, shining, with a basal incomplete aril 5 in. long. Planchon in Linnea, Vol. XXIII, 429; Hook. fil. Fl. Br. Ind. II, 51. Tricholobus ferrugineus, Blume Mus. Bot. Lugd. Bat. I. 237. Connaraceae, Wall. Cat. 2530.

In all the provinces except the Andaman and Nicobar Islands.—

Distrib. Sumatra.

I see no character to separate Blume's genus Tricholobus from Connarus, and I therefore follow Sir Joseph Hooker in adhering to Jack's name for this plant.

3. Connarus semidecandrus, Jack in Mal. Misc. 2, VII, 39. A sarmentose or often scandent shrub; young branches deciduously puberulous. Leaves 6 to 9 in. long, their rachises and the under-surfaces of the leaflets with their petiolules pubescent or puberulous; leaflets 5 to 7, thinly coriaceous, oblong to elliptic-lanceolate, shortly caudate-acuminate, the base cuneate or rounded; upper surface quite glabrous; the lower reticulate, the pubescence often deciduous with age; main nerves 6 or 7 pairs, prominent on the lower surface, spreading but curving upwards, the lower pair very oblique; length 2·5 to 4·5 in., breadth '9 to 2·5 in., petiolules '15 in Panicles axillary and terminal, longer than the leaves, much branched, densely and minutely rusty-tomentose. Flowers rather crowded, '2 in. long, on pedicels shorter than themselves. Sepals oblong, obtuse, concave, pubescent outside, shorter than the glabrous linear-oblong petals. Stamens 10, in two rows, one row very short; the other with its filaments dilated at their bases and as long as the petals. Pistil single, shorter than the stamens, the ovary hairy; the style short, stout, pubescent; stigma sub-capitate. Follicles falcate, obovoid, compressed, with a short abrupt apical point, narrowed to a stalk at the base, at first rusty-pubescent, afterwards glabrous, obliquely striate, about '75 to '9 in. long and '5 in. broad; pericarp thin, sparsely

In all the provinces except the Nicobars and Andamans.—**Distrib.** Sumatra.

This species is easily distinguished when in fruit by the small size of its follicles. But, while in flower, it is not easy to separate it from *C. gibbous*, Wall.; the only distinctions that I can find being that, in the latter, the follicles are larger than in this, and that the leaflets are quite glabrous on both surfaces.

4. *Connarus oligophyllus*, Wall. ex Planch. *in* Linnae, XXIII, 427. Scandent, glabrous except the inflorescence. **Leaves** 6 to 8 in. long; leaflets 3 to 5, coriaceous, elliptic-lanceolate to elliptic-oblong, sub-acute or shortly and bluntly acuminate, the base cuneate or rounded; upper surface shining; the lower paler, dull; main nerves 4 or 5 pairs, ascending (especially the lower 2 pairs), curved, slightly prominent on the lower surface, very faint on the upper; length 2.25 to 4 in., breadth 1 to 2 in., petiolules 25 to 3 in. **Panicles** terminal and longer than the leaves or lateral and shorter, sub-pyramidal, much branched, minutely rusty-pubescent, many-flowered. **Flowers** 35 in. long, sub-sessile or on short pedicels. **Sepals** ovate-lanceolate, acute, much shorter than the oblong obtuse puberulous petals; perfect ovary 1, flask-shaped, puberulous. **Follicle** nearly straight, not compressed, cylindric, tapering to each end, glabrous and vertically striate (when dry) outside, the pericarp coriaceous, minutely sericeous internally, 1.5 to 2 in. long and .75 in. in diam. at the middle. **Seed** shining, black. Hook. fil. Fl. Br. Ind. II, 53. *Connaracea*, Wall. Cat. 8542 (in part) and 8539 D. (in part).

Penang; Porter. Perak; Wray, No. 1942. King’s Collector, Nos. 5232, 5613, 7804, 8335, 8432. Scortechini, No. 1057. Singaporë; Ridley, No. 5904. Malacca; Maingay, Nos. 506, 508/2, 513.

5. *Connarus herophyllus*, n. spec. King. A powerful climber; young branches deciduously rusty-pubescent; the bark pale, sparsely lenticellate. **Leaves** 6 to 12 in. long, their rachises glabrous; leaflets coriaceous, ovate-lanceolate, acuminate, the base rounded or slightly cuneate; both surfaces glabrous, dull, the lower pale and faintly reticulate; main nerves 6 or 7 pairs, spreading, curving upwards; length 2 to 4 in., breadth .75 to 1.35 in.; petiolules about .2 in., rugulose, glabrous, pale. **Panicles** terminal and axillary, shorter than the leaves in flower, as long as or longer than them in fruit; the branches short, densely rusty-tomentose. **Flower-buds** obovate, on short pedicels. **Calyx** densely rusty-tomentose outside. **Petals** glabrous. **Stamens** 5 long and 5 minute. **Follicles** when young rusty-tomentose, when ripe
glabrous externally except along the suture, broadly oblong, blunt at both ends, somewhat compressed, obliquely striate, attenuated to a very short grooved pseudo-stalk, rose-red when ripe, sparsely stellate-hairy inside; length 1·25 in., breadth 8·5 in.; the pericarp thin, coriaceous, glabrous inside. Seed narrowly oblong, blunt, with a short arillus at its base.

Perak; Wray, No. 1858. King’s Collector, Nos. 5586, 6317, 7519.

6. **Connarus nicobaricus**, King n. spec. Scandent, woody, all parts except the inflorescence glabrous; young branches with pale smooth bark. **Leaves** 8 to 10 in. long; leaflets thinly coriaceous, 3 to 5, broadly ovate with a very short blunt apical point, the base broad and rounded; upper surface slightly shining, the lower duller and paler; main nerves 6 or 7 pairs, faint, curving upwards; length of lateral leaflets 2·75 to 4·5 in., breadth 1·5 to 2·75 in.; petiolules about 2·25 in., the terminal leaflet larger. **Panicles** terminal (probably also axillary), nearly as long as the leaves, rusty-pubescent, the branches sub-erect. **Flowers** crowded near the ends of the branchlets, 35 in. long, on pedicels much shorter than themselves. **Calyx-segments** ovate, tomentose outside, glabrous inside, about one-fourth as long as the corolla. **Petals** linear, pubescent on both surfaces. **Stamens** 10, in two rows, the longer row much shorter than the style and petals; filaments sparsely pubescent, swollen near the base. **Pistil** as long as the petals; the ovary broadly ovoid, tomentose; style sparsely pubescent. **Stigma** sub-capitate. **Follicle** broad, sub-compressed, obtuse, glabrous, faintly striate longitudinally, 1·5 in. long, and nearly 1 in. broad, pubescent inside.

Nicobar Islands; King’s Collectors.

Allied to **C. gibbosus**, Wall., but with pubescent petals and larger follicles which are pubescent inside.

7. **Connarus gibbosus**, Wall. Cat. 8541 (in part). A large semi-scandent shrub; young branches deciduously rusty-puberulous. **Leaves** 6 to 9 in. long, quite glabrous; leaflets 3 to 5, thinly coriaceous, elliptic or elliptic-oblong, very shortly and obtusely acuminate, the base rounded; both surfaces shining, the lower reticulate; main nerves 6 or 7 pairs, spreading but curving upwards, the lower pairs very oblique, slightly prominent on the lower surface; length 3 to 5 in., breadth 1·25 to 2·5 in., petiolules 2 to 3 in. **Panicles** axillary and terminal, shorter than or as long as the leaves, many-branched, rusty-pubescent. **Flowers** rather crowded on the short ultimate branchlets, 25 in. long, on pedicels shorter than themselves. **Sepals** and **petals** as in **C. semidecandrus**. **Stamens** 10, the one row only slightly shorter than the other. **Pistil** longer than the stamens and petals; the ovary ovate-rotund, rusty-tomentose, the style pubescent; stigma sub-capitate. **Follicles**
sub-rhomboidal, compressed, with a short stout apical point, glabrous, obliquely striate; pericarp leathery inside, sericeous, 1-25 to 1-4 in. long, and about 1 in. broad, the stalk ¼ in. long. Seed nearly 1 in. long, oblong, blunt at both ends, black, with an arillus obliquely covering its lower half. Hook. fil. Fl. Br. Ind. II, 52; Kurz For. Flora Burma, II, 326.

The Andaman Islands.—Distrib. Burma.

This may be distinguished from C. semidecandrus by its larger follicles, and larger seeds much more extensively covered by arillus. The inner surface of the pericarp in this is glabrous; in C. semidecandrus it is sparsely sericeous.

8. Connarus grandis, Jack in Mal. Misc. 2, VII, 40. Scandent, all parts except the inflorescence quite glabrous. Leaves 9 to 12 in. long, their rachises stout; leaflets 3 to 5, very coriaceous, elliptic-oblong, acute or obtusely acuminate, the base rounded or sub-cuneate; both surfaces, but especially the upper, shining, the lower reticulate when dry; main nerves 9 or 10 pairs, oblique, faint; length 4 to 12 in., breadth 1-5 to 4 in.; petiolules of the lateral leaflets about 5 in., of the terminal ¼ in. Panicles often as long as the leaves, terminal or axillary, spreading, with a few spike-like branches, rusty-tomentose. Flowers sessile, ¼ in. long Sepals tomentose outside, linear-oblong, obtuse. Petals twice as long, linear, dilated upwards, glabrescent. Filaments puberulous. Follicles obliquely ovoid, sub-rhomboidal, compressed, glabrous, slightly and obliquely rugulose when dry, tapering to a short pseudo-stalk, 1-5 to 1-75 in. long, and about 1 in. broad; pericarp woody, sericeous inside. Planchon in Liunæa, XXIII, 429; Hook. fil. Fl. Br. Ind. II, 53. C. Wallichii, Planch. 1.c. 426; Kurz For. Flora Burma, I, 328. Connaracea, Wall. Cat., 8538 A. B. (in part).

In all the provinces except the Nicobars and Andamans.

9. Connarus ellipticus, King n. spec. Scandent; young branches deciduously rusty-pubescent, the bark dark and polished. Leaves 8 to 15 in. long, everywhere glabrous; leaflets coriaceous, 3 to 5, elliptic-oblong to elliptic, acute or shortly acuminate, the base rounded or sub-cuneate, upper surface very shining when dry; the lower paler, reticulate and less shining; main nerves 5 pairs, oblique, rather prominent beneath; length 4-5 to 7 in., breadth 2 to 3 in.; petiolules 2 to 3 in., rugulose, pale. Panicles axillary and shorter, or terminal and longer than the leaves, minutely rusty-pubescent, the branches obliquely spreading, the ultimate branchlets short. Flowers ¼ in. long, on pedicels slightly shorter than themselves. Segments of the calyx ovate-lanceolate, acute, rusty-tomentose outside, glabrescent inside, about as long as the pistil and half as long as the linear acute glabrous petals. Stamens 5 perfect nearly as long as the petals, and 5 abortive (without
anthers) shorter than the pistil; filaments glabrescent or glabrous, those of the perfect stamens dilated at the base. Ovary pubescent, style glabrous, stigma discoid-capitate. Follicles broad, obliquely sub-rhomboid, tapered to the base, the dorsal suture straight and ending in a conical point, the ventral compressed and widely curved, glabrous, red when ripe, 2·5 in. long and 1·5 in. broad; pericarp woody, adpressed-pubescent on its inner surface. Seed oblong, flat; the testa black, half covered by a thin basal arillus. Erythrostigma ellipticum, Zoll. in Tijdsch. Ned. Ind. XIV, 174.

Singapore; Ridley, No. 1380. Perak; King's Collectors, Nos. 4090, 4943, 5958, 7480, 8435. Wray; Nos. 1831, 2870, 2873; Scortechini, No. 1689. Penang; Curtis.

There is a specimen in the Calcutta Herbarium collected by Kurz in the Buitenzorg garden what exactly agrees with this. That specimen is named Erythrostigma ellipticum Zoll.; and it is on the strength of this identification of Kurz's that I have included this synonym here. For Zollinger (who refers the genus Erythrostigma to Anacardiaceae) defines his three species (1. c.) E. ellipticum, E. obliquum and E. villosum so briefly and imperfectly, that it is quite impossible, from his descriptions alone, to identify any of them.

2. Ellipanthus, Hook. f.

Trees or erect shrubs. Leaves with 1 leaflet, quite entire. Racemes or cymes axillary, short. Flowers hermaphrodite or polygamous. Sepals 5, not enlarged in fruit, sub-erect, valvate. Petals 5, longer than the sepals, oblong-lanceolate, densely pubescent. Stamens 10, 5 shorter without anthers; filaments short, subulate, connate at the base. Ovary 1, pubescent; style short. Follicle stalked, oblique, velvetty; valves glabrous within. Seed arillate, albumen 0; cotyledons plano-convex.—Distrib. 12 species; Malayan Peninsula and Islands.

Both surfaces of leaves quite glabrous.

Leaflet narrowly elliptic-oblong, tapering to each end; filicicles 5 in. long ... ... 1. E. Scortechinii. Leaflet elliptic-ovate to elliptic; follicle 1 in. long ... 2. E. calophyllus.

Under surfaces of leaves hairy.

Leaflet oblong-lanceolate, 2·5 to 3·5 in. long; flowers in short panicles ... ... 3. E. Curtisi. Leaflets ovate- or oblong-elliptic to elliptic, 4 to 6 in long. Flowers in racemes, follicle with a pseudo-stalk only 2 in. long ... ... 4. E. Griffithii. Flowers in dense capituloid cymes; follicle gibbous at the base on one side, its pseudo-stalk about 1 in. long ... 5. E. gibbosus.

1. Ellipanthus Scortechini, King n. spec. A small tree; young branches with pale cinereous bark, pubescent. Leaflet thinly coriaceous, narrowly elliptic-oblong, tapering from the middle to either end, the
apex caudate-acuminate; both surfaces glabrous, the upper shining; the lower dull, minutely reticulate; main nerves 4 pairs, curved, ascending, prominent on the lower surface; length 4·5 to 7 in., breadth 1·25 to 2 in., petiole '1 to '15 in. Cymes axillary, very short, tawny-tomentose. Calyx thick; the lobes deep, ovate, obtuse, cinereous-tomentose. Petals slightly longer than the calyx, membranous. Follicles cinereous-tomentose, obliquely elliptic, sub-compressed, grooved along the suture, almost straight, the apex rather blunt with an abrupt small apiculus, the base slightly and suddenly contracted into a short stout pseudo-stalk covered by the persistent calyx; length '5 in., breadth '3 in.; pericarp thick, glabrous inside. Seed oblong with a large hilum and thin arillus.

Perak; Scortechini No. 607.

Gathered only by the late Father Scortechini whose specimens are in fruit, and from whose field notes the foregoing description of the flower has been taken.

A small tree; young branches slender, glabrous. Leaflet coriaceous, elliptic to elliptic-ovate, sometimes oblong-lanceolate, shortly caudate-acuminate, the base rounded or slightly and abruptly cuneate; both surfaces glabrous; the upper shining when dry; the lower dull, minutely reticulate; main nerves 4 or 5 pairs, spreading, curving upwards, interarched freely; length 4·5 to 6·5 in., breadth 2 to 2·25 in.; petiole '75 to 1 in., the joint near the apex. Cymes axillary, shorter than the petioles, minutely tawny-tomentose. Flowers '3 in. long, on pedicels shorter than themselves. Calyx lobes broadly ovate, sub-acute, tawny-tomentose outside, less than half as long as the linear-oblong densely velvetty obtuse petals. Stamens the 5 perfect shorter than the petals and with very pubescent filaments; the 5 abortive much shorter and more slender, antheraceous. Ovary narrowly ovoid, sericeous. Style rather short, stigma sub-capitate. Follicles obovoid or ellipsoid, slightly compressed, blunt, rusty-tomentose, 1 in. long; pericarp thick, woody, glabrous within; Kurz Journ. As. Soc. Beng. 1872, Pt. II, 305; For. Flora Burma I, 329; Hook. fl. Fl. Br. Ind. II, 55.

Andaman Islands; Kurz, King's Collectors.

3. Ellipanthus Curtissi, King n. spec. A tree; young branches rusty-puberulous, the bark dark. Leaflet thinly coriaceous, oblong-lanceolate, tapering to each end, the apex caudate-acuminate; upper surface glabrous, shining; the lower reticulate, sparsely pubescent, the midrib tomentose; main nerves 7 or 8 pairs, curving obliquely upwards, prominent beneath; length 2·5 to 3·5 in., breadth '8 to 1·5 in., petiole '3 in., tomentose. Panicles axillary, branching from the base, '3 to '7 in. long, sericeous. Flowers '2 in. long, on pedicels shorter than themselves. Segments of the calyx ovate-lanceolate, thick, tomentose on the outer,
glabrescent on the inner surface, less than half as long as the petals and pistil. *Petals* narrowly oblong, sub-acute, pubescent on the outer, glabrescent on the inner surface. The 5 fertile *stamens* as long as the ovary, glabrous, the anthers broadly ovate, the filaments much dilated at the base, the 5 alternate much smaller and without anthers. *Ovary* oblong, sericeous-tomentose, longer than the stout pubescent style; stigma capitate-discoid. Fruit unknown.

Penang; Curtis Nos. 1014, 1097.

The nearest ally of this appears to be the imperfectly known *E. Helferi*, Hook. fil. from Tenasserim, of which the type is Helfer's No. 1253; but the leaves of this are much more pubescent on the lower and more shining on the upper surface. The flowers of this are moreover larger.

4. **Ellipanthus Griffithii**, Hook. fil. Fl. Br. Ind. II, 56. A small tree? Young branches slender, rusty-pubescent. *Leaflet* thinly coriaceous, ovate-elliptic, caudate-acuminate, the base abruptly sub-cuneate; upper surface glabrous, shining, the lower sparsely rusty-pubescent, the midrib and nerves almost tomentose; main nerves 9 or 10 pairs, spreading, interarching, prominent beneath; length 4 to 5 in., breadth 1·5 to 2 in., petiole 2·5 to 2·25 in. *Racemes* 25 in. long, few-flowered; *calyx* deeply divided into 5 ovate-lanceolate teeth, adpressed-pubescent. Follicles compressed, much curved, the apex beaked, narrowed at the base to a pseudo-stalk 2 in. long which is embraced by the persistent *calyx*, rufous tomentose outside, 75 in. long; the pericarp coriaceous, glabrous inside.

Mallacca; Griffith No. 1253.—Distrib. Borneo.

5. **Ellipanthus gibbosus**, King n. spec. A small tree; young branches slender, rusty-tomentose. *Leaflet* elliptic or oblong-elliptic, sometimes slightly obovate, shortly and rather abruptly caudate-acuminate, the base cuneate; upper surface quite glabrous; the lower sparsely adpressed-pubescent, the midrib densely so; main nerves 7 or 8 pairs, spreading but curved upwards, prominent on the lower surface when dry; length 4·5 to 6·5 in., breadth 1·75 to 2·75 in., petiole 5 or 6 in. long, tomentose, stout, the joint near the apex. *Flowers* 15 in. long, in dense many-flowered capituliform axillary cymes, sub-sessile. *Calyx-teeth* lanceolate, tawny-tomentose externally, glabrous internally. *Petals* broader than the sepals and sometimes also longer, imbricate, tomentose outside, glabrous inside. *Stamens* 5 or 6 fertile with broadly ovate anthers, and 5 alternate smaller and abortive; the filaments of all united by their expanded bases. *Ovary* villous, style about as long as the stamens, stigma discoid. *Follicle* narrowly oblong, compressed, the apex produced into a long conical beak; the base gibbous at one side, contracted below the gibbosity into a curved pseudo-stalk about an inch
long, everywhere pale rusty-tomentose; length of follicle and beak equal to that of the pseudo-stalk; pericarp leathery, glabrous inside. Seed arillate at the base, testa black.

Perak; very common, Scortechini, Wray, Curtis, King’s Collectors.

3. **Rourea, Aubl.**

Scandent or sarmentose shrubs. Leaves unequally pinnate, sometimes with only one leaflet; leaflets subopposite or alternate. Racemes or panicles axillary. Flowers small; pedicels usually slender. Sepals 5, orbicular, imbricate, enlarged and clasping the base of the ripe capsule. Petals 5, usually linear-oblong. Stamens 10; filaments connate at the base. Ovaries 5, 4 usually imperfect; style slender. Follicle sessile, curved. Seed erect, arillate, exalbuminous.—

**Distrib.** Tropics; species about 52.

Leaflets not more than 7, petiolulate, glabrous.

Leaves with usually a single leaflet ... ... ... 1. *R. anomala*.

Leaves with 3 to 9, rarely 11, leaflets; inflorescence ebracteolate, or the bracteoles (if any) fugacious.

Leaflets glaucous on the lower surface ... ... ... 2. *R. acuminata*.

Leaflets not glaucous on the lower surface.

Leaves 8 to 12 in. long; leaflets elliptic-lanceolate to elliptic, their main nerves 2 to 5 pairs, curving abruptly upwards; flowers 35 in. in diam., in racemes or panicles, flower buds ovoid ... ... ... 3. *R. commutata*.

Leaves 3 to 7 in. long; leaflets ovate-lanceolate, their main nerves 4 or 5 pairs, faint, spreading; flowers 25 in. in diam.; flower buds ovoid ... ... ... 4. *R. pulchella*.

Leaves 3.5 to 6 in. long; leaflets 3 rarely 5, broadly ovate or ovate-orbicular with broad rounded bases; their main nerves about 4 pairs, spreading, faint; flower-buds globose ... ... ... 5. *R. humilis*.

Leaflets very numerous (17 to 40), small, sessile, oblong.

Leaflets shortly and bluntly acuminate, pubescent beneath ... ... 6. *R. rugosa*.

Leaflets bifid at the apex, minutely dotted and sparsely pubescent beneath ... ... ... ... 7. *R. parallela*.

Leaflets with obtuse rounded apices.

Lower surface of leaflets rusty-sericeous ... ... ... 8. *R. fulgens*.

Lower surface of leaflets minutely dotted, reticulate, glabrous ... ... ... ... 9. *R. concolor*.

1. **Rourea anomala**, King n. spec. A powerful woody perfectly glabrous creeper. Leaves either simple or teruate; leaflets coriaceous, ovate-elliptic to broadly ovate, shortly and bluntly caudate-acuminate, the base rounded and usually broad; both surfaces shining and minutely reticulate when dry; main nerves about 6 pairs, curving upwards,
faint; length of the simple leaves and of the terminal leaflet of the
ternate leaves 3·25 to 4·5 in., breadth 1·6 to 2·2 in.; petiolules about 1·2
in., those of the lateral leaflets shorter. **Racemes** slender, shorter than
the leaves, in fascicles in the leaf-axils, laxly-flowered. **Flowers** 3·5 in.
long, on slender pedicels of about the same length. **Segments of calyx**
ovate-orbicular, sub-oblique, puberulous outside, their edges ciliate, only
about one-third of the length of the linear-oblung glabrous petals. **Stamens**
much shorter than the petals and than the glabrous pistils. **Follicles**
obliquely ovoid, sub-compressed, blunt, yellowish with a red
tinge when ripe, 1 in. long. **Seed** with a soft red arillus.

Penang; Curtis No. 504. Perak; King’s Collector Nos. 804, 953,
3066, 3866, 4527, 4622, 6755, 8312, 10542, 10863. Wray, No. 3799;
Scortechini.

This resembles *R. simplicifolia* Bl. in having both simple and compound leaves;
but that is a smaller plant with puberulous inflorescence, and different follicles.

woody perfectly glabrous creeper often over 100 feet long; young branch-
es glabrous, often minutely lenticellate. **Leaves** 3 to 9 in. long, the
rachis slender; leaflets 5 to 11, thinly coriaceous, oblong, lanceolate
or elliptic-oblung, sometimes somewhat obovate, abruptly shortly and
bluntly caudate-acuminate, slightly narrowed to the rounded base or
with broad minutely cordate base; upper surface shining, the lower dull
and glaucous, both minutely reticulate when dry; main nerves about
5 pairs, very faint, spreading; length 1·5 to 2·25 in., breadth ‘65 to ‘9
in.; petiolules under ‘1 in., the terminal one slightly larger. **Racemes**
very slender, lax, several from an axil. **Flowers** 3·3 in. long, on slender
pedicels of about the same length. **Sepals** ovate-rotund, about half as
long as the narrowly oblong glabrous sepals, glabrous, the edges minutely
ciliolate. **Stamens** shorter than the petals and glabrous pistils. **Follicle**
narrowly ovate, curved, pointed, ‘75 in. long, when ripe red tipped with
yellow. **Onostis acuminata**, Wall. Cat. 8533.

Singapore; Wallich. Perak; King’s Collector Nos. 866, 4271, 6987,
7781, 10599, 10871.

3. **Rourea commutata**, Planch. in Linnaea, XXIII, 420. Shrubby,
scandent; young branches puberulous becoming glabrous, sometimes
minutely lenticellate. **Leaves** 8 to 12 in. long, glabrous; leaflets 3 to 7,
thinly coriaceous, sub-opposite, elliptic-lanceolate to elliptic, sub-obtuse-
ly caudate-acuminate, the base rounded, both surfaces shining; main
nerves 2 to 5 pairs, curved, rather abruptly ascending; length 2·5 to 6
in., breadth 1·35 to 2·25 in.; petiolules ‘15 to ‘2 in., the terminal one
larger. **Flowers** 3·5 in. in diam., in glabrous racemes or racemoid panicles
much shorter than the leaves and clustered in their axils, pedicels

Andaman and Nicobar Islands.—Distrib. Burma, Chittagong, Sylhet and Assam.

The present species (published in 1850), *R. pulchella*, Blume (1850), and *L. humilis*, Planch. (1850), differ from each other so little that I am not sure that they should not be reduced to one, in which case the species might be named *Rourea monadelpha*, the earliest published name of any of them being *Cnestis monadelpha*, Roxb. (1832).

4. *Rourea pulchella*, Planch. in Lindreae XXIII, 419. Scendent, woody, quite glabrous. *Leaves* 3 to 7 in. long; leaflets 3 to 7, thinly coriaceous, ovate-lanceolate, obtusely caudate-acuminate, the upper surface very shining, the lower less so, both reticulate; main nerves 4 or 5 pairs, spreading, faint; length 1.5 to 3 in., breadth .75 to 1.6 in.; petiolules .15 in., slender. *Racemes* crowded in the axils, shorter than the leaves. *Flowers* .25 in. in diam., the pedicels of the same length, slender. *Sepals* broadly ovate, acute, ciliolate, half as long as the petals, linear-oblong. *Pistils* 5, ovaries pilose, styles slender. *Follicle* stout, curved, pointed, glabrous, .6 in. long, red when ripe. Hook. fil. Fl. Br. Ind. II. 48.

Malacca; Griffith, No. 1265. Maingay, No. 501 (Kew Distrib.); Ridley, No. 1449. Singapore, Ridley, Nos. 2028, 3981. Perak; Wray, Nos. 1167, 3774.

5. *Rourea humilis*, Blume Mus. Bot. Lugd. Bat. I, 262. Scendent, woody, glabrous. *Leaves* 3.5 to 6 in. long, the rachises slender; leaflets 3 rarely 5, coriaceous, broadly ovate or ovate-orbicular, abruptly and obtusely caudate-acuminate, the base rounded, rarely sub-cuneate, upper surface very shining, the lower less so and more distinctly reticulate; main nerves about 4 pairs, spreading, faint; length 1.5 to 3 in., breadth 1 to 2.25 in. petiolules about .2 in., the terminal leaflet the largest. *Racemes* axillary, clustered, slender, few-flowered; the buds sub-globose, on pedicels of about their own length. *Calyx-lobes* sub-orbicular, glabrous. *Stamens* shorter than the calyx, much shorter than the styles. *Follicles* cylindric, pointed, coriaceous, glabrous, .75 in. long.

Nicobar Islands; Jelinek, No. 140. Kurz. Penang; Curtis, No. 2285. Pahang, Ridley, Nos. 2645, 5121; Singapore. Perak; King’s Collector, No. 4677, Scortechini.—Distrib. Sumatra, Borneo.

Distinguished chiefly by its broadly ovate coriaceous leaves, very shining on the upper surface and with broad bases.
6. **Rourea rugosa**, Planch. in Linnaea XXIII, 422. A stout woody climber; young branches densely cinereous-tomentose. *Leaves* thinly coriaceous, 12 to 15 in. long, the rachises tomentose; leaflets 8 to 15 pairs, sub-sessile, sub-opposite, narrowly oblong or oblong-lanceolate, shortly and bluntly acuminate, rarely acute, the bases rounded or minutely cordate; upper surface glabrous, smooth; the lower reticulate, sparsely pubescent, the midrib tomentose; main nerves 8 or 9 pairs, spreading, interarch ing very freely, prominent; length 2 to 3·25 in., breadth '6 to 1·25 in. *Panicles* shorter than the leaves, crowded in the leaf-axils, pubescent, many-flowered. *Flowers* about '2 in. long, their pedicels shorter. *Sepals* rotund, pubescent, half as long as the petals. *Follicle* about '75 in. long, pointed, glabrous, striate. *Seed* ovoid, apiculate, about '5 in. long. Hook. fil. Fl. Br. Ind. II, 46. *Connarus-rugosus*, Wall. Cat. 8527.

Singapore; Wallich. Malacca; Griffith, Maingay. Penang; Porter, Curtis. Perak; King's Collector, Wray.

7. **Rourea parallela**, Planch. in Linnaea XXIII, 421. A powerful woody climber, often 150 feet long; young branches cinereous-pubescent. *Leaves* 2 to 6 in. long, their rachises with crisped pubescence; leaflets coriaceous, sessile, 10 to 22 pairs, opposite or sub-opposite, oblong, the apex broad, shortly bifid; the base minutely cordate, slightly oblique; upper surface glabrous, shining; the lower with very minute pale dots, sparsely pubescent especially on the midrib; main nerves about 6 pairs, faint; length '5 to '75 in., breadth '25 to '3 in. *Racemes* in axillary clusters, shorter than the leaves; the rachises slender, tomentose. *Flowers* not crowded, '3 in. in diam. and '2 in. long, the pedicels slightly shorter. *Sepals* puberulous, half as long as the petals, broadly ob lanceolate, sub-glabrous. *Follicles* when ripe bright red with yellow tips, glabrous, '6 to '7 in. long, pointed. *Seed* elliptic, keeled on one side, '3 in. long. Under C. similis, Bl. in Hook. fil. Fl. Br. Ind. II, 50. *Connarus minusoides*, Vahl. ? Wall. Cat. 8526 C.

Penang; Porter; Curtis, No. 473. Malacca; Maingay, No. 498. Perak; King's Collector, Nos. 2580, 4302, 8405, 10119, 10592, 10896; Scortechini. Singapore; Anderson, Ridley. Kedah, Curtis, No. 2629.

Blume's species *R. similis* (Mus. Lugd. Bat. I, 264 (September, 1850), is stated by its author to be very near to this, and indeed Sir Joseph Hooker (Fl. Br. Ind. II, 50) has taken Blume's name in preference to Planchon's. *R. sororia*, Planch. from Borneo must, from the description, be also very near this.

**Var. major**. *Flowers* '3 in. long and '35 in. in diam. in lax panicles; leaflets nearly 1 in. long.

Perak; King's Collector, No. 5516.
8. Rourea fulgens, Planch. in Linnaea, XXIII, 423. A woody climber; young branches minutely and deciduously rusty-tomentose. Leaves 3 to 5 in. long, the rachis tomentose; leaflets 12 to 24 pairs, thinly coriaceous, oblong, slightly oblique, entire, obtuse, the base rounded or sub-cordate, usually oblique; upper surface glabrous, reticulate, minutely rugulose when dry, the lower rather densely covered with rusty silky pubescence; length 4 to 65 in., breadth 15 to 25 in. Racemes axillary, solitary, shorter than the leaves, pubescent, pedicels short. Flowers unknown. Follicles 75 in. long, much curved. Hook. fil. Fl. Br. Ind. II, 46. Connarus fulgens, Wall. Cat. 8524.

Singapore; Wallich; Ridley, Nos. 2027, 4568. Malacca; Maingay, No. 499.

9. Rourea concolor, Blume Mus. Bot. Lugd. Bat. I, 264. A woody climber; young branches rusty-pubescent. Leaves 1 to 4 in. long, the rachises tomentose; leaflets 4 to 16 pairs, thinly coriaceous, sub-sessile, broadly oblong, with very obtuse or truncate apex and broad oblique minutely cordate base; both surfaces glabrous, the upper shining, the lower minutely dotted and boldly reticulate; main nerves about 3 pairs, spreading; length 3-5 to 5 in., breadth 1-5 to 3 in. Racemes about as long as the leaves, axillary, slender, rusty-tomentose; pedicels slender, 25 in. long, as long as the flowers. Sepals orbicular, only half as long as the oblong petals, stamens as long as the petals. Follicles 5 to 75 in. long, pointed. Hook. fil. Fl. Br. Ind. II, 49. R. parvifolia, Planch. in Linnaea, Vol. XXIII, 420. Connarus mimusoides, Wall. (not Vahl.) Cat. 8526 B. Cnestis mimusoides, Jack in Mal. Misc. Vol. II, VII, 44.

Singapore; Prince, Ridley, No. 2026, Hullett. Malacca; Griffith, No. 1262 (Kew Distrib.) Perak; King’s Collector, No. 4373.—Distrib. Sumatra; Forbes, No. 3169. Borneo.

4 Roueopsis, Planch.

Sarmentose or scandent shrubs. Leaves unequally-pinnate, leaflets few. Flowers in axillary racemes; pedicels slender, bracteolate at the base. Sepals oblong, slightly imbricate, somewhat enlarged and spreading, but not clasping the base of the capsule. Petals linear-oblong. Stamens 10, the alternate longer. Ovaries 5, styles slender. Capsule linear-oblong, straight. Seed ovoid; testa thin, black, arilliform at the base; cotyledons amygdaloid.—Distrib. Species 3, all Malayan.

This genus differs from Rourea in having straight (not curved) follicles, at the base of which the persistent sepals are free, and also in having bracteoles at the base of the pedicels.

Leaflets puberulous beneath ... ... ... 1. R. pubinervis.
" quite glabrous ... ... ... 2. R. Scortechinii.
1. *Roureopsis pubinervis*, Planch. in *Linnaea*, XXIII, 424. A woody climber, sometimes as long as 50 feet; young branches with pale striate puberulous bark. *Leaves* 2·5 to 5 in. long, the rachises pubescent; leaflets membranous, 5 to 9, (the terminal one larger than the others), narrowly ovate-elliptic, tapering to each end, the apex abrupt and notched, the base cuneate; upper surface glabrous; the lower paler, puberulous on the midrib and sometimes on the nerves; main nerves 4 or 5, inter-arching, not much more prominent than the intermediate nerves; length of lateral leaflets '7 to 1·7 in., breadth '5 to '75 in. * Racemes* slender, shorter than the leaves, solitary or in fascicles of 2 or 3 in the leaf axils, laxly few-flowered. *Flowers* 3·5 in. long; their pedicels of about the same length, each with a minute pubescent persistent bracteole at its base. *Sepals* broadly oblong, obtuse, pilose near the apex, about half as long as the linear-oblong sub-acute glabrous petals. *Stamens* shorter than the sepals and pistils; ovaries pubescent. *Follicles* ovate, '5 or '6 in. long, not curved; the persistent calyx-lobes free, erect, about one-third as long as the fruit. Hook, fil. Fl. Br. Ind., II, 50. *Indeterminata*, Wall. Cat. 9050.

Penang; Porter; Curtis, 2332 and 2749. Malacca; Griffith, Maingay No. 500. Perak; very common, Scortechini, King’s Collector.—*Distrib. Java.*

2. *Roureopsis Scortechini*, King n. sp. A slender sarmentose woody shrub, all parts except the inflorescence glabrous, young branches minutely lenticellate *Leaves* 6 to 10 in. long, the rachis rather slender; leaflets 7 to 9, sub-opposite, very thinly coriaceous, ovate-lanceolate, tapering from below the middle to the long rather blunt acuminate point, the base cuneate; upper surface shining, the lower rather dull, paler and conspicuously reticulate; main nerves about 4 pairs, faint, the lower very oblique; length 2·25 to 3 in., breadth 1 to 1·25 in., petiolules about 1 in., stout; the lowest leaflets the smallest. *Racemes* slender, axillary, 1 to 2 in. long, laxly-flowered, minutely and sparsely rusty-pubescent. *Flowers* about 2·25 in. long, on slender pedicels about 2 in. long, each pedicel with a minute rusty-tomentose bracteole at its base. *Calyx-lobes* ovate, obtuse, ciliolate, hairy inside, glabrous outside. *Petals* longer than the calyx, lanceolate, plicate in bud, yellowish. *Filaments* slightly coherent at the base, glabrous. *Pistils* 5, only 1 or 2 fertile. *Fruit* narrowly ovoid, not curved, pointed, coriaceous, glabrous, 1 in. long.

Perak; Scortechini, No. 613. Curtis (elevation 5,000 feet), No. 1998.

Scortechini’s specimens have flowers in bud only, and none of them is in fruit. The foregoing description, as respects the flower, is copied from his field note. The fruit is described from what I take to be the same plant collected by Curtis in Perak at an elevation of 5,000 feet and described by him as a small tree.
5. **Aгеlєа, Сoland.**

Erect or scandent shrubs. *Leaves* 3-rarely 5-foliolate. *Panicles* or *racemes* axillary. *Calyx* 5-partite, not accrescent nor embracing the fruit, imbricate or subvalvate. *Petals* lanceolate or ligulate, obtuse, free or connate at the middle. *Stamens* 5 or 10. *Disc* \( \frac{1}{2} \)-annular or 0. *Pistils* 2–5. *Follicles* 1–3, sessile or shortly stalked, coriaceous, rugose or lamellate. *Seed* erect, exalbuminous; tests arilliform below the middle.

—**Distrib.** 12 species, African and Asiatic.

Main nerves of leaflets 2 or 3 pairs, sub-erect, curving.

All parts more or less pubescent, stamens 5 ... ... 1. *A. vestita*.

All parts, except the inflorescence, glabrous; stamens 10 ... ... 2. *A. Wallichii*.

Main nerves of leaflets 7 to 10 pairs, spreading.

Leaflets 3 to 5, all parts more or less pubescent; stamens 5 ... 3. *A. pinnata*.

Leaflets never more than 3, adult leaves quite glabrous; stamens 10 ... ... ... ... ... 4. *A. Hullette*i.

1. **Aгеlєа vestita**, Hook. fil. Fl. Br. Ind. II, 46. A rather slender woody creeper 20 to 80 feet long; young branches at first rusty-tomentose but soon becoming sub-glabrous or glabrous. *Leaflets* membranous, unequal, more or less ovate or elliptic, with rounded base and caudate-acuminate apex; the terminal one the larger, sometimes ovate-rotund to sub-rhomboidal; its petiolule 5 or more in length, swollen at the apex; the lateral leaflets inequilateral, the petiolule only 1 or 2 in. long; upper surface of all sparsely adpressed-pubescent, the midrib and nerves tomentose; lower surface pubescent; main nerves about 3 pairs (one pair sub-marginal), much curved, prominent as are the intermediate nerves and reticulations; length of the lateral leaflets 2.5 to 3 in., breadth 1.25 to 1.75 in., the terminal one larger. *Panicles* extra-arillary, less than 1 in. long, tomentose, with many short branches. *Flowers* under 2 in. long, on slender pedicels. *Calyx* cleft to the very base; the segments unequal, linear, tomentose, shorter than the glabrous yellowish oblancoolate or linear petals. *Stamens* 5, unequal. *Styles* 2 to 5, slender, with a few white hairs. *Follicles* solitary, bright red, rarely in pairs, ovoid, boldly tuberculate or lamellate externally and tomentose, about 6 to 8 in. long, usually with a short curved stout apical beak. *Seed* narrowly sub-obovoid, black, 4 in. long, pale and arilliform near the base. *Onetis vestita*, Wall. in Herb. Linn. Soc. **Connaracea**, Wall. Cat. 8535. *Hemiandrina borneensis*, Hook. f. in. Trans. Linn. Soc. **xxxiii.** 171, t. 28. *Troostwyckia singularis*, Miq. Fl. Ind. Bat. Suppl. 531.

Singapore; Jack, Ridley. Penang; Porter, Curtis. Malacca; Griffith, Maingay. Perak; King’s Collector, Scortechini, Johore, Ridley.—**Distrib.** Sumatra, Borneo.

A very common species in Perak. The arillus of the seed is very inconspicuous

J. II, 3
in dried specimens. The number of the pistils varies from 2 to 5. There are in the Kew Herbarium fruiting specimens of a plant collected by Griffith which exactly resembles this except that its fruits (which are immature) are non-tuberculate and are covered with a dense coating of long silky tawny hairs. The same plant was collected by the Calcutta Garden Collector (No. 6378), but also without flowers. I believe the dense hairiness of the fruit of both gatherings to be due to the irritation caused by the deposit of the eggs of some insect in the young fruit.

2. **Agelea Wallichii**, Hook. fil. Fl. Br. Ind. II, 47. A slender woody creeper 20 to 50 feet long, all parts except the inflorescence glabrous. Leaflets coriaceous, slightly unequal, ovate-elliptic, with rounded or cuneate bases and short caudate-acuminate apices; the petiolo- lule of the terminal leaflet about 1 in. long, thickened near the apex; the petiolules of the lateral leaflets about 2½ in. long; both surfaces shining, the lower reticulate; length 3 to 4½ in.; breadth 1½ to 2¼ in.; main nerves 2 or 3 pairs, ascending, much curved, one pair submarginal. Panicles under 1 in. long, extra-axillary, pubescent. Flowers 2½ in. in diam., on pedicels longer than themselves. Calyx divided for three-fourths of its length into 5 ovate-lanceolate imbricate segments, sparsely pubescent externally, glabrous internally, their edges densely sericeous. Petals longer and narrower than the segments of the calyx, glabrous, linear, sub-acute. Stamens 10, sub-equal, longer than the styles, much shorter than the petals. Pistils 5, very short, stout. Follicle usually solitary, bright red when ripe, ovoid, curved, shortly beaked, covered outside with short obtuse tubercles and minutely rusty-tomentose, inside glabrous, 6 in. long. Seed oblong, black, its lower half pale and arilliform. Connaraceae, Wall. Cat., 8544.

Singapore; Wallich. Malacca; Griffith (Kew Distrib.) No. 1275, Maingay, No. 511, Derry, No. 69. Penang; Curtis, Nos. 1633 and 3032. Perak; Wray, No. 48, Scortechni, No. 1730, King’s Collector, No. 3735. —Distrib. Sumatra, Forbes, No. 2589.

3. **Agelea Pinnata**, King n. spec. A woody climber 30 to 40 feet long; young branches rusty-puberulous, striate. Leaflets 3 to 5, thinly coriaceous, unequal, (the middle the largest), elliptic, broadly and shortly cuneate-acuminate, the base rounded or sub-cuneate; upper surface glabrous except the minutely pubescent midrib; lower surface minutely sub-adpressed pubescent, the transverse veins distinct; the midrib tomentose; main nerves 7 to 10 pairs, spreading and curving upwards, prominent on the lower surface, slightly impressed on the upper; length of the terminal leaflet 6 to 8 in., breadth 3 to 3½ in.; its petiolule jointed to the rachis and not longer than those of the lateral slightly smaller leaflets. Panicles about 1 in. long, densely crowded in the axils of the leaves, many-flowered, minutely tomentose. Flowers 3 in. long, their pedicels half as long. Calyx divided to the very base
into 5 linear acuminate reflexed segments, half as long as the petals, tomentose externally. Petals linear, much acuminate, glabrous, white inside and purple outside. Stamens 5, shorter than the pistils, the anthers sub-globular. Pistils 5, the ovaries softly tomentose; the styles spreading, recurved; the stigma bifid. Fruit unknown.

Perak; King's Collector, No. 5425.

This differs notably from both the other species of this genus in its leaflets having often 5 instead of 3 leaflets. In the structure of its flowers, however, it agrees perfectly with the diagnosis of the genus. It is more nearly allied to A. vestita than to A. Wallichii, but it differs from both in the larger number of main nerves in its leaves. Its flowers are moreover larger than those of A. vestita, and the petals are differently coloured.

4. Agelea Hulletti, King n. spec. A woody creeper 15 to 20 feet long; young branches minutely tomentose. Leaflets 3, coriaceous; the terminal slightly the largest, narrowly elliptic-oblong; the lateral pair slightly oblique, all with acute apices and cuneate bases; the petiolo- lule of the terminal one from 5 to 75 in. long, jointed; those of the lateral pair 25 in. long; upper surface glabrous and minutely pitted, the lower finely reticulate, when young sub-lepidote and puberulous, when adult glabrous; main nerves 7 or 8 pairs, spreading and curving upwards, prominent on the lower and obsolete on the upper surface; some of the intermediate nearly as distinct; length of the terminal leaflet 6 to 9 in., breadth 2 to 2•5 in., the lateral pair rather smaller. Panicles less than 1 in. long, minutely tomentose, crowded in the leaf-axils or from the axils of fallen leaves, many-flowered. Flowers '2 in. long and about the same across; their pedicels about 25 in. long. Calyx divided for two-thirds of its length into 5 lanceolate segments, tomentose outside, glabrescent inside. Petals longer than the sepals, spreading, linear-oblong, glabrous, with a mesial rib, recurved from about the middle. Stamens 10, the alternate ones shorter, none of them so long as the pistils. Ovaries narrowly oblong; tomentose. Styles sub-glabrous, slightly diverging. Follicles 1 to 3, bright red when ripe, woody, ovoid, shortly beaked, externally tubercled and minutely rusty-tomentose, inside glabrous, length 5 to 65 in. Seed sub-cylindric, compressed, the upper half black, the lower pale and arilliform, 5 in. long.

Singapore; Hullett, No. 841; Ridley, No. 4589. Perak; King's Collector, No. 5729.

This is distinguished from A. pinnata by the leaflets being invariably 3 and the stamens being only 5 while, in that species, there are often 5 leaflets and always 10 stamens. This resembles A. Wallichii in some respects, but it differs from that species in having larger leaflets more cuneate at the base with acute, not ciliate acuminate, apices and with more than twice as many main nerves. The leaflets of the former are moreover quite glabrous at all stages, while in this the lower surface of the young leaflets is puberulous and lepidote.
6. **TiENIOCHLiENA, Hook. f.**


**TiENIOCHLiENA Griffithii**, Hook. fil, in Benth. and Hook. Gen. Pl. I, 434; f1. Br. Ind. II, 55. Young branches puberulous, and with pale brown lenticels; all parts except the inflorescence quite glabrous. *Leaflets* coriaceous, the terminal largest, elliptic to ovate-elliptic, with sub-acute slightly bifid apices, slightly narrowed to the rounded base, the edges slightly sub-revolute when dry; both surfaces shining, the lower reticulate; main nerves 4 or 5 pairs, the lower pair sub-marginal, all curved upwards, prominent on the lower and depressed on the upper surface; the petiolules of all jointed, 15 in. long; length of the terminal leaflets 5 to 6·5 in., the laterals smaller. *Panicles* (fide Sir J. D. Hooker) "2 to 3 in. long, fascicled, densely pubescent, slender. *Flowers* rotate, 33 in. in diam. *Segments of the calyx* oblong, pubescent, recurved in flower. *Petals* twice as long, linear, dilated upwards, glabrous; filaments short, subulate. *Follicles* 2 or 3, 5 to 1 in. long, obtuse, densely pubescent, valves coriaceous. *Seed* short, slightly compressed, testa black, arillus small."

Malacca; Griffith, Maingay, No. 497.

7. **Cnestis, Juss.**

Scandent shrubs or trees. *Leaves* unequally pinnate; leaflets many, quite entire. *Flowers* in racemes, tomentose, rarely panicked, polygamous or dioecious, rotate. *Sepals* 5, valvate or imbricate at the tip, spreading in fruit. *Petals* 5, shorter or longer than the calyx. *Stamens* 10, free. *Ovaries* 5-7, sessile; styles short, stigmas capitellate. *Capsules* 1-3, kidney-shaped, cylindric, curved or waved, pubescent, often villous or clothed with rigid hairs within. *Seed* with a thin arillus, albumen
fleshy, cotyledons thin.—Distrib. Tropical Asia and Africa; species about 17.

_Cnestis ramiiflora_, Griff. Notul. IV, 432. A small tree or a climber, young branches, rachises of leaves, under surfaces of leaflets and inflorescence more or less softly rusty-tomentose. Leaves 8 to 15 in. long; leaflets 19 to 31, sub-sessile, narrowly oblong, rarely slightly obovate, obtuse or sub-acute; the base broad, rounded or minutely cordate; upper surface sparsely adpressed-pubescent or glabrescent, the nerves pubescent; main nerves 4 or 5 pairs, spreading, faint; length 1:25 to 3 in., breadth 1'4 to 1'5 in. Racemes much shorter than the leaves, in axillary fascicles. Female flowers about 35 in. in diam., the males smaller. Sepals narrowly oblong, obtuse, pubescent on both surfaces. Petals similar in shape to the sepals but sometimes longer, glabrous. Stamens much shorter than the sepals, the filaments glabrous. Disc and Ovaries 5, tomentose, styles short. Follicles 1 to 3 from one flower, sessile, compressed, falcate, widest about the middle, much curved, rugose, rusty-pubescent; the pericarp very thick, woody, lined inside with a dense layer of sericeous tomentum, 1'5 to 1'75 in. long and 8 in. broad. Seed broad, compressed, the testa and arillus thin. Kurz Journ. As. Soc. Beng. Vol. XLV, pt. 2, p. 216; For. Flora Burma, I, 329; Hook. fil. Fl. Br. Ind. II, 54. _C. flaminaea_, Griff. Notul. VI, 433. _C. platantha_, Griff. l. c. 434; Kurz l. c. _Cnestis foliosus_ and _C. igneus_, Planch. MSS. in Herb. Kew. Connarus foliosus, Jack in Wall. Cat. 8529. _C. igneus_, Wall. Cat. 8528. _Rouea dasiphylla_, Miq. Fl. Ind. Bat. Suppl. 528.

In all the provinces, a common plant.—Distrib. Burma, Sumatra, Philippine Islands.

A widely distributed plant and therefore presenting various forms, some of which (as the synonymy shows) have been regarded as species. The form which is most distinct is that which assumes the habit of a small tree; but its flowers and leaves are in no way different from those of the scandent forms. This was, however, kept separate by Kurz under the specific name _C. ramiiflora_ Griff.; while, for the scandent forms, he kept the name _C. platantha_, Griff.

Order XXXVIII. Leguminosae.

(By D. Prain.)

Herbs, shrubs or trees. Leaves stipulate and usually alternate, pinnate or digitate or simple, often stipellate, sometimes with the rachis ending in a bristle or tendril. Inflorescence axillary or leaf-opposed or terminal; usually simply racemose or paniced; bracts and bracteoles usually both present. Flowers usually irregular, hermaphrodite, rarely regular or polygamous. Sepals 5, combined or free, often unequal, sometimes arranged in two lips. Petals 5, rarely fewer by arrest, very
rarely 0, usually free and unequal. Stemens normally 10, perigynous or almost hypogynous, rarely fewer by arrest, or indefinite; filaments free or variously combined; anthers 2-celled, dehiscence almost always longitudinal. Ovary free, style simple, cylindric, usually decline; stigma capitate, terminal or oblique; ovules 1—∞ on the ventral suture. Fruit usually dry, a pod splitting open along both sutures, sometimes opening only along the ventral suture, sometimes continuous and indehiscent, sometimes separating into one-seeded indehiscent segments. Seeds usually exalbuminous; cotyledons foliaceous or amygdaloid, with a straight or an inflexed accumbent radicle.

A very large order with three very natural suborders, including altogether about 8,000 species. Of these suborders the Papilionaceae are cosmopolitan in distribution, the Caesalpinioieae and the Mimoseae are confined to the tropics and to warm temperate regions.

Petals imbricate:
   Calyx segments united above the level of the disc;
the upper petal (standard) exterior (Papilionaceae):
   Stamens mon- or diadelphous:
   Pods dehiscent along both sutures:
   Leaves even-pinnate the rachis continued as a tendril or bristle ...
   Leaves simple, digitate or odd-pinnate:
   Leaves simple sessile, or digitately 3–7-foliate; stamens monadelphous, anthers dimorphic ...
   Leaves pinnately 3-foliate, rarely (Clitoria) 5–7-foliate or (Flemingia) petioled 1-foliate or digitately 3-foliate and then with 2-adelphous stamens; when stamens 1-adelphous, the upper filament attached to the others at its base ...
   Leaves 5–∞-foliate, or if 1–3-foliate (Tephrosia) with partially monadelphous stamens and uniform anthers, or (Indigofera) with 2-adelphous stamens, apiculate anthers and basifixed hairs; when stamens monadelphous the upper stamen free at its base ...
   Pods indehiscent or opening only along lower suture; (leaves, except Arachis, odd-pinnate):
   Pods not segmented, always quite indehiscent; leaves all odd-pinnate ...
   Pods breaking into 1-seeded indehiscent segments, or if dehiscent (Desmodium in part) only opening along lower suture; if not segmented (Arachis) with leaves even-pinnate; (segment solitary in Phylacium) ...
Stamens free ...

I. Vicieae.
II. Genisteae.
III. Phaseoleae.
IV. Galegeeae.
V. Dalbergieae.
VI. Hedysaroeae.
VII. Sophoreae.
Calyx segments free to the level of the disc (except Bauhinieæ); the upper petal interior (Cæsalpinieæ):—

Leaves simple or simply pinnate:—

Anthers basifixed ... ... ... VIII. Cassieæ.

Anthers versatile:—

Petals 5:—

Calyx gamosepalous or valvately partite ... IX. Bauhinieæ.

Calyx lobes free imbricate ... ... X. Cynometreæ.

Petals fewer than 5 (≤ 1 or 1 or 0) ... XI. Amherstieæ.

Leaves 2-pinnate ... ... ... XII. Cæsalpinieæ.

Petals valvate (Mimoseæ):—

Calyx teeth imbricated ... ... ... XIII. Parkieæ.

Calyx valvate:—

Stamens 5 or 10:—

Anthers glandular ... ... ... XIV. Adenantherææ.

Anthers not glandular ... ... ... XV. Eumimoseæ.

Stamens ∞ :—

Filaments free ... ... ... XVI. Acacieæ.

Filaments united ... ... ... XVII. Ingeæ.

A. Suborder I. Papilionaceæ. Calyx segments united beyond the disc. Petals imbricated, the upper external. Radicle inflexed accumbent or, rarely, very short and straight.

Tribe I. Vicieæ. Dwarf herbs or climbers. Leaves usually even-pinnate, the petiole produced in a spine or tendril, leaflets entire ex-stipellate; stipules often foliaceous. Flowers solitary or racemose. Stamens diadelphous (9+1). Pod dehiscent.

1. Abrus.


2. Crotalaria.

Tribe III. Phaseoleæ. Climbing or creeping herbs, rarely erect and shrubby, very rarely trees. Leaves pinnately 3-foliolate, rarely 1- or 5–7-foliolate, leaflets entire or lobed, almost always stipellate. Bracts 2 opposite persistent stipular or caducous. Stamens monadelphous, but if so the upper filament always free at the base; or diadelphous (9+1) by more or less complete detachment of the upper; anthers uniform very rarely (Mucuna) 2-morphous. Pod dehiscent.

Leaves gland-dotted beneath ... ... ... ... A. Cajanææ.

Leaves not gland-dotted beneath:—

Style bearded and bracts very small or deciduous ... ... ... B. Euphasoleææ.

Style beardless, or if bearded (Clitoria) with bracts persistent:—

Rachis of inflorescence not swollen at nodes (style bearded in Clitoria) ... ... ... ... ... ... C. Glycineææ.
Rachis of inflorescence nodose:—
Upper stamen subconnate with the others and petals subequal ... ... ... ... ... D. Dioecex.
Upper stamen free or if subconnate, then petals very unequal:—
Petals very unequal ... ... ... ... E. Erythrinex.
Petals of same length ... ... ... ... F. Galactiscex.

Sub-tribe A. Cajanese. Inflorescence racemose, rachis not swollen, or flowers subumbellate or solitary, bracts usually membranous caducous, bracteoles 0; petals of subequal length; upper stamen free; style bearded, stigma terminal; leaves gland-dotted at least beneath; stipels small, sometimes 0.
3. Flemingia. Ovules 2; pod turgid, leaves subdigitate or 1-foliolate.
4. Eriosema. Ovules 2; pod compressed, leaves pinnately 3-foliolate; funicle terminal on hilum.
5. Dunbaria. Ovules 4—∞; pod compressed, not deep-lineate between the seeds.
6. Atylosia. Ovules 4—∞; pod compressed, deep-lineate between the strophiolate seeds.
7. Cajanus. Ovules 4—∞; pod compressed, deep-lineate between the seeds; strophiole 0.

Sub-tribe B. Euphaseolese. Inflorescence racemose, rachis nodose, bracts small or caducous; petals equal in length or the keel long-beaked, or spirally twisted; upper stamen free; style longitudinally bearded along the inner face or less often simply pilose round the stigma.
9. Vigna. Keel not spiral; stigma oblique, style not flattened upwards; pods not lineate between seeds.
10. Pachyrhizus. Keel not spiral; stigma oblique globose on inner face of style flattened upwards; pod lineate.
11. Dolichos. Keel not spiral; stigma terminal; pod not winged.
12. Psophocarpus. Keel not spiral; stigma terminal; pod square, winged at the 4 corners.

Sub-tribe C. Glycinese. Inflorescence of axillary fascicles or racemes of solitary or geminate flowers on an unswellen rachis; standard not appendiculate or (in small flowered genera) minutely appendiculate at the base; upper stamen free or united at the base with the rest; style naked (bearded in Clitoria).
13. Clitoria. Bracts persistent; standard large not spurred; calyx-tube long; style bearded; stamens 10 fertile.
15. Teramnus. Bracts small decidous; standard small; stamens alternate, 5 fertile, 5 sterile.
Sub-tribe D. Dioclææ. Inflorescence racemose with rachis swollen at the nodes, bracts small or caducous; calyx usually 4-lobed from union of the two upper teeth, rarely very unequally 2-lipped; petals subequal in length; upper stamen free at the base, connate with the remainder above; style not bearded.


17. Pueraria. Calyx campanulate; pod linear, flat or narrow.

18. Canavalia. Calyx 2-lipped; with a large upper and small lower lip.

Sub-tribe E. Erythrineæ. Inflorescence usually racemose with rachis nodose, flowers showy with unequal petals—in some genera with very large standard longer than the wings and sometimes than the keel also, in others with standard much exceeded by the large cochleate keel; upper stamen free or united at the base with the remainder; style naked; bracts usually small, deciduous.

19. Mucuna. Keel longest, standard shorter than wings; anthers 2-morphous; climbers.

20. Strongylodon. Standard and keel equal and longer than wings; anthers uniform; climbers.

21. Erythrina. Standard longer than keel and wings; anthers uniform; armed trees. Pod sometimes dehiscent only at apex, sterile and indehiscent below.

Sub-tribe F. Galactiese. Inflorescence racemose with nodose rachis, more rarely amply paniculate; bracts small very deciduous; calyx usually 4-lobed, the two upper teeth connate; petals sub-equal in length; upper stamen free; style not bearded.

22. Spatholobus. Pod 1-seeded at the apex only and there partially dehiscent, sterile and indehiscent below.

Tribe IV. Galegeæ. Herbs never twining, erect shrubs, or less often trees or large woody climbers. Leaves odd-, very rarely even-pinnate without the rachis prolonged, leaflets ∞, or rarely 3-1, usually entire. Stamens 10, the lower 9 united as far as their middle or further in a sheath split along the upper side or less often closed in the middle, the upper sometimes free from the base, at others connate by its middle with the sheath, very rarely wanting; filaments filiform at the tips, anthers versatile uniform, or rarely somewhat dimorphous. Pod not segmented, 2-valved or if indehiscent usually small, 1-2-seeded or membranous inflated. Seeds rarely strophiolate.

Anthers with connective apiculate or gland-tipped ... ... A. Indigoferææ.

Anthers muticus:—

Racemes all axillary or from old nodes ... ... B. Robinieæ.

J. 11. 4
Racemes terminal, or leaf-opposed, or paniculate at the ends of branches ... ... ... ... C. Tephrosiæ.

Sub-tribe A. Indigoferæ. Herbs or shrubs, glandular punctate or not, usually hoary canescent, the hairs always fixed in the middle; racemes or spikes axillary; connective of anther produced in a gland or mucro; ovules usually ∞; pod 2-valved.

23. Indigofera.

Sub-tribe B. Robinieæ. Herbs, erect or rarely climbing shrubs, or trees; racemes all axillary or fasciculate on old nodes; upper stamen usually free; anthers muticous; ovules ∞; style usually rigid; pod usually 2-valved, flat or only turgid opposite the seeds.


Sub-tribe C. Tephrosiæ. Herbs, erect or large climbing shrubs, or trees; racemes terminal or leaf-opposed or panicled at the ends of branches, rarely arising from upper axils, or with the lower or all the pedicels geminate or fasciculate in the axils of leaves; anthers muticous; ovules usually ∞; style usually rigid; pod 2-valved.

25. Tephrosia. Leaves striate-veined; pod thin, early dehiscent.


Tribe V. Dalbergieæ. Trees or erect or lofty climbing shrubs. Leaves pinnately 5-∞-foliolate, very rarely 3- or 1-foliolate, usually exstipellate. Inflorescence various, paniculate, fascicled racemose, or cymose. Stamens all united in one sheath, entire or split along the upper side, or in two lateral half-sheaths from simultaneous fission along both upper and lower sides, or the upper stamen free the rest connate; anthers usually uniform. Pod longer than the calyx, membranous, coriaceous, woody or drupaceous, indehiscent and not segmented.

Leaflets opposite ... ... ... ... ... A. Lonchocarpæ.
Leaflets alternate ... ... ... ... ... B. Pterocarpæ.

Sub-tribe A. Lonchocarpæ. Leaflets opposite; pod not drupaceous; seeds usually transverse or attached by a lateral hilum, not pendulous.

27. Pongamia. Pod coriaceous, not winged; calyx subtruncate.

28. Derris. Pod coriaceous or membranous, winged; calyx subtruncate.

29. Kunstleria. Pod membranous not winged; calyx toothed.

Sub-tribe B. Pterocarpæ. Leaflets alternate; pod not drupaceous; seeds usually transverse or attached by a lateral hilum, not pendulous.

30. Dalbergia. Anthers small, terminal; pod oblong or linear.

Tribe VI. Hedysarèz. Herbs, undershrubs or shrubs sometimes twining or climbing, rarely trees. Leaves odd- or rarely even-pinnate, petiole if produced not cirrhate, leaflets 3–∞, rarely digitately 3–4-foliolate, 1-foliolate or simple. Stamens diadelphous, 9 connate in a sheath as high as their middle or higher and split along the upper side, the upper being free, or monadelphous in a sheath split along the upper side, or diadelphous in two equal lateral half-sheaths (split simultaneously along upper and lower sides) or rarely all free; filaments free at their tips, filiform or dilated upwards; anthers uniform versatile, or rarely 2-morphous, the alternate larger subbasifixed. Pod indehiscent separating into 1-seeded segments, rarely unsegmented (Arachis), or by abortion or organically (Phylacium) 1-seeded. Seeds rarely strophiolate.

Stamens monadelphous, anthers 2-morphous; leaflets even-pinnate or digitate, exstipellate

... ... A. Stylosantheæ.

Stamens diadelphous, anthers uniform; leaflets odd-pinnate or simple.

Leaflets exstipellate, staminal phalanges 5 + 5 ... ... B. Aeschynomenæ.

Leaflets stipellate, staminal phalanges 9 + 1 ... ... C. Desmodieæ.

Sub-tribe A. Stylosantheæ. Herbaceous approaching undershrubs, often viscid; leaves exstipellate, leaflets few; flowers spicate, capitately or rarely subracemose, in terminal spikes, or axillary by suppression of floral branches; bracts 1-foliolate and 2-stipulate, or stipuloid from suppression of the leaf-element; stamens monadelphous; anthers 5 oblong basifixed, 5 alternate shorter versatile.

32. Arachis. Calyx-tube long filiform; leaves even-pinnate; pod not segmented ripening underground.

33. Zornia. Calyx-tube not elongated; leaves digitately 2–4-foliolate.

Sub-tribe B. Aeschynomenæ. Herbs, undershrubs or shrubs; leaves pinnate, leaflets ∞, or rarely 1–3, exstipellate; flowers usually in few-fld. axillary racemes, rarely in axillary fascicles or subcymose; keel obtuse or beaked, incurved; wings usually transversely folded; stamens (in Malayan genera) connate in two lateral phalanges; style filiform.

34. Smithia. Pod folded within calyx.

35. Ormocarpum. Pod straight exserted, joints oblong; ovary sessile.

36. Aeschynomene. Pod straight exserted, joints quadrate or suborbicular; ovary stipitate.

Sub-tribe C. Desmodieæ. Herbs, rarely twining, or undershrubs, less often shrubs, very rarely trees; leaves pinnately 3-foliolate or 1-foliolate the distal leaflets 2-stipellate the lateral leaflets opposite, each 1-stipellate, rarely 5–7-foliolate; stipules often striate; flowers in pairs
along the rachis of a raceme, rarely fasciculate or solitary, the racemes terminal or casually at the same time also axillary; standard usually cuneate at the base, wings as long as or longer than keel and usually adherent to its base; upper stamen free or coherent with the rest from the base upwards; pod sometimes (*Phylacium*) 1-jointed, sometimes (*Desmodium § Nicholsonia*) opening along the lower suture.

37. *Phylacium*. Ovary 1-ovuled; pod 1-seeded.
38. *Uraria*. Ovary 2- or more-ovuled; pod folded inside calyx; calyx-tube short, teeth long, not accrescent.
39. *Lourea*. Ovary 2- or more-ovuled; pod folded inside calyx; calyx-tube large, teeth small, accrescent in fruit.
40. *Alysicarpus*. Ovary 2- or more-ovuled; pod straight exserted; joints of pod coriaceous as thick as they are long and broad.
41. *Desmodium*. Ovary 2- or more-ovuled; pod straight exserted; joints of pod membranous or, if coriaceous (§ *Dendrolobium*), broader than their thickness, and, if as thick as they are broad, (§ *Scorpiurus*) then much longer than broad.

**Tribe VII. Sophoreae.** Trees or tall shrubs, very rarely sub-herbaceous or large climbers. *Leaves* pinnately 5—∞-foliolate or 1-foliolate. *Corolla* papilionaceous or almost regular the upper petal outer in bud, the lower ones occasionally absent. *Stamens* 10, free or very slightly connate at the base. *Pod* indehiscent unsegmented, or 2-valved. *Radicle* straight, incurved or inlexed.

42. *Sophorá*. Pod moniliform elongated, indehiscent.

**B. Suborder II. Cesalpiniae.** Calyx-segments partite to the disc, very rarely (some Bauhiniae) gamosepalous. *Petals* imbricated the uppermost internal. *Radicle* straight or, rarely, slightly oblique. *Stamens* almost always free.

**Tribe VIII. Cassiae.** Trees, rarely shrubs or undershrubs. *Leaves* odd- or even-pinnate. *Calyx* segments or sepals 5, rarely 4–3, divided to the disc, imbricate or rarely subvalvate. *Petals* 5 or fewer or 0. *Anthers* erect, thick, basifixed, dehiscence longitudinal or 2-porose; or rarely dorsifixed and 2-porose. *Ovary* or stipe free inside calyx-tube. *Ovules* 2—∞, rarely 1. *Seeds* albuminous.

44. *Cassia*. Sepals 5, petals 5; stamens 10 or 5, leaves even-pinnate.
45. *Koompassia*. Sepals 5, petals 5; stamens 5; leaves odd-pinnate.
46. *Dialium*. Sepals 5, petals 2 or 1 or 0, stamens 2; leaves odd-pinnate.

**Tribe IX. Bauhiniae.** Woody tendril-bearing climbers, rarely trees. *Leaves* simple, entire or 2-lobed; rarely 2-foliolate. *Calyx* gamo-
sepalous above the disc or valvately partite, the tip 5-toothed or less often 5-lobed with teeth or lobes imbricated. Petals 5. Anthers versatile. Ovary with stalk free or adnate to calyx-tube. Ovules 2–∞. Seeds albuminous.

47. Bauhinia.

TRIBE X. CYNOMETREE. Trees. Leaves even-pinnate, 2–∞-folio-late. Calyx lobes divided to the disc, imbricate or valvate. Petals 5 or fewer or 0. Anthers versatile. Ovary 1–2-ovuled. Flowers usually small.

48. Cynometra.

TRIBE XI. AMHERSTIÆ. Trees. Leaves even-, very rarely odd-pinnate, 2–∞-, rarely 1-foliolate. Calyx lobes divided to the disc, imbricate or valvate. Petals 5 or fewer or 0. Anthers versatile. Ovary 3–∞-ovuled, stalk adnate to the disc-bearing tube of calyx.

49. Tamarindus. Petals 3 perfect; stamens 3 perfect.

50. Sindora. Petal 1; leaves very coriaceous; calyx-segments sub-valvate.

51. Afzelia. Petal 1; leaves papery; calyx-segments much imbricated.

52. Saraca. Petals 0; leaflets even-pinnate.

53. Crudia. Petals 0; leaflets alternate odd-pinnate.

TRIBE XII. EUCESALPINIÆ. Trees, shrubs or large climbers. Leaves all 2-pinnate or, rarely, some leaves simply pinnate others 2-pinnate. Calyx lobes divided to the disc. Petals usually 5 slightly unequal. Anthers versatile. Ovary 2–∞-, rarely 1-ovuled, the stalk free in the calyx tube.

54. Peltophorum. Calyx-lobes subequal; pod winged along both sutures; stigma large peltate.

55. Casalpinia. Calyx-lobes unequal, the lowest large hooded; pod wingless.

56. Mezoneuron. Calyx-lobes unequal, the lowest large hooded; pod winged along upper suture.

57. Pterolobium. Calyx-lobes unequal, the lowest large hooded; pod samaroid, winged at the apex only.

C. SUBORDER III. MIMOSEÆ. Flowers regular small. Calyx gamosepalous or valvately partite. Petals valvate, usually connate below the middle. Stamens free or monadelphous.

TRIBE XIII. PARKIÆ. Trees. Leaves 2-pinnate. Calyx teeth short, imbricate. Stamens as many or twice as many as petals.

58. Parkia.
TRIBE XIV. ADENANTHEAE. Herbs, climbing shrubs or trees. Leaves 2-pinnate. Calyx valvate. Stamens twice as many, rarely only as many, as the petals. Anthers tipped by a stipitate gland.

59. Entada. Inflorescence a long spike; woody climbers with very large pods and seeds.

60. Adenanthera. Inflorescence a long narrow raceme; trees.

61. Neptunia. Inflorescence capitate; aquatic floating or creeping herbs.

62. Xylia. Inflorescence capitate; tall trees.

TRIBE XV. EUMIMOSEAE. Herbs, erect or climbing shrubs, or trees. Leaves 2-pinnate. Flowers 4–5-merous, rarely 3- or 6-merous. Calyx valvate or pappus-like, or 0. Stamens twice as many, or only as many, as the petals, free. Anthers not gland-tipped; pollen-granules many, distinct.

63. Leucaena. Pod opening through the sutures, valves continuous; shrubs or small trees.

64. Mimosa. Pod with persistent sutures; valves segmented; shrubs or undershrubs.

TRIBE XVI. ACACIEAE. Trees, shrubs or woody climbers. Leaves 2-pinnate. Flowers 4–5-merous, rarely 3-merous or 6-merous. Calyx valvate, very rarely 0. Stamens indefinite, often very numerous, free, or with the inner rows slightly subconnate at the base into a shallow ring; pollen-masses 2–6.

65. Acacia.

TRIBE XVII. INGEAE. Trees. Leaves 2-pinnate sometimes 2–3-geminate, rarely simply pinnate. Flowers usually 5-merous. Calyx valvate. Stamens indefinite often numerous, rarely 10–15, united in a tube at the base or sometimes higher up; anthers small; pollen-masses 2–6.

66. Serianthes. Pod septate between the seeds, thick, woody, indehiscent; flowers large; trees.

67. Enterolobium. Pod septate between the seeds, spongy or fleshy, indehiscent; flowers small; trees.

68. Calliandra. Pod thin, straight with thickened sutures, dehiscing elastically; flowers small; trees or shrubs.

69. Albizzia. Pod thin, straight, dehiscent or indehiscent; flowers small; trees or shrubs.

70. Pithecolobium. Pod coriaceous, curved, indehiscent or dehiscing through lower suture, or fleshy and dehiscing by both sutures; flowers small; trees.
Sub-order I. Papilionaceae.

Herbs or shrubs (often climbing), rarely trees. Leaves simple or digitately or pinnately compound; usually stipellate rarely even-pinnate. Inflorescence various, often racemose. Flowers irregular, usually hermaphrodite, rarely regular. Sepals 5, united beyond the disc in a campanulate or tubular calyx with a truncate, 5-toothed or 5-lobed limb, or with limb 4-toothed by union of the two upper segments or 2-lipped by similar union of three lower. Petals 5 imbricate or rarely spreading, the upper (standard) outer, two lateral (wings) usually overlying and free from or attached about the middle to the two lower inner rarely free usually connate below in a curved sheath (keel); petals rarely subsimilar and subequal. Stamens inserted with the petals on a disc lining the base of the calyx, usually 10 diadelphous in a sheath of 9 connate next keel with 1 free next standard, rarely in 2 lateral sheaths of 5 each; sometimes 9 by abortion of upper filament, or 5 by abortion of alternate stamens; occasionally 10, monadelphous, very rarely 10, free; anthers usually dehiscing longitudinally. Embryo with radicle usually inflexed, accumbent. Albumen 0 or very scanty.

Stamens mon- or di-adelphous: —
Pods dehiscent by both sutures: —
Leaves even-pinnate the petiole ending in a bristle; stamens 9, the tenth abortive ... ... ... 1. Abrus.
Leaves odd-pinnate or simple, or digitately 3- or more-foliolate: —
Leaves simple or digitately compound; (pods turgid): —
Leaves simple, sessile, or digitately 3-7-foliolate; stamens monadelphous; seeds many ... ... ... 2. Crotalaria.
Leaves digeritately 3-foliolate or, if 1-foliolate, petioled; stamens diadelphous; seeds 2 ... ... ... 3. Flemingia.
Leaves pinnately compound: —
Leaves 3-foliolate (5-7-foliolate in one species of Clitoria) (Phaseolae except Flemingia): —
Pods dehiscent from end to end: —
Leaves glandular beneath; (pod compressed; stamens 9 + 1) (Cajanese except Flemingia): —
Ovules 2; the 2 upper calyx-lobes almost free; (stigma small terminal; seed not strophiolate,) funicle attached to end of hilum ... ... ... 4. Eriosema.
Ovules 4 or more; the 2 upper calyx-lobes much connate; funicle centric: —
Climbers; stigma small terminal; seeds strophiolate or sub-strophiolate: —
Pod linear acuminate, hardly depressed between the seeds; funicle expanded but seeds not distinctly strophiolate ... ... ... 5. Dunbaria.
Pod oblong obtuse, deeply transversely lineate between the seeds; strophiole large ... 6. *Atylosia*.

Woody undershrubs; stigma dilated, oblique; seeds not strophiolate; (pod acute deeply transversely lineate between the seeds) 7. *Cajanu*s.

Leaves not glandular beneath, (leaflets stipellate; climbing species except *Erythrina*):

Style bearded below the stigma; (stamens 9 + 1) (*Epaphoseolex* + *Clitoria*):

Stigma oblique:
- Keel spirally twisted ...
- Keel not spiral:
  - Style filiform ...
  - Style flattened upwards ...

Stigma terminal:
- Petals equal in length:
  - Pod flattish, not winged ...
  - Pod square, 4-winged ...
- Petals very unequal, standard large; leaflets sometimes 5-7 ...

Style not bearded below the stigma:

Nodes of racemes not swollen (*Glycineae* except *Clitoria*):
- Petals very unequal, standard large; stamens 9 + 1, all fertile ...
- Petals subequal, all small; stamens monadelphous, 5 fertile, 5 alternate sterile ...

Nodes of racemes swollen:
- Stamens monadelphous; petals equal (*Diocleae*):
  - Upper lip of calyx not projecting:
    - Pod oblong, turgid, 1-2-seeded ...
    - Pod linear, flat, many-seeded ...
  - Upper lip of calyx projecting ...
  - Stamens diadelphous (9 + 1); petals very unequal (*Erythrineae*):
    - Anthers dimorphous; keel exceeding wings and standard ...
    - Anthers uniform:
      - Keel and standard equal, wings very short ...
      - Keel and wings both shorter than standard; *armed trees* ...

Pods dehiscent at the seed-bearing apex only, elsewhere seedless and indehiscent:


Unarmed climbers; petals equal ...

22. *Spatholobus*. 
Leaves pinnately 5-\(\infty\)-foliolate; (1-foliolate in some species of \textit{Tephrosia}):—

Anthers apiculate; hairs centrally fixed; (stamens diadelphous, 9+1) ... ... 23. \textit{Indigofera}.*

Anthers obtuse; hairs basifixed:—

Pods transversely septate between the seeds; (stamens diadelphous, 9+1) ... ... 24. \textit{Sesbania}.

Pods not septate; (stamens 9+1, the upper often united in the middle to the staminal sheath):—

Leaflets closely parallel-veined; pod thin early dehiscent; \textit{leaves sometimes 1-3-foliolate} ... 25. \textit{Tephrosia}.

Leaflets reticulate-veined; pod thick, tardily dehiscent ... ... ... 26. \textit{Millettia}.

Pods indehiscent or, rarely, opening (some \textit{Desmodia}) along the lower suture:—

Pod not segmented; (always indehiscent) :—

Leaves odd-pinnate; trees or strong woody climbers:—

Leaflets opposite:—

Stamens monadelphous, the vexillary filament united in the middle to the staminal sheath; pod thickly coriaceous or woody; (calyx truncate):—

Pod wingless ... ... ... ... 27. \textit{Pongamia}.

Pod winged ... ... ... ... 28. \textit{Derris}.

Stamens quite diadelphous, 9+1:—

Pod winged; calyx truncate ... ... ... 28. \textit{Derris} § \textit{Aganope}.

Pod wingless; calyx toothed ... ... ... 29. \textit{Kunstleria}.

Leaflets distinctly alternate:—

Flowers small, pods narrow ... ... ... 30. \textit{Dalbergia}.

Flowers large, pods suborbicular ... ... ... 31. \textit{Pterocarpus}.

Leaves even-pinnate, the rachis ending in a bristle, \textit{herbs with hypogaeal fruits} ... ... ... 32. \textit{Arachis}.

Pod of several (rarely 1) indehiscent 1-seeded segments (in \textit{Desmodium} § \textit{Nicholsonia} dehiscing along the lower suture) (\textit{Hedyssarum} except \textit{Arachis}):—

Leaves exstipellate:—

Stamens monadelphous, anthers dimorphous; leaves digitately 2-4-foliolate; (joints of pod muricated) ... ... 33. \textit{Zornia}.

Stamens diadelphous in 2 bundles of 5 each; anthers uniform; leaves pinnate (\textit{Aeschynomene}) ; (joints of pod papillosely or weakly muricated, rarely smooth):—

Leaves even-pinnate, end-leaflet replaced by a bristle; pod folded together within the calyx ... ... ... 34. \textit{Smithia}.

Leaves odd-pinnate; pod straight exserted:—

Calyx 5-toothed; ovary sessile, ovules few, joints of pod oblong ... ... ... ... 35. \textit{Ormocarpum}.

* None of the simple-leaved or subdigitately-leaved species of \textit{Indigofera} are reported from the Malay Peninsula.

\textit{J. ii. 5}
Calyx deeply 2-lipped; ovary stalked, ovules many; joints of pod suborbicular or quadrate... 36. Aeschynomene.
Leaves stipellate; (stamens 9 + 1, anthers uniform):—
Ovary 1-ovuled; (leaves pinnately 3-foliolate) ... 37. Phylacium.
Ovary 2- or more-ovuled:—
Pod folded together within the calyx:—
Calyx-teeth setaceous, not accrescent ... 38. Uraria.
Calyx-teeth lanceolate, accrescent ... 39. Lourea.
Pod straight exserted:—
Joints of pod coriaceous about as thick as they are broad and long ... ... ... 40. Alysicarpus.
Joints of pod thin, or if coriaceous (§ Dendrolobium) much broader than thick, and if as thick as broad (§ Scorpiurus) much longer than broad; opening along lower suture in § Nicholsonia and in § Pleurolobium ... ... ... 41. Desmodium.
Stamens free:—
Stigma terminal, pod long moniliform ... ... ... 42. Sophora.
Stigma oblique, pod short turgid ... ... ... 43. Ormosia.

1. Abrus Linn.

Climbing shrubs. Leaves with numerous deciduous leaflets. Flowers small, in dense racemes on axillary peduncles or short branches. Calyx campanulate, equal; teeth very short. Corolla much exserted; standard ovate, acute, adhering below to the staminal tube; wings narrow; keel arcuate. Stamens 9, united in a tube slit above, the tenth absent; anthers uniform. Ovary subsessile, many-ovuled; style short, incurved, beardless, stigma capitata. Pod oblong or linear-oblong, flat or turgid, moderately firm, thinly septate. Species 5; cosmopolitan in the tropics.

Pod oblong turgid 3-5-seeded ... ... ... ... 1. A. precatorius.
Pod linear flat incurved 8-12-seeded ... ... ... ... 2. A. pulchellus.

Andamans; very common from the Coco Group to Little Andaman; Barren Island. Nicobars; common. Penang; Wallich! Curtis! Pang-kore; Scortechini! Pahang; Ridley! DistriB. Cosmopolitan in the tropics.


Andamans; Coco Group, Prain! Port Blair, common. Perak; Kunstler 1023! Scortechini 630! DistriB. S. Africa and S.-E. Asia.

2. Crotalaria Lind.

Herbs or shrubs with simple or digitately 3-foliolate rarely 5-7-foliolate leaves. Flowers often large and showy in terminal or leaf-opposed racemes. Calyx with short tube, and with lanceolate or linear teeth free or somewhat connate in two lips. Corolla equalling or exceeding the calyx; standard rounded or ovate short-clawed; wings obovate or oblong shorter than standard; keel as long as wings, its petals united, much incurved and beaked. Stamens monadelphous in a sheath split dorsally, anthers dimorphous, alternately on short filaments versatile and on longer basifixed. Ovary sessile or, rarely, stipitate linear usually many-ovuled; style long, abruptly incurved at the base, bearded above, stigma oblique small. Pod sessile or, rarely, supported on a gynophore oblong or linear, straight, turgid or inflated, continuous within, 2-∞-seeded. Species about 250, widespread in tropical and sub-tropical regions.

Leaves simple:—

Stipules not longer than the calyx:—

Pods not longer than the calyx:—

Flowers in elongated racemes, petals blue; stipules minute ... 1. C. alata.

Stipules, if present, not decurrent:—

Flowers in short few-fl. heads, petals pale yellow;

Stipules 0 ... 2. C. sessiliflora

Stipules recurved as a persistent wing to the stem ... 1. C. alata.

Flowers in long-stalked racemes, petals yellow; stipules minute ... 2. C. sessiliflora

Flowers in short few-fl. heads, petals pale yellow;

Stipules 0 ... 3. C. chinensis.
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Pods much longer than the calyx:—  
Pods glabrous, flowers yellow:—  
Stems diffuse, racemes lateral ... ... 4. *C. ferruginea*.  
Stems erect, racemes terminal:—  
Branches stout striated, glabrous or nearly so;  
leaves stipellate:—  
Leaves obtuse or retuse, bracts and stipules  
small subulate ... ... 5. *C. retusa*.  
Leaves acute, bracts and stipules large acute  
and leafy ... ... ... 6. *C. sericea*.  
Branches slender terete, densely silky; leaves  
extipellate ... ... ... 7. *C. albida*.  
Pods hirsute, flowers usually blue, racemes lateral  
as well as terminal ... ... ... 8. *C. verrucosa*.  

Leaves compound:—  
Leaves 3-foliolate:—  
Pods small, obliquely subglobose, very few-seeded  
(hirsute) ... ... ... 9. *C. uncinella*.  
Pods large, cylindric, many-seeded:—  
Pods hirsute (narrowly cylindric almost sessile) ... 10. *C. incana*.  
Pods glabrous:—  
Pods narrowly cylindric, almost sessile ... 11. *C. Saltiana*.  
Pods oblong, supported on a long gynophore ... 12. *C. laburnifolia*.  
Leaves usually 5-foliolate (at times 3-, 4-, or even 6-7-  
foliolate ... ... ... 13. *C. quinquefolia*.  

1. **Crotalaria alata** Ham. in Roxb. Hort. Beng. 98. A suberect  
undershrub 1-2 feet high; stem and leaves below clothed with short  
silky pubescence. *Leaves* 1-3 in. long, simple, oblong-ovate or obovate,  
subacute or obtuse, membranous, the stipules with lanceolate-dentate  
points forming decurrent wings on the stem for nearly the whole length  
of the nodes. *Racemes* 2-3-fld., on elongated often leafy lateral pe-  
duncles; bracts small, persistent, ovate, acuminate. *Calyx* densely silky,  
.35 in. long, tube campanulate, bracteolate. *Corolla* pale-yellow hardly  
exserted. *Pod* distinctly stalked 1.25-1.75 in. long, linear-oblong,  
glabrous, 30-40-seeded. Don, Prodr. 241; Roxb. Flor. Ind. III, 274;  
DC. Prodr. II 124; Wall. Cat. 5356; Benth. in Hook. Lond. Journ. II,  

**Singapore**; **Changi,** *Hullett! Ridley!* **Distrib.** **Himalaya; Indo-  
China; Malay Islands.**  

erect annual 1-2 feet high, simple or sparingly fastigiately branched,  
stem and leaves below shortly silky. *Leaves* 2-6 in. long, simple linear  
or lanceolate narrowed to both ends thickly herbaceous, quite glabrous  
above, the stipules setaceous very small. *Racemes* 1-8 in. long, 5-20-

MALAYA PENINSULA; Pahang, Ridley! NICOBARS; Kamorta, Kurz! DISTRIB. Japan, China, Indo-China, Philippines, Java; Himalayas from Assam westward; Panjab, Central India and Behar.

The specimens collected by Mr. Kurz in Kamorta having yellow flowers were referred by him to *C. calycina*. An examination however shows that they are not *calycina* but *sessiliflora*. A gathering from Java has been issued from Mus. Leyden, also under the name *C. calycina*; this probably indicates that in Java as in the Nicobars, *C. sessiliflora* may have yellow flowers.

3. CROTALARIA CHINENSIS Linn. Sp. Pl. ed. 2, 1003. An annual 1−2 feet high, usually breaking into several stoutish ascending branches from near the base, laxly silky with reddish brown hairs. *Leaves* 1−2 in. long, simple, linear to oblanceolate with rounded base and obtuse or subacute apex, thickly herbaceous laxly silky on both surfaces; stipules 0. *Racemes* densely capitulate 3−6-flld., all terminal, bracts and bracteoles linear, persistent. *Calyx* laxly silky, 35−5 in. long, tube very short, teeth all long acute, the upper lanceolate, lower linear. *Corolla* pale-yellow, glabrous, not exserted. *Pod* sessile 5 in. long, not exserted, oblong, glabrous, 15−20-seeded. DC. Prodr. II, 130; Benth. in Hook. Lond. Journ. II, 566; Miq. Flor. Ind. Bat. I, 339; Bak. in Flor. Brit. Ind. II, 73.

Perak; Larut river; on rocks in the stream, Wray! DISTRIB. China, Indo-China, Philippines; India; Malay Islands.

4. CROTALARIA FERRUGINEA Grah. in Wall. Cat. 5398. A diffuse copiously branching herb with a perennial rootstock, finely silky or shaggy, branches 1−5−2 feet long. *Leaves* very short petioled, herbaceous 1−5−2 in. long, 5−75 in. across, simple, ovate-oblong obtuse paler beneath; stipules persistent foliaceous deflexed or spreading, 25 in. long; petioles 15 in. long. *Racemes* laxly 2−8-flld. leaf-opposed, 2−4 in. long, bracts linear 2 in. long often deflexed, pedicels very short. *Calyx*

Pahang; Katepong Pekan, Ridley! Distrib. India, Indo-China, China; Malay Archipelago.

Mr. Ridley has kindly sent the writer for inspection, from the Singapore Herbarium, the only specimen of this species hitherto collected in the Malayan Peninsula. The plant is, however, quite common in Sumatra and Java and may yet be found elsewhere in the Peninsula.


Malay Peninsula; Malacca, Maingay! Hervey! Pahang, Ridley! Andamans; Port Blair, very common; having been introduced as a plant of native gardens, it has now run wild throughout the settlement. —Distrib. General in the tropics.

6. Crotalaria sericea Retz, Obs. V, 26. A robust undershrub 3-4 feet high with stout striated almost glabrous branches. Leaves 2-6 in. long, simple, short petioled, thickly herbaceous, glabrous above, finely silky beneath, oblong-oblancoolate acute or subacute at apex, cuneate at base; stipules large leafy persistent. Racemes terminal elongated 10-12 in. long, laxly 20-50-fl., bracts ovate leafy persistent, pedicels longer than calyx. Calyx almost glabrous 5 in. long, tube short campanulate half the length of the lanceolate teeth. Corolla 8 in. long, much exserted, yellow with purple tinge. Pod glabrous linear-oblong 1-2 in. long, distinctly stalked 20-30-seeded. DC. Prodr. II,
7. Crotalaria albida Heyne ex Roth, Nov. Sp. Pl. 333. An undershrub 1–2 feet high with numerous firm slender terete obscurely silky branches. Leaves simple linear or oblanceolate obtuse firm shining gland-dotted glabrescent above, thinly silky beneath, 1–2 in. long '2–25 in. wide, petiole '1 in., stipules 0. Flowers in terminal, or rarely lateral, laxly 6–20-fld. racemes, 2–4 in. long; bracts linear '05–'1 in. long; pedicels '15–'2 in. long slender adpressed-puberulous. Calyx turbinate '25 in. long, in fruit '35 in. long, thinly silky; teeth long the 3 lower linear acuminate, the 2 upper broader often subobtuse. Corolla pale yellow glabrous '3 in. long. Pod glabrous sessile, oblong-cylindric '5–'6 in. long, half as long again to twice as long as calyx; seeds 6–12. W. & A. Prodr. 189; Bak. in Flor. Brit. Ind. II. 71. C. montana Roxb. Hort. Beng. 54; Flor. Ind. III, 265; W. & A. Prodr. 182. C. scoparia Wall. Cat. 5418. C. parva Graih. in Wall. Cat. 5402. C. punctata Graih. in Wall. Cat. 5401 A, 5401 C. C. tennis Wall. Cat. 5403.

Selangor; roadides at Kwala, Ridley 7293! Distrib. Throughout South Eastern Asia.

A species perhaps only recently introduced to the Malay Peninsula from India; in India and Indo-China the plant is very common in grassy places.

MALAY PENINSULA; Perak, *Scortechini*! Malacca, Griffith. Pahang, Ridley!


First described by Lamarck from specimens received by him from Mauritius; probably the plant had been there introduced; at all events Mr. Baker does not cite it, even as a stranger, in his *Flora of Mauritius*. Afterwards described, independently, by Roxburgh, from specimens reared in the Calcutta garden, and therefore, though issued by Wallich, deliberately excluded from the Indian Flora by Wight and Arnott, who have been in this followed by Baker in the *Flora of British India*. Its discovery in Pahang by Mr. Ridley, in whose list it stands as *Rhynchosia aurea*, and in Malacca where it is apparently quite common, shows that after all it deserves to be included in the Indian Flora.

Penang; Curtis! Distrib. Cosmopolitan in the tropics, originally American.

There is one specimen of this in Mr. Curtis' own Herbarium. No other collector has sent it from Malaya.

11. Crotalaria Salitiana Andr. Bot. Rep. t. 648. An erect shrub 2-4 feet high with robust smooth or slightly sulcate thinly silky branches. Leaves compound, 3-foliolate, petioles 2-3 in. long, leaflets membranous, glabrous above very sparingly silky below, terminal 1-5-2-5 in. long, larger than lateral, all obtuse cuneate at base; stipules minute, deciduous. Racemes terminal and occasionally also lateral, usually 1-1-25 feet long, laxly 20-50-fld.; bracts minute. Calyx 25 in. long, thinly silky; teeth lanceolate as long as campanulate tube. Corolla 6 in. long, exserted, yellow with purple stripes or pure yellow, glabrous. Pod subsessile deflexed, subrecurved puberulous when young, ultimately glabrous, cylindric, 1-5 in. long, 20-30-seeded. *C. striata* DC. Prodr. II, 131; Miq. Flor. Ind. Bat. 1. 346; Bak. in Flor. Brit. Ind. II, 84 (excluding the synonyms *C. Brownei* Bertero and *C. latifolia* Roxb.)

Malay Peninsula; Perak, Wray! Scortechini! Penang, King! Malacca, Maingay! Singapore, Kunstler! Pahang, Ridley.

Nearly related to, and at times mistaken for *C. Brownei* Bertero ex DC. in Prodr. II, 130 (*C. lanceolata* Roxb. Hort. Beng. 54 [nomen prius] nec Meyer; *C. latifolia* Roxb. ex Wall. MSS. in Hort. Calcutta) a native of the West Indies, but now occasionally met with as a spontaneous species in India. From *C. Salitiana*, *C. Brownei* differs in having more numerous lateral racemes, with flowers always close-set and racemes never exceeding 6 in., and in having much larger leaflets acute at apex as well as base and more densely silky underneath. The leaves of *C. Salitiana* are like those of the next species; of *C. Brownei* like those of *C. bracteata* and of *Priotropis cystisoides* for both of which species it has, at times, been mistaken.


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MALAY PENINSULA; Malacca, Griffith! Maingay! Hervey! Distrib. India; Malay Archipelago; Philippines.


MALAY PENINSULA; Kedah, Kunstler! Singapore, Huldet! Distrib. India; Indo-China; Malay Archipelago; Philippines.

3. Flemingia Roxb.

Shrubs, rarely herbs, with leaves digitately 3-foliolate or simple, gland-dotted below. Inflorescence various; pedicels very short, not bracteolate. Calyx-tube short; teeth narrow, acuminate, the lowest often the longest. Corolla little or not at all exserted; petals equal in length; keel obtuse or slightly rostrate. Stamens diadelphous; anthers uniform. Ovary subsessile, 2-ovuled; style filiform, beardless, stigma capitiate. Pod oblong, turgid, small, usually two-seeded; seeds not strophiolate, the funicle centrical. Species about 25; 3 Tropical African, the remainder Asiatic.

Leaves 1-foliolate; flowers in small cymes hidden by large folded persistent bracts and arranged in racemes longer than the leaves .... .... .... .... ... 1. F. strobilifera.

Leaves 3-foliolate; flowers in simple solitary or fascicled axillary racemes shorter than the petioles, bracts small deciduous .... .... .... .... .... ... 2. F. congesta.

§ Ostryodium Desv. Shrubs. Leaves simple. Flowers in small cymes, each hidden by a large folded persistent bract, closely distichously arranged in copious simple or slightly branched racemes, both in the axils of the leaves and above them.

puberulous; leaflets 1, subcoriaceous green glabrescent above thinly silky on the nerves beneath, ovate-acute, base widely rounded or truncate 3·5 in. long, 2 in. wide, lateral nerves 10–12 pairs; stipels obsolete, stipules scarios scarios lanceolate 3 in. long. Inflorescence in terminal racemes or thyrses 3–6 in. long, the slender zigzag rachis rusty-pubescent; bracts erecto-patent, short-petioled, deeply cordate 1 in. long, 1·25 in. wide, membranous, apex shortly cuspitate in all except the upper-most. Calyx 2·5 in. finely pilose; teeth lanceolate, exceeding the tube. Corolla yellowish or greenish-white 35 in. long. Pod oblong turgid 35 in. long, finely downy; 2-seeded. DC. Prodr. II, 351; Wall. Cat. 5753; W. & A. Prodr. 243; Wight Ic. t. 267; Miq. Flor. Ind. Bat. I, 161; Bak. in Flor. Brit. Ind. II, 227 (excluding both varieties). F. abrupta Wall. Cat. 5755. Hedysarum strobiliferum Linn. Sp. Pl. 746; Roxb. Flor. Ind. III, 350. Zornia strobiliifera Per. Synops. II, 319.

In all the provinces, common. Distrib. Throughout S.-E. Asia.

§ 2. Flemingiastrum DC. Erect shrubs. Leaves digitately 3-foliolate. Flowers in dense subspicate axillary racemes; bracts linear or lanceolate, caducous.

2. Flemingia congesta Roxb. Hort. Beng. 56. An erect woody shrub 4–6 feet high with slender triangular sulcate branches silky towards their tips. Leaves 6–9 in. long, petioles 2·5–3·5 in. long, adpressed puberulous margins angled but hardly winged; leaflets 3, subcoriaceous, ovate-acute, terminal cuneate lateral obliquely round at base, green, puberulous above thinly rusty silky especially on the nerves beneath, 3–5 in. long, 1·5–3 in. wide, lateral nerves 5–7 pairs, the lowest pair long, very oblique, arising at junction of midrib and petiolo, stipules obsolete, petiolules 25 in. long, stipules scarios externally velvety, early caducous 4 in. long. Inflorescence in dense axillary racemes sometimes solitary in the higher, usually fasciculate in the lower axils, 2 in. long, always shorter than petioles; bracts lanceolate 25 in. long or less, silky externally less rigid than the stipules and like them deciduous. Calyx 35 in. long, densely silky externally, teeth linear-lanceolate the lowest exceeding the others. Corolla wings purple standard white striped with pink 4 in. long. Pod oblong 5 in. long, 25 in. wide, closely shortly tomentose; seeds 2. Roxb. Fl. Ind. III, 340; DC. Prodr, II, 351; W. & A. Prodr. 241; Wight, Ic. t. 390; Wall. Cat. 5747; Miq. Flor. Ind. Bat. I, 164; Bak. in Flor. Brit. Ind. II, 288, excluding all the varieties. Crotalaria macrophylla Willd. Sp. Pl. III, 982. Rhynchosia crotalariaeoides DC Prodr. II, 387.

Penang; Wallich 5747 F! Pulo Boeting, Curtis 1926! Malacca; Griffith! Pangkore, Goodenough! Perak; Larut, Scortechini 134! Kampong Kota, Wray 3316! Distrib. India, Indo-China, Java.

All the specimens quoted belong to Roxburgh's true Flemingia congesta.
4. **Eriosema DC.**

Shrubs or herbs, mostly suberect, with 1-3-foliolate leaves. **Flowers** racemose or axillary. **Calyx** campanulate; teeth 5, as long as the tube. **Corolla** distinctly exserted; limb of standard roundish, anuricled at the base; wings and slightly beaked keel shorter. **Stamens** diadelphous; anthers uniform. **Ovary** sessile, 2-ovuled; style filiform, glabrous, stigma capitate. **Pod** oblong, turgid, 1-2-seeded; seeds oblique, the funiculus attached to the extremity of a linear hilum. Species about 50, mostly Trop. African and American.

**Eriosema chinense** Vogel. **Pl. Meyen. 31.** An erect undershrub 1-1.5 feet high, stems slender branching virgately usually near base, densely pubescent one or more from a small tuberous woody rootstock 1.5 in. long, *75* in. across. **Leaves** 1-2 in. long, *3-4* in. across, 1-foliolate very short petioled, linear-oblong to linear-lanceolate, subcoriaceous, greenish with a few adpressed hairs above densely grey-tomentose beneath, the veins rusty brown tomentose; stipules linear scarious 2-nerved persistent *2* in. long, stipules minute. **Flowers** in axils of upper leaves, solitary or geminate subsessile or on a common pedicel, sometimes *5* in. long jointed below flower, bracteoles obsolete. **Calyx** campanulate densely pilose *2* in. long. **Corolla** yellow, drying black, *4* in. long, standard orbicular hairy externally. **Pod** oblong *4* in. long, pubescent with long spreading rusty hairs. Bak. in Flor. Brit. Ind. II, 219. **Crotalaria tuberosa** Ham. in Don. Prodr. 241. **Rhynchosia virgata** Grah. in Wall. Cat. 5503. **R. Grahami** Wall. Cat. 5504. **Pyrrotricha tuberosa** W. & A. Prodr. 238.

**Perak**; **Wray** n. 3804! **Malacca**; **Griffith.** **Distrib.** S.-E. Asia; N. Australia.

5. **Dunbaria W. & A.**

Woody or herbaceous climbers. **Leaves** 3-foliolate, distinctly gland-dotted beneath; stipellae rarely present. **Flowers** racemose or axillary. **Calyx** teeth narrow the lowest distinctly exceeding the others. **Corolla** exserted, marcescent or caducous; keel usually not beaked. **Stamens** diadelphous anthers uniform. **Ovary** sessile or stalked, many-ovuled; style inflexed filiform beardless, stigma capitate. **Pod** linear, flat not marked with depressed lines between the substrophiciate seeds. Species about 12, Eastern Asiatic, Japanese and North Australian; only one from our area.

§ **Rhyncolobium.** **Corolla** caducous.

**Dunbaria scortechinii** Prain. A slender creeper 10-20 feet long with rigid subsulcate grey canescent stem and branches. **Leaves** 4-6 in. long, 3-foliolate; leaflets subtrapezoid, cuspidate acuminate at apex narrowed from below to the middle to a rounded base, the lateral pair
obliquely; bluish-green faintly puberulous above, densely grey-canescence beneath 2–2.5 in. long, 1.75–2 in. wide; petiole 1.5–4 in. long, puberulous; petiololes '15 in. long, puberulous; stipels very minute caducous, stipules lanceolate '1 in. long caducous. **Racemes** 2–3 in. long on peduncles 4–6 in. long, overtopping the leaves; pedicels geminate '2 in. long. **Calyx** grey-pubescent with reddish streaks, '3 in. long, tube wide campanulate, lower tooth lanceolate as long as tube and twice as long as lateral deltoid and connate upper pair. **Corolla** '5 in. long, externally dark brown, within pale yellow; keel beaked, standard '6 in. wide, orbicular entire. **Pod** '2.5 in. long, '2-25 in. wide, linear, pedicel abruptly recurved, closely grey-canescence; 6–8 seeded.

**Perak**; in open grassy or bamboo jungles, at Dijong, **Scortechini**, 1841! **Kunstler**, 908! Ulu Bubong, **Kunstler**, 10852!

A species with somewhat the appearance of *Rhynchosia bracteata* but with much more slender stems. It also resembles, but to a less degree, *Atylosia mollis* Its pods, however, have no depressions between the seeds and this renders it necessary to refer the plant to *Dunbaria*.

6. **Atylosia W. & A.**

Herbs or shrubs, erect or twining. **Leaves** 3-foliolate, sometimes subdeterminate often extipellate, gland-dotted beneath. **Flowers** axillary or racemose. **Calyx** teeth distinct, longer or shorter than the tube the lowest the longest. **Corolla** more or less exerted, marcescent or caducous; keel not beaked. **Stamens** diadelphous; anthers uniform. **Ovary** sessile; ovules 3 or more; style filiform incurved glabrous, stigma capitulate. **Pod** linear or oblong, turgid, marked with horizontal or oblique transverse lines between the seeds which have a conspicuous divided strophiole. **Species** about 25; from India to Australia and Mauritius.

Petals marcescent, leaflets large pinnately trifoliolate ... 1. **A. crassa**.

Petals deciduous, leaflets small subdeterminate ... 2. **A. scarabaeoides**.

§ **Atylla.** Petals marcescent, remaining till the pod develops.

1. **Atylosia crassa** Prain. A twining species with firm slender striate shortly-tomentose stems and branches. **Leaves** 3–6 in. long, pinnately 3-foliolate; leaflets subtrapezoid cuspidate-acuminate at apex narrow from beyond the middle to a rounded base, the lateral pair obliquely, dark green and rather densely puberulous especially on the nerves above, densely greenish-brown pubescent and reticulately veined beneath, 2–3 in. long, 1.75–2.25 in. wide; petiole 1.5–2.5 in. long, pubescent; petiololes '15 in. stipels subulate '1 in. long, pubescent, sub-persistent, stipules minute caducous. **Racemes** 2–3 in. long, lax short-peduncled, pedicels geminate '3–5 in. long; bracteoles large roundish acute reddish '6 in. long, forming a conspicuous tuft before the racemes expand. **Calyx** '4 in. finely grey-downy lowest tooth lanceolate as long

**Andamans; very common. Distrib.** India, Indo-China, Malay Archipelago.

The prior name for this species is *Dolichos reticulatus* Ham. but the name *Atylosia reticulata* may not be employed for it owing to there being another *A. reticulata* from Australia based on the *Dolichos reticulatus* Ait. of the *Hortus Kewensis* which was known before our plant. The nearest ally of this species is the purely Himalayan and quite distinct *A. mollis* Bth. (*Collsea mollis* Grah.)

§ **Cantharospermum.** Petals falling before the pod develops.


**Malacca; Griffith!** Distrib. India, Indo-China, Malaya, China, Mascarene Islands.

7. **Cajanus DC.**

An erect shrub. *Leaves* 3-foliolate. *Flowers* racemed. *Calyx*-tube campanulate; teeth short. *Corolla* much exserted, its petals equal in length; keel truncate. *Stamens* diadelphous; anthers uniform. *Ovary* subsessile, few-ovuled; style long, filiform, much upcurved, stigma capi-
tate. **Pod** linear, straight, narrowed at both ends, 3–5-seeded, torulose with oblique linear depressions between the non-strophiolate seeds. The only species.

**Cajanus indicus** Spreng. Syst. III, 248. An erect shrub 6–8 feet high with slender grooved grey-silky branchlets. **Leaves** 2–5 in. long; petiole 5'1–1'5 in. finely fluted densely adpressed hoary; leaflets 3 oblong-lanceolate entire subcoriaceous, terminal 1'75–3 in. long, 5'1–2'5 in. wide lateral similar but smaller 1'25–1'75 in. long, 3'5–7'5 in. wide, thinly silky above densely shortly silky and indistinctly gland-dotted beneath, nerves 6–9 pairs oblique prominent; stipels minute; stipules lanceolate hoary-canescence externally, 15 in. long. **Inflorescence** in sparse corymbose axillary racemes with peduncles 2 in. long and in a terminal panicle; pedicels downy the lowest 5 in. long, bracteoles obsolete. **Calyx** campanulate 25 in. long, teeth triangular shorter than tube. **Corolla** 6–75 in., standard yellow, or yellow with red veins, or rarely red. **Pod** 2–3 in. long, 25–45 in. wide, finely downy, with oblique cross depressions between the 2–6 seeds; armed at tip with thickened base and lower half of style; testa firm from pale to dark brown. W. & A. Prodr. 256; Miq. Flor. Ind. Bat. I, 174; Bak. in Flor. Brit. Ind. II, 217. **C. flavus** DC. Prodr. II, 406. **C. bicolor** DC. Prodr. II, 406; Wall. Cat. 5577. **Cytisus Cajan** Linn. Sp. Pl. 739; Roxb. Flor. Ind. III, 325. **C. pseudo-Cajan** Jacq. Hort. Vindob. t. 119.

**Andamans; Perak; Penang; Malacca.** Distrib. Cultivated everywhere in the tropics; probably a native of S.-E. Asia.

8. **Phaseolus** Linn.

**Twiners,** usually herbaceous, with 3-foliolate stipellate leaves. **Flowers** in copious axillary racemes; bracteoles usually conspicuous and persistent. **Calyx** campanulate, the lowest tooth usually longer than the rest and the two uppermost subconnate. **Corolla** much exserted, the keel prolonged into a very long beak which forms a complete spiral. **Stamens** diadelphous; anthers uniform. **Ovary** sessile, many-ovuled; style filiform, twisted round with the keel, conspicuously bearded down the side below the very oblique stigma. **Pod** linear, rarely oblong, subterete or subcompressed, more or less distinctly septate between the seeds. Species about 60, mostly tropical, many widely cultivated, especially in America.

**Stipules** small basifixd:—

Petals yellow puberulous externally, pods broad subcompressed ... ... ... ... ... 1. **P. lunatus.**

Petals red glabrous, pods narrow subtorulose between seeds 2. **P. adenanthus.**
Stipules produced below point of insertion (petals yellow, glabrous):—

Pods subcylindric glabrous:—

Stems slender diffuse, racemes subcapitate, leaflets less than half as long as petioles, seeds rounded at ends ... 3. *P. trilobus*.

Stems twining, racemes subspicate, leaflets as long as petioles, seeds subtruncate ... ... 4. *P. calcaratus*.

Pods slightly compressed, pubescent; (racemes subcapitate, seeds rounded at ends) ... ... ... 5. *P. Mungo*.

§ Euphaseolus. Stipules small, basifixed. Pods broad subcompressed.


In all the provinces, cultivated.

An American species now widely spread in the old world.

§ Leptosprion Bth. & Hk. f. Stipules medium, basifixed. Pods narrow subcompressed.

2. *Phaseolus adenanthus* G. W. F. Mey. Prim. Flor. Esseq. 239. A spreading glabrescent perennial, with slender rigid stems. *Leaves* 4–6 in. long; leaflets 3 medium to pale green, chartaceous, ovate-acute base cuneate—of lateral leaflets obliquely, nerves on both surfaces at first sparsely puberulous, otherwise glabrous, 2–5–4 in. long, 1–25–2 in. wide; petiole 2–5 in. long channelled above very sparsely hirsute or glabrous, petiolules '2 in. long puberulous; stipels '1 in. ovate adpressed, stipules often reflexed ovate-acute '2 in. long. *Racemes* axillary rather crowded, peduncles 1–4 in. long nodes rather close together; flowers 1–3 from each node, pedicels under '1 in. long, bracts minute. *Calyx* '25 in. long campanulate, teeth deltoid to lanceolate half as long as tube, with 2 ovate bracteoles '1 in. long at its base. *Corolla* pink to purple, showy, 1 in.
1897.] G. King—Materials for a Flora of the Malayan Peninsula. 49


**Andamans;** N. Andaman, *Helfer!* S. Andaman, *King’s Collector!* Narcondam, growing on the boulders of the higher beach, *Prain!* **Distrib.** Cosmopolitan in the tropics.

A very beautiful species not yet reported from the Malay Peninsula proper and not recorded by Prof. Miquel from the Malay Archipelago. It may, however, be found if looked for in the sea-fences of screw-pines along the coasts, this being the habitat chiefly affected by it in the Andaman group.

§ Strophostyles Bth. & Hk. f. Stipules produced below their point of insertion.


**Andaman**; an introduced weed. **Distrib.** Northern Africa, S.-E. Asia, Malay Archipelago.

An annual crop and a perennial weed throughout its natural area. The perennial form has usually more deeply lobed leaflets; in the annual form lobed and entire leaflets are generally met with in varying proportions on the same plant. Though not as yet recorded from the Malay Peninsula proper, it may be expected to occur there as an introduced weed.

4. **Phaseolus calcaratus** Roxb. Hort. Beng. 54. A twining annual, or perennial with annual pubescent rarely glabrous stems 6–10 feet long,
rarely suberect with stems 1–2 feet high. Leaves usually 4–5 in. long; leaflets 3 membranous sparsely adpressed-pubescent on both surfaces, ovate to lanceolate, acute or shortly acuminate, entire or faintly repand rarely slightly lobed, base of terminal leaflet cuneate of lateral truncate or subauriculately lobed to outer side, 2–4 in. long, 1–2.5 in. wide; petioles 2–4 in. long, pubescent with spreading or slightly reversed hairs, petiolules 0.15 in. long, pubescent, stipels 0.15 in. long, glabrous lanceolate, stipules 0.2–0.25 in. long, lanceolate glabrescent. Racemes subspicate 0.75–1.5 in. long, at end of stoutish peduncles 5–8 in. long, pubescent with at first decidedly reflexed hairs; flowers 2–3 together from 6–8 nodes at length 0.2 in. apart, lower pedicels at length 0.2 in. long, bracts lanceolate 0.25 in. long fixed above the base. Calyx 0.15 in. long teeth short deltoid, bracteoles narrowly lanceolate 0.2 in. long. Corolla yellow 0.5–0.75 in. long, glabrous. Pod 2.5–3 in. long 0.2 in. wide, recurved glabrous; seeds 10–12 subtruncate at ends with prominent hilum half as long as seed.


Perak; Batu Kuran, common, Scortechini! Curtis 2984! Andaman; common, cultivated and as an escape. Distrib. S.-E. Asia and Malaya.

Var. gracilis; stems slender, glabrous.

Perak; Larut, Scortechini 1476! Wray 1756! Goping, Kunstler 990! Durian, Kunstler 1035! 2467! Pahang; at Pekan, Ridley 1124! Distrib. Sumatra (Forbes).

But for the more slender and glabrous stems there is no character to separate var. gracilis from P. calcaratus which is otherwise a sufficiently variable species. Except that it is described as having subtorulose pods even when old, the writer would have no hesitation in referring P. luteus Bl. to var. gracilis. As a matter of fact the pods of all the varieties of P. calcaratus are subtorulose when young, and in Roxburgh's P. torosus, which is referable to P. calcaratus, they continue so; but, not having seen specimens, the writer does not feel justified in formally reducing Blume's plant, and would leave the matter to be settled by the botanists of the Dutch Indies.

5. Phaseolus Mungo Linn. Mantiss. I, 101. A spreading annual or perennial with slender annual pubescent stems 6–10 feet long, growing in open grassy places (Kunstler). Leaves 8–10 in. long; leaflets 3 blueish-green membranous ovate-acute, base wide-truncate—of lateral leaflets oblique, sparsely pubescent on both surfaces, 3–5 in. long, 2.5–4 in. wide, petioles 5 in. long sparsely pubescent with spreading hairs,
petiolules 2 in. long densely pubescent, stipels slender subulate 2 in. long, stipules lanceolate sparsely pubescent 3 in. long. Racemes dense few-fld. at the end of sparsely pubescent peduncles 4 in. long, bracts lanceolate densely pubescent 3 in. long, pedicels 1 in. Calyx 15 in. long puberulous externally, teeth triangular except the lowest lanceolate which is twice as long as the others and half as long as calyx-tube; bracteoles at base as long as bracts but rather narrower. Corolla bright yellow 5 in. long glabrous. Pods ascending or almost erect, densely clothed with spreading hairs, 1.5–2 in. long, 2.5 in. wide, compressed, 6–8 seeded. Seeds 15 in. long, 1 in. wide, dark brown, flat, oval, hilum one-third as long as seed not very prominent, dissipation between seeds not pronounced. W. & A. Prodr. 245; Wall. Cat. 5889 in part only. P. radiatus Roxb. Hort. Beng. 54; Flor. Ind. III, 296; Miq. Flor. Ind. Bat. I, 197 in part, not of Liun. P. Mungo var. radiatus Bak. in Flor. Brit. Ind. II, 203.

Prov. Wellesley; at Priye Dock, Curtis 2211! Perak; at Goping, Kunstler 946! Distrib. Wild in S.-E. Asia and also largely cultivated.

Very nearly related to P. sublobatus Roxb. (P. trinervius Heyne) which differs in having narrower pods, more distinct dissipements between the much smaller seeds, and a rusty-red pubescence. This is the wild form of the plant cultivated in India as the māsh-kulai or urd crop; though it happens to have been named P. Mungo by Linnaeus it is quite distinct from the Māng plant which has spreading pods with smaller seeds and dark green leaves. The Māng is the species named P. radiatus by Linnaeus.


Twining herbs or shrubs with pinnately 3-foliolate stipellate leaves. Flowers in copious axillary racemes bracteoles conspicuous. Calyx campanulate; teeth short or long, the upper often connate. Corolla much exserted; keel truncate or exserted not spirally twisted. Stamens diadelphous, anthers uniform. Ovary sessile many-ovuled; style long filiform, bearded along the inner face below the oblique stigma. Pod linear, suberecte, subseptate. Species 40–50, mostly tropical; one widely cultivated.

Keel not prolonged into a beak; pods glabrous:—

Stems trailing, pods short few-seeded; a wild sea-coast species

... ... ... ... ... 1. V. retusa.

Stems suberect or twining, pods long very many-seeded; a widely cultivated plant

... ... ... ... ... 2. V. Catjang.

Keel prolonged into a beak; pods pilose

... ... ... ... 3. V. pilosa.

entire; apex obtuse or sometimes retuse base cuneate or rounded, 2 in. long, 1.5 in. wide; petiole 1.5 in., glabrous; petiolules 1.5 in. sparsely hairy, stipels 0.06 in. recurved lanceolate glabrous, stipules 1 in. lanceolate basifix'd. Racemes rather densely 12-20-fld. on peduncles 2-6 in. long, nodes 1-2-fld., the lowest 1.5 in. apart; pedicels slender puberulous 2 in. long, bracts 1.5 in. long membranous ovate-lanceolate very early deciduous. Calyx campanulate faintly puberulous 12 in. long teeth short deltoid. Corolla yellow, glabrous, 5 in. long. Pod 1.5-2.5 in. long 4 in. wide 25 in. thick, glabrous subtorulose, seeds 4-8. V. anomal a Walp. Rep. I. 779. V. lutea A. Gray in Bot. Wilkes Exped. I, 452; Bak. in Flor. Brit. Ind. II, 205. Dolichos luteus Sw. in Prodr. Veg. Ind. Occ. 105; DC. Prodr. II. 398. Phaseolus obovatus Grah. in Wall. Cat. 5609.

Andamans and Nicobars; common on all the coasts from the Coco group and Narcondam south to Katschall and Kamorta. Perak; Scortechini! Ridley 8011! Malacca; Griffith! A cosmopolitan littoral species.

2. Vigna Catjang Walp. in Linnæa XIII, 533. A suberect or twining annual with glabrous stems. Leaves 4-8 in. long; leaflets 3 membranous pale-green ovate-rhomboid entire or slightly lobed, apex acute base shortly wide-cuneate—of lateral leaflets obliquely, glabrous on both surfaces, 2.5 in. long by 1.75 in. wide or rather larger (var. typica) to 4 in. long by 3.5 in. or rather less (var. sinensis); petiole 1.5-4 in. long glabrous, petiolules 1.5 in. long glabrous or puberulous; stipels ovate obtuse 1 in., stipules 3-4 in. long attached above the base, membranous persistent ovate-lanceolate. Racemes subcapitately few-fld. on peduncles usually 1-4 in. long (var. typica) sometimes 8-12 in. long (var. sinensis); pedicels short (under 1 in.), bracts membranous, fixed above base, deciduous. Calyx glabrous 4 in., teeth deltoid-cuspidate one-third as long as tube. Corolla yellow, white, or pinkish 7.5 in. long. Pod 4-24 in. long, 3-4 in. wide, scarcely depressed between the seeds; seeds 12-30 (in much elongated pods the spaces between the seeds are greatly widened). Bak. in Flor. Brit. Ind. II, 205.


Cultivated in most of the provinces.

Wall. Cat. 5550; Bot. Mag. t. 2232; W. & A. Prodr. 250. D. tran-

Cultivated in most of the provinces.

Widely cultivated in the Eastern Hemisphere; probably a native of S.-E. Asia, but apparently not now known in a truly wild state.

3. Vigna pilosa Bak. in Flor. Brit. Ind. II, 207. A slender twinning perennial with hirsute stems. Leaves 5-8 in long, leaflets 3, green, downy to subscabrid on both surfaces, entire ovate-acute 3-6 in. long, 1-5-2-5 in. wide, base truncate—of lateral leaflets unequally; petiole 2 in. long, closely downy, petiolules '05 in. only, stipe is subulate minute; stipules '1 in. lanceolate caducous. Racemes many-fld. 2-3 in. long on peduncles '5-2 in. long, nodes 1-2-fld. all close together in flower, at length '15 in. apart, pedicels '1 in. downy, bracts minute. Calyx campanulate oblique thinly silky, '3 in. long, lower tooth lanceolate as long as tube one half exceeding the others. Corolla purple '75 in. long. Pod 4-5 in. long, subcylindric '25 in. in diam., densely hirsute with spreading hairs, septate within between the 8-12 subreniform shining black seeds with truncated ends, '25 in. long '15 in. wide. Dolichos pilosus Roxb. Hort. Beng. 55; Flor. Ind. III, 312; DC. Prodr. II, 397: W. & A. Prodr. 249. Phaseolus difformis Wall. Cat. 5599.

Andamans; common, King's Collectors! Distrib. India and Indo-
China.


Wide-climbing herbs. Leaves pinnately 3-foliolate with stipellate lobed leaflets. Racemes long, with tumid nodes and fascicled pedicels; bracts and bracteoles setaceous, caducous. Calyx 2-lipped, the limb as long as the tube, the upper lip emarginate, the lower deeply 3-toothed. Corolla much exserted, the petals subequal; keel obtuse. Stamens diadelphous; anthers uniform. Ovary subsessile, many-ovuled; style long circinate at the apex, bearded down the inner side below the very oblique stigma. Pod large, linear, turgid, deeply depressed between the seeds. Species 2 or 3; the others Mexican and Angolan.

The oldest name for this genus is Cacara under which designation it was published by Thouars (Dict. Sc. Nat. V, 35) twenty years before Richard's name was issued.

Pachyrhizus angulatus Rich. ex DC. Prodr. II, 402. A large strong climber with a tuberous root; stems stout, suffruticose, young stems and branches deciduously downy. Leaves 8-9 in. long, trifoliolate; leaflets large, membranous glabrous as broad as long base entire deltoid from middle of circumference anterior half deeply or shallowly lobed, 4 in. long, as much across; petiole 5-6 in. long glabrous, petiolules '2 in.

Cultivated in most of the provinces. Distrib. Cosmopolitan in the tropics, probably originally American.

This is known, Mr. Curtis notes, as Obie Songnang in the Island of Penang. The large tuberous root, white outside and inside of the appearance and consistence of a turnip, is occasionally, according to Dr. Watt's Dictionary of Economic Products, 6–8 feet long and as thick as a man's thigh. It is eaten both cooked and uncooked, is palatable enough but rather insipid. If the rules as to priority of names be rigidly applied this must be known as Cacara erosum Kuntze.

11. Dolichos Linn.

Twining herbs with stipellate 3-foliolate leaves and minute sub-persistent bracts bracteoles and stipules. Flowers racemose or axillary. Calyx-tube campaunulate, teeth long or short. Corolla much exserted; its petals usually equal in length; keel obtuse or rostrate not spiral. Stamens diadelphous; anthers uniform. Ovary nearly sessile, many-ovuled; style thickened upwards and bearded down the inner edge or filiform and penicillate round the terminal stigma. Pod flat, linear or oblong, recurved. Species about 20, wide-spread in the tropics of both hemispheres.

The only species so far reported from the Malay Peninsula belongs to the group Lablab, with a style thickened upwards from a narrow base, bearded down the inner edge. This group is treated by Baker as a subgenus, by Taubert as a section, of Dolichos. De Candolle, Wight & Arnott, and Kurz consider however, with Savi, that it would be preferable to deal with this as the type of a distinct genus Lablab.

Dolichos Lablab Linn. Sp. Pl. 725. A tall subglabrous wide twining perennial or annual with round smooth or slightly downy stems. Leaves 4–12 in. long, 3-foliolate; leaflets entire ovate-acute, base cuneate or deltoid, rather pale green, glabrous or slightly pubescent beneath,
2–6 in. long and almost as broad; petiole 2–8 in. long, glabrous; petiolules 2 in. long puberulous; stipels 15 in. long subulate smooth; stipules lanceolate 2 in. long basifixed. *Racemes* lax 6–9 in. long on peduncles 5–8 in. long; pedicels fascicled 15–25 in. long on nodes 5–75 in. apart; bracts early deciduous. *Calyx* 2 in., teeth short deltoid, bracteoles oblong 15–2 in. *Corolla* white or pink 6 in. long. *Pod* 1.5–2 in. long (in one rather unusual form 3 in. long) tipped with the hooked persistent base of the style. Bak. in Flor. Brit. Ind. II, 209.


**Andamans**; cultivated. Cultivated throughout south-eastern Asia.

In deference to the great authority of Mr. Baker these two very distinct plants are united specifically; they are however so different that they must be treated as at least separate varieties.


Twining herbs, with large tuberous roots. *Leaves* 3-foliolate, stipulate; stipules fastened above the base. *Flowers* rather large, lilac. *Calyx* teeth shorter than the tube, the two upper connate. *Corolla* much exserted, the petals equal in length; keel much incurved, but not beaked. *Stamens* monadelphous, the upper free downwards; anthers uniform. *Ovary* substipitate, many-ovuled; style long, much recurved, flattened laterally, densely bearded round the terminal stigma. *Pod* square, with a distinct wing to each angle, distinctly septate between the seeds. Species 3–4, all tropical in the Old World.

*Psophocarpus tetragonolobus* DC. Prodr. II, 403. A slender annual glabrous twiner with tuberous roots. *Leaves* 5–10 in. long; leaflets 3 ovate, acute or acuminate, base rounded or wide-cuneate, margin entire or slightly waved, glabrous, green above, paler sometimes slightly glaucescent beneath, 3–6 in. long, 2–6 in. wide; petiole 2–4 in.
glabrous, petiolules '15 in. sparsely hairy along the sides; stipels lanceolate, glabrous '1 in. long, stipules oblanceolate acute towards both ends from the almost median insertion, '3 in. long; glabrous. *Racemes lax 4–6 fl.; peduncles 2–6 in. long; pedicels geminate '5 in. long, bracts small ovate, '08 in long. *Calyx campanulate glabrous oblique; upper connate teeth rounded emarginate, lateral oblong rather exceeding lowest; bracteoles 2 ovate, striate, glabrous, attached slightly above the base '15 in. long twice as large as bracts, half as long as buds. *Corolla blue or white 1·5 in. long. *Pod 6–12 in. long, 1·35 in. wide, the wings along the angles membranous '5 in. wide their margins crisped dentate and laciniate; seeds 8–16, rounded. W. & A. Prodr. 252; Hassk. Pl. Jav. Rar. 388 (var. a. only); Miq. Flor. Ind. Bat. I, 181 (var. a. only). *Dolichos tetragonolobus* Linn. Syst., Ed. X, 1162; Roxb. Flor. Ind. III, 305 (in part). *D. ovatus* Grah. in Wall. Cat. 5540.—Rumph. Herb. Amb, V. t. 133.

**Singapore; Hullett n. 75!**

Cultivated throughout Southern Indo-China and Malaya.

13. **Clitoria Linn.**

Scandent or suberect undershrubs, with showy flowers, 3–7-foliolate leaves, stipellate leaflets and persistent membranous small stipules and bracts and large bracteoles. *Calyx* membranous, tubular; teeth deltoid or lanceolate. *Corolla* much exserted; standard spoon-shaped, very large; wings and incurved keel much shorter. *Stamens* monadephous or diadelphous; anthers uniform. *Ovary* stalked, many-ovuled; style incurved, flattened, bearded along the inner side. *Pod* linear, flattish or turgid. Species 27, in tropics of old and new world, mostly the latter.

*Pod* flattish, valves not keeled on the face (Subgen.

Ternatea); stems scandent ... ... ... 1. **C. Ternatea.**

*Pod* turgid, with a rib along face of valves (Subgen.

Neurocarpum); stems suberect ... ... ... 2. **C. cajanifolia.**

Andamans; commonly cultivated. *Pangkore*; *Scortechni*! Distrib; common throughout the tropics in gardens and as an escape.


Malacca and Singapore, in old clearings, common. Distrib. A native of Brazil now naturalised in the localities mentioned, in Java, and in Siam.


Twining herbs or shrubs; stems with woody base. *Leaves* pin-nately 3-foliolate, stipulate; stipules persistent basifixed. *Flowers* very large and showy with persistent bracts and large persistent bracteoles. *Calyx*-teeth short the upper pair connate or obsolete. *Corolla* much exserted; standard orbicular emarginate shortly spurred near base, longer than the falcate obovate wings and the broad incurved slightly shorter keel. *Stamens* usually diadephous; anthers uniform. *Ovary* sub sessile, many-ovuled, style incurved dilated at the apex, stigma terminal beardless. *Pod* subsessile linear flattened, 2-valved, slightly se tate between the seeds, both sutures thickened and both valves strongly ridged along the face parallel to the sutures. Species about 25, all American.

Dr. Kuntze states (Rev. Gen. Pl. I, 163) that *Bradburya Raf.*, reduced in the Index Kewensis to *Wistaria*, is in reality this genus, and that Rafinesque's description refers to *Centrosema virginianum* a species widely cultivated in Asia and now quite naturalized in Java though not yet reported as an escape in our area.

Centrosema Plumeri Benth. in Ann. Wien. Mus. II, 118. A large climber with woody base and twining slender firm glabrous or puberulous branches. *Leaves* 6-10 in. long; leaflets 3 papery dark green glabrous above puberulous on the nerves beneath broadly ovate acute or acuminate 3-6 in. long, 2.5-5 in. across; petioles 3-6 in., glabrous or puberulous;

Perak; at Kampar, Curtis 3140! Singapore; Hullett 57! 669! no doubt an escape from gardens, as it also is in Sumatra where it has been found growing in forests near Lampar (Forbes n. 2599!) A native of South America; cultivated in Asiatic gardens on account of its handsome flowers.

15. Teramnus Sw.

Twining herbs, of slender habit. Calyx-tube campanulate; teeth distinct, subequal or two upper not so long. Corolla little exserted; petals about equal in length; standard not spurred. Stamens monadelphous; alternate anthers small, abortive. Ovary sessile, many-ovuled; style short, curved, bearded, stigma capitate. Pod linear, hooked with the persistent style at the tip, flattish, sepalte between the seeds. Species 4, belting the world in the tropics.

Teramnus labialis Spreng. Syst. III, 235. A wide-spread climber of slender habit with a few adpressed hairs on the stem. Leaves 2.5-4.5 in. long, petiole 1-1.5 in. sparsely adpressed-hirsute; leaflets 3 membranous or subcoriaceous ovate-oblong base rounded apex subacute or at times, especially of lateral pair, obtuse, terminal 1-2.5 in. long 75-15 in. wide, lateral slightly smaller, green glabrescent above sparsely adpressed-hirsute beneath; stipules minute lanceolate deciduous 15 in. long, stipels subulate 1 in. Inflorescence of elongated lax axillary 8-12-fld. racemes 2-3 in. long; pedicels 2 in. solitary below fascicled upwards, bracts narrowly lanceolate 1 in. long, bracteoles close under calyx minute subulate. Calyx 15-2 in. long, 2-labiate, teeth subequal

**Penang; Wallich 5518** Distrib. Throughout the tropics.

**Var. mollis** Baker (**Teramnus mollis** Benth.), should be looked for in the Malay Peninsula, for though it has not yet been reported from our area it occurs in Burma where it has been collected by Wallich and by Kurz, and again in Java where it appears to be commoner than **T. labialis** proper. It is distinguished from **T. labialis** by the presence of spreading hairs on the stem and by the pods being striously hirsute with long spreading hairs. Its leaflets also are densely pubescent beneath and its calyx-teeth are shorter than the tube.

16. **Dioclea** H. B. K.

Climbing shrubs. **Leaves** pinnately 3-foliolate, stipellate. **Flowers** blue or white, in elongated racemes with thickened nodes; bracts and bracteoles caduceous. **Calyx**-tube campanulate, teeth shorter than tube, two upper quite connate. **Corolla** exserted; petals about equal in length; keel incurved but not beaked. **Stamens** monadelphous; the vexillary stamen free below connate with the others in the middle shorter than the rest and with a perfect anther; anthers of keel stamens (in Malay species) alternately perfect and abortive. **Ovary** subsessile hirsute, few-ovuled, style incurved beardless, stigma capitate. **Pod** oblong turgid 1–3-seeded, flattened along the upper suture. Species 17–18, one Indo-Malayan, one extending to Africa and America, the rest tropical American.

Leaflets glabrescent beneath, larger; flowers 175 in. long; calyx teeth half as long as tube ... ... ... 1. **D. reflexa**.
Leaflets densely velvety beneath; flowers 1 in. long; calyx teeth wider one-third the length of tube ... ... ... 2. **D. javanica**.

1. **Dioclea reflexa** Hook. f. Niger Flora 306. A strong woody climber 20–30 feet long with rounded black early glabrescent branches. **Leaves** 3-foliolate 9 in. long; leaflets 3, dull green above paler beneath, subcoriaceous when young sparsely hairy on both surfaces but early becoming glabrous above and glabrous except for a few adpressed hairs on the nerves beneath, ovate shortly acuminate with subtruncate base 5 in. long 3 in. across, petiole 4 in. long channelled above sparingly adpressed hirsute; peti1ules 25 in. rusty pubescent, stipels 2 in. long, subulate,

Andamans; very common, Helder 1752! King's Collectors! Penang or Singapore; Wallich! Perak; Larut, Kunstler 5718! Distrib. Silhet; trop. Africa; trop. America.

The vexillary stamen in this and the next species is free at the base though not above; it is rather shorter than the others and bears a perfect anther; the anthers of the 9 stamens that constitute the keel-sheath are alternately perfect and abortive thus giving 5 perfect anthers on the sheath and a sixth perfect anther on the vexillary stamen; hence Roxburgh's excellent specific name.

Dr. Wallich did not obtain this species at Penang and Singapore; his note on the sheet of Cat. n. 5562 at Calcutta states that he had forgotten the precise locality but was of opinion that he obtained the specimen either at Penang or at Singapore.

2. Dioclea javanica Benth. Pl. Jungh. 236. A rather slender woody climber 20-30 feet long with rounded black early glabrescent branches. Leaves 3-foliolate 6-7 in. long; leaflets dull green above, coriaceous, beneath densely rusty-velvety, ovate shortly acuminate with subtruncate base 4 in. long 2-25 in. across, petiole 2-3 in. long channelled above, rusty-velvety; petiolules 25 in., velvety, stipels 2 in. long subulate; stipules lanceolate 25 in. long, deciduous. Inflorescence in dense subspicate racemes 6 in. long on axillary peduncles 8-12 in. long with 2-3 widely scattered empty bracts; rachis densely velvety, flowers 2-3 together on rounded alternate nodes 2-25 in. apart; bracts 5 in. long linear reflexed rusty-pubescent early deciduous. Calyx campanulate 5 in. long with two small obtuse bracteoles at base; pedicels 15 in. long rusty-puberulous; calyx teeth subequal except the broader truncate upper wide triangular, one-third as long as tube. Corolla pale-pink 1 in. long, standard-limb orbicular. Pods few usually 1-2; sometimes 3-seeded; 3-5.5 in. long, 2 in. wide, 5 in. thick along upper suture; at first densely rusty-tomentose at length glabrescent; seeds discoid 1:25 in. in diam. Miq. Flor. Ind. Bat. 1, 217. D. Fergusonii Thwaites Enum. 412.
Perak; Layut, Kunstler 5196! 10320! Wray 2000! Malacca; Maingay 520! Distrib. Ceylon; Chittagong; Java.

Very nearly related to the preceding and perhaps only a form of that species. At the same time the characters by which they are separable are very constant in all the specimens of both that the writer has seen, and from the field-botanist's point of view, at least, it is just as well to follow Mr. Bentham in separating them.

17. Pueraria DC.

Twining shrubs or herbs with stipellate pinnately 3-foliolate leaves; leaflets sometimes palmarly lobed. Flowers sometimes appearing before leaves, large or small, densely fascicled, in long often compound racemes. Calyx teeth long or short the two upper connate. Corolla distinctly exserted; standard usually spurred at the base equalling in length the obtuse wings and keel. Stamens more or less thoroughly monadelphous; anthers uniform. Ovary sessile or nearly so, many-ovuled; style filiform much incurved beardless, stigma capitate. Pod linear, flattish. Species about 12, mostly Indo-Chinese.

1. Pueraria phaseoloides Benth. in Journ. Linn. Soc. IX, 125.

A slender creeper 20-30 feet long with adpressed-pubescent slender hardly woody stems, and slender twining branches clothed with spreading greyish-brown hairs. Leaves contemporaneous with flowers, 6-8 in. long; leaflets 3, membranous dull-green thinly adpressed-hirsute above, dark greenish-grey and densely velvety-tomentose beneath, triangular ovate base wide cuneate—of lateral pair obliquely, apex subobtuse margin entire repand or slightly 3-lobed, sub-3-nerved at base, 3-4 in. long, 2-3 in. wide, petiole 3-4 in., densely clothed with spreading hairs, petiolules 2 in. long; stipels small subulate weak 1 in. long, stipules small lanceolate basifixed. Inflorescence of long-peduncled axillary racemes of fascicled flowers; peduncle 6-8 in. and rachis puberulous; racemes 4 in. long, fascicles 25-5 in. apart 4-5-fld., pedicels 2 in. puberulous, bracts and bracteoles lanceolate rather rigid clothed with adpressed bristly hairs, the bracteoles subpersistent. Calyx campanulate 25 in. long clothed with adpressed bristly hairs, teeth unequal upper broad, and lower lanceolate as long as tube and one-third larger than lateral triangular, all setaceous at tip. Corolla pale-blue and white, 6 in. long, standard-limb suborbicular distinctly spurred. Pods numerous, at first puberulous, at length glabrescent slightly recurved at the tip, 3-5 in. long only 2 in. wide. Seeds about 16, 15 in long 1 in. wide, truncate at ends, dark brown, testa dull minutely rugulose. Bak. in Flor. Brit. Ind. II, 190 (excl. syn. P. subspicata Bth.). Dolichos phaseoloides Roxb. Flor. Ind. III, 316. D. viridis Ham. in Wall. Cat. 5559. Neustanthus phaseoloides Benth. Pl. Jungh. 235; Miq. Flor. Ind. Bat. 1, 219. Phaseolus decurvis Graf. in Wall. Cat. 5612.
Andamans; at Port Blair, Prain! Penang; Wallich 5612! Perak; Goping, Kunstler 1062! 2456! 5117! Scortechini 591! 1441! Ipoh, Curtis 3151! DISTRIB. S.-E. Asia.

18. Canavalia DC.

Large twining perennials or biennials with stipulate pinnately 3-foliolate leaves and showy flowers. Calyx deeply tubular, limb 2-labiate, the upper lip projecting, entire or emarginate the lower shortly 3-toothed. Corolla far exserted; standard large roundish; wings shorter equaling the incurved obtuse keel. Stamens monadelphous; anthers uniform. Ovary obscurely stalked many-ovuled; style incurved beardless, stigma terminal. Pod large linear or oblong, flat or turgid with a longitudinal ridge along each margin of the flattened upper suture. Species 10–12, mostly American.

Pods not turgid, deeply double-channelled along the dorsal suture:
- Pods 1·5–2 in. across; flowers many... 1. C. ensiformis.
- Pods 5–75 in. across; flowers few... 2. C. lineata.
Pods turgid, almost flat along the dorsal suture; endocarp separating... 3. C. obtusifolia.


In some of the provinces, cultivated; as it almost universally is throughout the tropics.
The writer follows Mr. Baker in identifying the American Dolichos gladiatus (Canavalia gladiata DC.) with the Asiatic Dolichos ensiformis (Canavalia ensiformis DC.)

2. Canavalia lineata DC. Prodr. II, 404. A glabrous perennial on rocky or sandy sea-coasts. Leaves 3-foliolate 8-9 in. long; leaflets pale-green thickly membranous ovate or orbicular, obtuse with or without a short point, or retuse, base cuneate, 2-3 in. long and 2-3 in. across; petiole 3-5 in. long somewhat fleshy, glabrous; petiolules .25 in., stipels .15 in. subulate very early deciduous; stipules small triangular .1 in. long caducous. Inflorescence in long-pediculed 4-8-fld. racemes on peduncles 10-16 in. long; flowers solitary or geminate from swollen nodes 3-5 in. apart, pedicels 1-15 in. bracteoles minute ovate caducous. Calyx campanulate sparsely puberulous reticulate-veined .6 in. long, upper lip oblong subentire one-fourth the length of tube. Corolla violet 1 in. long, limb of standard orbicular emarginate. Pods few, short, linear-oblong, straight, dorsal suture strongly 3-keeled and deeply 2-grooved between the keels, 4-6-seeded, 3-5 in. long, .75 in. deep; width between outer ridges of dorsal suture .3 in. Seeds brown .5 in. long. Somoko-Dusets XIII, t. 20. Dolichos lineatus Thunbg. Flor. Japon. 280. D. obcordatus Roxb. Flor. Ind. III, 303. Canavalia obtusifolia Bak. in Flor. Brit. Ind. II, 196, not of DC; Cleghorn, Madr. Journ. (n. s.) I, t. 4.

Pahang; Sungei Kelang, Ridley! Penang; common on sand-banks along the coast, Curtis 1714! Singapore; Hullett 514! Distib. Coasts of India, Indo-China, Malaya, China, Japan, Polynesia, Australia.

3. Canavalia obtusifolia DC. Prodr. II, 404. A large biennial climber with glabrous stems and branches. Leaves 3-foliolate 10-12 in. long; leaflets green, membranous, when young puberulous very soon quite glabrous, ovate-acute to rounded with a shortly acuminate tip, base rounded to subtruncate; 5-6 in. long 3:5-4:5 in. wide; petiole 6 in. long, glabrous; petiolules .25 in.; stipels .15 in. subulate, very early deciduous; stipules small triangular .1 in. long, caducous. Inflorescence in lax 12-16-fld. racemes 3-8 in. long, on axillary peduncles 6-12 in. long; flowers solitary or geminate from swollen nodes 3-5 in. apart, pedicels 1-15 in., bracteoles minute ovate caducous. Calyx campanulate, sparsely puberulous, faintly ridged and not very distinctly reticulate-veined, .5 in. long, upper lip rounded hardly emarginate, scarcely longer than lower and not one-sixth the length of tube. Corolla blue and white, 1 in long, limb of standard orbicular slightly emarginate. Pods few, short, turgid, slightly curved, dorsal suture faintly 3-keeled, spaces between keels wide and plane, not grooved, 3-6-seeded, length 3-5 in., depth 1:75-2:25 in., width of dorsal suture between outer keels .75 in. Seeds pale umber with gamboge streaks, .75 in. long .5 in. broad,

Andamans; Coco Group and Narcondam, Prain! Mid. Andaman, Kurz! S. Andaman, Kurz! Man! King's Collector! Little Andaman, Prain! Perak; Scortechini 1391! Kunstler 1123! Pangkore; Scortechini 978! Penang; Wallich 5534! Singapore; Pulon Obin, Hullett 330! Distr. Indian, Indo-Chinese and Malayan coasts.

There is no doubt that, in the first place, this is C. obtusifolia DC.; that, in the second place, it is not C. obtusifolia Bak., in Flor. Brit. Ind.; and that, finally, it is specifically distinct from C. ensiformis of which the Flora makes it a variety. It is however, particularly unfortunate that, while the leaflets of C. lineata are almost always "obtuse," those of C. obtusifolia rarely are.

19. MUCUNA Adans.

Perennials and annuals of wide-twining habit. Leaves ample, stipellate, always 3-foliolate. Flowers large, showy, usually dark purple, turning quite black when dried. Calyx-tube campanulate; two upper teeth quite connate; lowest longer than the middle ones. Corolla much exserted; standard not more than half as long as the rostrate keel, which usually a little exceeds the wings. Stamens diadelphous; anthers dimorphous, like those of the Genista. Ovary sessile, many-ovuled; style incurved, beardless, stigma capitulate. Pod very variable in shape and sculpture, usually covered with brittle needle-like irritating bristles. Species about 30, spread everywhere in the tropics.

Perennials; pods flat, seeds large flattened, with a hilum extending round the greater part of their periphery (Sub-gen. Zoophthalhum):

Pods with plait across their faces (§ Citta):

Racemes long lax simple, bracts large boat-shaped; pods with broad wings, over which the plait do not extend, down the sutures.

Racemes short corymbose, bracts small; pods with transverse plaits that extend across the usually narrower sutural wings:

Peduncles naked at base; bracteoles longer than buds; calyx-teeth long; pods one-seeded; margins of transverse plaits simple, and of sutural wings entire.

Peduncles bracteate at base; bracteoles shorter than buds; calyx-teeth very short; pods two-seeded; margins of plaits 2-plicate, and of sutural wings incised.

1. M. imbricata.
2. M. monosperma.
3. M. biplicata.
Pods without plaits across their faces (§ Carpopogon); (wide-winged down both sutures):

Racemes short corymbose, bracts large boat-shaped ... 4. *M. acuminata.*

Racemes long-peduncled, umbelliform, bracts minute... 5. *M. gigantea.*

Annuals; pods turgid, hooked; seeds small oval with small lateral hilum (Subgen. Stizolobium) ... ... 6. *M. pruriens.*

**Subgen. 1. Zoophthalmum.** Perennial climbers; seeds large more or less flattened, with a long hilum extending round the greater part of the periphery.

§ Citta. Pods plaited across their faces.


Andamans; in the interior forests, common. Distrib. Himalayas from Kamaon, eastward; and throughout Indo-China.

Most nearly related, amongst Malayan species, to *Stizolobium Junghuhnianum* Kuntze (Rev. Gen. Plant. I, 208) from Java, which has very similar bracts. The pods, however, are in that species slightly narrower with rather narrower wings across which the plaits extend more completely. The branches, petioles, leaves and bracts of *M. Junghuhniana* are moreover strigously hispid and the calyx and pods are more densely bristly. Nearly related also is *M. cyanosperma* K. Schum., from the Moluccas.

**Andamans**; everywhere very common in the interior jungle.

3. **Mucuna biplicata** Teysm. & Binnend. Cat. Hort. Bog. 261. A large woody climber 30–40 feet long with slender glabrous branches. Leaves 9–12 in. long; leaflets 3, chartaceous dull green, glabrous on both surfaces ovate-oblong, cuspitate, base rounded—of lateral leaflets obliquely, 6–8 in. long, 5 in. across, petiole glabrous 4–6 in. long, petiolules 25 in., stipules subulate 15 in.; stipules linear 2 in.; pulvinus swollen puberulous. Inflorescence corymbose axillary 2 in. long; peduncle rusty-puberulent arising from an axillary node, its neck surrounded by a number of small triangular acute scaly bracts 15 in. long emitting at once 1–4 3–6-fld. branches 1–5 in. long, main rachis corymbose branched or simple 13–18-fld., bracts at base of pedicels small triangular immediately deciduous; pedicels 2 in. long; bracteoles at base of calyx 2 in. long, oblong much shorter than buds. Calyx greenish-brown densely covered with deciduous pungent bristles, 35 in. long, tube wide-campanulate, teeth extremely short. Corolla dark-purple 1.75 in. long; keel abruptly in flexed at tip, wings 1.25 in. long, standard 75 in. wide. Pod hardly stipitate 3.5 in. long 1.75 in. wide; plaits oblique very close-set their
edges double with reflexed margins, covered with close pungent brown bristly pubescence; marginal wings lobed between the plaits. *M. atropurpurea* Bak. in Flor. Brit. Ind. II. 186 in part and as to the Malacca plant only. *M. anguina* Scheff. Nat. Tijd. Ned. Ind. XXXII. 413 not of Wall. *Zoophthalmum biplicatum* Prain MSS.

**Malacca; Maingay, 590. Penang; Gapis Pass, Curtis 2989! Perak; Ulu Kewanta, Scortechini 925! Sunga Ryah, etc. Kunstler 863! 3915! 6805! 8330! Wray 3746! Distrib. Sumatra (Forbes 2649!)

Borneo.

There are at Calcutta both flowering and fruiting examples of Teysmann and Binnendyk's original species cultivated in the Buitenzorg garden; these are identical in every detail with this common Sumatra and Malay Peninsula plant. The pods much resemble those of *M. atropurpurea*, to which it comes nearest and with which it has been identified by Mr. Baker. But, besides the double edge to the plaits on the pods, whence the name, the Malayan differs from the Indian species in having larger leaflets, shorter inflorences, a calyx with an almost truncate mouth and a collar of scaly bracts at the neck of the peduncle similar to but smaller than those that occur at the base of the peduncle in *M. bracteata* of the subgenus *Stizolobium*.

§ **Carpopogon.** Pods not plaited across their faces.

4. **Mucuna acuminata** Grun. in Wall. Cat. 5621. A slender creeper 20–30 feet long with sparingly adpressed-puberulous branches. *Leaves* 6–10 in. long; leaflets 3, membranous dull green glabrous above sparingly puberulous especially on the nerves beneath, ovate-oblong rather abruptly acuminate, base rounded or subtruncate—of lateral leaflets obliquely, 2.5–4 in. long 2–3.5 in. wide, petiole glabrous, 4–6 in. long; petiolules 2–5 in. adpressed-puberulous; stipels subulate 15 in. long, stipules linear 2 in. *Inflorescence* when young in strobilate heads, corybbose, axillary, 2–3 in. long, peduncle grey-pubescent arising from an axillary node, its neck with a collar of small triangular acute scaly bracts 15 in. long emitting at once 1–4 4–8-fld. usually bifurcate branches; bracts at base of pedicels deciduous large boat-shaped externally finely grey-pubescent, 75 in. long, 5 in. wide; pedicels grey-pubescent at length 4–6 in., bracteoles at base of calyx 3 in. long, deciduous, lanceolate, as long as buds. *Calyx* glossy pale-brown densely covered with deciduous pungent bristles, 5 in. long, tube wide campylnulate twice as long as unequal teeth; upper tooth truncate, lateral wide-deltoid, lower linear longer than the others. *Corolla* 1.75–2 in. long, keel not abruptly inflexed at tip; wings as long as keel and twice as long as the standard 7 in. wide. *Pod* not quite ripe, 3 in. long, 1.5 in. across, broadly winged down both sutures but not plaited on the faces, copiously clothed especially along the wings with deciduous yellow-brown irritating bristles; seeds 3. *Zoophthalmum acuminatum* Prain MSS.

**Andaman**; **Coco Group**, **Prain**! Middle Andaman, **Kurz**! South Andaman, **Liebig**! **Kurz**! **Man**! Little Andaman, **Prain**! always close to salt-water creeks or in Mangrove-swamps. Narcondam, near sea beach, **Prain**! **Perak**; **Scortechini**! **Pahang**; **Ridley** 1227! Distr. A littoral species on Indian, Indio-Chinese, Malayan and Polynesian Coasts.

**Subgen. 2. Stizolobium.** Annual climbers; seeds ovoid with a small lateral hilum.

6. **Mucuna pruriens** DC. Prodr. II, 405. A slender annual climber with adpressed-pubescent branches at length glabrescent. *Leaves* 6-9 in. long; leaflets 3, membranous ovate-rhomboid, green glabrescent above grey-silky and lustrous beneath, the lateral pair very oblique truncate at base, all 3-5 in. long 2-3 in. wide; petioles 2-5-4-5 in. long, adpressed silky, petiolules 2 in. long, stipels 15 in. long subulate, stipules lanceolate 2 in. long. *Inflorescence* of short-peduncled racemes varying from 1 in. to 1 foot in length and from 3-30-fld., drooping, rachis

Andamans: Great Coco, near N. Andaman, common, Prain! Perak; Kampong Kota, Wray 3326! Distrib. Throughout the tropics.

20. Strongylodon Vogel.

Twining herbs, with firm stems and with stipellate 3-foliolate leaves. Flowers in long lax racemes. Calyx campanulate, gibbous; teeth short, obtuse, imbricated. Corolla much exserted; standard lanceolate, recurved; wings obtuse, more than a third as long; keel curved, as long as the standard, narrowed into a long beak. Stamens diadelphous anthers uniform. Ovary stalked, few-ovuled, style filiform beardless; stigma capitate. Pod oblong, turgid. Seeds as large as a bean, with a hilum running more than half round. Species 3, Polynesian.

Strongylodon ruber Vogel, Linnæa X, 555. An extensive climber with quite glabrous thin hollow but firm stems. Leaves 8 in. long, petioles 2 in. long glabrous; leaflets 3, bright green, glabrous on both surfaces membranous shining above, ovate, shortly bluntly cuspidate subequal, 4 in. long 2·5 in. wide, terminal rounded at base with petiollule 1 in., lateral obliquely cuneate at base with short petiolules; 3-nerved at base, central nerve with 2–3 pairs of arching lateral nerves all visible beneath; stipels lanceolate membranous 1·5 in. long, stipules triangular 2·5 in. long membranous. Inflorescence in copious axillary racemes with peduncles 4–6 in. long of 30–40 1–3 fld. fascicles of pedicellate flowers arising from small produced nodes with obsolete bracts; pedicels slender spreading, 5–7·5 in. long. Calyx glabrous 3 in. long tubular; teeth very short rounded; 2-bracteolate at base, bracteoles caducons. Corolla bright-red 1 in. long, standard lanceolate acute, the short obtuse wings

*Andamans*; common, *Prain! King's Collectors!* Distrib. Ceylon; Polynesia.


Trees with prickly branches. *Flowers* large, coral-red, in dense racemes, produced usually before the development of the large constantly 3-foliolate leaves. *Calyx* oblique, spathaceous, finally slitting down to the base or campanulate-bilabiate. *Petals* very unequal; standard always much exserted and considerably exceeding the keel and wings. Upper *stamen* free down nearly to the base or connate with the others half way up the filaments; anthers uniform. *Ovary* stalked, many-ovuled; style incurved, beardless; stigma capitate. *Pod* linear, fertile turgid and torulose throughout, or flat and seedless below. Species 25-30, principally tropical, in both the New World and the Old, and at the Cape.

Pods turgid and seed-bearing throughout their length; stipels replaced by ovate-glands as long as broad; seeds with a very large oval hilum:

*Calyx* spathaceous, oblique not at all 2-lipped, splitting to the base down the back (§ Stenotropis); leaflets membranous subreniform or triangular, green on both surfaces; flowers narrow, standard entire at apex ...

1. *E. indica*.

*Calyx* campanulate, somewhat 2-lipped, not splitting to the base (§ Micropteryx); leaflets subcoriaceous ovate-oblong, glaucous beneath; flowers broad, standard emarginate ...

2. *E. ovalifolia*.

Pods flat, seedless and indehiscent in their lower half (§ Hypaphorus); stipels replaced by oblong glands longer than broad; seeds with a small hilum; (calyx somewhat 2-lipped; leaves membranous ovate-acute, green on both surfaces; flowers narrow, standard entire at tip) ...

3. *E. lithosperma*.

Subgen. 1. *Stenotropis* Hassk. *Calyx* spathaceous, oblique not at all 2-lipped, finally split to the base down the back. *Pod* turgid and seed-bearing throughout.

1. *Erythrina indica* Lamk Encyc. Meth. II, 391. A tree 60 feet high with thin grey bark, armed with minute conical dark-brown prickles. *Leaves* 8-12 in. long; *petioles* 4-6 in. long unarmed, when young densely brownish-grey puberulous when full-grown glabrescent
especially in the upper half; leaflets 3, membranous, uniformly bright green, densely brownish-grey puberulous when young when full-grown quite glabrous, terminal subreniform lateral pair slightly oblique triangular, all subcuspidate at apex and subtruncate at base, 4-6 in. long, terminal rather broader than, lateral hardly so broad as long; petiolules 3-4 in. long; stipels represented by ovate glands 1 in. diam. that remain attached to the rachis on the fall of the leaflets; stipules flaccid lanceolate 4 in. long softly brown-puberulous early caducous. Inflorescence of dense racemes 4-6 in. long on stout spreading woody peduncles 3-4 in. long; flowers 1-3 in axils of small triangular puberulous deciduous bracts, pedicels 25 in. long at first brown-puberulous with 2 subulate puberulous deciduous bracteoles 15 in. long at base of calyx. Buds narrowly spindle-shaped slightly falcate puberulous. Calyx 1-2.5 in. long, soon glabrescent, mouth very oblique splitting to the base down the back the tip with 5 teeth of which 2 or casually 3 are narrowly subulate 2 in. long much exceeding the others. Corolla bright-red 2-2.5 in. long, standard 1 in. wide, wings and free keel-petals subequal about 5-6 in. long. Ovary softly grey-puberulous 2 in. long, stalked. Pod 6-12 in. long on a stalk 7.5-1 in. long, black glabrescent distinctly torulose 6-8-seeded, usually the lowest and 1-3 of the uppermost seeds abortive, valves ultimately irregularly shred, hardly distinctly dehiscent; seeds subreniform 6 in. long 4 in. wide testa warm-brown, hilum large oval dark-grey with pale margin. DC. Prodr. II, 412; Roxb. Flor. Ind. III, 249; Wall. Cat. 5963; W. & A. Prodr. 260; Wight, IC. t. 58; Miq. Flor. Ind. Bat. I, 207; Bak. in Flor. Brit. Ind. II, 188. E. spathacea Wall. Cat. 5965, fide Baker. E. Coralloidendrum Linn. Sp. Pl. 706, in part. E. cuneata Grah. in Wall. Cat. 5967, fide Baker.

Andamans; on all the coasts common, Kurz! Prain! Nicobars; common behind the sea beaches, King's Collectors! Perak; Scortechni! Malacca; fide Baker in Flora of British India. Distrib. Sea-shores of S.-E. Asia, from the Sunderbuns to the Malay Archipelago and Polynesia.

This, as a wild species, is purely littoral; where it occurs inland it has certainly been planted.

Mr. Baker refers here E. cuneata Grah. which the writer has not seen; also E. spathacea Wall. Cat. 5965. What Wallich's 5965 B. & C. (which were doubtfully identified with 5965 A) may have been, it is difficult to say; they were Himalayan plants and are not at Calcutta. But the Calcutta example of 5965 A is not named E. spathacea as in the Lith. Cat., but is named E. stricta; the specimen belongs moreover to E. stricta and not to E. indica.

Subgen. 2. MICROPTERYX Walp. Calyx campanulate, more or less distinctly 2-lipped, but not splitting down to the base. Pod turgid and seed-bearing throughout.
2. **Erythrina ovalifolia** Roxb. Hort. Beng. 53. A tree 30-40 feet high with spreading branches, bark grey, stem 1·5-2 feet diam., armed with thick-based dark-brown prickles. **Leaves** 8-12 in. long; petioles 4-5 in. long sparsely prickly, when young very sparingly puberulous, when full grown quite glabrous; leaflets 3 subcoriaceous deep green above glaucous beneath quite glabrous on both surfaces, terminal ovate or ovate-oblong 4-6 in. long 2·5-3·5 in. across, lateral pair similar but rather smaller, base rounded or wide-cuneate apex obtuse or subacute; petiolules 2·5 in. long; stipules represented by ovate persistent glands 1 in. in diam.; stipules membranous orbicular deciduous 1·5 in. across. **Inflorescence** in lax 8-20-fld. racemes 3-6 in. long on stout spreading peduncles 5-8 in. long; flower 1-3 in axils of small broadly ovate deciduous puberulous bracts; pedicels puberulous 3 in. long with similar but smaller bracteoles at base of calyx. **Buds** narrowly ovate, puberulous. **Calyx** 5 in. long, 6 in. wide deeply 2-lobed. **Corolla** 2 in. long dark velvety-brown with deep scarlet tinge, standard 1·5 in. wide emarginate, wings 75 in., keel-petals coherent 1 in. long. **Ovary** softly grey-puberulous, stalked. **Pod** 6-8 in. long 6-8-seeded on a stalk 5 in. long, pale-brown puberulous, valves more distinctly dehiscing by the sutures; seeds subreniform 5 in. long, 3 in. wide, testa brown, hilum large oval. Roxb. Flor. Ind. III, 254; Wall. Cat. 5961; Wight Ic. t. 247; Benth. Pl. Jungh. 237; Miq. Flor. Ind. Bat. I, 207; Bak. in Flor. Brit. Ind. II. 189. E. holosericea Kurz, Journ. As. Soc. Beng. XLII, pt. 2, 69 as to flowers. Duchassaingia ovalifolia Walp. in Linnaea XXIII, 742.

**Perak**; Kinta, **Kunstler 7215! Malacca**; **Maingay 528! Distrib. S.-E. Asia, from Assam and Bengal to the Malay Archipelago and Polynesia.**

Mr. Kurz’s **Erythrina holosericea** (Corallodendron holosericeum O. Kuntze, Rev. Gen. Pl. I, 172) is a spurious species manufactured by combining in one diagnosis a description of the flowers of *E. ovalifolia* and of the leaves of *E. lithosperma*; the mélange had been sent to Herb. Calcutta by an officer of the Indian Forest Department under the idea that it came from one tree. The citation of this species by Kuntze (*loc. cit.*) while that author is taking the opportunity to (as the writer thinks) unnecessarily restore an obsolete generic name, might lead to the conclusion that Kuntze had made an effort to verify the validity of the Kurzian species, as to the existence of which Mr. Baker had already expressed a doubt (*Flora of British India* II, 190). It is obvious, however, that Kuntze had done nothing of the kind and it would seem from this citation that the object of much of the bouleversement effected by priority-hunting “botanists” is less the restoration of generic names that have been improperly suppressed than a search for opportunities of posing as the authorities for species of whose characters they are ignorant.

In the Herbarium of Mr. Curtis, of the Penang Forest Department, is a solitary
specimen of an Erythrina belonging to this section, collected in Langkawi. The flowers are precisely those of E. suberosa, a glabrous form of which is common in Burma and Tenasserim; it may, therefore, well belong to that species. But the solitary branchlet is densely prickly whereas it is a feature of both the tomentose Indian and the glabrous Indo-Chinese form of E. suberosa to have almost unarmed branchlets. As moreover, Mr. Curtis’ specimen is without leaves, the writer cannot on its authority alone, formally include E. suberosa among the Malayan species.

Subgen. 3. Hypaphorus Hassk. Calyx campanulate more or less distinctly 2-lipped, but not splitting down to the base. Pod flat seedless and indehiscent below, 1–3-seeded towards upper half.


Penang; Wallich! Perak; at Kinta, Kunstler! at Waterloo, Curtis 2982! Scortechini (a MSS. description only.) Singapore; Hullett! Distrib. Indo-China, from the Shan Plateau, to the Malay Archipelago.

Mr. Kurz, as Mr. Baker remarks, has pointed out that the present species is Erythrina sumatrana Miq.; authentic examples of E. sumatrana in Herb. Calcutta, show that this is the case. But the only difference between E. sumatrana Miq. and E. lithosperma Bl. (ex Miq. in Flor. Ind. Bat.),—to which Mr. Baker has referred the Indo-Chinese plant that agrees in every respect with the Sumatra and Perak one,—
is in the size of the pods; those of *E. sumatran* are rather larger than those of *E. lithosperma*. Both species are retained in the *Index Kewensis* but the writer agrees with Mr. Baker in believing that they do not deserve to be treated even as separate varieties. Kurz further states that *E. lithosperma* Blume ex Miq. in Flor. Ind. Bat. is not the same as *E. lithosperma* Bl. Cat. Bogor., which, according to Kurz, was introduced to the Buitenzorg garden from Mauritius. Koorders and Valeton, in their valuable Java Herbarium, issue the common wild Java plant which only differs from *E. sumatran* in having rather smaller pods, under the name *E. lithosperma*; they have however in every case named the plant *E. lithosperma* Miq., not *E. lithosperma* Bl. In their *Bijdragen* II, these authors explain that Blume's "*E. lithosperma*" is only *E. indica*; this being the case the name *E. lithosperma*, but on Miqel's authority, not as that of Blume, is still available for the present species. Here again Kuntze's pretentious *Revisio* fails to assist the serious student; Kuntze claims the authorship of both, as *Corallodendron lithospernum* and *C. sumatrana* respectively, thus clearly indicating that he has failed to make himself acquainted with the characters of either.

22. **Spatholorus Hassk.**

Woody climbers, with 3-foliolate stipellate leaves. *Flowers* small or middle-sized, in ample terminal panicles, extending into the axes of the upper leaves, the pedicels densely fascicled at the tumid nodes. *Calyx* campanulate; teeth lanceolate or oblong-deltoid, the upper two connate. *Corolla* distinctly exserted, its petals subequal, the keel obtuse, nearly straight. *Stamens* diadelphous; anthers uniform. *Ovary* sessile or stalked, 2-ovuled; style incurved, beardless, stigma capitate. *Pod* flat, winglike, indehiscent, seedless below; thick, 1-seeded, tardily dehiscent at tip. Species 10, the others Malayan and one Tropical African.

Leaflets not twice as long as broad, the terminal leaflets dissimilar, rhomboid; (leaflets large 3 in. across manifestly pubescent beneath, rachis prolonged beyond attachment of lateral leaflets; flowers blue or purple): —

Leaflets puberulous above, uniformly tomentose beneath; flowers '25 in. long, distinctly pedicelled ... ... 1. *S. ferrugineus*.

Leaflets glabrous above, tomentose only on the nerves beneath; flowers '15 in. long, very shortly pedicelled ... 2. *S. gyrocarpus*.

Leaflets at least twice as long as broad, all subsimilar lanceolate or oblanceolate to ovate: —

Leaf-rachis hardly prolonged beyond the insertion of lateral leaflets, leaflets large 3'5 in. across (sparsely pubescent on the nerves beneath) ... ... 3. *S. bracteolatus*.

Leaf-rachis distinctly prolonged beyond the insertion of lateral leaflets, leaflets medium or small not more than 2 in. across: —

Petaloids and leaflets beneath finely adpressed puberulous (stipels manifest flexuous): —

Petaloids twice as long as stipels, flowers pink, branches of panicle lax; leaflets elliptic-acuminate... 4. *S. acuminatus*. 

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Petiolules shorter than stipels, flowers white, branches of panicle strict, leaflets ovate-lanceolate acute 5. *S. dubius*.

Petiolules and leaflets beneath glabrous:

Leaflets thickly coriaceous (oblong, stipels obscure rigid) flowers purple, calyx densely rusty-pubescent... 6. *S. crassifolius*.

Leaflets chartaceous, flowers white, calyx glabrescent or puberulous:

Leaflets oblong, stipels obscure rigid, calyx glabrescent, branches of panicle strict ... 7. *S. Maingayi*.

Leaflets oblanceolate, stipels manifest flexuous, calyx finely puberulous, branches of panicle lax ... 8. *S. Ridleyi*.

1. **SPATHOLOBUS FERRUGINEUS** Benth. Pl. Jungh. 238. A robust woody climber 30–60 feet long with a stem 3–6 in. thick; branchlets densely rusty-tomentose, brown beneath the tomentum, cylindric. Leaves 9 in. long; leaflets 3, coriaceous dull green puberulous above, everywhere rusty-pubescent beneath, terminal ovate apex obtuse base subcordate, 5–6 in. long 3 in. across, lateral obliquely elliptic 4–5–5 in. long as wide as terminal, lateral nerves 5–7 pairs ascending and midrib prominent beneath, cross-nerves and fine reticulate venation very distinct; petiole 3–4 in. long rusty-pubescent, petiolules 25 in. also densely rusty; stipels subulate small; stipules broad-based triangular 25 in. long, very densely rusty, deciduous. Inflorescence 8–10 in long, in lax axillary panicles with stout densely rusty-pubescent somewhat flattened peduncles, branches 4–6 in. long again paniculate the bracts at their bases triangular subpersistent; pedicels distinct 2 in. long in fascicles of 2–5, bracteoles shorter than buds. Calyx densely rusty-pubescent 2 in. long, teeth deltoid shorter than tube subequal except the rounded slightly emarginate upper. Corolla claret-coloured to dark-blue, 25 in. long, standard oblong deeply notched. Pod 3–5 in. long, softly velvety, semi-transparent except at the seed-bearing tip, 7 in wide below 3 in. wide at seed-bearing apex. Miq. Flor. Ind. Bat. I, 204. *Drebbelia ferruginea* Zoll. in Nat. en Geneesk. Arch. III, 79.


From Singapore comes also a form collected twice by Mr. Ridley (n. 5578! n. 6394!) with a close red-silky tomentum beneath. This bears to ordinary *S. ferrugineus* very much the relationship that *Butea sericophylla* Wall. bears to *S. Roxburghii* (*Butea parviflora*) and it has not therefore been here separated as a variety, though it is certainly a very distinct "form" of *S. ferrugineus*. While very near *S. gyrocarpus* this species is quite readily separable by its nearly always rather smaller leaves; its always different tomentum; its always larger flowers with much longer pedicels, and its differently shaped more persistent bracts. The fruits are however,
thick; branchlets closely shortly rusty-pubescent, black beneath the
tomentum, slightly angular. *Leaves* 12 in. long; leaflets 3 subcoriaceous
bright green and glabrous above rusty-pubescent on all veins and nerves
beneath, terminal obovate-rhomboid apex rounded with a short point
base cuneate, 5-6 in. long, 4·5-5 in. wide, lateral obliquely elliptic 5-6 in.
long 3·5-4 in. wide base obliquely rounded apex as in terminal; lateral
nerves 6-8 pairs ascending and midrib prominent beneath, cross-nerves
and fine reticulate venation very distinct; petiole 4-6 in. rusty puberu-
lous, petiolules 3 in. also rusty; stipels subulate small; stipules broad-
based ovate-lanceolate 3 in. long very early deciduous. **Inflorescence** in
lax axillary panicles sometimes 12 in. long with stout somewhat flatten-
ed rusty-puberulous peduncles, branches 6-8 in. long again paniculate,
the bracts at their bases small lanceolate early deciduous; pedicels very
short, bracteoles at base of calyx linear shorter than buds early deci-
duous. **Calyx** grey silky-pubescent 1 in. long, teeth deltoid shorter
than the tube subequal except the triangular slightly notched upper.
**Corolla** deep-claret to dark-blue, 15 in. long, standard wide-orbicular
deeply notched. **Pod** 3-5 in. long 1 in. wide below, seed-bearing tip
3 in. wide, softly velvety, semitransparent except at the seed-bearing
*Butea gyrocarpa* Wall. Cat. 5442.

**Perak**; very common at low elevations, **Kunstler** 3181! 7770!
8182! 10390! 10458! **Penang**; **Wallich** 5442! **Stoliczka**! **Distrib.**
Philippines.

This, though common, appears to be hardly so frequent as the last species which
it much resembles, especially as regards pods. The tomentum of this species is
however, less dense and less red than in *S. ferrugineus* and the flowers are about half
the size. This has never been sent to Calcutta from Malacca though *S. ferrugineus*
is very plentiful there.

3. **Spatholobus bracteolatus** Prain. A slender creeper 15-20 feet
long with sparsely rusty-pubescent branches. *Leaves* 10-12 in. long;
leaflets 3 ovate-acute or shortly acuminate, the tip slightly mucronate,
subcoriaceous glossy bright green on both surfaces very sparsely beset
with short rusty adpressed hairs, midrib beneath prominent more
densely adpressed-pubescent, lateral nerves ascending 8-9 pairs promi-
ment, cross-nerves distinct, terminal and lateral subequal subsimilar-8-9 in. long, 3-5 in. across; petiole 2-2.5 in. long densely adpressed rusty-pubescent, scarcely prolonged beyond attachment of lateral leaflets, petiolules 3 in. long also densely rusty; stipels short subulate, stipules 0.25 in. long, deciduous, membranous, densely rusty, lanceolate; leaves towards ends of branches sometimes 1-foliolate. Inflorescence in terminal and axillary panicles 1-5-2 ft. long, branches 3-4 in. long again paniculate, with smaller sometimes 1-foliolate leaves at their bases, or bractless; pedicels very short, bracteoles at base of calyx lanceolate 2-25 in. long, longer than buds, early deciduous. Calyx pale-brown pubescent, 15 in. long, lower teeth sublinear central longer than lateral all shorter than calyx tube, upper lip triangular notched at apex. Corolla shortly exserted small, colour not noted, standard orbicular-oblong slightly retuse. Pod not seen.

PERAK ; in dense jungle on Gunong Batu Patch, at 3000-4000 feet, Kunstler n. 8079!

This in externals more resembles S. Roxburghii than it does any other Malayan species, and may possibly be the plant from Penang, noted by Mr. Baker as having been confused by Dr. Wallich with S. gyrocarpus under Cat. n. 5442; at Calcutta, however, all the specimens of Cat. n. 5442 are genuine S. gyrocarpus. The present plant was not identified with any species at Kew and in any case it is certainly not a form of S. Roxburghii; it differs in having smaller flowers; narrower, relatively longer bracteoles, and much longer stipules—the latter in S. Roxburghii are triangular and though wider at the base are only 1.5 in. long. The stipels on the other hand are small and obscure and the most striking difference between this plant and S. Roxburghii, or indeed between it and any other species of Spatholobus is that the rachis of the leaf is so shortly prolonged beyond the attachment of the lateral pair of leaflets that the leaf is at times subdigitately 3-foliolate.

4. Spatholobus acuminatus Benth. Pl. Jungh. 238. A robust climber with branches at first minutely downy soon glabrescent. Leaves 8-10 in. long; leaflets 3, all oblong-cuspidate rounded at the base, 4-6 in. long, 1.5-2 in. across, subcoriaceous, pale green on both surfaces glabrous above, under the lens very minutely and sparsely puberulous beneath, midrib prominent beneath very sparsely shortly puberulous, lateral nerves 8-10 pairs spreading very slender, fine reticulations distinct but not prominent; petiole 2-4 in. long glabrescent, petiolules 2 in. adpressed puberulous; stipels short subulate, stipules ovate-lanceolate 0.25 in. long 1.5 in. wide, very early deciduous. Inflorescence in short axillary panicles 6-8 in. long, branches 1.5-2 in. long again paniculate; pedicels slender usually 2-3 together 2 in. long. Calyx puberulous 1.5 in. long, teeth oblong obtuse half as long as tube the upper slightly emarginate. Corolla 4 in. long, bright red (fide Baker), standard orbicular emarginate. Pod 3-5 in. long, softly velvety, semi-transparent except at seed bearing tip, 7 in. wide below 3 in. wide at tip. Miq.
Flor. Ind. Bat. I, 204; Bak. in Flor. Brit. Ind. II, 194. Sapindaceae
Wall. Cat. 8082. Butea acuminata Wall. Cat. 5443.

Penang; Wallich 8082! Andamans; common, King’s Collectors!

Distr. Martaban.

The solitary Malayan specimen at Calcutta that appears referable to this species is one issued by Dr. Wallich as Sapindaceae sp. (Cat. n. 8082); this specimen is not dealt with in the Flora of British India. So far as it goes it agrees better with Dr. Wallich’s Martaban specimens of S. acuminatus (Cat. n. 5443) than it does with any Malayan species of Spatholobus, to which genus it manifestly belongs; the specimen is, however, only in very young flower. No one has met with it in Penang since Dr. Wallich collected it.

Mr. Baker’s description of S. acuminatus does not apply to Dr. Wallich’s Butea acuminata in so far as the lengths of the panicles and of the pedicels are concerned. His description would apply to Wall. Cat. 5907 (Pongamia rosea Grah.) which Mr. Baker also includes here; Pongamia rosea certainly is a Spatholobus but is a species very distinct from S. acuminatus. There are not at Calcutta examples of Wall. Cat. 5908 or Wall. Cat. 9054; both are here excluded because Mr. Baker expresses a doubt regarding both. The first may indeed prove to be the same as Spatholobus riparius Prain; of the second nothing can be said because, in the Flora of British India, it is referred not only to S. acuminatus, but also to Derris thyrsiflora.

The Andamans specimens are absolutely identical with Wallich’s original specimens (Cat. 5443) from Martaban.

5. Spatholobus dubius Prain. A large climber 100–150 feet long, stem 6–8 in. diam., with round adpressed-puberulous branches. Leaves 6–8 in. long; leaflets 3 ovate-acuminate base rounded the tip slightly mucronate, coriaceous glossy bright green, glabrescent above adpressed-puberulous beneath, lateral nerves ascending 8–9 pairs prominent beneath, cross-nerves distinct; terminal 2–6 in. long 1.5–3 in. wide, lateral subsimilar rather smaller; petioles 1.5 in. long puberulous, petiolules 0.15 in. pubescent; stipules subulate 0.15–2 in. long, stipules lanceolate 0.2 in. deciduous; leaves towards ends of branches sometimes 1-foliolate. Inflorescence in terminal and axillary spreading panicles the former sometimes 8 in. the latter 4 in. long, sometimes 2–3 from same axil, Bracts lanceolate persistent adpressed-pubescent 0.15 in. long equalling the pubescent solitary or fasciculate pedicels; bracteoles minute. Calyx adpressed-pubescent, 0.12 in., campanulate, teeth short triangular except the 2-fid upper. Corolla 0.25 in. long, pure white, standard orbicular repute. Pod not seen.

Perak; Gunong Bubu, 800–1200 feet, Kunstler 7585! Penang; Govt. Hill, Curtis 2970!

A very distinct species apparently nearest to S. littoralis Hassk. from which it differs in having the lower lip of calyx toothed and the leaves uniformly puberulous beneath. The shortness of its petiolules, which are equalled and often exceeded in length by the subulate stipels, renders the species easily distinguishable.

a strong climber, branches at first rusty-pubescent at length glabrescent. Leaves 8–10 in. long, all oblong-cuspidate, cuneate at the base, 4–6 in. long 1:5–2 in. wide, thickly rigidly coriaceous, dark green and quite glabrous on both surfaces midrib prominent beneath glabrous, lateral nerves 6–7 pairs and secondary nervation very slightly raised; petiole 2–4 in. long glabrous, petiolules ·2 in. glabrescent; stipels short subulate often obscure, stipules lanceolate ·2 in. long very early deciduous. Inflorescence of short axillary panicles 8–9 in. long, branches about 2 in. long, again paniculate, peduncles rusty-pubescent with a few ovate-acute deciduous leaf-scales at their base; pedicels very short, rusty-pubescent. Calyx densely rusty-velvety, ·1 in. long, teeth all deltoid shorter than the tube. Corolla ·2 in. long, dark-purple, limb of standard much broader than deep, deeply emarginate at apex subcordate at junction with claw. Pod not seen; when immature with a stalk (vide Baker.) Bak. in Flor. Brit. Ind. II, 194. Pongamia? crassifolia Grah. in Wall. Cat. 5913.

Penang; Wallich! Distrib. Silhet.

This is very distinct by reason of its leaves and (from Mr. Baker’s description) on account of its stipitate pod. Dr. Wallich’s original specimens from Silhet and Penang seem undoubtedly examples of one species; strangely, it has not been sent again to Calcutta from either locality.

7. Spatholobus Maingayi Prain. A large climber with glabrous branches. Leaves 4–5 in. long; leaflets 3 ovate-acute base rounded tip slightly mucronulate, thickly coriaceous glabrous on both surfaces, lateral nerves ascending 5–6 pairs slightly prominent beneath cross-nervation distinct but not prominent; terminal 3 in. long 1:75 in. wide; lateral rather smaller; petiole 2 in. glabrous, petiolules ·25 in. quite glabrous; stipels subulate ·1 in. long, stipules ovate ·1 in. long, deciduous. Inflorescence in terminal and axillary panicles 6–8 in. long. Bracts minute subulate persistent puberulous, as are the rachis and pedicels shorter than calyx; bracteoles very minute. Calyx adpressed-puberulous ·12 in. long, campanulate, teeth all short rounded. Corolla white ·25 in. long, the standard orbicular deeply emarginate. Ovary hirsute 2-ovuled.

Malacca; Maingay 611! Perak; Kunstler 3535! 4652! 6906! 10428! Scortechini 206! 1537! Singapore; Ridley!

This evidently quite common species has never yet been reported in fruit. It appears from a note in Herb. Calcutta that Mr. Kurz had supposed it might be the same as S. macropterus Miq.; the flowers, however, differ slightly and, in their venation, the leaves of the two species differ markedly. Father Scortechini on the other hand thought when he collected it that this might be Derris (Aganope) macrophylla, a reasonable supposition in the absence of fruit since the flowers of Spatholobus are very like the flowers of Aganope and since the obscureness, and indeed at times apparently total absence, of stipels from the leaves of this species leads to their being
S. **Spatholobus Ridleyi** Prain. A climber with glabrous slightly-angled branches. **Leaves** 6 in. long; leaflets 3 subequal ob lanceolate apex acuminate tip mucronulate base cuneate, papery quite glabrous on both surfaces, 3–3.5 in. long 1–1.25 in. wide; petiole glabrous 1–5 in. long, petiolules glabrous 2 in. long; stipels small rigid subulate, often very obscure; stipules lanceolate 25 in. long subrigid parallel-veined. **Inflorescence** in axillary racemes 3 in. long 1 in. wide, bracts and bracteoles minute deciduous. **Calyx** 12 in. campanulate adpressed-pubescent, upper tooth truncate the others rounded half as long as tube, pedicels 2 in. long, adpressed-puberulous. **Corolla** 25 in., white, standard orbicular, limb slightly auriculate, apex retuse. **Pod** 4 in. long, 1 in. wide below, seed-bearing tip '4 in. across; sparsely puberulous, reticulate-veined, semitransparent except at apex.

**Singapore; Ridley 6401!**

A very distinct species though nearest to *S. macropterus* Miq.

23. **Indigofera** Linn.

Herbs or shrubs more or less densely clothed with adpressed hairs, with (in Malayan species) compound odd-pinnate leaves. **Flowers** small in copious axillary racemes. **Calyx** minute campanulate; teeth 5, subequal or the lower longest. **Corolla** caducous, standard obovate; keel straight, not beaked, laterally spurred near base. **Stamens** diadelphous, anthers uniform apiculate. **Ovary** sessile many-ovuled; style short incurved, stigma capitate penicillate. **Pod** linear-cylindric several-seeded. Species about 250; in all tropical regions and in temperate South Africa.

The genus is hardly a Malayan one; the above definition applies, as to foliage, only to the species that occur in the Malay Peninsula.

**Herbs**: stems densely pubescent; pod short straight pubescent ... ... ... ... 1. *I. hirsuta*.

**Shrubby**: stems faintly hoary; pod glabrous:—

Calyx deeply cleft, about half as long as corolla; pods reflexed:—

Leaflets ovate-acute; racemes dense, pods short much recurved ... ... ... ... 2. *I. Anil*.

Leaflets obovate-obtuse; racemes lax, pods longer straight or only slightly recurved at the tip ... ... 3. *I. tinctoria*.

Calyx shortly toothed, hardly ½ as long as corolla; pods ascending ... ... ... ... 4. *I. galegioides*. 

Pahang; Ridley! Penang; Curtis! Malacca; Ridley! Singapore; Hullett! Distr. Tropics generally.


Andamans; Port Blair, not uncommon. A native of America but not uncommon in cultivation and as an introduced weed in the Old World. This is apparently much commoner in Indo-China than it is in India; it is frequently mistaken for Indigofera coerulea Roxb. which however appears to be exclusively an Indian plant.


Penang; cultivated, Curtis! Malacca; Griffith! Pangeore; Scortechini! Pahang; "growing near Sultan's tomb," Ridley! Singapore; J. II, 11.
Ridley! A native apparently of the Old World; often cultivated and occasionally occurring as an escape.


**Malay Peninsula; Perak; Kunstler, 316! Malacea, Griffith! Langkawi, Curtis, 2865! Distrib., Ceylon; Indo-China; S. China; Philippines; Malay Archipelago.**

Very easily distinguished from other species by the fact that its pods instead of spreading or being reflexed, are fastigiately grouped with their apices pointing in the direction of the apex of the peduncle. It is often planted for ornament and is perhaps not really native in Malaya.

24. **Sesbania Pers.**

Soft-wooded shrubs or trees with long, very narrow abruptly *pinna* leaves with very numerous deciduous linear-oblong obtuse mucronate leaflets. *Flowers* in axillary racemes. *Calyx* campanulate shallowly 2-lobed or 5-toothed. *Corolla* much exserted; petals all with long claws; standard broad keel straight and obtuse or subrostrate and recurved. *Stamens* 2-adelphous; anthers uniform. *Ovary* stipitate, linear, many-ovuled; style filiform, incurved glabrous; stigma capitate. *Pod* very long and narrow, dehiscent; septate between the very many seeds.

Species about 40, cosmopolitan in the tropics.

*Flowers small, bud straight (§ *Eusesbania*); annual shrubs:*—

Pod twisted pendulous; stems thick pith-like; flowers '75 in long ... ... ... 1. *S. paludosa.*

Pod not twisted usually ascending; stems woody very slender; flowers '4 in. long ... ... ... 2. *S. cannabina.*

*Flowers large, bud falcately recurved (§ *Agati*); a tree* ... 3. *S. grandiflora.*

1. **Sesbania paludosa** Roxb. Hort. Beng. 56 (sub Aeschynomene). A large tree-like herb with annual stems reaching 12 feet in height,

* By an unfortunate oversight this character is not made prominent in the Keys to the tribes and genera, p. 22 and p. 33.

**KEDAH**; open marshy ground near rice-fields, *Künstler* 1712! **DISTRI6.** Bengal; Burma; China; Java.

Roxburgh, who knew the Bengal *Sesbanias* well, has left of most of them, under the name of *Aeschynomene*, unmistakeable descriptions and figures which subsequent Indian botanists have for some reason treated with little consideration. A careful examination of living plants shows, however, that Roxburgh’s treatment of the forms is probably accurate, and his views of the limitation of the species are certainly preferable to any that have since been proposed.

The present species is the familiar *Kathsola* (as opposed to the true *Sola* which is *Aeschynomene aspera*), so common in marshes throughout the Gangetic Delta.

Though recognised as distinct by Prof. Miquel, that author unfortunately has used a specific name that is pre-occupied in the genus. Mr. Kurz thought it might be *Coronilla cochinchinensis* Lour. but that species has erect torulose pods and the identification is therefore impossible. Mr. Bentham has suggested its being *Sesbania punctata* but the pods and the stem structure forbid this identification also. As *Sesbania paludosa* Jacq. is not this species but is Roxburgh’s *Aeschynomene uliginosa* it seems best to conserve Roxburgh’s specific epithet *paludosa* for the very distinct plant to which he originally applied it.

Dr. Kuntze (Rev. Gen. Plant. I, 181) would reduce this to *Sesbania aegyptiaca*! an excellent instance of the unscientific use of the imagination.

Tongkah; Curtis' Collector 2861! Distrib. Lower Bengal, commonly cultivated; Lower Burma; Java.

This species has, like the last, been much misunderstood. It is the familiar Dunchi plant of Bengal, where it is widely cultivated; to a slight extent on account of its fibre which, being more resistant to water than other kinds is employed in making fishing nets and lines; to a greater extent for its long lithe stems that are used as the wattles of which are constructed the walls of the houses in which Piper Betle is grown in Bengal. Probably this is an introduced plant in Malay countries.


Perak; Thaipeng, Scortechini 525! Singapore; Kunstler 1147! Hullett 819! Distrib. Mascarene Islands to N. Australia, usually planted.

The Agati tree, which is very doubtfully native either in India or Malaya, is often grown as a support for Pepper-vines in Southern India. In Northern India it is chiefly planted for the sake of its showy flowers.


Herbs or undershrubs with compound odd-pinnate or, rarely, simple leaves; the leaflets opposite, subcoriaceous. Flowers in terminal and leaf-opposed racemes. Calyx campanulate with distinct subequal teeth. Corolla much exerted, petals clawed, standard suborbicular; keel incurved, not beaked. Stamens diadelphous, anthers uniform, obtuse. Ovary sessile, linear, many-ovuled; style much incurved, flattened or filiform, silky or glabrous; stigma capitate often penicillate. Pod linear flattened, many-seeded, 2-valved, continuous or obscurely sejate between the seeds. Species about 100, in all tropical regions.

The above definition applies only to the species of the Malay Peninsula.

An undershrub; calyx-teeth short, deltoid ... ... 1. T. candida.

Herbs; calyx-teeth narrow cuspidate as long as the tube:—

Pods glabrescent ... ... ... 2. T. purpurea.

Pods clothed with persistent brownish silky hairs ... 3. T. Hookeriana.

1. Tephrosia candida DC. Prodr. II, 249. A low shrub, 4–6 feet high, with slender woody grooved branches clothed with brown or grey

SINGAPORE; Anderson! Hullett! Distrib. Himalayas, Western Indo-China, Malay Archipelago.


MALACCA; Griffith! Penang; Curtis! Pahang; Ridley! Selangor; roadsides, Ridley 7291! Distrib. S.-E. Asia.

The form found in the Malay Peninsula is the typical plant described by Linnaeus and by Roxburgh as Galega purpurea. Mr. Ridley has noted on his Selangor specimens:—"Indigofera, introduced by Tamils, now established."

3. Tephrosia Hookeriana W. & A. Prodr. 212; var. amoena Prain. A slightly-branched erect herbaceous perennial with firm terete finely downy branches. Leaves short-petioled 4-8 in. long; leaflets terminal and in 6-9 opposite pairs narrowly oblongobovate, truncate, 1 in. long, green and glabrous above, grey and thinly silky beneath; stipules linear erect. Racemes copious all lateral, 6-9 in. long, lax-fld.; pedicels 1 in. long; bracteoles minute. Calyx densely silky 15-2 in. long; teeth setaceous rather longer than tube. Corolla 35-5 in. long, red, standard thinly silky. Pods 2-2·5 in. long, 8-10-seeded, slightly recurved, densely clothed with persistent brownish silky hairs; style flattened

**Penang; Curtis’ Malacca; Maingay & Derry! Distrib. N. India.**

This differs from Wight and Arnott’s *T. Hookeriana* (*T. colutea* Wight in Wall. Cat. 5647 not of Pers.) in having leaflets almost twice as long and glabrous above; in true *T. Hookeriana* the leaflets are pubescent above as well as beneath. As Hamilton in Trans. Linn. Soc. XII, 546 gives the alternative name *Tephrosia hirta* to the *Galega hirta* cited under this species by Mr. Baker, it must follow, if Mr. Baker’s identification be correct, that the name *T. hirta* Ham. should be cited for the species. Dr. Hamilton’s diagnosis, however, is of a plant with “falcate” pods in “dense” racemes, two characters which exclude *T. hirta* from this species and which point to its being a form of *T. villosa*.

There is little doubt that in a critical review of the genus the Malayen and North Indian plant should be looked on as specifically distinct from the true *T. Hookeriana* of Southern India; but as an African *T. amena* Eckl. has already been published, Dr. Wallich’s MSS. name is not available. The species might, however, be known as *Tephrosia subamena*. The *Tephrosia amena* “Pers.” cited by Mr. Baker does not exist.

26. Millettia W. & A.

Trees, shrubs or large woody climbers with odd-pinnate, rarely-1-foliate leaves; the leaflets opposite and usually large, generally stipellate. *Flowers* large and showy in axillary solitary or fascicled racemes and in terminal panicles, the florets single or in fascicles along the rachis. *Calyx* cup-shaped lobed or slightly toothed; teeth 5 or the 2 upper connate or absent. *Corolla* much exserted, petals long-clawed; standard broad spreading or reflexed, auricled or not at the base; wings free or only cohering at the tip, oblong sickle-shaped; keel incurred obtuse. *Stamens* monadelphous or diadelphous, the vexillary filament being united at the base or as far as the middle with the others, or being quite free; anthers uniform, filaments filiform. *Ovary* linear sessile or shortly stalked surrounded at base by an annular disc-like sheath; ovules rather numerous; style filiform incurved glabrous, stigma capitate. *Pod* linear, lanceolate or oblong, usually compressed and flat, occasionally turgid; thickly coriaceous or woody; late or hardly dehiscent. Species about 60; especially prevalent in Indo-China and Malaya.

The genus *Millettia* is retained here because its species are familiar to residents in the east under this name. But, as Baron von Mueller has shown, there is no room for a genus *Millettia* apart from *Wisteria*. The name *Wisteria* unfortunately, though it has come into common use among horticulturists, is not the one that was originally given to the genus. The oldest name, as pointed out by Dr. O. Kuntze, is *Phascoloides* and this, in a modified form, that author proposes to employ. Adjectives are not, however, advisable as generic names and the name *Kraunhia* which, as Sir Joseph Hooker and Mr. Jackson point out, is the earliest unobjectionable name, appears to be that which, when the two genera are united, must be employed for their species.
Inflorescences in axillary or terminal racemes or panicles; leaves scattered along the branches:

Standard not auricled at the base of the lamina (§ Eumillekettia), or auricles only represented by callosities:

Leaves lustrous beneath with thin lepidote silky pubescence;
(pods turgid silky; leaves exatipellate) ...

Leaves opaque beneath, glabrous when mature, or silky only on the nerves beneath (M. Hemsleyana); (pods woody):

Pods turgid rugose; leaves rigidly coriaceous; racemes densely thyrsoid; flowers dark-red or purple; (leaves without stipels):

Bracts large suborbicular, young racemes strobilat;
standard silky externally; pods pubescent ...

Bracts small ovate early deciduous; standard glabrous externally; pods glabrous ...

Pods flat smooth (lenticelled in M. glaucescens);
leaves membranous (subcoriaceous in M. corulea);
racemes lax; flowers white, pink or blue:

Leaflets without stipels, membranous; racemes distinctly peduncled; pods glabrous (standard 2-calloose):

Standard glabrous externally:

Pods lenticelled, the sutures slightly winged;
leaflets subglabrous quite glabrous beneath ...

Pods not lenticelled the sutures thickened but not winged; leaflets pubescent on midrib
and nerves beneath ...

Standard silky externally; (pods not lenticelled, sutures not winged; leaflets glabrous beneath).

Leaflets stipellate, subcoriaceous; racemes very close and short peduncled; pods pubescent externally;
(leaves glabrous beneath; flowers blue) ...

Standard auricled at base of lamina (§ Otosema); (leaves subcoriaceous opaque beneath, pods pubescent):

Pods very wide turgid; leaflets small many obtuse;
flowers pink, or white with pink tinge; panicles wide short:

Leaflets densely velvety beneath; pod obpyriform, longitudinally channelled, pubescence short, pale-purple brown ...

Leaflets glabrescent beneath; pod ovate, not channelled, pubescence long, dark-brown ...

Pods flat; leaflets large few caudate-acuminate;
flowers pure white:

Leaflets 5–7, rarely 3; pods soft brown-velvety ...

Leaflets solitary; pods pale yellowish-velvety ...

Flowers solitary along leafless stem on conical processes in axils of leaf-scars; leaves tufted at top of slender stems ...

1. *M. sericea*.

2. *M. eriantha*.

3. *M. atropurpurea*.

4. *M. glaucescens*.

5. *M. Hemsleyana*.

6. *M. decipiens*.

7. *M. corulea*.

8. *M. Mainayi*.

9. *M. oocarpa*.

10. *M. albiflora*.

11. *M. unifoliata*.

12. *M. cauliflora*. 
1. **Millettia sericea** W. & A. Prodr. 263. A large woody climber 80–100 feet long, in dense forest; in the open a low spreading shrub 8–25 feet high; stems 3–6 in. diam.; branches striate shortly finely pubescent. **Leaves** 8–12 in. long, leaflets terminal and in 3–4 opposite petiolulate pairs, without stipels; obovate to elliptic-oblong, entire, apex bluntly cuspidate, base rounded or cuneate, 3–5 in. long 1½–3 in. wide; coriaceous, deep-green and glabrous above glossy and silvery-grey or light-brown from a minute scale-like pubescence beneath; petiolules 2 in. long. **Racemes** axillary nearly as long as the leaves, slightly pubescent, the nodes not produced, each with the scars of 7–8 flowers. **Flowers** on pedicels 1½ in. long bracteolate under the calyx. **Calyx** wide-tubular, limb truncate 1½ in. deep, dark-brown silky externally. **Corolla** 5 in. diam., standard orbicular long-clawed, whitish pink or blue internally, brown-silky externally, wings clawed, purple or pink with white stripes. **Vexillary filament** hardly cohering at base with the remaining stamens. **Ovary** pubescent, style glabrous. **Pod** 3–7 in. long 1 in. across, densely brown-tomentose with a rusty shining velvety tomentum, turgid when ripe. **Seeds** 1–3, rarely 4, testa dark-brown smooth; 1 in. long, 75 in. diam. Miq. Flor. Ind. Bat. I, 153; Bak. in Flor. Brit. Ind. II, 104. **Pongamia sericea** Vent. Hort. Malmais. sub. t. 28; DC. Prodr. II, 416. **Phaseolodes sericeum** Kuntze Rev. I, 201.

**Var. typica**; leaflets silky beneath; sutures of young pods distinctly thickened; seeds 1–2, rarely 3.

**Perak**; **common**; **Scortechini**! *Kunstler*! *Wray*! **Distrib.** Sumatra (*Teysmann*! *Forbes* 3103 A!); Java (*Kurz*!)

A small-leaved form of *M. sericea* is reported from Penang (*Curtis* n. 844!); Lobb n. 310 in Herb. Kew, not seen by the writer, is noted by Mr. Hemsley as identical with it; and the same plant is also at Kew from Singapore, as it is at Calcutta from Perak (*Kunstler* n. 401! *Wray* n. 2364!). But the Perak specimens have in some cases leaflets of the ordinary size on the same twig with the small leaflets; the flowers of this form are exactly like those of *M. sericea* and the Penang plant is therefore not even separable as a variety.

**Var. malaccensis**; leaflets brownish underneath; sutures of young pods hardly thickened; pods longer seeds 3–4.

**Malacca**; *Griffith* 1764! *Mainay* 518! *Goodenough* 1706!

A distinct local form but perhaps hardly a good variety.

2. **Millettia eriantha** Beuth. Pl. Jungh. 250. A rather slender woody climber 50–80 feet long with only the youngest twigs silky. **Leaves** 8–11 in. long, rachis glabrous, leaflets terminal and in 2, rarely 3, opposite pairs, petiolulate without stipels; obovate-oblong or elliptic shortly cuspidate 2–4 in. long, 1½–2½ in. across, rigidly coriaceous pale green and glabrous on both surfaces; petiolules 2½ in. **Racemes** copious, at first short dense 1–1½ in. long and strobilate with large
suborbicular cuspidate densely silky bracts, ultimately thyrsoid 6 in. long; the bracts deciduous 3 in. in diam.; pedicels 15 in. long. *Calyx* wide-campanulate 4 in. long, externally uniformly pubescent with brownish silky hairs; the teeth triangular two-thirds as long as tube. *Corolla* dark-red within, the standard externally densely glossy-brown silky nearly 1 in. long. *Pod* turgid, 3 in. long 1-75 in. across, 1-seeded; woody, rugose, clothed with pale brown hairs; slightly beaked. Miq. Flor. Ind. Bat. I, 155; Bak. in Flor. Brit. Ind. II, 108.

**Perak; common, Wray! Scortechini! Kunstler! Malacca; very common, Griffith! Maingay! Derry! Goodenough! Singapore; Ridley 6396! 6663! Pahang; Ridley 2644!**


**Perak; Scortechini 193! 273! Kunstler 8012! Penang; Wallich 5910! Malacca; common. Singapore; Hultett 60! Distrib. Tenasserim; Sumatra.**

4. *Milletia glaucescens* Kurz in Journ. As. Soc. Beng. XLII, 2. 67. A large tree with glabrous branches the smaller ones slightly angled. *Leaves* 8–9 in. long; rachis glabrous; leaflets terminal and in 4–5 opposite petiolulate pairs; lowest pair broadly ovate the rest obovate-oblong all acuminate, 3-5–5 in. long 1-25–1-75 wide; membranous, bright green above glaucescent beneath, glabrous from an early stage on both surfaces; petiolules 2 in. *Racemes* axillary slender 6 in. long, at first puberulous as are the capillary solitary, paired, or fascicled pedicels, 2 in. long. *Calyx* wide shallow-tubular, slightly pubescent, obscurely toothed, 1 in. deep. *Corolla* 4 in. long, standard orbicular glabrous externally, 2-callose at base, steel-blue (*fide* Kurz); wings clawed. *Vexillary filament* cohering half way up staminal

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sheath. **Ovary** pubescent style glabrous. **Pod** 5–6 in. long, 1 in. wide, thickish, woody, usually tubercled rarely reticulated on the faces, quite glabrous; both sutures thickened and expanded into narrow wings. **Buk. in Flor. Brit. Ind. II,** 107.

**Perak; Kapayong Kurta, Wray 168! Scortechini** (specimens with reticulated but not tubercled pods)!

By its pods this species is most nearly allied to *M. tetrapera* Kurz, but it has very different leaves which resemble those of *M. pubinervis* and *M. Hemsleyana* except in being glabrous. It agrees with these two species also as regards structure of flowers though not as regards pods. As regards leaves it likewise much resembles *M. decipiens* and *M. dehiscens*; in these species, however, not are the pods without wings along the thickened sutures but the standard is silky externally.

5. **Millettia Hemsleyana** Prain. An erect bushy tree 20–40 ft. high, stem 10–15 in. in diam.; branches puberulous when young. **Leaves** 6–8 in. long, rachis pubescent, leaflets terminal and in 3–4 opposite petiolulate pairs, without stipels; lowest pair broadly ovate the rest elliptic-ovobovate all obtusely acuminate, 2–3½ in. long, 1½–1½ in. wide; membranous bright green glabrous from an early stage above subglaucescent and pubescent beneath with scattered flexuous spreading hairs which quickly disappear except from the midrib and main lateral nerves; petiolules 2 in., stipules large, 25 in., deciduous. **Racemes** axillary, slender simple, 2½–4 in. long, at first puberulous as are the capillary, solitary or fascicled pedicels, 2½ in. long, subtended by lanceolate deciduous bracts 2 in. long. **Calyx** wide shallow-tubular, slightly pubescent, obscurely toothed, 1½ in deep, red, or green with a reddish tinge. **Corolla** 4 in. long, standard orbicular 2-callose at base glabrous externally, white or faintly tinged with pink, wings clawed. **Vexillary** filament cohering nearly half way up staminal sheath. **Ovary** pubescent, style glabrous. **Pod** 3½–4 in. long ½ in. wide, thin, quite glabrous, sutures slightly thickened not winged. **Kraunhia Hemsleyana** Prain MSS.

**Perak; Wray 3310! 3608!**

*Millettia Hemsleyana* is very closely related to *M. pubinervis* Kurz, a Tenasserim species; it has however rather narrower leaflets and differs especially in having large stipules and bracts. To *M. glanescens* it is also closely related, but it differs in having pods that are neither winged along the sutures nor lenticelled along the valves. Both in pods and in foliage it likewise closely resembles *M. decipiens* but that species differs in having a pubescent standard.

6. **Millettia decipiens** Prain. An erect wide-spreading tree 40–60 feet high, stems 2–3 feet in diam.; branches all glabrous the smaller slightly angled. **Leaves** 8–9 in. long; rachis glabrous; leaflets terminal and in 4–5 opposite petiolulate pairs; lowest pair broadly ovate the rest elliptic-ovobovate all acuminate 2–3½ in. long 1½–1½ in. wide;
membranous rather dark green on both surfaces glabrous from an early stage on both surfaces except for occasionally a few scattered hairs on the midrib beneath; petiolules 2 in. Racemes axillary slender simple 6-8 in. long, at first puberulous as are the capillary solitary or fascicled pedicels, 2 in long. Calyx wide shallow-tubular; slightly pubescent, obscurely toothed, 15 in. deep. Corolla 4 in. long, standard orbicular, densely silky externally, 2-callose at base, pink, or white with a pink tinge, wings clawed. Vexillary filament cohering half way up staminal sheath. Ovary pubescent, style glabrous; ovules 4. Pod 4-5 in. long, nearly 1 in. across, glabrous, sutures not thickened. *Kraunhia decipiens* Prain MSS.

**Perak; Ulu Slim, 400 feet, Kuntsler 10718! Kwala Dipong, Scortechini 1749! Pluss river, Wray 548! Pahang; Kwala Tahan, Ridley 2591!**

The flowers of this species so much resemble those of *Pongamia glabra* that, with flowering examples, only careful dissection to ascertain the number of ovules satisfactorily distinguishes the two. Another species extremely nearly related to this is *Millettia dehiscent* (*Pongamia dehiscent* Koord. & Vul. Bijd. II. 96) a Java tree with the same silky standard, but with the ovary 5- or more-ovuled; its leaves are like those of *M. glaucescent*, its pods like those of *M. ovalifolia*.

**7. Millettia coerulea* Bak. in Flor. Brit. Ind. II, 107. A woody climber with glabrous branches. Leaflets terminal and in 3 petiolulate pairs, stipellate; obovate-oblong cuspidate 4-6 in. long; subcoriaceous, glabrous on both sides from an early stage; petiolules 15 in. long. Racemes short-pediculed, close, axillary. Flowers short-pedicelled, densely fascicled. Calyx campanulate 1 in., faintly silky, nearly truncate. Corolla three times the calyx, the standard densely white-canescent on the back. Stamens monadelphous. Pod large flat rather woody, linear-oblong 7-8 in. long, 1.5-1.75 in. wide, recurved, late in dehiscing, clothed with dense short persistent brown-velvety pubescence. *Pongamia coerulea* Grah. in Wall. Cat. 5894.

**Malacca; Griffith. Distrib. Burma.**

The above description is taken from the *Flora of British India*, there being no specimen at Calcutta either of the Burmese or of the Malacca types of Mr. Baker's species. The specimens here that accord best with the description are some from Penang (Curtis n. 2459); they are in fruit only and may prove to belong to *M. coerulea*. The plant is noted, however, as a "tree"; the specimens have 5-foliolate leaves and the leaflets resemble those of *M. albiflora*, of which it may equally well be a variety.

**8. Millettia Maingayi* Bak. in Flor. Brit. Ind. II, 110. A creeper over 100 feet long; young branches pale brown-pubescent. Leaves 8-10 in. long, leaflets terminal and in 5-8 opposite pairs, shortly petiolulated stipellate; oblong, base rounded, apex rounded or subacute, 1.5-2 in. long 1 in. across, coriaceous, light green and glabrous above, velvety
underneath as is the leaf-rachis; petiolules 2 in., stipels setaceous, persistent. Racemes in small axillary panicles one-third as long as leaves, 2·5 in. long, 1·5 in. across; rachis and pedicels rusty-pubescent, as are the linear deciduous bracts 1 in. long; pedicels 1 in. Calyx 2 in. campanulate, externally rusty-pubescent, teeth wide-triangular half as long as tube. Corolla white tinged with pink, 5 in. long, standard orbicular, auriculate at base of lamina, slightly emarginate and slightly puberulous externally. Pod oblong or obpyriform, woody indehiscent (fide Baker), rounded at both ends, 6 in. long 3·5 in. wide, turgid, shortly pale rusty-brown velvety, the surface traversed by deep longitudinal grooves.

Singapore; cultivated, Maingay; Ridley! Selangore; in dense jungle at 800-1200 feet elev., Kunstler 8759!

A remarkable species, originally described by Mr. Baker from a fruiting specimen. To the kindness of Mr. Ridley, the Calcutta Herbarium owes the possession of excellent flowering and fruiting examples of the plant; from these the above description has been drawn up. Mr. Kunstler's plant from Selangore is unfortunately only in flower; it agrees however in every detail with the flowering specimens sent from the Singapore garden by Mr. Ridley.

The only near ally of M. Maingayi is the next species from which it differs in having larger pods that, according to Mr. Baker, do not dehisce and in having leaflets densely tomentose beneath.

9. Millettia oocarpa Prain. A large creeper, young branches glabrous. Leaves 6–8 in. long, leaflets terminal and in 4–6 opposite pairs, shortly petiolulate stipellate; oblong, rounded at both ends, 2–3 in. long, 1–1·5 in. across, the terminal considerably exceeding the others, subcoriaceous light green and glabrous above, whitish and very sparsely adpressed-puberulous, finely reticulately veined beneath; leaf-rachis puberulous as are the petiolules 2 in. long; stipels setaceous persistent. Racemes in small axillary panicles one-half as long as leaves, 2·5 in. long, 1·5 in. across; rachis and pedicels slightly puberulous as are the linear deciduous bracts 1 in. long; pedicels 1 in. Calyx 2 in. long, campanulate, externally grey-puberulous, teeth short obscure. Corolla white tinged with pink, 5 in. long, standard orbicular, auriculate at base of lamina, entire, uniformly sparsely puberulous externally. Stamens diadelphous, vexillary filament free. Ovary 2-ovuled, pubescent. Pod oval, woody, dehiscent, rounded at both ends, 3·5 in. long, 1·75 in. in diam., turgid, densely dark brown-velvety, the surface smooth. Kraunthia oocarpa Prain MSS.

Perak; Batu Togoh, 250 feet, Wray 2141! Scortechini 429!

Very nearly related to Millettia Maingayi of which it has exactly the flowers. Its pods however are smaller, densely covered with darker and much longer hairs, and are distinctly dehiscent. In shape and size they resemble the egg of a domestic fowl. The leaflets too differ in not being velvety beneath, and the leaves are shorter.

10. Millettia albiflora Prain. A handsome spreading tree some-
times 80-100 feet high (Kunstler), usually 30-50 feet, trunk 2-3 feet in diam., branches glabrous. Leaves a foot long, leaflets terminal and in 2-3 more rarely 1, opposite pairs, shortly petiolulate without stipels, elliptic-lanceolate entire apex caudate base cuneate, 5-10 in. long, 1.5-2.5 in. across, lowest pair rather smaller, thickly membranous shining above dull beneath, with 6-9 pairs of ascending rather prominent lateral nerves and a very prominent midrib, quite glabrous on both surfaces, petiolules 2 in. long. Racemes in very long narrow axillary panicles towards ends of branches, 1-1.5 feet long, 2.5 in. across; individual racemes subfastigiate 4-6 in. long with 10-12 solitary short-pedicelled flowers; pedicels 15 in. long, rusty-puberulous as are the peduncles and main-rachis. Calyx 25 in. long, rusty-puberulous, tube campanulate rather longer than the triangular teeth, the two upper teeth connate emarginate. Corolla pure white 7.5 in. long, standard orbicular 2-auriculate at base of lamina, externally glabrous. Vexillary filament extending half way up the sheath or at length free on one side only, or on both. Ovary puberulous. Pod linear 7-13 in. long, 1.5-2 in. wide, straight flat rather woody, uniformly soft brown-velvety. Kraunhia albiflora Prain MSS.


A very fine species apparently extremely common in Perak. Mr. Kunstler notes that it is usually found near river-courses or in wet low ground.

11. MILLETTIA UNIFOLIATA Prain. A handsome spreading tree 30-40 feet high, trunk 1 foot in diam., branches glabrous. Leaves consisting of a solitary terminal leaflet, petiolulate without stipels, obovate-oblong or lanceolate entire, apex acute rarely caudate, base cuneate, thickly membranous shining above dull beneath, with a prominent midrib and 6-9 pairs of ascending lateral nerves not much more prominent than the distinct secondary reticulations; glabrous on both surfaces; petiolule 25 in. long directly articulate with branch. Racemes in very slender axillary panicles shorter than the leaflets, 3-4 in. long 25-35 in. across; individual racemes short 3-5-fld. separated from each other by intervals 1 in. long; peduncles and pedicels glabrous. Calyx 2 in. long, externally glabrous, campanulate 2-bracteolate at base, bracteoles ovate-lanceolate minute, teeth shorter than tube hirsute within. Corolla pure white 75 in. long, standard orbicular 2-auriculate at base of lamina, externally glabrous. Stamens monadelphous in a sheath split along the vexillary side. Ovary puberulous. Pod linear 6 in. long 1 in. across, flat, rather woody, tapering to both ends, finely pale yellowish-velvety externally. Kraunhia unifoliata Prain MSS.
Pangkore; Pangkore Island, Curtis 1615! Scortechini 1023! Tupia, Wray 2836! Blanja, Scortechini 124! 1711! Larut, Kunstler 4251! Goping, Kunstler 4492! 8210!

Very closely related to Millettia albiflora of which it has much the flowers and also much the fruits. It differs however from all other hitherto known Millettias in having 1-foliolate leaves. The pods are never so large as in M. albiflora and the inflorescence is very different in appearance owing to its being smaller and more slender.

12. **Millettia cauliflora** Prain. A small slender unbranched gregarious shrub 6–8 feet high, stems hardly 5 in. in diam., with black lenticelled bark, bearing a terminal tuft of leaves and having small nodular flower-bearing projections in the axils of leaf-scars along the stem. *Leaves* 1–1.5 feet long; stipules subulate, 3 in. long, caduus; rachis tawny-pubescent as are the petiolules and the setaceous persistent stipels; leaflets thinly membranous glabrous on both surfaces, lateral nerves in 5–7 ascending pairs impressed above very prominent like the midrib beneath; lowest pair 2 in. long 1.25 in. across, terminal and upper pairs 6 in. long 2 in. wide. *Calyx* 2 in., glabrescent. *Corolla* (only withered specimens seen) apparently pink, standard apparently auricled. *Pod* solitary, at intervals along the stem, 3–3.5 in. long, 6 in. wide, narrowed towards base, slightly recurved, rigidly coriaceous early dehiscent, externally grey silky-tomentose; seeds 2. *Kraunhia cauliflora* Prain MSS.

Perak; Larut, Kunstler 2555!

A very distinct species with leaves much like those of the African *Millettia macrophylla* Hook. f., but with fewer lateral nerves. It differs from all other known species in having solitary fruits (and apparently solitary flowers) in the axils of old leaf-scars along the stem. The standard seems to be auricled, but whether the stamens are monadelphous or diadelphous cannot yet be said.

27. **Pongamia** Vent.

A tree. *Leaves* odd-pinnate, leaflets opposite, ex-stipellate. *Flowers* racemened. *Calyx* campanulate, nearly truncate. *Corolla* much exserted; standard broad, silky; keel obtuse the petals cohering at their tip. *Stamens* monadelphous, the upper filament free low down; anthers oblong; versatile. *Ovary* subsessile, 2-ovuled; style incurved, glabrous, stigma capitulate. *Pod* woody, somewhat turgid, oblong, indehiscent, not winged nor thickened at the sutures. A single species, on all coasts from the Mascarene Islands to Malaya, North Australia, and Western Polynesia.

**Pongamia glabra** Vent. Jard. Malm. t. 28. A fairly-large tree 40–60 feet high, with spreading glabrous branches; bark greyish-green soft, wood pale-yellow when cut, darkening on exposure; stem reaching 2–3
feet in. diam. Leaves 8–10 in. long, pale-green, leaflets usually 5–7, more rarely 7–9, oblong or ovate, rarely ovate-lanceolate, acute, base cuneate or deltoid; subequal, 3–7 in. long, 1–3½ in. wide, subcoriaceous, glabrous on both surfaces or, rarely, slightly puberulous on the nerves beneath, lateral nerves about 8 pairs rather prominent beneath as is the midrib, rachis about 5 in. long glabrous as are the petiolules 2½ in. long. Flowers in rather short axillary racemes 4–6 in. long with peduncles 1½–1½ in. long, usually simple; nodes tumid bearing 2–4 subequal filiform pedicels, rachis and pedicels sparsely puberulous, pedicels 2½–35 in. long, bracteolate at base and 2-bracteolate towards apex. Calyx wide-campanulate 1½ in. deep, 1½ in. wide, mouth truncated. Corolla 3½–5 in. long, white with violet or pinkish flush, standard orbicular, silky on the back, subcordate and 2-auriculate at the base. Stamens monadelphous. Ovary finely pubescent, ovules 2, rarely 1. Pod turgid woody glabrous, 1½–2 in. long, 8–1½ in. wide, 2½ in. thick, brownish-green with a short curved point; seeds 1, very rarely 2, testa white, marbled with slightly raised brownish lines radiating irregularly from the hilum, 7½ in. long, 3½ in. wide.


In all the provinces, very abundant on the banks of every tidal river and along the margins of all Mangrove-swamps.—Distrib.; of the genus; often planted in inland districts.

Var. xerocarpa; leaflets 7–9, very rarely 5, lanceolate 1–1½ in. wide, usually sparsely puberulous on the midrib and main veins beneath, racemes occasionally 2–3 in same axil and sometimes sparingly branched, the pedicels 2½ in. long with the bracteoles opposed and situated close under the calyx; ovules sometimes solitary. Pongamia xerocarpa Hassk. Retz. ed. nov. 208. Malaparius flavus Miq. Flor. Ind. Bat. I, 1082 in addend., hardly Malaparius Rumphius.

Pahang; Ridley 1362! Kedah; Kunstler 1740! Perak; Trang,
**Pongamia glabra** is the well-known littoral species known in Southern India generally as **Pongam**, in Northern India as **Karanj**, in Burma as **Thin-wei** and in Malaya as **Malapari**. Throughout India it is very generally planted, both as a timber tree, and for the sake of the oil obtained from its seeds; it does not seem to be planted in the Malayan provinces.

The typical variety appears in two somewhat distinct forms that pass, however, into each other by all kinds of intermediates. These are:

(a) a form with medium-sized leaflets and flowers (the original *P. glabra*) which is spread throughout the area occupied by the species; also

(b) a form with decidedly larger leaflets and flowers (the form named *P. grandifolia* Zoll. & Mor.) which extends from north to south along the coasts of Chittagong, Arracan, the Andamans, Nicobars, Sumatra and Java, apparently without extending westward to the Sundribuns and India or eastward to Tenasserim and the Malay Peninsula.

**var. zorocarpa**, though only separable by characters that individually are trivial, nevertheless looks remarkably different from the type; it resembles far more the two species known as *Millettia decipiens*, and *Millettia dehiscentes*. Indeed, with flowers alone, only a careful examination of the ovary, 4- or more-ovuled in the *Millettias*, 1- or 2-ovuled in the *Pongamia*, ensures accurate determination. The fruits of the *Millettias* are, however, dehiscent and therefore unlike those of *Pongamia*.

Roxburgh used for this genus Lamarck’s name *Galedupa*, first applied in 1786. Lamarck’s use of the name depended on his belief that *Caju galedupa* Rumphius (Herb. Amboin. II, t. 13) was this tree. As figured, however, *Caju galedupa* has equally-pinnate leaves, dehiscent pods and arillate seeds; *Pongamia glabra* has unequally-pinnate leaves, indehiscent pods, no arillus and a very small hilum. Moreover Rumphius describes and figures *Pongamia glabra* (Herb. Amboin. III, 117) under its Malayan name *Malapari*. That Lamarck had detected his mistake is clear from his having abandoned the name *Galedupa* in 1797 (Illustr. t. 603) in favour of *Pongamia*—taken from Adanson’s name *Pongam* of 1786. This last Venentat amended to *Pongamia* in 1803, and in that form has become familiar a name which, even were *Galedupa* accurately applicable, is much anterior to *Galedupa*. The point would not indeed call for discussion but for the fact that quite recently Taubert in the authoritative *Natürlichen Pflanzenfamilien* has re-adopted Roxburgh’s usage. Kuntze, not satisfied even with this amount of change, desires to use the word *Caju*(*m*); that is, he desires to use precisely the synonym which cannot be applied to the plant described by Lamarck, as the name of the plant to which Lamarck’s definition belongs.

Loureiro, overlooking both Rumphius’ description of the pods and his figure showing its leaflets as opposite, referred *Malaparius* to *Pterocarpus*; he has been followed in this by most subsequent botanists except Miquel, who, having seen specimens of *Malapari* collected in Sumatra by Teysmann, removed the plant from *Pterocarpus* and established it as a genus. Bentham (Gen. Plant. I, 465) expresses a doubt as to Teysmann’s ‘*Malapari*’ being conspecific with Rumphius’ one. Everything, however, is in favour of the belief (unfortunately the Sumatra plant is unrepresented in Herb. Calcutta) that Teysmann’s ‘*Malapari*’ is *Pongamia glabra*, just as Rumphius’ ‘*Malapari*’ and the ‘*Malapari*’ recently collected by Derry in Malacca, are *Pongamia glabra*. But it must be noted that while Rumphius’ ‘*Malapari*’ appears...
to be typical *Pongmia glabra*, Derry's 'Malapari' is var. *zerocarpa*, and so apparently, judging by Miquel's description, is Teysmann's.

28. **DERRIS LOUR.**

Climbers, rarely erect trees. *Leaves* odd-pinnate, with usually exstipellate leaflets. *Flowers* copious, usually fascicled, showy, in axillary or terminal racemes or panicles. *Calyx* campanulate, nearly truncate. *Corolla* much exserted, standard broad; keel obtuse, the petals cohering slightly. *Stamens* usually monadelphous, the upper one free in § *Aganope*; anthers versatile. *Ovary* sessile, few-ovuled; *style* incurved, filiform, stigma capitate. *Pod* rigid, thin, flat, indehiscent, oblong if one-seeded, strap-shaped if few-seeded, with a distinct wing down the upper or both sutures. *Distrib.* Species about 40, belting the world in the tropics.

Standard not callose at the base:—

Vexillary stamen free throughout; flowers single in ample thyrsoid panicles with nodes neither tumid nor produced into stalks (§ *Aganope*):—

1. *D. sinuata.*

Pod winged only along the upper suture, and sinuate between the seeds; corolla over 1/2 in. long:—

Pod winged down both sutures, not sinuate between the seeds; corolla under 1/2 in. long:—

Buds and flowers distinctly pedicelled, bracteoles shorter than buds:—

Buds and flowers subsessile, bracteoles exceeding the buds:—

2. *D. Wallichii.*

3. *D. thyrsiflora.*

Vexillary stamen united with the others at least in the centre of tube; flowers fascicled on tumid nodes that are sometimes produced into stalks:—

Pods winged only along upper suture:—

Pod narrow, pointed at both ends, several-seeded (§ *Brachypiterum*):—

Climbers, leaflets 9–19 medium, acute; flowers in long lax panicles exceeding the leaves:—

4. *D. scandens.*

Trees, leaflets 25–39 small, rounded; flowers in dense panicles shorter than the leaves:—

5. *D. dalbergioides.*

Pod suborbicular or shortly broadly-oblong, obtuse, few-seeded (§ *Euderris*):—

Leaflets glabrous, not exceeding 5 in. long, exstipellate; pods glabrous:—


Leaflets pubescent beneath, often 6–8 in. long, stipellate; pods pubescent:—

7. *D. elegans.*

Pod winged along both sutures [unknown in *D. affinis* and *D. floribunda*] (§ *Dipteroderris*):—

Rachis and branches of panicle densely silky; pod silky; (leaves faintly-veined):—

8. *D. andamanica.*

J. II. 13
Rachis and branches of panicle glabrous or sparsely puberulous; pod (where known) glabrous:—

Flowers white in laxly-branching panicles:—
Leaves with 10 pairs of prominent spreading secondary nerves; ovules 4
Leaves with 4-5 pairs of ascending faint secondary nerves; ovules 2-3

Flowers pink in fastigiate-branching panicles (leaves with numerous spreading but not prominent secondary nerves; ovules 2; pod glabrous)

9. D. affinis:


Standard 2-callose at base (§ Paraderris):—

Leave and petals pubescent
Leaves and petals glabrous

11. D. amana.

§ 1. Aganope. Robust climbers with large leaflets; flowers usually rather small in ample thyrsoid panicles, the nodes not produced into stalks; upper stamen quite free from the others down to the base; base of vexillum without callosities; pod winged down one or both sutures.

1. Derris sinuata Thwaites Enum. Pl. Zeylan. 93. A strong climber with dark-brown glabrous branches. Leaves 10-16 in. long; leaflets dark-green 5-7, coriaceous ovate- to ovate-oblong or elliptic, shortly cuspidate or subobtuse base rounded or widely deltoid, 4-5 in. long, 2-3 in. wide, glabrous on both surfaces, lateral nerves 5-7 pairs spreading hardly visible, rachis 6-12 in. long glabrous as are the petioles 25 in. long. Flowers in ample thyrsoid terminal, or terminal and axillary panicles 8-16 in. long, branches 1.5-3 in. long at intervals of .5-1 in. their nodes not tumid nor produced into stalks, pedicels .1 in. long (in fruit lengthening to 25-3 in.), stout, arranged usually in sub-opposite pairs 2-25 in. apart, occasionally all scattered, rachis and its branches glabrescent, pedicels adpressed rusty-puberulous, with small deciduous bract at base and 2 very minute triangular deciduous bracteoles close to calyx. Calyx wide-campanulate thinly silky .2 in. long, with ripe fruit .25 in. in diam. circumscissile at base. Corolla .6 in., standard erect orbicular .5 in. wide, with callose cordate base. Stamens 2-adellphous, the vexillary filament free from the rest to the base. Ovary pubescent, ovules 5-7. Pod strap-shaped, coriaceous, distinctly reticulated, 2.5-3 in. long, 1.5 in. wide, upper suture narrowly winged, wing never exceeding .1 in. in breadth, usually much less and sometimes barely perceptible, always more or less sinate between the 1-5 seeds. Benth. Journ. Linn. Soc. IV, Suppl. 113; Bak. in Flor. Brit. Ind. II, 246. Pongamia sinuata Wall. Cat. 5911. Pongamia grandifolia Grah. in Wall. Cat. 5882, not of Zoll. & Mor.

Perak; on banks of tidal rivers, Kunstler 179! Scortechini! Malacca; river banks, Griffith 1773! Maingai 551! Distrib. Ceylon; Sundribuns: Coasts of Indo-China and the Malay Archipelago.
2. **Derris Wallichii** Prain. A strong climber with glabrous brownish lenticular branches. *Leaves* 8-12 in. long, leaflets pale-green, 5-9, subcoriaceous oblong-lanceolate acute, base rounded, 4-5 in. long 1:5-2 in. wide, glabrous on both surfaces, lateral nerves ascending 8-9 pairs prominent beneath, rachis 4-8 in. long glabrous as are the petiolules. Flowers in ample thyrsoid terminal and axillary panicles 8-16 in. long; their branches 5-1:5 in. long at intervals of 25-5 in., their nodes not tumid nor produced into stalks, pedicels 2-25 in. long arranged in subopposite pairs at intervals of 2-3 in., rachis and its branches thinly-silky as are the pedicels and calyx, bracts at base of pedicels ovate, much shorter than buds, lateral pair of bracteoles at their apices very minute. *Calyx* tubular at length campanulate, mouth truncate, 12 in. long, 15 in. wide. *Corolla* 3 in. long, standard erect orbicular with cordate ecallose base. Stamens 2-adelphous, the vexillary filament quite free. *Ovary* pubescent, ovules 4. *Pod* broadly strap-shaped, thin, flat, glabrous, finely veined, 1:5-4:5 in. long, 1:5 in. wide 1-2-seeded, not sinate between the seeds; distinctly winged along both margins. *Pterocarpus floribundus* Wall. Cat. 5846. **Derris thyrsiflora** Prain MSS. in Herb. Calcutta (as to Andaman specimens) hardly of Bentham.

**Andamans; King's Collectors!** Distrib. Silhet, Cachar and Khasia.

The Andaman specimens here described have leaves very like those of *D. thyrsiflora* but they have rather more nerves and are not quite so thick. The long pedicels, however, make it very easy to distinguish the two, while the fruits of *D. Wallichii* are broader than those of *D. thyrsiflora*. In distributing specimens from the Calcutta Herbarium those from the Andamans were unfortunately issued under the name *D. thyrsiflora*.

3. **Derris thyrsiflora** Benth. in Journ. Linn. Soc. IV, Suppl. 114. A large rambling bush or small tree with spreading branches, 15 to 20 feet high, or a robust climber reaching 60-80 feet in length, in either case with a stem 6-8 in. in diam. with glabrous lenticelled branches. *Leaves* 8-15 in. long, leaflets dark-green, 5-9, coriaceous oblong to oblong-lanceolate usually acute sometimes rounded at apex, base rounded or cuneate, 4-6 in. long, 1:5-2:5 in. wide, glabrous on both surfaces, lateral nerves ascending 5-7 pairs rather prominent beneath, rachis 4-10 in. long, glabrous as are the petiolules 25 in. long. Flowers in ample thyrsoid terminal and axillary panicles 8-24 in. long, their branches 5-2 in. long at intervals of 25-5 in., their nodes not tumid nor produced into stalks, pedicels in fruit under 1 in. in flower hardly perceptible, arranged usually in close-set subopposite pairs, rachis and its branches thinly silky as is the subsessile calyx with linear deciduous basal bracteole as long as bud and with two very minute lateral bracteoles. *Calyx* tubular, at length campanulate, mouth truncate, 12 in. long, 15 in. wide, green-

 scour the Nicobars; Kamorta, Kurz! Kedah; Yan, Ridley 5224! Penang; Curtis 248! Malacca; Griffith 1776! Maingay 552! Derry 94! 1030! Perak; Scortechini, 907! 1176! 1342! 1533! 1639! 2073! Wray, 1985! 2513! 2770! 3068! Kunstler 3630! 6419! 7638! 7757! 7919! 10062! 10395! 10850! Pahang; Ridley 2456! 2458! Singapore; Anderson! Kurz! Hullett! Distr. Sumatra, Java.

This species is very distinct from *D. sinuata* by reason of its much smaller, more numerous, and more closely set florets, which are as nearly as possible sessile; also on account of its very different pods which are shorter, much thinner, not sinuate between the seeds and are distinctly winged down both sutures. It is much more closely related to the last species from which it can be most easily distinguished by the absence of pedicels.

The synonym *Amerimum obovatum* is excluded because that plant is the same as *Pongamia obovata* Grif., reduced, with justice, to *Derris cuneifolia*. And the synonym *Pongamia* Wall. Cat. 9054 is also excluded, at least as a temporary measure, because Mr. Baker, in another passage, has referred it to *Spatholobus acuminatus*.

There are at Calcutta authentic examples, named by Dr. Miquel himself, both of *Aganope floribunda* Miq. and of *Derris pyrothryrsa* Miq.; these are specimens of the same species, from Java and Sumatra respectively; they agree exactly with our specimens from the Malay Peninsula.

The variation in habit depends on whether the species is growing in open places or in dense forest.

§ 2. **Brachypterus.** Trees or climbers with comparatively small leaflets; flowers medium fasciculate on tumid nodes in axillary panicles: stamens monadelphous; base of vexillum without callosities; pod thin strap-shaped, narrow, pointed at both ends, winged only along the upper suture.

4. *Derris scandens* Benth. in. Journ. Linn. Soc. IV, Suppl. 103. A very large climber often exceeding 100 feet in length with branchlets at first obscurely grey downy; stems as thick as a man's wrist with very irregularly excentric annual rings. *Leaves* 4–6 in. long, dark green; leaflets 9-19, rigidly subcoriaceous obovate-oblong to oblong, acute rarely obtuse at apex, cuneate less often rounded at base, 2 in long, *75* in. wide, polished and glabrous above, obscurely adpressed


Mr. Baker has described the pod as glabrous; it never becomes quite glabrous even when ripe. Though the name Derris scandens is most generally used for this species, it has to be pointed out that, so soon as Deguelia is recognised to be the best generic name, this species will have to be known as Deguelia timorensis Taub. (Natür. Pflanzenfam. III, 3, 345) because Deguelia scandens is the original name for the American plant at present known as Derris guianensis Bth. The genus was published under the name Deguelia before it was published under the name Derris.

5. Derris dalbergioides Bak. in Flor. Brit. Ind. II, 241. A spreading tree 30-40 feet high; branchlets silky-pubescent. Leaves 6-8 in. long by 1·5-2 in. wide, leaflets 25-39, linear rounded-obtuse at both ends slightly oblique at the base the apex slightly emarginate, 1 in. long, 35 in. wide, firmly papery, adpressed pubescent on both sides, dark-green above paler beneath, lateral nerves 7-8 pairs, indistinct, rachis 5-6 in. long and petiolules 1-15 in. rusty-pubescent. Flowers in copious short-peduncled axillary racemes 3-6 in. long very rarely exceeding the leaves, about 65-75 in. wide with crowded timid nodes each bearing a dense cluster of unequal short pedicels 1 in. long or less, the various flowers of a node expanding successively, rachis and pedicels brown silky-pubescent, the pedicels 2-bracteolate under the calyx, the bracteoles linear 0·8 in. long. Calyx 15 in. long, densely brown-silky, shortly but distinctly toothed, the teeth deltoid the lower subequal, the

PERAK; very common, Scortechini 1995; Ridley 3024; Kunstler 3039; 5805; Patani; Machado 5812; Malacca; Maingay 603; Derry, 138; 488; Goodenough 1829! Distrib. Tenasserim and Martaban.

None of the large suites of specimens sent to Calcutta has fruit; Mr. Baker describes the pod as exactly like that of D. robusta; he however describes D. robusta as having a glabrous pod which is never the case. Further Mr. Baker has described the leaflets of this species as ‘glabrous’ and on this account Father Scortechini has proposed for the Perak plant the name D. dalbergioides var. dasyphylla, to be distinguished by its pubescent leaflets from Mr. Baker’s plant. The leaves of the original specimens collected by Parish and Maingay have, however, leaflets pubescent on both surfaces exactly as in the Perak plant.

§ 3. EUDERRIS. Robust climbers with medium to large leaflets; flowers rather large fasciculate on tumid or produced nodes in axillary panicles; stamens monadelphous; base of vexillum without callosities; pod thin, broadly oblong or suborbicular, obtuse, winged only along the upper suture.

6. DERRIS ULIGINOSA Benth. Pl. Jungh. 252. A widely spreading shrubby climber sometimes 40 feet long, with glabrous branches; stems 2–3 in. in diam. Leaves 5–8 in. long, leaflets usually 5, but very often 3, casually solitary, the terminal exceeding the others, rigidly subcoriaceous, ovate, acuminate or caudate-acuminate, base always rounded, 3–5 in. long, 1½–2½ in. wide, polished above quite glabrous on both surfaces, lateral nerves 7–8 pairs, very faint, looping at their ends some way within margin, bright green above paler beneath, rachis 2–5 in. long, channelled above and glabrous as are the petiolules 25 in. long, secondary nerves indistinct. Flowers in rather short showy axillary racemes, 3–5 in. long, with nodes produced into short stalks each bearing one or several subequal pedicels the flowers of a fascicle opening subsimultaneously, rachis and pedicels glabrous, the node-stalks 15 in., the pedicels proper as long, bracteolate at base and again 2-bracteolate a little below the calyx. Calyx 15 in. long, subglabrous except the shortly ciliate subtruncate margin, rather wide-campanulate. Corolla delicate rose-pink, 4 in. long, standard orbicular base subcordate eglandular. Stamens monadelphous. Ovary finely puberulous, ovules 5–7. Pod obliquely rounded-oblong 1–5 in. long, 1½ in. across, glabrous, pale straw-colour when ripe, thin, flat, distinctly reticulately-veined; seed solitary, yellowish-brown, much compressed, 1 in. long almost as broad. Benth. in Journ. Linn. Soc. IV, Suppl. 107; Miq. Flor. Ind. Bat. I, 141; Bak. in Flor. Brit. Ind. II, 241. ROBINIA ULIGINOSA Roxb.

In all the provinces, on the sea-coasts and on muddy tidal-river banks, common. **Distrib.** Sea-shores from Eastern Africa and the Mascarene Islands to Malaya and Western Polynesia.

Mr. Bentham would refer here *Derris Forsteniana* Bl. (Miq. Flor. Ind. Bat. I, 144); this hardly seems probable owing to Miquel's description of the leaves as having 3 pairs of leaflets. Mr. Baker would also refer here *Dalbergia heterophylla* Willd. (Sp. Pl. III, 901). But this again is very improbable for *D. heterophylla* has, according to the original description, obtuse leaves, which *Derris uliginosa* never has; as, also, racemes longer than the leaves, which those of *D. uliginosa* never are.

7. **Derris elegans** Benth. Pl. Jungh. I, 252. A rather slender creeper sometimes 60 feet long, with brown pubescent branchlets. *Leaves* 8–12 in. long, dark-green, leaflets 5 (very rarely 3 or 7) the terminal exceeding the others, rigidly subcoriaceous, from oblong to lanceolate, base always somewhat rounded, 3–8 in. long, 1·5–4 in. wide, glabrous above, when young rusty-pubescent (sometimes persistently so) beneath, rachis rusty-pubescent 4 in. long, petiolules glabrescent 2 in. long with rigid subulate stipels 1 in. long, lateral veins 6–8 pairs prominent like midrib beneath. **Flowers** in solitary or fascicled axillary racemes 2–3 in. long, always much shorter than the leaves, nodes bracteate tumid but not produced into stalks, each bearing one or several subequal pedicels, rachis and pedicels rather densely villous with spreading rusty pubescence, the pedicels filiform 35 in. long with 2 linear bracteoles a little below the calyx. **Calyx** 1·5 in. long, black purple, sparsely pubescent, margin subtruncated. **Corolla** pure-white with pink tips, 4–5 in. long, standard orbicular-oblong tapering at base eglandular. **Stamens** monadelphous. **Ovary** softly villous, ovules 2–4. **Pod** obliquely rounded-oblong or oblong 1·5 (rarely 2·5 in.) long, 1 in. wide, thin, flat, distinctly reticulated, covered throughout with a fine sparse pubescence; seeds 1, rarely 2, much compressed 75 in. in diam.


**Andamans**; **King's Collectors! Perak**; **Kunstler** 1419! 3911! **Distrib.** Tenasserim and Martaban; Sumatra (Forbes!)

MALACCA; Maingay 608! Perak; Scortechini 1758! Kunstler 2775! 4014! 5583! 7398! Distrib.; Tenasserim.

The only differences between the two plants are in the points noted; their fruits are identical. The species is evidently closely related to D. uliginosa and has very similar pods; these however are always rather narrower in proportion to their length and further differ in occasionally being 2-seeded. But the inflorescence differs in the two in that the nodes of D. elegans are not produced; and the leaves differ markedly from those of D. uliginosa in shape, and as to pubescence. The most striking peculiarity of D. elegans is however the presence of stipels, a feature most unusual in Derris, but equally manifest in both varieties.

§ 4. Dipteroderris. Robust climbers with large leaflets, flowers medium on tumbid or produced nodes in terminal and axillary panicles; stamens monadelphous, base of vexillum without callosities; pod winged down both sutures.

8. Derris andamanica Prain. A strong climber with fulvous or tawny-pubescent branches. Leaves 10–16 in. long; leaflets pale-green 7–9 (rarely 5) coriaceous,-oblong or elliptic shortly cuspidate, base rounded, 5–6 in. long 2–3 in. wide, glabrous on both surfaces, lateral nerves 8–10 pairs spreading faint below not visible above except in young leaves, secondary veining fine, rachis 6–12 in. long glabrous as are the petiolules 25 in. Flowers in ample terminal and axillary panicles, the branches rather numerous ascending 5–8 in. long, nodes tumbid or produced into short stalks sometimes 75–1 in. long, bearing several unequal filiform pedicels either clustered at their tips or scattered throughout their extent, rachis and branches pale tawny-pubescent, pedicels puberulous 2–3 in. long exceeding the calyx, bracteate at their base and 2-bracteolate under the calyx. Calyx wide-campanulate 12 in. long, densely silky, green, margin subentire. Corolla white 6 in. long, standard orbicular, base callose shallow-cordate. Stamens monadelphous. Ovary finely pubescent; ovules 4. Pod finely tawny-silky, thin, strap-shaped, 3–4 in. long, 1 in. wide, winged subequally along both sutures, wings 12 in. wide; seeds 1–3. Derris sinuata Prain in Journ. As. Soc. Beng. LX, 2, 311 not of Benth.

Andamans; from Coco Group southwards; common on the coasts. Nicobars; common.

This fine species has not, so far, been collected outside the limits of the Andamans and Nicobars. Originally referred in the Calcutta Herbarium to Derris sinuata, recent and fuller suites of specimens now show that its nearest alliance is with the South Indian D. eualata Bedd., but it has longer pedicels and smaller bracteoles than has that species, and has a silky pod.

long, 1·25 in. wide, glabrous on both surfaces, lateral nerves 10 pairs prominent on both sides running almost to margin of blade, rachis 3·5 in., glabrous as are the petiolules 2 in. long. Flowers in lax axillary panicles 6–8 in. long, sparingly branched, branches 2·5 in. long or less, spreading, nodes tumid but not produced into stalks, bearing one or more unequal filiform pedicels, rachis and pedicels sparsely adpressed-puberulous, the pedicels 2 in. long rather longer than the calyx, bracteate at their base, 2-bracteolate close under the calyx. Calyx campanulate 12 in. long, subglabrous, purplish, margin sinuate-toothed, Corolla apparently white, 3·5 in. long, standard orbicular ecallose. Stamens monadelphous. Ovary sparsely hairy; ovules about 4. Derris uliginosa var. Loureirii Benth. in Journ. Linn. Soc. IV, Suppl. 108 in part. Pongamia uliginosa Wall. Cat. 5879 (E only) not of DC.

Penang; Wallich!

Nearly related to D. marginata Bth. from which it differs mainly in having shorter pedicels 2-bracteolate close under the calyx, and in having rather smaller leaflets with more numerous nerves. It seems also very nearly related to the next species from which it differs in its shorter panicles and its leaflets with more numerous and more prominent nerves. It is besides nearly related to D. amena but differs in having thinner leaves, and laxer panicles with spreading not fastigiate branches.


Perak; Larut, Scortechini 2180! Distrib. Java.

The Perak specimens have pedicels rather more glabrous than the Java ones; otherwise they agree very closely. Miquel refers the plant doubtfully to Brachypterum; to the writer it seems as if its affinities were rather with Dipteroderris; unfortunately the pod is still unknown. The Perak plant is 2-ovuled, the Java one 3-ovuled, in all the flowers examined by the writer.

11. Derris amena Benth. Pl. Jungh. 252. A large glabrous climber reaching 50 feet, with black branches. Leaves 6–8 in. long, J. ii. 14
leaflets bright-green, 7 (sometimes 9, rarely 5), rigidly subcoriaceous to coriaceous, ovate-oblong cuspidate, base rounded to cuneate, 2–4 in. long, 1–2 in. wide, glabrous on both surfaces, lateral nerves numerous parallel spreading indistinct beneath visible above, rachis 4–6 in., glabrons as are the petiolules 25 in. long. Flowers in rather dense, fastigiate branches, axillary panicles 6–9 in. long, lower branches almost equalling main-rachis, nodes rather close often produced in short stalks bearing usually 3 unequal filiform pedicels, rachis and pedicels glabrons, the pedicels 25 in. long, 2-bracteolate a short distance below calyx. Calyx campanulate 12 in., glabrescent, mouth minutely-toothed. Corolla pink (Ridley) or purple (Kunstler), 3 in. long, standard orbicular ecallose. Stamens monadelphous. Ovary sparsely puberulous; ovules usually 2. Pod thin glabrous ligulate-oblong flexible finely veined, 3–4 in. long, 1–1·5 in. wide, upper wing 25 in. wide, lower narrow; seeds usually 2, sometimes solitary.


**Perak**; Kunstler 1381! Scortechini 1736! Malacca; Maingay! Distrib. Tenasserim.


Malacca; Derry! Singapore; Maingay! Hul lett! Ridley 6402!

It seems impossible, now that large suites of specimens have been sent from Malacca by Mr. Derry, to treat these two plants as more than varieties of one species. Mr. Derry gives two local names for his plant, 'Aker-tuba-tuba' and 'Aker-pakidah.'

§ 5. Paraderesis. Robust climbers with large leaflets, flowers large on usually produced nodes in axillary panicles; stamens monadelphous; base of vexillum with two callosities extending along the claw; pod winged down the upper suture.

12. Derris elliptica Benth. Journ. Linn. Soc. IV, Suppl. 111. A large climbing shrub 20–30 feet long with black warty branches and rusty-pubescent young shoots. Leaves 9–15 in. long, dull greyish-green, leaflets 9–13 subequal, at first membranous, with age subcoriaceous, oblong to oblanceolate-oblong cuspidate, 3–6 in. long, 1–1·3 in. wide, pubescent beneath, at first puberulous at length glabrous above, rachis 6–9 in. long, rusty-pubescent faintly grooved above, petiolules 2 in. long rusty-pubescent, lateral veins 8–10 pairs prominent beneath as is the midrib. Flowers in copious lax axillary racemes 9–10 in. long, never exceeding the leaves, nodes produced into distinct stalks 3–1·3 in. long, each bearing one or more (usually 3) subequal pedicels, rachis and

MALACCA; Griffith! Maingay! PERAK; Scortechini 1735! Wray 1678! 1695! 3823! Kunstler 1431! DISTR. Northwards through Tenasserim to Chittagong; southwards through Sumatra to Java.

Mr. Wray gives 'Aker-tuba' as the Malay name of this species. It has a true Derris pod but differs markedly from the other species by its standard silky on the outside. When they are only in flower and the leaves of both are still young it is very difficult without careful examination to distinguish this species from Millettia pachycarpa. This is Zollinger's Pongamia volubilis of which there are authentic specimens at Calcutta; it is also said by Mr. Bentham to be the same as P. Horsfieldii Miq. and P. hypoleuca Miq.; neither of these is represented in Herb. Calcutta.

13. DERRIS MALACCENSIS Prain. A rather slender creeper 30-50 feet long with glabrous branches. Leaves 9-15 in. long, bright-green, leaflets 5-7 (rarely 9), subequal, subcoriaceous, elliptic, base rounded apex caudate-acuminate, 4-6 in. long 2-2.5 in. wide, the caudate tip .35-.6 in. long, glabrous on both surfaces, rachis 6-8 in. long, glabrous hardly grooved above, petiolules .25 in. glabrous, lateral veins about 5 pairs indistinct. Flowers in solitary axillary racemes 4-6 in. long always much shorter than the leaves, nodes produced in stalks .15-.2 in. long each bearing one or several subequal pedicels, rachis and pedicels glabrescent, the pedicels filiform .25 in. long bracteolate at base and with 2 small lanceolate bracteoles very near base of calyx. Calyx .15 in. long reddish, wide-campanulate, glabrous except the ciliate slightly sinuate margin. Corolla white or yellow tinged with pink, .65 in. long, standard orbicular truncate or suborbicular at the 2-callose base. Stamens monadelphous. Ovary densely rusty-pubescent; ovules 4-5. Pod oblong winged or not, glabrous, 1-4-seeded, 2-3 in. long.

Var. typica; pod 1.5 in. wide, winged along the upper suture, sometimes along both. Derris cuneifolia var. malaccensis Benth. Journ. Linn. Soc. IV, Suppl. 112.
PEKAK; Larut, Goping, etc. Kunstler 4028! 4149! 4504! 8551! Scortechini 110! Malacca; Griffith 1774! Singapore; Ridley! Distrib. Tenasserim; Borneo.

Var. ? aptera; pod 1 in. wide, wingless; leaflets with lateral veins stronger beneath.

Malacca; Mainagay 613! Perak; Kunstler 4518! 6428!

Var. ? millettiioides; pod and leaflets as in var. ? aptera but the former usually longer and ultimately dehiscing (as in Millettia) along both sutures.

Perak; Ulu Bubong, Kunstler 10696!

The plant here described as Derris malaccensis is extremely closely related to D. cuneifolia of which indeed it was treated by Mr. Bentham as a variety. Its leaves differ mainly in having fewer but larger leaflets with long caudate-acuminate tips; the flowers, too, are considerably larger and of a somewhat different colour: the pods of D. malaccensis are also much larger than those of D. cuneifolia. It must also, from the description of that plant, be very nearly allied to D. montana Benth. (Pl. Jungh. 253) a Java species not represented in Herb. Calcutta. The foliage of the two is evidently almost identical but the flowers are a little larger in D. montana, being -75 in. long. D. malaccensis is thus evidently intermediate between D. cuneifolia and D. montana as regards its petals; it is likewise intermediate as regards ovary. Mr. Bentham ascribes two ovules to D. cuneifolia and this is almost always the case; in one or two flowers, however, three ovules have been found; Mr. Baker indeed says that the pod of D. cuneifolia may be 3-seeded,—this no Calcutta specimen shows. To D. montana Mr. Bentham ascribes "about 8 ovules;" D. malaccensis has had, in almost every flower examined, 4 ovules and in some pods it has 4 seeds; one or two ovaries with 5 ovules have been met with, but never more than 5 have been seen.

The plants named var. ? aptera and var. ? millettiioides are placed here merely for convenience of reference. They are both reported in fruit only, and as they have almost exactly the leaves of Derris malaccensis it seems better for the present to refer to them under that species. As regards var. ? aptera indeed this is the more essential since two gatherings from Perak (Wray 2025! Kunstler 3190!), and one from Penang (Curtis 2735!) have pods intermediate between those of var. ? aptera and those of D. malaccensis. The pods of var. ? aptera are, however, obviously those of a Pongamia rather than those of a Derris, if Pongamia be really entitled to a separate generic position, which the writer hardly believes. The distinguishing character is a quite artificial and, as these very plants show, a somewhat inadequate one.

The existence of var. ? millettiioides raises an even more troublesome question, the relationship of Millettia to Derris. The arrangement adopted in the Genera Plantarum, the Histoire des Plantes and the Natürlichen Pflanzenfamilien places Derris and Pongamia among the Dalbergiæ and Millettia among the Galegeæ. This then, considering the great authority of the authors who have sanctioned it, must be accepted as the most natural arrangement possible. That a more inconvenient one could hardly be devised has, however, been the experience of most field botanists and of most authors who have had to deal with the species belonging to the genera. For these genera are so closely allied that they only differ, and that merely
'on paper,' in the "tardy dehiscence" of the pod in *Millettia*, its "indehiscence" in *Pongania* and *Derris*. As a matter of fact Mr. Bentham has placed in *Derris* a species (*D. microptera*) the pods of which dehisce, while Mr. Kurz has placed in *Millettia* a species (*M. monticola*) that has the pods of a *Derris*. No taxonomist, however able, can venture in the absence of fruit to do more than suggest to which of the three genera a particular species should be referred. A fourth genus to which similar remarks apply is *Lonchocarpus*; this only differs from species of *Derris* that have thin pods, exactly as *Pongania* differs from species of *Derris* that have turgid pods, in having sutures without wings. It is, moreover, a suspicious fact that Koorders and Valeton (Bijd, II.) find the same difficulty in separating *Pongamia* from *Millettia*.

In the works of Roxburgh and of Wight and Arnott, also in Bentham's account of the *Leguminosae* in *Plant. Janghuhm.*, *Millettia* was not divorced from *Derris* and its allies; Miquel and Kurz, too, continued to place the genera side by side. And certainly if they have adopted the less natural method of arrangement, it cannot be denied that, in so doing, these authors have retained a much more convenient one.


Woody climbers with unequally pinnately 1-7-foliolate exstipellate leaves; stipules small, deciduous. *Flowers* rather small in ample terminal thyrsoid panicles extending into the axils of the upper leaves; pedicels solitary, nodes not turgid. *Calyx* campanulate, teeth lanceolate the two upper connate. *Corolla* distinctly exserted; standard ovate entire; keel boat-shaped the petals slightly cohering. *Stamens* diadelphous the upper one quite free from the other 9 and adnate at base to standard claw; anthers versatile uniform on alternately short and long free filaments. *Ovary* sessile, few-ovuled; style incurved filiform, stigma capitate. *Pod* thin, flat strap-shaped membranaceous or coriaceous, indehiscent, style terminal, sutures not winged. *Seeds* 1-3, much compressed, oblong; radicle inflexed. Species 5, Malayan.

This interesting genus possesses the habit of *Spatholobus* with the calyx and almost the corolla and stamens of that genus. It differs, however, in having its flowers solitary in place of fascicled on turgid nodes; in having exstipellate leaflets varying in number in different species from 1-7; and in having the pod quite indehiscent with the seeds centrally not terminally situated, in this last character being indistinguishable from *Lonchocarpus*. From *Lonchocarpus* however *Kunstleria* differs in having the flowers unfascicled, in having the calyx toothed, and in having the stamens diadelphous. As regards inflorescence *Kunstleria* agrees exactly with *Derris* § *Aganope* and agrees moreover with that group of species in having the vexillary stamen free. But here again *Kunstleria* differs in having a wingless pod and a toothed calyx, and in having the free stamen adnate to the standard claw. With the calyx of *Spatholobus* then, we have associated in *Kunstleria* the inflorescence of *Aganope* and the pod of *Lonchocarpus*.

The genus is dedicated to the memory of Herr H. H. Kunstler, one of the most enthusiastic, as he was one of the most painstaking and faithful of the collectors who have laid down their lives in the cause of science in the tropics.
Leaflets solitary, with petiolules attached slightly within margin
of lamina:—

Leaflets and petiololes glabrous on both surfaces ... ... 1a. K. Curtisii.
Leaflets and petiololes subscabridly pubescent ... ... 1b. K. Curtisii

var. laxiflora.

Leaflets several, with petiolules attached to margin of lamina:—

Leaves 3-foliate, (leaflets and petiololes glabrous ; pods narrower
than in the other species of which pods are known) ... ... 2. K. Kingii.
Leaves 5-foliate:—

Leaflets thickly coriaceous, densely ferruginous underneath 3. K. Forbesii.
Leaflets chartaceous, glabrous on both surfaces... ... 4. K. Ridleyi.
Leaves 7-foliate, (leaflets and petiololes subscabridly pubescent) 5. K. Derryi.

1. Kunstleria Curtisii Prain. A shrubby climber with slender
branches; bark brownish lenticular. Leaves 5-8 in. long, leaflet 1,
ovate-lanceolate 4-6½ in. long, 2½ in. wide, apex acute base rounded,
lateral nerves ascending 4-5 pairs rather prominent as is the midrib
beneath, margin entire; rigidly chartaceous, pale-green; petiole 7½-1½
in. long, petiolute 2½ in. subpeltately attached. Flowers in copious
terminal and axillary panicles 8-12 in. long, 5-8 in. across, rachis and
branches rusty-pubescent; pedicels pubescent 0½ in. long. Calyx cam-
panulate densely pubescent, 1½ in. long, teeth triangular except the
upper broadly deltoid bifid at tip half as long as tube. Corolla apparently
purple, 2½ in. long, standard ovate-oblong. Pod thin flat densely
rusty-pubescent, 5 in. long 1 in. wide, 2-3 seeded.

Var. typica; leaves above and petiololes glabrous, leaves beneath
and petiolules sparsely adpressed-pubescent with whitish hairs; rachis
and branches of panicles sparsely rusty-pubescent; pods distinctly
reticulated.

Penang; at Tulloh Bahang, Curtis 3019!

Var. laxiflora; leaves on both surfaces subscabridly, petiololes and
petiolules densely softly pubescent with rusty tomentum, as are the
rachis and branches of the laxer more spreading panicles; pods more
densely velvety not visibly reticulated.

Pangkore; Tulloh Sera, Curtis 1632!

The calyx and corolla, so far as the limited material goes, are not distinguish-
able in these two plants. The measurements of pod given are taken from fruits of
the typical variety; the pods of the other are much smaller but are apparently not
so far advanced. When fuller material of these two plants is available it may be
necessary to consider them specifically distinct; on the other hand their leaves,
but for the different pubescence, are quite similar and it may prove unnecessary to
separate them even as varieties.

2. Kunstleria Kingii Prain. A very extensive climber over 100
feet long, with slender branches; bark brown lenticular. Leaves 5-8 in.
long, leaflets 3 ovate-lanceolate 4-6 in. long, 1½-2 in. wide, apex acute,
base of lateral leaflets rounded, of central rather the larger shortly cuneate, lateral nerves ascending 5-6 pairs rather prominent as is the midrib beneath, margin entire; firmly chartaceous pale-green glabrous on both surfaces, petiole glabrous 1·5-2·5 in. long, petiolules glabrous 2 in. marginally attached. Flowers in copious terminal and axillary panicles 8-12 in. long, 5-8 in. across, rachis and branches rusty-pubescent; pedicels pubescent '08 in. long. Calyx campanulate densely pubescent 15 in. long, teeth triangular except the upper broadly deltoid bifid at tip almost as long as tube. Corolla dark-purple, 25 in. long, standard oblong. Pod thin flat densely brown-pubescent and distinctly reticulated, 2-4 in. long, 6 in wide, 1-2 seeded, seeds oblong 1·25 in. long, '5 in. wide, cotyledons thin and leaf-like, testa very dark brown.

Perak; Larut, Kunstler 3830! 6870! 6935!

Among the many specimens sent by Mr Kunstler only one has a leaf with a solitary leaflet, all the other leaves are 3-foiulate. The individual leaflets are extremely like those of typical K. Curtissi and only differ in not being slightly peltate and in being hardly so thick; the pods however are very different.

3. **KUNSTLERIA FORBESII** Prain. A small shrubby climber 6-10 feet long, with densely rusty-pubescent branches. Leaves 8-10 in. long, leaflets 5 elliptic, 3·5-5 in. long, 2-2·5 in. wide, terminal rather exceeding the others, bases of all rounded, apex rounded shortly abruptly acuminate, lateral nerves spreading, 6-9 pairs, rather prominent as is the midrib beneath, margin entire; rigidly coriaceous dark-green subscabrid above densely rusty velvety beneath, petiole rusty-puberulous 3·5 in. long, petiolules 2·5 in. densely rusty-pubescent. Flowers in rather strict terminal and axillary panicles 12-18 in. long 5-6 in. wide, rachis and branches densely rusty-velvety, as are the very short pedicels and lanceolate bracts 1 in. long. Calyx campanulate, densely rusty-velvety, '15 in. long. teeth lanceolate except the triangular slightly bifid upper almost as long as tube. Corolla deep lake-red, 25 in. long, standard oblong. Pod not seen.

Perak; Salama, Kunstler 3094! Distrib. Sumatra (Forbes 3241!).

4. **KUNSTLERIA RIDLEYI** Prain. A climber with slender puberulous branches. Leaves 6-8 in. long, leaflets 5 elliptic, 2-3·5 in. long, 1·25-2 in. wide, terminal considerably larger than the others, bases of all narrowly truncate, apex tapering to a finally somewhat abrupt blunt point, lateral nerves ascending, 5-6 pairs, rather prominent as is the midrib beneath; margin entire, firmly chartaceous pale-green glabrous on both surfaces, petiole sparsely pubescent 2-3 in. long, petiolules rusty-pubescent, 2 in. long, marginally attached. Flowers in rather strict terminal and axillary panicles 12-18 in. long, 4-5 in. across, rachis and branches sparsely rusty-pubescent; pedicels very short, and subulate bracts '08 in.
long, densely rusty. **Calyx** campanulate densely rusty, 15 in. long, teeth triangular except the broadly deltoid slightly bifid upper, rather more than half as long as tube. **Corolla** 25 in. long, standard broadly ovate. **Pod** thin flat densely rusty-pubescent and distinctly reticulated, 6 in. long 1-25 in. wide.

**Singapore; Ridley, 6395!**

A very distinct species, in inflorescence most resembling *K. Forbesii* but with leaves of the consistency and appearance of those of *K. Kingii*, though with 5 leaflets in place of 3. The pod however is very different from that of *K. Kingii*, and resembles that of *K. Curtisii*, the chief difference being that the meshes of the reticulations on the valves are much opener in *K. Ridleyi* than in *K. Curtisii*.

5. **Kunstleria Derryi** Prain. A climber with densely pale-rusty pubescent branches. **Leaves** 6-8 in. long, leaflets 7, ovate-lanceolate, 1-3 in. long 75-15 in. wide, terminal with deltoid base considerably exceeding the lateral with rounded bases, all with cuneate apex, lateral nerves ascending 6-7 pairs, rather prominent as is the midrib beneath, margin entire; rigidly chartaceous pale-green subscabridly pubescent on the nerves above, uniformly subscabrid beneath as are the petioles 2-5-3 in., and the marginally attached petiolules 2 in. long. **Flowers** in rather strict terminal and axillary panicles 12-15 in. long 2-3 in. wide, rachis and branches softly pale-rusty as are the very short pedicels and the very small lanceolate bracts. **Calyx** campanulate, densely rusty-pubescent, 15 in. long, teeth triangular, upper rather broader, notched, half as long as tube. **Corolla** dark-purple 25 in. long, standard oblong. **Pod** not seen.

**Malacca; Machap Tebung Road, Derry 1006!**

Leaves and branches with exactly the pubescence of *K. Curtisii var. laxiflora* but with 7 leaflets instead of a solitary leaflet and with marginally, not subpellately attached petiolules.

30. **Dalbergia** Linn., fil.

Trees or climbing shrubs. **Leaves** with alternate subcoriaceous leaflets. **Flowers** copious, small, in terminal or lateral panicles. **Calyx** campanulate; teeth 5, distinct, usually short. **Corolla** exserted; standard broad; keel obtuse, with its petals only joined at the tip. **Stamens** 9-10, monadelphous, the sheath split above, or diadelphous, the sheath split also down the keel; anthers minute, basifixed, with the cells back to back, and the slit mostly short and apical. **Ovary** stalked, few-ovuled; style short, incurved, glabrous, stigma capitate. **Pod** oblong or strap-shaped, usually thin and flat, 1-4-seeded, indehiscent, not thickened or winged at the sutures. Species 60-70, cosmopolitan in the tropics.
Stamens in two lateral phalanges of 5 filaments each, pod thin and flattened except opposite the seeds (§ Dalbergia) 1. D. volubilis.

Stamens monadelphous:

Pod thin and flattened except opposite the seed (§ Sissoo) [unknown in D. Hulletti] —

Flowers contemporaneous with the leaves; climbing species:

- Standard narrow, claws of petals shorter than calyx tube —
  - Pod very short-stalked; flowers 25 in. long in pani-
  - cles of congested corymb (leaflets 1 in. or more in length) ... ... ... ... 2. D. confertiflora.
  - Pod distinctly stalked; flowers minute (15–2 in.)
  - Leaflets ‘6–1-5 in. long; corymb mostly terminal;
  - ovary puberulous ... ... ... 3. D. Junghuhnii.
  - Leaflets ‘2–4 in. long; corymb smaller axillary
  - and terminal; ovary glabrous ... ... 4. D. subsympaph-
  - tica.

Standard orbicular, claws of petals as long as calyx-

- Leaflets rather numerous, membranous, not cus-
pidate:
  - Leaflets 13–17, 15–2 in. long, oblong obtuse or
  - subacute; racemes large spreading; calyx and
  - leaves densely pubescent ... ... 5. D. velutina.
  - Leaflets 25–41, 6–75 in. long, rhomboid retuse;
  - racemes small congested; calyx and leaves thinly
  - pubescent ... ... ... 6. D. tamarindifolia.
  - Leaflets few (1–5), large (2–4 in. long), firm,
  - abruptly cuspidate ... ... ... 7. D. pseudo-sissoo.
  - Flowers preceding the leaves; a small tree, (claws of
  - petals as long as calyx-tube) ... ... ... 8. D. Hulletti.
Pod uniformly thickened throughout the valves, the upper
suture falcate at least when young (§ Selenolobium):

Pods flattened, reticulated, always 1-seeded, (upper
suture recurved when ripe):

- Leaflets usually 5, small (under 1 in. long), obotate-
  - oblong obtuse; flowers many in congested panicles
  - Leaflets usually 3, large (3–3.5 in. long), ovate-
  - lanceolate acute; flowers few in short spikes ... ... 9. D. torta.

Pods turgid, smooth, often 2-seeded:

- Upper suture recurved when ripe, pod puberulous;
  - leaflets acuminate, large (4–6 in. long), prominently
  - veined and when young densely pubescent beneath,
  - thickly coriaceous ... ... 10. D. menoeides.
- Upper suture convex like lower when ripe, pod
  - glabrous; leaflets glabrous obtuse slightly emar-
    - ginate, smaller (2–3.5 in. long), not prominently
    - veined beneath, thinly coriaceous ... ... 12. D. parviflora.

J. 11. 15
§ 1. Dalbergaria. Pod thin and flattened except opposite the seeds. Stamens diadelphous in two lateral phalanges of 5 filaments each.

1. Dalbergia volubilis Roxb. Cor. Pl. II, 48 t. 191. A large woody climber, 40-60 feet high, with twining glabrescent branches here and there thickened and twisted into spiral hooks. Leaves 4–5 in. long, leaflets 11–13 obovate, or ovate-oblong rounded, obtuse or slightly retuse faintly mucronulate at apex, dark-green above paler beneath, glabrous on both surfaces, ‘75–1 in. long ‘5–75 in. across; rachis 3–4 in. long and petiolules ‘15 in. long, quite glabrous. Flowers in copious terminal and axillary panicles 8–12 in. long with glabrous peduncles and with numerous horizontal or decurved puberulous branches 1–3 in. long bearing corymbose cymes, ultimate corymbs densely congested; bracts at base of branches of panicle small ovate subpersistent; pedicels slender puberulous, lower ‘2 in. long upper very short with a small lanceolate persistent bracteole at base and two small ovate ones embracing the lower fifth of calyx-tube. Calyx campanulate, densely puberulous ‘1 in. long, teeth lanceolate lowest exceeding the others. Corolla pale-blue ‘25 in. long, standard broadly orbicular emarginate, reflexed at junction of blade and claw. Stamens 10, in two lateral groups of 5 each. Pod distinctly stalked, linear-oblong obtuse membranous, 2–3 in. long, 1 in. wide; 1–2-seeded. Hort. Beng. 53; Fl. Ind. III, 231; DC. Prodr. II, 417; Wall. Cat. 5874; W. & A. Prodr. 265; Benth. in Journ. Linn. Soc. IV, Suppl. 46; Bak. in Flor. Brit. Ind. II, 235.

Andamans; very common. Distrib. Throughout India and Indo-China.

By an oversight this is described in the F. B. I. as having ebracteate pedicels; in reality each pedicel has three persistent bracteoles, one at its base, two at its apex.

§ 2. Sissoa. Pod thin and flattened except opposite the seeds. Stamens monadelphous.

2. Dalbergia confertiflora Benth. Pl. Jungh. 255. A large climber with sparsely puberulous, soon glabrescent branches. Leaves 4–6 in. long, leaflets firm 11–15, oblong obtuse or retuse, green and glabrous above paler and sparsely puberulous beneath, 1–1.5 in. long, ‘5–75 in. wide; rachis 3–4 in. long, glabrous as are the petiolules ‘2 in. long. Flowers rather small in ample terminal and axillary panicles, 3–5 in. long, of corymbose or subcapitately crowded cymes; peduncle and branches rather densely pubescent; bracts puberulous minute ovate deciduous; solitary bracteoles at base of pedicels also ovate deciduous; pair at base of calyx ovate-lanceolate persistent embracing lower fifth of calyx-tube Calyx ‘15 in. long, pubescent, rather narrowly tubular, teeth short obtuse, one-third as long as tube except the lower lanceolate half as long

**ANDAMANS; very common. DISTRIBUTION.** Eastern Himalaya, Assam, Chittagong, Pegu.

A very distinct species; the description of the pod given in the *Flora of British India* is apparently taken from another species.

3. **Dalbergia Junghuhnii** Bentham. Pl. Jungh. 254. A shrubby climber 15–30 feet long, with twining glabrous branches, here and there twisted and thickened into spiral hooks. *Leaves* 4–5 in. long, leaflets 7–15, oblong or elliptic, rounded at both ends faintly emarginate at the apex, green and glabrous above, glaenaceous and glabrous or faintly puberulous beneath, 6–1‘5 in. long ‘35–75 in. wide; rachis 2‘5–4 in. long, petiolas ‘15 in. long. *Flowers* minute, secund in an ample terminal and—in smaller axillary paniculate cymes 2 in. wide and as long as the leaves, peduncle branches and pedicels pubescent; bracts minute caduceous; bracteoles all persistent, one at base of short pedicel lanceolate acuminate very minute, two at base of calyx ovate-obtuse embracing the lower third of calyx-tube. *Calyx* ‘08 in. campanulate, teeth short obtuse one-third as long as tube, except the lower acute half as long as tube. *Corolla* white, ‘15 in. long, claws of petals short. *Stamens* 9 monadelphous. *Ovary* pubescent. *Pod* thin membranous greenish, glabrous, 2‘5–3 in. long, 1–1‘3 in. wide, 1-seeded, slightly cuneate at base and distinctly stalked.


**Penang;** 500 feet, Curtis! *Malacca;* Maingay 547! 547/2! Good-enough! Derry! Singapore; Hullett 141! Ridley! DISTRIBUTION. Sumatra, Java.

**Var. Scortechinii** Prain; leaflets 11–15 elliptic, beneath more closely puberulous especially on midrib.

**Penang;** Ayer Etam, Curtis 1437! *Malacca;* Bijong, Scortechini 1830! Maingay 549! Singapore; Bukit Timah, Ridley 6406! DISTRIBUTION. Borneo.

These two plants differ in no way as regards flowers; the leaves however differ considerably in appearance and it may ultimately be found that the second variety—of which the fruit is as yet unknown—should be known as a distinct species, *Dalbergia Scortechinii.* The original specimens on which Mr. Bentham founded the species were collected by Junghuhn in Sumatra and by Griffith in Malacca; the writer has not seen either. Mr. Bentham describes the *ovary* as glabrous in his
specimens, it is hairy in all the specimens above cited where there are flowers. The most nearly related species are D. subsympathetica, which has much smaller leaflets with rather larger flowers in more numerous less ample cymes; and D. sympathetica which also has rather larger flowers and smaller leaflets. In D. sympathetica however the leaflets are more numerous and the pod though similar is more shortly stalked.

Mr. Bentham, who had not seen fruit of this when he wrote, suggested that this might prove to be the same as D. parviflora Roxb. One objection to this suggestion is the very small number of leaflets described by Roxburgh; a still more fatal objection, however, is in the pod; this Roxburgh describes as falcate,—an indication that D. parviflora should be sought for in § Selenolobium rather than in § Sissoa.

4. Dalbergia subsympathetica Prain. A tall climber 60-80 feet long, less often a scendent shrub or small tree 15-30 feet high, with twining puberulous branches. Leaves 1'5-3 in. long, leaflets 9-15 oblong, apex truncate or emarginate base wide-cuneate or rounded, green and glabrous above, paler and pubescent with long adpressed hairs beneath, 25-4 in. long, 2-3 in. wide; rachis 1-2:5 in. long, densely puberulous, as are the petiolules 1 in. long. Flowers minute secund, in small axillary paniculate cymes, 75-1 in. across, as long as the leaves, peduncle 5-7 in., branches and pedicels pubescent; bracts minute caduceous; bracteoles all persistent, one at base of short pedicel lanceolate, acuminate, very minute, two at base of calyx ovate-obtuse embracing lower fourth of calyx-tube. Calyx 1 in. campanulate, teeth short obtuse one-third as long as tube, except the lower acute half as long as tube. Corolla white, 2 in. long, claws of petals short. Stamens 9, monadelphous. Ovary glabrous except along anterior suture. Pod thin membranous greenish glabrous, 2-5 in. long, 1 in. wide, 1-seeded; slightly cuneate at base and distinctly stalked.

Penang; Curtis 1492! Perak; Scortechini 201! 1071! Wray 2086! 3205! Kunstler 2354! 3562! 4978! 5182!

Very near D. Junghuhnnii and just possibly only a variety of that species; it is however easily distinguished by its much smaller leaflets and its smaller, more numerous cymes of rather larger but still very minute flowers.

5. Dalbergia velutina Benth. Pl. Jungh. 255. A long climber with rusty densely pubescent branches. Leaves 6-8 in. long, leaflets 13-17, oblong obtuse or subacute membranous, 1'5-2 in. long, 6-8 in. wide, dark-green glabrescent to puberulous above, rusty-puberulous to pubescent beneath, stipules large densely pubescent, rachis 5-6 in. long puberulous or pubescent, as are the petiolules 1 in. long. Flowers in somewhat dense axillary panicles, with corymbose branches, 4 in. long 2'5 in. wide, the peduncles branches and pedicels densely pubescent, bracts rather large ovate and bracteoles narrowly lanceolate persistent pubescent; the pair at base of calyx half as long as pedicel one-third as


**Malacca; Maingay! Distrib. Burma, Assam.**

**Var. Maingayi** Prain; leaves puberulous glanscent beneath; leaf-rachis, ovate-acuminate stipules, peduncles and bracts very darkly rusty-puberulous.

**Malacca; Maingay 612! Singapore; Ridley! Distrib. Tenasserim (Griffith 1798); Malay Archipelago.**

The only pods of true *D. velutina* at Calcutta are still unripe; the description of the fruit is therefore taken from Mr. Baker's account: to Mr. Bentham the fruit was unknown.

Of **Var. Maingayi** which, as a note made in Herb. Kew indicates, is at Kew treated as a "less hairy variety" of *D. velutina*, the writer has seen no fruit. Not improbably it may be found ultimately necessary to treat it as a distinct species to be known as *D. Maingayi*.

6. **Dalbergia tamarindifolia** Roxb. Hort. Beng. 53. A shrubby climber, 15–40 feet high with densely pubescent young branches. *Leaves* 5–6 in. long, leaflets 25–41, thinly pubescent on both surfaces rather paler beneath, crowded, trapezoid-oblong, '6–'75 in. long, '3 in. wide, moderately firm, caducous; rachis densely puberulous 4.5–5.5 in. long, petiolules very short; stipules lanceolate densely puberulous '2 in. long. *Flowers* with the leaves, in congested sessile axillary panicles with corymbose branches '5–2 in. long, '5–1 in. wide, peduncles, branches and pedicels densely puberulous, bracts rather large ovate and bracteoles persistent puberulous; pedicels as long as calyx with solitary bracteole as base and two rather large ovate close under calyx, the lower fourth of which they embrace. *Calyx* campanulate, glabrescent (in Malayan specimens), pale greenish-yellow, '15 in. long, teeth short obtuse. *Corolla* white '35 in. long, claws of petals as long as calyx-tube. *Stamens* usually 9, rarely 10, monadelphous. *Ovary* glabrous; ovules 2–3. *Pod* thin greenish, drying bright-brown, glabrous, long-stalked, strap-shaped, subacute; 1–3-seeded; not veined nor thickened opposite the seeds, 1.5–3 in. long, '4–'5 wide. Roxb. Flor. Ind. III, 233 (in part only); Wight, Icones, t. 242 (excluding fig. of fruit); Wall. Cat. 5870; Bentham in Journ. Linn. Soc. IV, Suppl. 44; Miq. Flor. Ind. Bat. I, 131; Bak. in Flor. Brit. Ind. II, 234. *D. rufa* Grah. in Wall. Cat. 5864.

ANDAMANS; very common everywhere in the main group; Barren Island, Prain / LANGKAWI; Curtis 2625! PERAK; Scortechini 65! Wray 2387! Kunstler 3346! 5963! 6481! 8667! PENANG; Wallich 5665! MALACCA; Maingay 602! Derry 1167! DISTRIBUTION. Himalayas from Nepal eastward; Indo-China; Malay Archipelago.

All the Perak and Malacca specimens agree exactly with D. multijuga Grah., and that in turn does not differ even as a variety from D. rufa Grah., with the type of which Curtis’ Langkawi specimens and the Andaman form exactly coincide. These two forms differ from the Upper Burma and Himalayan plant in having fewer-flled., laxer panicles, with a glabrescent instead of a downy calyx. The pods are, however, identical in both. It has been usual to quote Roxburgh without qualification as the authority for this species, in spite of the fact that he has described as belonging to it, the fruit that belongs to D. Millettii. And it has been also usual to cite Derris pinnata Lour. as this plant, overlooking the fact that Derris pinnata has glabrous leaflets and, presumably, only monospermy pods. The writer has not seen Loureiro’s original specimens; his description of D. pinnata, however, certainly applies more aptly to D. Millettii than it does to D. tamarindifolia, which moreover does not appear to have such a root as Loureiro describes. In any case until specimens can be produced, D. pinnata should be treated as indeterminable.


PERAK; Larut, Kunstler 3177! 3340! 3579! 4964! 6565! Scortechini 1348! Wray 2098! 2965! PENANG; Government Hill, Curtis! SINGAPORE; Bukit Mandai and elsewhere, Hullett! Ridley! DISTRIBUTION. Ceylon; Malay Islands.

The doubt that has hung over the identity of this species has at length been
cleared up through the kindness of Dr. J. V. Suringar. Both Mr. Bentham and Mr. Baker have suggested that it may be the same as *D. pseudo-sissoo* Miq., and in response to a request made by Dr. King that some Malayan specimens from Calcutta, which are undoubtedly conspecific with the Ceylon plant, might be compared with the Miquelian types at Leiden, Dr. Suringar has not only made the necessary comparisons but has sent to Calcutta examples of some of the authentic specimens and very careful drawings of others. These leave no doubt whatever as to the identity of the two plants named *D. pseudo-sissoo* and *D. Championii*. One curious feature has been noticed in this examination by Dr. Suringar and by the writer. In Ceylon (as Mr. Bentham found) and in Penang the ovaries appear to be always 1-ovuled; in Perak, Singapore and Borneo they are oftener 2-ovuled than 1-ovuled in the proportion of 7 to 3; in Java they are nearly always 2-ovuled, nine ovaries having 2 ovules for one ovary with 1 ovule. A still more interesting discovery made by Dr. Suringar is that *D. Sissoo* Miq. is not *D. Sissoo* Roxb. (this no one who considers what the native habitat of *D. Sissoo* is, will be surprised to learn), but that it is (what was hardly to be expected) Dr. Miquel’s own *D. pseudo-sissoo*. Dr. Suringar, in confirmation of his discovery, has sent to Calcutta an authentic specimen of *D. Sissoo* Miq. in Herb. Leiden (not of Roxb.). This then explains the “unfortunate selection” of name that Mr. Bentham very justly comments upon. Dr. Suringar, sharing Mr. Bentham’s feeling, suggests that in view of this extraordinary confusion it would be better to drop Miquel’s name altogether; and the writer would very gladly have adopted the suggestion and continued to use Dr. Thwaites’ name *D. Championii*, had the dictates of common-sense been of any weight in modern nomenclature. But unfortunately there is now no doubt that the plant named *D. pseudo-sissoo* by Miquel is the same as that named *D. Championii* by Thwaites; it cannot be gainsaid that so far as it goes, the description of *D. pseudo-sissoo* applies to the species; and it is clear that the name *D. pseudo-sissoo* has nine years’ priority over the name *D. Championii*. This being so, Miquel’s name may just as well be given precedence now, seeing that one or other of the bibliographers who pose as botanists would make the alteration so soon as this note appears, in spite of the fact that Miquel did not recognise his own species when he saw it.

8. *Dalbergia Hulletti* Prain. A small tree with blackish rugose rusty-puberulous thickish branchlets, without leaves at time of flowering. *Flowers* in short, clustered racemes, 1-1.5 in. long, springing from tufts of triangular rusty-puberulous small bracts in axils of old leaves; lowest pedicels longer than the rest, slender, 3 in. long, rusty-puberulous as are the peduncles; bracteoles at base of pedicels solitary ovate-lanceolate 1 in. long persistent, the pair below calyx subulate very small. *Calyx* campanulate, densely rusty-tomentose 1.5 in. long, teeth half as long as tube, acute. *Corolla* 3 in. long, claws of petals as long as calyx-tube. *Stamens* 9, rarely 10, monadelphous. *Ovary* with densely pubescent stalk; ovule solitary. *Pod* unknown.

**Singapore; Hullett 626!**

A very distinct species, only once reported. It is nearest to a Bornean tree apparently as yet undescribed (*Haviland n. 2894*); the only difference between the flowers of the two is that in the Bornean plant the ovary is densely woolly; in this the ovary is quite glabrous though its stalk is pubescent. The Bornean plant has
leaves with solitary or trifoliate leaflets; when trifoliate the lateral leaflets are subopposite. It thus approaches most nearly to D. pseudo-sissoo which also has flowers similar to those of D. Hyllettii and of Haviland’s species from Borneo.

§ 3. *Selenolobium*. Pod thickened throughout upper suture, recurved at least while young.


**Andamans**: very common on all the coasts of the main group; Narcondam, Prain! Penang; Wallich 5873! Curtis 220! Langkawi; Curtis 2868! Perak; coast at Matong, Scortechini 1099! Wray 2502! Malacca; at Tanjong Kling, Ridley 3312! Singapore; growing in salt water, Kunstler 66! Krangi, Ridley 5576! T. Anderson! Kurz! Distrib. Western coasts of India; Sundribuns; Burma; Borneo; New Guinea; China.

A purely littoral species. The citation of *Wall. Cat.* 5879 by Dr. Miquel and Mr. Baker for this species is due to their having copied the statement from Mr. Bentham. By an uncorrected printer’s error Mr. Bentham is made in the description to quote this number, though in the notice of localities the number 5873 is correctly given.

10. *Dalbergia menoeides* Prain. An unarmed climber with glabrous, twining, hooked branches. *Leaves* 5 in. long; leaflets 3, ovate lanceolate tapering to both ends, dark-green and glabrous above, paler and sparsely adpressed-puberulous beneath, 3–3.5 in. long, 1–1.5 in. wide; rachis 1.5 in. long, glabrous, petiolules ’08 in. puberulous. *Flowers* very few, sessile, clustered at tips of short puberulous axillary peduncles ’15–25 in. long, each with two ovate bracteoles embracing lower fourth of calyx-tube. *Calyx* campanulate, externally sparingly
puberulous .15 in. long, teeth short subequal obtuse. Corolla .35 in. long, claws of petals as long as calyx-tube. Stamens 10 monadelphous. Ovary glabrous, ovule solitary. Pod greenish, semilunar, flat, glabrous, firm, reticulated throughout, upper suture recurved, 1:5 in. long, .75 in. wide; 1-seeded; tip acute, stalk rather longer than calyx.

Perak; Krian, Scortechini 1392!

A very distinct species with leaflets somewhat resembling those of D. pseudo-sissoo.

11. Dalbergia Kunstleri Prain. An extensive climber 40-150 feet long with stem 3-6 in. in diam, and pubescent young branches. Leaves 10-12 in. long, leaflets 7-9, the lateral ones subopposed, dark-green quite glabrous above, dark-grey when young densely pubescent when old sparsely puberulous beneath, rigidly coriaceous, elliptic-acuminate, 4-6 in. long, 2 in. wide, with very prominent midrib and 8-9 pairs of spreading lateral veins beneath, secondary venation also distinct, rachis 8 in. long, petiolules .3 in. long at first densely pubescent ultimately glabrescent. Flowers in axillary panicles 4-6 in. long with spreading rusty-puberulous branches, bracts and bracteoles deciduous, pedicels under .1 in. Calyx .15 in., teeth lanceolate except the upper, the lowest twice as long as the tube. Corolla dark-blue, .35 in. long, standard orbicular emarginate. Stamens monadelphous. Ovary pubescent. Pod finely puberulous, rigid, much thickened throughout, 1-2-seeded, 1:5-2:5 in. long, .9 in. wide, .3 in. thick, short-stalked, dark-brown to almost black when ripe, with grey lines alongside the sutures.

Perak; Goping, Kunstler 4736! Kinta, Kunstler 7067!

A very fine species nearest to D. reniformis; it differs in being a climber whereas that species is a tree; in having blue flowers whereas that species has them white; in having larger and thicker leaves and larger pods. The pod is quite indehiscent but as the seed matures the epicarp cracks alongside both sutures so that, when quite ripe, the pod, as Kunstler remarks in a field note, shows a "grey seam" due to the exposure of the mesocarp along two lines parallel to each suture. Sometimes the pod consists of but one reniform segment with a solitary seed; usually however there are two segments though the seed inside the distal segment rarely develops; when this happens the epicarp does not give way, and there is then no "grey seam" along the suture.

12. Dalbergia parviflora Roxb. Hort. Beng. 98. A strong climber 30-80 feet long with glabrous branches. Leaves 6-8 in. long, leaflets 5-9, ovate-lanceolate with obtuse slightly emarginate tips, light-green quite glabrous on both surfaces, finely reticulately veined beneath, 2-3:5 in. long .75-1:5 in. wide; rachis 2-3 in. and petiolules .15 in. long, glabrous. Flowers very small in axillary and terminal panicles of congested dichotomous cymes with puberulous branches; bracts rounded ciliate deciduous; bracteoles at base of very short pedicels rounded persistent,

**Andamans:** *Helfer* 1808! *Dindings; Curtis*! *Pahang; Ridley* 1374! 2639! *Perak*; Matang Jambu, *Wray* 2525! *Goping, Kunstler* 1423! 5973! 6151! *Scortechini*! *Distrib.* Malayan Archipelago.

Regarding this plant Mr. Hemsley has noted:—"This agrees with Kew speci-
"mens of *D. reniformis* Roxb." This species, however, is a climber whereas *D. reniformis* is a tree; Roxburgh's *D. reniformis* has moreover much larger flowers and, as in *D. Kunstleri*, the fruits of *D. reniformis* remain falcate along the upper suture even when ripe.

That this is *D. parviflora* Roxb. hardly admits of a doubt. Mr. Bentham and Mr. Baker have, indeed, suggested that *D. parviflora* may be the same as *D. Junghuhnii*; in spite of the very great authority of these authors this suggestion must be abandoned as untenable. The number and, still more, shape of the leaflets make the identification impossible; moreover, Roxburgh's account of the pod shows that his species must be, as Miquel admits, a *Selendalobium* and not as Bentham and Baker suppose, a *Sissoa*. Roxburgh's description is meagre in the extreme; but since *D. Cumingiana* provides a species that exhibits all the characters of *D. parviflora* and as no other Malayan species of *Dalbergia* hitherto found does so, it seems imperative to use Roxburgh's name for the species.

A more interesting question regarding this plant is, however, its supposed identity with Rumphius' *Locco lignum* (*Herb. Ambobo*, V. 17. t. 13). So far as Calcutta specimens go the only authority for the belief is the existence of a speci-
"men from Halmahera (*Teysmann* n. 5668) on which Mr. Teysmann has written "Kayoe lakka" and another from Tarabangie, Lampongs, Sumatra (*Hort. Bogor* n. 444) also collected by Mr. Teysmann and also marked "Kayoe lakka." It is re-
"markable that our other Sumatra specimens, collected on the R. Rawas by Dr. H. O. Forbes (*Forbes* n. 3216), have no note to this effect, and just as remarkable that collectors so careful as Mr. Ridley, Fr. Scortechini, Herr Kunstler and Mr. Wray, who have sent us numerous specimens of the same species, should have made no note regarding it. Their silence renders the matter doubtful, and appears to afford good ground for Dr. Kuntze's refusal (*Rev. Gen. Plant.* I, 158) to accept the identification proposed by Teysmann and adopted by Hasskarl (*Neue Schluessel zu Rumph.*, p. 90). As Kuntze justly remarks, the meagre account of the flower given by Rumphius does not fit the present species since Rumphius says it has two petals, and though the general habit agrees that alone hardly suffices for identifica-
"tion. The calyx of the only open flower in the figure quite accords with the calyx
of our plant and the fruit also quite agrees. But the uppermost branchlets are
shown as curved and twisted like those of D. torta while those lower down are
figured as passing into spines like those of D. spinosa, two species that, though they
belong to the same section of Dalbergia, are nevertheless very different from D.
parviflora. None of our very numerous specimens show either hooks or spines, nor
have any of the field-notes that accompany the specimens a reference to spines on
the stem.

In the Herbarium of the Penang Forest Department, kindly lent by Mr. Curtis,
there is however a specimen from Lamot in the Dindings, to which the native name
"Kayu Laha" is attached along with the further note, "climber; wood valuable,
used as incense." This specimen, from a widely remote locality, thus bears a note
made without reference to the controversy that has arisen regarding Kayoe lakka
but that entirely confirms the notes of Mr. Teysmann, who was, it may be remarked,
one of the most careful collectors that has ever worked in Malaya. The existence
of this specimen therefore re-opens the whole question, which may be commended to
Malayan field-botanists as one worthy of attention and solution. To judge from
Rumphius' account there were, in his time, three if not four species included under
the name Caju Lacca and of one, at least, of these he says that it had no spines, only
thickened nodes instead. It seems quite certain that D. parviflora must have been
one of the four. But whether his figure is meant to represent it or has been made
to include some of the characters of the others as well, can only be known when
all four are completely understood.

31. PTEROCARPUS Linn.

Erect trees. Leaves with alternate coriaceous exstipellate leaflets. Flowers yellowish, in copious panicked racemes; bracts and bracteoles minute, caducous; pedicels distinctly articulated at the apex. Calyx turbinmate, curved before expansion, the teeth short. Petals exserted, with long claws; standard and wings crisped; keel obtuse, the petals scarcely or not at all coherent. Staminal sheath slit both above and below, or above only; the upper stamen often nearly or quite free; anthers versatile. Ovary stalked, 2-ovuled; style incurved, stigma terminal. Pod orbicular, rarely other than 1-seeded, with a broad rigid wing, the point turned down to opposite the base or near it. Species about 15; cosmopolitan in the Tropics.

Leaflets finely veined throughout, pedicels slender longer than the calyx, beak of pod distinctly raised beyond the outer base ...
...
...
...
1. P. indicus.

Leaflets with 5-7 pairs of distinctly raised veins beneath, pedicels stoutish shorter than the calyx, beak of pod hardly raised beyond the outer base ...
...
...
2. P. dalbergioides.

1. PTEROCARPUS INDICUS Willd. Sp. Pl. III, 904. A tree 30-40 feet high with widely spreading branches drooping at the end. Leaves 8-10 in. long, leaflets 5-9 moderately firm, 2-4 in. long 1'5-2 in. wide, the terminal rather larger than the others, the rachis usually faintly prolonged, all ovate with rounded rarely deltoid base and rounded

Penang; Wallich 5843 G ! Malacca; Griffith ! Mainqay 550 ! Perak; Kunstler 1513 ! 8713 ! Scortechni 503 ! Wray 2003 ! 2280 ! Distrib. Northwards throughout Tenasserim to Martaban; southwards to Sumatra and Java.

A fine tree often confused with the next species from which it is, however, very distinct in foliage and somewhat different in habit.

2. *Pterocarpus dalbergioides* Roxb. Hort. Beng. 53. A tree 60-80 feet high with ascending branches, spreading at the end. *Leaves* 8-10 in. long, leaflets 5-9, firm, 2-4 in. long 1-5 in. wide the terminal rather larger than the others, ovate-lanceolate with deltoid rarely rounded base and gradually narrowing to apex, glabrous on both surfaces, pale-green, margins entire hardly undulate, with 5-7 pairs of distinctly raised veins beneath, stipules lanceolate 5 in. long, early caducous, petiolules 15 in. long glabrous as is the leaf-rachis. *Flowers* in copious terminal and axillary panicles, rachis and pedicels finely brown-pubescent, pedicels 2 in. long stoutish with 2 very shortly ovate caducous bracteoles under 0.5 in. long, less than ½ as long as bud, at apex. *Calyx* 25 in. long, densely brown silky, teeth rounded the two uppermost exceeding the others. *Corolla* yellow 4 in. long, standard 35 in. across. *Pod* orbicular, with stalk 6 in. long, 2-2-25 in. in diameter, uniformly very finely puberulous and not veined opposite the seed, the style usually a short distance (40°-50°) above the base, pointing slightly downwards. DC. Prodr. II, 418: Roxb. Flor. Ind. Ill, 236; W. & A. Prodr. 267
Wall. Cat. 5543 (excluding G and, according to W. & A., also excluding D). *P. indicus* Benth. in Journ. Linn. Soc. IV, Suppl. 77, in part; Bedd. Fl. Sylvat. t. 23; Bak. in Flor. Brit. Ind. II, 238 in part, not of Willd.

**Andamans; common.**

This tree is usually treated as a form of the preceding species, and it has been the fashion to say that the two are not distinguishable by 'botanical' characters. As they grow it would be very hard to mistake them, and when have been carefully examined it becomes difficult to realize that, even in the herbarium, they should ever have been confounded.

32. *Arachis* Linn.

Annual herbs. *Leaves* abruptly pinnate, leaflets few; stipules elongated adnate to the petiole. *Calyx* long-tubular simulating a pedicel, 2-lipped; the upper lip 4-toothed the lower long slender. *Corolla* resupinate. *Stamens* (sometimes only 9) united in a tube inserted with the petals on calyx limb; staminal tube grooved on vexillary side but not split; anthers dimorphic alternately on short filaments versatile and on longer subbasifixed. *Ovary* at first short-stalked, at base of calyx-tube, the stalk soon elongating; style filiform, bearded above; stigma minute. *Pod* long-stalked ovate-oblong, obtuse at both ends, gibbous, torulose, reticulated, coriaceous, indehiscent, 2–4-seeded. *Seeds* fleshy, oily. Species 7; six in Brazil, 1 widely cultivated in the tropics.


**Singapore; cultivated, Anderson! Penang; cultivated, Curtis!**

The “Ground-Nut,” commonly cultivated in India and Malaya, probably originally introduced into the old world from Brazil.

33. *Zornia* Gmel.

Annuals, with large geminate coriaceous bracts and dotted leaflets in 1–2 opposite pairs. *Flowers* in lax racemes. *Calyx* minute; upper
teeth short, connate; lowest shorter than the two middle ones. Corolla much exserted; standard broad; keel incurved, acute. Stamens monadelphous; anthers dimorphous. Ovary sessile, many-ovuled; style filiform, incurved, stigma minute capitately. Pod of several small round flattened finely muricated 1-seeded indehiscent joints. Species 10, all but two American.


Singapore; Changi, Ridley 4672! Distr. Cosmopolitan in the tropics.

34. Smithia Ait.

Herbs or undershrubs. Leaflets many small sensitive, opposite, leaf-rachis ending in a bristle; stipules scariose with large auricles. Flowers racemose or axillary. Calyx deeply 2-lipped, the lips usually entire. Corolla exserted; standard orbicular; keel incurved obtuse. Stamens in two bundles of 5 each; anthers uniform. Ovary linear, many-ovuled; style incurved, filiform, stigma minute capitately. Pod of many or few small flattened or turgid joints, folded together inside the calyx. Species 20–30, throughout tropics of the Eastern Hemisphere.

Smithia sensitiva Ait. Hort. Kew. ed. I, III, 496. A diffuse spreading annual with slender glabrous much branched stems 1–3 feet long, only 12 in. thick at base. Leaf-rachis 5–1 in. long sparsely beset with long whitish bristles; leaflets 3–10 pairs, 25–4 in. long, oblong obtuse, sparsely bristly on the almost straight margins and on the midrib beneath. Racemes simple 1–6-fld., in axils of upper leaves on peduncles 3 in. long, pedicels slender bracteolate 1.5 in. long or less, ascending; bracteoles small ovate-acute scarios. Calyx 25–3 in. long, lips subequal, entire, acute, with a few scattered subadpressed pale-yellow

**Andamans**; a common weed throughout the settlement at Port Blair. **Nicobars**; Kamorta, *Kurs*! **Distrib.** Africa; S.-E. Asia.

Not seen from the other provinces; probably a recent introduction from India. From Java comes a very closely allied plant (*S. javanica* Miq.) which differs mainly in having no bristles on the calyx; this may be no more than a form of the Indian and African *S. sensitiva*: all the specimens reported are, however, very uniform.

### 35. *Ormocarpum* Beauv.

**Shrubs.** **Leaves** with odd-pinnate exstipellate leaflets and persistent striated stipules and bracts. **Flowers** in lax racemes. **Calyx-tube** campanulate; 2 upper teeth deltoid; 3 lower lanceolate. **Standard** broad; keel much incurved, not at all beaked. **Stamens** in two bundles of 5 each; anthers uniform. **Ovary** linear, few-ovuled; style filiform, indented, stigma minute terminal. **Pod** of a few indehiscent turgid linear or oblong joints, the lower seedless, the faces rugose, naked or muricated with weak gland-tipped prickle. Species 6, spread all round the world in the tropics.

**Ormocarpum glabrum** Teysm. & Binnend. Nat. Tijd. Ned. Ind. XXVII, 56. A small tree 12–14 feet high, with smooth angular branches; epidermis desquamating. **Leaves** 6 in. long, leaflets 1 in. long, ¼ in. wide, terminal and 8–9 alternate lateral elliptic obtuse mucronate, glabrous, glancescent beneath; rachis subtrigonom, glabrous, thickened at base; stipules subulate erect. **Racemes** corymbose, on short peduncles ¼2 in. long; individual flowers on slender pedicels ¼5 in. long, 2-bracteolate above the middle. **Calyx** ¼25 in. long, green, campanulate, unequally 5-toothed, glabrous externally; teeth oblong, acute. **Corolla** much exserted, yellow, purple-veined; standard suborbicular retuse. **Ovary** long-stipitate, glabrous. **Pod** 6–7-jointed, ultimately becoming blackish, 5–6 in. long; individual joints ¼75–1 in. long, externally marked with 6–8 longitudinal more or less parallel ridges.

**Andamans**; very common in thickets near Port Blair; no doubt introduced. **Distrib.** Malay Archipelago.

This has the general habit of the common Indian *O. sennoïdes*, of which it is perhaps only a cultivated form; its pods, however, are much longer and are never muricated. The original description, it should be noted, was made from specimens cultivated at Buitenzorg.

### 36. *Æschynomene* Linn.

**Erect herbs** or undershrubs. **Leaves** with very numerous close
sensitive odd-pinnate small linear leaflets. *Flowers* in sparse racemes. *Calyx* deeply 2-lipped, the lips faintly toothed. *Corolla* fugacious; standard orbicular; keel not beaked. *Stamens* in two bundles of 5 each; anthers uniform. *Ovary* stalked, linear, many-ovuled; style filiform, incurved, stigma terminal. *Pod* linear, with a stalk longer than the calyx, and 4–8 flattened 1-seeded separating joints. Species about 30, spread everywhere in the tropics.

Stems woody, slender, much-branched; calyx and corolla small glabrous; pods narrow, smooth ... ... ... 1. *Æ. indica.*

Stems pith-like, stout, little-branched; calyx and large corolla hispid; pods broad, wartyed ... ... ... 2. *Æ. aspera.*


**Andamans;** Port Mout, plentiful. Prov. Wellesley; Ridley 8009! Distrib. Tropics generally.

2. *Æschynomene aspera* Linn. Sp. Pl. 713. A tall erect swamp-shrub reaching 10–12 feet in height, stems 3 in. or more in diam., externally glabrous, internally full of soft white pith; branches few or none. *Leaf-rachis* 3–6 in. long; leaflets terminal and in 30–50 opposite pairs, linear, obtuse, 1-nerved, 5 in. long; stipules lanceolate 5 in. long, auricled, deciduous. *Racemes* axillary corymbose 2–4-fld.; peduncles 1 in. and pedicels 4 in. clothed with spreading bristles; bracteoles small ovate deciduous. *Calyx* 4 in., hispidly hairy, unequally 5-toothed, the two upper teeth subconnate. *Corolla* 7½ in. yellow, fugacious, standard orbicular. *Pod* 2–2½ in. long, 3 in. across, often indented on

MALACCA; Griffith Distr. Tropical S.-E. Asia and Tropical Africa.

This is the well-known "Sola" plant, the pith of which is used in making sun-hats, fishermen's floats and other articles where great lightness is desirable. Doubtless it is an introduced plant in Malacca.

37. Phylacium Benn.

Climbing herbs. Leaves 3-foliolate; stipules persistent small linear or lanceolate, leaflets stipellate. Flowers in axillary racemes shortly pedicelled, 2-bracteolate near the calyx, completely enveloped, as ultimately is the legume, in a large boat-shaped membranous accrescent bract. Calyx tubular, sub-2-labiate, 4-toothed. Standard ovate, apex retuse base 2-auriculate; wings oblong, long-spurred, spurs incurved clasped by the auricles of the standard; keel straight obtuse shortly spurred. Siamens diadelphous, posterior filament adnate to base of standard-claw. Ovary short-stalked, its base surrounded by a shallow disc; ovule solitary; style inflexed. Pod short-stalked ovate-rotund, acute. Species 2, the present and another which is Indo-Chinese.

Phylacium Bracteosum Benn. Pl. Jav. Rar. 159 t. 33. A slender climber 20–30 feet long, young parts and leaves beneath sparingly adpressed-hirsute. Leaves pinnately 3-foliolate; leaflets ovate-oblong base rounded apex obtuse, thinly herbaceous, green on both surfaces, glabrous above, sparingly hirsute beneath, 2–3 in. long, 1·5 in. wide; petioles glabrescent 1·5 in. long, stipules and stipels linear, persistent. Racemes axillary 2–10 together, 1·5–2 in. long, shorter than the leaves, flowers fasciculate few. Bracte pale-green, 1–1·5 in. long, externally glabrous, sparing hirsute within. Calyx 1·5 in. long, externally sparingly hirsute, upper lip entire ovate, lower 3-lobed, lobes lanceolate the central rather the larger, none overlapping. Corolla 3 in. long, white with a pink tinge, glabrous. Pod 25 in. long, compressed, sparing hirsute, reticulate. Benth. Pl. Jungh. I, 231; Miq. Flor. Ind. Bat. I, 228.

Perak; near Gunong Pondo, in open jungle, 200–300 feet elev., Kunstler 8367! Distrib. Sumatra and Java to the Philippines.

38. Uraria Desv.

Suffrutiaceous perennials. Leaves stipellate, with 1 to 9 leaflets. Flowers very numerous, minute, racemose. Calyx-tube very short; two
upper teeth short; three lower usually elongated, setaceous. Standard broad; wings adhering to the obtuse keel. Stamens diadelphous; anthers uniform. Ovary sessile or short-stalked, few-ovuled; style inflexed filiform, stigma terminal. Pod of 2–6 small turgid 1-seeded indehiscent joints, often placed face to face. Species 15, S.-E. Asiatic.

Stems erect, heads long cylindric; upper leaves 5–9-foliolate, leaflets much longer than broad:—

Leaflets narrowly lanceolate, clouded above, pedicels clothed with short bristles; joints of pod polished glabrous ... 1. \textit{U. picta}.

Leaflets oblong, green above, pedicels clothed with long bristles, joints of pod dull puberulous ... ... 2. \textit{U. crinita}.

Stems trailing heads short oblong; leaves 1-foliolate and 3-foliolate intermixed, leaflets not much longer than broad ... 3. \textit{U. lagopoides}.


Perak; Scortechni! Prov. Wellesley; Ridley 6958! Nicobars; Kamorta, Kurz! Distrib. India; Indo-China; Malay Islands.

2. \textit{Uraria crinita} Desv. Journ. Bot. I, 123. An erect little-branched perennial 3–8 feet high, with stout finely downy stems 75 in. or more in diam. at base. Leaves 8–15 in. long, rachis sparingly puberulous, leaflets terminal and in 2–3 opposite pairs, ovate-oblong acute, subcoriaceous, glabrous, green above, finely reticulate-veined and minutely tomentose beneath, 3–4 in. long, 1–1.5 in. wide, base rounded; petiole 3–4 in. long, stipules lanceolate acuminate 6 in. long, puberulous; stipels lanceolate 15 in. long; the lowest leaves simple or trifoliolate, ovate or subcordate. Racemes in dense cylindric heads 8–18 in. long, 1–1.5 in. broad; bracts scariose deciduous ovate-acuminate, ciliate;

PAHANG; Renchong, etc. Ridley! PERAK; Thaipeng, Scortechini 71! Sunga Ryuh, Kunstler 1011! MALACCA; Maingay 527! SINGAPORE; Hullett 49! Ridley 8110! Distrib. India, Indo-China, China, Malay Islands.


PAHANG; Ridley 2594! PERAK; Scortechini 13! Prov. Wellesley; Ridley 8010! ANDAMANS; King’s Collectors! Distrib. India; Indo-China; China; Malay Islands.

39. LOUREA Neck.

Herbs. Leaves membranous, stipellate, 1–3-foliolate. Flowers in terminal simple or panicled racemes. Calyx membranous, accrescent, the lanceolate teeth as long as the campanulate tube. Corolla equalling or exceeding the calyx; standard broad; keel obtuse. St.·mens diadelphous; anthers uniform. Ovary few-ovuled; style filiform, inflexed, stigma capitate. Pod of about 4 small distinct 1-seeded smooth veined joints, included in the calyx. Species 4; all originally East Indian.
Loureia Vespertilionis Desv. Journ. Bot. I. 122, t. 5 f. 18. An erect slender herb, sparingly subfastigiately branched; branches towards their tips finely downy with hooked hairs. Leaf-rachis '5-1 in., leaflets usually 1 terminal, rarely 3; rigidly subcoriaceous, green usually clouded with white, the terminal one 2-3 in. broad, '3-5 in. long with two linear or lanceolate spreading or slightly ascending 2-3-nerved halves, apex of each lobe broadly emarginate bristle-tipped; lateral leaflets, when present, much smaller, obliquely obversely deltoid. **Racemes** simple or slightly panicked; 3-6 in. long; pedicels pubescent, shorter than calyx, the lower geminate. **Calyx** membranous campanulate; in fruit 25-35 in. long, sparsely pubescent with spreading hairs; teeth as long as tube, wide-triangular with a strong central nerve and widely reticulate-veined, as is the tube, with slightly weaker secondary nerves. **Corolla** not longer than calyx. **Pod** included, 4-5-jointed. DC. Prodr. II, 323; Wall. Cat. 5671; Miq. Flor. Ind. Bat. I, 264; Bak. in Flor. Brit. Ind. II, 154. Hedysarum Vespertilionis Linn. fil. Suppl. 331; Roxb. Hort. Beng. 57; Flor. Ind. III, 352.

**Malayan Peninsula**; exact locality not given, Sir W. Norris!

**Distrib.** Now cosmopolitan in the tropics, but often only planted.

40. _Alysicarpus_ Neck.

Diffuse annuals or biennials. **Leaves** simple, rarely 3-foliolate, stipellate, subcoriaceous. **Flowers** in copious axillary racemes. **Calyx** glumaceous; teeth deep, often imbricated, the two upper often connate. **Corolla** not exserted; standard broad; keel obtuse, adhering to the wings. **Stamens** diadelphous; anthers uniform. **Ovary** nearly or quite sessile, many-ovuled; style incurved, stigma capitulate. **Pod** terete or turgid, composed of several indehiscent 1-seeded joints. Species about 15; weeds, everywhere in the tropics of the old world.

**Alysicarpus vaginalis** DC.; Miq. Flor. Ind. Bat. I, 231. A robust ascending herb, stems 1-3 feet long (var. typica); or a dwarf diffuse herb with very slender stems and branches spreading 8-12 in. (var. nummularifolia); the branchlets slightly downy. **Leaves** always 1-foliolate, petioles '3 in. long, slender, glabrous, stipules subcoriaceous parallel-veined ovate-acute half as long as petioles; leaflets glabrous cordate at base, lowest lanceolate 1.5-2 in. long, '5 in. broad acute, with upper oblong obtuse 1-1.5 in. long and 1 in. wide (in one series of forms); or lowest oblong 75 in. long subacute, the upper 5 in. long ovate-obtuse all 3 in. wide (in a second series of forms). **Racemes** 8-12-fld. lax-fld. 1-3 in. long (var. typica) or congested under 1 in. long (var. nummularifolia); pedicels shorter than calyx. **Calyx** 12 in. glabrescent, teeth linear-setaceous longer than tube. **Corolla** pale-yellow tinged with
pink, small, included. Pod terete, reticulate-veined, 5–75 in. long, 0.8 in. wide; joints 6–8, half as long again as broad; faintly pubescent, slightly thickened at the ends. Bak. in Flor. Brit. Ind. II, 158.


Pangkore; Scortechini 1461! Malacca; on Pulo Besai, Maingay 516! Singapore; Changi, Ridley 1080!


Andamans; Gt. Coco Isd. Prain! Port Blair, King! Perak; Scortechini! Ridley 8008! Penang; Water-fall, Curtis 1892! 1893! Malacca; King! Hervey! Singapore; on Pulo Obin, Kunstler 4!

The writer has followed Miquel and Baker in uniting these two plants which Linnéus, De Candolle, Wallich and Wight have endeavoured to keep distinct. The difficulty that has arisen in distinguishing them, has been due to the fact that A. vaginalis, though always diagnosed as having lower leaves lanceolate and upper leaves oblong, in reality very often has the lower oblong and the upper ovate as in A. nummularifolius. The true distinguishing characters are the spreading habit and condensed racemes of the variety, the ascending stems and lax racemes of the typical plant. The description and the varietal diagnoses now given may, it is hoped, prevent a recurrence of the difficulty that has hitherto been experienced in differentiating the two.

41. Desmodium Desv.

Herbs or shrubs. Leaves 1- or 3-foliolate, stipellate. Flowers small usually in copious often dense racemes. Calyx campanulate; teeth longer or shorter than the tube the two upper often subconnate. Corolla exerted; standard broad; wings more or less adherent to the usually obtuse keel. Upper stamen entirely or partially free from the other united 9. Ovary sessile or stipitate, few- or many-ovuled; style incurved, stigma minute capitulate. Pod usually composed of several 1-seeded indehiscent joints, the faces compressed, the upper suture rarely finally splitting open, the joints usually separating. Species about 150; cosmopolitan in tropical and subtropical countries, a few in temperate N. America and temperate S. Africa.
Pod distinctly divided into several separating one-seeded joints:

Leaves 3-foliolate:
Small trailing herbs with 1-3 axillary flowers (1. Sagotia):

Pedicels hardly exceeding the petioles; leaflets obovate-cuneate, truncate or emarginate ... 1. D. triflorum.
Pedicels distinctly longer than petioles; leaflets oblong rounded at apex ... ... 2. D. heterophyllum.

Undershrubs or shrubs with woody branches:
Bracts small, simple, deciduous:

Flowers in dense short-peduncled axillary umbels (3. Dendrolobium):

Leaflets smooth, veins beneath indistinct; pods glabrous ... ... ... ... 4. D. umbellatum.
Leaflets rugose, reticulate-veined beneath; pods strigose ... ... ... ... 5. D. rugosum.

Flowers in more or less elongated racemes:
Lowest joint of pod distinctly stalked, constrictions between joints reaching from lower almost to upper suture (4a. Eudesmodium § Podocarpium) ... ... ... ... 6. D. laxum.
Lowest joint of pod sessile:
Joints of pod not manifestly longer than broad:

Joints of pod opening along lower suture, leaflets small (4c. Eudesmodium § Nickolsonia):

Leaflets obovate-cuneate silvery beneath; pedicels always ultimately reflexed; stems prostrate ... ... ... ... 8. D. capitatum.
Leaflets obovate-cuneate or obovate-acute, not silvery beneath; pedicels erect or ascending; stems erect ... ... 9. D. polycirpus.

Joints of pod 4 times as long as broad (4d. Eudesmodium § Scorpiurus) ... ... 10. D. laxiflorum.

Leaves 1-foliolate:

Pedicels not winged:

Joints of pod 4 times as long as broad (4d. Eudesmodium § Scorpiurus) ... ... 11. D. ornocarpoides.
Joints of pod not manifestly longer than broad (4e Eudesmodium § Heteroloma):

Racemes lax, pods glabrescent ... ... 12. D. gangeticum.
Racemes dense, pods densely pubescent ... ... 13. D. virgatum.

Pedicels broadly winged (5. Pteroloma):
Pods thin, densely strigose ... ... 14. D. triquetrum.
Pods coriaceous, quite glabrous ... 15. *D. auriculatum.*

Pods indistinctly jointed, not separating into segments but dehiscent in a continuous line along the ventral suture (6. *Pleurolobium*) ... 16. *D. gyroides.*

**Surgen.** 1. *Sagotia Walp.* Trailing herbs, with small 3-foliolate stipellate leaves. **Flowers** in sparse lax racemes or 1–2 in the axils of the leaves; bracts deciduous and pods distinctly jointed.

1. **Desmodium triflorum DC. Prodr. II, 334.** A small trailing herb with very slender diffuse branching stems 6–18 in. long; branches sparsely hirsute with fine spreading hairs. **Leaves** 3 in. long, 3-foliolate; petiole 2 in. long; leaflets membranaceous obovate-cuneate, apex truncate or emarginate, terminal 25 in. long 2 in. across, lateral 2 in. long 15 in. across, glabrous above sparsely adpressed-hirsute beneath; stipules minute subulate, stipules persistent lanceolate 15 in. long. **Inflorescence** of 1–3-fld. axillary fascicles; pedicels 25 in., bracteoles minute. **Calyx** pubescent with longish white hairs 1–15 in. long; teeth setaceous longer than narrowly campanulate tube. **Corolla** pink or occasionally white 2 in. long. **Pod** 4–6 in. long, 15 in. wide; joints 3–5, reticulately veined and finely puberulous; upper suture straight, lower distinctly indented between the joints. **Wall. Cat.** 5734 (except part of F.); **Benth.** in Mart. **Flor. Bras.** XV, 95, t. 26; **Miq. Flor. Ind.** Bat. I, 235; **Bak.** in Flor. Brit. **Ind.** II, 173. *D. triflorum var. minus W. & A. Prodr. 229; Wight Ic. t. 292. D. heterophyllum Wall. Cat. 5701 C. **Hedysarum triflorum** Linn. Sp. Pl. 749; **Roxb. Hort. Beng.** 57; **Flor. Ind.** III, 353. *H. stipulaceum* Burm. **Flor. Ind.** t. 54, f. 2. *Nicholsonia reptans* Meissn. in Linnaea XXI, 260. *Sagotia triflora* Walp. & **Duch.** in Linnaea XXIII, 738.

**Andamans; Port Blair, Kurz! Prain! Great Coco Island (specns. all white-fld.) Prain! Malacca; Maingay 522! Prov. Wellesley; King! Penang; Wallich 5734! Distr. Cosmopolitan in the tropics.

An extremely common species in India, not so common in Indo-China; very rare, perhaps only a recently introduced weed, in Malaya.

2. **Desmodium heterophyllum DC. Prodr. II, 334.** A trailing herb with slender diffuse branching stems 2–2.5 feet long; branches densely hirsute with spreading hairs. **Leaves** 1–1.5 in. long, 3-foliolate, petiole 5 in. long; leaflets membranous oblong or obovate-oblong apex rounded or subacute, terminal 5–1 in. long, 3–5 in. wide, lateral similar 25–3 in. long 2–25 in. wide, glabrous above, hairy beneath; stipules minute subulate, stipules persistent lanceolate 15 in. long. **Inflorescence** of solitary or geminate axillary flowers and, towards ends of branches, of a few axillary lax few-fld. racemes; pedicels 5–8 in. long, sparsely pubescent with rusty spreading hairs; bracts 2 in. long, ovate-lanceolate, deciduous, bracteoles minute. **Calyx** 15 in. densely hirsute,

In all the provinces, very common. **Distrib.** Throughout tropical S.-E. Asia.

Though very like the preceding this is quite easily distinguished by its thicker stems, larger and differently shaped leaflets, much longer pedicels and rather broader pods, the joints of which usually dehisce along the lower suture.

The distribution in India and Malaya of these two species, is reversed. In India this is quite a rare plant, **D. triflorum** being common everywhere; in Malaya, on the other hand, **D. triflorum** is very rare while **H. heterophyllum** is extremely common and is apparently the representative of the other.

**Subgen. 2. Phyllodium Desv.** Shrubs with woody branches and 3-foliolate leaves. **Flowers** umbellate, the umbels in long continuous rows, each hidden by a pair of persistent bracts.

3. **Desmodium pulchellum** Benth. ex Bak. in Flor. Brit. Ind. II, 162. A small shrub 4–5 feet high with slender terete finely grey-downy branches. **Leaves** 5–6 in. long, 3-foliolate, petiole 25–4 in., channelled above, downy; leaflets coriaceous green subrugose above, finely downy beneath, narrow-ovate to ovate-lanceolate subacute, terminal 3–4 in. long 1·5 wide, on petiolules 6 in. long; lateral pair much smaller, 1·25 in. long, 75 in. wide, petiolules 15 in. long; lateral nerves 10–12 pairs, very oblique distinctly raised beneath, secondary reticulate cross-venation visible; stipels subulate as long as petiolules, stipules 25 in. long subsessile closely parallel-veined, subpersistent. **Inflorescence** axillary or terminal, 3–10 in. long, in racemes of solitary flowers, fascicles, or small subumbellate coryms, in the axils of 12–40 compound foliar bracts; **bracts** 2-foliolate, their stipules 2 in. and petiole 15 in. long, leaflets opposite subobliquely orbicular 5 in. across, glabrous externally, finely downy internally, on very short stipellate petiolules, their terminal leaflet reduced to a bristle 2–2·5 in. long; fascicles or close-set coryms 2–6-fld.; pedicels slightly unequal, 08–10 in., downy. **Calyx** 1 in. puberulous, teeth lanceolate shorter than tube. **Corolla** 25 in. yellow. **Pod** 2–3 in. long indented on both suture slightly puberulous; joints 2, less often solitary, very rarely 3, 1 in. long, 12 in. broad. **Hedysarum pulchellum** Linn. Sp. Pl. 747; Roxb. Flor. Ind. III, 361.

MALACCA; Griffith. Pahang; Ridley 2596! Johore; Kunstler 376! Perak; Scortechini!

SUBGEN. 3. Dendrolobium W. & A. Shrubs with woody branches and 3-foliolate leaves. Flowers in dense short-peduncled or sessile axillary umbels, bracts minute deciduous.

4. Desmodium umbellatum DC. Prodr. II, 325. A littoral shrub 5–15 feet high with densely downy terete young branches. Leaves 5–7 in. long, 3-foliolate, petiole 1 in. long, channelled above, rusty-puberulous; leaflets subcoriaceous, green glabrous above, paler and thinly canescent underneath, ovate-oblong obtuse or rarely acute or subacute, terminal 3–3½ in. long, 2–2½ in. wide on a petiolule ½ in. long, the lateral pair similar but smaller 2–2½ in. long, 1½–1½ in. wide on petiolules ½ in. long; lateral nerves 6–8 pairs hardly raised beneath; stipels very small, subulate, half as long as petiolules; stipules large 3 in. long, subscarios, closely parallel-veined, caducous with the unfolding of leaf next above which they cover in bud. Inflorescence axillary, with peduncles 3½ in. long, in 6–12-fld. corymbs simulating umbels; pedicels short ½ in. or less, elongating in fruit to ½ in., unequal, very close-set. Calyx with a broad scarious deciduous bracteole, ½ in. long '07 in. wide, at its base, densely silky externally, ½ in. long, teeth lanceolate, as long as tube. Corolla ½ in. long, white. Pod 1½–2 in. long, joints 4, very rarely 5, 3 in. long, ½ in. wide, sparsely silky when young, glabrous when ripe, thick and coriaceous almost turgid. W. & A. Prodr. 224; Wall. Cat. 5687; Bak. in Flor. Brit. Ind. II, 161. Dendrolobium umbellatum Benth. Pl. Jungh. 218; Miq. Flor. Ind. Bat. I, 262. Hedysarum umbellatum Linn. Sp. Pl. 747. H. arboresum Roxb. Flor. Ind. III, 360.

In all the provinces, common on the coasts. Distrib. On all coasts from the Mascarene Islands to Polynesia.

A curious variety of this species, with branches, leaves beneath, and ripe pods softly silky, is var. hirsutum DC. It is known only from specimens cultivated in Hort. Calcutta (Wall. Cat. n. 5687/D) and in Hort. Bogor.—the Buitenzorg specimens being marked “E horto Calcuttensi recepta.” The original habitat of this variety is unknown.

D. umbellatum has been said to occur in Upper Burma; this is a mistake caused by Dr. Wallich having issued (as 5687/B) a totally different species under the same name. No one has ever sent specimens of D. umbellatum to Calcutta except from sea-coasts and the shores of tidal rivers.

5. Desmodium rugosum Prain. A large gregarious shrub with J. II. 18
rusty-puberulous angular young branches. Leaves 5–7 in. long, 3-foliolate, petiole 1 in. long, channelled above, rusty-puberulous; leaflets coriaceous rugose, puberulous on the midrib and nerves above, densely rusty-puberulous beneath on the midrib lateral nerves and secondary veins; obovate-acute, terminal 4 in. long 2.5 in. wide, on a petiolule 5 in. long; lateral pair oblong-acute base obliquely rounded, 3.5 in. long 1.75–2 in. wide, on petiolules 15 in. long; lateral nerves 10–12 pairs very prominent beneath as is the close reticulate secondary venation; stipels subulate, 12 in., nearly as long as petiolules; stipules subsessile caducous. Inflorescence axillary, with peduncles 25 in. long, in 3–6-fld. corymbs simulating umbels but with the rachis produced for 3 in. or more in the centre and marked by numerous close-set scars left by fallen pedicels; pedicels that persist 2 in. long, elongating slightly in fruit. Calyx with a broad scarious deciduous bracteole 1 in. long at its base, pubescent externally, 2 in. long, teeth longer than tube. Corolla 5 in. long, white. Pod 1.5 in. long, joints 4, 3 in. long 25 in. wide, densely adpressed-pubescent with coarse rusty hairs, thick, coriaceous, almost turgid.

Kedah; Langkawi, Curtis 2550! Distrib. Tenasserim.

Very nearly related to the preceding species but with quite different foliage and pods. Very nearly related also to D. Wallichii (D. umbellatum Wall. Cat. n. 5687 letter B only) from Upper Burma, but with larger pods, and coarser, more rugose acute leaves than in that species; indeed, D. Wallichii with the inflorescence of D. rugosum has foliage more resembling that of D. umbellatum. The stipules of D. Wallichii do not fall immediately after the unfolding of the leaf next above, as in the case of D. umbellatum and D. rugosum.

Desmodium (Dendrolobium) Cephalotes Wall. is stated by Dr. Miquel to occur in Java. No Malayan specimens of the species, which is very common throughout India and Indo-China, have yet reached Calcutta. Its presence, however, would not be surprising and the species should be looked for by collectors in the Malay Peninsula.

Subgen. 4. Eudeskmodium. Erect herbs or undershrubs with large 1–3-foliolate leaves. Flowers often 2 or several from a node in long racemes simple or paniced, braets deciduous and pods distinctly jointed.

§ Podocarpium Bth. Joints of pod indehiscent, longer than broad, the lowest one distinctly stalked, constrications reaching from lower nearly to straight upper suture.

6. Desmodium laxum DC. Prodr. II, 336. A bush 2–4 feet high with angular erect finely-puberulous branches. Leaves 5–8 in. long, 3-foliolate, petiole 1–2.5 in., channelled above, finely sparsely puberulous; leaflets membranous, green and glabrous above, paler and sparsely hirsute on the nerves beneath, terminal narrow ovate, 4–6 in. long 1.5–2 in. wide, narrowed gradually to apex, cuneate at base on a petiolule 75 in.
long, lateral nerves 3 pairs the lowest much stronger than the rest and very oblique; side leaflets similar but smaller, 3–4 in. long 1–1.5 in. wide, with slightly oblique bases; stipels subulate 2 in. long; stipules linear–lanceolate 5 in. long, persistent. *Inflorescence* in rather narrow terminal and axillary racemes, the former sometimes paniculate, 12–20 in. long, composed of as many distant solitary flowers or few-fld. fascicles, bracts minute linear; pedicels puberulous slender 2 in., ultimately spreading 4 in. long. *Calyx* very small 0.08 in. long, tubular, slightly pubescent, teeth deltoid very short. *Corolla* pink, 25 in. long. *Pod* 1–3 in. long, the lowest joint on a stalk 3 in. long, joints few indehiscent 5 in. long, 2 in. wide, the constrictions nearly reaching the upper suture, cut obliquely from opposite the point to the base. *D. Gardneri* Bth. Pl. Jungh. 226; Miq. Flor. Ind. Bat. I, 255; Bak. in Flor. Brit. Ind. II, 165. *D. podocarpum* Miq. Ann. Mus. Lugd. Bat. III, 46 not of DC.

**Perak**; on Ulu Batang Padang, *Wray* 1608! **Distrib.** India; Himalayas; Indo-China; China; Malay Archipelago.

§ *Dollinera* Endl. Joints of pod indehiscent, hardly longer than broad, upper suture straight or slightly indented; calyx teeth not exceeding tube.

A straggling shrub 8 feet high with slightly grooved, blackish branches, with a sparse short tomentum. *Leaves* 7–9 in. long, 3-foliolate, petiole 2–2.5 in., channelled above, sparsely tomentose; leaflets subcoriaceous, green sparsely puberulous above, grey thickly softly woolly beneath; rhomboid ovate-acuminate terminal cuneate at base, 4–6 in. long, 2.5–3.5 in. wide, on petiolule 1–1.5 in. long; lateral pair similar but smaller 3–4 in. long, 1.5–2.5 in. wide with obliquely rounded base; lateral nerves 5–6 pairs very oblique; stipels linear 25 in. long; stipules subcoriaceous 15 in. long, lanceolate. *Inflorescence* longer than the leaves, in axillary and terminal racemes, the latter sometimes panicked, 8–10 in. long, of 25–30 few-fld. fascicles; pedicels slender 4 in. long, bracts 5 in. long, subcoriaceous, lanceolate, bracteoles minute subulate. *Calyx* campanulate 15 in. long, teeth triangular as long as tube. *Corolla* pale-violet, 3 in. long. *Pod* dull-crimson, 2–2.25 in., 6–8-jointed, joints 25 in. long, 2 in. wide, indehiscent, slightly puberulous, finely reticulate-veined, slightly indented on the lower suture. Miq. Flor. Ind. Bat. I, 245, excluding synonyms.

**Perak**; upper part of Batang Padang Valley, at 2,000 feet, *Wray* 1441! **Distrib.** Java, Tenasserim.

§ *Nicholsonia* DC. Joints of pod dehiscent along lower suture, not longer than broad; upper suture straight, lower slightly indented.

8. *Desmodium capitatum* DC. Prodr. II, 336. A prostrate under-

Perak; Durian, S. Batang, Kunstler 361! Thaipeng, Scortechini! Pahang; Palan Tawa, Ridley 2598a!

H. siliquosum Burm. Fl. Ind. 169, t. 55, fig. 2. H. heterocarpon Linn

Var. typica; leaves obovate-cuneate rounded at apex; pods faintly
puberulous.

In all the provinces, extremely common. Distrib. East Africa,
India, Malaya, Indo-China, China, Polynesia.

Var. ovalifolia; leaves ovate-acute base rounded or truncate;
leaflets beneath sometimes softly silky; pods pubescent with spreading
hairs. D. ovalifolium Wall. Cat. n. 5730.

Penang; Wallich! Perak; Goping, Kunstler 1007! Distrib.
Sumatra (Forbes n, 1256!)

There are several more or less distinct forms of D. polycarpum most of which are
readily recognisable, though all are connected with each other and with typical
D. polycarpum by means of many intermediates. The form here defined as var.
ovalifolia has no intermediates, however, and so far as material hitherto collected
moins, might even be treated as a separate species. But its habit and its flowers are
so exactly those of D. polycarpum that it seems better to consider the differences of
leaves and fruit as merely varietal.

§ Scoepiurus Bth. Joints of pod indehiscent much longer than
broad constricted along both sutures.

10. Desmodium laxiflorum DC. Prodr. II, 335. An erect under-
shrub 2–5 feet high with woody slender obtusely angled stems, at first
densely clothed with short hairs at length glabrescent. Leaves 6–20
in. long, 3-foliolate, petiole 1\'5–2\'5 in., pubescent with adpressed hairs,
grooved above; leaflets membranous or subcoriaceous, green and glabrous
above, sparsely adpressed-hirsute beneath, terminal ovate-acute base
rounded or cuneate, 4–6 in. long 1\'5–3 in. across with petiolule 1 in. long,
lateral nerves prominent beneath 7–10 pairs; lateral leaflets similar
but smaller 1\'5–2\'5 in. long, 1–1\'5 in. wide, base obliquely rounded,
petiolule very short; stipels subulate *2 in. long; stipules ovate long-
acuminate, *3 in. long. Inflorescence in axillary and terminal racemes
6–10 in. long, of 12–20 distant solitary flowers or few-fld. fascicles;
bracts and bracteoles minute linear or setaceous; rachis puberulous
with adpressed hairs as are the ultimately patent pedicels *2–25 in.
long. Calyx *1 in., pubescent, tube campanulate, teeth lanceolate as long
as tube. Corolla white, *2 in. long. Pod 1–1\'75 in. long, pendulous,
*1 in. wide, joints *3 in. long, indehiscent, hardly constricted at the
sutures and not ribbed, closely beset with short hooked hairs. Miq.
Flor. Ind. Bat I, 251; Bak. in Flor. Brit. Ind. II, 164. D. bicolor
Wall. Cat. 5719. D. elongatum Wall. Cat. 5715. D. leptostachyum
Wall. Cat. 5697 B. D. sulcatum Wall. Cat. 5736. D. recurvatum Grah.
in Wall. Cat. 5717; W. & A. Prodr. 226; Wight Ic. t. 374. D. diffu-

Andamans; Great Coco, Prain! Nicobars; Kondil, Kurz! Distrib. Throughout India, Indo-China and Malaya.

11. Desmodium ormocarpoides DC. Prodr. II, 327. An erect undershrub 2–5 feet high with woody slender obtusely angled stems, at first densely clothed with short hairs at length glabrescent. Leaves 5–7 in. long, 1-foliolate, petiole 75 in. long, pubescent with spreading hairs, channelled above; leaflet subcoriaceous, green and glabrous above, sparsely pubescent to closely silky beneath, ovate-acute, base rounded or truncate, 4–6 in. long 1.5–2.25 in. wide, lateral nerves 6–8 pairs visible beneath; stipels subulate, 2 in. long; stipules ovate long-acuminate scarious, 3 in. long, subpersistent. Inflorescence in terminal or rarely axillary racemes 6–10 in. long, of 12–20 distant solitary flowers or few-flld. fascicles; bracts and bracteoles minute linear or setaceous; rachis puberulous with rusty tomentum as are the ultimately patent pedicels 25–35 in. long. Calyx 1 in. pubescent, tube campanulate, teeth short deltoid. Corolla white, 2 in. long. Pod 3–4 in. long, pendulous, 15 in. wide; joints 6–8, 6 in. long, indehiscent, constricted at both sutures, longitudinally ribbed, closely beset with short hooked hairs. Miq. Flor. Ind. Bat. I, 249; Bak. in Flor. Brit. Ind. II, 164. Hedysarum adhaerens Poir. in Lamk. Encyc. Meth. V, 15 not of Vahl. H. ormocarpoides Desv. ex DC. Prodr. II, 327. Rumph. Herb. Amboin, VI, t. 66.


Andamans; common in the interior of the Islands. Selangor; Ridley 7295! Pahang; Kwala Tembeling, Ridley 2605! Distrib. Java.

The typical form of this species has leaves very sparsely hairy beneath; it occurs in Java (fide De Candolle), and is common in India from Ceylon and the Pulney Mts. northwards to Assam.

§ Heteroloma Bth. Joints of pod indehiscent, hardly longer than broad; upper suture straight or slightly indented; calyx-teeth exceeding tube.

12. Desmodium gangeticum DC. Prodr. II, 327. A slender undershrub 1–4 feet high with woody obtusely angled glabrescent stems and angled adpressed-puberulous branches. Leaves 4–6 in. long, 1-foliolate, petiole 75 in. long channelled and with a few adpressed hairs above; membranous or rarely subcoriaceous, green and glabrous above, a little paler adpressed-puberulous beneath; ovate-acute, base rounded or truncate, 3–5 in. long 1–2 in. wide, lateral nerves 8–9 pairs slightly

Penang; Pinara Bukit, Curtis 2771! Nicobars; Teressa, etc., Jelinek 233! King's Collectors!


Perak; Batu Kuran, Scortechini 1594! Distrib. Chittagong, Burma, Java.

This has the habit and foliage of D. gangeticum, but in flowers and especially in fruits, it more resembles D. latifolium to which indeed Miquel and Baker have referred it.

Subgen. 5. Pteroloma Desv. Shrubs with 1-foliolate leaves and winged petioles. Flowers racemose, bracts minute and keel acute.

14. Desmodium triquetrum DC. Prodr. II, 326. A shrub with

**Andamans;** common in the interior of the Islands. **Perak; Kunstler 1074! Scortechini!** Distrib. India and Indo-China.

This species is very easily recognised by its hairy pods. Some difficulty is at times found in separating flowering specimens of this from flowering specimens of the next species; the two are however quite distinct. Equally distinct are two other species, *D. alatum* and *D. pseudo-triquetrum*, quite justly differentiated by De Candolle but merged in *D. triquetrum* by Miquel, who has been followed in the *Flora of Brit. Ind.*

**15. Desmodium auriculatum** DC. Prodr. II, 326. A littoral shrub with grooved triangular glabrescent branches. *Leaves* 4–5 in. long, 1-foliolate, petiole 1 in. long *3* in. wide, with broad leafy reticulate-veined wings; blade 3–4 in. long 1–1'5 in. wide, oblong or ovate-acute with truncate or cordate base and acute apex, green and glabrous on both surfaces, lateral nerves 10–12 pairs and secondary cross reticulate venation distinct on both surfaces, especially beneath; stipules large *5* in. long *2* in. wide, subscarios, closely parallel-veined, persistent, stipels adnate to tip of petiolar wing. *Inflorescence* in axillary and terminal racemes 5–8 in. long, of solitary or fascicled flowers in the axils of 12–20 simple scarious bracts; pedicels ascending, *3* in. long. *Calyx* *15* in. long, sparsely hairy, base bracteolate; tube campanulate shorter than the unequal teeth. *Corolla* purple, *3* in. long. *Pod* 1–2 in. long.


Though common in Tenasserim where it has been collected by Wallich (n. 5788 M!) and Helder (n. 1648!) as well as in Mergui where it has been obtained by Griffith (n. 5681) and Proudlock (n. 14!1), this is not present in Calcutta from any locality within the Straits Settlements. It is rather more closely related to *Desmodium alatum*, which has broader pods, than to the preceding species, but it is equally distinct from both. It appears to be an almost exclusively littoral form; there are however two inland gatherings at Calcutta, both from Silhet and both collected by Mr. Clarke (n. 14352! and n. 42702!).

It should be noted that *Hedysarum alatum* Roxb. is not the species described by De Candolle as *Desmodium alatum*; Roxburgh's *H. alatum* is exactly equivalent to Linnaeus' *H. triquetrum*. Roxburgh's *H. triquetrum* on the other hand is not Linnaeus' plant but is *Desmodium pseudo-triquetrum* DC., a species confined to Northern India, the lower Himalayan slopes, and the mountains of Assam. *D. alatum* DC., the plant with broad pods described in the *Prodromus*, occurs in Khasia, Cachar and Chittagong without appearing in India proper or in Burma and the Malay Peninsula; it recurs, however, in Java. The present species, *D. auriculatum*, has not been found in Java but is met with again in Timor.

**Subgen. 6. Pleurolobium** DC. Erect undershrubs, with large leaves. *Flowers* racemose; *pods* indistinctly jointed, dehiscent in a continuous line along the ventral suture.

42. Sophora Linn.

Trees or shrubs. Leaves odd-pinnate. Flowers showy, yellow or white or violet-purple, racemose or panicled. Calyx oblique subgibbous broadly campanulate; teeth deltoid very short. Corolla much exserted, standard broad; petals equal in length all with long claws; keel obtuse. Stamens free or only obscurely connate at the very base; anthers uniform versatile. Ovary stalked, many-ovuled; style incurved, stigma capitate. Pod mouiform, sublignose or membraneous usually indehiscent, the joints turgid and usually terete. Species about 25; widespread in tropical and subtropical regions, a few temperate or alpine.

The above definition applies to the section Eusophora, to which the only Malayan species belongs.

Sophora tomentosa Linn. Sp. Pl. 373. An evergreen littoral shrub or small tree sometimes reaching 20 ft. in height, with all parts at first softly and shortly tomentose. Leaves 6-12 in. long, leaflets 10-17 terminal and in subopposite pairs or often along proximal half of rachis distinctly alternate, elliptic to oval-obtuse 1-1.5 in. long, 5-7.5 in. wide, thinly coriaceous, with age glabrescent above, persistently softly pubescent beneath, petiolules very short densely pubescent as is the rachis. Flowers in terminal racemes 6 in. long on softly tomentose pedicels, 3 in. long, with deciduous subulate basal bracteoles, 15 in. long. Calyx obliquely truncate, 35 in. long, obsoletely toothed, externally softly pubescent. Corolla yellow, glabrous, 65 in. long; standard orbicular veined. Stamens almost free to the base, the vexillary filament quite free, the filaments of the other 9 very shortly connate round base of pubescent 10-12-ovuled ovary. Pod mouiform 6-8-seeded, 4-6 in. long, the oblong hoary joints separated by stipes as long as themselves. DC. Prodr. II, 95; Wall. Cat. 5333; Roxb. Flor. Ind. II, 316; W. & A. Prodr. 179; Miq. Flor. Ind. Bat. I, 124; Bak. in Flor. Brit. Ind. II, 249. S. glabra Hassk. Cat. Hort. Bog. 285; Miq. Flor. Ind. Bat. I, 125 (fide Baker).

Kedah; Langkawi, Curtis! Dindings; on coast, Scortechini! Curtis! Perak; Larut, Ridley! Pulo Condor; on the coast, Finlayson! Andamans; very common on all the coasts. Distrib. On most tropical sea-coasts.

43. Ormosia Jacks.

Erect trees or, one species, climbing. Leaves odd-pinnate. Flowers usually in dense terminal racemes. Calyx campanulate, deeply 5-cleft,
the two upper teeth usually distinctly subconnate into an upper lip. 
Corolla slightly exserted, petals subequal in length, all short-clawed; 
standard orbicular sometimes emarginate; keel petals free, and wings 
oblung, obtuse. Stamens free or only faintly subconnate at the very 
base, much incurved and exserted when the flower expands; anthers 
oblung, versatile. Ovary subsessile; style long, filiform, circinate at the 
tip with an oblique stigma on the inner face. Pod thickly fleshy or 
woody, or thinly woody, turgid 2-valved continuous within, the sutures 
without wings. Seeds bright red, with or without arillus. Species 
about 25, cosmopolitan in the tropics.

Climber; (leaves quite glabrous beneath) ... ... 1. O. scandens.

Trees:—
Seeds large with a black adnate basal aril; (leaves mi-
nutely sparsely pubescent underneath):—
Panicles fastigiate, flowers white, pedicels stout; pods 
3 in. wide, seed 1 in. long ... ... 2. O. macrodisca.
Panicles lax, flowers yellow, pedicels slender; pods 1-25 
in. wide, seed '75 in. long ... ... 3. O. gracilis.

Seeds small without any aril:—
Leaves quite glabrous beneath; (pod '6 in. broad, '4 in. 
 thick, valves thinly woody) ... ... 4. O. nitida.

Leaves pubescent beneath:—
Leaflets distinctly petiolulate; pedicels shorter than 
calyx; pod with thinly woody valves '6 in. broad, 
'4 in. thick:—
Leaflets (9-13) small (not exceeding 2'5 in.) shortly 
acuminate (dark green thinly pubescent beneath)... 5. O. parviflora.
Leaflets larger (4 in long) acute or subobtuse:—
Leaflets thinly pubescent beneath, pale-green, 
7-9; branches thin; panicles lax, bracts small; 
pubescence grey ... ... ... 6. O. sumatrana.
Leaflets densely pubescent beneath, dark-green, 
11-13; branches very thick; panicles fastigiate, 
bracts conspicuous; pubescence rusty ... ... 7. O. microspurma.

Leaflets sessile; pedicels almost equalling calyx; pod 
with thinly woody valves 1-35 in. wide, 1 in. thick ... 8. O. venosa.

1. Ormosia scandens Prain. A large climber over 100 feet long 
with stem 6-8 in. in diam.; branches glabrous. Leaves 12-15 in. long; 
leaflets 5-7, ovate-oblong or the terminal slightly obovate, coriaceous, 
bright-green, quite glabrous on both surfaces, apex shortly acuminate 
base rounded, 6-9 in. long, 2'5-3 in. across; secondary nerves 13-18, 
fine ultimate reticulations rather distinct beneath. Racemes in ample 
terminal panicles, 12 in. long 6 in. across, with pale-tawny shortly 
puberulous rachis and branches, pedicels 2 in. long, pale-tawny silky, 
shorter than the calyx, with a minute deciduous basal and 2 subulate
apical persistent bracteoles, ’08 in. long, close under calyx. *Calyx* 3 in. long, finely grey-silky, three lower teeth deltoid as long as calyx-tube, two upper subconnate into a shortly bifid upper lip. *Corolla* 35 in. long, white with a reddish tinge, standard 25 in. across. *Stamens* quite free, incurved, exserted. *Ovary* with line of hairs along upper suture, elsewhere glabrous, ovate; style slightly contorted; ovules 3. *Pod* unknown.

**Perak; Larut, Kunstler 3560**!

A very distinct species differing from the rest in its scandent habit. Mr. Kunstler speaks of it as rare.

2. *Ormosia macrodisca* Bak. in Flor. Brit. Ind. II, 253. A large tree with very thick grey glabrous branches. *Leaves* 8–10 in. long, leaflets 7–9, oblong, very thick and rigid in texture, pale grey-green on both surfaces, quite glabrous above, with a very sparse adpressed pubescence of short hairs beneath, apex acute, base broadly rounded to cuneate, 3–5 in. long, 1·25–2 in. broad, secondary veins 7–9 pairs, faintly prominent beneath. *Racemes* crowded in terminal fastigiate panicles, 6 in. long, 3 in. wide, with brown-silky puberulous rachis and branches, pedicels 1–15 in., brown-silky, shorter than calyx, with a minute basal and 2 minute apical persistent bracteoles close under calyx. *Calyx* 3 in. long, finely brown-silky, three lower teeth two-thirds, two upper teeth one-third as long as tube, all teeth oblong-obtuse. *Corolla* 5 in. long, white; standard 4 in. across. *Stamens* quite free, incurved, exserted. *Ovary* glabrous, obliquely oblong, ovules 3. *Pod* hard thick irregularly orbicular, 3 in. across 75 in. thick, at first flattened, at length turgid opposite the usually solitary seed. *Seed* oblong, 1 in. long, 7 in. wide, bright scarlet, with an adnate, black, pitted aril, 2 in. deep, embracing its base.

**Malacca; Maingay 600! Singapore; Ridley 2103**!

3. *Ormosia gracilis* Prain. A slender tree with very thin pale-brown glabrous branches. *Leaves* 5–8 in. long, leaflets 7–9, ovate-lanceolate, chartaceous, pale grey-green on both surfaces, quite glabrous above, with a very sparse adpressed pubescence of short hairs beneath, apex caudate-acuminate, base cuneate, 2·5–3 in. long, 1 in. across, secondary veins 8–9 pairs, very faint beneath not visible above. *Racemes* in lax terminal panicles, 5 in. across, with slender branches 6 in. long, faintly adpressed grey-silky as is the rachis, pedicels grey-silky, 15 in. long, very slender, rather shorter than calyx, with lanceolate basal bract, 08 in. long, and 2 very minute triangular apical bracteoles at base of calyx. *Calyx* 25 in. long, finely silky, pale-green, teeth ovate-lanceolate, longer than calyx-tube except the two upper. *Corolla* pale-yellow, 35 in. long; standard 25 in. across. *Stamens* quite free, much
incurved, exserted. **Ovary** puberulous, ovate-lanceolate; ovules 2. **Pod** hard, thick, irregularly oblong-ovate, with a short stalk and slightly excentric acute point, 1½ in. long, 1½ in. wide, externally covered with a pale bluish bloom; inside white. **Seed** usually solitary, oblong, 7½ in. long, 6 in. wide, somewhat compressed, bright scarlet, with an adnate, black, smooth aril, 1½ in. deep, embracing its base.

**Perak**; Larut, Scortechini 324! **Kunstler** 4234! **Wray** 2979!

A very fine species; near to *O. macrodisca*, but with a smaller pod and seed as well as with smaller leaflets; the seed too has the black arillar portion unpitted. It resembles *O. glauca* as to leaves though its leaflets are not quite so large; it has however larger seeds than *O. glauca* has, and the seeds have a black hilum; the seeds of *O. glauca* are all scarlet.

4. **Ormosia nitida** Prain. A tree 30–50 feet high, stem 2 feet in circumference, with stout rusty-brown glabrescent branches. **Leaves** 5–7 in. long, leaflets 7, obovate or elliptic, base rounded, apex broadly rounded and abruptly shortly cuspitate, very rigidly coriaceous, dark glossy-green quite glabrous on both surfaces, terminal 2½–4 in. long, 1½–2 in. wide, rather exceeding the others, secondary nerves very slender, 12–15 pairs. **Racemes** in fastigiate terminal panicles, 6–8 in. long, 5–6 in. across, rachis and branches faintly puberulous, pedicels puberulous, 1½ in. long, shorter than calyx, bracts and bracteoles deciduous. **Calyx** 2 in. long, rather densely tawny-silky, teeth deltoid, the 3 lower as long as tube the two upper subcuneate into a 2-fid upper lip. **Corolla** unknown. **Pod** irregularly oblong, 1 in. long, 7½ in. across, the valves thinly woody, rigid, quite glabrous and black externally, brown and not suberous within, with a short stalk equalling the calyx-tube. **Seed** oval, usually if not always solitary, cinnabar-red, 3½ in. long × 3 in. wide, without arillus.

**Perak**; Goping, in open jungle, local, **Kunstler** 6082!

This very distinct species has unfortunately only been reported in fruit. Its pods are very like those of *O. microsperma* or *O. parvifolia* but appear to have been glabrous from the beginning. They differ, moreover, very markedly in being shortly stipitate; the leaflets too, are of different shape and firmer texture, besides being quite glabrous on both surfaces.

5. **Ormosia parvifolia** Bak. in Flor. Brit. Ind. II, 253. A fairly large tree with slender persistently brown-velvety branches. **Leaves** 6–8 in. long, leaflets 9–13, oblong, coriaceous, green, glossy above, thinly hairy beneath, apex shortly acuminate, base rounded, the terminal rather larger than the others, 2½–5 in. long, 6–7 in. wide, secondary nerves fine and hardly raised beneath, 8–9 pairs. **Racemes** in fastigiate terminal panicles with rather short branches, 3–4 in. long, 2½ in. wide, with densely brown-velvety rachis and branches, pedicels brown-velvety, very short, each with an ovate-lanceolate basal bract and with 2 ovate

**Malacca;** Griffith 1765 ! Maingay 614 ! Goodenough 1443 ! Singapore; Ridley 5292! 8096! Pahang; Ridley 1267! 5013! *Distrib. Banka* (Teysmann 3405!); Borneo (Haviland 57!)

There is an authentic example of *Macro tropis ? bancana* Miq. at Calcutta; it belongs undoubtedly to this species.

6. **Ormosia sumatrana** Prain. A large tree with tomentose rather slender ultimately glabrescent branches. *Leaves* 8–10 in. long, leaflets 7–9 (very rarely 5), ovate or ovate-elliptic or obovate, obtusely apiculate or subacuminate, base rounded, coriaceous, pale-green, glabrous somewhat glossy above, hisrate but at length glabrescent beneath as are the rachis and petiolules, 2–4 in. long 1–1·75 in. wide, the terminal exceeding the others, nerves 8–10 pairs, spreading rather prominent beneath. *Racemes* in lax terminal panicles, 6–8 in. long and almost as wide, with pubescent rachis and branches; pedicels 1 in. long, shorter than the calyx, bracts 1 in. long, oblong, very deciduous as are the similar bracteoles at base of pedicels, the two bracteoles under the calyx sub-persistent, lanceolate, 0·8 in. long. *Calyx* 2 in., externally tawny-pubescent, three lower teeth ovate-lanceolate shorter than tube, the two upper subconnate in a 2-lobed upper lip. *Corolla* pinkish-white with lilac-purple markings, 35 in. long, standard orbicular emarginate, 3 in. wide. *Stamens* quite exerted, incurved. *Ovary* densely puberulous, almost always 3-ovuled. *Pod* irregularly orbicular if 1-seeded, 1 in. across, oblong and 1·7 in. long if 2-seeded, lineate between the seeds, the valves thinly woody, rigid, black and glabrescent externally. *Seed* ovoid 4 in. long, 35 in. wide, cinnabar-red without arillus. *Macro tropis sumatrana* Miq. *Flor. Ind. Bat. Suppl. 294.*

**Malacca;** Brisu, *Holmberg 735! Distrib. Sumatra* (Teysmann 3618! Forbes 2592! 2648!)

Though very closely related to the next species, this is nevertheless easily distinguished by its different leaves and tomentum, its lax panicles, its smaller flowers, and its larger seeds.

The Malacca plant here referred to *O. sumatrana* has been only once collected; it has inflorescence and flowers exactly as in *O. sumatrana* but it has not yet been sent in fruit. While therefore we know that it differs from *O. microsperma* and from *O. venosa* it is not absolutely certain that it exactly agrees with *O. sumatrana.*
7. *Ormosia microsperma* Bak. in Flor. Brit. Ind. II, 253. A tree 40 to 60 feet high with thick, densely brown-velvety branches. *Leaves* 8–10 in. long, leaflets 11–13, oblong or obovate, acute or subobtuse, base broadly rounded, rigidly coriaceous, dark-green, glabrous rather glossy above, densely persistently shortly brown-pubescent beneath as are the rachis and petiolules, 2·5–4 in. long 1·5–2 in. wide, secondary nerves 7–9 pairs, slightly raised beneath. *Racemes* in ample terminal fastigate panicles, 8 in. long, 6 in. across, with densely velvety rachis and branches; pedicels 0·7–12 in. long, much shorter than the calyx, bracts ovate-lanceolate, densely velvety, persistent, 1·25 in. long, bracteoles at base of pedicels similar but smaller (·12 in. long), two bracteoles close under calyx 1 in. long, oblong. *Calyx* 2·5 in. long, externally densely velvety, 3 lower teeth as long as calyx 2 upper rather shorter. *Corolla* white, 45 in. long, standard 3·5 in. wide, *Stamens* quite free, exserted, incurved. *Ovary* densely velvety, 3–4-ovuled. *Pod* 6 in. across, irregularly orbicular if 1-seeded, oblong and 1·1·2 in. long if 2-seeded, lineate between the seeds, the valves thinly woody, rigid, glabrescent or persistently velvety. *Seed* ovoid 3 in. long, 2·5 in. wide, cinnabar-red, without arillus.


**Malacca**; *Griffith* 1759! *Maingay* 532! *Derry* 1090! *Perak*; near Ulu Selangor, *Kunstler* 8767!

**Var. Ridleyi**; pedicels distinct, pods more persistently pubescent.

**Singapore**; *Selitar, Ridley*, 5574!

The specimens collected by Dr. Griffith have been named by Mr. Bentham "*Ormosia coarctata* Jacks." and those collected by Dr. Maingay have been definitely issued as *Ormosia coarctata*; Mr. Kurz too, has accepted this determination. Mr. Baker however finds that the identification of Griffith's and Maingay's Malacca plant with *O. coarctata* Jackson (Trans. Linn. Soc. X, t. 25; a plant from Guiana) cannot be sustained.

*Ormosia microsperma* is nearly related to *O. sumatrana* (*Macrotropis sumatrana* Miq.) and is also closely related to *Chromolobium septemjugum* Miq. and *O. decemjugum* Miq. (*Flor. Ind. Bat. Suppl. 302*). Mr. Kurz reduces the genus *Chromolobium* to *Ormosia* (Journ. As. Soc. Beng. XLII, 2. 71); in this he is certainly right. He, however, further considers that both plants are but forms of the same species and that moreover they are both referable to *O. microsperma*. So far as the material that was at Kurz' disposal goes this appears to the writer to be a premature conclusion, and it seems better for the present to keep Miquel's plants specifically apart.

Mr. Ridley's plant from Singapore differs very considerably from the Perak and Malacca one. The pods are described as hairy in the field note; they are so in the specimens themselves, but those at Calcutta are not quite ripe. If the pods prove to be quite persistently velvety it will probably be necessary to treat the plant as a distinct species to be named *O. Ridleyi*. 

1897.] G. King—Materials for a Flora of the Malayan Peninsula. 151
8. ORMOSIA VENOSA Bak. in Flor. Brit. Ind. II, 254. A tall tree, with branches densely persistently velvety-pubescent. Leaves 4–6 in. long, leaflets 7, obovate-oblong, obtuse or subobtuse, base cuneate nearly sessile on the rachis, rigidly coriaceous, greyish-green glabrous but dull above, densely persistently tomentose beneath, 3–4 in. long 1½–2 in. across, terminal exceeding the rest, secondary nerves 10–12, distinctly raised beneath, rachis densely velvety. Racemes terminal crowded, with rather slender branches, 3–4 in. long and about as wide, rachis and branches densely velvety; pedicels 2 in. long, nearly equalling the calyx, bracts 1½ in. long, lanceolate, persistent, bracteoles at base of pedicels 1 in. long; 2 bracteoles under calyx minute but subpersistent. Calyx 2½ in. long, densely velvety, teeth triangular, three lower as long as tube, two upper subconnate. Corolla 3½ in. long, apparently white, standard 3 in. across. Stamens incurved, exserted. Ovary velvety. Pod obtuse or subacute, orbicular or oblong, obtuse or subacute, 1½ in. long, 1½ in. across, 1 in. thick, the valves very thickly woody, black and glabrous externally. Seeds usually solitary, ovoid, 5 in. long, 4 in. wide, crimson-red, without arillus.

MALACCA; MAINGAY 533!

A very distinct species.

SUBORDER II. CÆSALPINIÆ.

Trees or shrubs, very rarely herbs. Leaves pinnate or 2-pinnate leaflets 1–∞-paired, rarely simple or 1-foliolate, stipels usually 0, if present very minute. Inflorescence racemose, rarely cymose, very rarely spicate; axillary, lateral, or in terminal panicles. Flowers irregular or very rarely regular, 5-, less often 4-merous. Sepals 5, or 4 from fusion of the upper two, divided to the summit of the disc that lines the short or long calyx-tube, imbricate or rarely valvate, or very rarely united in a toothed or lobed limb. Petals 5, or fewer by abortion, the upper innermost in bud, the others variously imbricate. Stamens 10, or fewer by abortion, very rarely indefinite, free or rarely some or all more or less connate; anthers various. Ovary free or united by its stipe to the disc-bearing calyx-tube. Seeds various, albumen copious, scanty, or 0. Radicle straight or slightly oblique, hidden between cotyledons, or shortly exserted.

Leaves simply pinnate or (Bauhinia) 1-foliolate:—

Anthers basifixed:—

Leaves even-pinnate; (petals 5) ... ... 44. CASSIA.
Leaves odd-pinnate; leaflets alternate:—

Petals 5; stamens 5; pod flat, winged throughout its circumference, indehiscent ... ... ... 45. KOOMPASSIA.
Petals 2 or 0; stamens 2; pod turgid subglobose, wingless, dehiscent ... ... ... 46. Dialium.

Anthers versatile:—

Corolla complete, i.e., with 5 petals; sepals 5; (stamens free):—

Seeds with albumen; leaves 1-foliolate 2-lobed, rarely entire, rarely by fission 2-foliolate ... ... 47. Bauhinia.

Seeds without albumen; leaves even-pinnate, 2-3- (rarely 1-)jugate ... ... ... 48. Cynometra.

Corolla incomplete, i.e., with fewer than 5 petals; sepals 4:—

Petals present; sepals green; (leaflets even-pin-nate):—

Petals 3; stamens 3 monadelphous ... ... 49. Tamarindus.

Petol solitary:—

Calyx-lobes subvalvate; stamens monadelphous 9, all or only 2 perfect, funiculus of seed thick arillate ... ... ... 50. Sindora.

Calyx-lobes much imbricated; stamens free 3 ... 51. Afzelia.

Petals 0; sepals colored:—

Leaflets even-pinnate; stamens 3-8 ... ... 52. Saraca.

Leaflets alternate; stamens 8-10 ... ... 53. Crudia.

Leaves 2-pinnate; (anthers versatile):—

Calyx segments subequal; stigma peltate ... ... 54. Peltophorum.

Calyx segments manifestly unequal, the lowest lobe cucul-late larger than the rest:—

Pod wingless ... ... ... 55. Cæsalpinia.

Pod winged:—

Wing extending all along the upper suture ... ... 56. Mezoneuron.

Wing apical, (pod samaroid) ... ... 57. Pterolobium.

44. Cassia Linn.

Erect shrubs or trees, rarely herbs. Leaves simple, abruptly pinnate. Flowers usually large and showy, in axillary racemes and terminal panicles. Calyx-tube very short; sepals broad or narrow, imbricated. Petals 5, imbricated, subequal, usually broad. Stamens normally 10, but rarely all perfect, 3-5 being often reduced to stamino-dia or altogether absent; anthers mostly but not invariably basifixed, dehiscing by terminal pores or with the slit more or less continued longitudinally. Ovary sessile or stalked, many-ovuled; style incurved, stigma terminal. Pod very variable, terete or flat, usually septate, the albuminous seeds flattened, sometimes parallel with the valves, sometimes with the septa, dry, dehiscent or indehiscent. Species 340, spread everywhere in the tropics, a few extra-tropical.
Trees shrubs or stnt herbs with large leaflets and with obtuse sepal.:
Stamens 10, all fertile:
Lowest 2-3 stamens larger than the rest, pods terete indehiscent ($\S$ Fistula):—
Flowers pink, in dense corymbs, bracts large persistent:
Leaflets acute, corymbs from old nodes below leaves, sepals green, petals acute ...
Leaflets obtuse, corymbs among leaves, sepals brown to purple, petals obtuse ...
Flowers yellow, in lax racemes, bracts small deciduous ...
Lowest stamens not exceeding the rest, pods flat, indehiscent ($\S$ Psilorhegma) ...
Stamens 7 only fertile; the 3 upper reduced to staminodes ($\S$ Senna); pods dehiscent, usually more or less compressed):
Leaves with glands on the common rachis:—
Glands between the bases of two opposed leaflets; leaflets obtuse, pods with oblique dissepiments; seeds rhombohedral:—
Glands between each of the two lower pairs of leaflets; pedicels short, pods subquadrate ...
Gland between lowest pair of leaflets only; pedicels long, pods subterete ...
Glands far below leaflets and near base of petiole; leaflets acute, pods with transverse dissepiments; seeds ovate, compressed:—
Calyx, leaves and pods densely tomentose; flowers in sub sessile axillary pairs ...
Calyx, leaves and pods glabrous; flowers in axillary corymbs:—
Leaflets 3-5 pairs; pods flattened ...
Leaflets 8-12 pairs; pods turgid ...
Leaves with rachis channelled above, barred transversely between the leaflets but without glands:—
Shrubs with flowers in strobilate subspicate racemes; pods winged along the valves; leaflets reaching 6 in. ...
Trees with flowers in panicles of corymbs; pods not winged; leaflets not exceeding 2.5 in.:—
Stipules large persistent; pod thin-valved flexible, with narrow sutures ...
Stipules small deciduous; pod with coriaceous rigid valves, sutures thickened ...
Slender herbs or undershrubs with very small leaflets and with acute sepals ($\S$ Chamucrista):—
Leaflets linear minute (15 in. long); pedicels 1 in.
bracteolate above middle; pod 20-25-seeded; stamens all fertile alternately short and long

13. C. mimosoides.

Leaflets oblong (4 in. long, 15 in. wide); pedicels 3 in. bracteolate below middle; pod 8-16-seeded; stamens unequal 1-3 upper often sterile


§1. FISTULA DC Sepals obtuse, stamens all antheriferous, the 2-3 lowest larger than the rest and with longer filaments. Pods indescent, stipitate, very long, terete with thin brittle ligneous dissepiments between the numerous seeds which are embedded in suberous wad-like discs between the partitions.

I. CASSIA NODOSA Ham. in Roxb. Hort. Beng. 31. A tree 40-50 feet high, stem 10-15 inches across, branches spreading, branchlets black glabrous except for the slightly downy tips. Leaves equally pinnate 9-10 in. long; leaflets chartaceous 6-12 pairs, opposite, oblong, base rounded, apex shortly acuminate, 2-2.5 in. long, 1-1.25 in. wide, bright green, glabrous and shining above, dull and slightly pubescent, especially on the nerves, beneath; lateral nerves spreading 12-16 pairs, slender but visible beneath, petiolules 15 in. long, puberulous as is the leaf-rachis. Flowers in corymb 2-3 in. long, from old nodes along the branches, peduncles solitary or 2-4 together, puberulous simple very rarely branched, 1 in. long, bracts ovate-lanceolate persistent, puberulous, 25 in. long, pedicels puberulous the lower 1.5 in. long. Calyx 5-partite to the base, lobes subequal green, ovate-obtuse, hoary. Petals 5, subequal, carnation to white with a flush of pink, 6-7 in. long, 25 in. wide ovate-acute, distinctly clawed. Stamens 10, all antheriferous, the 3 lowest with longer nodose filaments and larger anthers than the others. Pod terete, rather distinctly annulated, 5 in. in diam., 1.5-2 feet long, glossy black with thin brittle ligneous transverse dissepiments between the 60-90 seeds each of which is embedded in a suberous disc 5 in. across 2 in. thick. Seeds broadly ovate smooth slightly shining, 35 in. long, 3 in across, 2 in. thick, testa pale brown. Wall. Cat. 5331; Roxb. Flor. Ind. III, 336; Wight, Ic. t. 410; Bak. in Flor. Brit. Ind. II, 261.

ANDAMANS; King’s Collectors! MALACCA; Griffith! Maingay 596! Bukit Tampin, Goodenough 1912! Brisu, Derry 537! Sadanam Reserve, Derry 588! Selandan, Goodenough 125! PENANG; Waterfall, Curtis 1576! PERAK; Chanderia, Kunstler 5722! near Ulu Kerling, Kunstler 8732! Goping, Kunstler 4364! Scortechini 1934! PAHANG; Makang, Ridley 1359! DISTRIB. Indo-China, from Sylhet and Chittagong southwards and eastwards; Sumatra (Forbes 1748! 2669!); Borneo (Haviland!)

The Malay names given for this are Siboosok (Goodenough 1912); Busok-busok (Derry 537); and S’busu (Goodenough 125; Derry 588). This name it shares with
C. javanica. It seems that this species does not occur in Java, where C. javanica is its representative.

2. Cassia javanica Linn. Sp. Pl. 379. A tree 30–40 feet high, branches spreading; branchlets black glabrous except for the slightly downy tips. Leaves equally pinnate 9–15 in. long; leaflets chartaceous 8–20 pairs, opposite, oblong, base rounded, apex obtuse, 1.5–2 in. long, 1.75–9 in. wide, bright-green, glabrescent and slightly shining above, dull and uniformly puberulous beneath, lateral nerves rather oblique 10–12 pairs, slender but visible beneath, petiolules 1.5 in. long, puberulous as is the leaf-rachis. Flowers in corymbs 6–10 in. long, terminal and from leaf-axils, sometimes paniculously branched, peduncles solitary, often with 1–2 small foliage leaves with 2–4 pairs of leaflets, puberulous, 4–6 in. long, bracts ovate-lanceolate 4–5 in. long, persistent, puberulous, pedicels puberulous the lowest 1.5 in. long. Calyx 5-partite to the base, lobes subequal crimson to purple-brown, ovate-obtuse, hoary. Petals 5 subequal, rose-pink, 8–1 in. long, 35 in. wide, broadly spatulate obtuse, distinctly clawed. Stamens 10 all antheriferous, the 3 lowest with nodose larger filaments and larger anthers. Pod terete, not very distinctly annulated, 1.75 in. in diam., 1.25–1.5 feet long; glossy black, with thin brittle ligneous transverse dissepiments between the 50–75 seeds each of which is embedded in a suberous disc 1.75 in. across 2 in. thick. Seeds broadly ovate, smooth slightly shining, 35 in. long, 3 in. across, 2 in. thick, testa pale warm-brown. DC. Prodr. II, 490; Wall. Cat. 5009; Benth. Pl. Jungh. 259; Miq. Flor. Ind. Bat. I, 90; Bak. in Flor. Brit. Ind. II, 267; Koord. & Val. Bijdr. II, 8. C. Bacillus Gaertn. Fruct. I, 313; Roxb. Hort. Beng. 31; Flor. Ind. II, 337; Wight, Ic. 252. Rumph. Herb. Amboin. II, 82, t. 22.

Perak; Thaipeng, Wray 4020! DISTR. Sumatra (Forbes 1275!); Java.

Mr. Wray is the only collector who has sent this very distinct species to Calcutta from the Malay Peninsula. The Malay name of this Mr. Wray gives as Sibau, a circumstance that causes no surprise when it is considered how very closely related this species and C. nodosa undoubtedly are.

3. Cassia Fistula Linn. Sp. Pl. 377. A tree 20–40 feet high with spreading branches and glabrous branchlets, Leaves equally pinnate 8–16 in. long; leaflets coriaceous 4–6 pairs, developing successively, opposite, ovate, tapering from below the middle to a narrow point, base wide-cuneate, 2–6 in. long, 1.5–3.5 in. wide, bright-green, glabrous shining above, dull and paler beneath when young clothed with a close but very caducous silvery pubescence; lateral nerves obliquely spreading 10–20 pairs, slender but visible above somewhat prominent beneath, petiolules 2 in. long stoutish, glabrous as is the leaf-rachis. Flowers in
long lax racemes 12–20 in. long, bracts minute caducous, pedicels glabrous 1·5–2 in. long. *Calyx* 5-partite to the base, segments broadly spatulate 2·5 in. long, finely puberulous. *Petals* 5 subequal, obovate shortly clawed, 8·1 in. long, 6–7 in. wide. *Stamens* 10 all antheriferous, the 3 lowest with larger and thicker but not nodose filaments, and with larger anthers. *Pod* terete, 9–1 in. thick, not at all annulated, 1–2 feet long, dull black with thin brittle ligneous transverse dissepiments between the 50–90 seeds each of which is embedded in a suberous disc 8–9 in. across, 2 in. thick. *Seeds* broadly ovate smooth shining, 35 in. long, 3 in. across, 2 in. thick, testa pale warm-brown. DC. Prodr. II, 488; Roxb. Hort. Beng. 31; Fl. Ind. II, 333; Wall. Cat. 5502; W. & A. Prodr. 285; Miq. Flor. Ind. Bat. I, 89; Bak. in Flor. Brit. Ind. II, 261; Koord. & Val. Bijdr. II, 11. *C. rhombifolia* Roxb. Hort. Beng. 31; Flor. Ind. II, 334; Wight & t. 269.

**MALACCA; fide Baker in Flor. Brit. Ind. ANDAMANS; planted, common.**

This is the well-known *Amaltis* or "Indian Laburnum" undoubtedly a native of India but, not in the writer's opinion, entitled to be considered an indigenous tree in Malaya; indeed none of the Malayan botanists have sent specimens to Calcutta. Mr. Baker however alludes to specimens at Kew from Malacca; possibly it is planted in the other provinces also. In the Andamans it only occurs as a planted tree.

§ 2. **Psilorrhoea** Vogel. *Sepals* obtuse, stamens all antheriferous, anthers all subequal. *Pods* compressed, dehiscent, the dissepiments between the seeds membranous.

4. **Cassia glauca** Lamk. Encyc. Meth. I, 647. A small tree 15–20 feet high with glabrous terete branches; stem 4–6 in. in diam. *Leaves* equally pinnate 6–9 in. long; leaflets 4–6 pairs opposite, membranous or subcoriaceous, pale-green glabrous above, very glaucous and sparingly adpressed-puberulous or glabrous beneath, ovate-acute, base cuneate, 2–4 in. long, 1–2 in. wide, lateral nerves 10–12 pairs indistinct, petiolules 1·5 in. long, puberulous as is the rachis which is faintly channelled above and furnished with long conical glands between each of the 2–3 lowest pairs of leaflets; stipules falcate narrowly lanceolate 35 in. long, caducous. *Flowers* in axillary corymb 4 in. long, 2·5 in. across, the peduncles 2 in. long; lower pedicels 1·25 in. long, spreading, solitary in the axils of small elliptic caducous bracts glabrous as are the peduncles. *Calyx* 5-partite to the base, segments very unequal, pale-yellow, glabrous, all orbicular, the outer 2, the others 3 in. across. *Petals* 5 subequal, spreading, broadly ovate-obtuse shortly clawed, 1 in. long, 75 in. across, pale-primose with faint greenish-yellow veins. *Stamens* 10 subequal. *Pod* straight flat very thin, dehiscent, linear, tapering to both ends, flexible, dull, slightly compressed between the seeds, valves thinly coriaceous, 6–8 in. long, 5–7 in. wide, with a stalk.

Penang; Kunstler 1473! Curtis! Malacca; cultivated, Maingoy 595! Perak; Simpang, Wray 2051! Distrib. S.-E. Asia generally, but often, perhaps usually cultivated.

§ 3. Senna Bth, & Hk. f. Sepals obtuse, perfect stamens 7, the 3 uppermost reduced to staminodes, the remainder subequal or the lowest 2–3 with longer filaments and larger anthers than the rest. Pods compressed, rarely subterete, usually dehiscent, the dissepiments between the seeds membranous.


This is sometimes spoken of as cosmopolitan in the tropics and possibly it has now become introduced in the New World. But if so, it is not common there and the writer has never seen an American specimen.

6. *Cassia obtusifolia* Linn. Sp. Pl. 377. An annual bland herb or undershrub 2-7 feet high. Leaves equally pinnate, distinctly petioled 3-4 in. long; leaflets 3 pairs opposite, membranous, green, obovate-oblong, uppermost leaflets 2 in. long, 1 in. wide, lowest pair 1-1 1/2 in. long, 7 1/2 in. wide, apex broadly equally deltoid, base slightly obliquely rounded, glabrous or puberulous on both surfaces, lateral nerves 8-10 pairs, oblique straight faint on both surfaces, petiolules under 1 in. puberulous as is the rachis which is deeply grooved above and is furnished with a long conical gland between the lowest pair of leaflets; stipules linear 7 1/2 in. long, caducous. Flowers usually in sub sessile pairs in axils of the leaves the upper crowded, their common peduncle even in fruit not exceeding 1 1/2 in. usually shorter, the pedicles even in flower 1-1 1/2 in. long. Calyx 5-partite to the base, segments green ovate-acute glabrous, spreading, 2 1/2 in. long. Petals 5 sub equal, spreading, bright-yellow, 5 in. long, 3 1/2 in. wide, oblong-obtuse, the standard truncate. Stamens 7 (the 3 upper replaced by staminodes) sub equal, anthers brown. Pod 8-10 in. long, 2 1/2 in. wide, sub-terete, obliquely septate, the valves glabrous, membranous, distinctly transversely reticulated, sutures broad. Seeds 30-35, rhombohedral, 2 in. long, 1 1/2 in. thick, brown shining. Linn. Sp. Pl. ed. II, 539 as to the plant but excl. the ref. to Dillenius and to Rumphius; DC. Prodr. II, 493; Collad. Hist. Cass. 95. *C. toroides* Roxb. Hort. Beng. 31. *C. humilis* Collad. Hist. Cass. 96. *C. Tora var. β*. Linn. Sp. Pl. 376. *C. Tora var. β*, W. & A. Prodr. 291 excl. references to Rheede and to Lamarck; Miq. Flor. Ind. Bat. I, 95. *C. Tora* Bak. in Flor. Ind. Bat. I, 263 in part, not of Linn. *C. obtusifolia var. β*, Miq. Flor. Ind. Bat. I, 96, not var. a. *Senna toroides* Roxb. Fl. Ind. II, 340.

**Singapore**; common, Hullett 102! Kunstler 124! Distrib. Native in Tropical America; now introduced and, here and there, fairly common in South-Eastern Asia.

Dr. Roxburgh was at some pains to point out how different this species is from *C. Tora*. The confusion of identification originated with Linnaeus himself and has been perpetuated owing to the fondness that many authors have for books and names as compared with plants and facts.

7. *Cassia hirsuta* Linn. Sp. Pl. 378. A diffuse tomentose under-
shrub 2-5 feet high usually of annual duration. *Leaves* equally pinnate 4-8 in. long; leaflets 3-6 (rarely 2) pairs, opposite, membranous, green, foetid, ovate-acuminate with enate base, rather densely pilose on both surfaces, 1.5-3.5 in. long, 1-1.5 in. wide, lateral nerves about 6 pairs straight ascending, petiolules very short pilose as is the leaf-rachis which has a single large gland 2 in. above its base; stipules subulate membranous 35 in. long. *Flowers* usually in subsessile pairs in axils of leaves, the upper crowded, their common peduncle even in fruit not exceeding 1.5 in., pedicels in fruit 5 in. long, erect, rigid, pilose. *Calyx* 5-partite to base, segments pale, ovate-subacute, pilose externally, 0.25 in. long. *Petals* 5, subequal, spreading, bright-yellow, 0.45 in. long, 0.25 in. wide ovate-oblong obtuse. *Stamens* 7 (the 3 upper replaced by staminodes) the 3 lower longer and with larger anthers than the two lateral pairs; anthers brown. *Pod* slightly falcate, 6-8 in. long, 0.25 in. wide, suberete, faintly transversely septate, the valves densely villous, papery, very faintly reticulated and faintly depressed between the seeds, sutures broad. *Seeds* 90-120, ovate, small, dull-brown, 0.15 in. long, 0.1 in. wide, 0.07 in. thick. DC. Prodr. II, 497; Bak. in Flor. Brit. Ind. II, 263. *C. tomentosa* Wall. Cat. 5304 not of Linn.

**Singapore;** very common, Anderson 44! Hullett 75! Kunstler 317! **Distrib.** An American weed now naturalised in many parts of S.-E. Asia.

8. *Cassia occidentalis* Linn. Sp. Pl. 377. A diffuse subglabrous undershrub 2-5 feet high usually of annual duration. *Leaves* equally pinnate 6-8 in. long; leaflets 3-5 pairs opposite, membranous, glaucescent, foetid, ovate-oblong with rounded base, tapering to an acuminate tip, glabrous above, glabrous or finely pubescent beneath, 1-3 in. long, 0.5-1.25 in. wide; lateral nerves 6-10 pairs spreading, petiolules very short glabrous as is the leaf-rachis which has a single large globose gland at its base. *Flowers* in axillary short-peduncled few-fld. corymbs arranged in a terminal panicle, bracts white with pink tinge, thin, ovate-acuminate, caduceous, 0.5 in. long; pedicels 15-2 in. long, sparsely puberulous, spreading, in fruit reaching 0.5 in. long, ascending, rigid. *Calyx* 5-partite to base, segments white faintly tinged with pink, glabrous, membranous, obtuse, 0.3 in. long. *Petals* 5 subequal, yellow very faintly veined with orange, 0.5 in. long, 0.3 in. wide, ovate-obtuse. *Stamens* 7, (the 3 upper replaced by staminodes) the 3 lower longer and with larger anthers than the two lateral pairs; anthers brown. *Pod* slightly falcate, compressed, transversely septate, sutures rigid, valves depressed between the 20-30 seeds, 4-5 in. long, 0.35 in. wide, 0.2 in. thick. *Seeds* broadly ovate, small, pale-brown, 0.2 in. long, 0.15 in. across, 0.1 in. thick. DC. Prodr. II, 497; Roxb. Hort. Beng. 31; Bot. Reg. t. 83; W. & A. Prodr. 290; Miq.

In all the Provinces, a very common weed of waste places. Distrib. Cosmopolitan in the tropics but in all probability derived originally from America and only introduced in the Old World.

Mr. Baker describes the flowers as pale lilac; this they appear never to be in South-Eastern Asia.


Andamans; much less common than *C. occidentalis*. Penang; fide Baker. Distrib. Originally American, now cosmopolitan in the tropics.

This species has not been sent by any Malayan botanist to the Calcutta Herbarium. Its presence in Penang is however mentioned by Mr. Baker; the collector’s name is not given. It was not Dr. Wallich; Wallich’s Malayan “C. *Sophera*” (Cat. 5317 L) is all *C. occidentalis*. It is strange that though this species appears to have been earlier of introduction to—at all events to have been longer known—in S.-E. Asia, it is now, though almost equally wide-spread, much less “common” than the more recently introduced *C. occidentalis*.

10. Cassia *alata* Linn. Sp. Pl. 378. A shrub 5–8 feet high with very thick finely downy branches; stem often 4–5 in. thick, scarred J. ii. 21
with cicatrices of fallen leaves and marked by the persistent rather rigid stipules. **Leaves** equally pinnate 1–2 feet long; leaflets 8–14 pairs opposite, rigidly chartaceous, green, linear-oblong to oblong, obtuse or marginate, apiculate, base obliquely rounded or truncate, glabrous on both surfaces or sometimes obscurely downy beneath, gradually increasing in size from base upwards, 2–6 in. long, 1–2.5 in. wide, lateral nerves 10–15 pairs ascending curved towards extremities, distinct above and very prominent beneath, secondary venation beneath distinct; petiolules very short glabrous as is the leaf-rachis, which is deeply channelled above with firm yellow borders and with transverse ridges occasionally slightly apiculate in the middle between each pair of leaflets, but with no true gland; stipules 2.5 in. long, auriculate, rigid, pointed, persistent. **Flowers** in peduncled subsespicate racemes, 6–18 in. long, at first enveloped in large membranous strobilatate yellow caducous bracts 7.5 in. long, 6 in. wide, ovate, subacute or obtuse; pedicels 15 in. (in fruit 25 in.) long, very finely puberulous as is the thick rachis. **Calyx** 5-partite to base, segments spatulate obtuse, 1 in. long, 6 in. wide, yellow, membranous, glabrous. **Petals** 5 subequal, bright yellow veined with orange, ovate-orbicular shortly clawed, 1.25 in. long, 7.5 in. wide. **Stamens** 7 (the 3 upper reduced to staminodes) the 3 lowest with long filaments and two of these with very large anthers; the two lateral pairs with short filaments and small anthers. **Pod** straight rigid divaricately spreading glabrous dehiscent, 6 in. long 8 in. wide, sutures narrow, valves with a crenulated chartaceous wing 3.5 in. wide running from end to end. **Seeds** 50–60 flattened, triangular, the sides straight with acute point at hilum, the base somewhat rounded, 25 in. long, 2 in. wide, 1 in. thick, testa smooth shining brown. DC. Prodr. II, 492; Roxb. Hort. Beng. 31; Wall. Cat. 5301; W. & A. Prodr. 287; Wight, Ic. t. 253; Miq. Flor. Ind. Bat. I, 93; Bak. in Flor. Brit. Ind. II, 261. C. bracteata Linn. f. Suppl. 232; DC. Prodr. II, 492. C. herpetica Jacq. Obs. II, 24, t. 45, f. 2. Sena alata Roxb. Flor. Ind. II, 349.

**Andamans; common, King! Prain! Perak; Scortechini! Malacca; Griffith!** Distrib. Cosmopolitan in the tropics.

11. **Cassia timoriensis** DC. Prodr. II, 499. A shrub or small tree 6–30 feet high, with virgate pubescent branches. **Leaves** equally pinnate, 1–1.5 feet long; leaflets 16–24 pairs, opposite, membranous, pale-green, glabrescent to densely pubescent above, sparsely pubescent to softly densely tomentose beneath, lanceolate-oblong with a fine point at the rounded apex and with obliquely rounded base, 1–1.75 in. long, 35–65 in. wide, lateral nerves 8–10 pairs inconspicuous, petiolules 0.7 in. long, pubescent as is the rachis which is channelled above and trans-
versely barred between the leaflets; stipules lanceolate to auriculate foliaceous persistent, usually larger in the region of the inflorescence, *25 in. long. Flowers in a large erect terminal panicle extending into the axils of the upper leaves, 1-1*25 feet long, 6 in. across, composed of alternate corymbs 2-3 in. long, 1*5 in. across; lower pedicels 1 in. long, solitary in axils of small deciduous bracts, rusty- or yellow-pubescent as are the branches and main-rachis. Calyx 5-partite to base, segments distinctly unequal, oblong-obtuse, densely pubescent outside, the larger *3 in. the smaller *2 in. long. Petals 5 oblong, *6 in. long, *3 in. wide, bright-yellow faintly veined with orange. Stamens 7 (the 3 upper reduced to staminodes) the 3 lower with longer filaments but not much larger anthers than the two lateral pairs. Pod straight, flat, very thin, deliiscent, linear, slightly tapering to both ends, glossy and flexible, valves thinly coriaceous, 5-6 in. long, *5 in. wide, with a stalk *3 in. long. Seeds biseriate, 16-20, oval-obtuse *25 in. long, *2 in. across, very thin, testa dark brown, shining, with a dull paler vertical central patch.


Kedah; Coah Langkawi, Curtis 2094! Distrib. India; Indo-China; Malay Archipelago.


Perak; Kwala Dipong, growing near limestone, Kunstler 8255! Scortechini 1751! Goping, Kunstler 689! Ulu Bubong, Kunstler 10087! Distrib. Tenasserim, Malay Archipelago.

The two varieties are very easily distinguished but they do not differ at all in essentials. The Bornean specimens of C. xanthcooma first received by Miquel were without fruit; on seeing pods that author himself very justly reduced his species, as a variety, to C. timorensis.

12. Cassia siamea Lamk Encyc. Meth. I, 648. A tree 30-50 feet high with smooth bark and spreading branches; stem 12-18 in. in diam. Leaves equally pinnate, 6-12 in. long; leaflets 4-16 pairs, opposite, subcoriaceous, rather dark-green shining above, dull and paler beneath, oblong-obtuse or retuse minutely mucronate, base rounded, 1*25-2*5 in. long, *5-9 in. wide, lateral nerves 10-12 pairs obscure above fine but distinct beneath, petiolules distinct *1 in. long, glabrous as is the rachis which is channelled and is transversely barred between the leaflets above but is without glands; stipules minute subulate caducous.
Flowers in large erect terminal panicles extending into the axils of the upper leaves, 8-16 in. long, 6-8 in. across, composed of alternate crowded corymbs 3-4 in. long, 2 in. across; lower pedicels 1 in. long solitary in axils of small lanceolate bracts 2 in. long, grey-pubescent as are the branches and main rachis. Calyx 5-partite to base, segments distinctly unequal, ovate-obtuse, greenish-yellow, downy externally, the larger '35 in. the smaller '2 in. long. Petals 5 suborbicular, 75 in. long, 6 in. wide, except the upper obcordate 6 in. long, 5 in. wide, all rather pale uniform-yellow. Stamens 7 (the 3 upper reduced to staminodes) the 3 lower with much larger anthers and longer filaments than the 2 lateral pairs. Pod nearly straight, flat, thin, slightly swollen opposite the seeds, sutures faintly thickened, valves thickly coriaceous, sparingly puberulous, 6-9 in. long, 5 in. wide, with a distinct stalk 5 in. long. Seeds biseriate 20-30, oval, 3 in. long, '25 in. across, very thin, testa dark-brown, shining. Bak. in Flor. Brit. Ind. II, 264. C. florida Vahl. Symb. III, 57; DC. Prodr. II, 499; W. & A. Prodr. 288; Bedd. Fl. Sylv. t. 179; Miq. Flor. Ind. Bat. I, 98. C. sumatrana Roxb. Hort. Beng. 31; DC. Prodr. II, 506; Wall. Cat. 5305. Senna sumatrana Roxb. Flor. Ind. II, 347.

Perak; near Ulu Selangor, Kunsiter 8668! Blanja, Wray 147! Malacca; Briso, Holmberg 869! Pahang; Pulo Rumpit, Ridley 2648! Distr. India, Indo-China, Malay Archipelago.

Mr. Wray gives the local name of this in Perak as Pako Nemnong and notes that the wood is strong and tough. Mr. Holmberg gives the name in Malacca as Judil.

§ 4. Chamecrista DC. Sepals narrow; stamens 5 or 10 all perfect, or with the uppermost one smaller than the others and sometimes replaced by a staminode. Pod dehiscent small strap-shaped, flat, the seeds compressed parallel with the more or less oblique valves.

13. Cassia mimosoides Linn. Sp. Pl. 379. A low diffuse perennial, suberect or spreading, simple or much branched, glabrous or pubescent, sometimes suffrutescent 2-3 feet high; stem terete. Leaves 3-4 in. long, equally pinnate; leaflets 40-60 pairs, linear with a distinct oblique mucro, 1-15 in. long, glabrous on both surfaces, rachis puberulous with a small sessile gland on the petiole below the lowest pair of leaflets, stipules finely subulate, straight, 2 in. long. Flowers axillary, solitary or 2-3 together, pedicels unequal, ultimately 1 in. long, bracteolate above the middle; buds pointed narrow. Calyx 5-partite to base, segments unequal linear-lanceolate to oblong-acute, 2-25 in. long. Petals 5 subequal, elliptic or orbicular, shortly clawed, obtuse, 35 in. long. Stamens 10 perfect, alternately longer and shorter. Pod 2 in. long, 2 in. across, linear, flattish. Seeds 20-25, obliquely rhomboid, compressed, testa dark-brown, shining. DC. Prodr. II, 503;
1897.] G. King—Materials for a Flora of the Malayan Peninsula. 165


14. Cassia Leschenaultiana DC. Mem. Soc. Hist. Nat. Gen. II, 2, 132. A suberect perennial, rather softly pubescent, 2–3 feet high, stems terete. Leaves equally pinnate 1–2 in. long, leaflets 16–24 pairs, narrowly oblong with a distinct oblique macro and 4–6 strong very oblique secondary nerves, glabrous or puberulous, 4–6 in. long, 1–15 in. across; rachis pubescent, with a large sessile gland on the petiole below the lowest pair of leaflets, stipules lanceolate straight 35 in. long. Flowers axillary, solitary or 2–3 together, pedicels unequal, ultimately 25–35 in. long, bracteolate not far above the base, buds pointed. Calyx 5-partite to base, segments unequal linear-lanceolate to oblong-acute, 35 in. long. Petals 5 subequal, elliptic or orbicular, shortly clawed, obtuse, 4–6 in. long. Stamens 10 or 9 or 7 (all perfect or with the uppermost, or the three uppermost, reduced to staminodes), the 2–3 lowest often rather larger than the lateral ones. Pod 1–1.5 in long, 2 in. across, linear, flattish. Seeds 8–16, obliquely rhomboid, compressed, testa brown shining. DC. Prodr. II, 504. C. Wallichiana DC. Prodr. II, 505; W. & A. Prodr. 292. C. mimosoides var. Wallichiana Bak. in Flor. Brit. Ind. II, 266.

Penang; Government Hill, Curtis 829! Singapore; Hullett 663! Distrib. India; Himalayas; Indo-China.

This is reduced to C. mimosoides by Mr. Baker but it seems better in the meantime to keep the two plants apart. They are certainly, as Mr. Baker indicates, very closely related, but they do not much resemble each other and are not easily con-founded.

45. Koompassia Maingay.

Very tall erect trees. Leaves odd-pinnate with alternate leaflets. Flowers copious small, obscure, in ample terminal panicles; bracts small deciduous. Calyx-tube very short conical or none; sepals 5, lanceolate, subequal, very slightly imbricated. Petals 5 subequal, their margins not meeting. Stamens 5, filaments short or very short, anthers equal basifixied, dehiscing by two apical pores. Ovary sessile, subglobose or slightly elongated, 1-ovuled; style short acute, stigma small, terminal. Pod oblong, compressed, winged throughout its circumference, narrowed and somewhat twisted at the base, indehiscent. Seed solitary situated
near the middle of the pod; compressed, exalbuminous; cotyledons leafy, radicle short straight. Species 4, Malayan.

Leaves green beneath; panicles rusty-pubescent; petals exceeding sepals and stamens; anthers short broad; ovary subglobose, rusty-pubescent ... ... ... 1. K. malaccensis.

Leaves glaucescent beneath, much smaller; panicles grey, puberulous; petals much shorter than sepals and stamens; anthers long; narrow; ovary compressed, very nearly glabrous ... ... ... ... 2. K. parvifolia.

1. KOOMPASSIA MALACCENSIS Maingay ex Bentli. in Hook. Icon. Pl. XII. 58. t. 1164. A tree 80-100 feet high, with stem 3-4 feet in diameter; branches closely rusty-pubescent at length glabrescent. Leaves alternate odd-pinnate, 5-8 in. long, rachis rusty-pubescent; leaflets 7-9 alternate, ovate-lanceolate or oblong, acuminate, apex obtuse slightly emarginate, base rounded, 2-3 in. long, 8-12.5 in. wide, coriaceous, dark-green glabrous and shining above, rather paler, dull and sparsely adpressed rusty-puberulous beneath; lateral nerves 10-12 pairs, faintly visible above, distinct beneath and connected by a fine reticulate secondary venation; petiolules rusty-pubescent 25 in. long. Panicles terminal and extending into the axils of the uppermost leaves 5 in. long, 3-4 in. across; branches 2 in long, pedicels 2 in. long; all parts densely rusty-pubescent. Calyx-tube obsolete; sepals 5 slightly imbricate ovate-acute, 12 in. long, densely rusty externally. Petals 5, oblong, obtuse, white, 15 in. long, slightly exceeding the sepals, two and a half times as long as stamens. Stamens 5, filaments very short glabrous; anthers slightly incurved twice as long as broad, widely triangular. Ovary subglobose, densely rusty-pubescent, 1-ovuled; style short. Pod oblong, compressed, 4-5 in. long, 1.25-1.5 in. wide, reticulately wide-veined opposite the solitary seed. Seed 1.5 in. long, 0.65 in. wide, cotyledons foliaceous; cordately 5-nerved at base, nerves conspicuous. Taubert in Engl. Natürlich. Pflanzenfam. III, 3. 156.

PERAK; Larut, Kunstler 7692! Thaipeng, Wray 2388! near Blangie, Scottichini 1712! Malacca; Merlimau, Selendar, Sungei Udang, etc.; Maingay 557 (fide Bentham); 604! Derry 51! Holmberg 880! Goodenough 1416! Singapore; Selitan, etc.; Ridley 4567! 6403! Cantley (fide Taubert). PENANG; T. Bahang, Curtis 432! Dindings; Lumot, Curtis! Distri, Sumatra (River Rawas, Forbes!).

This is the fine tree which the Malays know as Kumpass. Another species from Borneo (K. Beccariana Taubert.—founded on Beccari n. 2690) is evidently closely related; there are no specimens of the species at Calcutta. The description and drawing of the anthers in the original account of the genus are somewhat inaccurate.

2. KOOMPASSIA PARVIFOLIA Prain. A tree 50-100 feet high, branchlets glabrous or only puberulous at the tips. Leaves alternate odd-
pinnate, 3–4 in. long, rachis grey-silky; leaflets 9–11 alternate, elliptic-lanceolate, apex obtuse slightly emarginate, base widely cuneate, 1–1.25 in. long, 25–35 in. wide, chartaceous, medium-green, glabrous and shining above, glaucous and sparsely silky-pubescent beneath; lateral nerves 4–5 pairs, quite invisible above and very faint beneath; petiolules grey-silky, 2 in. long. Panicles terminal, 5 in. long, 2.5–3 in. across, branches 1.5 in. long, pedicels 1.5 in. long slightly thickened under the calyx; all parts closely grey-silky. Calyx-tube short conical; sepals 5 slightly imbricate, ovate-lanceolate, margins of the inner slightly narrower, recurved, all 1.5 in. long and silky-puberulous externally. Petals 5, elliptic, white, one-third as long as sepals, half as long as stamens. Stamens 5, filaments very short glabrous; anthers distinctly incurved, four to five times as long as broad, narrow-lanceolate. Ovary compressed glabrous except for a few hairs at the base, 1-ovuled; style short. Pod not seen.

Perak; Goping, Scortechinii 1996!

This fine tree is known to the Malays as Tualang; its timber is largely used for building purposes. In this respect it resembles the preceding species as well as another famous timber-tree from Borneo the Tapan (Koompassia excelsa Tanb. = Abauria excelsa Beccari).

From Signor Beccari’s description of Tapan it is evidently a tree of much more gigantic proportions than the Tualang. Its foliage is probably similar for its leaflets are described as being of about the same size; the number of leaflets to a leaf Beccari does not state. But the flowers are very different for in Tapan the petals are hardly shorter than the sepals and are about the same length as the stamens, while the anthers are shorter than the filaments; in Tualang the petals are very small and the anthers are exceedingly long as compared with the filaments.

46. Dialium Linn.

Erect unarmed trees. Leaves odd-pinnate with more or less distinctly alternate leaflets. Flowers copious small obscure in ample terminal panicles. Calyx-tube very short; free segments lanceolate or ovate lanceolate, subequal, much imbricated, deciduous. Petals 0 (in all Malayan species). Stamens 2, erect, included; anthers attached near the base, delihience longitudinal. Ovary sessile, 2-ovuled; style filiform stigma terminal. Pod firm, dry, indehiscent, oblong, 1-seeded; endocarp pulpy. Seed albuminous, embryo foliaceous, radicle straight. Species about 15, cosmopolitan in the tropics, chiefly however in S.-E. Asia.

Leaves quite glabrous on both surfaces:

Pods large, (firm), 1.5 in. long, strongly umbonate at apex ... ... ... ... 1. D. Kunstleri.
Pods smaller, not exceeding 1 in. in length, obtuse or only faintly apiculate:—

Pods fragile not velvety; leaflets thinly coriaceous:—

Pedicels as long as calyx, panicles laxly spreading

Pedicels shorter than calyx, panicles erect:—

Leaflets lanceolate alternate; seeds subquadrato-longitudinally striate...

Leaflets elliptic opposite; seeds orbicular reticulate...

Pods firm, velvety; leaflets rigidly coriaceous...

Leaves more or less pubescent beneath:—

Leaflets large, 5−7:—

Leaflets opposite or nearly so, very faintly puberulous beneath; sepals pubescent within...

Leaflets conspicuously alternate, thickly covered beneath with golden-brown pubescence; sepals pubescent within...

Leaflets small, 9−15:—

Leaflets 9−11, conspicuously alternate, thickly covered beneath with golden-brown pubescence; sepals glabrous within...

Leaflets 13−15, opposite, rusty tomentose beneath; sepals puberulous within...

1. Dialium Kunstleri Prain. A tree 100−130 feet high with spreading branches, stem 2−3 feet thick; branchlets slender, pale, rugose glabrous. Leaves alternate, odd-pinnate, 5−6 in. long; leaflets 5, rarely 3, alternate or subopposite, ovate-lanceolate, narrowly acuminate, apex entire, base cuneate, 4−5 in. long, 1.25−1.5 in. wide, coriaceous, rather dark-green shining above, dull and pale green beneath, glabrous on both surfaces; lateral nerves ascending 5−6 pairs hardly visible above, faint beneath and with there a very faint reticulate intermediate secondary venation; petiolules stout, very short, 1 in. long, glabrous. Panicles terminal and axillary 4 in. long, 3 in. wide; branches 2 in. long, glabrous, pedicels (in fruit) 2 in. long. Calyx and stamens not seen. Pod subshpherical, hardly compressed, obliquely prominently umbonate at the tip, firm, 1.5 in. long, 1.35 in. across; glabrous, very faintly verrucose, black. Seed solitary subrotund, smooth, dark-brown, dull, 6 in. long, 5 in. wide, 2 in. thick.

Perak; Goping, 500−800 feet, Kunstleri 4415!

This very fine species, easily distinguished from all the others by its much larger pods with very pronounced umbonate apex, has been but once reported and then, unfortunately, without flowers. It is perhaps most nearly related to D. indum from which, however, besides differing as to fruits it is also distinguished by its thicker and fewer leaflets. No native name has been given for the species.
2. **Dialium patens** Bak. in Flor. Brit. Ind. II, 270. A tree 60–80 feet high with a rather slender stem 10–20 in. thick; branchlets slender smooth pale-brown glabrous. **Leaves** alternate, odd-pinnate, 5–6 in. long; leaflets 3–5, opposite or subopposite, oblong to elliptic, rather abruptly cuspidately narrowed to an obtuse entire apex, base rounded, 3–5 in. long, 1·5–2·25 in. wide, subcoriaceous, bright-green and shining above, paler and dull beneath, glabrous on both surfaces; lateral nerves 8–10 pairs spreading, fine but distinct on both surfaces as is the reticulate intermediate secondary venation; petiolules stout, glabrous, 25 in. long. **Panicles** terminal and axillary, 6–8 in. long, 4–5 in. wide, rachis and branches slender and flexuous, glabrous; pedicels glabrous spreading or cernuous, 2–25 in. long. **Calyx** 15 in. long, ovoid-oblong in bud, tube obsolete, segments 5, white and almost petaloid, subequal, much imbricated, ovate-oblong obtuse, finely grey-pubescent on both surfaces, the two upper segments sometimes faintly connate. **Petals** 0. **Stamens** 2, filaments short slender, connective puberulous, anthers oblong basifixed. **Ovary** silky, narrowly-ovate, sessile, tapering upwards to the slender incurved style; ovule 2. **Pod** ovoid, slightly compressed, apex not apiculate, fragile, black, thinly grey-pubescent, '5 in. long' 35 in. across, 3 in. thick. **Seed** solitary, nearly regularly oblong in shape with rounded angles, 3 in. long, 25 in. across, '15 in. thick, dark-maroon in colour, only slightly shining, neither striate nor reticulate.

**Perak**; Larut, at low elevations, **Kunstler** 5551! 5577! Malacca; **Griffith** 1846 (K. D.)! **Maingay** 537! **Distrib.** Borneo.

"**Maingay** 537" forms, with "Griffith 1846," the basis of this species. The description here given of pod and seed is drawn up entirely from an example of "**Maingay** 537." The discrepancy between the description in the F. B. I. and the actual fruit of the species the writer is unable to explain.

3. **Dialium indum** Linn. Mantiss. 24. A tree 60–70 feet high with spreading branches; branchlets slender, rugose, grey-puberulous. **Leaves** alternate, odd-pinnate, 6–8 in. long; leaflets 5–9, alternate or subopposite ovate-oblong to ovate-lanceolate, narrowly acuminate apex entire, base cuneate, 3–4 in. long, 1–1·5 in. wide, chartaceous, dark-green slightly glossy above, dull and rather paler beneath, glabrous on both surfaces; lateral nerves 8–10 pairs, faint above more pronounced beneath and with there a distinct reticulate intermediate secondary venation; petiolules glabrous 2 in. long. **Panicles** terminal and axillary, 4 in. long, 3 in. wide; branches from 25–2 in. long, faintly silky-puberulous as are the pedicels 1 in. long, usually in clusters of 3, with caducous basal bracts. **Calyx** 15 in. long, obtuse-oblong in bud, tube obsolete, segments 5 subequal much imbricate ovate-oblong obtuse, grey-puberulous on both surfaces. **Petals** 0. **Stamens** 2, opposite the two J. ii. 22

**Pahang; Pijaie, Pahang river, Ridley 2607! Penang; Ayer Etam, Curtis!**

This is the **Kranji** of the Malays in Java according to Bontius, Rumphius, Miquel and Koorders. Mr. Ridley’s specimens have no native name and as there is no indication that they are from a planted tree it may be reasonably supposed that the species is indigenous in Pahang. The specimens sent by Mr. Curtis are noted as being from “Ayer Etam in Miller’s compound;” this remark, taken in conjunction with the fact that two native names “Kranji borong or Kranji padie” are given as alternatives, seems to point to the species being an introduced one in Penang. The name **Kranji borong** is sometimes applied in Malacca to the quite dissimilar species *D. platysepalum*.

The fruits are eaten for the sake of the pulp that forms the endocarp of the pod. In the *Indian Forester* for October 1896, it is stated that **Kranji** is one of the valuable timbers of the Straits Settlements. The scientific name cited in the notice is *D. indicum*; there is no species of that name. Perhaps the present species is intended; there is however nothing to show whether the tree referred to be this or some of the other species of *Dialium*.

4. **Dialium laurinum** Bak. in Flor. Brit. Ind. II, 269. A large tree with slender rugose dark-brown rusty-puberulous branchlets. **Leaves** alternate, odd-pinnate, 7–8 in. long; leaflets 7, rarely 5, subopposite, elliptic rather suddenly narrowed to a broad subobtuse or emarginate apex, base broadly rounded, 4–5 in. long, 1.75–2 in. wide, rigidly coriaceous, dark-green on both surfaces, glossy above, dull beneath, glabrous on both sides, secondary nerves 8–9 pairs oblique but not curved, faint above, rather prominent beneath and with there a distinct reticulate intermediate secondary venation; petiolules stout, glabrous, 3–4 in. long. **Panicles** terminal and axillary, 4 in. long, 3 in. wide, branches from 5 to 2 in. long, rusty-pubescent, pedicels 1 in. long, usually in clusters of 3, silky. **Calyx** 1.5 in. long, ovoid-oblong in bud, tube subobsolete, segments 5 subequal much imbricate, oblong-lanceolate, densely grey-vellety on both surfaces. **Petals** 0. **Stamens** 2 opposite the upper calyx-segments, filaments very short, slender; anthers oblong.
Ovary silky, ovate, subsessile, style slender incurved, ovules 2. Pod almost orbicular, 1 in. across not apiculate, black, thinly coated with short grey-pubescence, the thin epicarp extremely fragile. Seed solitary, almost exactly orbicular, 5 in. across, 2 in. thick, reddish-brown, shining and smooth with fine rather wide-meshed reticulations on the surface. Ridley, Trans Linn. Soc. n. s. III, 294.

MALACCA; Ayer Papan, etc.; Maingai 539 (K.D.)! Goodenough 1321! Singapore; Krangi, Ridley 6437! Pahang; Pigang, near Pekan, Ridley.

A very distinct species, easily recognised by its almost orbicular seed. Mr. Goodenough notes that this is known in Malacca as *Kranji papan*; he however quotes the same name as applied to a form of *D. platysepalum*. There are no Pahang specimens at Calcutta; the locality is cited from Mr. Ridley's paper on the Pahang flora.

5. **Dialium Maingai** Bak. in Flor. Brit. Ind. II, 269. A large tree with spreading branches; branchlets slender lenticelled dark-brown, glabrous. Leaves alternate odd-pinnate, 4-5 in. long; leaflets 9, rarely 7, subopposite elliptic-oblong narrowed cuspidately to an obtuse or subacute entire apex, base rounded, 2-2.5 in. long, 7.5-1 in. wide, coriaceous, very dark-green shining above, dull and paler green beneath, glabrous on both surfaces; lateral nerves 4-5 pairs not visible above, faint and not raised beneath, scarcely more conspicuous than the very faint intermediate reticulate secondary venation; petiolules slender 2 in. long, glabrous. Panicles terminal, 4-5 in. long, 3 in. wide, branches 2 in. long, erecto-patent rusty-puberulous; pedicels 1.5 in. long, 2-3 together, rusty-puberulous. Calyx 25 in. long, ovoid in bud, tube very short campanulate, segments 5, or occasionally only 4, much imbricate, broadly ovate-obtuse, shortly brown-velvety silky on both surfaces. Petals 0. Stamens 2 opposite the two upper calyx-segments, filaments thick nearly as long as the anther, the connective beset with short brown hairs. Ovary black-velvety, ovate, shortly stipitate, style incurved glabrous; ovules 2. Pod widely obovoid, apex not apiculate, firm, 9 in. long, 8 in. wide, hardly at all compressed, densely persistently deep-olive velvety. Seed solitary, obovate-quadrate, finely longitudinally striate, shining, 45 in. long, 35 in. wide, 15 in. thick.

Perak; Goping, Scortichini 2052! Upper Perak, 1000 feet, Wray 3407! 3767! Penang; Tuloh Bahang, Curtis 440! 3031! Malacca; Selandan, Goodenough 1533! Singapore; Maingai 538 K. D. (Herb. Propr. 1398 A.)!

The seeds of this species are hardly distinguishable except in colour from those of *D. indum*, the fruits and the foliage are however extremely different. Curtis gives *Kranji* as the native name of this species in Penang; in Malacca the tree is said by Goodenough to bear the alternative names *Kranji ambot* and *Kranji*
6. Dialium ambiguum Prain. A tree 40–50 feet high, stem 5–8 in. in diam.; branchlets very verrucously lenticelled, glabrous, blackish. Leaves alternate, odd-pinnate, 8–9 in. long; leaflets 7, opposite or rarely subopposite, oblong, rather abruptly shortly caudate-acuminate apex obtuse entire, base rounded, 4–5 in. long 1.5–1.75 in. wide, very rigidly coriaceous, bright-green, glossy and glabrous above, dull and faintly puberulous under the lens beneath; leaf-rachis glabrous; lateral nerves 9–11 pairs, fine, only visible beneath, forming distinct intra-marginal loops and with a fine intermediate reticulate secondary venation; petiolules glabrous 2 in. long. Panicles terminal and axillary, deltoid, slightly spreading, 5–8 in. long, 4–8 in. wide, branches 2–4 in. long very sparsely puberulous with grey-silky hairs as is the main rachis; pedicels usually in clusters of 3, 1.5 in. long. Calyx 1.5 in. long, ovoid in bud, tube obsolete, segments 5, subequal, much imbricate, broadly triangular subacute, reflexed after flower opens; densely brown-velvety on both surfaces. Petals 0. Stamens 2, opposite the two upper calyx-segments; filaments thick and fleshy one-third as long as anther. Ovary light green-silky, ovate, quite sessile, tapering gradually into the glabrous style; ovules 2. Pod and seed unknown.

Perak; Goping, 500–800 feet, Kunstler 6142! Malacca; Bukit Sadanen, Derry 510 (partly; only the specimens termed "Kranji")!

This tree is evidently very closely allied to D. platysepalum and may ultimately prove to be but a form of that variable species; if so, however, it is an exceedingly distinct variety, readily recognised owing to the differences in its ovary, in its pubescence, and in the arrangement of its leaflets. No native name is given for the Perak specimens; those from Malacca that appear to belong to the same species are simply termed Kranji.

7. Dialium platysepalum Bak. in Flor. Brit. Ind. II, 270. A tree 40–50 feet high; branchlets brown, closely-puberulous, sparsely lenticelled. Leaves alternate, odd-pinnate, 5–9 in. long; leaflets 5–7, usually conspicuously alternate, or rarely subopposite, elliptic or oblong to ovate-lanceolate, rather abruptly shortly caudate-acuminate apex obtuse entire, base rounded or cuneate, 3–5 in. long, 1–2 in. wide, very rigidly coriaceous, dark-green glossy and glabrous above, densely shortly yellowish-brown silky beneath; leaf-rachis finely puberulous; lateral nerves 9–11 pairs, fine, only visible beneath, forming distinct intra-marginal loops and with a fine intermediate secondary reticulate venation; petiolules puberulous 25 in. long. Panicles terminal and axillary, deltoid, close or slightly spreading, 5–8 in. long, 4–7 in. wide, branches 2–3 in, long, erecto-patent, finely brown-silky as is the main-
racihs; pedicels usually in clusters of 3, 15 in. long. *Calyx* 2 in. long, ovoid in bud, tube rather distinct campanulate, segments 5, subequal, much imbricate, broadly triangular-obtuse, coriaceous, reflexed after flower opens, densely brown-velvety on both surfaces. *Petals* 0. *Stamens* 2, opposite the two upper calyx-segments; filaments thick and fleshy one-third to one-half as long as anther. *Ovary* black-velvety, ovate, shortly stipitate, gradually tapering upwards into the puberulous incurved style; ovules 2. *Pod* obovoid or orbicular, apex not apiculate, firm, spherical or slightly compressed, 1 in. long, 6-8 in. across, 5-7 in. thick; persistently brown-velvety. *Seed* solitary, orbicular, widely oblong or subrhomboid, pale-brown in fresh, darker in old specimens, finely longitudinally striate, 45 in. long, 35 in. wide, 2 in. thick.

*Var. typica*; leaves usually ovate-lanceolate, cuneate less often rounded at the base; filaments half as long as anthers; pods orbicular very little compressed. *D. platysepalum* var. *typica* Bak. loc. cit.


*Var. papan*; leaves elliptic, rounded rarely cuneate at the base; filaments only one-third as long as anthers; pods orbicular very distinctly compressed.

*Malacca*; *Ayer Panas*, *Holmberg* 814! *Derry* 1225! *Goodenough* 1553!

*Var. burong*; leaves oblong, rounded at base; pods clavately obovoid.

*Malacca*; *Selandan*, *Holmberg* 855!

The tree here described as *var. typica* is also the typical variety of *D. platysepalum* as described by Mr. Baker. For reasons given under that plant, the present writer has found it necessary to treat Mr. Baker's *var. Wallichii* as a distinct species.

No native name is given for the specimens of *D. platysepalum* collected by *Griffith, Maingay*, and *Wray*. *Holmberg* gives its Malay name as merely 'Koran'; *Derry* for his n. 510 collected in 1890 (which, by the way, is quite different from his n. 510 collected in 1892) gives the name *Sepan*. For his n. 89 however *Derry* gives the name *Kraagi s' Kellat*; the same name is used by *Goodenough* for his n. 1693. As explained under that species, *Goodenough* also uses this name, with the name *Kraagi ambot* as an alternative one, for *D. Maingayi*; and it is true that though the flowers of *D. Maingayi* are quite different from those of *D. platysepalum*, their fruits are exceedingly alike and fruiting specimens of the two are only to be easily distinguished by the absence of pubescence from the leaves of *D. Maingayi*, the presence of a close golden-brown pubescence on the under-surface of those of *D. platysepalum*. *Goodenough* gives no native name for the *Johore* examples, which are quite like those from *Perak* and *Malacca*. 
Whether the other two "varieties" here described are really separable as such, or whether, perhaps, they may not even prove to be distinct species, it is not, from the material at the writer's disposal, at present possible to decide. But field-botanists in the Peninsula should be able to settle the point satisfactorily for themselves.

Var. papan, so named because each of the three gatherings has been noted as bearing the Malay name Kranji papan, differs from the type only in the characters noted. Its faces, owing to its broadly elliptic leaves and its conspicuously compressed pods, is somewhat distinct, and it is rather noteworthy that all three gatherings have received the same native name, a name too that has been applied to no other form.

Var. burong, so named because it has been said by Holmberg to be termed Kranji burong by the Malays, has a still more distinctive facies owing to its pods being clavate, and because the pubescence on the under surface of its leaves is of a darker, somewhat brownish tint. Its leaflets too are in shape exactly like those of D. ambiguum. Still it does not seem possible to treat it as representing the fruit of D. ambiguum because in that tree the leaflets are almost exactly opposite and are very faintly puberulous beneath, in this they are conspicuously alternate and densely pubescent beneath. Its flowers have not been sent. The name Kranji burong, it should be noted, is used in Penang as an alternative one with Kranji padiie, for D. indum.

8. Dialidam Wallichii Prain. A tree, branchlets brown, closely pubescent, slightly rugose, not lenticelled. Leaves alternate 7–8 in. long; leaflets 9–11, very conspicuously alternate, oblong-lanceolate, acuminate, apex acute, base cuneate, 2–2.25 in. long; 6–8 in. wide, coriaceous, bright-green glabrous above, densely slightly yellowish-brown-silky beneath; leaf-rachis softly pubescent; lateral nerves about 15 pairs, only visible beneath and there hardly more distinct than the faint intermediate secondary venation; petiolules pubescent 1 in. long. Panicles terminal and axillary, 6–8 in. long, 3–4 in. wide, branches 2–3 in. long, ascending, rather flexuous, softly pubescent as is the main rachis; pedicels 1 in. long. Calyx 2 in. long, ovoid in bud, tube distinct, segments 5, subequal, much imbricate, broadly triangular-obtuse, thinly coriaceous, reflexed after flower opens, densely greenish-velvety outside, inside white, glabrous. Petals 0. Stamens 2, opposite upper calyx-segments; filaments very thick less than one-fourth the length of anther, connective uniformly softly pubescent. Ovary brown-silky, distinctly stipitate, tapering into the slender, incurved, puberulous style; ovules 2. Pod obovoid 1 in. long, '75 in. across, purplish-velvety. Seed solitary, subquadrate, indented near the micropyle; '4 in. long, '3 in. across, '15 in. thick, finely longitudinally striate. D. platysepalum var. Wallichii Bak. in Flor. Brit. Ind. II, 270. Conaraceae Wall. Cat. 8534.

MALACCA; Maingay 540! SINGAPORE; Wallich 8534! Ridley!

This very distinct species agrees with D. platysepalum, of which Mr. Baker has
made it a variety, in having the same golden-brown pubescence on the under surface of its leaflets. But the smaller size of these leaflets; the shortness of the petiolules; the great difference in sepals, glabrous within in *D. Wallichii*, velvety within in *D. platysepalum*; and the equally marked differences in the fruit and the seed have led the present writer to treat it as a species apart.

9. **Dialium Kingii** Prain. A tree with spreading branches 100–150 feet high, stem 3–4 ft. in diameter; branchlets brown closely pubescent, slightly rugose, not lenticelled. **Leaves** alternate 8–9 in. long; leaflets 13–15, opposite except the terminal one, oblong-lanceolate, apex abruptly cuneate or rounded with an obtuse or retuse tip, base cuneate or rounded, 2–2.5 in. long, 6–8 in. wide, very rigidly coriaceous, deep-green glabrous and shining above, rusty-pubescent beneath, leaf-rachis glabrous; lateral nerves about 10 pairs rather distinct, secondary intermediate venation faint; petiolules glabrous 1 in. long. **Panicles** terminal and axillary, deltoid, 6–8 in. long, 8–10 in. across, branches 3–4 in., erecto-patent, densely dark-brown velvety as is the main rachis; pedicels usually in clusters of 3, 2.5 in. long. **Calyx** 25 in. long, ovoid in bud, tube obsolete, segments 5, subequal, much imbricate, broadly ovate-obtuse, reflexed after flower opens; externally densely brown-velvety, inside waxy-white closely pubescent. **Petals** 0. **Stamens** 2 opposite upper calyx-segments, filaments very thick and fleshy, one-third as long as the bright-yellow anther; connective uniformly softly pubescent. **Ovary** densely brown-velvety, sessile, tapering abruptly into the incurved puberulous style; ovules 2. **Pod** irregularly spherical, 9 in. long, 7.5 in. across, velvety-black. **Seed** solitary, subquadrate, warm-brown, faintly longitudinally striate, 4 in. long, 5 in. wide, 2 in. thick.

**Perak**; Goping district, in hilly localities from 300–1000 feet, **Kunstler 4627! 8187!**

No Malay name has been sent for this tree which is one of the most distinct and is perhaps the finest of the Peninsular species of *Didium*. Its nearest ally is evidently *D. Wallichii* from which however its opposite leaflets, rusty-pubescent beneath, and its larger flowers at once distinguished it.

47. **Bauhinia Linn.**

Unarmed erect trees, or climbers with circinate tendrils. **Leaves** simple usually more or less deeply cleft from the tip, rarely entire or fully divided into two leaflets. **Flowers** usually showy sometimes small, in copious simple or paniced often corymbose racemes. **Calyx**-tube with a disc produced to the top, sometimes long and cylindrical, sometimes short and turbinate or campanulate, limb entire and spatheaceous or cleft into 2 or 5 teeth, very rarely campanulate truncate. **Petals** 5 subequal usually with a distinct claw. **Stamens** 10, or reduced to 5
or 3 or 1, if fewer than 10 with or without sterile filaments; filaments free filiform; anthers versatile dehiscing longitudinally. Ovary stalked, many-ovuled; style long or short, stigma small or large and peltate, subterminal or oblique. Pod linear or oblong, flat, continuous within, dehiscing or indehiscent. Seeds albuminous, funiculus usually broadly triangular. Species 150, spread throughout the tropics.

Fertile stamens 10, (flowers large showy):—
Leaflets distinct; calyx with a produced tube and a 5-cleft limb (§ Lysiphyllum); a very extensive cirrhose climber ... ... ... 1. B. diphyllea.
Leaflets connate; calyx with a short tube and a spathaceous limb (§ Pauletia); shrubs:—
Lobes of leaves rounded; flowers yellow the upper petal with a central purple blotch; pod puberulous, not ribbed along upper suture ... ... ... 2. B. tomentosa.
Lobes of leaves subacute: flowers pure white; pod glabrous ribbed along each side of upper suture ... ... 3. B. acuminata.
Fertile stamens 3:—
Calyx-tube produced (§ Phanrra):—
Buds narrowly clavate, the calyx-tube passing gradually into the limb; tendrils 0; (flowers large showy):—
Erect; leaves glabrous above; calyx-limb spathaceous; pods glabrous ... ... ... 4. B. purpurea.
Climbing; leaves puberulous above; calyx-limb dividing into equal segments; pods pubescent ... ... 5. B. mollissima.
Buds widely clavate, with a rather abrupt transition from tube to limb; tendrils circinate more or less plentiful:—
Buds club-shaped—calyx-tube slightly ampulliformly dilated downwards, limb in bud obovate; anthers much longer than broad; (leaves of two connate leaflets with rounded or subacute apices):—
Petals glabrous except on midrib and claw externally; (flowers long-pedicelled in pyramidal terminal corymb)s:—
Stipules persistent; style glabrous ... ... ... 6. B. albo-lutea.
Stipules deciduous; style densely pubescent ... ... 7. B. semibifida.
Petals uniformly densely pubescent externally:—
Petals much longer than calyx-lobes:—
- Flowers long-pedicelled in pyramidal lateral and terminal corymb; leaves pubescent, (stipules large persistent orbicular) ... ... 8. B. Hulsettii.
- Flowers short-pedicelled in dense terminal corymb; leaves glabrous:—
Stipules large persistent orbicular ... ... 9. B. Griffithiana.
Stipules small deciduous ... ... 10. B. ferruginea.
Petals not longer than calyx-lobes; (leaves pubescent; corymb terminal dense, flowers very shortly pedicelled) ... ... ... 11. B. Ridleyi.
Buds clove-shaped—calyx-tube cylindric, limb in bud ovate or orbicular; anthers shortly oblong:

Leaves of two connate leaflets with rounded apices; (calyx-tube considerably longer than limb) ... 12. B. glauca.

Leaves entire or divided at the tip (in young plants of some species casually split to the base) into two narrow acute or acuminate lobes:

Calyx-tube much longer than the limb; (leaves usually entire, less often divided at the tip, flowers in dense terminal corymbs):

Leaves 5-7-nerved, adpressed-pubescent beneath; calyx rusty-downy; pod pubescent ... 13. B. cornifolia.

Leaves 7-9-nerved, glabrous beneath; calyx sparsely puberulous; pod glabrous ... 14. B. bidentata.

Calyx-tube not exceeding the limb:

Inflorescence lax, the lower flowers not at all deciduous; leaves thick firm:

Flowers in racemes, the lower pedicels not sensibly longer than those above:

Racemes long, many-fld.; leaves all entire, glabrous beneath ... ... ... 15. B. lucida.

Racemes short, few-fld.; leaves rather deeply bifid, densely pubescent beneath ... 16. B. Sorachinii.

Flowers in corymbs, the lower pedicels manifestly longer than those next above:

Leaves deeply cordate often subpeltate, not much longer than broad, sometimes 2-fld at tip, petiole 1 in. long ... ... 17. B. Kingii.

Leaves shallow-cordate, twice as long as broad, all entire, petiole '5 in. long ... 18. B. Finlaysoniana.

Inflorescence dense, most of the lower pedicels deciduous leaving the rachis below as a longish nodose peduncle; leaves thin flexible:

Leaves entire or rarely slightly emarginate at tip, 5-nerved; calyx glabrous; (pod glabrous) ... ... ... ... 19. B. Wrayi.

Leaves divided at apex (only a few in region of inflorescence entire), nerves more than 5; calyx-pubescent:

Leaves as broad as long, nerves 9-11, apical sinns wide deltoid; calyx rusty-pubescent; pod large pubescent ... 20. B. integrifolia.

Leaves longer than broad, nerves 7-9, apical sinns narrow; calyx grey-silky; pod small glabrous; flowers small ... 21. B. glabrifolia.

Calyx-tube very short (§ Lasiobema); (flowers small, in long narrow many-fld. racemes):

Calyx-limb 5-partite; petals white; pods small glabrous; leaves flexible, divided at apex:

Pod short, 2-seeded ... ... ... 22. B. anguina.
Pod longer, 3-5-seeded ... ... 23. B. Curtisii.
Calyx-limb entire; petals red; pods large densely pubescent (3-5-seeded); leaves rigid, entire ... 24. B. strychnoidea.


1. Bauhinia diphylla Ham. in Syme, Embassy 476 c. 1c. (1800). A very extensive glabrous twining species with circinate tendrils, sometimes spreading 200-300 feet or further. Leaves cordate at base; leaflets always quite free, each 5-6-nerved, flexible, rounded at both ends, wider below, 3 in. long, 2 in. across, pale-green glabrous on both surfaces; petiole glabrous .75–1.25 in. long, slightly thickened at both ends. Flowers very large, in lax terminal racemes 8–12 in. long, pedicels glabrous ascending 1.5–2 in. long, bracts small ovate squamous; buds 2 in. long fusiform. Calyx thickly coriaceous, green, glabrous, limb cut to base into 5 lanceolate equal reflexed segments 1.2 in. long, tube 8 in. long very slightly infundibuliform. Petals lanceolate erect, clawed, equal, as long as calyx-lobes, '4 in. wide, white, faintly veined. Stamens 10, all fertile, equal, anthers linear, filaments as long as petals, glabrous. Ovary glabrous very long-stalked, style '5 in. long, somewhat incurved. Pod very large, thin and flat, 10–16 in. long, 3 in. wide, stipe 2 in. long, rather finely transversely veined. Seeds 30–40 in a row along the middle of the pod, oval, somewhat compressed, '5 in. long, '3 in. across, '2 in. thick, testa pale-brown shining. Wall. Cat. 5784; Bak. in Flor. Brit. Ind. II, 278. Bauhinia Buchanani Desv. Ann. Sc. Nat., ser. I, IX, 430. Phanera diphylla Benth. Pl. Jungh. 264.

Malacca; Griffith (fide Baker). Distr. Burma; S. India.

This species is extremely plentiful in Burma but has never been sent to Calcutta from Malaya. It is inserted on the authority of Mr. Baker in the Flora of British India II, 278.


2. Bauhinia tomentosa Linn. Sp. Pl. 375. An erect shrub with downy zig-zag rounded branches. Leaves truncate at base, flexible, rather broader than long, 2–2.5 in. wide, 7–9-nerved, cut three-sevenths down into two rounded obtuse or faintly acute lobes, shining glabrous above, closely pubescent beneath; petiole pubescent, slightly grooved above, thickened at both ends, '5 in. long. Flowers in short-peduncled leaf-opposed 2-fld. (rarely 1- or 3-fld.) peduncles '4–1.2 in. long, pedicels erect 2 in. long, 2-bracteolate, bracts linear '25 in. long; buds narrowly ovate-acute, '7 in. long, the tip very shortly subulate 5-lobed. Calyx green, finely closely pubescent, splitting spatheaceously to the base of

Penang; fide Baker. Andamans; King's Collectors! Distrib. S.-E.-Asia; Trop. Africa.

There are no Malayan specimens at Calcutta; the plant in the Andamans is, if not cultivated, probably introduced.

3. Bauhinia acuminata Linn. Sp. Pl. 376. A small erect shrub with obscenely downy zig-zag angular branches. Leaves slightly cordate, flexible, rather longer than broad, 3—6 in. wide, 9—11-nerved, cut one-third down into two triangular subobtuse or acute lobes, shining glabrous above, glaucescent hairy (sometimes at length glabrescent) beneath; petiole puberulous grooved above, thickened at both ends, 1—1.5 in. long. Flowers in leaf-opposed few-fld. corymbs, peduncle '5 in. long, pedicels erect the lowest '4 in. long, 2-bracteolate, bracts linear or subulate '15 in. long; buds lanceolate acuminate 1.5 in. long, the tip very shortly subulate 5-lobed Calyx green, glabrous or faintly puberulous, splitting spathaceously to the base of the 1.25 in.-long parallel-veined limb, tube '25 in. long, very slightly infundibuliform. Petals oblong, pure white, glabrous, 1.75 in. long, 1 in. wide. Stamens 10, all fertile, subequal, anthers linear, filaments hirsute in lower third. Ovary long-stalked glabrous, style '5 in. long, curved. Pod 4—5 in. long, '6—7 in. broad, firm, glabrous, compressed, at length deliscent, strongly ribbed along each side of the upper suture, stipe '5 in. long. Seeds 10—15, ovate, flattened, '3 in. long, '2 in. wide. DC. Prodr. II, 513; Roxb. Hort. Beng. 31; Flor. Ind. II, 324; Wall Cat. 5794; W. & A. Prodr. 295; Miq. Flor. Ind. Bat. I, 74; Bak. in Flor. Brit. Ind. II, 276. B. candida Ait. Hort. Kew. II, 49; DC. Prodr. II, 513 not of Roxb. B. purpurea Wall. Cat. 5797 (D only) not of Linn.

Andamans; very common, King's Collectors! Perak; Kunstler 413! 2386! 2823! Scortechini 1812! Malacca; Hervey! etc. Distrib. China, India, Indo-China, Malay Archipelago.

§ 3. Phanera Lour. Fertile stamens usually 3, sometimes 4—5.
Calyx-tube usually more or less produced; limb 5-cleft or, very rarely, spatheaceous. Erect or scandent; flowers variable in size.

4. Bauhinea purpurea Linn. Sp. Pl. 375. An erect tree 20–30 feet high, with moderately stout glabrescent branches and without tendrils. Leaves roundish, base shallowly cordate, apex divided one-third to one-half down, sinus wideish, lobes rounded obtuse or subacute; rigidly subcoriaceous, 4–6 in. long and broad, medium-green, glabrous above, paler and glabrous or faintly puberulous beneath; nerves 9–11; petiole 1·5 in. glabrous; stipules small membranous, triangular, 1 in. long, deciduous. Flowers in terminal and axillary short-peduncled few-fld. corymbs, 2–4 in. long; lower pedicels 25–5 in. long, puberulous as is the rachis, bracts minute deltoid, deciduous; buds elavate 1·5 in. long, tapering uniformly from the blunt apex to the base. Calyx tawny-downy, limb 9 in. long, splitting into 2 coriaceous valves slightly divided at the apex into 5 short teeth, tube slightly dilated upwards 6 in. long. Petals 5, oblanceolate acute with long claw, white to purple, 1·75 in. long, 5 in. wide. Stamens 3–4 fertile, anthers linear-oblong, filaments white, as long as the petals. Ovary very long-stalked, puberulous, ovules 16–20, style stoutish 4 in. long; stigma rather large oblique peltate. Pod glabrous 8–12 in. long, 8–1 in. across, tardily dehiscing, valves firm woody flat, rather pointed at both ends, stipe 1 in long. Seeds 12–16, compressed, orbicular, 5 in. in diam. testa brown. Roxb. Hort. Beng. 31; Ham. in Trans. Linn. Soc. XIII, 497; Wall. Cat. 5787 in part; Roxb. Flor. Ind. II, 320; W. & A. Prodr. 296; Bedd. Flor. Sylv. 92; Bak. in Flor. Brit. Ind. II, 284. B. triandra Roxb. Hort. Beng. 31; Wall. Cat. 5799; Roxb. Fl. Ind. I, 320. B. coromandeliana DC. Prodr. II, 515. Phanera purpurea Benth. Pl. Jungh. 262; Miq. Flor. Ind. Bat. I, 60.

SINGAPORE; Hullett 218! perhaps planted. Distrib. India; Indo-China; China.

5. Bauhinia mollissima Wall. Cat. 5782 (1830). A rather slender climber, usually small but sometimes reaching 60–80 feet in length, branches slender persistently rusty-tomentose; apparently always without tendrils. Leaves roundish, base cordate, apex divided one-third down, sinus wide, lobes obtuse; rigidly subcoriaceous, 4–6 in. long, rarely a little narrower than broad, bright-green; above persistently puberulous along the nerves, elsewhere densely papillose and velvety to the touch but ultimately not hairy, beneath thinly persistently rusty-pubescent; nerves 11–13; petiole 1·25–1·5 in., rusty-pubescent. Flowers in leaf-opposed racemes, peduncle subterete 5·2–5·5 in. long, compressed towards tip, densely rusty-tomentose, lower flowers usually deciduous, bracts persistent ovate-acute under 1 in. long, pubescent externally,
glabrous within; pedicels 25 in. long, rusty-tomentose, 2-bracteolate near the apex; buds narrowly clavate 2-2.5 in. long, the narrowly fusiform upper part rather shorter than the narrow slightly infundibuliform base. Calyx densely tawny-to rusty-tomentose limb splitting into reflexed equal linear-lanceolate lobes 1-1.25 in. long, tube 1-1.25 in. long. Petals 5, narrowly oblanceolate, the four lower 2 in. long, 3 in. wide, reddish-brown with a central yellow streak, the upper 2-2.5 in. long, 5 in. wide, bright-red with a central branching yellow line, all narrowed into a long claw and pubescent externally. Stamens 3 fertile, anthers linear-oblong, filaments yellowish, uniform, glabrous. Ovary densely tawny-pubescent, stalk 5 in. long, tomentose as is the style 7 in. long, stigma small peltate; ovules 4-6. Pod pubescent, 4 in. long, 1 in. wide, tapering to both ends, stipe 5 in. long. Seeds 1-2, compressed, orbicular, about 4 in. in diam. B. elongata Korth. Nat. Verh. Gesch. 89 t. 24 (1839); Bak. in Flor. Brit. Ind. II, 281. B purpurea Zoll. & Mor. Syst. Verzeichn. 1; Nat. en Geneesk. Arch. III, 69, not of Linn. Phanera elongata Benth. Pl. Jungh 262; Miq. Flor. Ind. Bat. I, 61. B. Pottsii G. Don, Gen. Syst. II, 462.

Perak; Scortechini! Kunstler 1024! 2461! 5165! Kedah; at Yan, Ridley 5206! Penang; Porter (Wall. Cat. 5782)! Malacca; Maingay 542/2! Distrib. Northwards to Tenasserim; southwards to the Malay Archipelago.

The name given by Korthals being of considerably later date than that employed by Wallich, Dr. Wallich's name is here adopted. Korthals' figure conveys a rather inaccurate idea of the colour of the flower, the true nature of which is given from a full field-note made by Mr. Kunstler.

6. Bauhinia albo-lutea Prain. A slender shrubby climber with slender rusty-pubescent branches, tendrils few circinate glabrous. Leaves roundish, base cordate, apex divided one-third down, sinus narrow apiculate, lobes usually subacute; rigidly subcoriaceous, 2.5-4 in. long, often rather broader than long, dark-green; glabrous above, persistently puberulous, rarely closely pubescent, beneath; nerves 11-13; petiole 1.5-2.5 in., sparsely puberulous; stipules oblong-obtuse, 2 in. long persistent. Flowers in few-flowered lax pyramidal terminal racemes, 3-4 in. long, 3 in. across, pedicels rusty-puberulous erecto-patent the lower 1.5-1.75 in. long, bracts lanceolate 2 in. long, bracteoles subulate 15 in., deciduous; buds club-shaped, 9 in. long, the obovoid upper part exceeding the ampulliform base. Calyx rusty-puberulous, limb splitting into reflexed lanceolate segments 5 in. long, 1 in. wide, tube 4 in. long, slightly dilated towards base. Petals cream-coloured, 5 subequal, oblanceolate subacute distinctly clawed, 1.25 in. long, 3 in. wide, glabrous within, and glabrous externally except on the claw and

**Nicobars; Great Nicobar, Jelinek 241! DISTRIB. Indo-China; Sumatra.**

It is rather strange that this species should occur in Burma, the Nicobars and Sumatra and not have as yet been gathered in the Malay Peninsula. It is nearer to *B. semibijida* than to *B. ferruginea*, with which Mr. Kurz has placed it, both on account of its long pedicels and because of its almost glabrous petals, but it differs very markedly as regards bracts and stipules as well as in its ovary which has a glabrous style. Its nearest allies are, however, the Indian *B. nervosa* which differs in having pubescent petals, and the Sumatran *B. stipularis* Korth., which differs in having petals with cordate instead of cuneate bases.

7. *Bauhinia semibijida* Roxb. Hort. Beng. 31. A very strong climber often exceeding 30 feet in length, with stems 4-6 in. thick; branchlets stoutish brightly rusty-silky, tendrils glabrous few, thick, woody, circinate. *Leaves* roundish, base cordate, apex divided one-third to one-half down, sinuses narrow apiculate, lobes round or subacute; rigidly subcoriaceous, 2-3 in. long, sometimes a little narrower than broad, light-green and glabrous above, beneath with reddish rather densely rusty nerves, elsewhere sparsely adpressed-rusty silky; nerves 9-11; petiole 1-1.5 in., sparsely rusty-silky, stipules broadly ovate, falcate, 15 in. long, very deciduous. *Flowers* in pyramidal terminal racemes 4-10 in. long, 3 in. across, pedicels erecto-patent, rusty-pubescent, 1-1.5 in. long, bracts 2 in. long, lanceolate, deciduous; buds club-shaped 9-12 in. long, the obovoid upper part exceeding the ampulliform base. *Calyx* densely rusty-pubescent, limb splitting into reflexed lanceolate segments 5-7 in. long, 15 in. wide, tube dilated slightly towards base, 4-5 in. long. *Petals* 5 subequal, oblanceolate obtuse, shortly clawed, 8-1 in. long, 35 in. wide, dull, white, glabrous except on the claw and along the base of the midrib externally where there is a faint rusty pubescence. *Stamens* 3 fertile, anthers linear-oblong, filaments white, uniform, shorter than the petals. *Ovary* distinctly stalked densely rusty-silky, ovules 6-8, style thick silky stout, 4 in. long; stigma large oblique peltate. *Pod* thin oblong, with black glabrous woody valves, 4 in. long, 1.25 in. wide, stipe 35 in. long. *Seeds* 4-6, flattened, orbicular, 5 in. in diam. Wall. Pl. As. Rar. t. 253; Cat. 5783; Roxb. Flor. Ind. II, 330; Wight Ic. t. 263; Bak. in Flor. Brit. Ind. II, 280. *Phanera semibijida* Benth. Pl. Jungh. 263; Miq. Flor.
1897.] G. King—Materials for a Flora of the Malayan Peninsula. 183


Malacca; Griffith 1868; Mount Ophir, Lobb! Singapore; Lobb! Maingay 542/3! Schomburgk 60! Hullett 55! 146! Kunstler 1251! Ridley! Distr. Sumatra; Borneo.

This is very near indeed to B. ferruginea, but is easily distinguished by the pubescence on the outside of the petals being limited to a line on the centre near the base. Phanera excelsa Bl., from Borneo, reduced by Korthals to Bauhinia ferruginea is a quite distinct species, recently again reported by Hullett (n. 246). The Malaaca specimen collected by Griffith which Mr. Baker refers to B. ferruginea var. excelsa is not at Calcutta, but Maingay 542/3 referred at Kew to the same variety is, at Calcutta, exactly the same as typical B. sumatrana Miq. and is therefore only a large form of B. semibijida. Another Maingayan sheet (n. 542/2, referred also to B. ferruginea var. excelsa) is, at Calcutta, the quite different B. mollissima Wall. (B. elongata Korth.).

8. Bauhinia Hulletti Prain. A strong shrubby climber reaching 20 feet in length, branchlets stoutish pubescent, tendrils few circinate pubescent. Leaves roundish, base cordate; apex divided one-third down, sinus narrow apiculate, lobes round; rigidly subcoriaceous, 2-5-4 in. long, rather longer than broad, dark-green sparsely pubescent above, paler and closely adpressed-pubescent beneath; nerves 9-11; petiole 1-1'5 in., densely pubescent; stipules orbicular hirsute foliaceous, 5 in. in diam., persistent. Flowers in lax few-fld. lateral leaf-opposed racemes, 3-6 in. long, 3 in. across, pedicels erecto-patent densely rusty-tomentose, 1'25-1'5 in. long, bracts lanceolate 25 in. long as are the linear bracteoles 1'5 in. long; buds club-shaped, '7-9 in. long, the obovoid upper part exceeding the ampullaceous base. Calyx pubescent, rose-red as are the pedicels, limb splitting into reflexed lanceolate segments '4-5 in. long, '1 in. wide, tube slightly dilated towards base, '3-4 in. long. Petals rose-pink, 5 subequal, oblanceolate-obtuse, long-clawed, 1'25 in. long, '4 in. wide, far exerted, glabrous within, very densely tomentose externally. Stamens 3 fertile, anthers linear-oblong, filaments uniform pink, 2 in. long. Ovary distinctly stalked, densely silky, style thick tomentose stout, 1-2 in. long, stigma large oblique peltate. Pod unknown.

Penang; Curtis 784! J. Scott! Kunstler 1347! Perak; Wray 177! Malaaca; Holmberg 775!

Very near B. Griffithiana but differs in having the stipules, though similar, very much smaller; in having the leaves pubescent instead of glabrous; in having long-pedicelled lax-flowered lateral corymbs instead of short-pedicelled dense-flowered terminal ones, and in having the flowers red or pink.

9. Bauhinia Griffithiana Prain. A very strong shrubby climber reaching 20 feet in length, branchlets stout glabrous, tendrils few cir-
cinate, glabrous. Leaves roundish, base cordate, apex divided one-third down, sinus narrow apiculate, lobes round; rigidly subcoriaceous, 2.5–4 in. long, about as long as broad, dark-green shining above, paler beneath, quite glabrous on both surfaces; nerves 9–11; petiole 1–1.5 in. glabrous; stipules orbicular foliaceous, 7.5 in. in diam., persistent. Flowers in pyramidal terminal racemes 3.5–6 in. long. 3 in. across, pedicels spreading, rusty-pubescent, '4 in. long, bracts ovate '3 in. long, '25 in. wide, subpersistent as are the two similar subequal bracteoles; buds club-shaped 1 in. long, the broadly obovoid upper part exceeding the ampulliform base. Calyx rusty-puberulous, limb splitting into reflexed lanceolate segments '6 in. long, '15 in wide, tube slightly diluted towards base '4 in. long. Petals bright-yellow, 5 subequal, oblanceolate obtuse, shortly clawed, 1.25–1.5 in. long, '4–'5 in. wide, glabrous within, densely tomentose externally. Stamens 3 fertile, anthers linear-oblong, filaments red, dilated in the middle, 2 in long. Ovary distinctly stalked, densely silky; ovules 6–8; style thick silky, stout, '6 in. long, stigma large oblique peltate. Pod thin, oblong, with black glabrous woody valves, 5 in. long, 1.5 in. wide, stipe '35 in. long. Seeds 4–6, flattened, ovate, '5 in. long, '35 in. across. Bauhinia ferruginea var. Griffithiana Bak. in Flor. Brit. Ind. II, 233. Phanera Griffithiana Bentl. Pl. Jungh. 263; Miq. Flor. Ind. Bat. I, 65.

Malacca; Griffith 1867! Maingay 542! Hervey! Derry 188! Holmberg 775! Perak; Scortechini 298! Pahang; Ridley 2606!

This agrees in foliage with B. ferruginea with which Mr. Baker has united it, and it has the same pubescence on the outside of the petals. But it differs considerably in flower and very markedly in the nature of its bracts and of its large persistent stipules and Mr. Bentham seems to the writer to have been undoubtedly justified in treating it as specifically distinct. It is in reality more nearly allied to B. Hullettii which has however pink flowers and pubescent leaves, and has the long-pedicelled flowers of B. semibijida and B. albo-lutea, than it is to the species in which Mr. Baker includes it.

10. Bauhinia ferruginea Roxb. Hort. Beng. 90. A very strong shrubby climber sometimes exceeding 20 feet, branchlets stoutish soon glabrescent, tendrils few cincinate glabrous. Leaves roundish, base cordate, apex divided one-third down, sinus narrow apiculate, lobes round; rigidly subcoriaceous, 2.5–4 in. long, always about as broad as long, dark-green, shining and glabrous above, paler and glabrous beneath; nerves 9–11; petiole 1–1.5 in., glabrous; stipules broadly ovate, falcate, '15 in. long, very deciduous. Flowers in pyramidal terminal racemes 3.5–6 in. long, 3 in. across, pedicels spreading, rusty-pubescent, '4 in. long, bracts '2 in. long, lanceolate, deciduous; buds club-shaped 1 in. long, the broadly obovoid upper part exceeding the ampulliform base. Calyx rusty-puberulous, limb splitting into reflexed lanceolate segments '6 in. long,
...ovules rigidly Penang Miq. Roxb. Porter 3492!

nerves style Bak. stipules oblique oblong, densely clawed, "4-5 towards late orbicular, pedicels little .7 in. long, stigma large oblique peltate. Pod thin, oblong, with black glabrous woody valves, 8 in. long, 2 in. wide, stipe '5 in. long. Seeds 4-6, flattened, broadly ovate, '5 in. long, '4 in. across. Wall. Cat. 5776; Roxb. Flor. Ind. II, 331; Bak. in Flor. Brit. Ind. II, 283 excl. both the varieties and the syn. of Korthals and G. Don. Phanera ferruginea Benth. Pl. Jungh. 262; Miq. Flor. Ind. Bat. I, 62.

PERAK; Wray 622! 1258! Scortechini 67! Kunstler 2508! 3492! 6173! Penang; Porter (Wall. Cat. 5776)! Curtis 211!

This is very near to B. semibijda Roxb. but is at once distinguished by its petals being externally uniformly pubescent.

Bauhinia ferruginea Korth., referred by Mr. Baker to Roxburgh's plant, is an exceedingly distinct species. Korthal's plant is, in fact, the basis of Phanera excelsa Miq., which Mr. Baker elsewhere separates (as to citation) as a variety of B. ferruginea. The plant described as var. excelsa by Mr. Baker is, however, still another species (B. sumatrana Miq., which is only a form of B. semibijda). B. Pottsii G. Don, also referred here by Mr. Baker, has a tomentose pod and therefore cannot possibly be the present species. Don's plant is doubtless B. mollissima Wall, which is the only tomentose-fruited species at all nearly related to the present one.

11. Bauhinia Ridleyi Prain. A very strong shrubby climber reaching 20 feet in length, branches stoutish, thinly but persistently rusty-silky, tendrils few circinate persistently silky. Leaves roundish, base cordate, apex divided one-third down, sinus narrow apiculate, lobes usually subacute; rigidly subcoriaceous, 2.5-4 in. long, sometimes a little longer than broad, dark-green strigose above, densely adpressed-pubescent beneath; nerves 9-11; petiole '75-1 in., densely rusty-pubescent; stipules ovate-lanceolate, falcate, '15 in. long, very deciduous. Flowers in densely congested terminal corymbs 2 in. long and broad, pedicels densely silky '3 in. long, spreading, bracts and bracteoles equal orbicular, persistent, densely tomentose, '25 in. long; buds club-shaped '7 in. long, the obovate upper part exceeding the ampulliform base. Calyx densely softly rusty-pubescent, limb splitting into reflexed lanceolate segments '4 in. long, '1 in. wide, tube '3 in. long, slightly dilated towards base. Petals pure-white, 5 subequal, oblong-obtuse, hardly clawed, not exerted, glabrous within, densely tomentose externally, '4-5 in. long, '2 in. wide. Stamens 3 fertile, anthers crimson, linear-oblong, filaments '75 in. long, uniform, red. Ovary shortly stalked, densely tomentose, style thick, tomentose, stout, '5 in. long, stigma large oblique peltate. Pod unknown.

J. II. 24
Midley, Mik., Johore; Scortechini

Very nearly related to B. ferruginea, B. Hullettii, B. Griffithiana, and like these species with petals densely pubescent outside; it is, however, easily recognised by its dense corymbs and by its short petals, not at all exerted.

12. Bauhinia glauca Wall. Cat. 5785. A spreading climber with glabrous slender branchlets; tendrils numerous circinate rusty-puberulous. Leaves cordate at base, bifid to the middle with obtuse lobes and a narrow sinus; firm, thinly coriaceous, rather broader than long, 2-3 in. across, glabrous above, thinly persistently adpressed rusty-puberulous especially on the nerves beneath; nerves 9-11; petiole 7½-12½ in. long, stipules linear-subulate ½ in. long. Flowers in copious, dense, peduncled or very rarely subsessile, leaf-opposed and terminal corymbs, the peduncles sparsely rusty often 1-2 in. long, lower pedicels ½-7½ in. long sparsely rusty, bracts and bracteoles linear-subulate, 1½-2 in. long; buds clove-shaped 6½ in. long, the ovoid head one-half shorter than the ridged cylindric base. Calyx glabrous, limb splitting into subequal ovate-oblong lobes 2½ in. long, tube 4 in. long, puberulous within. Petals 5 subequal, cream-coloured, oblong very long-clawed, wavy at the margin, ½ in. long, sparsely pubescent externally. Stamens 3 fertile, anthers short-oblong, filaments white uniform glabrous, ½ in. long, exceeding the petals, declinate. Ovary glabrous with a distinct slender stalk and a stoutish style, 1½ in. long, slightly incurved; stigma small; ovules about 20. Pod thin glabrous, flat, 6-8 in. long, 1½-2½ in. across, stipe 2½-3 in. long. Seeds 15-20 in a line down the centre of the pod, much compressed, oval, ½ in. long, ½ in. wide. Bak. in Flor. Brit. Ind. II, 282. Phanera glauca Benth. Pl. Jungh. 265; Miq. Flor. Ind. Bat. I, 68, t. 2 A.

Perak; Scortechini 219! Wray 3332! Penang; fide Baker. Distrib. Indo-China; China; Malayan Archipelago.

The pods are like those of B. diphylla but smaller and with shorter stipe. Its nearest allies are the Chinese B. coriifolia with similar but smaller leaves and with similar flowers but with narrow pods, and the Assam B. tenuiiflora with similar pods but with less deeply bifid leaves and with a much longer calyx-tube. Mr. Baker has seen a variety from Singapore with smaller leaves (var. parvifolia); this has not yet been sent to Calcutta.

13. Bauhinia cornifolia Bak. in Flor. Brit. Ind. II, 278. A very large slender creeper 100-150 feet long, stems 2-3 in. in diam., branches slender, thinly rusty-downy, tendrils few circinate downy. Leaves very slightly cordate at base, narrowed gradually to an obtuse or subacute entire or rarely bifid point, half as long again as broad, 2½-3½ in. long, 1½-2½ in. across, rather rigidly subcoriaceous, dark-green and glabrous above, thinly adpressed brown-silky beneath; 7- (rarely 5-) nerved; petiole 1 in. long, puberulous, slightly thickened at both ends. Flowers
in dense terminal corymb, 4 in. long and broad; pedicels rusty, erecto-patent, the lower 1-75 in. long, bracts very small deciduous; buds clove-shaped, the cylindrical base much longer than the spherical apiculate upper portion. Calyx rusty-downy, limb splitting into 5 subequal ovate shortly acuminate lobes 25 in. long, 2 in. across; tube cylindrical 6-7 in. long. Petals 5 subequal, deep orange-yellow at length becoming brick-red, oblong-oblong very shortly clawed, 8 in. long, 5 in. wide, externally sparsely rusty-pubescent. Stamens 3 fertile, anthers shortly oblong, filaments much shorter than petals. Ovary densely rusty-downy, shortly stalked, style 2 in. long; stigma large peltate. Pod oblong woody, 4 in. long, 2 in. wide, externally finely adpressed rusty-pubescent; stipe 15-2 in. long. Seeds about 4, much compressed, dark-brown, 1 in. long, 7 in. across.

Penang; Griffith; Kurz! Hullett 123! Curtis 488! Malacca; Maingay 545! Perak; Kunstler 6261!

Very closely related to B. bidentata but differing in having larger flowers, pubescent pods, and leaves slightly downy beneath. The character derived from the leaf-apex, which appeared reliable when Mr. Baker's account of the Indian Bauhinias was published 20 years ago, is now proved, by the large suites of specimens sent to Herb. Calcutta during recent years, to fall within the limits of both of these species.

14. Bauhinia bidentata Jack, Malay. Misc. II, 7, 76. A very strong creeper over 150 feet long, or sometimes, when growing apart, shrubby or even tree-like (Kunstler, Hullett), branches slender glabrous, tendrils few circinate quite glabrous. Leaves very slightly cordate at base, sometimes truncate, narrowed gradually to an obtuse or sub-acute bifid or entire point, half as long again as broad, 2.5-5 in. long, 1.5-3.5 in. across, rather rigidly subcoriaceous, dark-green shining above, pale beneath, glabrous on both surfaces; 7-9-nerved; petiole 1 in. long, glabrous, slightly thickened at both ends. Flowers in dense terminal corymb 3 in. long and broad; pedicels finely pubescent, erecto-patent, the lower 1.5 in. long, bracts ultimately deciduous, ovate-acute, 15 in. long; buds clove-shaped, the cylindrical base much longer than the spherical acute but not apiculate upper portion. Calyx puberulous, limb splitting into subequal ovate-acute lobes 3 in. long, 2 in. across; tube cylindrical striate 1 in. long. Petals subequal, deep orange-yellow at length becoming scarlet, oblong, spreading, shortly clawed, 6 in. long, 35 in. wide, externally sparsely rusty-pubescent. Stamens 3 fertile, anthers shortly oblong, filaments short hirsute. Ovary sparsely pubescent, distinctly stalked, style 2 in. long, stigma large peltate. Pod oblong woody, 4-5 in. long, 1.5 in. wide, externally quite glabrous, stipe 25 in. long. Seeds 4-5, much compressed, 5 in. long, 35 in. wide. Hook. Comp. Bot. Mag. I, 223; Wall. Cat. 5778; Bak. in Flor. Brit.
15. Bauhinia lucida Wall. Cat. 5779 A. A large creeper more than 100 feet long, with stoutish glabrous branches; tendrils long circinate glabrous. Leaves usually distinctly cordate at the base, tapering from below the middle to an ultimately abruptly shortly acuminate point; rather longer than broad, 3-5 in. long, 2-2.5 in. wide, rigidly subcoriaceous, bright-green shining above, glabrous on both surfaces, 5-(rarely 7-) nerved; petiole 3'-4 in. long, glabrous. Flowers in lax long-peduncled copious paniculate racemes, terminal and extending into the axils of the upper leaves, 4-6 in. long, 2 in. across; pedicels rusty-puberulous, erecto-patent, subequal throughout the raceme, rarely exceeding 75 in. long, bracts lanceolate, deciduous, 2 in. long, bracteoles 2 subpersistent, subopposite, subulate, 15 in. long, near base of calyx-tube; bud clove-shaped, the subcylindric base as long as the obvoid blunt upper portion. Calyx closely rusty-tomentose, limb splitting into subequal ovate-obtuse lobes 25 in. long, 2 in. across; tube subcylindric 25 in. long. Petals subequal, bright-yellow, ovate-oblong, long-clawed, 8 in. long, 5 in. across, externally rusty-pubescent. Stamens 3 fertile, anthers shortly oblong. Ovary glabrous except on sutures near the base, stalk distinct pubescent; style 15 in. long, glabrous, stigma large peltate. Pod narrowly oblong, woody, 3.5 in. long, 1 in. wide, narrowing towards the base, valves glabrous; stipe 25 in. long, rusty-pubescent. Seeds 4-6, irregularly orbicular, compressed, 4 in. across. Bauhinia emarginata Bak. in Flor. Brit. Ind. II, 278 not of Mill. and hardly of Jack. Phanera lucida Bentham. Pl. Jungh. 262.

Penang; Porter (Wall. Cat. 5779) Perak; Wray 2127! Scortechini 66! 1534! Kunstler 3434! 3902! 6659!

Mr. Bentham and Mr. Baker both refer to this species B. emarginata Jack, from Sumatra. But Jack's plant has, by the original description, corymbose racemes with long pedicelled flowers and has tomentose ovaries. It is therefore quite clear that it cannot be the same as B. lucida Wall. In any case the use of the name 'emarginata' is to be deprecated, seeing that it was applied to a Mexican species (B. emarginata Mill. Diet., ed. VIII, 5) before Jack's name was published.

16. Bauhinia Scortechnih Prain. A large climber with slender branches, glabrous except at the rusty-puberulous tips, tendrils long circinate puberulous. Leaves one and a half times as long as broad,
very shallowly cordate or truncate at base, from which they taper gradually to the junction of upper and middle third thence more abruptly to a bifid tip; 3·5–4 in. long, 2·2–5 in. wide, rigidly coriaceous, dark-green and shining above, uniformly densely rusty-tomentose beneath; nerves 9, rarely 7; sinus ·75 in. deep, very narrow; petiole 1·5 in. long, glabrous, thickened at both ends. Flowers in lax, few-fld., terminal short racemes under 2 in. long; pedicels and rachis rusty-pubescent, the former erecto-patent, subequal throughout, the lowest not exceeding ·5 in.; bracts lanceolate subpersistent ·15 in. long, bracteoles 2 subpersistent subopposite subulate, ·15 in. long; bud ·5 in. long, clove-shaped, the cylindrical base as long as the spherical upper portion. Calyx closely rusty-tomentose, limb splitting into subequal ovate lobes; tube cylindrical ·25 in. long. Petals subequal ovate, externally densely rusty-tomentose (fully opened flowers not seen). Stamens 3 sometimes 4 fertile, anthers short oblong, filaments hisrute. Ovary rusty-pubescent, stalk and style distinct, the latter glabrous; stigma large peltate Pod not seen.

Perak; Scortechini 698!

This species is evidently very closely related to B. lucida with which it agrees altogether in inflorescence and largely in shape of leaf. It differs however in having the leaves densely tomentose beneath and in having them all deeply bifid at the tip. The colour of the flower has not been noted by Father Scortechini, but the petals, in the dried state, are exactly like those of the numerous species that are noted as having orange-yellow flowers which redden with age, and are unlike those petals that are noted as white. Owing to the absence of fully opened flowers the dimensions of petals and the lengths of stipe and style cannot be given.

17. Bauhinia Kingii Prain. A small climber with slender zig-zag glabrous branches, tendrils circinate glabrous, often much thickened. Leaves deeply cordate often slightly subpeltate at base, narrowed gradually from the rounded basal lobes to an ultimately shortly acuminate emarginate or often deeply bifid rarely entire apex, rather longer than broad, 3·5–4 in. long, 2·5–3 in. wide, rigidly coriaceous, medium-green, glabrous and shining above, pale and puberulous along the nerves, very sparsely adpressed-pubescent elsewhere beneath; very uniformly 5-nerved, the nerves much branched outwards; petiole 1 in. long, glabrous. Flowers in lax, lateral axillary and terminal corymbs, 3 in. long, 2·5 in. broad, sometimes forming large loose leafless or leafy zig-zag panicles 6 in. across and at times 1–1·5 ft. long; pedicels very sparsely puberulous, spreading, the lowest 1·25 in. long; bracts at base ·2 in. long, lanceolate; bracteoles near apex ·1 in. long subulate, both deciduous; bud clove-shaped, ·5 in. long, the narrowly-infundibuliform base as long as the subglobose apiculate upper part. Calyx closely rusty-pubescent, limb splitting into subequal ovate, very shortly acuminate lobes ·25 in. long, ·2 in. across; tube narrow-infundibuliform,
-25 in. long; '15 in. in diam. at apex. Petals subequal, bright-red (Wray), oblongate-obtuse, long-clawed, '8 in. long, '25 in. wide, externally rusty-pubescent. Stamens 3 fertile, anthers shortly oblong, filaments hirsute. Ovary rusty-pubescent along sutures, long-stalked; style long, curved, puberulous, '25 in. long, stigma large peltate. Pod small, quite glabrous; woody, narrowly ovate, tapering to both ends, '2 in. long, '8 in. across; stipe '2 in. long, pubescent. Seeds 1 or 2, ovate, compressed, '3 in. long, '2 in. across.

Perak; Scortechini 320! on Gunong Batu Patch, at 4500 feet, Wray 392! Selangor; Bukit Etam, Kellsall 2001! Distrib. Borneo?

This is an exceedingly distinct species, more nearly approaching B. Finlaysoniana than any of the other Peninsular species, but amply distinct in the shape and colour of its flowers, the smaller size of its pods, the pubescence on its leaves beneath; also in the shape of the leaves and the type of nervation. Beccari n. 835, from Borneo, of which however there are only 2 leaves and one flower at Calcutta, appears to be the same.

18. Bauhinia Finlaysoniana Grah. in Wall. Cat. 5801. A large climber, over 100 feet long, branches slender glabrous, tendrils few circinate glabrous. Leaves slightly coriaceous at base, oblong, narrowed rather suddenly from above the middle to an obtuse or emarginate or acute point; about twice as long as broad, 3-5 in. long, 1.5-2.5 in. across, rigidly coriaceous, medium-green, glabrous on both surfaces, 5- (rarely 3-) nerved; petiole '3-'4 in. long, glabrous. Flowers in rather lax, terminal corymbs 3-4 in. long, 2-3 in. across; pedicels closely rusty-pubescent, erecto-patent, the lowest 1 in. long; bracts lanceolate, '15 in. long, deciduous; buds clove-shaped, the subcylindric base rather shorter than the ovoid-acute upper portion. Calyx densely rusty-tomentose, limb splitting into subequal ovate-acute lobes '25 in. long, '2 in. across; tube subcylindric, '2 in long. Petals subequal, creamy-white or pale yellow, orbicular, distinctly clawed, '6 in. long, '5 in. across, externally rusty-pubescent. Stamens 3 fertile, anthers shortly oblong. Ovary densely pubescent along sutures and on the distinct stalk, style short ('15 in.), glabrous, stigma large peltate. Pod (not quite ripe) linear-oblong, woody, 2 in. long, '6 in. wide. Seeds 4-6. Bak. in Flor. Brit. Ind. II, 278. Phanera Finlaysoniana Benth. Pl. Jungh. 262.

Penang; foot of Government hill, Curtis 295! Perak; Scortechini 247 ! 1463! Kunstler 3589! Wray 2300! Distrib. Siam (Finlayson).

Mr. Bentham describes this as having almost glabrous petals; this is not the case in the Peninsular specimens. Both Mr. Bentham and Dr. Miquel doubt whether it be more than a form of B. lucida; it is, however, extremely distinct from that species and is much more nearly related to B. Kockiana Korth. (Verh. Nat. Geschied. 87, t. 10), which differs mainly in usually having 3-nerved leaves and in always having rather longer pedicels and a much longer calyx-tube. Dr. Finlayson's
specimens are said by Mr. Bentham to be from the Malay Archipelago, by Mr. Baker to be from the Peninsula; we know, however, from Dr. Wallich’s correspondence that the majority of Finlayson’s specimens, more particularly those without any definite locality, came from Siam.

19. Bauhinia Wrayi Prain. A shrubby creeper 15–30 feet long, with slender glabrous branches and cirsinate glabrous tendrils. Leaves flexible, truncate very rarely cordate at the base, tapering from about the middle to an acute entire, very rarely an obtuse emarginate apex, rather longer than broad, 2–3 in. long, 1½–1½ in. across, medium-green, glabrous above, glaucous glabrous or faintly puberulous only on the nerves beneath; very uniformly 5-nerved; petiole slender, glabrous, 4–6 in. long. Flowers in dense close-fld. terminal and axillary racemes, 2½–4 in. long, the lower flowers deciduous except the few that become fertilised, the remaining terminal portion corimbos 2½ in. long and broad; pedicels very slender, thickening in fruit, 1½ in. long, sparsely rusty as is the slightly nodose main-rachis, bracts subulate 2 in. long; very deciduous; bud clove-shaped, only 2 in. long, the spherical minutely apiculate upper part in diameter equaling the length of the slender cylindric base. Calyx glabrous, tube 1½ in. long, limb splitting into 5 spathulate subequal lobes 1½ in. long. Petals pale greenish-yellow, or white at length pinkish, broadly ob lanceolate, long-clawed, 6 in. long, 2 in. across, margins slightly wavy, sparsely pubescent externally. Stamens 3 fertile, anthers shortly oblong. Ovary small, 3½–4 ovuled, distinctly stalked, quite glabrous throughout, style 1½ in. long, stigma small peltate. Pod obviate to oblong-obtuse, tapering to base, thin, woody, stipe 2 in. long, 2½ in. long, 1 in. across, quite glabrous. Seeds 1–2, rarely 3, very much compressed, broadly ovate, 3 in. long; 4½ in. across, testa dark-brown, dull.

Perak; Kunstler 2238! 2466! 4049! 5243! Scortechini 1652! Wray 1934! 2782! Selangor; Kunstler 8758!

Very distinct from any other Peninsular species, and by its inflorescence (in which it most resembles B. integrifolia among the Phaneras) connecting Phanera with Lasiobema, its small flowers approaching those of the latter section. It is extremely nearly allied to a Bornean species (represented by Mottley n. 376 and Haviland n. 95) which differs in having deeply cordate leaves, in having quite glabrous pedicels, and in having the petals, though similarly crenulate, larger and almost glabrous. It is just possible that the Bornean plant may be the lost B. cordifolia Roxb.

20. Bauhinia integrifolia Roxb. Hort. Beng: 90. A large climber over 100 feet long, branchlets slender rusty-puberulous, tendrils cirsinate rusty. Leaves usually deeply cordate, always about as long as broad, mostly 4–6 in. across and with a deltoid apical sinus 4½–6 in. deep; the leaves in the region of inflorescences usually small 1½ in. long, 1 in. across, not infrequently entire; the leaves on young root-shoots
or seedlings paler and larger often 8 in. across, much broader than long with an obtuse-angled sinus reaching nearly halfway down and with divergent deltoid lobes 3–4 in. long; thinly subcoriaceous, bright-green, glabrous and shining above, at times brownish underneath especially on the nerves which are sometimes rusty-puberulous; nerves 11, very rarely 9; petiole glabrous cylindric thickened at both ends, usually 1·75–2·25 in. long, upper petioles in inflorescence 25–5 in. only; petioles of young shoots and seedlings sometimes exceeding 4 in. Flowers in terminal leafy panicles a foot long, the individual racemes dense close-fld., 3–6 in. long, the lower flowers deciduous except the few that are fertilised, the remaining terminal portion corymbose 3 in. long and broad; pedicels very slender, thickening in fruit, 1·5 in. long, spreading, rusty-pubescent as is the nodose main-rachis; bracts very short, ovate-acute, sometimes persisting; bud clove-shaped, 35 in. long, the cylindric base slightly shorter than the ovate upper part. Calyx rusty-pubescent, tube 15 in. long, limb splitting into 5 subequal ovate-acute lobes 2 in. long. Petals 5 subequal, bright-yellow passing with age to orange and brick-red, broadly obovate, long-clawed, 7 in. long, 3 in. wide, margins slightly wavy, very densely rusty-pubescent externally. Stamens 3 fertile, anthers shortly oblong. Ovary 4–6-ovuled, densely pubescent, shortly stalked, style very long, 6 in., glabrous, stigma small peltate. Pod oblong, flat, woody, 7–8 in. long, 2·5 in. across, externally pubescent, stipe 15 in. long only. Seeds 3–5, very much compressed, broadly ovate, 9 in. long, 7·5 in. across, margin deeply notched at micropyle; funicle flat triangular 5 in. long, 5 in. broad at base, narrowing obliquely to the hilum. Wall. Cat. 5780; Roxb. Flor. Ind. II, 331; Bak. in. Flor. Brit. Ind. II, 279. *Phanera integrifolia* Benth. Pl. Jungh. 263; Miq. Flor. Ind. Bat. I, 64 and Suppl. 286.

*Xenopus*


Like *B. Wrayi* this species serves to connect *Phanera* with *Lasiobema*. In Perak, Mr. Wray informs us, the Malay name of this species is *Dadaub*; he says that string and rope are made from the inner bark. Dr. Jack, on the other hand limits the name *Dadaub*, in Sumatra, to his *B. emarginata*. In Malacca there appears to be some dubiety as to the Malay name of the species, the following being those noted:—Akbar Katop-Katop (Derry, 1118; Holmberg, 866; Goodenough, 1276): Akbar t-pak kuda merah (Goodenough, 1672): Sarau (Holmberg, 850): Panga Sarau (Derry, 484).
21. Bauhinia glabrafolia Bak. in Flor. Brit. Ind. II, 281. A slender climber 50-80 feet long, stem 1-5 in. in diam., branchlets slender at first grey-silky, tendrils few short, circinate, woody, sparsely silky. Leaves truncate or shallowly cordate, very rarely deep-cordate at base, gradually taping to an acute point, towards apex of twigs entire, lower down cleft at tip, with narrow sinus extending one-sixth to one-fourth down and with narrow acute lobes; the leaves of young plants and root-shoots bifid to the very base; rather longer than broad, 4-6 in. long, 3-4-5 in. wide, light-green, shining, quite glabrous above, when young pubescent on the nerves at length glabrous beneath; nerves 9 more rarely 7, in the quite 2-fid. leaves 3 or 4 to each lobe; petiole 1-25-2 in., glabrous. Flowers in terminal panicles, 8 in. long, 4 in. wide, of numerous dense short-peduncled many-flowered corymb 2 in. long, 1-25 in. wide, pedicels erecto-patent 35-5 in. long, loosely grey-silky, bracts at bases of corymb-peduncles 2, stipellar, ovate-acute, 15 in. long, silky beneath, glabrous above, at base of pedicels solitary, lanceolate, persistent, 2 in. long, bracteoles about middle of pedicels 2, sub-opposed, subulate, 15 in. long; buds close-shaped, the spherical subapiculate upper part longer than the narrowly cylindric base. Onlyx rather laxly grey-silky, limb splitting into spreading subequal ovate lobes with inturned tips, 25 in. long, tube 15 in. long. Petals small white, obovate, clawed, 3 in. long, densely grey-silky outside. Stamens 3 fertile, anthers very shortly oblong, filaments white slender glabrous, 5 in. long. Ovary densely silky especially along sutures, distinctly stalked, style glabrous slender, 2 in. long, stigma small. Pod (young) with silky sutures and glabrous valves; stipe 25 in. long. Bauhinia diptera Blume ex Miq. Anal. Ind. I, 12. B. piperifolia Kurz, Journ. As. Soc. Beng. XLV, 2, 288 not of Roxb. B. anguina Kurz, Journ. As. Soc. Beng. XLV, 2, 288 not of Roxb. Phanera diptera Miq. Flor. Ind. Bat. I, 70.

Perak; Scortechini 316! 1512 (spp. with distinct leaflets = B. diptera Bl.)! Kunzler 4511! 4511! 6170! Wray 3960! Penang; Curtis 801! 1541! Distrib. Tenasserim; Pegu; Borneo.

This is extremely nearly related to Bauhinia piperifolia Roxb. (Phanera glabrafolia Benth.) and has, indeed, been united with Roxburgh's species both by Mr. Kurz and by Mr. Baker. It is however very easily distinguished by its stipelliform main-bracts, not present in B. piperifolia; its much longer persistent bracts at base of pedicels; its pedicels less than half as long, with a spreading, not adpressed,omentum; and its densely woolly ovaries, those of B. piperifolia being quite glabrous.

The oldest name is Bauhinia diptera Bl. but as the term is applicable only to young leafy root-shoots or to seedling plants and is quite inappropriate when used in connection with flowering branches of adult plants, it seems much better to neglect it. When Mr. Baker's name is used, however, it has to be recollected.
that it is merely the name which one employs, and that this can be done only because Baker has referred to his B. glabriifolia some Tenasserim specimens collected by Helfer that differ specifically from the plant he describes; both the diagnosis and the cited synonyms of the *Flora of British India* must be altogether excluded.

§ 4. **Lasiobema** Korth. **Fertile stamens 3. Calyx** with very short tube and equally 5-partite or entire truncate limb. **Pod** dehiscent or (*B. anguina*) indehiscent. Slender climbers with long narrow racemes of very small flowers.

22. **Bauhinia anguina** Roxb. Hort. Beng. 31. A woody climber with slender glabrous branchlets and circinate tendrils. **Leaves** ovate, base cordate, apex of upper leaves often entire, of the others very variably shallowly to deeply 2-fid, sometimes on young plants and root-shoots quite divided to the base with more or less divergent and more or less acuminate lobes; membranous, 2·5–5 in. long, 2–3 in. wide, bright-green, shining, glabrous on both surfaces; nerves 5–7; petiole 1 in. long, glabrous. **Flowers** very small in many-fld. racemes arranged in terminal panicles often extending into axis of upper leaves, 6 in. long, as much across, individual racemes 2–4 in. long, '5 in across, pedicels spreading, equal, '15 in. long, very slender, faintly puberulous as is the main-rachis, bracts minute linear; buds small spherical, '07 in. in diam. **Calyx** faintly puberulous, tube campanulate very short, lobes ovate '07 in. long, spreading. **Petals** oblanceolate, '12 in. long, puberulous externally, white. **Stamens** 3 fertile, filaments '1 in. long. **Ovary** distinctly stalked, glabrous, style slender '1 in. long, stigma minute. **Pod** thin flat oblong, glabrous, indehiscent, 1·5–2 in. long, 1 in. across. **Seeds** oblong, '6 in. long, '35 in. wide, only slightly compressed, long diameter in long axis of pod. Cor. Pl. III, t. 285; DC. Prodr. II, 516; Wall. Cat. 5773; Roxb. Flor. Ind. II, 328; W. & A. Prodr. 298; Bak. in Flor. Brit. Ind. II, 284. *B. scandens* Linn. Sp. Pl. I, 374 (as to Rheede's Malabar, not as to Rumphius' Malayan plant.) **Lasiobema anguinum** Korth. ex Miq. Flor. Ind. Bat. I, 71.

**Malayan Peninsula;** *vide* Baker in *Flora of British India*. **Distrib. India;** Indo-China; Malay Archipelago.

Mr. Baker notes this as being from the Eastern Peninsula; no specimens have been sent to Calcutta as yet. Dr. Miquel claims it also as a native of the Malay Archipelago; from this region likewise, no specimens have as yet been sent here; all those at Calcutta from the Archipelago belong to *Lasiobema Horsfieldii* Miq. This latter form Mr. Baker has reduced to *B. anguina* and the writer agrees with Baker in believing that the two plants are not specifically separable. At the same time he considers it better to treat *L. Horsfieldii* as varietally distinct, on account of its much smaller pods which are only 1·25 in. long, and '5–'6 in. wide: Dr. Watt too has, in Herb. Calcutta, proposed for the plant the name *B. anguina var. Horsfieldii* Watt MSS. The point is here dwelt on because of the possibility that, when *B. anguina* is again collected in the Peninsula, it may prove to be this Sumatra and
23. **Bauhinia Curtissii** Prain. A woody climber with slender very faintly puberulous branchlets. *Leaves* ovate-oblong, base rounded, apex divided at the tip into two short diverging deltoid lobes, sinus wide rectangular, a few of the smallest uppermost leaves entire at apex; membranous, 2.5–4 in. long, 2–2.5 in. wide, bright-green glabrous on both surfaces; nerves 5–7; petiole 1.25 in. long, glabrous. *Flowers* very small in terminal, simple, many-fld racemes or panicles that extend into axes of upper leaves, 4 in. long and as much across, individual racemes 3 in. long, 1 in. across, pedicels spreading, equal, 5 in. long, very slender, faintly puberulous as is the main rachis, bracts minute linear; buds small ovate-acute, 15 in. long. *Calyx* puberulous externally, tube campanulate very short, lobes ovate-lanceolate spreading, 15 in. long. *Petals* spathulate, glabrous, 25 in. long, clawed, white. *Stamens* 3 fertile, filaments 35 in. long. *Ovary* shortly stalked, glabrous, style slender, 15 in. long, stigma minute. *Pod* thin flat, black, somewhat flexible, slightly recurved, quite glabrous, 2.5 in. long, 75 in. wide, stipe 0.7 in. long. *Seeds* 3–5, not seen quite ripe.

*Kedah; Langkawi, Trutow, Curtis 1682!* near the lake, *Curtis 2619*

Very nearly related to *B. Championii* Benth., from S. China and the Eastern Himalaya, which has similar but rather larger pods. The present species, however, has longer pedicels, smaller buds, shorter calyx-lobes, a shorter stipe to the ovary and pod. The ovary here is also quite glabrous as are the leaves beneath; in *B. Championii* the ovary is somewhat silky, the leaves adpressed pubescent beneath. It is easily distinguished from *B. anguina* by the longer pods and pedicels. Mr. Curtis’ specimens have no tendrils.

24. **Bauhinia strychanoiidea** Prain. A slender climber 60–80 feet long with stems only 1 in. in diam., branches slender glabrous, tendrils few very small circinate glabrous. *Leaves* ovate-acute, base cuneate or rarely rounded, apex entire; rigidly subcoriaceous, 3–3.5 in. long, 1.5–2 in. wide, bright-green glabrous, polished above, dull beneath; nerves 5, the outer pair very slender the inner almost as strong as the laterally branching midrib with whose base they are usually more or less confluent; petiole 0.75 in., glabrous. *Flowers* small, in many-fld racemes arranged in terminal panicles extending into axes of upper leaves, 8–12 in. long, 4–6 in. across, individual racemes 6–10 in. long, 2 in. wide, pedicels spreading, equal, 75 in. long, very slender, glabrous as is the main rachis, bracts minute linear; buds small, obovoid, 2 in. long, *Calyx* glabrous, tube campanulate very short, limb wide-campanulate 2 in. long and as much across, the entire margin truncate with 5 minute projections representing calyx tips. *Petals* spathulate, quite glabrous externally,
slightly puberulous within along midrib, the upper rather longer sub-acute, the others obtuse 35 in. long, light-red, spreading. *Stamens* 3 fertile, filaments 3 in. long. *Ovary* very shortly stalked, densely pubescent, style 2 in. long, stigma large peltate. *Pod* thin flat densely velvety, 3-5 in. long, 2 in. across, valves woody; stipe very short. *Seeds* 3-5, ovate, dark-brown, 1 in. long, 6 in. across.

**PERAK; KUNSILER 5914! 7054! SCORTECHINI! SELANGOR; KWALA LAMPAR, “top of the cave,” KELSALL 1971!**

A very remarkable species at once distinguished from any of the other Malayan ones by its leaves, which have the nervation of a *Strychnos*; and from all the hitherto known species by its truncate entire calyx. It might on this account be perhaps treated as the type of a new section. As regards fruit it might be placed in the section *Phanera*; as regards its other characters it agrees better with *Lasioibema* in which it is now placed.

48. **CYNOMETRA LINN.**

Erect unarmored trees. *Leaves* with few coriaceous odd-pinnate leaflets. *Flowers* copious, minute, in axillary corymbs or racemes. *Calyx* with a very short tube and subbasal disc; divisions 4-5, oblong, imbricated. *Petals* 5, ob lanceolate, equal, not exserted. *Stamens* 10, or in *C. polyandra* indefinite, filaments erect, free, filiform, exserted; anthers small, oblong, versatile, dehiscing longitudinally. *Ovary sessile* or short-stalked, 2-ovuled; style filiform, stigma capitate. *Pod* turgid, oblique-oblong, with very thick indehiscent, usually rugose, tough, somewhat fleshy valves. *Seed* exaluminous, central, filling up the cavity.

**DISTRIBUTION.** Species 20, spread everywhere in the tropics.

*Stamens* 10 (*§ Eucynometa*); leaf-rachis glabrous:—

Flowers on stem and thick branches in racemes with a produced axis; pedicels glabrous; (leaves 1-jugate) ... 1. *C. cauliflora*.

Flowers among the leaves in racemes or corymbs without a produced axis; pedicels puberulous:—

Corymbs laxly umbelliform, bracts small very deciduous;

 pods rugose; leaves 1-2-jugate ... ... ... 2. *C. ramiflora*.

[Leaves 1-jugate ... ... SUBSP. GENUINA; Leaves 2-jugate ... ... SUBSP. BIJUGA; End-leaflets acute much exceed ing basal pair ... ... VAR. HETEROPHYLLA; End-leaflets obtuse hardly exceeding basal pair ... ... VAR. MIMOSOIDES.]

Racemes dense subsparticate, bracts subpersistent; pod smooth; leaves 3-jugate ... ... ... 3. *C. inaequalifolia*.

*Stamens* 40-60 (*§ Pseudocynometra*); leaf-rachis puberulous; (flowers in axillary corymbs; pedicels puberulous) ... 4. *C. polyandra*.

[Pod smooth ... ... VAR. TYPICA;]
§ 1. EUCYNOMETRA. Stamens 10.

1. CYNOMETRA CAULIFLORA Linn. Sp. Pl. 382. A shrub or small tree 8–16 feet high. Leaves even-pinnate, leaflets 1-jugate with petiole under 2 in. long or occasionally with one of the leaflets abortive, dimidiate-oblong to subfalcate-oblong, subsessile, 2–3 in. long, 75–15 in. wide, base cuneate, apex acute or subacute slightly notched, subcoriaceous, dark-green, glabrous on both surfaces, slightly shining above, lateral nerves few ascending not very prominent beneath, not visible above. Flowers in small elongated sessile racemes, 5–2 in. long, occasionally reduced to very short 2–3-fld. stalklets or to single flowers, clustered, rarely solitary, on rugose nodes on the stem, the bracts small concave-ovate, persistent, 05 in. long, glabrous, pedicels 2 in. long, slender glabrous, with small concave-ovate basal bracteoles, 05 in. long. Calyx-tube very short, lobes 5, lanceolate, white, 15 in. long. Petals linear, 15 in. long, white or pink. Stamens 10, filaments 2 in. long, slender, glabrous. Ovary glabrescent, shortly stipitate, oblique; ovules 2. Pod thick and fleshy, oblong to irregularly globose, apiculate, glabrous, 1–2 in. long, edible. DC. Prodr. II, 509; Roxb. Hort. Beng. 32; Wall. Cat. 5816 A, B; W. & A. Prodr. 293; Miq. Flor. Ind. Bat. I, 77; Bak. in Flor. Brit. Ind. II, 268.

Malacca; fide Baker. Distrib. Cultivated occasionally in India and in our area; generally in the Malay Archipelago.

2. CYNOMETRA RAMIFLORA Linn. Sp. Pl. 382. A medium-sized, spreading, sea-coast tree, 20–30 feet high. Leaves even-pinnate; leaflets 1-jugate with petiole under 2 in. long, or 2-jugate with rachis 125–2 in. long, the lowest pair always slightly, often much, smaller than the terminal, obliquely obovate-oblong to subfalcate-oblong, subsessile, 1–5 in. long, 25–2·5 in. wide, base obliquely cuneate, apex obtuse or shortly bluntly acuminate, coriaceous, dark-green, glabrous on both surfaces, shining above, lateral nerves numerous, spreading, rather distinct. Flowers in small subumbellate corymb on small branches above the axils of fallen leaves, 3–6 in. long, the bracts small ovate, the outer 15–2 in. in diam., very deciduous, pedicels 3–5 in. long, very slender, finely puberulous, with small lanceolate basal bracteoles. Calyx-tube very short, lobes 5, ovate-lanceolate, white, 12 in. long. Petals white, linear-lanceolate, 15 in. long, much narrower than sepals. Stamens 10, filaments slender, 25 in. long, glabrous; anthers versatile. Ovary densely pubescent, subsessile, very oblique; ovules 2. Pod fleshy, strongly wrinkled, irregularly oblong or ovoid with a thick terminal fleshy tip, 5 in. long, 4 in. broad and nearly as thick. Seed oblong, 4 in. long, 3
leaves of Amboina, terminal Mattaban Ceram, mixed Ceylon, Singapore Skudai Coco 1 Teysmann Bak. Sungei 64x452
distributed of King neously pair; Johore 201 5528

Not reported from our area. DISTR. Java, Horsfield 146 (erroneously distributed as C. bijuga) ! Ceram, Teysmann 1961 (erroneously distributed as C. cauliflora) ! Amboina, Rumphius (icon.) ! Teysmann 5528 !

Subsp. bijuga ! leaves 2-jugate. C. bijuga Spanoghe, Limnaca XV, 201 (1841), name only.


Andamans ; Coco Group, rare, Pratî ! S. Andaman coast, very rare, King’s Collector! Perak; Matong, on the coast, Wray 2503 ! Johore ; Skudai River, Hullett and King! Singapore; Sungai Jurong, Ridley 5891 ! DISTR. Ceylon, (Walker)! Sumatra, (Forbes)! Java, Timor, Borneo.

b. Var. mimosoides Bak. in Flor, Brit Ind, II, 267; terminal pair of leaflets obtuse, emarginate or retuse, hardly larger than the basal pair; leaflets much smaller than in var. a. C. mimosoides Wall. Cat. 5817 (1830). C. ramiﬂora var. b. W. and A. Prodr. 293. Rheede, Hort. Malab. IV, t. 31 ; Lamk, Ill. t. 331, f. 1 ? (seems to show 1-jugate leaflets only).

Andamans ; very common in every tidal and beach forest. DISTR. Malabar, Rheede (icon.) ! Ceylon, Wallich (Cat. n. 5816 C in part; mixed with cultivated examples of C. polyandra from Madras and erroneously distributed as C. cauliflora)! Sundribeens; Arracau; Martaban and Tenasserim.

The three plants here included in C. ramiﬂora have been somewhat misunderstood by Limnens and indeed by most subsequent botanists. That the plant of Rumphius, here treated as subsp. genuina, will have to be kept apart from the other two as a distinct species in any careful monograph of the genus seems to admit of little question. Though mentioned in many works as Indian, no one has ever sent Indian specimens to Calcutta; the only authors who have actually seen specimens that were not from the Malay Archipelago are Wight and Arnott, Thwaites, and Trimen; the specimens mentioned by these writers in every case came from Ceylon not from India. No one has ever sent it from the Malay Peninsula.

It is tolerably certain that the two plants which form what is here termed
subsp. *bijuga* are not specifically separable, for some examples from the Andamans seem intermediate between the two. There are, however, no specimens that serve to link either of the forms with the 1-jugate subsp. *genuina*, and it will always be necessary to keep them apart as distinct—they are certainly very easily distinguishable—varieties.

*Var. heterophylla* is also said to be Indian; it is, however, only found in Indian gardens, though it does appear to be wild on the coasts of Ceylon. That *var. mimosoides* occurs in India seems likely from its having been figured by Rheede, though no one has ever collected it in Malabar again. It is, however, quite common in the Sundribuns at the northern end of the Bay of Bengal and extends from that area down the eastern side of the Bay as far as Tenasserim and the Andamans; it has never been reported from the Malay Peninsula or Archipelago, where *var. heterophylla* (*C. bijuga* Miq.) is the representative form. And just as the two forms grow side by side in the beach forests of the Andamans, so they both occur on the coasts of Ceylon, for a plant from Trincomalee issued by Wallich under 5816/C is the same thing as his own *C. mimosoides* from the coasts of Burma. Wight and Arnott, too, say that they also have seen specimens from Ceylon which are the same as Rheede’s Malabar plant; there is no doubt that Rheede’s plant is Wallich’s *C. mimosoides*.

In the event of subsp. *bijuga* being treated as a “species” of which *heterophylla* and *mimosoides* are only varieties, it must be noted that the name to be employed, from the point of view of priority, should be Wallich’s, which is a decade anterior to Spanoghe’s. But the adoption of Wallich’s name will afford an excellent example of the disadvantage of the modern craze that insists on a rigid adherence to the laws of priority, Spanoghe’s name being so much the more suitable of the two.

3. *Cynometra inqualifolia* A. Gray, Bot. U. S. Expl. Exped. 473. A lofty tree 150–200 feet high; leafy shoots at first enveloped in imbricating bracts. *Leaves* even-pinnate, rachis glabrous 2–3 in. long; leaflets 3-jugate, elliptic-oblong, base obliquely cuneate, inner side with the lower third to two-thirds of margin straight, narrower than outer with uniformly curved outline, apex subacuminate; rigidly coriaceous, dark-green, glabrous and smooth on both surfaces, shining above, lateral nerves 8–9 pairs very faint and hardly distinguishable from the secondary reticulations; sessile, 2–3 in. long, 1–1.25 in. wide, the lowest the smallest. *Flowers* in subcapitately congested axillary racemes 1–1.5 in. long, 1 in. wide, the closely imbricating bracts hard, striate, scarious, broadly ovate, 25 in. across, pedicels puberulous, 25–3 in. long, with two oblong membranous basal bracteoles 0.15 in. long. *Calyx*-tube very short, lobes 5, narrowly obovate, imbricate, ascending, 0.2 in. long, white. *Petals* 5, oblanceolate, white, 0.2 in. long, a little narrower than sepals. *Stamens* 10, filaments slender, 0.4 in. long, glabrous, anthers versatile. *Ovary* densely pubescent, shortly stipitate, very oblique; ovules 2. *Pod* obvoid, thickly woody, obliquely obovoid, 2–2.25 in. long, 1.5 in. wide, 0.75 in. thick. *Seed* solitary, irregularly oval-oblong, 1.6 in. long, 1 in. broad, 0.5 in. thick. Bak. in Flor. Brit. Ind. II, 267.
MALACCA; Maingay 589! Derry 893! Prov. Wellesley; Tasek Gelugur, Ridley 6981! Perak; Scortechni 2190! at Goping, Kunstler 6022! 6066!


4 Cynomextra polyandra Roxb. Hort. Beng. 32. A large tree, the leafy shoots at first enveloped in imbricating bracts, the basal ones scarious, 3 in. in diam., the inner membranous and reaching 2 in. long, 1 in. across. Leaves even-pinnate, rachis puberulous 3–7 in. long; leaflets 3-jugate, elliptic-ovate or oblong, base obliquely cuneate, inner side with the lower half of margin straight, narrower than outer with uniformly curved margin, apex subacuminate, suborriaceous, dark-green above, paler beneath, glabrous and smooth on both surfaces, hardly shining, lateral nerves 7–8 pairs more prominent beneath than the secondary reticulations, sessile, 2–5·5 in. long, 1–2·5 in. across, the lowest the smallest. Flowers in sessile axillary corymbs 2 in. long, 1·5 in. wide, the closely imbricating bracts hard striate scarious, broadly ovate, 3 in. across, soon deciduous, pedicels pubescent, '6–1 in. long with 2 very deciduous basal bracteoles. Calyx-tube very short, lobes 4, narrow-ovate, imbricate, reflexed, 4 in. long, white. Petals 5, lanceolate, 4 in. long, narrower than sepals, white. Stamens 40–60, filaments slender, '5 in. long, glabrous, anthers versatile. Ovary densely pubescent, sub-sessile, very oblique; ovules 1–2. Pod oblique, oblong, woody, 2–2·5 in. long, 1·25–1·5 in. wide, smooth or rugose. Seed solitary, irregularly oblong, 1·5 in. long, 1 in. wide, '5 in. thick.


Var. ? Kurzii; pod very rugose, leaflets rather larger. C. cauliflora Wall. Cat. 5816 E.

Penang; Jack (Wall. Cat. 5816 E)! Kurz! on Govt. Hill, “Apr. 1890” and “May 1893” Curtis! Perak; Scortechni!

There are no specimens of C. polyandra proper from Penang or Malacca in Herb. Calcutta. The specimens of “Var. ? Kurzii,” which may possibly prove, when fully represented, to be a distinct species, has been obtained in fruit by Kurz alone; all the other specimens are in leaf only; its flowers are, so far, unknown.

49. Tamarindus Linn.

A spineless tree. Leaves abruptly pinnate. Flowers in racemes. Calyx-tube turbinate; disc produced above its base; teeth lanceolate much imbricated, the two lowest connate. Petals only the three upper developed, the two lateral ovate, the upper hooded, the two lower
reduced to scales. *Stamens* monadelphous, only 3 developed, the others reduced to mere bristles at the top of the sheath; anthers oblong, versatile, deliscing longitudinally. *Ovary* many-ovuled, with a stalk adnate to the calyx-tube; style filiform, stigma capitate. *Pod* linear-oblong, many-seeded, with a thin crustaceous epicarp and thick pulpy mesocarp. *Seeds* exalbuminous. One species, now planted everywhere in the tropics.


_Andamans_; Great Coco Island, introduced by the sea, not planted, _Prain!_ Kedah; “growing wild at the top of limestone hills,” _Kunstler_ 1728; Selangor; “in dense old jungle,” _Kunstler_ 8613! Distr. Planted throughout the tropics; believed by Oliver to be truly indigenous in Africa.

50. Sindora Miq.

Unarmed lofty trees. *Leaves* abruptly pinnate; leaflets few rigidly

J. ii. 26
coriaceous. Flowers small, panicled. Calyx with a very short tube and basal disc; segments 4, valvate or very slightly imbricated. Petal 1, the size and shape of the upper calyx-segment. Stamens 10, the upper free and without anther, the others decline shortly monadelphous, hirsute, unequal, the two nearest the free staminode always fertile, rather larger than the rest which are alternately short and long and may casually have sterile anthers or none; anthers oblong, versatile, dehiscing longitudinally. Ovary 2–5-ovuled, short-stalked, pubescent; style long, filiform, circinate, stigma small terminal capitate. Pod more or less oblique, broadly rounded-oblong, dehiscent, the valves flat, hard and woody, armed or not all over the face with straight, conical, firm prickles. Seeds usually 2, rarely 3–5, with a hard shining testa and resting on the cupshaped apex of a thick obconic arillate funiculus. Species 9; eight Malayan, one Cambodian.

The earliest publication of any species of this genus was in Rumphius, Herb. Amb. II, t. 13. It thus forms, by citation, a part of the genus Galedupa Lamk, (Encyc. Meth. II, 504 [1786]); it is not, however, covered by the description of Galedupa indica given by Lamarck; that description applies only to the Pongam of Rheede (Hort. Malab. VI, t. 3), now known as Pongamia glabra Vent. As this latter name is validly established—Rheede's genus having been published by Adanson as Pongam, before it was mistaken by Lamarck for Galedupa—it may be one day found necessary to restore Lamarck's name Galedupa indica and restrict it to Rumphius' Caju Galedupa. In any case Galedupa is the generic name first applied to, and therefore, by the modern canons, the one that should be used for what is at once Sindora Miq., Echinocalyx Benth., and Grandiera Lefevre. The writer, be it understood, is of those who consider our modern priority-hunting to be frequently unwise; this consideration will probably be shared by sober-minded students who, after reading what is said here and what has been already said under Pongamia, may take the trouble to examine the treatment that adepts in the art are prepared to accord the names now under discussion.

The genus is not a member of the tribe Cynometrea but of the Amherstiae, where it has to be placed close to the genera Pahudia Miq. and Afzelia Linn. Pahudia is in fact almost exactly intermediate between Sindora and Afzelia since it combines the thinner leaves and the much imbricated sepals of the latter, with almost the pod and exactly the seeds of the former. The stamens in both Pahudia and Sindora are similarly united in a sheath, but there is the curious difference that the two nearest the fissure are abortive and represented by bristles on the tube in Pahudia, whereas in Sindora these are fully developed and in some of the species are at times the only fertile stamens present.

Pods armed on the face with strong straight prickles (unknown in S. velutina); leaves puberulous or pubescent beneath; —

Pods subequally rounded at base, style and beak at opposite ends of its long axis; rachis of raceme straight with spirally-set bracts and flowers: —

Stipules large foliaceous; calyx-lobes with a few spines outside in their upper third ... ... ... 1. S. Wallichiana.
Stipules inconspicuous; calyx-lobes rather densely spinescent outside in their upper two-thirds
Pods obliquely rounded at base, beak projecting laterally at right angles to direction of stalk (unknown in S. velutina); rachis of raceme zig-zag with subdistichously-set bracts and flowers:

Leaflets 3-jugate, puberulous beneath; calyx-lobes slightly spinescent in their upper third outside
Leaflets 5-6-jugate, densely pubescent beneath; calyx-lobes not spinescent

Pods unarmed; leaves glabrous beneath; (pod subequally rounded at base, calyx-lobes not spinescent)

1. Sindora Wallichiana Benth. A large tree with slightly rusty-pubescent branchlets. Leaves equally pinnate with puberulous rachis 4–6 in. long, stipules very large foliaceous semi-lunar sub-intrapetiolar, 6 in. long, acute at apex, rounded auriculate at base, pubescent on both sides; leaflets 3-jugate, oblong, apex round or acute, base round or cuneate, 1·5–3·25 in. long, 1 in. wide, the lowest pair slightly the smallest, very coriaceous, shining glabrous above, dull uniformly pubescent beneath, nerves numerous close horizontal slightly irregular, faint beneath not visible above, petiolules 2 in. long, puberulous. Flowers in axillary and terminal lax panicles 6–8 in. long, 5–6 in. wide, individual racemes 3–4 in. long with straight pubescent rachis, flowers spirally arranged, bracts broadly ovate-obtuse, 4 in. long, densely pubescent beneath, sparsely puberulous above, pedicels 3·5 in. long, with two ovate-lanceolate bracteoles, 2 in. long, at the apex; buds oblong densely pubescent, 4 in. long. Calyx-tube short, lobes 4, thick, 25 in. long, densely strigose within, ovate-acute, valvate, sparingly spinescent externally in the upper third. Petal 1, as long as the calyx-lobes, inside densely hairy. Staminal-sheath and filaments decline pubescent. Ovary very hirsute, style twisted, stigma capitate. Pod broadly oblong, subequally rounded at base so that the short stout straight beak projects in the direction of the long axis, 3 in. long, 2 in. across; valves dehiscent, puberulous, woody, uniformly armed on the outside with strong straight conical spines 15 in. long. Seeds usually 2, with arillate funicle. Sindora Wallichii Benth. in Hook. Icon. Plant. t. 1018 not t. 1017; Bak. in Flor. Brit. Ind. II, 268 in part, excl. syn. Echinocalyx Bth. and both vars. Guilandina Wallichiana Grah. in Wall. Cat. 5805. Galedupa Wallichiana Prain MSS.

Singapore; Wallich 5805! Kurz! T. Anderson 41! Malacca; Griffith!

The Griffithian specimens referred to were given by Dr. Griffith to Dr. McClelland; from his collection they passed into the Calcutta Herbarium under Griffith's original name "Cassia sp." They were afterwards examined by Dr. T.
Thomson, who referred them to the genus Schotia which is much nearer their real position. They are very distinct, by reason of their less spiny calyx-lobes and their large foliaceous stipules, from another Griffithian gathering from Malacca, first issued from Kew as n. 1848 under the name “Dialium? sp.” and subsequently made by Mr. Bentham the type of his genus Echinocalyx. When afterwards referring Griffith n. 1848 and Wallich n. 5805 to one species, Mr. Bentham, who apparently had only Wallich’s specimens at his disposal, did not know that the Singapore plant has large foliaceous stipules.

2. *Sindora Echinocalyx* Prain. A large tree with glabrous branchlets. *Leaves* equally pinnate with puberulous rachis 2–3 in. long, stipules small; leaflets 3-jugate oblong, apex round or slightly acute, base round or slightly cuneate, 1·25–2 in. long, 0·75–1 in. wide, the lowest pair slightly the smallest, very coriaceous, shining glabrous above, dull minutely puberulous beneath especially on the midrib, nerves numerous close horizontal slightly irregular, faint beneath not visible above, petiolules 1·5 in. long, puberulous. *Flowers* in axillary and terminal lax panicles 4–5 in. long, 2·5–3 in. wide, individual racemes 1·25–1·5 in. long, with straight puberulous rachis, flowers spirally disposed, bracts ovate-obtuse 2·5 in. long, glabrescent above, puberulous beneath, pedicels 25 in. long, puberulous, with two oblanceolate bracteoles, 2 in. long, at the apex; buds oblong, puberulous, 2·5 in. long. *Calyx*-tube short, lobes 4 thick, 2 in. long, pubescent inside, ovate-acute, valvate, rather densely uniformly spinescent externally in the upper two-thirds. *Petal* 1, pubescent internally. *Staminal*-sheath and filaments declinate, hairy. *Ovary* very hirsute, style curved, stigma capitate. *Pod* broadly oblong, subequally rounded at base so that the slender straight beak projects in the direction of the long axis, 2·25 in. long, 1·5 in. across; valves dehiscent, puberulous, thinly woody, uniformly armed on the outside with strong straight conical spines 1·5 in. long. *Seeds* 2, funicule arillate. *Sindora Wallichii* Benth. in Hook. Icon. Plant. t. 1017, not t. 1018 and not Guilandina Wallichiana Grah. *S. Wallichii* var. ovalifolia Maingay MSS. Echinocalyx Benth. in Benth. & Hook. f. Gen. Pl. 1, 584. Gale-dupa Echinocalyx Prain MSS.

Malacca; Griffith 1848! *Maingay* 562/1!

Nearest to *S. Wallichiana* but easily distinguished by its less pubescent leaves, different stipules, and smaller flowers with more spinescent calyx.

3. *Sindora intermedia* Baker. A large tree, over 100 feet high, with slightly rusty-tomentose branches. *Leaves* equally pinnate, with puberulous rachis 4–6 in. long, stipules small; leaflets 3-jugate, oblong, apex round or slightly acute, base round or slightly cuneate, 1·5–2·5 in. long, 1 in. wide, the lowest pair slightly the smallest, very coriaceous, shining glabrous above, dull minutely puberulous beneath especially on the midrib, nerves numerous close horizontal slightly irregular, not very
conspicuous beneath, not visible above, petiolules 15 in. long, puberulous. *Flowers* strongly scented, in axillary and terminal dense panicles, 4–6 in. long, 2.5–3 in. wide, individual racemes 2 in. long with suberecet zig-zag rusty-tomentose rachis, flowers subdistichous, bracts ovate-acute 3 in. long, densely puberulous beneath, sparsely so above; pedicels 35 in. long rusty-tomentose, with two ovate-lanceolate bracteoles, 2 in. long, at the apex; buds oblong densely pubescent, 1 in. long. *Calyx*-tube short, lobes 4, thick, 25 in. long, very densely strigose on the inside, ovate-acute, valvate, sparingly spinescent externally in the upper third. *Petal* 1, reddish, as long as the calyx-lobes, densely hairy. *Staminal-sheath* and filaments decinate, red with rusty hairs; perfect anthers 9. *Ovary* very hirsute, style twisted, stigma capitata. *Pod* wide-oblong, obliquely rounded at base so that the small recurved bead projects laterally at right angles to direction of stalk, 2 in. long, 2.5–3.5 in. across; valves dehiscent, puberulous, woody, uniformly armed on the outside with strong straight conical spines 2 in. long. *Seeds* usually 2, rarely 3–5, with hard black shining testa, oblong, horizontal, 5 in. long, 75 in. across, resting on a basal, arillus-like, thick obconic funiculus about 75 in. long. *Sindora Wallichii var. intermedia* Bak. in Flor. Brit. Ind. II, 268. *S. Wallichii* Scortechini MSS. not of Benth. *Galedupa intermedia* Prain MSS.

**Pangkor; Gunong Tungal, Curtis 1630! Scortechini 1064! Malacca; Maingay 562! Perak; Scortechini!**

This is at once distinguished by its transverse pods from both of the species placed under *S. Wallichiana* by Mr. Bentham. Mr. Curtis gives the Malay name of this in Pangkor as “Sapetir.”

Two other species with similarly oblique pods are *S. sumatrana* Miq. and *S. cochinchinensis* Baill.; it is just possible that *S. velutina* Bak. may prove to share the character and to belong to the same group.

4. *Sindora velutina* Bak. in Flor. Brit. Ind. II, 269. A large tree with densely tawny-tomentose branches. *Leaves* equally pinnate with sparsely pubescent rachis 5–7 in. long, stipules not seen; leaflets 5–6-jugate, oblong, apex subacute or acute, base round or slightly cuneate, 2.5–3.5 in. long, 1–1.75 in. wide, the lowest pair rather the smallest, very coriaceous, shining glabrous above, dull densely uniformly softly pubescent beneath, nerves numerous close horizontal slightly irregular, very faint beneath, not visible above, petiolules 1 in., densely pubescent. *Flowers* in axillary and terminal lax racemes 5–7 in. long, 3 in. wide; individual racemes 2 in. long, with zig-zag densely tawny-pubescent spreading rachis, flowers subdistichous, bracts ovate-acute, 3 in. long, densely tawny-tomentose, pedicels 15 in. long, densely tomentose as are the two lanceolate bracteoles; buds oblong, densely pubescent, 4 in. long. *Calyx*-tube short, lobes 4, thick, 25 in. long, densely hairy
within, ovate-acute, valvate, without spines externally. Petal 1, as long as calyx-lobes, densely hairy. Staminal-sheath and filaments dehiscent, slightly puberulous, spreading rachis; flowers spirally disposed, bracts and bracteoles not seen, pedicels thinly rusty, 2 in., buds oblong, thinly rusty, 25 in. long. Calyx-tube short, lobes 4, thick, 2 in. long, very faintly imbricated; spineless externally. Petal 1. Staminal-sheath and filaments hairy. Pod broadly oblong, subequally rounded at base so that the strong slightly recurved beak, 3 in. long, continues the direction of the stalk, tip subobliquely cuneate, tapering abruptly on the dorsal, slightly rounded on the ventral suture, 3 in. long, 2-2.5 in. across; valves dehiscent, glabrous, woody, unarmed. Seeds 2-3, funicle thick arillate. Afzelia? coriacea Bak. in Flor. Brit. Ind. II, 275, Intsia coriacea Maingay MSS. Galeodupa coriacea Prain MSS.

MALACCA; Chaban, Maingay 586! Ridley 2328! Penang; Tulloh Bahang, Curtis 430!

This fine tree is said by Mr. Ridley to be the “Sapetir” of Malacca; this name, it will be noticed, is used in Pangkor for the nearly allied but quite distinct S. intermedia. Mr. Curtis says it is known in Penang as “Mirbau,” the “Mirbau” of the Mainland, it will be observed, is Afzelia palembanica.

Of the specimens referred to, the writer has only seen leaves of Maingay’s, and only fruits of Curtis’ and of Ridley’s gatherings. The description of the flowers is therefore constructed from the characters stated and implied in the brief description of the Flora of British India. The number of stamens mentioned by Maingay, still more their monadelphous nature, makes it certain that the plant can be no Afzelia and goes to indicate that it is a species of Sindora; the fruiting specimens sent by Mr. Curtis and Mr. Ridley show that this is really the case.
The leaflets of this species are exactly like those of *S. sumatrana* but the pods differ in being much larger, and in being neither transversely twisted nor armed. The pods both in shape and in the absence of spines resemble those of *S. Galeedupa* (*Galeedupa indica* Lamk. Encyc. Meth. II, 594, as to syn. *Caju Galeedupa* Ramph. Herb. Amboin. II, 59, t. 13) and only differ in being a good deal larger. The two may indeed ultimately prove to be forms of one species.

51. *Afzelia* Smith.

Erect unarmed trees. Leaves abruptly pinnate, with few pairs of opposite leaflets. Flowers in copious terminal panicles. Calyx with the disc produced to the top of the elongated tube; sepals 4, much imbricated, slightly unequal. Petal only one developed, orbicular with a distinct claw, the others absent or rudimentary. Stamens 3 perfect, filaments long, pilose; anthers minute, oblong, opening longitudinally. Pod large oblong flattish, sublignose, subindehiscent. Seeds exalbuminous. Species 10–12; tropics of Old World.

Leaflets 4, rarely 2:

- Pedicels and calyx glabrous ... ... ... 1. *A. retusa*.
- Pedicels and calyx puberulous ... ... ... 2. *A. bijuga*.

Leaflets 8, rarely 10 or 6; (pedicels and calyx pubescent) ... 3. *A. palembanica*.

1. *Afzelia retusa* Kurz, Journ. As. Soc. Beng. XLIII, 2, 73. A small tree 15–20 feet high, stem 6–8 in. in diam. Leaves even-pinnate, 3–6 in. long; leaflets 2- (very rarely only 1-) paired, sometimes only subopposite, subcoriaceous, glabrous on both surfaces, oblong, base rounded, apex obtuse, emarginate or retuse, 2–4 in. long, 1·5–2 in. wide, nerves numerous fine spreading reticulate, petiolules distinct, 1·5 in. long, glabrous as is the rachis. Flowers in numerous terminal simple rarely slightly branched few-flowered glabrous racemes 2·5–3 in. long; pedicels stout glabrous, 5 in. long, bracteoles ovate-oblong, glabrous, 2 in. long, very early caducous as are the similar bracts. Calyx quite glabrous, tube slightly dilated upwards, 5 in. long, somewhat exceeding limb with 4 subequal oblong spreading lobes 3·5 in. long, 2·5 in. wide. Petal 7 in. long, limb 6 in. wide, 4 in. deep with rounded waved apex and wide-cuneate entire base, white or pinkish, claw very slender 3 in. long; pubescent along claw and midrib externally. Stamens 3 fertile, filaments 1·25 in., sparsely pubescent, pink. Ovary stalked, pubescent on lower suture, soon glabrous, style glabrous slender, 1·5 in. long. Pod 5–6 in. long, 2 in. wide, oblong, rigid, curved, coriaceous. Seeds orbicular, 1 in. in diam., 2·5 in. thick. Bak. in Flor. Brit. Ind. II, 274.

Andamans; very common on all the coasts. Perak; Wray 2491! Pahang; Scortechini 975! Malacca; Griffith 1855! Singapore; Ridley 4675! 6006! Distrib. Gangetic Delta.

Very nearly related to *A. bijuga* and perhaps only a variety of that species.
Mr. Baker attributes to this, just as Mr. Kurz does to *A. bijuga*, the occasional presence of 3 pairs of leaflets; none of the numerous specimens at Calcutta have more than two pairs of leaflets.


**Andamans**; very common in all the coast forests, Kurz! PRAIN! King's Collectors! NICOBARS; Kamorta, Kurz! SINGAPORE; Wallich (Cat. n. 5823 B)! Ridley! DISTRIB. All coasts from Eastern Polynesia to the Mascarene Islands.

In Mr. Kurz's description of this species occurs the statement that the leaflets may be at times in 3 pairs, and the same variation is indicated in Rumphius' figure quoted above. But the writer finds, as Mr. Baker does, that this species has not more than 4 leaflets. Mr. Kurz's statement is due to his having treated Andamans specimens of *Afzelia palombanica* as representing a form of *A. bijuga*.

The synonym *Intsia amboinensis* only applies to this species in the sense in which it is used by Miquel in his *Suppl.*: there is an authentic example of the Sumatra plant so named by Miquel in the Calcutta Herbarium; it is a specimen of *Afzelia bijuga*. The earlier use of the name must be neglected, since it has been made to cover Rumphius' description. For, while it is clear that that des-
cription includes this sea-coast species, it also includes one, if not more than one, inland species of far greater dimensions than this littoral tree ever attains.

Roxburgh’s Jonesia triandra is not a Saraca but is this species.

3. **Afzelia palembanica** Bak. in Flor. Brit. Ind. II, 275. A tall erect tree 100-150 feet high, stem 2-3 feet in diam. Leaves even-pinnate 6-8 in. long; leaflets usually 4- (very rarely only 3-, more often 5-) paired, sometimes only subopposite, subcoriaceous, glabrous on both surfaces, oblong, base slightly oblique, rounded or subcordate, apex obtuse or bluntish-acuminate emarginate, 2-4 in. long, 1.5-2 in. wide, nerves numerous fine spreading reticulate, petiolules distinct 1.5 in. long, glabrous as is the rachis. Flowers in leaf-opposed or terminal corymbose pubescent panicles of few-flowered racemes, 3-5 in. long, 2.5 in. across, the individual racemes 1 in. long; pedicels slender, pubescent, 15-2 in. long, jointed 2-bracteolate under the calyx, bracteoles ovate, pubescent, 2 in. long, bracts small ovate, 15 in. long, caducous. Calyx downy, tube cylinic 2 in. long, shorter than limb with 4 subequal oblong spreading lobes 25 in. long, 2 in. wide. Petal 35 in. long, limb oblong 25 in. long, 2 in. wide, margin uniform, claw 1 in. long, glabrous. Stamens 3 fertile, filaments 75 in., sparsely pubescent, dark-claret coloured, two sterile filaments at base of petal. Ovary stalked, pubescent, exserted; style glabrous, slender, 75 in. long. Pod 10-12 in. long, 3.5 in. wide, oblong, almost woody. Seeds wide-oblong, 1.25 in. long, 1 in. wide, 3 in. thick. A. *bijuga* Kurz, For. Flor. Brit. Burm. I, 412 not of Gray.

**Andamans; South Point, Kurz! Perak; Wray! Kunstler 4433! 7387! Scortechini 1839! Malacca; Griffith! Maingay 565! Cantley 1670! Holmberg 776! Distrib. Siam (Teysmann!).**

This is, according to Maingay, “the best Malacca timber tree;” according to Scortechini it affords “the best timber in the Peninsula.” The Malay name, according to Scortechini, is *Mirbau* in Perak; Holmberg gives this as the Malacca name also. In Penang however, according to Curtis, the name *Mirbau* is used for *Sindora coriacea*.

While this species is *Afzelia palembanica* Bak., it certainly is not *Intisia palembanica* Miq., of which one of the original types is in Herb. Calcutta. That tree, as Miquel says, has ovate-lanceolate leaflets (3 in. long by 1.25 in. wide, tapering to an acute point), it has also large ovate persistent bracts, 3 in. across. It does not seem necessary to alter the name in this place, but in a monograph of *Afzelia* it will be necessary to term the Peninsular species *Afzelia Bakeri*.

Mr. Baker has pointed out incidentally an omission in Mr. Kurz’s *Forest Flora of Brit. Burma*: Kurz himself collected this species in the Andamans; strangely no one has met with it there again. He has, however, united it with *A. bijuga* and it is this union that explains Mr. Kurz’s double error of attributing to *A. bijuga* pods a foot long and leaves with more than 4 leaflets.

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52. Saraca Linn.

Erect trees. Leaves abruptly pinnate, leaflets glabrous rigid subcoriaceous or coriaceous, in bud minutely stipellate, stipels very rarely persistent, stipules large intrapetiolar scarious completely united, rarely foliaceous partially free. Flowers in dense sessile paniculate rarely simple corymbs on old nodes, or rarely axillary, with subpetaloid coloured persistent or rarely deciduous bracts and bracteoles. Calyx petaloid, limb 4-cleft lobes imbricate subequal, tube cylindric crowned by a lobed disc. Corolla 0. Stamens 2-8, exserted, with long filiform filaments and oblong versatile anthers opening longitudinally. Ovary many-ovuled, with a stalk attached to and produced beyond the disc, in most of the flowers rudimentary; style long filiform, stigma minute suboblique capitate. Pod flat dehiscent, rigidly coriaceous. Seeds exalbuminous. Species 16 or more; all South-Eastern Asiatic.

Leaves quite glabrous; stipules small at length scarious quite united along their inner margins; stipels vanishing; flowers yellow, at length becoming reddish, in paniculate corymbs:—

Bracts and bracteoles very deciduous, large where known; (pedicels glabrous):—
Leaflets 7-jugate, petiolules 4 in. long; calyx-lobes shorter than tube, bracts and bracteoles very large:—
Corymbs subsessile, dense, subsimple; pods over 3 in. broad; (calyx-lobes more than half as long as tube; stamens 4) ... ... ... ... 1. S. thaipingensis.
Corymbs in lax long-peduncled panicles; pods 2 in. broad:—
Calyx-lobes one-third as long as tube; stamens 4; pod beakless ... ... ... ... 2. S. declinata.
Calyx-lobes half as long as tube; stamens 7-8; pod beaked ... ... ... ... 3. S. cauliflora.
Leaflets 2-3-jugate, petiolules 25 in. long; calyx-lobes as long as tube; (corymbs in lax long-peduncled panicles; pods 1-5 in. broad; bracts and bracteoles unknown; stamens apparently 7) ... ... 4. S. Kunstleri.
Bracts and bracteoles persistent, small; (petiolules not exceeding 2 in.):—
Stamens 7-8; (pedicels glabrous):—
Leaflets 4-6-jugate, coriaceous; bracteoles amplexicaul, ascending ... ... ... ... 5. S. indica.
Leaflets 1-2-jugate, subcoriaceous; bracteoles not amplexicaul, spreading ... ... ... ... 6. S. bijuga.
Stamens 3-4:—
Pedicels glabrous; ovary glabrous (leaflets 4-7-jugate) ... ... ... ... 7. S. macroptera.
Pedicels puberulous; ovary pubescent:—
Leaflets 4-7-jugate, corymbs short ... ... ... ... 8. S. palembanica.
Leaves 2-4-jugate, corymbs long

Leaves with rachis, petiolules and nerves beneath pubescent; stipules large foliaceous, united only in lower third; stipels persistent, flowers white in simple corymbs; (stamens 2)

1. **Saraca thaipingensis** Cantley MSS. in Herb. Kew. A tree 50-80 feet high, with rather slender stem 6-15 in. in diam. Leaves with rachis 16-30 in. long; leaflets membranous, strongly veined, 6-8-paired, oblong-lanceolate, apex acuminate, base slightly obliquely wide-cuneate, 12-16 in. long, 4-5 in. wide, secondary nerves about 12 pairs, dark-green, dull and glabrous on both surfaces; petiolules stout 1/4 in. long, stipels caducous; stipules coriaceous at length scarious, usually soon deciduous, the two united throughout into a convolute sheath for the subsequent bud, when laid open narrowly oblong, 1 in. long, 1/4 in. across, parallel-nerved and emarginate at the apex. Flowers in dense simple corymbs from old nodes on thick branches and stems, 3 in. long and 3-4 in. across; peduncles and pedicels glabrous, stout; bracts large oblong-lanceolate-obtuse, lowest 1/5 in. long, 3 in. wide, tapering from near the apex to the narrow-cuneate base, decreasing upwards; bracteoles 2 oblong-lanceolate, deciduous, 5 in. long, pedicels below bracteoles 3 in. long. Calyx yellow at length becoming red, tube 8 in. long, less than twice as long as limb of 4 oblong sepals, 5 in. long. Petals 0. Stamens 4 with a rudimentary filament, the filaments slender throughout; anthers nearly twice as long as broad; filaments twice as long as sepals. Ovary stalked, puberulous along sutures, elsewhere glabrous, usually rudimentary; style deciduate. Pod purple when young, shining dark-red when ripe, 15-18 in. long, 3-25 in. wide, linear-oblong, considerably curved, much compressed, stipe under 25 in. long, apex beakless, straight on lower, rounded on upper suture at the blunt apex, more rounded on upper than on lower suture at the oblique base.

**Perak;** Thaiping, Cantley 36! Tupai, Wray 2448! Larut, Scortechnini! Kunstler 2249! 2763! Goping, Kunstler 4248! 6088! Malacca; Ulu Chembong, Derry 999! Bukit Tampin, Goodenough 1875 A!

Mr. Derry gives the local name of this as "Talan;" Mr. Goodenough notes it as "Gapis;" consult also the note under *S. cauliflora*.

2. **Saraca declinata** Miq. Flor. Ind. Bat. I, 84. A tree 20-60 feet high with rather slender stem 6-15 in. in diam. Leaves with rachis 12-24 in. long; leaflets thinly subcoriaceous, strongly veined, 6-8-paired, oblong-lanceolate, apex acuminate, base slightly obliquely wide-cuneate, 9-12 in. long, 3-4 in. wide, secondary nerves about 12 pairs, dark-green shining above, dull beneath, glabrous on both surfaces; petiolules thick 1/4 in. long, stipels caducous; stipules coriaceous at length scarious, usually soon deciduous, the two united throughout into a convolute sheath for the subsequent bud, when laid open 75 in. long, 3 in. wide.
parallel-nerved. *Flowers* in panicles of corymbs from leaf axils and from old nodes on branches and stems, 1 foot long, sometimes nearly as broad, individual corymbs 4–6 in. long, peduncles and pedicels glabrous, stout, bracts very large ovate-acuminate, 2 in. long, .7 in. wide, tapering from the middle to both ends, decreasing upwards: bracteoles 2, elliptic, deciduous, .5 in. long, pedicels below bracteoles .5 in. long. *Calyx* bright yellow, tube 1 in. long, cylindric, slender, slightly curved, thrice as long as limb of 4 obovate obtuse-sepals. *Petals* 0. *Stamens* 4 with a rudimentary filament, the filaments slender throughout and inserted in the retiring angles of a 5-lobed disc; anthers nearly twice as long as broad; filaments thrice as long as sepals. *Ovary* stalked, puberulous along sutures elsewhere glabrous, most often rudimentary; style decinate. *Pod* black, 12 in. long, 2.75 in. wide, linear-oblong, quite straight, compressed, stipe under .25 in. long, base equally cuneate and apex equally acute to the beakless tip. *Jonesia declinata* Jack, Malay. Miscell. II, 7, 74; Walp. Rep. I, 844.


This species is said by Mr. Goodenough to be “Gapis Kognet” or “Talan Kognet,” the same names as he cites for *S. cauliflora*; see note under that species.

3. *Saraca cauliflora* Bak. in Flor. Brit. Ind. II, 272. A tree 20–60 feet high, with rather slender stem 6–15 in. in diam. *Leaves* with rachis 12–16 in. long; leaflets rigidly subcoriaceous, strongly veined, 5–6-paired, oblong-lanceolate, apex acuminate, base slightly obliquely wide-cuneate, 9–12 in. long, 3–4 in. wide, secondary nerves about 12 pairs, dark-green shining above, dull beneath, glabrous on both surfaces; petiolules stout .4 in. long, stipels caducous; stipules coriaceous at length scarious usually soon deciduous, the two united throughout into a convolute sheath for the subsequent bud, when laid open .75 in. long, .3 in. wide, parallel-nerved. *Flowers* in panicles of corymbs from old nodes on branches and stems, 6 in. long and as much across, individual corymbs 3 in. long, peduncles and pedicels glabrous stout; bracts very large, obovate-acute, deciduous, lowest 2 in. long, .6 in. wide, tapering from above the middle to a cuneate base, decreasing upwards; bracteoles 2, lanceolate, deciduous, .5 in. long, pedicels below bracteoles .5 in. long. *Calyx* yellow, tube 1 in. long, twice as long as limb of 4 oblong sepals. *Petals* 0. *Stamens* 7–8 with a rudimentary filament and two acute angular projections on the disc; the filaments alternately slender throughout and widened towards the base; anthers nearly twice as long as broad; filaments twice as long as sepals. *Ovary* stalked, puberulous
along sutures elsewhere glabrous, usually rudimentary; style declinate. 
*Pod* black, 12–15 in. long, 2-2.5 in. wide, linear-oblong, somewhat curved, 
compressed, stipe ‘3 in. long, base cuneate towards upper suture, apex 
acute tapering towards lower suture which is prolonged into a stout 
beak 1 in. long.

Malacca; Griffith, Maingay, Derry! Goodenough! Perak; Scorte-
chini!

The local name of this species is said by Mr. Goodenough to be “Gapis Kog-
net” or “Talan Kognet”; Mr. Derry notes it as “Bunga Talan?”

How far the characters are valid that separate this species and *S. thaipingensis* 
from *S. declinata* is, in the writer’s opinion, a very doubtful matter. The chief 
diagnostic character, in the case of *S. cauliflora*, is the presence of 7 stamens and the 
writer has accordingly placed in Mr. Baker’s species only those specimens where 7 or 8 
stenms occur. These however consist of but two gatherings, one from Malacca and 
one from Perak; for, as it happens, neither Maingay’s nor Griffith’s specimens that 
form the original types of the species are represented at Calcutta. The pods des-
cribed were collected by Goodenough in Malacca and are placed here because they 
certainly differ from the pods that are known to belong to the tree described as 
*S. declinata* and from those that belong to *S. thaipingensis*. But young pods of *S. 
declinata* from Java are rather more like those here supposed to belong to *S. cauliflora* 
than like those of the Peninsular *S. declinata* and a careful field study of the forms 
by Malayan botanists is urgently called for. The species which Mr. Cantley has 
named *S. thaipingensis* has usually been distributed as *S. cauliflora* and it is, as a 
matter of fact, of the three here described, the one that best accords with Mr. 
Baker’s account of the leaves and of the corymbs of his *S. cauliflora*. But *S. thaipin-
genesis* appears never to have more than 4 stamens and therefore can hardly be 
Baker’s plant. If it can only be shown that the characters to be derived from the 
stamens and the pods are at all variable it may be possible to reduce both 
Mr. Baker’s and Mr. Cantley’s plants to *S. declinata*.

in diam., branchlets zigzag glabrous. *Leaves* even-pinnate, rachis 5–10 
in. long, glabrous; leaflets petiolulate large, 2–3-jugate, diminishing 
downwards, ovate-acuminate, base cuneate, distal 8–10 in. long, 3–5–4 in. 
wide, basal if 2 pairs and central if 3 pairs 4–5 in. long, 2–2.5 in. 
wide, basal if 3 pairs 3.5–4 in. long, 2–2.25 in. wide; all chartaceous, 
dark-green above, rather paler beneath, glabrous on both surfaces, 
main-nerves ascending, 6–9 pairs, more prominent beneath as is the 
midrib and the fine secondary reticulation; petiolules 25 in. long. 
*Flowers* in terminal long-peduncled paniculate corymbs, the peduncles 
8–12 in. long, glabrous as are the branches 1–2 in. long, and the pedi-
cels. *Calyx*-tube and pedicels, especially the latter, very short, together 
only 4–5 in. long; bracts not seen; calyx-lobes ovate-oblong 2 in. 
long, glabrous. *Corolla* 0. *Filaments* 7, anthers not seen. *Pod* falcate 
4–6 in. long, 1.5 in. wide, glabrous. *Seeds* 5–6, transversely ovate, 5 in. 
long, 7 in. across, 25 in. thick, testa black, smooth, shining, crustaceous.
G. King—Materials for a Flora of the Malayan Peninsula. [No. 1, Perak; Gunong Batu Patch, 1500–2000 feet, Kunstler 8048!

A very distinct species, apparently nearest S. Lobbiaha Bak.; unfortunately good flowers are not yet available for description.

5. Saraca indica Linn. Mant. I, 98. A low wide-spreading tree 20–30 feet high, stem 2 feet thick, branches glabrous. Leaves with rachis 7–8 in. long, rachis glabrous, leaflets subcoriaceous 5, less often 6 rarely 4 pairs, oblong-lanceolate apex obtuse or acute, base rounded or cuneate slightly oblique, 6–9 in. long, 2–3 in. wide, margins faintly undulate, dark-green shining above, dull and paler beneath, both sides quite glabrous; petiolules short 2 in. long very stout, stipels deciduous; stipules small at first coriaceous, green, at length scarious, brown, the two united completely from base to apex into a convolute sheath for the subsequent bud, when laid open ovate-oblong 4 in. long, 25 in. wide, parallel-nerved and minutely laciniate at the wide tip. Flowers in dense corymb 3–4 in. in diam., axillary; peduncles and pedicels reddish, glabrous, rather stout, basal bracts ovate-subacute with ciliolate margins, bracteoles 2 subopposed persistent ascending oblong-spathulate subacute. amplexicaul, 15 in. long, pedicels below bracteoles 3–5 in. long. Calyx bright-orange becoming at length red, tube 5–6 in. long, cylindric, about twice as long as limb of 4 obovate-oblong sepals. Petals 0. Stamen 7 or 8 with 2 rudimentary filaments, all filaments slightly widened and slightly conuate at base, reddish, anthers nearly twice as long as broad, purple; filaments thrice as long as sepals. Ovary stalked, puberulous along the sutures elsewhere glabrous, 8–12-ovuled, in most flowers rudimentary and then quite glabrous; style filiform declinate nearly as long as filaments. Pod black, 4–10 in. long, 1½ in. wide, linear-oblong, compressed, valves strongly wide-reticulate; stipe 25 in. long. Seeds 4–8, oblong, compressed, 1½ in. long. Miq. Flor. Ind. Bat. I, 83; Bedd. Fl. Sylv. t. 57; Bak. in Flor. Brit. Ind. II, 271. S. arborescens Burm. Fl. Ind. 85, t. 25, f. 2. Jonesia Asoca Roxb. As. Res. IV, 355; Fl. Ind. II, 218; DC. Prodr. II, 487; Wall. Cat. 5822; W. & A. Prodr. 284; Wight Ic. t. 206; Bot. Mag. t. 3018. J. pinnata Willd. Sp. Pl. II, 287.

Malacca; fide Baker in Flora of Brit. India. Probably planted; the species has never been sent to Calcutta by any Malayan botanist.

6. Saraca bijuga Prain. A tree with spreading branches 20–30 feet high, stem 6 in. to 2 feet thick; branches glabrous. Leaves with rachis 1 in. long, leaflets thinly subcoriaceous 2–, or not infrequently 1-jugate, oblong-lanceolate, apex gradually narrowed in the upper third to a sharp point, bases of terminal pair very oblique, rounded on lower cuneate on upper margin, of lower pair rounded or subcordate on both sides, 4–10 in. long, 1–2½ in. wide, margins faintly undulate, dark-green
and shining above, dull and paler beneath, both sides quite glabrous; petiolules very short under 1 in., stout, stipels deciduous; stipules small coriaceous at length scarious, completely united from base to apex, narrowly ovate-oblong 6 in. long, 2 in. wide, tip subacute. Flowers in dense corymbs 4-5 in. in diam., axillary, peduncles and pedicels reddish, glabrous, slender, basal bracts ovate-subacute with ciliolate margins, bracteoles 2 subopposed persistent spreading, ovate-obtuse notamplexicaul, 1'5 in. long, pedicels below bracteoles 1'5-2 in. long. Calyx orange becoming at length light-red, tube 25 in. long, cylindric, hardly longer than the limb of 4 ovate-obtuse sepals. Petals 0. Stamens 7 or 8, all filaments slightly widened and faintly connate at base, dark claret-coloured; anthers not much longer than broad; filaments thrice as long as sepals. Ovary stalked, very sparsely puberulous along sutures, in most flowers rudimentary and then quite glabrous. Pod reddish-yellow, smooth, polished, faintly reticulate, 6-8 in. long, 2'35 in. across; stipe 2 in. long. Seeds 4-6.

Perak; Larut; in open jungle generally near running streams, Kunstler 2749! 2382! 4059! Kinta, near limestone hills, Kunstler 7221! Larut, Scortechini 1503! Batu Togoh, Wray 2152!

This is the nearest of the native Malayan species to the common Indian Saraca indica; it is however very distinct on account of its 2-jugate leaves, its smaller flowers with spreading bracteoles and its very different pods. Elsewhere the writer has indicated the possibility of this proving ultimately to be only a variety of the not very fully described Javanese S. minor Miq. But from Miquel's account of that plant this must be at least an exceedingly distinct variety.

7. Saraca macroptera Miq. Flor. Ind. Bat. I, 1080. A tree 30-40 feet high, stem 4-6 in. in diam. Leaves with rachis 4-15 in. long; leaflets rigidly subcoriaceous 4-7-paired, oblong-lanceolate, apex gradually narrowed to an acuminate tip, base slightly unequally rounded, 5-12 in. long, 1'5-3'5 in. wide, secondary nerves about 12 pairs, curving forward, prominent beneath, bright-green shining above, paler dull beneath; petiolules 1'5 in. long, glabrous as is the rachis, stipels caducous; stipules completely united in a scarious bud-sheath 5 in. long. Flowers in densely fascicled corymbs in leaf axils and on old nodes, 1 in. long, 1'5 in. across; peduncles and pedicels quite glabrous very slender, the latter 25-3 in. long below the two ovate-oblong spreading persistent bracteoles 1'5 in. long; bracts ovate-acute 1 in. long. Calyx bright-yellow, tube slender cylindric 25 in. long, exceeding the limb of 4 oblong sepals 2 in. long. Petals 0. Stamens 3-4, twice as long as sepals, filaments slender and inserted on the crenately lobed disc; anthers short oblong. Ovary stalked glabrous. Pod not seen.

Perak; Larut, in low wet ground, Kunstler 5511! Distr. Sumatra, Borneo.
This is extremely closely related to *S. palembanica* but is readily distinguished by its glabrous peduncles and pedicels, and its glabrous ovary. The solitary Perak gathering differs from the original Sumatrana specimens (n. 863 Hort. Bogor) in having much smaller flowers, but is not otherwise distinguishable. It may, on the whole, be better, however, to treat the Peninsula plant as a distinct variety, var. *parriflora*; unless it should be found that the two differ markedly in fruit they can hardly be looked upon as distinct species: as yet, the fruit is unknown in either plant.

8. **Saraca palembanica** Miq. ex Bak. in Flor. Brit. Ind. II, 272. A tree with spreading branches, 30–40 feet high, stem 8–10 in. in diam. *Leaves* with rachis 8 in. long; leaflets rigidly subcoriaceous 4–7 paired, oblong, apex obtuse shortly abruptly acuminate, base slightly unequally rounded, 5–14 in. long, 2½–4½ in. wide, secondary nerves about 12 pairs, curving forward, prominent beneath, dark-green above, paler beneath, rather dull; petiolules ½ in. long, glabrous as is the rachis, stipels caducous; stipules completely united in a scarious bud-sheath ½ in. long. *Flowers* in densely fascicled corymbs on old nodes, 2 in. long nearly as much across; peduncles and pedicels pubescent, slender, the latter ½ in. long below the two ovate-oblong spreading persistent bracteoles 2 in. long; bracts ovate-subacute 2 in. long. *Calyx* orange-yellow, tube slender cylindric 3½ in. long, exceeding the limb of 4 oblong sepals 2½ in. long. *Petals* 0. *Stamens* 4, at times only 3, two and a half times as long as sepals, filaments slender and inserted in the retiring angles of a crenately lobed fleshy ring, deep-purple as are the shortly oblong anthers. *Ovary* stalked, densely hairy, in most flowers rudimentary and then subglabrous. *Pod* not seen. *Jonesia* (Saraca) *palembanica* Miq. Flor. Ind. Bat. Suppl. 291.


This is very near *S. macroptera* Miq. but differs in having rather smaller flowers, with pubescent peduncles and pedicels, and more densely clustered corymbs. Miquel describes the ovary as glabrous, but it is densely pubescent except in the case of the abortive ovaries which occur, however, in the vast majority of the flowers. Though its leaves very much resemble those of *S. macroptera*, it is less closely allied to that species than it is to *S. triandra*, a species which is much more common in the Malay Peninsula than either of the others.

9. **Saraca triandra** Bak. in Flor. Brit. Ind. II, 272. A slender tree 15–30 feet high, stem 4–8 in. in diam. *Leaves* with rachis 1½–3 in. long; leaflets thinly subcoriaceous, 2–3, very rarely 4-paired, oblanceolate-oblong, obtuse with or without an abrupt acumen, or subacute, tapering from beyond the middle to a cuneate base, lower pair very rarely rounded at base, and narrowed towards apex; 5–12 in. long, 2–6 in. wide, secondary nerves about 12 pairs, the lowest pair distinctly
marginal to half-way up, the others curving forward prominent beneath; dark-green shining above, dull beneath, glabrous on both surfaces; petiolules '15 in. long, glabrous as is the rachis, stipels caducous; stipules completely united in a scariosus bud-sheath '5 in. long. Flowers in lax fascicled corymbs in leaf-axils and on old nodes, 5–8 in. long and broad; peduncles and pedicels slender pubescent, the latter '75 in. long below the two ovate-oblong spreading persistent bracteoles '25 in long; bracts ovate subacute '2 in long. Calyx yellow becoming pink or red, tube slender cylindric, '25 in. long, about as long as limb of 4 oblong sepals. Petals 0. Stamens 3–4, two and a half to three times as long as sepals, filaments slender, inserted on a crenated fleshy ring, purplish as are the anthers. Ovary long-stalked, densely pubescent, mostly rudimentary. Pod oblong, very obliquely rounded at base on lower suture, obliquely obtuse at apex with lower suture projecting as a beak '25 in. long; 4–6 in. long, 1-5-1-75 in. wide, much compressed, valves brown when ripe, uniformly finely puberulous. Seeds 3–4.

Malacca; Griffith! Miller! Hervey! Goodenough 1463! 1478! Mainay 563! Perak; in dry rocky places, Kunstler 2138! 2757! 34'4! 3797! 38-86! 3912! 3937! 4507! 4517! 5563! 7912! 8516! 8561! Ridley 3026! 3099! Wray 41! Scortechni 1143! 1675! Penang; Government Hill, Curtis 165! Dindings; at Rajah Hitam, Bryant! Distrib.; Sumatra, (Moera Enim; Teysmann 3638!)

Mr. Goodenough gives the native name of this as "Talan." The species is remarkably closely related to S. palembanica and differs only by its larger laxer corymbs and its fewer leaflets, and further investigation on the part of field-botanists in Malaya may demonstrate that Mr. Baker’s species is only a form assumed in dry localities by the tree that was previously described by Miquel as Jonesia palembanica. Both the synonyms of the Flora of British India should be deleted, for Jonesia triandra Roxb. is Azelia bijuga, while J. scandens Roxb. is, by Roxburgh’s definition, clearly not this species and probably not a Saraca at all.

10. Saraca latistipulata Prain. A small tree with slender leafy pubescent branches. Leaves 8 in. long, rachis puberulous, leaflets rigidly coriaceous, 6 pairs, ovate-lanceolate, apex acuminate, base slightly obliquely rounded, 4-5–6 in. long, 1-5 in. across, dark-green, dull glabrous above, pubescent on the midrib beneath and puberulous along the margins, petiolules short, '15 in. long, pubescent, stipels small subulate persistent pubescent; stipules large foliaceous each with a strong midrib, ovate-acute, auriculate at base on their outer free margin, connate between petiole and branch for one-third their length on the inner margin, from '5–1-5 in. long, '25–1 in. wide, usually slightly unequal. Flowers in very few-flowered cymes, sometimes reduced to single pedicels. clustered on rugose woody nodes along thick old branches, under '75 in. long; with ovate-lanceolate persistent basal bracts and two sub-

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opposite amplexicaul triangular persistent erect bracteoles midway between bract and calyx-tube, pedicels and bracteoles puberulous. Calyx white, tube cylindric 15 in. long, shorter than limb of 4 narrow-oblong sepals, pubescent along margin at tip. Petals 0. Stamens 2 with a rudimentary filament between them, opposite to and involved by the inmost calyx segment; filaments widened at base and subconnate, pink; anthers nearly twice as long as broad, filaments twice as long as sepals. Ovary pubescent. Pod oblong, obliquely obtuse at apex with a rather pronounced beak, obliquely rounded at base, 2 in. long, 1 in. across.

Perak; Dindings, Lumut, Ridley 3089! 8006!

A very remarkable species, easily distinguished from all those hitherto known by its large foliaceous stipules, and its stipellate leaves with pubescent rachis. It has been obtained twice, both times in the same locality, and on both occasions by Mr. Ridley.

53. Crudia Schreb.

Shrubs or trees. Leaves odd-pinnate or spursiously even-pinnate by the approximation of the penultimate to the terminal leaflet, the leaf-rachis sometimes prolonged beyond the ultimate leaflet, the remaining leaflets usually conspicuously alternate rarely occasionally subopposed; stipules interpetiolar, stipels 0. Flowers in racemes either terminating, or simple or in clusters at the bases of, the glabrous or pubescent new leafy shoots. Calyx-tube very short, with a short disc, segments 4 oblong, imbricated, persistent, reflexed in flower. Petals 0. Stamens 10 (or 8–9) exserted, filaments free filiform, anthers oblong, versatile, dehiscing longitudinally. Ovary pubescent, few-ovuled; with distinct short glabrous stalk and filiform incurved glabrous style; stigma terminal capitate, small. Pod with 2 rigidly coriaceous subcompressed valves. Seeds few, often only 1, exalbuminous. Species, one each Indian and African; nine or ten American; about twelve Malayan.

The oldest names for this genus, according to the Index Kewensis, are Aplatoa Aubl. and Touchiroa Aubl. As the first name was based on the flowers of one species of this genus with the fruit of a Pterocarpus, it cannot possibly be used. There seems nothing against the employment of the second name which was given to a species of the group with few leaflets to the leaf-rachis — the group to which C. bantamensis, C. gracilis and C. Wrayi, among Malayan species, belong.

Leaflets more than 3 (§ Crudia):—

Leaflets coriaceous, very long caudate-acuminate, rachis prolonged beyond the last of the oblianceolate, all conspicuously alternate leaflets; (innovations and petioles densely rusty-tomentose) ... ... ... ... 1. C. caudata.
Leaflets papery, acute or shortly acuminate, rachis not prolonged beyond the two terminal, often spuriously opposite leaflets:—

Innovations and petioles pubescent, leaflets uniformly puberulous or pubescent beneath; racemes rather lax; petiolules and pedicels rather long:—

Leaflets 11–13, lanceolate, pubescence tawny, pod densely rusty-puberulent ... ... ... 2. O. Scortechinii.

Leaflets 7–9, obvate to oblong, pubescence grey, pod tawny-puberulous ... ... ... ... 3. C. Curtisia.

Leaflets puberulous beneath; apex shortly acuminate ... ... var. typica; Leaflets densely pubescent beneath; apex acute ... ... var. ? Wallichii.]

Innovations and petioles glabrous; racemes rather dense; petiolules and pedicels rather short:—

Leaflets 7–8, glaucous, glabrous on the nerves, elsewhere uniformly puberulous beneath ... ... 4. O. glauca.

Leaflets 5 (rarely 3), pale-green, quite glabrous beneath ... ... ... ... 5. C. speciosa.

Leaflets 3 or by abortion fewer (§ Touchiroid) :—

Leaflets small oblanceolate, racemes dense with puberulous rachis and pedicelled flowers ... ... ... ... 6. C. Wrayi.

Leaflets large ovate-oblong, racemes sparse with glabrous rachis and sessile flowers ... ... ... ... 7. C. gracilis.

1. Crudia caudata Prain. A small tree with slender at length glabrescent branches, and densely rusty-tomentose new shoots. Leaves odd-pinnate, rachis 1·5–2 in. long, petiole articulate, the interpetiolar stipules united by their inner margins at the base only, elsewhere free, lanceolate, densely rusty-pubescent on their petiolar, glabrous on their axillary aspect; leaflets 5–7, petiolules 1 in long, densely rusty-tomentose as is the rachis, which is prolonged beyond the last leaflet into a subulate process; alternate, oblong-oblanceolate, base rounded in lower, deltoid in upper leaflets, apex prolonged into a 7·5 in long, narrow-caudate tip, 2·5–4 in. long, 1 in. across, rigidly coriaceous, dark-green glabrous and shining above, dull and densely rusty-pubescent on the nerves beneath, lateral nerves 6–7 pairs slightly ascending, looped within the margin, secondary venation prominent beneath, all nerves obscure above. Flowers in narrow racemes at the bases of new leafy shoots, with round densely rusty-tomentose rachis, pedicels rather stout, under 2·5 in long, densely rusty with a subulate bracteole close under calyx; buds oblong 2·5 in. long. Calyx-tube very short, lobes 4, imbricate, reflexed in flower, densely rusty outside, quite glabrous within. Stamens not seen. Ovary stipitate, densely rusty-velvety, 1-ovuled, stalk glabrous as long as calyx-tube. Pod (young) linear-oblong, obliquely rounded at base,
apex obtuse apiculate, compressed, 2 in. long, \( \cdot75 \) in. across, valves densely, shortly, subscabridly rusty-pubescent. Seed 1. **Touchiroa caudata** **Prain** MSS.  

**Johore**; **Tanjong Kupang, Ridley 6399**! **Distrib. Borneo.**

A remarkably distinct species, though recalling in some respects the description given by Hasskarl of *C. orientalis* *(Cat. Hort. Bog. 288)*. Hasskarl’s species has, however, more numerous leaflets which are only rusty-pubescent on their margins; it has also larger, 2-seeded pods.

2. **Crudia Scortechinii** **Prain**. A tree 80–90 feet high, young branches tawny-pubescent. **Leaves** odd-pinnate, rachis 6–8 in. long, petiole articulate on an auricled node with an interpetiolar entire stipule, leaflets 11–13, with petiolules \( \cdot2 \) in. long, sparsely tawny-pubescent as is the rachis, alternate, lanceolate, base slightly unequally rounded, apex acuminate, 2–3 in. long, 1 in. wide, papery, green and glabrous above, paler and pubescent with short sparse tawny hairs beneath, lateral nerves spreading, 12–16 pairs, not much stronger than the fine secondary venation. **Flowers** in narrow racemes at the ends and bases of new leafy shoots, 3–6 in. long, with angular tawny-pubescent rachis; pedicels slender at length \( \cdot4 \) in. long, tawny-puberulous, many of the lower caducous, minutely bracteolate about the middle; buds oblong \( \cdot2 \) in. long. **Calyx**-tube very short lined by a disc, lobes 4, imbricate in bud reflexed in flower, sparsely pubescent on both surfaces. **Petals** 0. **Stamens** 9, filaments glabrous, free, alternately short and long, anthers broadly ovate, versatile. **Ovary** stipitate, densely tawny-villous, 1- or 2-ovuled; stalk glabrous as long as calyx-tube, style glabrous incurved. **Pod** oblong, obliquely rounded at both ends, densely rusty-tomentose, rugulose, 2–5 in. long, 1–5 in. across, flat. Seed 1, funiculus elongated. **Touchiroa Scortechinii** **Prain** MSS.  

**Perak**; **Goping, Scortechini 2129**!  

A very distinct species.

3. **Crudia Curtisii** **Prain**. A tall tree 80–150 feet high with spreading crown and densely grey-pubescent branchlets; stem 2–3 feet in diam. **Leaves** odd-pinnate, rachis 3–4 in. long, petiole articulate on an auricled node with an interpetiolar 2-lobed stipule, leaflets 7–9, with petiolules \( \cdot25 \) in. long, closely puberulous as is the rachis, alternate, obovate to oblong, base slightly obliquely rounded or cuneate, apex rounded or tapering to an at length bluntly candate tip, 2–3\( \cdot5 \) in. long, 1–1\( \cdot5 \) in. wide, membranous, green and glabrous above, paler and uniformly sparsely puberulous beneath, lateral nerves ascending prominently looped within margin, secondary venation indistinct. **Flowers** in rather lax narrow racemes at the ends and bases of new leafy shoots, 4–6 in. long, with angular densely grey-pubescent rachis; pedicels very
slender, at length '6 in long, grey-puberulous, with a caducous subulate bracteole about the middle; buds oblong '15 in long. Calyx-tube very short, lobes 4, imbricate, reflexed in flower, sparsely pubescent externally, glabrous within. Petals 0. Stamens 10, filaments glabrous, free, alternately long and short, anthers broadly oblong, versatile. Ovary stipitate densely grey-downy, 1- or 2-ovuled, stalk glabrous longer than calyx-tube, style glabrous incurved. Pod oblong, obliquely rounded at base, subequally rounded and apiculate at tip, rusty-puberulous, rather distinctly reticulate, 3 in. long, 2 in. wide, '5 in. thick, valves very firmly coriaceous. Seed 1, oblong, 1-25 in. long, 1-2 in. wide, '35 in. thick, Touchirola Curtisi Prain MSS.

Penang; Govt. Hill, 1200 feet elev., Curtis 3007! Malacca; Bukit Sadanan, Derry 1164! Perak; Larut, Kunstler 7467! Thaiping, Kunstler 8514! Kinta, Kunstler 4753!

Var. ? Wallichii Prain; leaf-rachis and leaflets beneath densely softly velvety; leaflets acute, not cuspidate or caudate at the tip. Leguminosa Wall. Cat. 5983. Ignota Wall. Cat. 8089. Touchirola Wallichii Prain MSS.

Penang; Porter (Wall. Cat 5983)! Wallich (Cat. 8089)!

This fine tree is, according to Mr. Derry, known in Malacca as 'Kumpas vuman.' Though very nearly related to C. glauca it seems to be quite distinct and is easily separated by its longer petiolules; pubescent leaf-rachis, rachis of inflorescence and young leafy shoots; also by its rather smaller leaflets and pods. It is likewise very closely related to C. speciosa but it has longer pedicels and a less dense inflorescence than that species, which moreover has the leaflets quite glabrous.

The plant here tentatively referred to the species as var. ? Wallichii occurs twice in the Wallichian Herbarium, on both occasions without flowers or fruits. It has never been obtained again and it is just possible that when it is re-discovered it will prove a distinct species, C. Wallichii.

4. Crudia glauca Prain. A tree 50-70 feet high, with spreading glabrous branches; stem 1-5—2-5 feet in diam. Leaves odd- (or sometimes even-) pinnate, rachis 2-2-5 in. long, petiole articulate on an anruiced node with an interpetiolar 2-lobed stipule, leaflets 7-8, with petiolules '15 in. long, quite glabrous as is the rachis, alternate or occasionally subopposite, oblanceolate-oblong, base slightly obliquely rounded, apex rounded and at length abruptly obtusely cuspidate, 2-5-4 in. long, 1-25-1-75 in. wide, thinly papery, dark-green and quite glabrous above, very glaucous glabrous on the nerves elsewhere finely adpressed-puberulous beneath, lateral nerves ascending, prominently looped one-third their length within the margin, secondary venation indistinct. Flowers in dense narrow racemes at the bases of new leafy shoots, 3-5 in. long, with angular glabrous rachis. Calyx not seen. Pod oblong tapering subequally at base to a stipe '25 in. long, and at apex to a
short acute beak, closely tawny-puberulous, rather distinctly reticulate, 4 in. long, 2 in. wide, '6 in. thick; valves very firmly coriaceous. Seed 1, oblong, 1·5 in. long, 1·2 in. across, '4 in. thick. Touchiroa glauca Prain MSS.

Perak; Goping, Kunstler 8175!

This is very nearly related to C. Curtisii but differs markedly in having leaflets very glaucous beneath, the leaflets being also rather larger and the petiololes shorter; in having the leaf-rachis, petiololes, and nerves beneath glabrous; and in having, as is shown by the scars on the rachis of the infructescence, much more densely flowered racemes; the pods also are larger than in C. Curtisii. Flowers have not yet been sent. Of all the Malayan species, this is the one that most nearly approaches the Ceylon C. zeylanica.

5. Crudia speciosa Prain. A handsome tree with slender pendulous glabrous branches and glabrescent new shoots. Leaves odd-pinnate, rachis 2-3 in. long, petiole articulate on an auriculate node, with an interpetiolar 2-lobed stipule, leaflets 5 (rarely 3), with petiololes '15 in. long, glabrous as is the rachis; alternate, oblong, base unequally rounded or truncate, apex abruptly tapering to a short acutely caudate tip, 2-2·5 in. long, 1-1·5 in. wide, papery, dark-green above, paler beneath, quite glabrous or both surfaces, lateral nerves spreading slender, looped within margin, hardly more prominent than secondary venation. Flowers in rather dense narrow racemes at the ends of new leafy shoots, 6-10 in. long with round glabrescent rachis; pedicels spreading, very slender, quite glabrous, '35 in. long, with a minute bracteole below the middle; buds oblong, '25 in. long. Calyx-tube very short, lobes 4, imbricate, reflexed in flower, very sparsely puberulous externally, glabrous within. Petals 0. Stamens 10, filaments glabrous, free, alternately short and long, anthers broadly oblong, versatile. Ovary stipitate, densely pubescent, 1- or 2-ovuled; stalk as long as calyx-tube, glabrous, style glabrous incurved. Pod not seen. Touchiroa speciosa Prain MSS.

Pungah; "a very handsome tree with dark-green leaves and slender pendulous branches; growing in the Rajah's Garden," Curtis 2955!

Nearest to C. Curtisii and C. glauca but evidently quite distinct from both.

6. Crudia WratY Prain. A small tree with slender glabrous branches. Leaves odd-pinnate, rachis 1 in. long, petiole articulate on an auriculate node, the interpetiolar lanceolate stipules united at their very base only, glabrous as are the leaf-rachis and the petiololes, '15 in. long; leaflets 3, alternate, oblanceolate, base cuneate, apex acute or rounded and shortly abruptly acuminate, 1·5-2·5 in. long, '5-1 in. wide, thinly papery, pale yellowish-green, glabrous on both surfaces, lateral nerves spreading, 7-8 pairs, slender, looped within margin, secondary nervation fine but distinct. Flowers in narrow dense racemes at the ends and
bases of new leafy shoots, 4–8 in. long, with angular puberulous rachis; pedicels slender 2 in. long, puberulous, bracteolate in the middle; buds oblong, '15 in. long. Calyx-tube very short, lobes 4, imbricate in bud, spreading in flower, faintly puberulous outside, glabrous within. Petals 0. Stamens 8–9, alternately long and short, anthers broadly ovate, versatile. Ovary shortly stipitate, densely pubescent, 1- or 2-ovuled; stalk glabrous equaling calyx-tube, style glabrous incurved. Pod unknown. Touchiroa Wrayi Prain MSS.

Perak; Larut, at Sangei on the plains, Wray 2874!

This is a member of the group of species forming the original genus Touchiroa, to which C. bantamensis and C. gracilis, among Malayan species, also belong. But C. Wrayi is easily distinguished from both the species mentioned by its very small leaflets and its much longer pedicels; the flowers, except for having longer stalks, are extremely like those of C. bantamensis.

7. Crudia gracilis Prain. A slender shrub 6–8 feet high, young branches glabrous. Leaves odd-pinnate, rachis '75–1 in. long, petiole articulate on a small node, with interpetiolar glabrous lanceolate stipules united only at their very bases, leaflets 3 (or occasionally 2 from abortion of one lateral leaflet), with stout petiolules '25 in. long, glabrous as is the rachis; alternate, ovate-oblong to oblong-lanceolate, base cuneate or slightly unequally rounded, apex shortly caudate-acuminate, 4·5–6 in. long, 2–3 in. across, firmly papery, pale yellowish-green, glabrous on both surfaces, lateral nerves ascending, about 6 pairs, distinct, secondary venation somewhat distinct beneath. Flowers in very narrow sparse spikes at the ends of new leafy shoots, 10–12 in. long with angular quite glabrous rachis; sessile, minutely bracteolate below the calyx; buds oblong, '15 in. long. Calyx-tube very short, lobes 4, imbricate in bud, spreading in flower, quite glabrous on both surfaces. Petals 0. Stamens 8–9, filaments glabrous, free, alternately short and long, anthers broadly ovate, versatile. Ovary shortly stipitate, densely pubescent, 1- or 2-ovuled; stalk glabrous, shorter than calyx-tube, style glabrous incurved. Pod unknown. Touchiroa gracilis Prain MSS.

Perak; Thaiping, in low wet ground in dense forest, rare, Kunstler 8468!

This is extremely closely related to Touchiroa bantamensis Hassk. which has also 3- (or by abortion 2-) foliolate leaves, but has larger leaflets, puberulous rachis and sepals, and distinct though very short pedicels.

54. Peltophorum Vogel.

Tall unarmed trees. Leaves abruptly bipinnate. Flowers showy, yellow or white, in axillary and in panicled terminal racemes. Calyx with the disc confined to the base, teeth subequal, very deeply cut, imbricate. Petals oblong or roundish, imbricated, spreading. Stamens
10, free, declinate; filaments with a dense tuft of hairs at the base; anthers uniform, linear-oblong. **Ovary** sessile, free, few-ovulæd; style long filiform incurved, stigma large peltate. **Pod** oblong, flat, thin, hard, indehiscent, with a firm broad wing on each suture. **Species** 7-8; cosmopolitan in the tropics.

Flowering pedicels not exceeding the calyx ...
Flowering pedicels 3-4 times as long as calyx ...

1. **Peltophorum ferrugineum** Benth. Flor. Austral. II 279. A tall tree 70-80 feet high; branchlets covered with a thin rusty tomentum. **Leaves** 6-12 in. long, petiole 1-1.5 in., sparingly rusty-pubescent; pinnæ 16-20, distal 4-6 in. long, progressively shortening towards proximal, 3-4 in.; leaflets close, ligulate-oblong, sessile, base unequal, apex obtuse, 5-75 in. long, 35 in. wide, subcoriaceous, puberulous above, faintly rusty-pubescent beneath. **Racemes** in a large terminal panicle 12 in. long, 8-9 in. across, branches 4-6 in. long, bracts linear under 1 in. long, very caducous, bud 35 in. in diam., pedicels 15-25 in. long, rachis, branches and pedicels densely rusty-pubescent. **Calyx** partite to 15 in. from base, lobes subequal, ovate-lanceolate, 25 in. long, densely rusty-pubescent externally. **Corolla** 1.25 in. wide, petals 8 in. long, yellow, the thickened base densely rusty-hairy on both sides, the blade more or less glabrous but the margin ciliate with rusty hairs. **Stamens** 10, free, filaments equal, pubescent at the base. **Ovary** densely villous, style very sparingly pubescent throughout, the stigma peltate. **Pod** 2-4 in. long, 1 in. across, narrowed to both ends, rigid, glabrous, closely longitudinally veined outside. Bak. in Flor. Brit. Ind. II, 257. Poinciana Roxburghii G. Don, Gen. Syst. II, 433. *Caesalpinia inermis* Roxb. Flor. Ind. II, 367. C. ferruginea Dcne, Nouv. Ann. Mus. II, 462; Miq. Flor. Ind. Bat. I, 111. C. arborea Zoll. Nat. en Geneesk. Arch. III, 65; Miq. Flor. Ind. Bat. I, 112.

2. **Peltophorum dasyrachis** Kurz ex Bak. in Flor. Brit. Ind. II, 257. A tall tree 70-80 feet high; branchlets covered with a fulvous tomentum. **Leaves** 6-15 in. long, petiole 1-1.5 in. long, tomentose; pinnæ 14-18, distal 4-5 in. long, shortening progressively towards proximal 2-2.5 in.; leaflets close, ligulate-oblong, sessile, base unequal, apex rounded, 5-75 in. long, 35 in. wide, subcoriaceous, puberulous above; slightly rusty-pubescent beneath. **Racemes** 6-9 in. long, 3 in. across, pedicels patent 1-1.5 in. long, bracts lanceolate, 5 in. long, subpersistent; bud 35 in. in diam.; rachis, pedicels and bracts rusty-pubescent. **Calyx** partite to 15 in. from base, lobes equal, ovate-lanceolate, 25 in. long,
densely rusty-velvety externally. *Corolla* 1½ in. across, petals 1 in. long, oblong, yellow, the thickened base very densely hairy on both sides, the blade glabrous. *Stamens* 10, free, filaments equal, pubescent at the base. *Ovary* densely villous, style sparsely pubescent throughout, the stigma large peltate glabrous. *Pod* 4–5 in. long, 1·25–1·4 in. across, rigid, 1–5-seeded, narrowed at both ends, faintly puberulous and not veined externally. *Cesalpinia Finlaysoniana* Grab. in Wall. Cat. 5971. *C. dasyracchis* Miq. Flor. Ind. Bat. Suppl. 292.


The native name in Malacca is "Batai" or "Kayu Batai."

There is a third species of *Peltophorum* in Sumatra (*P. grande*), a very tall tree with white flowers tinged with pink.

55. *Cesalpinia* Linn.

Robust erect trees, shrubs, or woody prickly climbers. *Leaves* large, abruptly bipinnate. *Flowers* showy, yellow, in copious axillary racemes. *Calyx* deeply cleft, with the disc confined to its base, the lobes imbricated, the lowest the largest, cucullate. *Petals* spreading, usually orbicular with a distinct claw, the uppermost smaller than the others. *Stamens* 10, free, decinate; anthers oblong, uniform, versatile. *Ovary* sessile or sub sessile, few-ovuled; style filiform, sometimes clubbed at the tip, stigma terminal. *Pod* oblong or ligulate, thin and flat, or thicker and subturgid, indehiscent or dehiscent, smooth or (in subgen. *Guilandina*) armed all over with wiry spines. Species about 40, widely spread in the tropics of both hemispheres.

*Pod* armed with abundant wiry prickles; petals narrow (*Guilandina*):

- Leaves stipulate, leaflets small, bracts squarrose
  - 1. *C. Bonducella*.
- Leaves without stipules, leaflets larger, bracts ascending
  - 2. *C. Bonduc*.

*Pod* unarmed, petals broad:

- *Pod* dry, thin-valved with narrow sutures (*Eucesalpinia*):
  - Leaflets few, coriaceous, large; pods short, seeds solitary or rarely 2 (*§ Nuga*)
    - 3. *C. Nuga*.
  - Leaflets many, membranous or subcoriaceous, small; pods longer than broad, seeds 5–8:
    - Stamens long, far-exserted; petals long-clawed (*§ Cesalpinaria*)
      - 4. *C. pulcherrima*.
    - Stamens short, little-exserted; petals short-clawed (*§ Sappania*):
      - Petals orbicular, flowers 1·5 in. across:
        - Stipules 0, petals subequal, pod wingless broadly blunt-pointed with recurved beak
          - 5. *C. Sappan*.

J. II. 29
Stipules large, upper petal smaller than the others, pod narrowly winged along ventral suture, obliquely round-pointed with straight beak ... 6. \textit{C. sepiaria}.

Petals oblong (subequal), flowers only \(3\) in. across, (pod wingless, broadly blunt-pointed with straight beak) ... ... ... ... 7. \textit{C. parviflora}.

Pod somewhat fleshy, thick-valved with wide sutures (\textit{Cinclidoecarpus}) —

Leaflets oblong; racemes lax, pedicels much exceeding calyx ... ... ... ... ... 8. \textit{C. digyna}.

Leaflets ligulate, racemes denser, pedicels hardly exceeding calyx ... ... ... ... ... 9. \textit{C. tortuosa}.

\textbf{Subgen. 1. \textit{Guilandina} Bak.} Pod dry, armed on the face with abundant wiry prickles; petals narrow.

1. \textit{Cesalpinia Bonducella} Fleming, Asiat. Research. XI, 159. A climber, often very extensive, with finely grey-downy branches armed with many small hard falcate yellow prickles. \textit{Leaves} 1 to 2 feet long, with a pair of reduced pinnae (or compound stipules) at their base; pinnae 12-16, 2-3 in. long, slightly lengthening upwards, leaflets 12-18, membranous, rather pale-green, ovate or elliptic, base slightly unequally rounded, apex cuneate or rounded mucronulate, \(5-1\) in. long, \(3-6\) in. wide, glabrous above, slightly puberulous beneath, more closely on the margins, petiolules very short; lobes of compound stipules suborbicular. \textit{Racemes} terminal and slightly supra-axillary, simple or panicked, dense at top, laxer downwards, 6-10 in. long; pedicels \(2\) in. (in fruit \(3\) in.) long, with squarrose reflexed lanceolate deciduous bracts \(25-3\) in. long, finely brown-downy as are the pedicels and main-rachis. \textit{Calyx} \(25-3\) in. long, closely downy. \textit{Petals} oblanceolate, little exserted, yellow except the broader shorter ovate-acute upper with reddish base. \textit{Stamens} densely grey-silky, decline. \textit{Pod} short-stalked, oblong, 2-3 in. long, 1-75 in. wide, densely strongly aculeate externally. \textit{Seeds} usually 2, oblong, lead coloured, \(5\) in. across. Roxb. Flor. Ind. II, 357; Bak. in Flor. Brit. Ind. II, 254. \textit{Guilandina Bonducella} Linn. Sp. Pl. 381; Wall. Cat. 5803. \textit{G. Bonduc W. & A. Prodr.} 280 in part; Miq. Flor. Ind. Bat. I, 113 in part.

\textbf{Andamans; common on the coasts. Penang; Curtis 99! Distrib. Cosmopolitan in the tropics.}

2. \textit{Cesalpinia Bonduc} Roxb. Hort. Beng. 32. A large shrubby creeper often very extensive, with sparingly pubescent branches armed with rather strong falcate brown prickles. \textit{Leaves} 1-2 feet long, without stipules; pinnae 8-16, 5-8 in. long, slightly lengthening upwards, leaflets 12-14, papery, ovate, base subequally rounded, apex cuneate mucronate, 1-5-2 in. long, \(75-1\) in. wide, dark-green shining glabrous above, rather closely puberulous beneath, petiolules \(08\) in. long. \textit{Racemes}

**Nicobars; King's Collector! Penang; Wallich 5806! Pahang; Ridley 2650! Perak; Scortechini 1062! Kunstler 7147! Wray 3089! Distrib. Cosmopolitan in the tropics.**

**Subgen. 2. Eucesalpinia. Pod* dry, unarmed, valves thin; petals broad.

§ 1. *Nugaria* DC. Leaflets few coriaceous shining; petals short-clawed; stamens not far exserted; seeds 1, rarely 2.


**Andamans;** very common on all the coasts and near muddy creeks.
NICOBARS; common. KEDAH; Pulo Langkawi, Curtis 2618! 2867! PERAK; Scortechini 1096! Kuntsler 1029! MALACCA; Griffith 1898! PARANG; Ridley 1377! DISTRIBUT. Coasts of S.-E. Asia, North Australia and Western Polynesia.

The nearest ally of this species is not any plant known as a Cesalpinia, but a species from China known as Mezoneuron sinense.

§ 2. Cesalpinaria Bth. & HK. f. Leaflets small, numerous, membranous; petals very long-clawed; stamens very far exserted; seeds 6–8.

4. Cesalpinia pulcherrima Sw. Obs. 166. A shrub with glabrous unarmed or very sparsely and weakly prickly branches. Leaves 4–6 in. long, pinnae 12–16, 2–4 in. long, the proximal and distal rather shorter than those between, leaflets 16–24, distinctly petiolulate, close, membranous, elliptic-oblong, apex obtuse, base slightly oblique, cuneate on upper rounded on lower side, 5–7 in. long, 35–45 in. wide, dark-green, glabrous on both surfaces. Racemes terminal and axillary, simple or very sparingly branched, 8–12 in. long, at length subcorymbose, 4–6 in. wide, pedicels ascending, the lowest reaching 3–4 in. in length; bracts subulate 2 in. long, very early caducous. Calyx 6 in. long, quite glabrous, leathery, the lower segment very large and deeply cucullate, 4 in. wide. Corolla spreading, 1.5 in. across, all petals long-clawed, the lower four 75 in. long, yellow or red, lamina orbicular with crisped margin, 5 in. in diam., the upper smaller. Stamens far-exserted, red, glabrous, 1.75 in. long. Pod thin, flat, ligulate, glabrous, nearly straight, 2–3 in. long, 6 in. wide; seeds 6–8, broadly oval, compressed, brown, 4 in. long, 3 in. wide. Benth. PI. Jungh. 258; Miq. Flor. Ind. Bat. I, 111; Bak. in Flor. Brit. Ind. II, 255. Poinciana pulcherrima Linn. Sp. PI. 380; DC. Prodr. II, 484; Bot. Mag. t. 995; Wall. Cat. 5813; Roxb. Flor. Ind. II, 355; W. & A. Prodr. 282. Rheede, Hort. Malab. VI, t. 1; Rumph. Herb. Amboin. II, t. 20.

A garden or hedge plant in most of our provinces.

The native country of this species is uncertain, but apparently it is not anywhere truly wild in S.-E. Asia. The other species of the section are American, so that this one has perhaps also been originally derived from the Western Hemisphere.

§ 3. Sappania DC. Leaflets many, membranous, small; petals short-clawed; stamens not far exserted; seeds 3–6.

5. Cesalpinia Sappan Linn. Sp. PI. 381. A tree 20–30 feet high with thorny stem 6–10 in. in diam.; branches rusty-pubescent with few small prickles. Leaves 8–15 in. long, pinnae 16–24, 4–6 in. long; leaflets 20–36, close, membranous or chartaceous, oblong, very oblique, sessile, attached at lower corner, apex obtuse or slightly retuse, 5–75 in. long, 35 in. wide, glabrous above, slightly puberulous on the nerves.

Perak; open jungle at foot of hills, Ulu Bubong, *Kunstler* 10567! Pahang; Pulo Changei, *Ridley* 2590! Distrib. India, Indo-China; Malay Archipelago.

Penang; Govt. Hill, 2500 feet, Curtis, 385! Distrib. Eastern and South-Eastern Asia, introduced in America.

7. Cesalpinia parviflora Prain. A small tree or, at times, a climber, with stem 8—12 in. in diam. and with rusty-pubescent branches sparingly armed with small prickles. Leaves stipulate 8—10 in. long, pinnae 18—24, 2—3 in. long; leaflets 30—36, close, firmly subcoriaceous, oblong, sessile, attached sub-centrally but with the lower corner subauriculately produced, apex obtuse or rounded, 35—5 in. long, 2—25 in. wide in var. typica, 75 in. long, 35 in. wide (or rarely even larger) in var.? stipularis, dark-green glabrous and shining above, dull beneath and glabrous in var. typica, sparsely puberulous on the midrib in var.? stipularis; stipules lanceolate or oblong 45—75 in. long. Racemes in an ample terminal again branching panicle extending into the axes of the upper leaves, 2—3 feet long, 12—15 in. across, primary branches 5—8 in. long, final individual racemes 3 in. long; pedicels 25 in. long; slender, densely puberulous as are the main-rachis and branches of panicle; bracts linear or lanceolate, 2—25 in. long, deciduous. Calyx 25 in. long, thinly coriaceous, puberulous. Corolla 3 in. across, petals greenish-yellow, oblong, subequal, hardly exserted. Stamens green, densely woolly at base. Ovary sparsely pubescent. Pod of var. typica 1 in. long, 5 in. wide, with a recurved beak at upper angle of obtuse apex; seeds (young) oval, 4, 25 in. long.

Var. typica; leaflets not exceeding 5 in. in length, glabrous beneath; stipules lanceolate, 45 in. long, 2 in. wide, margin entire; bracts linear, 2 in. long, hardly equalling the pedicels.

Perak; at low elevations, Kunstler 3499! 7584! Wray 1909!

Var.? stipularis; leaflets 75 in length or longer, the midrib beneath puberulous; foliaceous stipules broadly ovate-oblong, 75 in. long, 35 in. wide, continued in the leafless portion of the more diffusely branching and more densely puberulous inflorescence, their margins often incised; bracts lanceolate, 25 in. long, equalling the pedicels.

Perak; Larut, in the plains, Wray 3983! 3991! 4261!

The foliage of the typical variety of this species is very like that of C. cinelidocarpa Miq. or C. tortuosa Roxb., but the remarkably small flowers and the different fruit (which is exactly like a miniature C. Sappan pod) abundantly distinguish it from all other Indo-Malayan species.

The pod of var.? stipularis is not yet known and it may ultimately be necessary to separate it specifically from C. parviflora. But its flowers, except that the calyx is somewhat more puberulous, are exactly as in C. parviflora, and though var.? stipularis has a somewhat different facies on account of its larger leaflets and especially its much longer foliaceous subsistent stipules. it seems better in the meantime to treat it tentatively as no more than a variety of C. parviflora. Wray notes that var. typica is a "small tree;" Kunstler states on one occasion that it is
a tree 30-40 feet high, on another that it is a climber 100-150 feet long. Of all three gatherings of var. stipularis it is noted that the plant is a climber.

Subgen. 3. *Cinclidocarpus* Bak. Pod rather fleshy, indehiscent, naked on the faces, with thickened sutures. Petals broad.


Malacca; Griffith Penang; Curtis 448! Tongkah; Curtis' Collector 2862! Distrib. India, Indo-China, Malay Archipelago.

9. *Cesalpinia tortuosa* Roxb. Hort. Beng. 32. A stout subscandent straggling shrub, with slightly downy spreading branches armed with very strong prickles. Leaves 12-18 in. long, pinnae 30-40, 2-5-4 in. long, the proximal and distal rather shorter than those between, leaflets 40-60, sessile, close, rigidly subcoriaceous, narrowly ligulate, apex obtuse or rounded, base obliquely cuneate, 25-3 in. long, 1 in. wide, dark-green and glabrous on both surfaces, shining above. Racemes axillary, simple, erect, 15-18 in. long, 1-5 in. across, pedicels spreading, '5 in. long, slender, glabrous as is the stout rachis, bracts very small caducous. Calyx '5 in. long, leathery, quite glabrous, the lower segment very deeply cuculcate, '35 in. wide. Corolla spreading, 75 in. across, petals bright-yellow with red streaks near base, all orbicular clawed, '5 in. across except the upper only '25 in. in diam. Stamens little-exserted, decinate, green, densely woolly in lower half. Pod oblong, twisted, indehiscent, glabrous, with much thickened sutures, 2-3 in. long, 1 in. across, turgid, torulose; seeds 2-5, hard, smooth, dark-brown,

Penang; Penara Bukit, 700 feet, Curtis 1027! Distrib. Sumatra, Tenasserim.

Very nearly related to C. cinclidocarpa Miq. which differs by its branching inflorescence and its pubescent calyx; also to C. acanthobotrya Miq. which has shorter, more laxly-flowered racemes and broader leaflets. Mr. Kurz indeed has in Herb. Calcutta proposed to treat C. acanthobotrya as a variety (var. latifolia) of C. tortuosa but the examination of an authentic example of Dr. Miquel’s plant leads the writer to believe that it is better, at least at present, to consider it specifically distinct.

56. MEZONEURON Desf.

Robust woody prickly climbers. Leaves abruptly bipinnate. Flowers in ample panicked racemes. Calyx very oblique, usually deeply cleft, with a basal or intertubal disc, the lobes imbricated, the lowest largest covering the others in bud like a hood. Petals spreading, ovate-spathulate, subequal or the upper smallest. Stamens free, decinate, usually exserted; anthers oblong, uniform. Ovary sessile or shortly stipitate, decinate, few- or many-ovuled; style filiform, stigma small, capitate, the margin often fringed. Pod large, thiu, oblong, flat, indehiscent, with a broad wing down the upper suture; seeds compressed, orbicular, cotyledons flat, radicle straight. Species about 15; all in the tropics of Eastern Hemisphere.

Calyx deeply cleft, with a wide short tube and a basal disc, the anterior lobe deeply cucullate (Eumezoneuron):—

Leaflets opposite, large; pods 1-seeded ... ... 1. M. cucullatum.
Leaflets alternate, medium to small; pods several seeded:—

Leaflets beneath and calyx externally puberulous ... 2. M. hymenocarpum.
Leaflets beneath and calyx externally glabrous:—

Pedicels puberulous, jointed near base of calyx; leaflets cuneate at apex ... ... 3. M. Kunstleri.
Pedicels glabrous, jointed considerably below base of calyx; leaflets obtuse ... ... 4. M. andamanicum.

Calyx shallowly cleft, with a narrow long tube and a disc extending above the base, anterior lobe shallowly hooded (Tubicalyx); (leaflets alternate) ... ... 5. M. sumatranum.

Subgen. 1. EUMEZONEURON; calyx deeply cleft, disc basal; lower lobe deeply cucullate.

1. MEZONEURON CUCULLATUM W. & A. Prodr. 283. A large climber, branches glabrous armed with small dark short recurved prickles. Leaves 6–12 in. long, pinnae 4–10, 6–8 in. long; leaflets 8–10, opposite, rigidly subcoriaceous, ovate-acute, base wide-cuneate slightly unequal, 2–4 in. long, 1·25–1·75 in. wide, glabrous on both surfaces, dark-green
above, paler beneath, secondary veins 4–5 pairs and intermediate reticulations faint; petiolules 2 in. long. Inflorescence a terminal or axillary panicle of simple or occasionally branched racemes, 1–1.5 feet long, with terete glabrous main-rachis; single racemes 4–8 in. long; pedicels close-set, slender, 3 in. long, jointed a little above the middle. Calyx yellow, quite glabrous, leathery, anterior sepal cucullate, obtuse, 25 in. long, the rest orbicular, tube shallow. Corolla 45 in. across, pale-green, standard 2-lobed, shorter but wider than the other subequal orbicular petals. Stamens far exserted, puberulous at base, declinate, unequal. Ovary declinate, 1–2-ovuled. Pod thin, 3–3.5 in. long, 1:25 in. wide (including wing 3 in. wide), faintly reticulated; seeds usually solitary, very rarely 2.

**Andamans;** common. **Distrib.** Eastern Himalaya, India, Indo-China.

2. **Mezoneuron hymenocarpum** W. & A. Prodr. I, 283. A large climber, branches finely puberulous, with a few scattered recurved brown prickles. Leaves 1–1.5 feet long; pinnae 1–10, 3–4 in. long, leaflets 10–14, alternate or subopposite, rigidly subcoriaceous, obovate, apex obtuse or rounded, base cuneate unequal, 5–1 in. long, 25–6 in. wide, puberulous above, puberulous to densely pubescent beneath, secondary veins 5–6 pairs very faint; petiolules 15 in. long. Inflorescence a large terminal thyrsoid panicle of unbranched racemes extending into the axis of the uppermost leaves, 2 feet long, 8–10 in. wide, the single racemes 6–8 in. long, puberulous as are the main-rachis and slender pedicels, 35–5 in. long, jointed 15 in. under base of calyx. Calyx densely puberulous, leathery, anterior sepal cucullate subacute, 25 in. long, the others orbicular. Corolla 5 in. across, yellow, petals ovate-orbicular, upper small. Stamens far exserted, hirsute at base, declinate, unequal. Ovary declinate, about 5-ovuled; stigma slightly fringed. Pod thin, 4 in. long, when ripe 1 in. wide (including posterior wing 25–3 in wide), faintly wide-reticulated, 5-seeded. *Cesalpinia hymenocarpa* Wall. Cat. 5832. **Mezoneuron pubescens** Bak. in Flor. Brit. Ind. II, 259 not of Desf.

**Andamans;** very plentiful near Port Blair, *King's Collectors! Distrib.** Burma; Ceylon.

Resembles *M. andamanicum* but is easily distinguished by its leaves and its calyx being pubescent; by its pedicels being shorter; and by its pods being smaller and not so distinctly reticulated.

3. **Mezoneuron Kunstleri** Prain. A large climber, branches glabrous, with a few brown scattered recurved prickles. Leaves 6–8 in. long, pinnae 4–6, 4–5 in. long, leaflets 6–8, alternate, subcoriaceous, ovate, cuneate at apex and base, almost equally decurrent on the short petiolule, J. ii. 30
5-1.25 in. long, 35-75 in. wide, glabrous on both surfaces, dark-green above, glancescant beneath, secondary veins few, faint, widely reticulated; petiolules 15 in. long. Inflorescence a large terminal thyrsoid panicle of unbranched racemes 1.5-2 feet long, 8-9 in. wide, the single racemes 8-10 in. long, faintly puberulous as in the main-rachis; pedicels slender 35-45 in. long, distinctly puberulous, jointed 2 in. under base of calyx. Calyx quite glabrous, leathery, anterior sepal deeply cucullate obtuse, 25 in. long, the rest orbicular, all gland-dotted as is the shallow tube. Corolla 5 in. across, bright-yellow, petals ovate-orbicular, upper smaller than the others. Stamens far exserted, hirsute at base, declinate, unequal. Ovary declinate, about 5-ovuled; stigma slightly fringed. Pod only seen very young; wing half as wide as body of pod.

Perak; Sungah Ryah, Kunstler 895!

A species very near M. andamanicum, with which it agrees in number, size, and disposition of leaflets, and which it closely resembles in flowers. The different shape of the leaflets, however, and especially the much shorter distance between the joint in the pedicel and the base of the calyx, with the much shorter puberulous pedicels, mark it as abundantly distinct. The wing, too, of the very young pod is in M. Kunstleri almost twice as wide as the wing in the corresponding stage of the pod in M. andamanicum.

4. MEZONEURON ANDAMANICUM Prain, Journ. As. Soc. Beng. LXI, 2. 131. A large climber, branches glabrous with a few scattered prickles. Leaves 1-1.5 feet long, pinnae 4-10, 5-7 in. long, leaflets 8-10, alternate, rigidly subcoriaceous, obovate, slightly retuse, base cuneate slightly unequally decurrent on the short petiolule, 5-1.5 in. long, 35-1 in. wide, glabrous on both surfaces, dark-green above, pale beneath, secondary veins few faint widely reticulated; petiolules 15 in. long. Inflorescence a large terminal thyrsoid panicle of unbranched racemes extending into the axils of the uppermost leaves, 2-2.5 feet long, 1 foot wide, the single racemes 10-12 in. long, quite glabrous as are the main-racemes and the slender pedicels 5-75 in. long, jointed 3 in. under base of calyx. Calyx quite glabrous, leathery, anterior sepal deeply cucullate obtuse, 25 in. long, the rest orbicular all reticulate-veined and yellow gland-dotted as is the shallow tube. Corolla 5 in. across, rather pale-yellow, petals ovate-orbicular, the upper smaller than the others with a thickened claw prolonged into a ligular ciliate ridge, the rest with claw hirsute internally and with lamina red-blotched at base and pink-veined. Stamens far exserted, hirsute at base, declinate, 2 seriate, free, unequal. Ovary declinate, ovules about 6; stigma slightly fringed. Pod thin, 5 in. long, when ripe 1-1.5 in. wide (including posterior wing 25-35 in. wide), finely wide-reticulated, distantly 3-5-seeded.

Andamans; very common near Port Blair, Prain! Man! King's Collector!

5. Mezoneuron sumatranum W. & A. Prodr. I, 283. A large climber, branches glabrous, armed with a few dark short recurved prickles. Leaves 1-1.5 feet long, pinnae 6-10, 8-12 in. long, leaflets 6-8, alternate, rigidly subcoriaceous, obovate-oblong, emarginate and apiculate, base rounded very slightly unequal, 1-5-2.5 in. long, 1-25-1.75 in. wide, glabrous on both surfaces, dark-green above, paler beneath, secondary veins rather prominently closely reticulate beneath; petiolules 0.2 in. long. Inflorescence a terminal or axillary panicle of simple or occasionally branched racemes 1.5-2 feet long, with terete thick glabrous main rachis, single racemes 5-6 in. long; pedicels close-set slender, 2.5 long, curved. Calyx quite glabrous, leathery, anterior sepal orbicular 2.5 in. long, twice as large as the others, tube compressed 0.5 in. long. Corolla 0.35 in. wide, 3 in. long, of 5 subequal petals, oblone, narrowed to the base, the standard reddish the other petals yellowish. Stamens hardly exserted, declinate, glabrous, unequal. Ovary declinate stipitate glabrous, 3-4-ovuled, stigma glabrous. Pod thin, 3-4 in. long, 1.35 in. wide (including posterior wing 2.5 in. wide), finely wide-reticulate, distantly 3-4-seeded. Miq. Flor. Ind. Bat. I, 105 and I, 1081; Bak. in Flor. Brit. Ind. II, 259. Caesalpinia sumatrana Roxb. Hort. Beng. 32; Flor. Ind. II, 336; Wall. Cat. 5831A only.

Malacca; Griffith! Muingay 534! Perak; Thaipeng, Scortechini 67! Kwala, Scortechini 1766! Simpat, Ridley 3083! Dindings; Lumot, Ridley & Curtis! Singapore; near Krangi, Ridley 2105! 6026!

The great difference in the appearance of the calyx no doubt justifies Dr. Miquel’s proposal to treat this plant as the type of a distinct subgenus of Mezoneuron.

57. Pterolobium R. Br.

Robust woody prickly climbers. Leaves abruptly bipinnate. Flowers in panicled racemes. Calyx deeply cleft, with the disc near the base, the lobes imbricated, the lowest longer and more hooded than the others. Petals spreading, oblone, and clawed equalling the calyx. Stamens 10, free, declinate, little exserted; anthers oblone versatile. Ovary sessile, 1-ovuled; style filiform, stigma small terminal. Pod indehiscent, samaroid with a large horny oblique terminal wing. Species 7; one African, one Australian, two Chinese, three South-East Asiatic.

Racemes with thin angular glabrous rachis, laxly 20-30. Racemes with stout terete puberulous rachis, densely

1. Pterolobium macropterum Kurz, Journ. As. Soc. Beng. XLII, 2, 71. A large climber, young branches sparsely pubescent, all parts

Andamans; very common. Distr. Jaya; Burma.

This species is not so closely related to P. lacerans R. Br., with which Dr. Miquel has identified it, as it is to P. indicum A. Rich. (P. lacerans Wall.; W. & A.; Wight, i.e.) of which Mr. Baker treats it as a variety. P. macropterum has however quite glabrous flower branches, very different leaflets, and fewer and smaller prickles; while it agrees with P. indicum in length of pedicels and in style of inflorescence, it has very different pods with a much larger wing.

2. Pterolobium densiflorum Prain. A large climber, young branches pubescent, all parts very strongly armed with large recurved prickles. Leaves 4–8 in. long, pinnae 8–16, 3 in. long, with puberulous rachis; leaflets 14–16, rather narrow-oblong, apex obtuse or retuse, base unequal abruptly rounded on both sides, ‘6 in. long, ‘25 in wide, subcoriaceous, dark-green, glabrous on both surfaces. Racemes dense in fastigiate terminal panicles with stout subterete puberulous rachis and branches; 1.5 feet long, 1 foot across, individual racemes 150–200-fl., 6–8 in. long; pedicels puberulous slender spreading, ‘25 in. long. Calyx sparsely puberulous, thinly coriaceous, lowest sepal ‘3 in. long. Corolla yellow, ‘3 in. long. Pod 2 in. long, glabrous; seed-bearing base turgescent, reticulate, ‘6 in. long, ‘5 in. wide, wing ‘5–7 in. wide, the upper margin straight thickened, the lower thin irregularly sinuately convex, the apex narrowly rounded. P. microphyllum Kurz, Journ. As. Soc. Beng. XLII, 2, 71 not of Miq. P. indicum var. microphyllum Bak. in Flor. Brit. Ind. II, 259 in part, and excl. the plant of Miquel.

Penang; Government Hill, 2500 feet, Curtis 3093! Malacca; Maingay 535!

Maingay’s plant here cited is the same as that of Curtis both as regards flowers and fruits. The description of the leaflets is taken from the Penang plant, the Malacca one at Calcutta having only bare rachises. The Malacca plant is the type
of *P. microphyllum* Kurz; that it cannot possibly be the true *P. microphyllum* Miq. is obvious from the fact that Miquel's plant has linear leaflets smaller than those of his *P. laseraus*—which is the *P. macropterum* of this work—arranged in from 20–22 pairs on 14–16 pairs of pinnae, whereas *P. densiflorum* has oblong leaflets larger than those of *P. macropterum*, arranged in from only 7–8 pairs on 4–8 pairs of pinnae. Mr. Kurz's misidentification no doubt arose from the fact that he had not seen the leaves of Mainzay's plant. In style of inflorescence *P. densiflorum* most resembles the Chinese *P. punctatum* Hemsl., but that plant has less dense and less numerous flowered racemes, and has very different leaves.

**Suborder III. Mimoseae.**

Trees, shrubs or very rarely herbs. *Leaves* 2-pinnate, very rarely simply pinnate. *Flowers* small, rarely elongated, tubular, sessile in globose heads or cylindrical spikes, rarely shortly pedicelled and in globose umbels or slender racemes; bracts small narrow often dilated at the tips, subtending bilaterally imbricate in bud usually deciduous during flowering; bracteoles very rare; perianth regular often in 5-merous, sometimes 4-merous, rarely 3-merous or 6-merous whorls. *Sepals* valvate (except in *Parkiea*), rarely free, usually connate in a 5-toothed to 5-lobed tube, sometimes 0; disc-tube 0. *Petals* as many as sepals, valvate, free or connate in a lobed tube, hypogynous or obscurely perizynous. *Stamens* as many, or twice or thrice as many, as petals, or indefinite, free or monadelphous, or adnate to base of corolla tube, usually exserted; anthers small, versatile, dehiscing longitudinally. *Ovary* free at base of calyx. *Seeds* usually ovate or orbicular, compressed, with basilar hilum; rarely thick globose or ovoid; testa hard. albumen 0, or scanty; cotyledons flat; radicle straight, shortly exserted or included; funiculus often expanded in a small fleshy arillus.

Anthers gland-tipped; *(stamens 5–10):—*

- Calyx-tooth short, imbricated (*Parkiea*); filaments usually either connate or adnate at base; (inflorescence capitulate; heads very large; trees) ...

- *Calyx valvate* (*Adenanthera*); filaments free:—
  - Inflorescence elongated; (species all woody):—
    - Flowers sessile; great climbers with opposite leaflets and huge pods and seeds ...
    - Flowers short-stalked; trees with alternate leaflets and narrow contorted pods ...

- Inflorescence capitulate; heads small:—
  - Small aquatic or subaquatic herbs with small thin pods opening early by upper suture; seeds small ...
  - Lofty trees with large thick woody pods, late in dehiscing, opening by both sutures; seeds large ...

- Anthers not gland-tipped; (calyx valvate, rarely 0):—
  - Filaments free:—
    - Stamens definite, as many, or twice as many as petals
(Eumimosese); (inflorescence capitate in Malayan species); shrubs or under-shrubs with thin coriaceous pods:

Pods straight with continuous valves, dehiscing through sutures ...

Pods slightly curved with usually segmented valves and with always indehiscent persistent sutures ...

Stamens indefinite often very numerous (Acacieae); inflorescence spicate or capitate ...

Filaments more or less connate (Ingese); (stamens usually indefinite, rarely only 2-3-times as many as petals):

Pods (indehiscent) septate between the seeds:

Flowers large; petals adnate below to the staminal tube, otherwise free; pod woody turgid, sutures not thickened ...

Flowers small; petals connate below in a tube; pod spongy or fleshy hardly turgid, the sutures thickened.

Pods not septate between the seeds:

Sutures thickened; valves elastically revolutely dehiscent from apex to base ...

Sutures thin, pods indehiscent or if dehiscent the dehiscence not elastic ...

Pods twisted with coriaceous valves, or if almost straight (P. bubalinum) with fleshy valves, (sutures thin) ...

58. **Parkia** R. Br.

Tall, unarmed trees. **Leaves** bipinnate with usually very numerous leaflets. **Flowers** in dense long-peduncled heads, each subtended by a coriaceous persistent ligulate bract with a spoon-shaped tip. **Calyx** tubular, shortly 5-cleft, lobes imbricate. **Corolla** tubular, cleft half-way down, the segments subvalvate. **Stamens** 10, exerted, the filiform filaments united in the lower part with each other and with the corolla-tube; anthers narrow, gland-tipped, the pollen cohering in irregular masses. **Ovary** stalked, many-ovuled; style filiform, stigma minute capitate. **Pod** large, flat, strap-shaped, coriaceous, finally dehiscing. Species about 10, cosmopolitan in the tropics, mostly American.

Petioles with two glands; heads subspherical (leaflets very narrow, acute, in 60-100 pairs) ...

Petioles with one gland only; heads turbinate or clavate:—

Leaflets subfalcate, acute, in 40-80 pairs ...

Leaflets straight, obtuse or retuse in 20-35 pairs ...

1. **Parkia biglandulosa** W. & A. Prodr. 279. A lofty tree. **Leaves** 2-pinnate, main-rachis downy 12-15 in. long; pinnae 20-40 pairs subalternate, secondary rachises also downy about 3 in. long; leaflets...
small straight narrow linear-ligulate close-set, 60–100 pairs, with obliquely truncate bases and acute apices, strongly 1-nerved, pubescent along the margins, 2 in. long, 0.05 in. across, petiolar part of main rachis 1–1.5 in. long, with 2 collateral glands at the top of its swollen base, and with 3–9 solitary glands between the bases of as many pairs of pinnae toward the apex of the rachis. Flowers in dense subspherical heads 1.5 in. in diam., peduncle 4–9 in. long. Calyx tubular, shortly 5-cleft, 3 in. long, teeth pilose, elsewhere glabrous. Corolla tubular, segments subvalvate. Stamens 10, exerted, the filaments connate below and adnate at base to corolla tube; anthers narrow. Pod (including stipe 2 in. long) 14–15 in. long, 1.5 in. wide, 3.5 in. thick, black, at first downy, ultimately quite glabrous. Seeds 10–12, oval, 7.5 in. long, 5 in. wide, 25 in. thick, dark-brown, smooth with a central ovate-lanceolate pale-brown rugose area. Bak. in Flor. Brit. Ind. II. 289. Mimosa pedunculata Roxb. Fl. Ind. II, 551.

MALAY PENINSULA; fide Baker.

Mr. Baker says that this comes from the Malay Peninsula, and on his authority the statement is here repeated. No botanist has, however, hitherto sent it from the Malay Peninsula; the locality given by Roxburgh is not Malaya, but "the islands to the eastward of the Bay of Bengal" by this Roxburgh indicates the Andamans and Nicobars. Still, no one has gathered it there in recent years, and the precise habitat must for the present be left doubtful. The specimens at Calcutta are (1) Wight's n. 559, the type of the species, cult. in the Missionary Garden; (2) Specimens from Madras Agri.-Hort. Society's Garden collected by Dr. Cleghorn; (3) Specimens of Roxburgh's plant from the Calcutta Botanic Garden where the tree still grows—these last are exactly like Wight n. 559 and show that the doubts expressed by Wight and Arnott as to the identity of their plant with Roxburgh's Mimosa pedunculata are unfounded; (4) Specimens, no doubt from cultivated examples, sent from Assam by Masters and by Jenkins. This is the only Parkia at all generally cultivated in Bengal; the next species, which is also grown, is comparatively uncommon.

P. biglandulosa should then be carefully looked for in the Nicobars and Andamans, and particularly in N. Andaman; it is highly improbable that it will be found, in a wild state, either in Indo-China or in Malaya.

2. PARKIA ROXBURGHII G. Don, Gen. Syst. II, 397. An erect tree 40–60 feet high, stem about 2 feet in diam., young branches pubescent. Leaves 2-pinnate, main-rachis puberulous or glabrescent, 12–24 in. long; pinnae 20–30 pairs, opposite; secondary rachises glabrescent 3–6 in. long; leaflets small, falcately curved forwards, linear-lanceolate, close-set, 40–80 pairs, subequally truncate at base, apex acute, strongly 1-nerved, puberulous along the margins, 3 in. long, 1 in. wide, petiolar part of main-rachis 2–3 in. long with 1 solitary gland below the lower pair of pinnae and with 3–5 solitary glands between the bases of as many pairs of pinnae towards apex of rachis. Flowers in dense turbi-

**Singapore;** cultivated, Ridley 6928! MALACCA; PANCHOR, Goodenough 1748! **Distrib.** Wild in Silhet, Cachar and Chittagong; cultivated sparingly in Indo-China and Malaya.

Mr. Goodenough gives the native name as "Kada-ong;" the seeds, he notes, are used as peppermint. This species is said by Koorders and Valeton to be wild in Java; the species cultivated by the Javanese is not, however, the present one, but the next, *P. speciosa* Hassk. And it should be noted besides that the wild tree in Java is not exactly the tree that is wild in Silhet, Cachar and Chittagong but is the form that Hasskari proposed to treat as a distinct species under the name *P. intermedia*. Mr. Ridley's specimens, from the Singapore Gardens, are precisely like those from Cachar and Chittagong (true *P. Roxburghii*); Mr. Goodenough's, on the other hand, are absolutely identical with those from Java (true *P. intermedia*). Before definitely deciding that *P. intermedia* and *P. Roxburghii* are the same species, the writer would wish to study the former in the living state; it is often a rash thing to reduce to another, from herbarium material alone, species founded by so competent a botanist as Hasskari; so far as our Calcutta specimens go, the evidence is altogether in favour of these two trees being quite distinct.

3. **Parkia speciosa** Hassk. Flora XXV. Beibl. 55. A large tree with spreading branches, 80–100 feet high, stem 2–3 feet in diam., young branches glabrescent. Leaves 2-pinnate, main-rachis pubescent, 8–10 in. long; pinnae 10–16 pairs, subalternate, secondary rachises puberulous, 3 in. long; leaflets small almost straight, linear, close-set, 20–35 pairs, sub-equally truncate at base, obtuse or retuse at apex, 25 in. long, 1 in wide, with strong median and 3–4 pairs of distinct secondary nerves beneath, margins with only a few scattered hairs; petiolar part of main-rachis 1–1·5 in. long, with 1 solitary gland midway between base and lowest pair of leaflets and with 2–6 solitary glands between the bases of as many pairs of pinnae towards apex of rachis. Flowers in dense narrowly clavate heads, 2 in. long, 75 in. in diam., peduncles slender 16–20 in. long. Calyx tubular, shortly 5-cleft, 25 in. long, teeth pilose, elsewhere glabrous. Corolla tubular, white, segments subvalvate. Stamens 10, exserted, the filaments connate below and adnate to corolla-tube; anthers

Penang; on the coast, cultivated, Curtis! Prov. Wellesley; Kunstler 1657! Perak; Thaiping, Scortechini 504! Larut, in dense jungle from 500-2000 feet elev., local, Kunstler 5300! Distrib. Sumatra; Java, (cult. Hasskarl!).

It would appear that this is the only species of Parkia truly wild in our area. It has been identified by Father Scortechini with P. macrocarpa Miq., from Sumatra, of which there is no authentic specimen at Calcutta; it certainly accords admirably with Miquel's description. There is at Calcutta an authentic example of Hasskari's P. speciosa; it proves that the present species is no other than Hasskarl's plant, and as Hasskarl's name has nearly twenty years' priority it is here adopted. In the Index Kewensis it is suggested that both P. intermedia and P. speciosa may be forms of P. Rozburghii. To judge by Hasskarl's description this may be true of P. intermedia; as regards P. speciosa the suggestion is obviously an impossible one.

While however, Hasskarl's name P. speciosa is long anterior to Miquel's, it does not conserve the oldest specific name. This tree is, as Hasskarl expressly admits, (Neuer Schluess. 50) the Pete of Rumphius (Herb. Amb. III, 51); it is equally the Petek of Jack, to which Jack has given the name Acacia graveolens. The writer does not propose, in the modern manner, to suggest that P. speciosa should therefore be known as Parkia graveolens, though doubtless there are those who will seize the opportunity of applying this name and of posing as authorities for the species.

It is strange that though evidently wild so near as in Sumatra and in the Malay Peninsula, this species is only cultivated in Java, and that there, according to Koorders and Valeton, its native country is unknown. These authors indeed (Bijdr. I, 283) suggest that it is a native of British India. It certainly is not a native of India proper; it is not even cultivated there. Our Indian species are, P. Rozburghii (P. biglobosa), wild in Silhet, Cachar and Chittagong; P. leiophylla, wild in Pegu; and P. insignis, wild in Martaban. We in India also experience a difficulty like that experienced by our Dutch colleagues, since there is a species P. biglandulosa, cultivated in India from Madras to Assam, of whose natural habitat we are somewhat uncertain.

59. Entada Adams.

Woody unarmed climbers, with tendrils. Leaves bipinate. Flowers in long narrow spikes, minute, yellowish, polygamous. Calyx minute, campanulate, equally 5-toothed. Corolla oblong in bud, the 5 long equal narrow lobes falcate in expansion. Stamens 10, free, shortly exserted, filaments filiform; anthers crowned with a gland. Ovary subsessile, many-ovuled; style filiform, stigma concave terminal. Pod flat, woody, very large, composed of many discoid one-seeded joints, J. n. 31
the endocarp persisting round the large compressed orbicular seeds. Species 10, the others Trop. African and American.


**Andamans; very common on the coasts. Nicobars: Kurz! Coco Group; Prain! Narcondam; Prain! Penang; Porter (Wall. Cat. 5293)! Curtis 115! Malacca; Hervey! Derry! Perak; Scortechini! 769! Kunstler! 1018! 6228! Wray! 1676! 1715! 2866! Distrib. Tropics generally.

Rather variable as to number and size of leaflets; both the forms figured by Scheffer occur in our area. That which he terms E. Rumphii is much the commoner in the Malayan Peninsula: from the Andamans and Nicobars only the form E. Purssetha is reported.

60. **Adenanthera** Linn.

Erect trees without spines or tendrils. Leaves ample, bipinnate. Flowers minute, in narrow spike-like racemes, hermaphrodite, usually pentamorous. Calyx campanulate, equally toothed. Petals valvate, equal, lanceolate, cohering only at the very base. Stamens 10, free, equalling the corolla; anthers tipped with a gland. Ovary sessile, many-ovuled; style filiform, stigma minute capitate. Pod strap-shaped, torulose, falcate, the coriaceous valves much twisted after they separate.
Seeds small, bright-coloured. Species 4, spread through tropics of Old World.

Leaflets obtuse glabrous beneath; pinnae 8-12 ... ... 1. A. pavonina.
Leaflets acute puberulous beneath; pinnae 6-8 ... ... 2. A. bicolor.

1. Adenanthera pavonina Linn. Sp. Pl. 384. A small unarmed tree 20–50 feet high. Leaves with a petiole 2–4 in. long, rachis prolonged 6–10 in. not produced beyond last pair of pinnae; pinnae 8–12 opposite, 3–6 in. long with stalk ·5–·75 in. long; leaflets alternate 10–16, ovate or oblong, base wide-cuneate, apex obtuse, papery, ·5–·75 in. long, ·3–·75 in. wide, dark-green above, pale glaucous beneath, glabrous on both surfaces; petiolule ·15 in. long. Inflorescence of narrow short-peduncled racemes 2–6 in. long, axillary or panicled at the ends of branches. Flowers small, ·15 in. long, on slender pedicels also ·15 in. long. Calyx green, lobes very small. Corolla pale-yellow, the petals equal, valvate, narrow-lanceolate, free except at the base, glabrous. Stamens 10, free, hardly exserted, anthers tipped by a gland. Pod flat, 6–9 in. long, ·6 in. wide, ·3 in. thick, contorted when ripe. Seeds 10–15, lenticular, ·35 in. in diam., ·25 in. thick, with a smooth, shining, usually uniformly red testa. DC. Prodr. II, 446; Roxb. Flor. Ind. II, 370; Wall. Cat. 5300; W. & A. Prodr. 271; Wight, Ill. t. 80; Bedd. Fl. Sylvat. t. 46; Miq. Flor. Ind. Bat. I, 46; Bak. in Flor. Brit. Ind. II, 287.

Andamans; very common. Perak; Thaiping, Scortechini 80! Inatang Jambu, Wray 2515! Kedah; Langkawi, Curtis! Tongkah; Curtis' Collector 3091! Malacca; Griffith! Distrib. Widespread in South-Eastern Asia.

2. Adenanthera bicolor Moon, Cat. Pl. Ceyl. 34. A small slender unarmed tree 20–30 feet high. Leaves with a petiole 1·5–2·5 in. long, rachis prolonged 3–5 in., not produced beyond last pair of pinnae; pinnae 6–8 opposite, 2·5–4 in. long with stalk ·3 in. long; leaflets alternate 8–10, ovate or elliptic, base rounded, apex acute, rigidly subcoriaceous, ·75–1·5 in. long, ·5–·75 in. wide, bright-green glabrous above, pale-glaucous adpressed-puberulous beneath; petiolule ·15 in. long. Inflorescence of narrow short-peduncled racemes 3–5 in. long, axillary or panicled at the ends of branches. Flowers small, ·15 in. long, on slender pedicels also ·15 in. long. Calyx green, lobes very small. Corolla white, the petals equal, valvate, elliptic-lanceolate, free except at the very base, glabrous. Stamens 10, free, distinctly shortly exserted, anthers tipped by a stipitate gland. Ovary glabrous reddish. Pod flat, 4–6 in. long, ·6 in. wide, ·3 in. thick, contorted when ripe. Seeds 8–10, lenticular, ·35 in. in diam., ·25 in. thick, with a smooth shining red, or black and red testa. Thwaites Enum. Pl. Zeyl. 98; Bedd. Flor. Sylvat. 94; Bak. in Flor Brit. Ind. II, 287.
The seeds are not always black and red but are sometimes concolorous red just as is usual in *A. pavonina*. The nearest allies of this species is one obtained in Borneo by Mr. Hulbett. This Mr. Hulbett notes as “a good-sized tree,” from Sarawak (Hulbett 292); Mr. Brace in the Calcutta Herbarium has named it *A. borneensis* Brace. The diagnosis between the two species may be given as follows:—
Pinnæ 3-4 pairs; leaflets 8-10, acute at apex, usually under 2 in. long, 1·5 times as long as broad, pale-green above, glaucous and puberulous beneath; flowers not longer than pedicels ... ... ... ... ... ... 1. *A. bicolor*.
Pinnæ 2 pairs; leaflets 4-5, acuminate at apex, usually over 2 in. long, twice as long as broad, dark-green above, glabrous and not glaucous beneath; flowers twice as long as pedicels... 2. *A. borneensis*.

The flowers of *A. borneensis* are considerably larger than those of *A. bicolor*.

Dr. Griffith has noted that the Malay name of *A. bicolor* in Malacca is “Bunah Saga;” Mr. Derry gives it as “Saga.”

61. **Neptunia** Lour.

Herbs without prickles. *Leaves* bipinnate, with persistent stipules and numerous small strap-shaped sensitive membranous leaflets. *Flowers* minute, dimorphous, in dense heads on axillary peduncles, polygamous, those of the lower part of the head bearing only protruded flattened staminodia. *Calyx* minute, campanulate, 5-toothed. *Petals* 5, strap-shaped, connate near the base. *Stamens* of the perfect flowers exserted; anthers gland-crested. *Ovary* stalked, many-ovuled; style filiform, stigma club-shaped. *Pod* coriaceous, flattened, ligulate or oblong, 2-valved. Species 8; cosmopolitan in the tropics.

**Neptunia olebracea** Lour. Fl. Cochinch. 654. An unarmed herb with annual wide-creeping softish swollen stems, rarely emitting suberect branches, rooting copiously at the leaf and flower-bearing nodes. *Leaves* 2-pinnate, rachis (including petiole 1·5 in.) 2·5-3 in. long, glabrous; pinnae 4-6, 2-3 in. long, with stalk 3 in. long; leaflets 8-15-jugate, narrow-oblong, obtuse, glabrous, 35-5 in. long, 2 in. wide. *Peduncles* ascending 3-12 in. long, glabrous; flowers minute, in dense heads 5-75 in. long, 5 in. across, the lower replaced by numerous ligulate yellow staminodes 25-3 in. long, bracts small ovate subobtuse. *Corolla* 05 in. long. *Pod* oblong, oblique, 5-1 in. long, 35 in. wide, beaked, dry, dehiscing early by the upper suture. *Seeds* 6-9, transverse, narrow-oval, somewhat pointed towards hilum, obtuse at opposite end, 2 in. long, 12 in. wide, 1 in. thick, testa brown, polished. Benth. in Hook. Journ. IV, 354; Miq. Flor. Ind. Bat. I, 50; Bak. in Flor. Brit. Ind.
Tall unarmed tree. Leaves bipinnate. Flowers in round heads, mostly perfect. Calyx tubular, 5-toothed at the tip. Petals 5, valvate, slightly united at the base, little longer than the calyx. Stamens 10, free, exserted; anthers gland-crested in an early stage. Ovary sessile, many-ovuled; style filiform, stigma minute terminal. Pod large, woody, oblong-falcate, finally dehiscing, flat, septate between the oblong compressed seeds.—A single species.

_Xylia dolabriformis_ Benth. in Hook. Journ. Bot. IV, 417. A tree 80–100 feet high, unarmed. Leaves 2-pininate; pinnae two, terminal on a rachis or petiole 1–2 in. long; leaflets 2–4 pairs, diminishing downward and with below the last pair on the outside a small unopposed leaflet; rachis of pinnae 3–4 in. long with a gland on the upper side between the bases of each pair of leaflets; terminal leaflets 3–6 in. long, 1·25–2·5 in. wide, lowest pair 1·25–1·5 in. long; all oblong with acute apex and rounded base, subcoriaceous, glabrous on both surfaces; petiolule 1 in. long. Inflorescence of very dense globose heads 5–75 in. in diam.; peduncles puberulous 3 in. long, slender, thickening in fruit, crowded on short puberulous branchlets developed with the young leaves. Calyx tubular 2 in. long; teeth 5, valvate. Corolla cream-coloured, 2·5 in. long, petals slightly cuneate at base, valvate, lanceolate. Stamens 10, filaments free, exserted, 5 in. long, young anthers very minutely gland-crested. Ovary sessile, many-ovuled. Pods large woody, oblong-falcate, flat, ultimately dehiscing, 4–6 in. long, 1·2–2·5 in. wide, 35 in. thick, septate between the seeds. Seeds 6–10, broadly ovate, much compressed, 65 in. long, 5 in. wide, 3 in. thick; testa brown, shining, smooth. Bedd. Fl. Sylvat. t. 186; Miq. Flor. Ind. Bat. I, 42; Bak. in Flor. Brit. Ind. II, 286. _Mimosa xylocarpa_ Roxb. Cor. Pl. t. 100; Hort. Beng. 40; Fl. Ind. II, 543. _Inga xylocarpa_ DC. Prodr. II, 439; Wall. Cat. 5277; W. & A. Prodr. 269. _I. lignosa_ Gr. in Wall. Cat. 5278. _I. dolabriformis_ Gr. in Wall. Cat. 5279.

_Singapore_; _Wallich 5279_. Distr. India, Indo-China, Philippines.


Kedah; in open jungle, Kunstler 1703! Perak; Lime-stone Hill, Gapis, Scortechni 912! Selangor; on hilly ground, Kunstler 1130! Pahang; Pulo Tawai, Ridley 2642! Penang; Water-fall, etc. Curtis 49! Singapore; Maingay 583! Distrib. Now cosmopolitan in the tropics but probably originally American.

64. Mimosa Linn.

Shrubs or herbs, with or without prickles. Leaves (in the Malayan species) bipinnate; leaflets small, sensitive, ligulate, caducous. Flowers minute, in dense globose heads, polygamous, (in the Indian species) mostly tetramerous. Calyx campanulate, shortly toothed. Petals connate towards the base. Stamens as many as, or twice the number of, the petals, much exserted, filaments filiform, free; anthers not gland-crested. Ovary stalked, many-ovuled; style filiform, stigma minute terminal. Pod flat, membranous, made up of 1-seeded joints that separate, when mature, from the sutures. Species 230, mostly confined to Trop. America.

Stamens 4; rachis of leaf bristly, stem bristly and prickly, leaves digitately divided, sutures of pod prickly ... ... I. M. pudica.
Stamens 8–10; rachis of leaf smooth, stem prickly not bristly, leaves pinnately divided, sutures of pod not prickly ... ... 2. *M. sepiaria*.

1. *Mimosa pudica* Linn. Sp. Pl. 518. A diffusely spreading undershrub rarely over 2 feet high, with stems and branchlets sparsely prickly and copiously beset with deflexed bristles. *Leaves* very sensitive, with usually 4 digitate pinnæ, sessile at the end of a petiole 2 in. or more long, beset with spreading bristles; stipules lanceolate 35 in. long, striate, subscarious, with margins beset with spreading bristles; pinnæ 2.5–3.5 in. long, the rachis beset with ascending bristles; leaflets 12–20 pairs, glabrous above, sparsely adpressed-bristly beneath, subcoriaceous, narrow-oblong, obliquely acute at apex of upper angle, obliquely rounded at lower side of sub-5-nerved base, main-nerve branching slightly upwards, 35 in. long, 15 in. wide; sessile. *Inflorescence* capitate, the heads usually in pairs from axils all along the branches, 35 in. in diam.; peduncles very slender 75–1 in. long, beset with spreading prickles. *Calyx* campanulate, teeth short valvate. *Corolla* pink, 1 in. long, petals connate below valvate above. *Stamens* 4, much exerted, filaments 3 in. long, filiform, free, anthers without glands. *Ovary* stalked; style filiform, stigma very small terminal. *Pods* flat, slightly recurved, membranous, 6–1 in. long, 2 in. across, made up of 3–5 1-seeded joints that fall away when mature from the persistent armed sutures, which are clothed with weak spreading yellowish-white bristles 15–2 in. long. DC. Prodr. II, 426; Roxb. Hort. Beng. 41; Wall. Cat. 5292; Roxb. Flor. Ind. II, 564; Miq. Flor. Ind. Bat. I, 43; Bak. in Flor. Brit. Ind. II, 291. *The Sensitive Plant*.

**Andamans**; extremely common throughout the settlement. **Penang**; overspreading the whole coast-line, Curtis 1237! Singapore; T. Anderson 32! Maingay 584! Distrib. Throughout S.-E. Asia, probably originally introduced from America.

This, having been introduced into the settlement at Port Blair in the Andamans, has there spread so much as to have become extremely troublesome, a large labour force has to be constantly told off to try and keep it in check; its complete eradication is apparently hopeless.

2. *Mimosa sepiaria* Benth. in Hook. Journ. Bot. IV, 395. A woody shrub with puberulous branchlets soon glabrescent, sparingly armed with strong compressed slightly recurved prickles. *Leaves* 2-pinnate, rachis slightly downy 2 in. long (the petiolar part 75 in long); pinnæ 6–8-jugate, 1.5 in. long, subsessile, upper side pubescent; leaflets 12–20-jugate, rigidly coriaceous, narrow-ligulate, caducous, 25–35 in. long, 1–15 in. wide, subacute at apex, obliquely truncate at lower side of sub-5-nerved sessile base, main-nerve branching considerably upwards. *Inflorescence* capitate, the heads 25 in. in diam., arranged in
ample patent terminal panicles with puberulous main-rachis and compound puberulous lower branches; the whole 6–8 in. long, 4–6 in. wide, peduncles of individual heads 5–75 in. long. **Calyx** campanulate, teeth short, valvate. **Corolla** 0.05 in. long. **Stamens** 8–10, filaments free, 0.1 in. long. **Ovary** stalked; style filiform, stigma small terminal. **Pod** with a slender stalk 2 in. long, flat, almost straight, membranous, 1.5–2 in. long, 25 in. wide, made up of 6–8 glossy, finely reticulated 1-seeded joints that fall away when mature from the persistent unarmed sutures. Bak. in Flor. Brit. Ind. II, 291. **M. nigrescens** Maingay MSS.

**Singapore; Maingay 582! Anderson 34! Kurz! King! Distrib.** Occurs also in China and in Borneo, but no doubt is an introduction from America; it is only found near clearings.

65. **Acacia** Willd.

Spinose or prickly shrubs or trees, erect or climbing. **Leaves** bipinnate, with minute leaflets. **Flowers** in globose heads or cylindrical spikes, hermaphrodite or polygamous, usually pentamersous. **Calyx** campanulate or funnel-shaped, shortly toothed. **Petals** exserted, united in the lower half. **Stamens** free, indefinite, much exserted; anthers minute, not gland-crested. **Ovary** stalked or sessile, many-ovuled; style filiform, stigma minute capititate. **Pod** ligulate or oblong, not jointed, usually compressed and dry, dehiscent or indehiscent, rarely turbid or subcylindrical, sutures straight or wavy, not thickened. Species 430; the leafy groups cosmopolitan in the tropics, the great phyllodineous series, which comprises two-thirds of the genus, almost restricted to Australia. None of the species with spicate inflorescence occur within our area.

Erect shrubs or small trees, with stipular spines, bracteate pedicels and cylindrical pods

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Climbing shrubs, with non-spinescent stipules, and with prickly branches; pedicels naked; pods flat:

| Flower heads | 1.0–2.0 in. across; leaflets narrow oblong |
| Flower heads | 2.0 in. across; leaflets linear |

1. **Acacia Farnesiana** Willd. Sp. Pl. IV, 1083. A shrub or low tree with slender zig-zag branches marked with grey dots. **Leaves** 2-pinnate; rachis downy 1–1.5 in. long with a minute petiolar gland; pinnae 8–16, 1–1.5 in. long; leaflets 10–20 pairs, green, subglabrous, rigidly coriaceous, linear-oblong, 25 in. long, 0.05 in. wide; stipules spinescent seldom over 25–35 in. long on the branchlets, persisting and on old branches sometimes over 1 in. long, polished, white, straight. **Flowers** in rounded heads 0.35 in. in diam., fragrant, bright yellow; peduncles crowded on axillary nodes, slender, puberulous, 75–1 in. long, with a ring of small bracts at or near the apex. **Calyx** campanulate, minute.

Planted in some of the provinces:—Andamans; Kurz! Penang; Porter (Wall. Cat. 15264F)! Pahang; Katapong, Ridley 1246! Distr. Cosmopolitan (perhaps usually planted) in the tropics.

2. Acacia pseudo-intsia Miq. Flor. Ind. Bat. I, 12. A large scandent shrub 12–20 feet high, the branches and branchlets armed with many small sharp recurved glossy dark-coloured prickles; young branches blackish, puberulous or glabrescent. Leaves 2-pinnate, rachis 8 in. long, puberulous or glabrescent, strongly armed with recurved prickles beneath, petiolar portion 2-5 in. long with a large projecting gland close to base on its upper surface; pinnae 8–12-pairs, 2-5–3-5 in. long, the upper 2–4 pairs with glands between their bases; leaflets 30–35 pairs, sessile, linear-oblong, obtuse, ′4 in. long, ′15 in. wide, rigidly subcoriaceous, glabrous above, adpressed-puberulous or glabrous beneath. Flowers in rounded heads, ′4 in. in diam., yellow, peduncles ′5–75 in. long, slender, puberulous, naked, in clusters of 2–4, rarely solitary along a panicle extending 10–12 in. beyond the leaves; bracts large, ovate-acute or acuminate, ′2–25 in. long. Calyx puberulous, ′07 in. long. Corolla ′1 in. long. Pod not seen.

Var. typica; bracts puberulous, pedicels ′5 in. long, leaflets adpressed-puberulous beneath.

Singapore; Changhi, Hullett 835! Ridley 3631! Bukit Timah, Ridley 6177! Distr. Sumatra, Java.

Var. ambigua Prain; bracts glabrous, pedicels ′75 in. long, leaflets quite glabrous beneath.

Andamans; very common, King’s Collectors!

In externals the Singapore plant much resembles A. caesia W. & A., the Andamans one at the same time resembling A. Intisia Willd. except in having the leaflets crowded. Closer examination shows, however, that the natural alliance of the species is rather with the group of forms aggregated under the name A. pennata; the large bracts, in particular, make all further comparison with the group to which A. Intisia belongs an impossibility.

Its nearest ally is a species from Northern Indo-China described by Kurz under the name A. pruinescens from which this differs in having broader leaflets, in J. II. 32.
having no bloom on the young branches, and particularly in having the large petiolar gland very near the base of the petiole; the corresponding gland in *A. pruinescens* is about an inch above the base. The two species *A. pseudo-Intsia* and *A. pruinescens* taken together form a group that is almost exactly intermediate between the *A. Intsia* and the *A. pennata* groups.

3. **Acacia pennata** Willd.; Bak. in Flor. Brit. Ind. II, 297. A large scandent bush or strong creeper, sometimes extending for 50–60 feet, branches and branchlets armed with many small sharp slightly recurved glossy brown or blackish prickles, young twigs faintly pubescent or glabrous. *Leaves* 2-pinnate; the rachis 6 in. long, glabrous or puberulous, prickly beneath or unarmed, petiolar portion 75–1 in. long with a projecting large or small gland '4–5 in. above the base; pinnae 20–40 pairs, 1.25–2 in. long, the upper pairs with glands between their bases; leaflets 35–40 pairs, sessile, linear, '2–3.5 in. long, under '05 in. wide, firm, glabrous. *Flowers* in rounded heads '2 in. in diam., white or pale-yellow, peduncles 5–7 in. long, slender, puberulous, naked, in clusters of from 4–8 along a panicle extending 12–15 in. beyond the leaves; bracts small linear, '1 in. long. *Calyx* glabrous, '05 in. long, campanulate. *Corolla* '07 in. long. *Pod* linear-oblong, acute or acuminate at both ends, 4–6 in. long, 75–1 in. wide, flat, very thin, with a stalk under '2 in. long, the sutures slightly thickened. *Seeds* flat, ovate, '4 in. long, '2 in. wide, under '1 in. thick, faintly areolate, dull-brown, smooth.


**Andamans**: very common. **Distrib.** India, Indo-China.


**Penang**; Porter (Wall. Cat. 5255)! Malacca; Griffith! Maingay 585! Derry 166! Holmberg 838! Hervey! Perak; Scortechini! Kunstler 482! 3332! 4876! 5504! 10300! **Distrib.** Malay Archipelago.

Following the *Flora of British India* these two very distinct plants are here treated as varieties of *Acacia pennata*. That *A. pluricapitata* is deserving of specific rank seems almost certain, and it is probably equally certain that the plant here termed **Var. arrophula** should also be separated specifically from *A. pennata*. The point can only be satisfactorily settled in a monographic revision of the Indian *Acacias*; pending the preparation of such a revision it seems better to deal with the forms as they have been dealt with by Mr. Baker. The true *A. pennata* of Willdenow is unknown from our area.
66. **Serianthes** Benth.

Unarmed trees. **Leaves** 2-pinnate. **Flowers** racemose, very large, 5-merous, mostly hermaphrodite. **Calyx** deeply campanulate, deeply toothed. **Petals** adnate to the base of the staminal column, free above. **Stamens** monadelphous, very numerous; anthers minute. **Ovary** sessile, many-ovuled; style filiform, stigma minute capitate. **Pod** large oblong, almost woody, somewhat turgid, indehiscent, septate between the seeds. Species 2, one in Malaya, one in Polynesia.

**Serianthes grandiflora** Benth. in Hook. Lond. Journ. Bot. III, 225. A large unarmed tree with rusty-puberulous young branches. **Leaves** evenly 2-pinnate, rachis puberulous 7–9 in. long, with a large sessile gland 25 in. above base and with small glands between the bases of each pair of pinnae; pinnae 3–8-jugate, 3–4 in. long, puberulous; leaflets 6–12 pairs, obliquely oblong, subfalcate, obtuse, base obliquely truncate, 5–1 in. long, 3–6 in. wide, rigidly subcoriaceous, glossy-green above, paler dull reticulate-veined beneath, glabrous on both surfaces. **Flowers** few, in axillary corymbose panicles 4–6 in. long, main-rachis puberulous, peduncular portion 2 in. long, the branches puberulous 5–7 in. long, each 2–4-fld; pedicels densely tomentose 2 in. long; buds oblong or globose, 35 in. across. **Calyx** wide-campanulate, 5 in. long, 35 in. wide with triangular teeth one-third the length of tube, uniformly densely felted externally. **Corolla** yellowish-white, 1.5 in. long, the segments densely woolly externally, glabrous within. **Filaments** over 500, 2.5 in. long. **Pod** turgid, 6 in. long, 2.25 in. wide, 75 in. thick, epicarp thin brittle, endocarp woody; sutures thin, valves septate and slightly depressed between the seeds. **Seeds** 6–8, narrowly ovate, the long axis across the pod, 75 in. long, 3 in. across, 15 in. thick, testa dark-brown, smooth but hardly shining, seed faintly areolate, Miq. Flor. Ind. Bat. I, 40; Bak. in. Flor. Brit. Ind. II, 301. Inga Finlaysoniana Wall. Cat. 5284. I. grandiflora Wall. Cat. 5285. I. ventricosa Grah. in Wall. Cat. 5266 in part.

**Singapore; Wallich / Finlayson. Malacca; Griffith / Maingay 580!**

Distrib. Malay Archipelago.

67. **Enterolobium** Mart.

Erect unarmed trees. **Leaves** bipinnate. **Flowers** in globose heads, 5-merous, usually hermaphrodite. **Calyx** campanulate or subcampanulate, shortly toothed. **Corolla** subinfundibuliform, the petals connate to the middle. **Stamens** monadelphous much exserted; anthers small not gland-crested. **Ovary** sessile many-ovuled; style filiform, stigma minute capitate. **Pod** strap-shaped straight or curved, indehiscent, mesocarp spongy at length hardening, or pulpy and soft, endocarp firm
forming continuous septa between the seeds; the sutures thickened. Species 5 or 6, all American; one introduced and now becoming subspontaneous in S.-E. Asia.

**Enterolobium Saman** Prain. A large spreading tree 40–60 feet high, stem 3 feet or more thick, branches pubescent. *Leaves* evenly 2-pinnate, rachis 4–6 in. long, pubescent, basal gland none but with glands between the bases of each pair of pinnae, single in the upper, paired in the lower half of the rachis; pinna 4–6-jugate, 2–3 in. long, rachises pubescent with glands between each pair of leaflets; leaflets decreasing downwards, 6–8-jugate in the upper, 3–5-jugate in the lower pinna, ovate-oblong rigidly coriaceous, glabrous above, densely pubescent beneath, apex obtuse, base obliquely truncate, main-nerve diagonal, terminal 1\(\frac{1}{2}\) in. long, \(8\) in. wide; stipules small lanceolate, densely pubescent, deciduous. *Flowers* in dense heads 1\(\frac{1}{2}\) in. across, on pubescent pedicels 2\(\frac{1}{2}\) in. long, solitary or 2–3 together in the axils of the upper leaves, each with a lanceolate pubescent bract 1\(\frac{1}{2}\) in. long and a slender puberulous pedicel 0\(\frac{1}{2}\) in. long. *Calyx* infundibuliform, densely pubescent externally, 1\(\frac{1}{2}\) in. long, teeth wide-triangular, short. *Corolla* pinkish, infundibuliform, 3 in. long, tube puberulous outside, teeth ovate, externally pubescent, half as long as tube. *Filaments* pink, 1\(\frac{1}{2}\) in. long, connate at base in a tube one-third as long as that of corolla. *Pod* straight, 6–7 in. long, \(6\) in. wide, \(35\) in. thick, valves slightly depressed between the seeds, sutures thickened, epicarp thinly crustaceous, mesocarp pulpy, endocarp firmly crustaceous and forming continuous septa between the seeds. *Seeds* 16–20, transversely ovate, \(4\) in. long, \(25\) in. wide, \(2\) in. thick, testa smooth brown shining with distinct duller darker-brown ovate areola, without arillus. *Inga Saman* Willd. Sp. Pl. IV, 1024. *Pithecolobium Saman* Benth. Hook. Lond. Journ. Bot. III, 216. *Calliandra Saman* Griseb. Fl. W. Ind. 225. The Rain Tree.

Planted in many of the provinces and now appearing subspontaneously, at least in the Andamans and Nicobars. A native of Guiana; introduced in the West Indies whence it has been sent to Asia.

This species, though of much more recent introduction than *Pithecolobium dulce*, is also of some economic importance, owing to its readiness of growth and the rapidity of which it thrives, as compared with most native species, when used in the re-afforestation of abandoned clearings. The sweet pulpy pods, of which it produces an abundant crop, are greedily eaten by cattle.

When Mr. Bentham tentatively placed the species in *Pithecolobium* he explained that the tree was unknown to him. Dr. Grisebach, who had the advantage of studying the tree in the living state, at once recognised that it cannot possibly be a *Pithecolobium* and placed it in *Calliandra*, no doubt owing to the sutures of its pods being thickened as in that genus. That the pods are septate and indehiscent militates however against his proposal, for the crucial test of a *Calliandra* is that its pods, which may not be septate, shall dehisc elastically from apex to base. The Index
Kewensis has therefore replaced the 'Rain-Tree' in *Pithecolobium*; this, however, is a step which in turn similarly mars the generic limits of that group since the pods of *Pithecolobium* must not be septate. The writer places the species with more confidence in *Enterolobium* owing to its possessing the septate pods characteristic of that genus. The pulpy, in place of spongy at length indurated mesocarp, and the shortly pedicelled in place of sessile florets, cannot, in view of the variability of these characters within adjacent genera, be considered more than comparatively trivial deviations from the hitherto recognised characters of *Enterolobium*. The writer is unable, both on academic and on practical grounds, to agree with the proposal, made by some botanists, to amalgamate *Calliandra*, *Pithecolobium*, *Enterolobium* and *Albizia*.

68. **Calliandra Benth.**

Shrubs or trees. *Leaves* bipinnate, with small or large leaflets. *Flowers* in globose heads, polygamous, 5-merous. *Calyx* campanulate, toothed. *Corolla* funnel-shaped, deeply 5-cleft. *Stamens* indéfinite, monadelphous at the base, filaments filiform much exserted; anthers minute, not gland-crested. *Ovary* stalked, many-ovuled; style filiform, stigma minute capitate. *Pod* strap-shaped, slightly falcate, flat, rigidly coriaceous, the valves dehiscing with elasticity, bordered by much-thickened sutures, continuous within, narrowed gradually to a short stalk. *Species* 80, mostly tropical American.

**Calliandra umbrosa** Benth. in *Gen. Pl.* I, 597. A tree 20–25 feet high, with slender glabrous branches and sometimes with small suberect stipular spines. *Leaves* 2-pinnate, petiole 1·25 in. long, glabrous; pinnae 2, terminal, each with rachis 1·25–1·5 in. long, with a pair of large sessile, oblique, oblong, rigidly subcoriaceous end-leaflets, acute at apex, cuneate at base, 6 in. long, 2 in. wide and with an odd similar but much smaller leaflet 1·5–2 in. long, '5–75 in. wide, on the outer side below; leaflets all glabrous on both sides, rather distinctly nerved beneath and each with a gland on rachis at base. *Flowers* sessile in small dense globose heads '4 in. across, with minute bracts, on short ascending slender peduncles '4–5 in. long, usually several together from old nodes on the branches; elongating in fruit to 1·5–2 in. *Calyx* campanulate, teeth valvate. *Corolla* 12 in. long, yellow, inodorous. *Pod* 6–9 in. long, '75–1 in. wide, smooth, finely veined, the valves with elevated rounded thickened edges. *Seeds* 6–9, ovate, '5 in. long, '35 in. wide, long diameter transverse, very much compressed; testa smooth shining thin crustaceous brown. Bak. in *Flor. Brit. Ind.* II, 302. *Inga umbrosa* Wall. Pl. As. Rar. t. 124; Cat. 5273. *Albizia umbrosa* Benth. in *Hook. Lond. Journ.* III, 86.

**Penang**; *fide* Baker in *Flora of British India*.

There are no Malayan specimens at Calcutta; Mr. Baker, however, alludes to the existence of Penang examples.
Large trees or, sometimes, (A. myriophylla) shrubs usually climbing. Leaves bipinate. Flowers (in the Indian species) in globose heads, sessile or pedicellate, usually pentameros and all hermaphro-dite. Calyx campanulate or funnel-shaped, distinctly toothed. Corolla funnel-shaped, petals firmly united below the middle. Stamens indefinite, monadelphous at the base, filaments several times the length of the corolla; anthers minute, not gland-crested. Ovary sessile or shortly-stalked; style filiform, stigma capitate minute. Pod large, thin, flat, strap-shaped, straight, indehiscent or subindehiscent, continuous within, the sutures not thickened. Distrib. Species 25-30, spread through the Tropics of the Old World.

Shrub, often climbing, the pulvinus below leaf-base enlarging into a firm short recurved hook; the leaflets (numerous) narrowly linear with a median main-nerve ... 1. A. myriophylla.

Erect usually large trees, pulvinus not accrescent; the leaflets ovate or oblong, or if linear with the main-nerve nearly marginal:

- Main-nerve close to upper margin; leaflets (numerous) dimidiate-lanceolate; stipules very large; (flowers shortly pedicellate) ... ... ... 2. A. stipulata.

- Main-nerve removed one-third to one-half the width of leaflet from upper margin; leaflets ovate or oblong; stipules small:

Leaflets never more than 2 in. long, rather numerous:

- Glands confined to main-rachis of leaf, leaflets sessile or sub sessile:

Florets pedicellate:

- Pinnae never more than 4-jugate:

Umbels small, few-fl., pedicels longer than calyx ... ... ... 3. A. littoralis.

- Umbels large, many-fl., pedicels not longer than calyx ... ... ... 4. A. Lebbek.

Pinnae 6-12-jugate; indehiscent pod very large and sinuate along the sutures ... ... 5. A. pedicellata.

Florets sessile; main-nerve nearer upper than lower leaf-margin ... ... ... 6. A. odoratissima.

Glands on the secondary rachises as well as on the main-rachis, leaflets shortly petiolulate; (florets sessile) ... ... ... 7. A. procera.

Leaflets few, large; the terminal pairs 4 in. long; (main and secondary rachises both gland-bearing, pinnae normally 1-jugate) ... ... ... 8. A. lucida.

1. ALBIZZIA MYRIOPHYLLA Benth. in Hook. Lond. Journ. Bot. III, 90. An evergreen unarmed shrub or strong climber 15-20 feet long if climbing, 8-12 ft. high if unsupported, the young shoots shortly tawny-
pubescent, bark thinnish, dark-brown, much lenticelled. Leaves evenly 2-pinnate; rachis 5–9 in. long, densely tawny-pubescent, with a medium sessile gland very near the base and with 2–4 small glands between the bases of as many pairs of distal pinnae, stipules subpersistent, subulate, puberulous, .15 in. long, deciduous; pulvinus hardening into a recurved almost woody hook; pinnae 12–20-jugate, 1–1.5 in. long, their rachises sparsely pubescent; leaflets 35–50 pairs, crowded, linear, sessile, slightly falcate, apex subacute, base slightly oblique, rigidly chartaceous, .2–.25 in. long, .07 in. wide, dark-green and glabrous above, margin ciliolate or glabrous, paler beneath and glabrous or sometimes sparsely adpressed-pubescent; midrib central. Flowers in small 10–20-fld. heads .5 in. across, pale-yellow with greenish-yellow stamens, or white; peduncles slender puberulous, .4–.5 in. long, solitary or 2–6 together on nodes in the upper half of pubescent corymbose branchlets 1–1.5 in. long, with pubescent ovate-acute bracts .2 in. long, usually accompanied by 2 subulate stipules like those of the leaves, the branchlets disposed in terminal leafy panicles 4–8 in. long, 2–4 in. wide; pedicels 0. Calyx campanulate, teeth small, ovate-acute, tube externally densely pubescent, .04 in. long. Corolla infundibuliform, yellowish or white, .15 in. long, teeth ovate-lanceolate one-third the tube and like it uniformly externally softly puberulous. Filaments few, 12–20, united below in a white tube half as long as that of corolla, free portion greenish or white, .4 in. long. Pod dehiscent, 4–5 in. long, .8–1.2 in. wide, thin, flexible, bright-brown, smooth and shining; opposite the seeds darker and distinctly reticulated. Seeds 6–8, obovate, apex obtuse, base cuneate, .25 in. long, .2 in. wide, much compressed, testa dull-brown, smooth, distinctly areolate. Bak. in Flor. Brit. Ind. II, 300. Acacia myriophylla Grah. in Wall. Cat. 5242. A. foliolosa Grah. in Wall. Cat. 5241. Mimosa microphylla Roxb. Fl. Ind. II, 549.

Kedah; Langkawi, Curtis 2135! 2801! Penang; Curtis 718! 1702 Kunstler 1444! Perak; Scortechni 28! 128!

This does not become a tree. When a climber it has not the assistance, as in climbing Acacias, of prickles; it develops however hard recurved hooks, that help to serve as hold-fasts, from the thickening of the pulvini at the leaf-bases.

2. Albizzia stipulata Boiv. Enycl. XIX Siécle II, 33. An unarmed evergreen tree, often 100–120 feet high, young shoots finely grey-downy, bark dark-grey rugose, stem 3–4 feet thick; heart-wood dark-brown. Leaves evenly 2-pinnate; rachis 6–18 in. long, pubescent, with a large sessile gland 1 in above the base and with 2–6 small between the bases of as many distal pairs of pinnae; pinnae 6–20-jugate, the secondary rachises tawny-pubescent, 2.5–4 in. long; leaflets 20–45-jugate, dimidiately falcate-lanceolate, sessile, apex acute slightly pointed
forward, base obliquely rounded on lower margin, membranous, 25–3 in. long, 1 in. wide, pale-green glabrous above, glaucous finely downy beneath, the midrib very close to the upper margin; stipules very large, usually 1–1.5 in. long, 4 in. wide, obliquely cordate-acuminate, velvety-pubescent beneath, puberulous above. Flowers in numerous heads 1.75 in. across, yellowish-white, the stamens often more or less flushed with pink; peduncles pubescent 1.25 in. long, solitary or in fascicles of 2–4 on nodes in the upper half of pubescent racemose branchlets 3–5 in. long, with large pubescent deciduous ovate-acuminate bracts 5 in. long, the branchlets in panicles 8–12 in. long, 6–8 in. wide, at the ends of leafy branches; pedicels 0.05 in. long, pubescent. Calyx 1 in. long, infundibuliform, teeth short acute, densely uniformly pubescent externally. Corolla 2 in. long, teeth lanceolate acute, half as long as tube and like it densely-pubescent outside. Filaments connate at the base in a yellowish tube longer than that of corolla, the free portion of filaments yellowish with a pink flush, or white, .75 in. long. Pod indescent 5–6 in. long, 75–1 in. wide, thin, rigid, pale-brown, dull; valves faintly wide-reticulate. Seeds 8–10, ovate, .25 in. long, .2 in. wide, much compressed, testa dark-brown, smooth, dull, not areolate. Benth. in Hook. Lond. Journ. Bot. III, 92; Bedd. Fl. Sylvat. t. 55; Miq. Flor. Ind. Bat. I, 28; Bak. in Flor. Brit. Ind. II, 300. Acacia stipulata DC. Prodr. II, 469; Wall. Cat. 5326; W. & A. Prodr. 274. A. Smithiana Wall. Cat. 5237. A. marginata Ham. in Wall. Cat. 5243. Mimosa Smithiana Roxb. Hort. Beng. 40; Fl. Ind. II, 550. M. stipulata Roxb. Hort. Beng. 40. M. stipulacea Roxb. Fl. Ind. II, 549. Arthrosprion stipulatum Hassk. Retzia I, 212. The White Siris.

**Andamans; rare, E. H. Man! Nicobars; Kamorta, common, Kurs!**

**Distrib. Throughout South-Eastern Asia.**

This was once found by Mr. Man in the forests of South Andaman many years ago; none of the numerous collections made in the group during recent years contain any specimens of the species. It becomes quite common again in the Nicobars and in the Malay Archipelago it seems to be as plentiful as it is in India and Indo-China. But from the intervening Malay Peninsula no collector has ever sent a specimen to Calcutta.

Miquel describes three varieties:—

(a.) typica with greenish stamens.
(b.) vegeta with pinkish stamens.
(c.) stipulis persistentibus with permanent, more pubescent stipules.

But his varieties (b.) and (c.) are only forms of one tree and that tree is what constitutes in reality typical A. stipulata. What Miquel treats as Var. typica is Roxburgh’s *Mimosa Smithiana*, which has small stipules, and is, if not a distinct species, certainly a very good variety. The Andamans and Nicobars tree is true A. stipulata; the other form has not been met with in our area.
3. **Albizia littoralis** Teysm. & Binnend., Nat. Tijds. Ned. Ind. XXIX, 259. An unarmed tree 30–40 feet high, young branches glabrous, lenticelled; with ash-grey bark. *Leaves* evenly 2-pinnate; rachis glabrous, 4–8 in. long, with a large sessile gland near base; pinnae 2–4-jugate, the distal pair 4–5 in. long with leaflets 5–6-jugate, the proximal 3–4 in. long, leaflets 3–4-jugate; leaflets elliptic-oblong or obovate, obtuse or retuse, base obliquely rounded, or rounded on lower cuneate on upper margin, subsessile, submembranous, glabrous pale-green above, faintly puberulous glancescent beneath, 75–125 in. long, 4–75 in. wide. *Flowers* in small few-fl.d. umbels, under 5 in. across, white with pink stamens; peduncles slender the longest 1·5 in. long, glabrous or puberulous, cortyledony arranged on leafless branches 1–3 in. long, themselves disposed in a terminal corymbose panicle; pedicels 2–25 in. long, very slender, glabrous. *Calyx* 1 in. long, teeth obscure, tube pubescent. *Corolla* 2 in. long, teeth ovate-lanceolate, externally closely grey-silky as is the tube. *Filaments* connate at base in a uniform white tube shorter than corolla, the free portion of filaments pink. *Pod* 6–7 in. long, 1 in. wide, linear, tapering at both ends, flat, much compressed, glossy pale greenish-brown, uniformly wide-ri ticulate. *Seeds* 12–16, transversely oval, much compressed, '4 in. long, '2 in. wide, '1 in. thick, testa smooth brown. Kurz, Journ. As. Soc. Beng. XIV, 2, 129.

**Nicobar**; Nancowry, Jelinek! King’s Collector! Great Nicobar, Jelinek. Penang; Pulo Jungah, Curtis! Distr. Malay Archipelago.

The Nicobarese name is “Uunjia”; the name in the Moluccas is “Kello-laut.”

4. **Albizia Lebbek** Benth. in Hook. Lond. Journ. Bot. III, 87. An unarmed deciduous tree 40–70 feet high, young shoots puberulous or almost glabrous; with pale bark. *Leaves* evenly 2-pinnate; rachis 3–9 in. long with a large sessile gland near base; pinnae 2–3- (less often 4-, rarely 1-) jugate, 4 in. long with a gland on the main-rachis above the bases of the distal, sometimes of the 2 distal pinnae; leaflets 5–9-jugate, often with glands between their bases, elliptic-oblong or the upper more oblique and obovate-oblong, very obtuse or retuse, base obliquely rounded, or rounded on lower, cuneate on upper margin, subsessile, glabrous above, glabrous or faintly pubescent beneath, reticulate, pale-green, 1–2 in. long, 5–75 in. wide. *Flowers* in globose subcapitate umbels 1·25 in. across, white and fragrant; peduncles 2–4 in. long, glabrous or puberulous, solitary or 2–4 together from axils of upper leaves, or corymbose at the ends of short leafless branches; pedicels 1–15 in. long, slender, puberulous. *Calyx* 1·5–2 in. long, teeth short deltoid, tube glabrous or puberulous. *Corolla* 3 in. long, tube glabrous, the teeth ovate-lanceolate, externally pubescent. *Filaments* connate at base in a uniform tube shorter than corolla. *Pod* 4–12 in. long, 1–2 in.

Planted in some of the provinces:—Andamans; Kurz! Penang; Curtis 296! Distrib. Planted throughout the tropics; appears to be wild in the drier regions of Asia and Africa.

5. ALBIZIA PEDICELLATA Bak. ex Benth. in Trans. Linn. Soc. XXX, 563. A tall erect unarmed tree sometimes over 100 feet high, young shoots dark-coloured, faintly rusty-puberulous, bark dark-coloured; stem 3 feet in diam., heart-wood black. Leaves evenly 2-pinnate; rachis 5–8 in. long, with a large sessile gland 5 in. above base, stipules persisting as two firm recurved thickly coriaceous hooklets; pinnae 6–12-jugulate, 4–6 in. long, the main and secondary rachises alike puberulous; leaflets 12–16-jugulate, oblong-obtuse, sessile, with slightly obliquely rounded base, rigidly subcoriaceous, 5–75 in long, 3–4 in. wide, dark-green above, pale but hardly glaucous beneath, reticulate-veined, quite glabrous on both surfaces. Flowers in many-fld. umbels 75–1 in. across, yellowish-white with green stamens; peduncles slender finely pubescent, 1–1.25 in. long, paneled in fascicles of 2–8 on nodes towards the apices of numerous axillary main-rachises, the nodes sometimes evolved as branchlets 1–2 in. long so as to form compound umbels; main-rachis puberulous, the peduncular portion beneath the flowers 3 in. long towards ends of branches, to 12–15 in. long in the axils lower down; pedicels rusty-pubescent very slender, 25–3 in. long. Calyx 15 in. long, teeth short deltoid, densely pubescent externally. Corolla 3 in. long, teeth ovate-acute externally, densely pubescent as is the tube. Filaments connate at base in a white tube shorter than corolla, free portions of filaments over 1 in. long, bright-green. Pod indehiscent, 12–18 in. long, 2.25–2.5 in. wide, very thin and brittle, pale yellowish-brown, very faintly reticulated opposite the seeds, sinuate-repand along the unthickened sutures. Seeds 6–9, transversely ovate, 25 in. long, 2 in. wide, much compressed, testa smooth dark-brown. Bak. in Flor. Brit. Ind. II, 299.

Perak; Goping, Ulu Bubong, etc. Kunstler 4474! 7988! 10436!
Penang; Waterfall, Curtis 1921! Malacca; Maingay 581! 586! Goodenough, 1796! Singapore; Kranji Road, Ridley 6297!

A very fine species.

6. **Albizia odoratissima** Bentham in Hook. Lond. Journ. Bot. III, 88. A tall erect unarmed tree sometimes 100 feet high, young shoots rather dark-coloured, stem 2-2.5 feet in diam., heart-wood black. **Leaves** evenly 2-pinnate; rachis 6-12 in. long, finely-downy, with a large sessile gland ~5 in. above base and 1-2 small ones between the bases of the distal pairs of pinnae, stipules small quite deciduous; pinnae 3-4-(rarely 2-) jugate, usually 5-8 in. long, the secondary rachises glabrous or pubescent; leaflets 8-24-jugate, obliquely oblong, sessile, obtuse, with very obliquely rounded base, rigidly subcoriaceous, ~75-1 in. long, ~3-5 in. wide, dark-green above, glaucous beneath, reticulate-veined, the midrib removed by one-third from, and parallel to, the upper edge, glabrous or faintly sparsely adpressed-hairy above, more densely adpressed-hairy beneath. **Flowers** in numerous small 10-12-flowered heads, ~75-1 in. across, yellowish-white with pale-yellow stamens; peduncles slender, puberulous, ~75 in. long, solitary or oftener in fascicles of 3-6 on nodes in the upper third of numerous small corymbose branchlets 2-2.5 in. long, themselves in panicles 8-12 in. long at the ends of leafy branches; pedicels ~0. **Calyx** ~05 in. long, teeth obsolete, tube campanulate, externally densely pubescent. **Corolla** ~15 in. long, oblong in bud, teeth ovate-lanceolate, externally densely grey-silky as is the tube. **Filaments** connate at the base in a white tube half as long as that of the corolla, free portion of filaments 4 in. long, pale-yellow. **Pod** indehiscent, 6-9 in. long, 1.2-1.6 in. wide, thin, flexible, warm-brown, glossy or dull, sutures straight or slightly repand; valves uniformly wide-reticulate. **Seeds** 8-12, broadly ovate, ~3 in. long, ~25 in. wide, much compressed, testa smooth, dull greenish-yellow, faintly areolate. Bedd. Flor. Sylvat. t. 54; Bak. in Flor. Brit. Ind. II, 299. **Albizia micrantha** Boiv. Encyc. II, 34; Miq. Flor. Ind. Bat. I, 24. **Acacia odoratissima** Willd. Sp. Pl. IV, 1063; DC. Prodr. II, 466; Wall. Cat. 5234; W. & A. Prodr. 275. **Acacia lomatocarpa** DC. Prodr. II, 467. **Mimosa odoratissima** Linn. f. Suppl. 437; Roxb. Cor. Pl. t. 120; Hort. Beng. 40; Fl. Ind. II, 546. **Mimosa marginata** Lamk. Encyc. Meth. I, 12. The Black Sirsis.

Malacca; (fide Baker). Distrib. India and Indo-China.

Mr. Baker notes the presence of this in Malacca and the species is therefore included here. It is, however, possible that Mr. Baker's specimens are from planted trees, for no botanist has ever communicated Malayan specimens to the Calcutta Herbarium.

An erect unarmed tree 60–80 feet high, young shoots rather pale, much lenticelled, subrugose, glabrous, bark pale-gray outside reddish within, stem 1-5–2 feet in diam.; heart-wood brown. Leaves evenly 2-pinnate; rachis 12–18 in. long, glabrous, with a large gland 25 in. above the base; pinnae 2–6-jugate, 5–6 in. long, secondary rachises glabrous, with sessile ovate gland below the last pair of leaflets; leaflets 6–12 jugate, obliquely ovate to ovate-oblong with petiolules 0-5 in. long, blunt or subacute, the base obliquely cuneate on upper rounded on lower margin; thinly coriaceous, 1-1-5 in. long, (in young trees sometimes 2 in. long) and 6–8 in. wide, dark-green glabrous above, paler beneath and when young densely silvery later sparsely adpressed-pubescent. Flowers in numerous small 20–25-fld. heads, 7-5 in. across, yellowish-white with pale-yellow stamens; peduncles slender puberulous or glabrous, 5 in. long, in fascicles of 3-5, less often solitary on nodes in the upper half of numerous racemose branchlets 3–5 in. long at the ends of leafy branches; pedicels 0. Calyx 1 in. long, teeth triangular distinct, glabrous externally as is the tube. Corolla 25 in. long, teeth lanceolate half as long as tube, densely uniformly pubescent externally. Filaments connate at base in a yellow tube as long as that of corolla, free portion of filaments 35 in. long, greenish-yellow. Pod at length dehiscent, 4–8 in. long, 7–9 in. wide, thin, flexible, bright reddish-brown, glossy, sutures straight, slightly thickened; valves not reticulated. Seeds 6–12, broadly ovate, 35 in. long, 25 in. wide, much compressed, testa smooth pale-brown. Bedd. Flor. Sylvat. 96; Miq. Flor. Ind. Bat. I, 21; Bak. in Flor. Brit. Ind. II, 299. Acacia procera Willd. Sp. Pl. IV, 1063; DC. Prodr. II, 466; W. & A. Prodr. 275. Acacia elata Grah. in Wall. Cat. 5233; Voigt, Hort. Suburb. Calcutt. 261 (not Mimosa elata Roxb.). Mimosa procera Roxb. Cor. Pl. t. 121; Hort. Beng. 93; Flor. Ind. II, 548.

Andamans; Coco Group, common, Prain! Distrib. Indo-China, China; Malaya Archipelago.

It is strange that though this species extends from Nepal to Central China on the north and from Java to the Philippines on the south, it should never have been collected in the Malay Peninsula. More extraordinary still, though quite common at the north end of the Andamans, it seems to be altogether absent from the southern islands of that group and from the Nicobars.

8. Albizia lucida Benth. in Hook. Lond. Journ. Bot. III, 86. An unarmed deciduous tree 50–60 feet high, all parts glabrous, bark thin, greyish, postural, stem 1-1-5 feet in diam.; heart-wood pale-brown. Leaves evenly 2-pinnate, rachis 1-5–2-5 in. long, quite glabrous, with a sessile cup-shaped gland 3–8 in. above the base and with another near the tip; pinnae usually 1-jugate with secondary rachis 2–3-5 in. long, with a gland on upper side 25 in. below the distal pair of leaflets and often with a second 25 in. below the penultimate pair, the leaflets usually 2-
sometimes 3-5; rarely 1-jugate, (when leaflets 3-jugate on the distal pinna, leaves occasionally with a second pair of pinnae with short eglandular rachis under '5 in. long, bearing 1 pair of small leaflets); leaflets ovate to elliptic-oblong or oblong-lanceolate, apex rather abruptly acuminate, base obliquely cuneate, glossy dark-green above, dull paler beneath, glabrous on both surfaces, thinly chartaceous, decreasing downwards, the distal pairs 4 in. long, 1-5 in. wide, the lowest 1-5 in. long, '7 in. wide. **Flowers** in small heads '6-7 in. across, yellowish; peduncles slender, faintly puberulous, '75-1 in. long, solitary or in fascicles of 2-3 in corymbs on nodes in the upper fourth, or subumbellate at the tips, of numerous branchlets 1'5-6 in. long, themselves in corymbose panicles 8-10 in. long and nearly as wide, at the ends of leafy branches; pedicels '05-1 in. long. **Calyx** '07 in. long, campanulate, faintly toothed, externally puberulous. **Corolla** 2 in. long, teeth lanceolate, uniformly sparsely silky externally. **Filaments** connate at base in a white tube slightly shorter than that of corolla, free portion of filaments 35 in. long, pale-yellow. **Pod** at length dehiscent, 6-10 in. long, 1-1'25 in. wide, thin, flexible, pale-brown, dull, reticulated opposite the seeds, smooth glossy elsewhere. **Seeds** 6-8, orbicular, 3 in. in diam., much compressed, testa smooth, pale-brown. Benth. Pl. Jungh. 268; Miq. Flor. Ind. Bat. I, 18; Bak. in Flor. Brit. Ind. II, 299. **Mimosa lucida** Roxb. Hort. Beng. 40; Flor. Ind. II, 544. **Inga lucida** Wall. Cat. 5267 mostly.

**Singapore**: *fide* Baker. **Distrib.** Eastern Himalaya and Indo-China; also Java (*fide* Miquel).

Like *A. odoratissima* this species is included on the authority of Mr. Baker, who records it from the Malayan Peninsula. Dr. Miquel reports it also from Java, but no British or Dutch botanist has ever sent a Malayan specimen to Calcutta.

70. **Pithecolobium** Mart.

**Erect trees. Leaves** abruptly 2-pinnate. **Flowers** in globose heads, rarely in small loose spikes or subumbellate corymbs, usually hermaphrodite and pentamerous. **Calyx** campanulate or funnel-shaped, shortly toothed. **Corolla** funnel-shaped, the petals united below from one-half to two-thirds their length. **Stamens** monadelphous, much exserted; anthers without glands. **Ovary** sessile or stipitate, many-ovuled; style filiform, stigma minute capitate. **Pod** strap-shaped, circinate or rarely falcate or nearly straight, usually dehiscent throughout the lower suture and much twisted in a late stage, sutures not or slightly thickened.

Species about 100; cosmopolitan in the Tropics, about 80% American, only 1-2 African.
Armed with spinescent stipules; seeds arillate; (pinnae of leaves 1-jugate, their rachises gland-bearing; leaflets 1-jugate; pods close-spiral, dehiscing along lower suture, testa of distant seeds thin) ... ... ... 1. P. dulce.

Unarmed; seeds without arillus:

Pod indehiscent, (horse-shoe shaped), seeds (distant) with a thick leathery testa; (pinna 1-jugate, their rachises gland-bearing, leaflets glabrous 2-jugate) ... ... 2. P. confertum.

Pods dehiscing, seeds with a thin crustaceous testa:

Pods straight or slightly falcate, opening along both sutures, valves thick, fleshy, seeds close-set, mutually compressed; (pinnae 1-jugate, their rachises gland-bearing, leaflets glabrous 1-2-jugate) ... ... 3. P. bubalinum.

Pods spirally twisted, opening only along the lower suture, valves coriaceous, seeds distant:

Pods deeply lobed between the seeds half-way down to upper suture or further, dehiscing only opposite the seeds; (pinnae 1-jugate, their rachises gland-bearing, leaflets glabrous 2-3-jugate) ... ... 4. P. lobatum.

Pods only faintly sinuate on lower suture between the seeds, dehiscence along lower suture continuous:

Pinnae 1-jugate without glands on their rachises; (leaflets glabrous): —

Pods large, ‘75 in. broad; seeds somewhat compressed, ‘6 in. long; leaflets 2-jugate apex acute

Pods small, ‘4 in. broad; seeds pisiform, ‘2 in. across; leaflets 3-4-jugate, apex candeate-acuminate ... ... ... ... 5. P. nicobaricum.

Pinnae more than 1-jugate or, if casually 1-jugate then with glands on their rachises; (pods large): —

Pods broad, 1-25 in. wide or more; leaflets very large, glabrous; (pinnae 2-jugate, distal much exceeding the proximal casually absent pair) :

Rachises of pinnae with glands between each pair of leaflets; flowers in dense many-fld. heads ‘75 in. across; leaflets shining on both surfaces; branches of panicle terete

Rachises of pinnae with glands between bases of terminal leaflets only; flowers in few-fld. heads ‘2 in. across; leaflets dull beneath, branches of panicle subcompressed ... ... ... ... 6. P. microcarpum.

Pods narrow, ‘75 in. wide or less; leaflets medium or small, puberulous or pubescent beneath: —

Flowers large (‘5 in. long); pod long-stipitate, seeds with long axis parallel to sutures; (pinnae 2-jugate or casually 1-jugate, leaflets medium; branches terete) ... ... ... ... 7. P. affine.

Pods narrow, ‘75 in. wide or less; leaflets medium or small, puberulous or pubescent beneath: —

Flowers small (under ‘25 in. long); pod short-stipitate, seeds with long axis transverse: —

8. P. ellipticum.

Florets sessile, branches terete; leaflets of distal pinnae 15–20-jugulate; (pinnae 5–8-jugulate, leaflets small, all rhomboid, the distal pairs not much exceeding the others) ... 10. *P. contortum.*

Florets pedicellate, branches angled; leaflets of distal pinnae 5–8-jugulate:

Pinnae 3–6 (rarely 8–10) jugulate; leaflets small, all trapezoid, the distal pairs not much exceeding the others; glands stipitate ...

Pinnae 2–4-jugulate; leaflets medium, terminal cuneate at base, considerably exceeding the subtrapezoid others; glands sessile ... 12. *P. angulatum.*

1. **Pithecolobium dulce** Benth. in Hook. Lond. Journ. Bot. III, 199. A tree 25–40 feet high with glabrous branches; stem 2 feet in diam., the ultimate branchlets pendent, armed with stipular thorns. **Leaves** evenly 2-pinnae, rachis 1 in. long glabrous, basal gland 0, with a sessile small cupped-gland at its apex between the bases of the 1-jugate pinnae, with secondary rachises 25 in. long also gland-bearing at apices between the bases of the 1-jugate leaflets glabrous on both surfaces, pale-green, approximated, oblique obovate-oblong, rigidly subcoriaceous, obtuse or occasionally subacute, 1–2 in. long, 3–7 in. wide; stipules ascending, 2–3 in. long, converted into conical smooth thorns, the main and secondary rachises both shortly produced in acute points. **Flowers** in dense heads 4–5 in. in diam., on puberulous pedicels 25 in. long, solitary or 2–3 together in the axils of small lanceolate bracts 1 in. long, along slender nodiform branchlets slightly zig-zag towards their tips, glabrous or puberulous, striate, from 3–5 in. long, the bracts of the lower two-thirds accompanied by minute stipular spines, those of the lowest fourth often replaced by reduced foliage leaves; the branches arranged in terminal panicles 7–12 in. long, 5–8 in. wide, extending into the upper axils. **Calyx** 05 in. long, grey-downy, subcampanulate, shortly toothed. **Corolla** white, 1 in. long, puberulous tube wide-infandibuliform, rather longer than the ovate-acute teeth. **Filaments** united at base in a tube as long as that of the corolla, shortly exserted. **Ovary** puberulous, shortly stipitate. **Pod** turgid, twisted, dehiscent along the lower suture, both sutures slightly indented between the seeds, 4–5 in. long, 5 in. wide; glabrous, wide-ridged, the valves coriaceous, claret-red when ripe. **Seeds** 6–8, obovate-oblong, 5 in. long, 3 in. wide, 2 in. thick, testa smooth shining purplish, enveloped in a firm edible pulpy pale arillus. **Miq. Flor. Ind. Bat. I, 40; Bedd. Flor. Sylvat. t. 188; Bak. in Flor. Brit. Ind. II, 302. **Mimosa dulcis** Roxb.

Cultivated in most of the Provinces; Penang; *Curtis 59!* SINGAPORE; *Maingay 579!* ANDAMANS: common. NICOBARS; Car Nicobar; King’s Collector!

A native of America whence it has been introduced, by way of the Philippines, to Malaya generally, and to India.

2. *Pithecolobium confertum* Benth. Trans. Linn. Soc. XXX, 304. An unarmed small tree with glabrous leucitcellled branchlets with dark-brown bark. *Leaves* evenly 2-pinnate, rachis glabrous .75 in. long, with no basal gland but with a long elliptic gland just below the bases of the 1-jugate pinnae; rachises of pinnae glabrous, 2 in. long, with glands between the bases of each of the 2 pairs of leaflets glabrous on both surfaces, bright-green shining above, paler dull beneath, rigidly papery, oblong, shortly obtusely pointed, cuneate at base, distal 3-25–3.75 in. long, 1.75–2 in. wide, proximal 2.5 in. long, 1.25 in. wide, lateral nerves 3–4 pairs ascending; petiolules distinct, glabrous, .2 in. long. *Flowers* in small 5–10-fld. heads .75 in. across, on pubescent pedicels .75 in. long, arranged in small axillary and terminal coryms 2 in. long and broad with pubescent main-rachises, 1 in. long or less. *Calyx* sessile .05 in. long, puberulous, campanulate, teeth obsolete; bracteoles minute. *Corolla* white, .25 in. long, tube glabrescent externally, twice as long as the lanceolate teeth, puberulous on the outside. *Filaments* united at base in a tube slightly longer than that of corolla, free portion white, exserted .35 in. *Ovary* glabrous, subsessile. *Pod* indehiscent, slightly turgid, horse-shoe shaped or loosely spirally twisted, 10–12 in. long, 1.5 in. wide, sutures firm not at all indented between the seeds, valves thinly coriaceous, glabrous, shining, faintly wide-reticulate. *Seeds* 11–13, compressed ovate, .75 in. long, .5 in. wide, .25 in. thick; testa brown, dull, areolate on the outside, thick, tough and leathery. Bak. in Flor. Brit. Ind. II, 304. *Albizia splendens* Miq. Flor. Ind. Bat. Suppl. 280.

MALACCA; Griffith 1951! Goodenough 1766! Hervey! DISTRIB. Sumatra (Teysmann 4228)!

This species is remarkable in having pods that do not twist spirally and that are apparently quite indehiscent. The seeds have no true arillus but have a thick softly coriaceous tough coat which apparently takes the place of an arillate structure.

3. *Pithecolobium babalinum* Benth. Trans. Linn. Soc. XXX, 576. An unarmed tree 30 feet high with pale-brown pubescent branchlets and grey bark. *Leaves* evenly 2-pinnate, rachis puberulous .5 in. long, with no basal gland but with a round gland just below the bases of the
1-jugate pinnae; rachises of pinnae '75—1.75 in. long with glands between the 1—2 pairs of leaflets, the leaflets often 1—than 2-jugate, sometimes 1-jugate on one and 2-jugate on the other pinna of the same leaf; leaflets glabrous on both surfaces, bright-green shining beneath as well as above, rigidly papery, oblong-lanceolate, shortly subacutely pointed, cuneate at base, distal 4—5 in. long, 1.75—2.25 in. wide, proximal 2.5 in. long, 1.25 in. wide, lateral nerves 4—5 pairs ascending, petiolules distinct, glabrous, '2 in. long. Flowers in small 5—8-fld. heads '3 in. across, on puberulous very slender pedicels '4—6 in. long, fascicled in the axils of small bracts and subumbellate at the tips of puberulous peduncles '75 in. long, subcorymbosely set on branchlets 2.5 in. long, themselves disposed in terminal and axillary panicles 6—8 in. long, 4—6 in. wide. Calyx sessile '05 in. long, pubescent, campanulate, teeth short, deltoid, bracteoles minute. Corolla white, '12 in. long, teeth lanceolate nearly as long as tube, uniformly puberulous externally. Filaments united in a tube longer than that of corolla, free portion white, exserted, '35 in. long. Ovary pubescent, distinctly stipitate. Pod dark-green inside, reddish outside, dehiscent along both sutures, oblong, straight or falcate, apex obtuse, base obliquely rounded, 3—4 in. long, 1 in. wide, '75 in. thick, sutures thin not at all indented, valves thick, fleshy, foetid, densely shortly velvety externally. Seeds 8—10, crowded, ovoid, with sides flattened from mutual compression, '75 in. long, '4 in. wide and as thick, testa thin crustaceous smooth shining dark-purple; arillus absent. Bak. in Flor. Brit. Ind. II, 304. Inga bubalina Jack, Mal. Miscel. II, 7. 77; Hook. Comp. Bot. Mag. I, 224.

Penang; fide Baker. Malacca; Griffith! Maingay 576! Goodenough 1552! Distr. Sumatra (Jack; Forbes 1801!)

Jack gives the Malay name of this as "Bua Karbau" in Sumatra; Forbes does not give any native name. In Malacca the name given by Griffith is "Ingria," that noted by Goodenough is "Ger dus Padi." The fleshy pod is eaten, in spite of its offensive odour.

4. Pithecolobium lobatum Benth. in Hook. Lond. Journ. Bot. III, 208. A tree 60—80 feet high with spreading crown, stem 15—20 in. thick; branchlets glabrous; bark grey. Leaves evenly 2-pinnate; rachis glabrous '6—1 in. long, with a gland near the middle but none at base or between the bases of the 1-jugate pinnae; rachises of pinnae glabrous 4—6 in. long, with gland between the bases of the 2—3-jugate leaflets; leaflets oblong to oblong-lanceolate, acute, base cuneate, firmly papery, flexible, glabrous and shining on both sides, medium-green, distal pair 5—3 in. long, 2—3 in. wide, proximal 3 in. long, 1.5 in. wide; petiolules glabrous, '25 in. long. Flowers in small 3—5-fld. heads '25 in. across, on glabrous slender pedicels '2—3 in. long, solitary or 2—3 together on nodes with small glabrous bracts along glabrous branchlets 1—4 in. long.


Curtis gives the Malay name in Penang as "Jereng;") Jack gives "Bua Jirina" as the name in Sumatra; Roxburgh uses this name and, perhaps, also the name "Koeringa."

Specimens issued by Javanese botanists as P. bigeminum always belong to this species; P. bigemum does not occur anywhere in the Malayan countries. Hasskori states that the name "Tjering" is, in Java, limited to the eastern parts of the island where alone the tree occurs uncultivated. The cultivated tree in West Java is termed "Djenkol." This last is the only name cited by Koorders and Valeton (Bijdr. I, 268) who say that, though occurring as an escape, the tree is nowhere wild in Java.

Roxburgh, it is to be noted, published two names:—Mimosa Koeringa (Hort. Beng. 40)—this he afterwards described as having seeds covered with edible fleshy pulp; and M. Dijirina (Hort. Beng. 93)—this he never did describe. It is to the former alone that Royle adverts under the name Acacia Koeringa, and it is the latter alone that Jack is careful to cite as synonymous with his Inga Jirina. Of Inga Jirina Jack does not say that the seeds are enveloped in pulp; he is careful, however, to imply that, like I. budalina, its seeds have an arillus, but that the legume
is fleshy and esculent. When therefore Benth and, following him, Miquel describe
the seeds of their *Pithecolobium lobatum*, for which they cite both of Roxburgh's
names, as enveloped in edible pulp, they give a character derived from Roxburgh's
description of *M. Koeringa* only.

On Burmese specimens Sir D. Brandis has noted "fruit sold;" Gallatly
says "edible.....common in the bazaars;" Kurz has said nothing about the fruits
or seeds and has not described the latter; Baker too has refrained from describing
them. Hasskarl in describing the use of the fruits does not say whether it is the
pod or the seed that is employed; he does say that the pulp of the seed dis-
appears when the fruit is ripe!* Koorders and Valeton say that the festid
seeds are eaten cooked. Watt in the *Dictionary of the Economic Products of India* only
quotes Roxburgh. What the actual facts may be it is for Malayan botanists to
declare. Is it the succulent pod, a fleshy pulp, or the seed itself of *Jiring* that
is eaten? And has *Jiring* any pulp at all? If so, is this pulp an arillus?

Roxburgh, though he laboured under the double disadvantage of working in the
East, and of dealing largely with living plants, was nevertheless remarkably given
to being accurate; in spite of the fact that systematists in Europe, whose labours
have been simplified by being confined to dried specimens, propose to unite the two,
the writer thinks it should be left an open question whether there may not be a
*Pithecolobium Koeringa* whose seeds have an edible pulp, and a *Pithecolobium
Jiringa* without a pulp enveloping the seeds. If this be so, these are the names
that should be used to designate the two trees, since the name *P. lobatum*, though the
best to employ so long as the point is in dubiety, must obviously be discarded should
it be found that Roxburgh was right.

5. *Pithecolobium nicobaricum* Prain. A small tree with slender
glabrous zig-zag branchlets with dark greenish-brown bark. *Leaves*
evenly 2-pinnate; rachis *7-5* in. long, glabrous, with a gland just above
the middle but none at base or between the 1-jugate pinnæ; rachises
of pinnae 1.5–2 in. long, glabrous, glandless; leaflets 2- (very rarely 3-)
jugate, ovate-lanceolate, gradually tapering to the acute apex and cune-
ate base, bright-green, glabrons on both surfaces, shining above, duller
beneath, distal pair 3–4 in. long, 1.4–1.8 in. wide, others 1–2.5 in.
long, *5–1*25 in. wide; petiolules distinct, glabrous, 1 in. long. *Flowers*
in small few-fl.d. heads on puberulous pedicels 25 in. long, in terminal
and axillary racemes *75–2* in. long. *Calyx* pubescent, campanulate, *05*
in. long, teeth deltoid, small. *Corolla* and *stamens* not seen. *Pod*
deliscent along lower suture, 5–6 in. long, *75* in. wide, spirally twisted,
valves thickly coriaceous, glabrous, dull, purplish-red, sinuate between
the seeds along the upper margin. *Seeds* 8–10, orbicular-ovate, some-
what compressed, *6* in. long, *5* in. wide, *25* in. thick, testa thin, crust-
taceous, dark-purple smooth shining; arillus absent. *Albizia bubalina*
(*Pithecolobium bubalinum*) Kurz, Journ. As. Soc. Beng. XLV, 2. 129 not

* There is no pulp visible in any of our specimens at Calcutta in any stage of
the pod, whether the specimens come from Burma, the Malay Peninsula, or the
Archipelago.
The Nicobarese name for this tree is "Kawos." Kurz has erred in identifying it with *P. bubalinum* Bth., which it does not much resemble as regards leaves and which it is totally unlike as regards fruits. He has erred still further in identifying it with *P. oppositum* Miq. which he supposed to be identical with *P. bubalinum*. In reality *P. oppositum* has 2-jugate leaves, with leaflets more like those of *P. microcarpus* than like those of either *P. bubalinum* or *P. nicobaricum*, and with the gland on the main-rachis similarly situated. In spite of the fact that Miquel’s specimens have neither flowers nor fruits, the writer thinks they belong to a tree that, though a member of the same group as, is probably quite distinct from, all three species mentioned.


Perak; Scortechini 64! 1978! Kunstler 1297! 5492! 5842! 10354! 10729! 10802! Penang; Porter (Wall. Cat. 5272)! Curtis 1093! Malacca; Griffith 1947! Maingay 567! 574! Goodenough 1413! Derry 1161! Hervey! Singapore; Ridley 1634! 6666! T. Anderson 40! Kurz! Distrib. Sumatra (fide Miquel); Borneo.
This very common species has been compared with \textit{P. bubalinum}; in reality the resemblance is very superficial; the leaves differ in having glandless secondary rachises, the leaflets are quite different in shape and the flowers are also very different; in inflorescence the two species are, however, remarkably similar. The nearest ally is undoubtedly \textit{P. oppositum} Miq., of which neither flowers nor fruits are yet known. The leaflets of the two species are of the same shape and have the same candeate tips but those of \textit{P. oppositum} are rather thinner in texture and have puberulous instead of glabrous petiolules besides being arranged on 2 pairs of pinnae whereas none of our numerous examples of \textit{P. microcarpum} have more than 1 pair of pinnae.

Goodenough gives "\textit{Kradus}" as the Malay name in Malacca.

7. \textit{Pithecolobium affine} Bak. ex Benth. in Trans. Linn. Soc. XXX, 577. A small unarmed tree 15–25 feet high, stem 6–8 in. in diam., young branches rusty-puberulous to pubescent. \textit{Leaves} evenly 2-pinnate, rachis glabrous or puberulous 4–6 in. long, with a large sessile gland 35 in. above the base, and with similar glands between the bases of the 1–2-jugate pinnae; secondary rachises of distal pinnae 6 in. long, with leaflets 4-, (less often 3-) jugate, of proximal pinnae when present 1·5–2·25 in. long with leaflets 2- (sometimes only 1-) jugate, both with glands between the bases of each pair of leaflets; leaflets papery, glabrous on both surfaces, bright-green, glossy, obovate-acute with subequal cuneate bases, diminishing downwards, distal pair 6–7 in. long, 3–3·25 in. wide, proximal 3 in. long, 1·5–1·75 in. wide; lateral nerves 4–6 pairs ascending; petiolules distinct, glabrous, 1·15 in. long. \textit{Flowers} in dense heads 75 in. across, on slender peduncles 6 in. long, arranged singly or in fascicles of 2–3 together along branchlets 3–8 in. long, themselves forming an ample terminal panicle 10–15 in. long and broad. \textit{Calyx} subsessile, minutely bracteolate at the base, 1·15 in. long, tube funnel-shaped, teeth very short, uniformly brown-silky externally. \textit{Corolla} white, 2·5 in. long, uniformly grey-silky externally, teeth ovate-lanceolate, half as long as tube. \textit{Filaments} united in a tube as long as that of corolla, exserted 35 in., pure white. \textit{Ovary} puberulous, shortly stipitate. \textit{Pod} dehiscent along lower suture, spiral, 8 in. long, 1·25 in. wide, hardly sinuate along upper suture, valves thinly coriaceous, glabrous, shining, faintly wide-reticulate, dark-green externally, bright orange-red within. \textit{Seeds} 6–8, transverse, ovate-oblong, 1 in. long, 5 in. wide, 4 in. thick, testa thin crustaceous dark-purple smooth shining; without arillus. Bak. in Flor. Brit. Ind. II, 304.

Malacca; Maingay 577! Hervey! Perak; Kunstler 3406! 3957! 5560! Singapore; Tanjong Bunga, Ridley 6408! Distrib. Burma (Brandis!) ; Borneo.

The pod is given in the \textit{Flora of British India} as 25 in. wide; this may be a misprint for 1·25 in. At all events the fruit of the species of which Maingay n. 577 forms the basis is as now described. The Borneo locality is given doubtfully
by Mr. Bentham; the pod which he describes, and which belonged to his Borneo specimens, evidently agrees very closely with that of the Peninsular plant.

8. _Pithecolobium ellipticum_ Hassk., Retzio I, 225. A tree 15-30 feet high (occasionally higher) branchlets tawny-puberulous soon glabrescent, bark grey. Leaves evenly 2-pinnate, rachis glabrous 3-4 in. long, with a large gland above base and another between the bases of the distal pinnae; pinnae 2-jugulate, rachises of distal pair 4-7 in. long, with small glands between each pair of leaflets except the lowest, of proximal pair often only subopposite always within an inch of base of main-rachis .75-1 in., with gland between the end pair of leaflets; leaflets very large, of upper pinnae 3-4-jugate, distal 6-8 in. long, 2-5-3 in. wide, of proximal 3 in. long, 2 in. wide; leaflets of lower pinnae usually 2-jugate, distal 4 in. long, 1-5 in. wide, lowest 2 in. long, 1 in. wide, the leaflets often unequally-jugate on the corresponding pinnae of the same leaf, elliptic-oblong, apex rather abruptly pointed, base rounded, glabrous on both surfaces, bright green shining above, paler dull beneath; peti- lules glabrous, .25 in. long, lateral nerves 5-8 pairs, ascending. Flowers in very small 2-5-fld. heads 2 in. or less across, on short tawny-puberulous peduncles .25-35 in. long, solitary or 2-3 vertically superposed above the axes of bracts with a large gland, on subcompressed branchlets 1-5-6 in. long, also 2-3 vertically superposed above the axes of larger bracts .25-6 in. long with a large sessile gland and small rudimentary leaflets; the branches of each axil diminishing downwards; branches themselves similarly disposed on a subcompressed tawny-puberulent main-rachis as a terminal panicle 16-20 in. long, 6-12 in. wide. _Calyx_ campanulate, tawny-puberulent, .05 in. long, teeth short obtuse. _Corolla_ yellow, silky, .15 in. long, teeth ovate-lanceolate nearly as long as tube. _Filaments_ united at base in a thick short ring, yellowish, .2 in. long, shortly exserted. _Ovary_ with a short stipe as long as staminal tube. _Pod_ spirally twisted, 3-7 in. long, dehiscent along the lower suture, 1-25 in. wide, valves firmly coriaceous, glabrous, dull, dark-green, at length becoming yellow externally, orange within. _Seeds_ 3-7, oblong, .8 in. long, .6 in. wide, .4 in. thick, testa thin, crustaceous, dark-purple, smooth, shining; without arillus. _Inga elliptica_ Bl. Cat. Gew. Buitenz. 88; Ind. Kew. I, 1216. _Inga Jiringa_ Wall. Cat. 5268 not of Jack. _Inga Clypearia_ Wall. Cat. 5270 B. not of Jack. _Pithecolobium fasciculatum_ Benth. Hook. Lond. Journ. Bot. III, 208?; Miqu. Flor. Ind. Bat. I, 33; Bak. in Flor. Brit. Ind. II, 304. _Albizia fasciculata_ Kurz, Journ. As. Soc. Beng. XLV, 2. 129, excl. syn. _Pithecolobium macrophyllum_ Teysm. & Binnend.

_Nicobars; Kamorta, Kurz! Kedah; Pulo Songsong, Curtis 2604! Pahang; Pulo Chugu, Ridley 2637! Malacca; Griffith! Goodenough 1894! Maingay 571! 578! Perak; Wray 542! 2666! 4171! Scortechini
A very common species for which none of our English collectors have cited a Malay name; Hasskarl and Miquel give the Javanese name as "Kitjang."

This is certainly the _P. fasciculatum_ alike of Baker and of Miquel and is the _Albizia fasciculata_ of Kurz. Mr. Baker moreover quotes Wall. Cat. 5268—the basis of Bentham's species, and Wall. Cat. 5270 B. from Singapore as the same. There is unfortunately no example of either of these Wallichian numbers at Calcutta though there are examples both of the Griffithian and the Malayan Malacca sheets named _P. fasciculatum_ by Mr. Bentham himself. The original description given by Mr. Bentham states that the pinnae of _P. fasciculatum_ are 1-jugate, and the account of the species being incomplete in other respects it seems better to treat the identity of Bentham's plant with Hasskarl's one as doubtful. As regards Hasskarl's plant no dubiety is possible; his description is very complete and accurate and there is besides an authentic example of his species in the Calcutta Herbarium. Since in any case Hasskarl's name conserves the oldest specific epithet, it may be better to continue its use even if it should turn out that Bentham's _P. fasciculatum_ is really the same thing.

Mr. Kurz's identification of _P. macrophyllum_ T. & B., with this species cannot be sustained, for Teysmann's tree is a very distinct one with pods lobed as in _P. lobatum_ though with leaves very different from those of _P. lobatum_; the leaflets while much larger than, considerably resemble those of _P. ellipticum_. Mr. Kurz's notice of _P. macrophyllum_ T. & B., in 1876, appears to be the earliest mention of the plant. As another species from America, _P. macrophyllum_ Spruce, was published in 1875, it is necessary to re-name Teysmann's plant _P. Teysmannii_.

By a _lapseus calami_ the _Index Kewensis_ gives _Inga elliptica_ Bl. as the name, _Pithecolobium ellipticum_ Hassk. as a synonym, for our species; the reverse is the actual state of affairs. The tree has not been sent to Calcutta from Penang or from Singapore during recent years.

9. _Pithecolobium Kunstleri_ Prain. A tree 20–30 feet high, with spreading branches; branchlets slightly pubescent, stem 8–12 in. thick, bark brown. _Leaves_ evenly 2-pinnate, rachis puberulous 1·5–2·5 in. long, with 1 or 2 large elliptic glands some distance below the bases of the 1 or 2 pairs of pinnae; rachises of terminal pinna 4 in. long with large glands some distance below the bases of the 3 pairs of leaflets, basal rachises when present 5 in. long with a gland some distance below the 1-jugate leaflets; leaves in the inflorescence sometimes small with short 1-jugate pinnae and small 1-jugate leaflets; leaflets ovate with rounded bases and rather long caudate-acuminate blunt apices, pale yellowish-green, glabrous shining above, dull uniformly sparsely adpressed-puberulous beneath, distal pair 3–4·5 in. long, 1–2 in. wide, proximal 1–2 in. long, 5–1 in. wide; those of the basal pinnae 1·5–2·5 in. long, 1–1·5 in. wide; petiolules puberulous, 1·5 in. long. _Flowers_ in 4–8-fld. heads 5–75 in. across, on puberulous pedicels 5 in. long, sparsely racemose, singly or 2–3 together in axils of bracts or subumbellate or
corymbose at the ends of branchlets 1–2 in. long, disposed in lax terminal panicles extending into the upper leaf-axils, 6–12 in. long, 4–8 in. wide. *Calyx* sessile, tubular, '15 in. long, densely pubescent externally, teeth short triangular; the bracteoles small spatulate, pubescent. *Corolla* white, '5 in. long; densely silky externally, tube narrowly funnel-shaped, teeth lanceolate '12 in. long. *Filaments* at base united in a white tube puberulous outside, as long as that of corolla, free portion glabrous bright-yellow, 1-25 in. long. *Ovary* very long, stipitate, pubescent. *Pod* with a puberulous stipe '75 in. long, dehiscent along the lower suture, spirally twisted, 8–10 in. long, '6 in. wide; valves thinly coriaceous puberulous, not sinuate between the seeds. *Seeds* 8–10, ovate, their long axis parallel with sutures, '7 in. long, '4 in. wide, compressed, testa pale-brown, crustaceous, shining.


A very distinct species; more nearly related to the Indian *P. bigeminum* than to any Malayan species but easily distinguished by its large florets and its long-stipitate pod.

10. *Pithecolobium contortum* Mart. in Flora XX, 2, Beibl. 115. A tree 15–30 feet high, with spreading grey-pubescent terete or slightly compressed branches, stem 4–6 in. thick, bark dark-brown. *Leaves* evenly 2-pinnate; rachis terete, pubescent, 4–8 in. long, petiolar portion 2 in. long with a large gland below the middle, foliar portion with 1–4 small glands below as many pairs of pinnae; pinnae usually 5–8-jugate, sometimes as few as 3-jugate, rarely as many as 15-jugate, rachises with 1–2 small sessile glands below bases of end-pairs of leaflets, diminishing downwards, the distal 4–6 in. long, the basal 1-5–2 in.; leaflets of upper pinnae 15–20-jugate, of lowest 9–10-jugate, oblong or trapezoid, obtuse or subacute at upper angle, base obliquely unilaterally truncate, upper and lower margins subparallel, main nerve diagonal; rigidly papery, pale-green puberulous above, pubescent beneath, '5–75 in. long, '25–35 in. wide, petiolules 0. *Flowers* in terminal and axillary simple deltoid panicles 1 foot across, with slender main-rachis 8–20 in. long, the filiform pubescent branches 3–8 in. long, bracts small lanceolate, pedicels puberulous '25–4 in. long, the sessile florets scattered or sub-aggregated near their tips in the axils of small acute puberulous bracteoles. *Calyx* '05 in, campanulate, puberulous, teeth triangular. *Corolla* greenish-white, glabrous, '15 in. long, teeth lanceolate spreading, almost as long as tube. *Filaments* united below in a tube as long as that of corolla, free portion cream-coloured, '35 in. long. *Ovary* faintly puberulous, stipitate. *Pod* 6-8 in. long, 5–7 in. wide, spirally twisted, dehiscent along the lower suture; valves firmly coriaceous, finely pu-

Kedah; Ridley 5223! Penang; Porter (Wall. Cat. 5283) ! Stolizka! Curtis 19! 264! Malacca; Griffith 1941! Mainyng 573! Hervey! Derry 149! Perak; Scortechini 1658! 1899! Wray 2635! 4249! Kunstler 1010! 3775! 3889! Singapore; Finlayson.

Nearest P. Clypearia but very easily distinguished by its terete branches and its sessile glands, as well as by its sessile florets.

11. Pithecolobium Clypearia Beuth. in Hook. Lond. Journ. Bot. III, 209. A tree 25–30 feet high with spreading brown-pubescent angular branches, bark dark-brown. Leaves evenly 2-pinnate; rachis angular, puberulous, 2–7 in. long, petiolar portion 1–1,5 in. long with a large shortly stipitate gland just above base, foliar portion with small distinctly stalked glands just below each pair of pinnae except the lowest, pinnae usually 3–6- (rarely 8–10-) jugate, their rachises with small stipitate glands between each pair of leaflets except the lowest, diminishing downwards, distal 5–6 in. long, basal 1,5–2 in. long; leaflets of upper pinnae 5–7-jugate, of lowest 3–4-jugate, trapeziform, wide-triangular at upper angle, base obliquely unilaterally truncate or rounded, upper and lower margins subparallel, main nerve diagonal; rigidly papery, dark-green glabrous or faintly puberulous shining above, glauncous with scattered adpressed hairs beneath, terminal 1,5 in. long, 75 in. wide, lowest 5 in. long, 3 in. wide; petiolules 0. Flowers in small subumbellate corymb 35–4 in. across, on short peduncles 3–5 in. long, solitary or 2–3 vertically superposed above the axils of bracts with a large gland, on angular branchlets 3–4 in. long similarly disposed on the angular main-rachis but with the bracts reduced to an angled petiolule bearing a large bract at its tip; pedicels of florets 1 in. long, slender, puberulous, their bracteoles minute or obsolete; the whole inflorescence forming a large terminal panicle extending into axils of upper leaves, 15–18 in. long, 10–15 in. wide. Calyx campanulate, 05 in. long, puberulous externally, teeth short deltoid. Corolla white, glabrous, 1 in. long, teeth lanceolate half as long as tube. Filaments united at base in a tube shorter than that of corolla, free portion white, 35 in. long. Ovary puberulous stipitate. Pod spirally twisted, 4–5 in. long, 4 in. wide, dehiscing along the lower suture, valves thinly coriaceous, orange outside, red within, glabrous; stipe 15 in. long; distinctly sinuate between

J. ii. 35

**Penang; Porter** (Wall. Cat. 5270 A)! Curtis 209! Prov. Welle-sley; Kunstler 1612! Pahang; Ridley 1476! Singapore; T. Anderson 38! Hullett 58! 5698! Malacca; Griffith! Maingay 570! Hervey! Perak; Scortechini 48! 2024! Wray 1889! 2643! Distrib. Sumatra, Java, Moluccas.

This is apt, when its leaflets are unusually small, to simulate *P. contortum* from which it is, however, easily distinguished by its smaller fruits, its pedicelled florets, and its terete branchlets. It is also apt, when its leaflets are unusually large, to simulate *P. angulatum*; as both have angular branches and pedicelled florets the only safe diagnostic character is the nature of the glands, especially those on the partial rachises of the pinnae; these glands are stipitate in *P. Clypearia*, sessile in *P. angulatum*.

There is just a trace of doubt as to whether this is Rumphius' *Clypearia rubra* since that author figures no glands, or even that it is *Inga Clypearia* Jack, since Jack says there is no petiolar gland on the leaf of his species. Jack's plant is, he says, known in Sumatra as "**Jiring muniet.**"

12. *Pithecolobium angulatum* Benth. in Hook. Lond. Journ. Bot. III, 306. A tree 25–30 feet high with spreading shortly puberulous angular branches, bark dark-brown. **Leaves** evenly 2-pinnate; rachis angular, puberulous, 3–8 in. long, with a large sessile gland '5–75 in. above the base and near the middle of the petiolar portion, foliar portion with smaller sessile glands below the bases of all but the last pair of pinnae set obliquely on the upper truncate ends of sharp-edged ridges; pinnae 2–4-jugate, their rachises with similar but small glands just below each pair of leaflets, the distal 6–7 in., the lowest 1–1·5 in. long; leaflets of upper pinnae 5–8-jugate, of lowest 2–3-jugate, all diminishing downward; terminal leaflets of most of the pinnae 3·5–6 in. long, 1·25–2 in. wide, ovate-lanceolate, gradually tapering to an acute tip, the base wide-cuneate, the midrib central, the bases of the remainder progressively more obliquely rounded and the midribs progressively more diagonal, proximal leaflets 1 in. long, '75 in. wide; all membranous, sparsely puberulous above, softly pubescent beneath when young; thinly subcoriaceous, dark-green glabrous shining above, dull puberulous beneath when mature, lateral nerves 5–7 pairs rather prominent beneath; petiolules '07 in. long. **Flowers** in small sub-umbellate corymb 5 in. across, on short peduncles '75 in. long, fascicled
in axils of small gland-bearing bracts on angular branchlets 4–10 in.
long, themselves fascicled in axils of bracts with a large basal gland and
a foliar simply-pinnate rudimentary lamina, so as to form a terminal
panicle extending into axils of upper leaves, 15–20 in. long, 12–18 in.
wide; pedicels of florets 2–25 in. long, bracteoles minute or obsolete.
Calyx puberulous, campanulate, 0.5 in. long, teeth short acute. Corolla
pale-yellow or white, 2 in. long, tube infundibuliform, teeth lanceolate
half as long; uniformly sparingly silky. Staments united in a tube
nearly as long as that of corolla, filaments white or faintly tinged with
pink, 5 in. long. Ovary puberulous, shortly stalked. Pod spirally
twisted, 7–8 in. long, 7 in. wide, dehiscing along the lower suture,
valves firmly coriaceous, red opposite the seeds elsewhere orange and
puberulous externally, red and glabrous within; distinctly sinate
between the seeds on the lower margin, stipe very short. Seeds 8–10,
ovate-oblong, 5 in. long, 35 in. wide, 2 in. thick, testa dark-purple,
Ind. II, 306. Mimosa heterophylla Roxb. Hort. Beng. 40; Flor. Ind. II,
545. Inga acutangula Grah. in Wall. Cat. 5271. Pithecolobium acut-

Andamans; very common. Nicobars; King's Collector! Penang;
Wallich 5270 C! Curtis 489! Malacca; Derry 552! 971! Mainpoy 569!
Perak; Scortechini! Wray 1102! Selangor; Kunstler 8669! Singa-
fore; Hullett 802! ItidUy 5576! 6407! Goodenough 289! Distrib.
Eastern Himalaya, Assam, Burma, Sumatra.

A rather variable species, with two leading types, hardly, however, to be
distinguished even as varieties owing to the number of intermediate forms that
occur. Of these, (a.) heterophylla—the original plant of Roxburgh with large
terminal leaflets—extends from the Himalaya to Chittagong, the Andamans and
Sumatra. This is very uniform in character and constitutes both Inga acutangula
Grah. (Wall. Cat. 5271), and Pithecolobium acutangulum Miq., although it happens
that Miquel when describing P. acutangulum conceived it to be different from Inga
acutangula. The other plant, (b.) intermedia—with smaller terminal leaflets and
usually more numerous pinnae and leaflets—extends from Upper Burma east of the
Irrawaddy though the Shan Plateau to Tenasserim, the Malay Peninsula and Java.
This is less uniform than the preceding and often has leaflets so like those of P.
Clupearia that it can only be safely distinguished by its longer pedicels and sessile
glands. This is the plant of Wall. Cat. 5270 C, from Penang, and it is the Pithecolobium
angulatum of Miquel as opposed to that author's P. acutangulum. P. angulatum
Benth., like P. angulatum as defined in this paper, includes both plants.

Order XXXIX. ROSACEÆ.

Herbs, shrubs or trees. Leaves stipulate, rarely opposite, simple
or compound. Flowers usually bisexual and regular (very irregular in
Chrysobalanaceæ). Calyx-tube free or adnate to the ovary, limb usually
5-lobed, often bracteolate, imbricate or valvate. *Petals* 5, or 0, inserted under the margin of the disc, deciduous, usually imbricate. *Disc* lining the calyx-tube or forming a ring at its base. *Stamens* perigynous, indefinite (rarely 1, 5 or 10) in one or many series, often connate and unilateral in *Chrysobalanaceae*; filaments subulate or filiform, usually incurved in bud; anthers small, didymous. *Ovary* of one or more free or connate carpels, with free or connate basal lateral or subterminal styles; stigmas simple, penicillate or capitate; ovules 1 or more in each carpel. *Fruit* variable, consisting of achenes or berries or drupes, rarely capsular. *Seeds* erect or pendulous, testa membranous or coriaceous, albumen 0; cotyledons large, plano-convex; radicle short.—*Distric*. About 1,200 species, found in all climates and countries, but chiefly in the temperate.

Of the ten tribes into which this order is subdivided by Messrs. Bentham and Hooker in their *Genera Plantarum*, only four are (as yet) represented by specimens from the Provinces within our area, and these four tribes are represented by only six genera which Sir Joseph Hooker (in his Flora of British India) distinguishes as follows:

**Tribe I. Chrysobalaneae.** *Flowers* usually irregular. *Carpel* 1; style basal; ovules 2, ascending. *Fruit* a drupe. *Radicle* inferior.—*Trees or shrubs with simple quite entire leaves.*
- Calyx-tube elongate. Stamens many, united in a phalange. *Ovary* 2-locellate ... ... ... 1. **Parinarium.**
- Calyx-tube short. Stamens 2. *Ovary* 1-celled ... ... 2. **Parastemon.**

**Tribe II. Prunee.** *Flowers* regular. *Carpel* 1, rarely 2; style subterminal, rarely basal; ovules 2, pendulous. *Radicle* superior.—*Trees or shrubs with simple usually serrated leaves.*
- Calyx 5-lobed. *Petals* 5, large, glabrous. *Carpel* solitary, fruit drupaceous ... ... ... ... ... ... 3. **Prunus.**
- Calyx 5-10-toothed. *Petals* 5 and minute, or absent. *Carpel* 1. *Drupe* coriaceous, usually elongated transversely ... ... ... ... ... ... 4. **Pygeum.**

**Tribe III. Rubee.** *Flowers* regular. *Calyx* bracteolate. *Stamens* very numerous. *Carpels* many; styles sub-basal or ventral; ovules 2, collateral, pendulous. *Fruit* of many dry or fleshy carpels, not included in the calyx-tube. *Radicle* superior.—*Usually shrubs, often with compound leaves* ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... 5. **Rubus.**

**Tribe IV. Pomee.** *Flowers* regular. *Calyx*-tube (or the apex of the peduncle) becoming fleshy after flowering, and enclosing the carpels. *Stamens* numerous. *Ovules* 2 or more, ascending. *Fruit* a pome or berry, with 2-5 bony or coriaceous 1-seeded stones; shrubs or trees ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... 6. **Pyrus.**

1. **Parinarium, Juss.**

*Trees.* *Leaves* simple, alternate, evergreen, quite entire. *Flowers* hermaphrodite, in panicles or corymbose racemes, 2-bracteolate, white or pink. *Calyx*-tube obovate, campanulate, turbinate, or funnel-shaped;
lobes 5, thick, subequal, imbricate. Petals 5, sessile or clawed, deciduous. Stamens 6–30, the filaments united into an incomplete ring at the base, or connate into an unilateral bundle, all perfect or some without anthers. Carpel 1, adnate to one side of the calyx-tube, 2-celled, rarely 2-seeded; style basal, filiform; ovules 2 collateral, or 1 erect. Drupe spherical, oblong, obovoid or ovoid, with a 1–2-celled, 1–2-seeded, woody or bony or rarely coriaceous pericarp. Seeds erect, testa membranous, cotyledons large fleshy, radicle small inferior. Distrib. About 50 species, natives of the tropics of both worlds.

Calyx-tube villous inside. Fruit 2-celled, more than 5 in. long; the pericarp woody, bony or crustaceous.

Leaves rusty-grey or dirty white beneath, with numerous spreading parallel stout nerves; stamens 8–10, not united in a phalanx.

Leaves with 10–12 pairs of main nerves, rusty-pubescent beneath ... ... ... 1. P. costatum.
Leaves with 15–18 pairs of main nerves, pale, arco-late and puberulous beneath ... ... ... 2. P. polyneurum.
Leaves with 25–30 pairs of main nerves, pale, obliquely areolar and puberulous on the nerves beneath... 3. P. oblongifolium.
Leaves glabrous beneath or with only a few strigose hairs on the midrib near its base; main nerves 10–16 pairs, always spreading.

Flowers in spikes, sessile, solitary.
Stamens about 10; fruit about 1 in. in diam. ... ... ... 4. P. spicatum.
Stamens 12–16; fruit several inches in diam. ... ... ... 5. P. Maingayi.

Flowers in racemes or panicles.
Leaves subsessile with broad bases; main nerves 12–14 pairs; fruit ovoid, not compressed ... ... ... 6. P. elatum.
Leaves distinctly petiolate.
Leaves oblong-lanceolate, narrowed at the base; stamens 10 ... ... ... ... 7. P. asperulum.
Leaves elliptic-oblong, broad at the base; stamens 12–16 ... ... ... ... 8. P. scabrum.

Leaves quite glabrous on both surfaces; main nerves 5–7 (rarely 10) pairs, obliquely ascending, never spreading.

Flowers straight; petals subequal.
Main nerves of leaves 6 or 7 pairs; fruit covered with crustaceous scurf, its cells glabrous inside ... ... 9. P. Kunstleri.
Main nerves 7–10 pairs; fruit quite glabrous, its cells sericeous inside ... ... ... ... 10. P. Griffithianum.

Flowers much curved; sepals and petals very unequal 11. P. heteropetalum.
Calyx-tube glabrous and lined by the glabrous staminal tube; fruit less than 5 in. long, quite glabrous; the pericarp thin, leathery... ... ... ... ... 12. P.? ntitidum.

1. Parinarium costatum, Blume Mol. Bot. (1855) Pt. 1. A small tree; young branches slender, deciduously puberulous, the bark pale
and minutely lenticellate. *Leaves* coriaceous, ovate-elliptic or ovate-lanceolate, shortly and obtusely acuminated, the base rounded or cuneate; upper surface glabrous and shining except the pubescent midrib, the lower pale brown when dry, reticulate and covered, except the 10 or 12 pairs of conspicuous slightly ascending glabrous main nerves, with a thin layer of cobwebby hair; length 1.5–3 in., breadth 75–1.25 in.; petiole .25 in., pubescent. *Panicles* axillary, longer than the leaves, with a few distant short few-flowered branches, tawny-tomentose. *Flowers* nearly .25 in. long, on short pedicels, solitary or in cymes of three. *Calyx-tube* densely puberulous outside, internally with a line of subulate processes at the throat and a broad belt of deflexed silky hair, the ovate lobes shorter than the tube. *Petal* s thin, obovate, clawed, longer than the calyx-lobes, sparsely pubescent. *Stamens* about 8, half of them antherous, the filaments villous. *Pistil* 1, the ovary villous. *Fruit* oblong, blunt, slightly compressed, with many pale scurfy patches, slightly more than 1 in. long and .65 in. broad. Miq. Fl. Ind. Bat. Vol. I, Pt. 1, 334; Hook. fil. Fl. Br. Ind. II, 311 (excl. syn. *P. sumatranum*, Benth. and Kurz’s *Petrocarpa sumatrana*); Jack Mal. Misc. II, VII, 67. *Eleo-carpus? punctatus*, Wall. Cat., 2676.

Malacca; Maingay 621, 621/2. Penang; Curtis 259, 2163. Perak; King’s Collector 5227. Singapore; Ridley 398.

2. *Parinarium polynedrum*, Miq. Fl. Ind. Bat. Suppl. 306. A tree 60 to 100 feet high; young branches slender, pale brown, profusely lenticellate, puberulous. *Leaves* coriaceous, oblong or ovate-oblong, rather bluntly acuminated; the base rounded, eglandular; upper surface glabrous, shining; the lower pale, areolate, puberulous; main nerves 15 to 18 pairs, spreading, prominent beneath; length 3 to 5 in., breadth 1.35 to 2 in. *Panicles* axillary and solitary, or terminal and in clusters of 2–4, rather shorter than the leaves when in flower, longer in fruit, hoary-tomentose; the branches short, rather crowded, the ultimate branchlets cymosely 3-flowered; bract shorter than the calyx-tube, oblong, obliquely acute, tomentose. *Flowers* .25 in. long, on very short pedicels. *Calyx* infundibuliform, tomentose outside, deflexed-villous inside; the lobes lanceolate, acuminate, pubescent on the inner face. *Petal* s as long as the calyx-lobes, oblong, slightly dilated upwards, obtuse, not clawed at the base, glabrous. *Stamens* 10, shorter than the petals, all bearing anthers. *Ovary* sericeous. *Style* glabrous. *Fruit* oblong, compressed, obtuse, slightly tapered to the base, covered with a dense layer of tawny scurf, about 2 in. long when ripe and 1.2 in. across, 2-celled; pericarp crustaceous, very hard, .25 in. thick.

Malacca; Griffith, Maingay 622. Perak; King’s Collector 4624, 6087. Distrib. Sumatra.
tree 50-70 feet high; young branches lenticellate, deciduously puber-
ulous. Leaves very coriaceous, oblong- or oblong-elliptic, the apex sub-
acute, the base rounded; upper surface glabrous and shining, the lower
pale with oblique areolae, puberulous on the nerves and midrib; main
nerves 25-30 pairs, stout, oblique, rather straight; length 5-5-8.5 in.,
breadth 1.85-3 in.; petiole 35-65 in., stout. Panicles axillary and
terminal, solitary, many-flowered, spreading, minutely tawny-tomentose,
3-6 in. across. Flowers '2 in. long, on very short pedicles; bracts
ovate-rotund, concave, acute, tomentose. Calyx-tube infundibuliform,
subgibbous, minutely tomentose outside, deflexed-villosous inside, lobes
broadly ovate, acute. Petals not longer than the calyx-lobes, spatulate,
glabrous. Stamens 8, about as long as the petals. Ovary villous; style
sparsely pubescent. Fruit elliptic-ovoid, obtuse, compressed, densely
coated with grey hard scurf, 2-75 in. long and 1-5 in. in diam.

Malacca; Griffith, Mainay 623. Pahang; Ridley 5026. Perak;
King's Collector 10369, 10422.

A species readily distinguished by its large oblong fruit, large leaves with
numerous parallel nerves prominent on the lower surface, and small flowers with the
stamens and petals not longer than the calyx-lobes. It approaches P. sumatranum,
Miq. in its leaves, but the under-surface in that species is uniformly and minutely
tomentose, whereas in this the under surface has very peculiar oblique areolae and
there is no tomentum. The fruits of the two differ also in size.

4. Parinarium spicatum, King, n. sp. A tree 60 to 80 feet high;
branches slender, dark-coloured, puberulous. Leaves coriaceous, elliptic-
oveate, shortly and broadly acuminate, the base rounded but slightly pro-
duced along the sides of the upper half of the petiole; both surfaces
reticulate when dry; the upper glabrous, shining; the lower slightly dull
and paler, minutely pustulate, glabrous except the sparsely strigose mid-
rib; main nerves about 12 pairs, spreading, faint; length 2-3 in., breadth
85-1.6 in., petiole 1 in. Spikes axillary and terminal, about as long as
the leaves, in clusters of 2 or 3, everywhere tawny-pubescent with many
adpressed hairs intermixed. Flowers '5 in. long, solitary, rather dis-
tant, sessile, bibracteate at the base; the bracts much shorter than the
flower, oblong, subacute, tomentose. Calyx-tube narrowly funnel-shaped,
slightly gibbous, tomentose outside, deflexed-villosous in its upper part
inside; its lobes broadly oblong, obtuse, deflexed. Petals longer than
the calyx-lobes, broadly elliptic, very obtuse, glabrous. Stamens about
10, longer than the petals, shorter than the pistil; the filaments glab-
rous, united at the very base. Ovary sericeous; style sparsely hairy in
its lower half, otherwise glabrous. Fruit about 1 in. in diam., sub-
orbicular, slightly compressed, densely covered with a yellowish crusta-
ceous scurf, 2-celled; the pericarp '2 in. thick, tomentose inside.
PERAK; King’s Collector 6145, 10326.

This approaches P. costatum, Bl. in the shape and nervation of its leaves; but is distinguished from that species by its spicate inflorescence and solitary flowers. Its fruit also is more orbicular than that of P. costatum.

5. Parinarium Maingayi, King n. spec. A tree; young branches with dark bark bearing a few oblong lenticels, glabrous. Leaves very coriaceous, elliptic-oblong, very shortly and obtusely acuminate, the base rounded; both surfaces glabrous and with minutely papillate reticulations, the upper shining, the lower dull and rather pale; main nerves 10-12 pairs, spreading, curving, rather prominent beneath; length 3-4.5 in., breadth 1.35-2 in.; petiole 3 in., stout. Spikes usually in pairs, axillary, shorter than the leaves, pedunculate, minutely tomentose. Flowers sessile, 3 in. long, or (to the apex of the stamens) 6 in.; bracts shorter than the calyx-tube, broadly ovate-obtuse, tomentose. Calyx-tube infundibuliform, tomentose outside, deflexed-villos inside; the lobes short, broad, rounded very obtuse. Petals longer than the calyx-lobes, obovate, sessile, glabrous. Stamens 12-16, much longer than the petals, decurved. Ovary densely wooly; style long, slender. Drupe spherical, the size of a small apple (Hooker); the pericarp thick and bony, smooth on the inner surface, narrowed on one side. Seed large, with a thin testa. P. asperulum, Hook. fil. in Fl. Br. Ind. II, 310 (not of Miq.)

Malacca; Maingay 618, and probably also Griffith 2049.

This in some respects resembles P. asperulum and P. seabrnum, but differs from both in its much larger fruit and sessile flowers, and from the former also in the venation of its leaves.

6. Parinarium elatum, King n. spec. A tree 60-120 feet high; young branches as thick as a quill, blackish-cinereous, lenticellate. Leaves thickly coriaceous, subsessile, elliptic to ovate-elliptic, acute or shortly acuminate; the base broad, rounded or minutely cordate; upper surface glabrous, shining; the main nerves and midrib slightly prominent; lower surface darker and duller than the upper when dry, glabrous except a few strigose hairs at the base of the very prominent midrib; the 12-14 pairs of spreading curved main nerves very prominent; length 4.5-7.5 in., breadth 1.5-3.25 in.; petiole only about 1.15 in., strigose. Panicles axillary, solitary or several together, shorter than the leaves, with few short rather distant branches, or unbranched, minutely tomentose, few-flowered; bracts 2 at the base of each flower, slightly shorter than the calyx-tube, elliptic, acute, adpressed-pubescent. Calyx-tube funnel-shaped, adpressed-tomentose outside, deflexed-villos inside at the mouth; the lobes unequal, nearly as long as the tube, broadly ovate, subacute, very tomentose on both surfaces. Petals longer and
more narrowed than the calyx-lobes, subacute, glabrous. *Stamens* longer than the petals, glabrous. *Ovary* sericeous, the style glabrous in its upper half. *Fruit* ovoid, not compressed, crustaceous-scurfy outside, pale-brown, 2-celled, 1-1½ in. long and 8 in. in diam.; the pericarp crustaceous, 2 in. thick, minutely hairy inside.

**Perak; King’s Collector, 3436, 3711.**

A species resembling *P. oblongifolium*, Hook. fil. in its leaves which however have fewer nerves; but differing greatly from that species both in its inflorescence and flowers.

7. **Parinarium asperulum**, Miq. Fl. Ind. Bat. Suppl. 307. A tree 50–80 feet high; young branches slender, with dark-coloured bark and a few scanty deciduous pale flexuous hairs. *Leaves* thinly coriaceous, oblong-lanceolate, tapering gradually to the obtusely acuminate apex; the blade narrowed slightly to the base and continued along the sides of the upper half of the short petiole; both surfaces glabrous and with minute pitted papillae; the lower paler and more reticulate; main nerves 10–16 pairs, faint, spreading; length 3–5½ in., breadth 1½–3 in., petiole 2½ in. *Racemes* or panicles axillary or terminal, solitary, half as long as the leaves, minutely tomentose; the flowers about 3 in. long, (*½ in. to the apex of the exserted stamens); the pedicels 1 in. long; bracts at the base of the flower 2, obtuse, tomentose. *Calyx* densely tomentose; the tube clavate, deflexed-pilose inside; the lobes broadly ovate, subacute, imbricate. *Petal* s longer than the calyx-lobes, obovate-oblong, not clawed, glabrous. *Stamens* about 10; the filaments glabrous, united at the base. *Ovary* densely and the style sparsely villous. *Fruit* sub-ovoid, compressed, very obtuse, with a vertical groove along the two sides, minutely rugulose and densely covered with hard pale-brown scurf, nearly 1 in. long and *½ in. broad, 2-celled; pericarp thick, bony, hairy inside.

**Penang; Curtis, 203. Pahang; Ridley, 2603. Perak; King’s Collector, 3537, 7568. Distrib. Sumatra.**

There is an original and authentic specimen of *P. asperulum* in the Calcutta Herbarium collected by Teysmann in Sumatra, and it agrees absolutely with the Penang and Perak specimens above quoted. The species is near to *P. scabrum*, Hassk., but has fewer stamens and smaller and differently shaped leaves. The ripe fruit is also presumably much smaller, for specimens of unripe fruit of *P. scabrum* are as large as specimens of ripe fruit of this species.

8. **Parinarium scabrum**, Hassk. Cat. Hort. Bot. Bogor. (1844), 269. A tall tree; young branches dark-coloured and with a few scattered hairs. *Leaves* coriaceous, elliptic-oblong, shortly and bluntly acuminate; the base broad, rounded or very slightly cuneate, eglandular; both surfaces glabrous, shining, strongly but minutely reticulate, and with numerous small perforate-topped papillae especially on the reticulations; main
nerves 13-15 pairs, slender, spreading, with a few shorter intermediate; length 4-6 in., breadth 1·75-2·75 in., petiole 2 in. Panicles (sometimes reduced to racemes) axillary and terminal, often two or three together, much shorter than the leaves, adpressed-pubescent; the flowers not numerous, collected near the ends of the branches; bracts oblong, obtuse, pubescent, shorter than the calyx-tube. Flowers (from the point of insertion) 5 or 6 in. long; the calyx-tube merged in the pedicel, clavate, pubescent outside, deflexed-villous inside. Calyx-lobes ovate-rotund, undulate, subacute, imbricate, minutely tomentose on both surfaces. Petals larger than the calyx-lobes, obovate, clawed, glabrescent. Stamens 12-16; the filaments united at the base into a tube open at one side, much curved, deflexed. Ovary lanate, 2-celled. Style sparsely pubescent, shorter than the stamens. Fruit ovoid, obtuse, slightly compressed, vertically grooved, rough and covered with pale scurf; pericarp bony, thick, 2-celled, the cells pubescent, 1 in. long and 6 in. broad (not ripe). Hassk. in Flora (1844), p. 585. Miq. Fl. Ind. Bat. Vol. I, pt. I, 354 t. V.

Perak; Scortechni 1981.

Only once collected in Perak. This species is very closely allied to P. glaberrimum, Hassk. and I greatly doubt whether the two should be kept separate. The latter species is described at great length by Hasskarl in the volume of Flora for 1844, p. 533; but I have seen only one authentic specimen, and that consists only of leaves. P. scabrum, on the other hand, is described by Hasskarl in nine words: but of it there are in the Calcutta Herbarium several excellent authentic flowering specimens. And with these Scortechni’s specimens numbered 1981 agree absolutely.

9. Parinarium Kunstleri, King n. spec. A tree 50-80 feet high; young branches slender, cinereous, glabrous. Leaves coriaceous, oblong-lanceolate, tapering from about the middle to each end, the apex acuminate; the base acute, eglandular; both surfaces glabrous and rather dull, the lower with wide slightly conspicuous reticulations and minute papillae; main nerves 6 or 7 pairs, curving upwards, only slightly conspicuous on the lower surface; length 3·25-4·5 in., breadth 1·15-1·65 in., petiole 2·5-3 in., lobes of the calyx oblong, obtuse, tomentose on both surfaces. Petals longer than the calyx-lobes, obtuse, glabrous. Stamens about 20 or 30, glabrous; the filaments united by their bases, longer than the petals. Style as long as the stamens, villous. Fruit oblong, ovoid, slightly compressed, obtuse, tapering slightly to the base, 1·25 in. long and about 9 in. broad, 2-celled, densely covered with pale-brown crustaceous scurf; pericarp crustaceous, smooth inside.

Perak; King’s Collector 3715, 3745, 6917.

I have seen no specimens of this in flower. The description of the parts of the flower above given has been taken from withered remains found persisting at the base of some of the ripe fruits. In its leaves this resembles P. asperulum,
Miq., but there are only 6 or 7 pairs of nerves as against 10–16 pairs in that species. The fruits of this are moreover slightly larger and much more globular, and the interior of the cells is glabrous; whereas in those of *P. asperulum* the cells are hairy inside.


**Malacca**; Griffith 2047/2; Maingay 620. **Pahang**; Ridley 1354. **Kedah**; Curtis. **Singapore**; Ridley 4792. **Penang**; Curtis 1514, 2416.

Griffith's specimen 2047/2, which is the type of the species, has more polished leaves and an opener panicle than the other specimens quoted above. But I can detect no difference in the flowers. Griffith's specimen has no fruit, and the whole material is imperfect. It may turn out that there are really two species included under *P. Griffithianum*.

11. **Parinarium heteropetalum**, Scortechini MSS. A tree 60–80 feet high; young branches rather slender and with rather rough cinereous glabrous bark. *Leaves* coriaceous, eglandular, oblong-lanceolate, tapering from the middle to both ends, the apex acuminate, the base acute; both surfaces glabrous, rather dull when dry, the lower very minutely punctate; main nerves faint on both surfaces, 5 or 6 pairs, oblique, ascending; length 3·5–4·5 in., breadth 1·1–1·6 in., petiole 35 in., stout. *Panicles* axillary and terminal, about one-third to one-half as long as the leaves, with short branches, everywhere rusty-pubescent; bract at the base of the flowers solitary, lanceolate, tomentose. *Flowers* 5 in long, sessile. *Calyx-tube* curved, narrowly tubular below the bend and suddenly expanded above it; the lobes thick, concave, reflexed, unequal, from oblong to suborbicular or obovate, everywhere pubescent
or tomentose, the hairs inside the tube not deflexed. Petals 5, pink, glabrous, longer than the calyx-lobes, very unequal; the two posterior erect, broadly elliptic, concave, clawed; the three anterior narrowly oblong, revolute, imbricate, flat. Stamens 25–30, in a single semi-tubular phalange, as long as the petals, glabrous; the anthers small. Ovary villous, 2-celled. Style curved, longer than the stamens, villous in the lower, glabrous in the upper half. Fruit unknown.

Perak; Scortechini, 240, 2040. King’s Collector, 664, 6599.

A species easily recognised by its curved flowers and very unequal sepal and petals.

12. Parinarium? nitidum, Hook. fil. Fl. Br. Ind. II, 310. A tree 15–40 feet high; young branches very slender, with pale-brown glabrous shining bark. Leaves elliptic to elliptic-lanceolate, shortly and bluntly acuminate, the blade much narrowed to the base and continued along the sides of the upper half of the petiole; both surfaces quite glabrous, the upper very shining; the lower slightly dull, paler, almost glaucous when young; main nerves 7–9 pairs, ascending, faint; length 2·25–3·5, rarely 4 in. breadth 8–1·75, rarely 2 or 2·5 in.; petiole below the winged part 1–2 in. Panicles slightly shorter or longer than the leaves, hoary-tomentose, axillary and terminal, with short sub-horizontal cymosely 3-flowered branches; bracts oblong, shorter than the flowers, broadly ovate, acute, concave. Flowers 15 in. long and about the same in width at the mouth, subsessile. Calyx widely funnel-shaped, the lobes broadly triangular, acute; the exterior hoary-tomentose; the interior lined by the subglabrous tube formed by dilated bases of the filaments, and with a thickened hairy process on the side opposite the 8–10 anthers. Petals longer than the calyx-lobes, oblong-obtuse, incurved. Ovary densely sericeous, the style short. Fruit obovoid-rotund, glabrous, 1-celled, 35 in. long and about 25 in. in diam.; the pericarp thin, leathery, densely woolly inside.

Malacca; Griffith 2017/1, Maingay 619. Derry 189, 1180. Perak; King’s Collector 8599, 8680, 8711. Penang; Curtis 147, 853; King’s Collector 1274, 1472.

Very few of the specimens which I have seen of this have fruit, and of these not one has a seed. When the material has been fully completed by the receipt of seeds, I think a new genus might with advantage be formed for this plant; for it differs from the other species of Parinarium here described in having a cushion-like process in its calyx-tube the other parts of which are lined by the tube formed by the lower part of the dilated filaments. It also has a small 1-celled fruit with a thin leathery pericarp.

2. Parastemon, A. DC.

A shrub or small tree. Leaves simple, alternate, evergreen, quite
entire. Flowers polygamo-dioecious, minute, racemose, minutely bracteolate. Calyx-tube shortly campanulate; lobes 5, imbricate. Petals 5, (or 6), oblong, deciduous. Stamens 2 perfect unilateral, and several imperfect. Carpel 1, adnate to one side of the calyx-tube, 1-celled; style basilar; ovules 2, erect. Fruit oblong, coriaceous, 1-celled, 1-seeded, indehiscent. Seed solitary, erect; testa membranous, pubescent; cotyledons fleshy, radicle inferior, plumule hairy.

Parastemon urophyllum, A. DC. in Ann. Sc. Nat. Ser. 2. XVI, 208. A tall tree with pendulous habit, young branches very slender, glabrous. Leaves coriaceous, ovate-lanceolate to lanceolate, sometimes slightly ob lanceolate, obtusely caudate-acuminate, the base much narrowed; both surfaces glabrous, the lower minutely lepidote; main nerves very faint, 4–6 pairs, oblique, the intermediate almost as distinct; length 2.5–3 in., breadth *85–1.5 in., petiole *25 in. Racemes nearly as long as the leaves, slender, axillary, glabrous, usually solitary but sometimes 2 together. Flowers *15 in. long to the apex of the stamens, on short pedicels each with a minute concave ovate bracteole at its base. Fruit cylindric, tapering a little to each end, glabrous, *45 in. long, and *25 in. in diam.

In all the provinces, except the Andamans.

3. Prunus, Linn.

Shrubs or trees. Leaves alternate, simple, quite entire, or serrate or crenate or glandular-serrulate; petiole often 2-glandular. Flowers white or red, solitary, fascicled, corymbose or racemel. Calyx deciduous in fruit; lobes 5, imbricate. Petals 5. Stamens 15–60, perigynous, inserted in the mouth of the calyx-tube, filaments free. Carpel 1; style terminal; ovules 2, collateral, pendulous. Drupe with an indehiscent or 2-valved, 1-seeded, smooth, or rugged stone. Seed pendulous, testa membranous or coriaceous, albumen scanty or 0. Distrib. N. temp. regions, rare in the tropics; species about 80.

Prunus martabanica, Kurz For. Flora Burma, I, 434. A tree 40–60 feet high; all parts, except the inflorescence, quite glabrous; young branches rather slender, lenticellate. Leaves membranous, elliptic-oblong to ovate-oblong, acuminate, suddenly slightly and often unequally narrowed to the base, with minute black dots on the lower surface; main nerves 5–7 pairs, spreading, very faint; length 3–6 in., breadth 1.65–2.5 in.; petiole 4–75 in., eglandular. Racemes solitary or in pairs, from the axils of fallen leaves and about as long as the leaves, pubescent. Flowers rather distant, about *35 in. in diam. on puberulous pedicels 3–35 in. long. Calyx-tube campanulate, tomentose; the lobes erect, ovate, subacute. Petals orbicular; about 1 in. long, deciduous.

**Andaman Islands; Kurz, King's Collectors.** Distrib. Burma.

Var. Scortechinii, King, bases of leaves rounded, main nerves 9–12 pairs; racemes less than half the length of the leaves; flowers 25 in. in diam.; stamens 30–40, fruit about 6 in. long.

**Perak; Scortechini 1782; King's Collector 5638.**

This variety may possibly prove to be a distinct species. Although differing from the Andamanese and Burmese specimens in the points noted above, the Perak specimens have the same general facies.

4. **Pygeum, Gærtn.**

Evergreen trees or shrubs. *Leaves* alternate, usually quite entire; stipules minute, fugacious, (large and persistent in one species) basal glands 2 or 0. *Flowers* small, racemose or paniculate, sometimes unisexual by want of the ovary. *Calyx-tube* obconic urceolate or campanulate, deciduous; limb 5–15-toothed, often unequally. *Petals* minute, 5–6 in the 5–6-toothed calyx, 0 in the 10–15-toothed, villous or tomentose, rarely glabrous, often undistinguishable from the calyx-lobes. *Stamens* 10–50, in one or more series at the orifice of the calyx-tube; filaments slender, incurved; anthers small. *Carpel* 1, basal in the calyx-tube, ovoid or subglobose; style terminal, slender, exerted from the bud, stigma capitate; ovules 2, collateral, pendulous. *Fruit* a transversely oblong, obscurely didymous, rarely subglobose drupe; pericarp thin, dry or juicy. *Cotyledons* very thick, hemispheric; radicle minute, superior. Distrib. Species about 30, tropical Asiatic and one African.

Edges of leaves entire:—

Stipules large and persistent ... ... ... 1. *P. stipulaceum.*

Stipules small and fugacious:—

Flowers 5 in. in diam. ... ... ... 2. *P. grandiflorum.*

Flowers much less than 5 in. in diam.:—

Ovary glabrous:—

Racemes not much longer than the petioles:—

Leaves 4 or 5 in. long and 2 in. broad, lower surface puberulous; main nerves 7 pairs ... 3. *P. intermedium.*

Leaves 1.5–2 in. long and 0.5–1 in. broad, lower surface deciduous and pubescent and rugulose beneath; main nerves 4–6 pairs ... 4. *P. Maingayi.*

Leaves 3–3.5 in. long, 1–1.4 in. broad, glabrous beneath and subglaucous; main nerves 4 or 5 pairs ... ... ... ... ... 5. *P. lanceolatum.*
Racemes 2 or 3 inches long:—
Flowers '15 in. long, 6-merous, stamens 30;
leaves with 6 or 7 pairs of nerves, their apices much tapered ... ... ... 6. _P. acuminatum._
Flowers '25 in. long, 5-merous; stamens 40 or 50;
leaves with 7-10 pairs of nerves, their apices slightly and obtusely acuminate ... ... ... 7. _P. polystachyum._

Ovary villous or hirsute:—
Racemes much longer than the petioles (from '75—
1'5 in. long):—
Leaves glabrous on the lower surface ... 8. _P. Scortechinii._
Leaves rugulose, the lower surface glabrous except for a few scattered adpressed hairs ... 9. _P. persimile._
Leaves with short adpressed hairs on the lower surface, not glabrous or rugulose ... ... ... 10. _P. parviflorum._

Racemes very little longer than the petioles:—
Lower surfaces of leaves with short adpressed hairs; bases of leaves cuneate, their apices caudate-acuminate ... ... ... 10. _P. parviflorum._ var. densa.
Lower surfaces of leaves minutely pubescent with adpressed bristles intermixed with the hairs; bases of leaves rounded, their apices obtuse and emarginate ... ... ... 11. _P. ovalifolium._
Lower surfaces of leaves minutely rusty-pubescent, the hairs partly deciduous; leaves with rounded bases and acuminate apices ... 12. _P. Hookerianum._
Leaves glabrous on the under surface ... ... ... 13. _P. brevifolium._

1. _Pygeum stipulaceum_, King n. sp. A tree; young branches stout, densely rusty-tomentose. _Leaves_ very coriaceous, broadly elliptic, acute, the base broad and slightly cordate, the edges revolute; upper surface glabrous, the nerves and midrib deeply depressed, the latter pubescent; lower surface rusty-pubescent especially on the midrib, main and transverse nerves; main-nerves 10-12 pairs, spreading, curving upwards; length 5-7 in., breadth 2'5-3'75 in., petiole 5 in., very stout and densely rusty-tomentose; stipules persistent, broadly ovate, or caudate, acute, boldly ribbed, puberulous, persistent. _Racemes_ in fascicles from the branches below the leaves, 1'25—2 in. long, rusty-tomentose; bracts broadly elliptic, concave, tomentose outside, glabrous inside. _Flowers_ '15 in. long, on pedicels about as long as themselves. _Calyx-tube_ campanulate, with 10 short obtuse teeth, tomentose outside. _Petals_ 0. _Stamens_ about 15, exserted, glabrous. _Pistil_ longer than the stamens; ovary villous; style stout, erect, subglabrous; stigma capitulate, discoid. _Fruit_ unknown.

_Perak_; _Scortechini_ 11020.
2. Pygeum grandiflorum, King n. spec. A tree 50-70 feet high; all parts, except the inflorescence, glabrous; young branches rather stout. Leaves thinly coriaceous, elliptic to oblong-elliptic, sometimes slightly obovate, with an abrupt short blunt point; the base cuneate, eglandular; upper surface shining, smooth, the lower less shining and minutely pustulate; main nerves 8 or 9 pairs, spreading but curving upwards, prominent on the lower surface; length 5-8 in., breadth 2.75-3.5 in., petiole 75 in. Panicles solitary, axillary, nearly as long as the leaves, with a few lax corymbose branches, almost glabrous below, rusty-tomentose towards the apex; bracts broadly ovate, concave, blunt, puberulous. Flowers 5 in. across, on pedicels 15 in. long; bracteoles near the apex of the pedicels 1 or 2, minute. Calyx-tube widely campanulate, short, with 5 broad blunt subreniform lobes tomentose outside. Petals 5, much larger than the calyx-teeth (2 in. long), subrotund to broadly oblong, blunt, reflexed. Stamens very numerous, glabrous. Pistil slightly longer than the stamens, the ovary pubescent, style puberulous; stigma small, capitate. Fruit unknown.

Perak; King’s Collector 7425.

A very distinct species with large glabrous leaves, and larger flowers than any here described.

3. Pygeum intermedium, King n. spec. A tree 30-40 feet high; young branches dark-coloured, lenticellate, subglabrous. Leaves coriaceous, broadly elliptic to oblong-elliptic, the apex acute or shortly acuminate, the base rounded or slightly cuneate; upper surface minutely punc-tulate, not shining when dry, glabrous except the broad, depressed, pubescent midrib; lower surface puberulous, pubescent on the nerves and midrib; main-nerves 7 pairs, oblique, curved, prominent beneath; length 4-5 in., breadth about 2 in., petiole 35 in. Racemes about 5 in. long, from the axils of fallen leaves, solitary or several together, densely tawny-tomentose; bracts shorter than the very short pedicels, ovate-obtuse, concave. Flowers less than 1.5 in. long. Calyx-tube widely infundibuliform, with 6 oblong blunt hairy teeth. Petals none. Stamens about 20, glabrous, exserted. Pistils as long as the stamens, glabrous; stigma capitate. Fruit subglobular, compressed, crowned by the style, glabrous, 3 in. long and about 2 in. thick.

Malacca; MainGay 626. Perak; King’s Collector 3791.

4. Pygeum Maingayi, Hook. fil. Fl. Br. Ind. II, 319. A tree; young branches slender, with dark-coloured glabrous bark. Leaves coriaceous, elliptic-lanceolate, acuminate, with slightly cuneate rather broad bases and often with 2 small glands a little above the petiole; the upper surface glabrous, smooth but not shining (when dry); the lower dark-brown in colour and rugulose, deciduously pubescent; main-nerves
4-6 pairs, spreading, curving upwards, rather prominent on the lower, obsolete on the upper surface; length 1'5-2 in., breadth '65-1'1 in., petiole '2 in. Racemes axillary and extra-axillary, about as long as the petioles, rusty-tomentose; bracts solitary at the base of the pedicels, ovate-acute, concave, tomentose outside, glabrous inside. Flowers '15 in. in diam., on pedicels shorter than themselves. Calyx-tube funnel-shaped, its mouth with 6 obtuse villous teeth. Petals none. Stamens about 16, glabrous, much exserted. Ovary small, often abortive; style slender, glabrous. Fruit transversely oblong with a sharp mucronate apex, '25 in. long, and '35 in. broad.

Malacca; Maingay 625; Perak; King's Collector 5336; Scortechini 217.

This species comes very near P. lanceolatum, Hook. fil. It has, however, no petals, whereas P. lanceolatum has. The leaves of this in the young state are more-obvously pubescent, while those of the latter are glabrous at all stages.

5. Pygeum lanceolatum, Hook. fil. Fl. Br. Ind. II, 319. A tree 30 or 40 feet high; young branches slender, dark-coloured, adpressed-puberulous. Leaves thinly coriaceous, elliptic-lanceolate, obtusely acuminate; the base cuneate, with 2 narrow glands just above it; both surfaces glabrous, the lower subglaucescent and with a few adpressed hairs on the main nerves and midrib; main nerves 4 or 5 pairs, curved, ascending, slightly prominent and dark-coloured on the lower surface; length 3-3'5 in., breadth 1-1'4 in., petiole '25-3 in. Racemes only about '5 in. long, axillary and extra-axillary, tomentose; the bracteole at the base of each pedicel sub-orbicular, acute, glabrous inside. Flowers on pedicels as long as themselves, '15 in. in diam. Calyx-tube widely campanulate, tomentose externally, glabrous inside and with 10 broad short teeth. Petals (if any) deciduous. Stamens about 20, much exserted. Ovary glabrous, compressed; style stout, glabrous, longer than the petals; stigma compressed. Fruit transversely oblong, with a slight vertical groove, glabrous, '3 in. long, and '4 in. broad, 2-seeded.

Singapore; Lobb 328. Penang; Curtis 216, 735.

The racemes of this are often very short, almost sessile, and subglobular. It is a very distinct species. I have not been able to discover any petals.

6. Pygeum acuminatum, Colebr. in Trans. Linn. Soc. XII, 360, t. 18. A tall tree; young branches cinereous, glabrous, rough. Leaves coriaceous, elliptic to elliptic-oblong, shortly and obtusely caudate-acuminate; the base rounded or slightly cuneate and unequal, often with 1 or 2 obscure glands; upper surface glabrous, shining, the midrib and nerves depressed; lower surface brown when dry, subrugulose, glabrous, dull; main nerves 6 or 7 pairs, curving upwards, prominent (almost winged)
beneath; length 4-6.5 in., breadth 1.75-3.25 in., petiole 35-5 in. *Racemes* from the axils of fallen leaves, solitary or several together, 2 or 3 inches long, slender, tawny-pubescent. *Flowers* 15 in. long, on pedicels 1 in. long; bracts narrowly oblong, sub-acute, very deciduous. *Calyx-tube* broadly campanulate, 15 in. wide at the mouth; teeth about 6, narrowly lanceolate. *Petals* 6, oblanceolate, obtuse, sericeous outside. *Stamens* about 30, long-exserted, glabrous. *Pistil* as long as the stamens; ovary glabrous; style slender, straight; stigma discoid-capitate. *Fruit* transversely oblong, slightly compressed, minutely apiculate, glabrous, but slightly rough, 5 in. long and 3 in. broad.

**Andaman Islands.** Distrib. Burma, Chittagong, Assam Range, Eastern Tropical Himalaya.

7. *Pygeum polystachyum*, Hook. fil. Fl. Br. Ind. I, 320. A tree 30-60 feet high; young branches with dark-coloured glabrous leathery bark. *Leaves* very coriaceous, elliptic-oblong, usually with an abrupt obtusely acuminate apex; the base broad or slightly and suddenly cuneate and with 2 large thick glands on its upper surface just above the petiole; upper surface glabrous, shining, pale greenish-brown when dry; the lower brown when dry, dull, minutely rugulose, glabrous; main nerves 7-10 pairs, oblique, rather straight, depressed on the upper and prominent on the lower surface; length 4.5-7 in., breadth 2.5-4 in., petiole 5 in., stout. *Racemes* (occasionally racemoid panicles) axillary, shorter than the leaves, slender, covered with short scanty rusty pubescence. *Flowers* about 2 in. long and 2.5 in. in diam., on pedicels varying from 1-2 in. long; bracts (if any) deciduous. *Calyx-tube* campanulate, ribbed and tomentose externally, glabrescent within; lobes 5, oblong, obtuse, rufous-tomentose. *Petals* 5, like the calyx-lobes. *Stamens* 40-50, much exserted. *Ovary* glabrous; style as long as the stamens, glabrous; stigma dilated, compressed laterally. *Drupe* sub-globular or transversely oblong, bluntly apiculate, 65 in. long and from 6-7.5 in. broad, glabrous.

*Seeds* glaucescent.

**Malacca;** Mainag 627. **Singapore;** Ridley 3830, 4453, 4666. **Perak;** Scortechini 2045, 2063. **King's Collector** 5676, 6603, 5676, 6847, 10942; **Wray** 3113, 3384.

This species is very near *P. acuminatum*, Colebr., of which I believe it to be probably only a southern form.

8. *Pygeum Scortechinii*, King n. sp. A slender tree 40-50 feet high; young branches puberulous, the bark dark-coloured. *Leaves* coriaceous, elliptic to oblong-lanceolate, acute or shortly acuminate; the base cuneate, eglandular; upper surface shining, glabrous except for occasionally a few scattered hairs on the depressed midrib near its base; lower surface pale, not shining, glabrous, minutely rugulose; main nerves
6 or 7 pairs, slender, spreading; length 2–3 in., breadth 8–1·35 in., petiole 25–35 in. Racemes solitary, axillary, 1–1·25 in. long, coarsely adpressed rusty-pubescent, bracts (if any) deciduous. Flowers 1·5 in. long, their pedicels 1 in. Calyx-tube narrowly campanulate, with 6 oblong subacute hirsute lobes. Petals none. Stamens about 12, exserted. Pistil shorter than the stamens, ovary with long white hairs; style glabrous. Fruit transversely oblong, glabrous, minutely pubescent, 3 in. long and 4 in. broad.

Perak; Scortechini 357.

9. Pygeum persimile, Kurz in Journ. As. Soc. Bengal Vol. XLI, 306. A tree; young branches slender, deciduously rusty-pubescent. Leaves thinly coriaceous, elliptic to elliptic-lanceolate, shortly and obtusely acuminate; the base rounded or slightly cuneate, eglandular; upper surface glabrous or glabrescent, very minutely punctate, dull, the midrib coarsely pubescent; lower surface brown, rugulose, with few scattered adpressed bristles, the nerves (but especially the midrib) strigose-pubescent; main nerves 7 or 8 pairs, spreading, very prominent (almost winged) on the lower surface; length 2·5–4 in., breadth 1·3–1·6 in.; petiole 25–3 in., slender, pubescent. Racemes usually in fascicles of 2 or 3 (sometimes united near the base), rarely solitary, from above the scars of fallen leaves, 75–1·75 in. long, densely tawny-tomentose; bracts broadly ovate, acute or obtuse, longer than the pedicels. Flowers 1 in. long and 1·5 in. wide at the mouth, their pedicels less than 1 in. Calyx-tube campanulate, tomentose outside, glabrous inside, the mouth with 6 distant obtuse teeth. Petals none. Stamens about 12 or 18, glabrous, spreading, exserted. Pistil erect, as long as the stamens, the ovary tawny-sericeous; the style glabrous above, sericeous below; stigma obliquely discoid. Fruit transversely oblong, with a deep vertical groove, scarcely apiculate, glabrous except for a few adpressed hairs in the groove, 25 in. long and 35 in. broad. Kurz For. Flora Burma, I, 436; Hook. fil. Fl. Br. Ind. II, 320.

Malacca; Griffith. Singapore; Ridley 4452.

Mr. Kurz inadvertently referred to this Griffith’s No. 2056 from Tenasserim which he says is closely allied to P. Lampongum, Miq. In my own opinion Griffith’s No. 2056 is P. Lampongum. Kurz’s description of his P. persimile exactly agrees with Griffithian specimens from Malacca (without any number), and on some of these he has written the name P. persimile with his own hand. This species must therefore henceforth be considered as Malayan and not as Burmese.

10. Pygeum parviflorum, Teysm. & Binn. in Nat. Tijds. Ned. Ind. II, 309. A tree 50–70 feet high; young branches dark-coloured, minutely rusty-pubescent. Leaves coriaceous, elliptic to elliptic-oblong, shortly caudate-acuminate, the base cuneate, upper surface shining,

Malacca; Ridley 1872. Penang; Curtis 162. Perak; King's Collector 7236, and 10827; Curtis 1293. Distr. Java, Borneo.

Var. densa; racemes not much longer than the petioles, the flowers much crowded and quite sessile, densely covered with pale tomentum; bracts very broad, subglaubrous.

Perak; King's Collector 6986, 10195, 10396, 10753.

It is possible that this variety ought to be treated as a species.

11. Pygeum ovalifolium, King n. spec. A small tree 15-20 feet high; young branches with rather rough cinereous bark, deciduously rusty-pubescent. Leaves oval or broadly ovate; the apex obtuse, obliquely and minutely emarginate; the base rounded and eglandular; upper surface shining, minutely punctate and rugulose, the midrib convex and rusty-pubescent; lower surface dull, minutely pubescent, with adpressed bristles intermixed, the midrib tomentose; main nerves 7 or 8 pairs, spreading, slightly depressed on the upper and slightly prominent on the lower surface when dry; length 1·75-2·15 in., breadth 1-1·5 in., petiole '3-4 in. Racemes axillary, stout, from 3-5 in. long, few-flowers-ed, densely rusty-tomentose; bracts obliquely ovate, very concave, glabrous inside, densely tomentose outside. Flowers '2 in. long, and 3 in. wide at the mouth, sessile. Calyx-tube campanulate, densely tomentose outside, glabrous inside except at the base; the mouth with 10 oblong obtuse teeth. Petals none. Stamen about 30 or 40, glabrous, much exserted, spreading. Pistil shorter than the stamens; the ovary narrowly ovoid, sericeous; style stout, subglaubrous; stigma obliquely discoid. Fruit subglaubrous with a slight vertical groove and shortly apiculate apex, sparsely strigose, '35 in. in diam.

Perak; at an elevation of about 5000 feet, King's Collector 7329.
12. Pygeum Hookerianum, King n. spec. A shrub or small tree; young branches dark-coloured, glabrous. Leaves thinly coriaceous, more or less broadly ovate, sometimes ovate-oblong, shortly acuminate, the base broad and rounded or sometimes slightly narrowed to the petiole; upper surface glabrous, the lower minutely rusty-pubescent especially on the midrib and nerves, the hairs partially deciduous; main nerves 6 or 7 pairs, spreading, slightly oblique, interarching rather far from the edge; length 2-4 in., breadth 1-1 8 in., petiole 25 in. Racemes axillary and extra-axillary, sometimes crowded, usually less than 5 in. long, densely rufous-tomentose. Flowers 2 in. in diam., on very short pedicels each with a broadly ovate concave bracteole at its base. Calyx-tube tomentose outside, glabrous inside, widely campanulate, with 6 obtuse teeth. Petals 6, about as long as the calyx-teeth, lanceolate, pubescent externally. Stamens from the mouth of the calyx-tube, about 20, glabrous, much exserted. Ovary sericeous; style longer than the stamens, puberulous, stigma obliquely discoid. Fruit sub-globular, 1-seeded and 25 in. in diam., or transversely elongate with a shallow vertical groove and often 2-seeded, 25 in. long and 4 in. broad, always glabrous and slightly apiculate, black or dark purple; seed when ripe covered with white down.

Perak; Scortechini 1234; Wray 3969; King’s Collector 1970, 2083, 2753, 4789, 6425.

To this species I believe belongs No. 628 of the Maingay Herbarium referred to by Sir Joseph Hooker in a note on p. 322, Vol. II of the Flora of British India, but left undescribed by him for want of sufficiently good material.

13. Pygeum brevifolium, Hook. fil. Fl. Br. Ind. II, 321. A shrub 3 or 4 feet high; young branches dark-coloured, glabrous. Leaves coriaceous, broadly oblong, shortly and obtusely acuminate, sometimes minutely emarginate, both surfaces quite glabrous; the upper olivaceous brown, the lower brown; main nerves 4 or 5 pairs, spreading and interarching, faint beneath; length 2-2.5 in., breadth 1-1.3 in., petiole 25-3 in. Racemes axillary, only about 3 in. long, sub-globose, tomentose, 6-10-flowered, bracts small. Calyx-tube urceolate, with 5 or 6 obtuse unequal teeth. Petals none. Stamens 10-16, filaments short. Ovary villous; style rather short, glabrous. Fruit unknown.

Malacca; Summit of Mount Ophir, Griffith 2051.

14. Pygeum Griffithii, Hook. fil. Fl. Br. Ind. II, 322. A tree? Young branches stout, densely tomentose. Leaves coriaceous, oblong or oblong-lanceolate, obtuse or obtusely cuspitate; the edges ciliate and obscurely sinuate-toothed; the base rounded or acute, with 2 small basal glands; both surfaces very minutely dotted; the upper glabrous, the midrib and main nerves impressed and puberulous; lower

Malacca; Griffith 2050.

This species is very imperfectly known, the only specimens of it being Griffith's which are quite fragmentary. The above description is taken entirely from Sir Joseph Hooker, who in turn took the description of the flowers from Griffith's MSS. It may be distinguished by its sinuate-toothed leaves.

5. Rubus, Linn.

Sub-erect or sarmentose shrubs, always prickly. Leaves alternate, simple or compound; stipules free or adnate to the petiole. Flowers in terminal and axillary corymbose panicles, rarely solitary, white or red. Calyx-tube broad; lobes 5, persistent. Petals 5. Stamens many. Disc lining the calyx-tube. Carpels many, on a convex receptacle; style subterminal; ovules 2, collateral, pendulous. Drupes many, 1-seeded, crowded upon a dry or spongy conical or cylindric receptacle. Seed pendulous. Distrib. Abundant in the northern hemisphere, rare in the southern; species about 200.

Leaves simple:

Leaves palmately 5–7-lobed; terminal panicle shorter than the leaves; young branches tomentose, woolly or villous. ... ... ... ... 1. R. moluccanus.

Leaves ovate or ovate-triangular, with 2 or 4 shallow lobes at the base only; terminal panicle as long as the leaves; young branches with thin cobwebby pubescence. 2. R. glomeratus.

Leaves broadly ovate, not lobed; terminal panicle much longer than the leaves; young branches puberulous at first but speedily glabrous ... ... ... ... 3. R. elongatus.

Leaves pinnate ... ... ... ... 4. R. rosefolius.

1. Rubus moluccanus, Linn. Spec. Pl. 707. A powerful subscandent shrub; the young branches, under surfaces of the leaves and inflorescence densely tawny or rusty-tomentose, villous or woolly; prickles short (1 in. or less) and recurved on the branches, petioles and lower surfaces of the midribs, often absent on the main nerves. Leaves coriaceous, usually broader than long, broadly ovate or orbicular, deeply cordate; palmately 5–7-lobed, the lobes often lobulate; 2–10 in. in diam., the petioles 1–2.5 in. long; upper surfaces of leaves rugulose, sparsely hispid, the edges irregularly dentate or serrate. Stipules varying in size, oblong, toothed, pinnatifid or laciniate. Panicles axillary and terminal, much shorter than the leaves, few-flowered. Flowers from 5–1 in. in diam., bracts like the stipules not with glandular hairs. Calyx-

In all the Provinces except the Andaman and Nicobar Islands; common on the hilly parts. Distrib. British India, Malayan Archipelago.

Var. alcefolia; pubescence very soft and velvety, leaves 4-5-10 in. in diam., prickles often 2 or 25 in. long, stipules and bracts pectinate, terminal panicle often 6 in. long, calyx-teeth spreading. R. alcefolius, Poir. Encycl. VI, 247; Miq. Fl. Ind. Bat. Vol. I, Pt. 1, 379.


2. Rubus glomeratus, Blume Bijdr. 1111. A semi-scandent shrub; young branches slender, with pale deciduous cobwebby pubescence. Leaves thinly coriaceous, ovate or ovate-triangular, with 2-4 shallow lobes near the coriaceous base only, the upper half tapering to the acuminate apex, not lobed, the edges everywhere dentate; upper surface glabrous except the pale-pubescent midrib and sometimes the nerves, minutely rugulose; lower surface minutely rusty- or tawny-tomentose or sparsely pubescent, reticulate; length 3-4 in., breadth 1-75-2-5 in.; petiole 1-1.5 in. long, with minute prickles which extend sometimes to the midrib. Stipules ovate, pinnatifid, deciduous. Panicles axillary and shorter than the leaves, or terminal and as long as the leaves, few-flowered, tawny-tomentose. Flowers 35 in. in diam. Calyx-lobes triangular, entire, acute, tomentose. Petals as long as the calyx-lobes, obovate. Carpels of the fruit numerous, red. R. Hasskarlii, Miq. Flor. Ind. Bat. Vol. I, Pt. 1, 381. R. acerifolius, Wall. Cat. 744.

Penang; Singapore; Perak. Distrib. Malay Archipelago.

Var. gracilis, King; terminal panicles twice as long as the leaves; pedicels of the flowers 4-6 in. long.

In its long terminal panicles this variety resembles R. elongatus, but the flowers have longer pedicels; moreover the venation of the leaves is quite that of R. glomeratus.

shrub; young branches at first pubescent but speedily glabrous, the bark dark-coloured and with minute deflexed prickles. *Leaves* coriaceous, broadly ovate, deeply cordate at the base, the apex acute; the edges sinuate and remotely dentate, not lobed; upper surface smooth, glabrous except the pubescent midrib; under surface pale, and (except 3 or 4 on the midrib) without prickles; the nerves and veins glabrous and chestnut-brown, the areole minutely pale-tomentose; length 3·5–5·5 in., breadth 2·5–3·5 in., petiole 1·35–2 in., with a few small prickles. *Stipules* ovate, pinnatifid, deciduous. *Panicles* pubescent and with small scattered prickles, a few axillary and shorter than or as long as the leaves; the terminal one much longer than the leaves (often 15 in. long) with distant branches; the flowers mostly clustered at their extremities, subsessile or shortly pedicelled, 3 in. in diam. *Calyx-lobes* triangular, blunt, tawny-tomentose. *Fruit* with numerous red carpels. DC. Prodr. II, 567; Blume Bijdr. 1112. R. Lobbianus, Hook. Ic. Pl. t. 741–742.

**Perak; Wray 421, 1849; King’s Collector 3465, 5732; Scortechini 1468. Distrib. Sumatra.**

4. **Rubus rosae folius**, Smith Ic. Ined. III, t. 60. A subscandent woody shrub; branches, petioles leaf-rachises and inflorescence with long stiff usually glandular hairs, with shorter softer hairs intermixed and a few sharp polished hooked spines. *Leaves* pinnate, 2–5 in. long; leaflets 3–7, membranous, lanceolate or ovate-lanceolate, unequally incised-serrate, rarely with 1 or 2 basal lobes, the apex acuminate, the base rounded; upper surface sparsely strigose, the midrib and nerves villous; lower surface less strigose than the upper, minutely reticulate, never white or glaucous; length of leaflets 1–3 in., breadth 3·5–1·2 in.; petiolules of the lateral leaflets 1·1–2 in., those of the terminal ones 3·5–1·1 in. *Stipules* linear-lanceolate, acuminate. *Flowers* 75–1 in. in diam., on pedicels much longer than themselves, solitary or in lax few-flowered panicles. *Calyx-lobes* lanceolate, acuminate, not prickly, woolly or glabrous. *Petals* usually larger than the calyx-lobes, broadly obovate, white. *Fruit* elongated, rarely subglobose, the numerous red carpels on a glabrous receptacle. Roxb. Flor. Ind. II, 518; Wall. Cat. 728; Kurz For. Flora Brit. Burm. I, 439; Hook. Ic. Pl. t. 349; Hook. fil. Fl Br. Ind. II, 341. R. pinnatus, Willd. R. asper, Don Prodr. 234; Wall. Cat. 741.

**Perak; at 3900 feet. Wray, at 4500 feet, No. 4187. Distrib. British India, Java.**

6. **Pyrus**, Linn.

Trees or shrubs. *Leaves* deciduous, simple or pinnate; stipules deciduous. *Flowers* white red or pink, in terminal cymes or corymbs; bracts subulate or linear. *Calyx-tube* urceolate turbinate or obconic,
lobes 5, erect or reflexed, persistent or deciduous. Petals 5, quincuncially imbricate in bud. Stamens 20 or more, filaments sometimes connate at the base. Disc annular, or lining the calyx-tube. Carpels 2-5, connate and adnate to the calyx-tube; styles 2-5, free or connate below, stigmas truncate; ovules 2 in each cell, basal, collateral, ascending. Fruit (a pome) fleshy, 2-5-celled; cells with a membranous or cartilagineous often 2-valved endocarp, 1-2-seeded. Seeds when in pairs plano-convex, testa coriaceous; cotyledous amygdaloid. Distrib. N. temp. and cold regions; species about 100.


Perak; at an elevation of 2000-2500 feet; Scortechini. Distrib. Burma; Khasia Mountains; Sumatra, Forbes 2050! 2376.

Order XL. Saxifragaceæ.

Trees shrubs or herbs. Leaves alternate and extipulate, or stipules adnate to the base of the petiole, or opposite and extipulate. Inflorescence various; flowers hermaphrodite or polygamo-dioecious; the sepals, petals and stamens symmetrically regular. Calyx more or less adnate to the ovary, sometimes nearly free, sometimes quite inferior; lobes imbricate or valvate. Petals 5 or 4, rarely 0, perigynous or epigynous, rarely sub-hypogynous, imbricate or valvate. Stamens inserted with the petals, equalling or double their number, rarely numerous. Ovary of 2 or 3-5 united carpels; usually 2- or 3-5-celled with axile placentas, occasionally 1-celled with parietal placentas; styles as many as the carpels, distinct or combined nearly to the summits, stigmas capitate or lateral and subcapitate; ovules numerous, anatropous, erect or pendulous. Fruit capsular or berried. Seeds numerous or several (solitary in Polyosma) albuminous; the albumen rarely scanty or nearly wanting. Distrib. Species 580; in the cold or temperate regions of the whole world and in the mountains of the tropics; together with a few genera of tropical trees.

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A sub-herbaceous shrub, with simple exstipulate leaves, and succulent fruits with numerous small seeds. 1. Dichroa.

Woody shrubs or trees with pinnate (rarely simple) stipulate leaves; fruits small, dry, capsular, dehiscent, 2-celled; seeds few hairy. 2. Weinmannia.

Trees or large woody shrubs with simple leaves, 4-merous flowers, and dry fruit with a single large smooth seed. 3. Poltostma.

1. Dichroa, Lour.

A sub-herbaceous shrub. Leaves opposite, more or less serrate, lanceolate, persistent, exstipulate. Panicle terminal. Calyx-tube adnate to the ovary; limb 5-6-toothed. Petals 5 or 6, thick, valvate, blue or purplish. Stamens 10 or 12, epigynous. Ovary 3-inferior, 1-celled; styles 3-5; ovules numerous, on 3-5 parietal placentas formed by the inflexed margins of the carpels. Berry 3-inferior, blue. Seeds numerous, small, obovate; tests with large reticulations.


Perak; on the Central Range; Scortechini 266. Distrib. On the higher parts of the Malayan Archipelago; China; Philippines; Temperate Himalaya from Bhotan to Nepal; Khasia Mountains.

2. Weinmannia, Lind.

Trees or shrubs, usually with terete opposite branches. Leaves stipulate, opposite, coriaceous, unequally pinnate, 3-foliolate or simple, leaflets usually glandular-serrate. Flowers hermaphrodite or polygamo-dioecious. Calyx-tube short, the lobes 4 or 5, imbricate, persistent or deciduous. Petals 4 or 5, sessile, imbricate, spathulate or obovate, inserted under the lobed margin of the perigynous disc. Stamens 8 or 10, inserted with the petals, the filaments often elongated and exserted; the anthers small, 2-celled. Ovary free, ovoid or conical, 2-celled, 2-beaked;
styles 2, subulate, persistent, the stigmas simple. Capsule small, coriaceous, 2-celled, septicidally 2-valved, the valves boat-shaped, few- or many-seeded. Seeds oblong, reniform or subglobose; the testa membranous, often hairy. Embryo terete, in the axis, or towards the apex, of the fleshy albumen. Distrib. Species about 80; Malayan, Mascarene, Australasian, and American.


Malacca; on Mount Ophir, Griffith. Perak; on Gunong Babu, at an elevation of 5000 feet, Wray 3814; on Gunong Idjan at 5000 feet, Scortechini 446.

3. Polysma, Blume.

Evergreen trees or shrubs. Leaves opposite or subopposite, petiolated, acute or acuminate. Flowers in terminal racemes (in some non-Indian species solitary) 3-bracteolate. Calyx-tube entirely adnate to the ovary; lobes 4, small, persistent. Petals 4, epigynous, linear, valvate, white, yellowish or greenish, much recurved when expanded, fugacious, usually hairy within. Stamens 4, epigynous, filaments hairy. Ovary inferior, 1-celled; style columnar, stigma simple; ovules numerous, ascending, on two parietal placentas which project considerably into the cavity of the ovary. Fruit sub-baccate, 1-seeded. Seed ascending, subbasal. Distrib. Species 18; Malayan, British Indian and tropical Australasian.

Leaves quite glabrous on both surfaces:—

Leaves sharply sinuate-dentate, membranous; flowers 2 in. long...

Leaves quite entire, coriaceous, flowers 3 or 3½ in. long:—

Leaves elliptic to elliptic-rotund, or obovate; calyx strigose...

1. P. parvispera.

2. P. coriacea.
300  G. King — Materials for a Flora of the Malayan Peninsula. [No. 1,

Leaves oblong or oblong-lanceolate, calyx nearly glabrous  3. P. Scortechinii.
Leaves glabrous on the upper surface, the midrib and nerves, often with the intervening spaces on the lower surface also adpressed-pubescent:—

Fruit truncate at the base and with 4 deep vertical grooves; flowers not more than 3 in. long; leaves entire  4. P. mutabilis.
Fruit not truncate at the base and not vertically ridged:—
Fruit subglobose; flowers 35 in. long; leaves entire  5. P. fragrans.
Fruit ovoid, tapering at the base; flowers 45 in. long; leaves entire or remotely serrate  6. P. integrifolia.

Leaves glabrous on the upper surface, the lower surface always in the young leaves, and usually in adult leaves covered with dense yellowish tomentum:—
Fruit sub-globose, not ridged, 25 in. long  7. P. lutea-vivens.
Fruit ovoid with a truncate base, and with 4 deep vertical ridges, 4 in. long  8. P. velutina.

Imperfectly known species near P. velutina, Bl.  9. P. Ridleyi.

1. Polyosma parviflora, King n. spec. A small tree; young branches slender, glabrous. Leaves membranous, narrowly elliptic, shortly caudate-acuminate, the edges sinuate-dentate in the upper three-fourths, entire in the lower fourth, the base cuneate; both surfaces glabrous, dull and dark-coloured when dry, the lower slightly paler than the upper; main nerves 10–12 pairs, sub-horizontal, slightly prominent on the lower surface only; length 2.5–3.25 in., breadth 1–1.5 in.; petiole 3–5 in., sparsely pubescent, channelled. Racemes terminal, shorter than the leaves, puberulous. Flowers 2 in. long, their pedicels 0.05 in., adpressed-pubescent; the bracteoles linear, longer than the pedicel. Calyx-tube narrow, nearly glabrous, the mouth with triangular acuminate teeth. Petals only twice as long as the calyx, linear, obtuse, pubescent externally, longer than the anthers. Fruit flask-shaped, the apex crowned by the calyx-teeth and the pointed base of the style, the base rounded and slightly gibbous, glabrous, 5 in. long, and 3 in. in diam.

Perak; on Gunong Inas, at 5000 feet, Wray 4143.

A species somewhat resembling P. ilicifolia, Blume in the shape of its leaves; but having much shorter racemes and smaller flowers, and an almost glabrous calyx.

2. Polyosma coriacea, King n. spec. A shrub or small tree; young branches glabrous, sparsely lenticellate. Leaves coriaceous, elliptic to elliptic-rotund, rarely sub-obovate, the apex acute or shortly acuminate, the edges entire and slightly revolute when dry, the base cuneate; both surfaces glabrous, the upper shining, the lower dull and paler; main nerves 9–11 pairs, spreading, interarching freely, slightly prominent on the lower surface only; length 2.75–4 in., breadth 1.5–2 in., petiole about 0.75 in. Racemes terminal, about as long as or longer than
the leaves, sparsely adpressed-pubescent. Flowers 0.35 in. long; their pedicels 1 in., bearing 3 unequal linear-acuminate strigose bracteoles. Calyx-tube shorter than the pedicel, slightly constricted under the mouth; the teeth triangular, acute, strigose like the tube. Petals much longer than the calyx and slightly longer than the stamens, linear, obtuse, minutely strigose outside, sub-villous inside. Fruit (very young) ovoid, glabrous, crowned by the calyx-teeth.

Perak; on Gunong Bubu at an elevation of 5000 feet; Scortechini 805; Wray 3819, 3855, 4131. Ridley's 5219 from Kedah Peak possibly belongs to this species. Its leaves, however, are thinner, and their nerves more distinct.

3. Polysoma scortechini, King n. spec. A medium-sized tree (fide Scortechini); young branches slender, with pale almost polished bark, all parts except the inflorescence glabrous. Leaves coriaceous, oblong or oblong-lanceolate, sometimes oblanceolate, acute, much narrowed to the base; the edges entire, slightly revolute when dry; both surfaces shining, glabrous, except sometimes a few hairs on the midrib beneath; main nerves 10–12 pairs, spreading, interarching, faint on both surfaces; length 4–6.5 in., breadth 1.5–2 in., petiole 3.5–6 in. winged. Racemes terminal, shorter than the leaves, sparsely puberulous. Flowers 3 in. long, their pedicels about 0.05 in.; the bracteoles small, lanceolate, hairy. Calyx-tube nearly glabrous; its lobes shallow, triangular. Petals linear, subacute, pubescent outside, only slightly so inside, about as long as the almost glabrous stamens. Fruit unknown. P. integrifolia, Herb. Scortechini (not of Blume).

Perak; Scortechini 1900.

Readily distinguished by its perfectly glabrous leaves and nearly glabrous flowers.

4. Polysoma mutabilis, Blume, Mus. Bot. Lugd. Bat. I, 261. A tree 20–40 feet high; young branches lenticellate, deciduously rusty-pubescent. Leaves narrowly elliptic, tapering gradually from about the middle to each end, not caudate-acuminate, the edges quite entire; upper surface black when dry, glabrous, shining; the lower deep-olivaceous, very sparsely pubescent, the midrib and nerves adpressed-pubescent; main nerves 8–10 pairs, spreading, slightly prominent on the lower and slightly depressed on the upper surface, length 3.5–6 in., breadth 1.25–1.75 in.; petiole 0.5–1.1 in., slender. Racemes terminal, much longer than the leaves, with short rather sparse pubescence. Flowers 3 in. long, their pedicels about 0.05 in. long with 2 adpressed bracteoles. Calyx-tube about as long as the pedicel, pubescent; its lobes short, triangular. Petals many times longer than the calyx, linear, sub-obtuse, pubescent, slightly longer than the stamens. Fruit ovoid from a
broad truncate base, the apex pointed and crowned by the small persistent calyx-teeth; length '45 in.; breadth at the base '25 in.; puberulous, black when ripe, the pedicel '25–3 in. long, pubescent. Miq. Flor. Ind. Bat. Vol. I, pt. 1, 724; Suppl. 336.

**Perak; King's Collector** 2596, 4344, 8332; **Wray** 925. **Johore; Lake and Kelsall** 4057. **Malacca; Goodenough** 438.

This species is closely allied to *P. integrifolia*, Blume; but has flowers only '3 in. long on pedicels only '05 in. long, while the flowers of *P. integrifolia* measure '45 in. and its pedicels '1 in. The best distinction between the two species lies however in the fruit which is in this truncate at the base and vertically ridged, while in *P. integrifolia* the fruit has a tapering base and is not ridged.

5. **Polyosma fragrans**, Benn. Pl. Jav. Rar. 196. A shrub 5 or 6 feet high; young branches slender, deciduously pubescent. Leaves elliptic, tapering much to each end, the apex abruptly acuminate; the base cuneate, the edges entire; the upper surface quite glabrous; the lower sparsely adpressed-pubescent especially on the midrib and 7–10 pairs of subhorizontal faint main-nerves; length 2:5–3 in., breadth 1:1–1:35 in.; petiole '4 in., slender, pubescent. **Raceme** terminal, erect, rather longer than the leaves, tawny-pubescent. Flowers '35 in. long, rather crowded, their pedicels under '1 in. long with 2 adpressed bracteoles. **Calyx-tube** short, sericeous; the mouth with 4 small triangular teeth. **Petal** many times longer than the calyx, linear, acute, adpressed-pubescent. **Stamina** shorter than the petals. **Anthers** linear, elongate; filaments broad, sparsely villous on the inner side. **Fruit** sub-globular, apiculate, glabrous, '2 in. in diam. H. f. & T. in Journ. Linn. Soc. II, 77; Miq. Fl. Ind. Bat. I, pt. I, 724; Suppl. I, 336; Clarke in Hook. **fil. Flor. Br. Ind. II, 408. Itea fragrans**, Wall. in Roxb. Flor. Ind. II, 420; Wall. Cat. 8472, partly.

**Perak; Scorletchini** 520. **Singapore; Wallich.** **Distrib. Sumatra.**

6. **Polyosma integrifolia**, Blume Bijdr. 659. A tree 20–40 feet high; young branches lenticellate, deciduously rusty-pubescent. **Leaves** ob lanceolate, the apex shortly and abruptly candate-acumin ate, gradually narrowed from the middle or above it to the petiole, the edges entire or remotely serrate, drying of a rather dark-brown colour; upper surface glabrous or with a few hairs on the midrib; the lower paler, with adpressed hairs on the midrib and sometimes also on the nerves; main nerves 8–12 pairs, spreading, interarching, slightly prominent on the lower surface only; length 3:5–8 in., breadth 1:35–3 in.; petiole '5–1 in., rather stout, pubescent. **Racemes** terminal, often longer than the leaves, subadpressed-sericeous. **Flowers** '45 in. long, rather crowded; their pedicels '1 in. long, pubescent, with 2 linear-lanceolate bracts. **Calyx-tube** about as long as the pedicel, pubescent; the mouth with 4

**Var. 1. typica**; leaves entire.

MALACCA; G. R. Griffith 2510 (Kew Distr.); Maingay 632. PERAK; Wray 508; King's Collector 3802. PENANG; Curtis 1081. ANDAMAN ISLANDS; King's Collectors, Prain.


**ANDAMAN ISLANDS. Distr.** Khasia Hills, Assam.

As I have noted under *P. mutabilis*, Bl., the only tangible distinction between that plant and this is that the former has fruit truncate at the base and with 4 bold vertical grooves, while this has smooth fruit. Many of the specimens above-quoted as belonging to this are not in fruit, and I accept them as *P. integrifolia* in deference to the authority of the Flora of British India.

7. **POLYOSMA LATE-VIRENS**, Griff. MSS. in Herb. Kew. A tree 20–50 feet high; young branches yellowish-tomentose. Leaves drying of a yellowish-green, coriaceous, oblanceolate or narrowly-elliptic, shortly acuminate, much narrowed to the base; the edges entire, slightly revolute when dry; upper surface glabrous, shining, the midrib minutely tomentose, lower surface yellowish-tomentose; main nerves 8 or 9 pairs, spreading, interarching, prominent on the lower surface only; length 3-25–5'5 in., breadth 8–2'25 in., petiole 35–5 in. Raceme solitary, terminal, tomentose, rather longer than the leaves. Flowers 3 in. long, on pedicels 1 in. long. Calyx-tube slightly longer than the three narrowly oblong adpressed bracteoles, its mouth with 4 broad triangular obtuse teeth, yellowish-tomentose. Petals much longer than the calyx and slightly longer than the stamens, linear, tapering to the obtuse apex, villous in front, tomentose behind. Filaments nearly as long as the anthers, villous in front. Fruit ovoid or globular-ovoid, crowned by the calyx-teeth, deciduously adpressed sericeous and lepidote, 25 in. long, the pedicel 1–2 in. *P. mutabilis*, Clarke in Hook. fil. Fl. Br. Ind. II, 469 (not of Blume).

MALACCA; G. R. Griffith 2508, 2509; Maingay 633. PERAK; King's Collector 8775. PENANG; Curtis 377, 758.
Griffith's original specimens, to which he gave the MSS. name _P. lete-virens_, have smaller leaves and more ovoid fruit on shorter pedicels than any specimens subsequently collected. But in other respects they agree with specimens more recently collected in Perak and Penang.

8. **Polyosma velutina**, Blume Mus. Bot. Lugd. Bat. I, 261. A small tree; young branches stout, deciduously tomentose. _Leaves_ coriaceous, elliptic to elliptic-oblong, sometimes slightly obovate, sub-acute or obtuse, the base cuneate; the edges entire, revolute when dry; upper surface at first with a few scattered adpressed hairs, glabrous when old except the pubescent depressed midrib and main nerves; lower surface covered with soft velvety yellowish tomentum; main nerves 9-12 pairs, prominent on the lower surface only; length 4-7.5 in., breadth 1-75-3.25 in., petiole 6-1.5 in. _Raceme_ terminal, about one and a half times as long as the leaves, stout, densely yellowish-tomentose like the calyx. _Flowers_ 4 in. long, their pedicels rather over 1 in., with 3 narrow unequal adpressed bracteoles. _Calyx-tube_ tomentose; its teeth triangular, acute. _Petals_ narrowly linear, sub-acute, slightly longer than the stamens, much longer than the calyx; the filaments slightly villous in front, about equal to the anthers. _Fruit_ ovoid, with a broad sub-truncate base, and with an apiculus formed by the remains of the base of the style, boldly 4-ridged, sparsely and deciduously strigose, 4 in. long and 3 in. in diam. at the base; the pedicel 2 in.; endocarp woody, deeply 4-grooved.

**Penang**; **Curtis** 1165; **King's Collector** 1352. **Perak**; **Scortechini** 2111; **King's Collector** 3685, 4362. **Distrib.** Sumatra, Java.

I identify the Penang and Perak plants with Blume's _P. velutina_ by description only; for I have seen no authentic specimen of that species. The deep vertical ridging of the endocarp is noted of no other described species except _P. mutabilis_, Bl., and I think my identification is correct.

9. **Polyosma Ridleyi**, King n. spec. A tree; young branches densely and minutely tomentose. _Leaves_ coriaceous, narrowly-elliptic, caudate-acuminate, the edges entire and slightly revolute when dry; the base cuneate; upper surface when young sparsely adpressed-pubescent, when adult glabrous and shining; lower surface covered with dense yellowish tomentum; main nerves 9-11 pairs, spreading, curving and interarching, rather prominent on the lower surface, the intermediate nerves almost as prominent; length 6-6.5 in., breadth 2-2.5 in.; petiole 1-1.75 or even 2 in., tomentose. _Raceme_ terminal, stout, shorter than the leaves, densely covered with pale yellowish or whitish tomentum like the calyx and petals. _Flowers_ 4 in. long, their pedicels 1 in., with 3 equal lanceolate bracteoles on the same level. _Calyx-tube_ shorter than the pedicel, wide; the teeth broad, shallow. _Petals_ much longer than the calyx, linear, blunt, villous in front. _Stamens_ nearly as long
as the petals; the filaments flat, villous in front, scarcely so long as the anthers. *Style* subglabrous. *Fruit* unknown.

**Singapore**; **Ridley 3972.**

A very distinct species in the neighbourhood of *P. velutina*, Bl., but with narrower leaves, much more tomentose flowers and inflorescence, and a wider calyx-tube.

**Note.**—I here take the opportunity of describing a very distinct new species from Sumatra.

**Polyosma longe-pedicellata**, King n. spec. A shrub or tree 15 feet high; young branches coarsely adpressed-pubescent. *Leaves* elliptic or obovate-elliptic, abruptly and shortly acuminate; the edges slightly sinuate and very obscurely and minutely toothed, slightly recurved when dry; the base cuneate; upper surface glabrous, finely reticulate; the lower with short coarse adpressed hairs especially on the midrib, finely reticulate; main nerves 14-16 pairs, almost horizontal, slightly curved and interarching towards the edge of the blade, slightly prominent on the lower surface only when dry, the intermediate nerves almost as distinct; the reticulations minute, distinct on both surfaces; length 5.25-7 in., breadth 2.2-3.25 in.; petiole 75-125 in., puberulous. *Raceme* solitary, terminal, rather longer than the leaves, with pubescence like the young branches. *Flowers* 5 in. long, on slender adpressed-pubescent pedicels 3-35 in. long, and bearing three adpressed bracteoles towards their apices. *Calyx-tube* 1 in. long, adpressed-pubescent, its teeth broadly triangular. *Petals* 4 in. long, linear, obtuse, adpressed-pubescent outside. *Fruit* ovoid, tapering to each end, crowned at the apex by the very short calyx-lobes and by the sharp base of the style, minutely adpressed-pubescent, 5 in. long, and 3 in. in diam. *Fruit pedicels* 5-7 in. long, sometimes deflexed.

**Eastern Sumatra**; at elevations of 3200 and 3700 feet, **Forbes 2037, 2250.**

**Order XLI. DROSERACEÆ.**

Herbs; catching insects by means of glandular viscid hairs, or by means of petioled leaves with automatically closing laminae. *Flowers* hermaphrodite, regular. *Calyx* 4-5- (rarely 8-) partite; or sepals free, imbricate, persistent. *Petals* and *stamens* as many as the sepals, hypogynous or nearly so. *Ovary* nearly free, globose or ovoid, 1-3-celled; styles 5-3, capitate, fimbriate or bifid; ovules numerous, on parietal placetas equal in number to the styles. *Capsule* membranous, 5-3-valved, many-seeded. *Seeds* with fleshy albumen; embryo cylindric or minute. **Distrib.** Species 110; spread over nearly all temperate and tropical lands except the islands of the Pacific.

1. *Drosera*, Linn.

Perennial herbs, scapigerous or with a leafy stem, glandular-pilose. *Leaves* radical or alternate, usually circinate in vernation; stipules 0, or scariose and adnate to the petiole. *Calyx* free from the ovary, 4-8-partite, sepals persistent. *Petals* 4-8, hypogynous or scarcely perigynous, white or rose-coloured, withering, persistent. *Stamens* as many

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as the petals, hypogynous or scarcely perigynous. Ovary 1-celled with 2-5 styles; ovules parietal, numerous. Capsule loculicidally 2-5-valved. Seeds numerous; in the Indian species ovoid-ellipsoid, with the testa black, smooth, reticulate, not lax. Distrib. Species 100; scattered throughout the world except Polynesia; very numerous in Australia.

Leaves cauleine, linear ... ... ... 1. D. indica.
Leaves all radical, spathulate-cuneate ... ... 2. D. Burmannii.


In swampy places in all the Provinces, except the Andaman and Nicobar Islands. Distrib. The southern part of British India, Ceylon, Burma, the Malayan Archipelago, China, tropical Australia, Africa.


In swampy places in all the Provinces, except the Andaman and Nicobar Islands. Distrib. Plains of British India, Ceylon, the lower Himalaya, Malayan Archipelago, China, Japan, Australia, West Africa.

Order XLII. Hamamelideae.

Trees or shrubs. Leaves alternate, petiolate, simple or palmately lobed; stipules 1-2, rarely wanting, deciduous or rarely persistent. Flowers hermaphrodite or unisexual, collected into heads or spikes. Calyx small or 0, adnate to the ovary. Petals 0 or 4-5, perigynous or
nearly epigynous. *Stamens* 4–∞, perigynous, or rarely hypogynous; anthers dehiscing longitudinally. *Ovary* 2-celled; styles 2, separate and ultimately divaricate, usually persistent; ovules 1–∞, axile, pendulous. *Capsule* woody, its segments often bifid; endocarp often horny and separating from the exocarp. *Seeds* 1, or many and then usually only the lowest in each cell perfect. **Distrib.** Species 35; Eastern Asia, the Himalaya, Khasia Hills, Malaya, China and Japan; also in North America and in South Africa.

Ovules solitary in each cell:—

Stipules small and deciduous; heads ebracteate; stamens 5, with short filaments, the connective produced into a horn; flowers hermaphrodite ... ... ... ... 1. *Maingaya*.

Ovules 6 or more in each cell:—

Stipules large, coriaceous; heads ebracteate; stamens 10–14, without appendages; flowers polygamous ... ... ... 2. *Bucklandia*.

Stipules absent; heads with numerous coloured bracts; stamens 7–10 without appendages; flowers hermaphrodite... 3. *Rhodoleia*.

1. *Maingaya*, Oliver.

A tree. *Leaves* alternate, undivided, petioled, persistent; stipules small, deciduous. *Heads* peduncled, quasi-terminal, ebracteate, of about 15 flowers. *Calyx-tube* adherent to the ovary; the limb closed, splitting up on one side a little way from the base and then circumscissile and deciduous. *Petals* 5, perigynous, linear, circinate in aestivation. *Stamens* 5, perigynous, filaments very short, connective produced as a horn. *Staminodes* about 10, horned. *Ovary* half-inferior, 2-celled; styles 2, distinct, short; ovule 1 in each cell, pendulous. *Capsule* woody, ovoid; endocarp horny, separating from the exocarp. *Seed* narrowly ellipsoid, and with pale thick iridescent testa.

*Maingaya malayana*, Oliver in Trans. Linn. Soc. XXVIII, 517, t. 44. A tree 50 or 60 feet high; young branches rather slender, glabrous, pale-coloured when dry, lenticellate. *Leaves* membranous, oblong-lanceolate or elliptic, acuminate; the base broad, rounded or minutely cordate, sometimes slightly peltate; both surfaces glabrous, shining, the lower of a bright brown tint when dry; main nerves 7–10 pairs, curving upwards, slightly prominent on the lower surface only; length 6.5–9 in., breadth 2.4–5 in., petiole '75–1 in., slender; stipules small, tomentose, caducous. *Capitules* from '75–1 in. in diam., solitary, or two or three from a short peduncle. *Flowers* '5 in. long, sessile; buds oblong or obovoid-oblong. *Calyx* thin, puberulous, not opening but separating in an irregular circumscissile manner. *Petals* linear, obtuse, glabrous, four or five times as long as the calyx. *Capsule* woody, ovoid, tapering into the thick pedicel, with truncate compressed apex, more than half enve-
loped by the calyx-tube, striate, minutely pubescent, 6 in. long, 4 in. wide at the apex. Seeds narrowly ellipsoid, tapering much to the apex; the testa thick, white, iridescent, with elongate reticulations. Clarke in Hook. fil. Fl. Br. Ind. II, 428.

Penang; Maingay 1513; Curtis 659. Perak; Scortechini 819; King's Collector 7330.

2. Bucklandia, Br.

A tall glabrous tree. Leaves alternate, acuminate, entire, long-petioled; stipules solitary or in pairs, large, oblong, coriaceous, deciduous. Inflorescence of 2-5 peduncled heads, at first enclosed between a pair of stipules; flowers adnate by their calyces, about 8 in a head, polygamous. Calyx-tube adnate to the ovary; limb 5-lobed. Petals in the 3 flower linear-spathulate, fleshy, variable in number; in the 2 fl. rudimentary. Stamens 10-14 (in the 2 none); filaments long. Ovary half-inferior, 2-celled; styles 2, separate, soon divaricate; ovules in each cell 6 in two rows. Capsule nearly superior, woody, subglobose; endocarp horny, showing a tendency to separate from the exocarp. Seeds in each cell 6, oblong, trigonous; the upper wingless, solid, without any embryo, the lower one in each cell winged and fertile.

Bucklandia populnea, R. Brown in Wall. Cat. 7414. Leaves broadly ovate sub-reniform or sub-orbicular, the apex acuminate or tricuspidate, the edges entire; the base broad and rounded, subcordate or truncate, or narrowed and cuneate; both surfaces glabrous; the lower sometimes pubescent on the nerves; main nerves 5-7, radiating palmately from the base, the lower on each side slender, prominent on the lower surface; length 2.5-6.5 in., breadth 1.5-7 in.; petiole 8-3 in., usually glabrous but sometimes pubescent; stipules oblong, sub-falcate, obtuse, 9-1.25 in. long, slightly pubescent at the base, breadth 25-45 in. Griff. in Asiat. Res. XIX, 95, with two plates; Clarke in Hook. fil. Fl. Br. Ind. II, 429. B. populifolia, H. f. & T. in Journ. Linn. Soc. II, 86; Kurz Forest Fl. Brit. Burm. I, 445. Liquidambar tricuspis, Miq. Fl. Ind. Bat. I, Pt. I, 1097; and Suppl. 346, with a figure.

Perak; Scortechini; on Gunong Inas, elevat. 5000 feet, Wray 4151; on Ulu Batang Padang, about 3900 feet, Wray 1535. Distrib. The temperate Himalaya from Nepal to Bhotan, elevat. 5000-8000 ft.; Khasia Hills 4000-6000 feet; Burma, Java, Sumatra.

None of the Perak specimens have flowers or fruit. Scortechini's have leaves in no way differing from those from the Himalaya and Khasia mountains, except that the main nerves and petioles, even when old, are pubescent. Wray's specimens, on the other hand, have smaller ovate leaves, rarely tricuspidate and never sub-rotund or reniform; their petioles are sometimes slightly hairy, but their main
nerves have tufts of hair only in their axils. In all the Perak specimens the stipules are much narrower than in those from the Himalaya and Khasia mountains.


Glabrous woody shrubs. **Leaves** extipulate, evergreen, alternate, with long petioles, coriaceous, glaucous beneath. **Flowers** in few-flower-ed axillary pedunculate reflexed capitula surrounded by numerous whorls of coloured bracts, increasing in size from without inwards. **Flowers** unsymmetrical, hermaphrodite, adnate in the capitula by their calyces. **Calyx-tube** adherent to the lower half of the ovary; its limb annular, truncate, glandular inside. **Petals** rosy, 2–4, very unequal, unilateral, deficient in the central flowers, clawed, oblong-oblancoate. **Stamens** 7–10, inserted with the petals; the filaments thick, elongate; the anthers' linear-oblong, basifixed, 2-celled, the connective not produced. **Ovary** half-inferior, ovoid, the apex bifid, 2-celled, or 1-celled by aborption of the septum. **Style** subulate, elongate, deciduous, stigma simple. **Ovules** numerous in each cell, inserted on two biseriate axile placentas. **Capsule** sub-ligneous, bicuspitate, 2-celled, 2-valved; the valves bifid, many-seeded. **Seeds** imbricate, not winged, angular, compressed, testa crustaceous. **Distrib.** Two species; Hongkong and Sumatra.

**Rhodoleia Teysmanni**, Miq. in Versl. en Meded. K. Akad. v. Wetensch. VI, 124. **Leaves** oblong to elliptic, the apex obtuse, slightly narrowed at the base to the long petiole, both surfaces rugulose when dry; main nerves 7–9 pairs, spreading, faint; the midrib prominent beneath; length 2·5–5 in., breadth 1·5–2 in., petiole '75–1·75 in. **Capitula** solitary, about '75 in. long, ovoid, on decurved peduncles about '25 in. long; the bracts broad, blunt, the outer short and glabrous, the inner longer and covered with reddish hair. **Stamens** and petals subequal, about '5 in. long. **Ripe capsules** glabrous, about '4 in. long, dehiscing widely for about half their length. **Miq. Fl. Ind. Bat. Vol. I, pt. 2**, p. 669; **Suppl. 532**.

**Malacca**; **Hervey**; **Ridley** 3289. **Perak**; elev. 3900 feet in Batang Padang Valley, **Wray** 1481. **Distrib.** Sumatra.

**Order XLIII. Haloragaceae.**

Herbs, often aquatic. **Leaves** opposite or whorled, or partly alternate, when submerged often pinnatisect, always extipulate. **Flowers** small, axillary, solitary or fascicled, sessile or pedicelled, hermaphrodite or unisexual, the nodes between the floral whorls sometimes developed. **Calyx-lobes** 4 or 0. **Petals** 4 and epigynous, or absent. **Stamens** 8, 4 or 1, epigynous in the bisexual flowers. **Ovary** inferior, 4-2- or 1-celled;
the styles equal in number to the cells, simple or finely lobed; ovules 4, (1 in *Hippurus*) pendulous. *Fruit* small, dry or drupaceous, with cells as in the ovary, indehiscent, or separating into its component carpels. *Seeds* 4 or 1. *Distrib.*; about 80 species, cosmopolitan.

Terrestrial; fruit 1-celled, 1-seeded... ... ... 1. *Haloragis.*
Aquatic (floating); fruit separating into its component carpels ... ... ... ... ... ... ... ... ... ... ... ... 2. *Myriophyllum.*


Branching herbs. *Leaves* opposite, the upper sometimes alternate, toothed, rigid. *Flowers* minute, nearly sessile in the axils of bracts, spicate or racemose, partially unisexual or hermaphrodite. *Calyx-tube* 4–8-ribbed; lobes 4, erect, persistent, acute, valvate. *Petals* 4, coriaceous, often wanting in the ♀. *Stamens* 8, epigynous. *Ovary* 2- or 4-celled, with 4 pendulous ovules; stigmas 4 (in the females at least), sessile, feathery. *Fruit* a dry, 2–4-celled, 2–4-seeded nut; but in the following species by abortion 1-celled, 1-seeded. *Distrib.* Species 40; N. Asia, Australia.


At elevations of about 5000 feet on the Perak Central Range? *Distrib.* Malaya, China, Australia and New Zealand. Khasia mountains; at elevations of from 5000–7000 feet.

I include this as a Perak plant with some hesitation. Scortechini's specimens are not now in the Calcutta Herbarium, although his field note is.

2. *Myriophyllum*, Linn.

Glabrous, aquatic herbs. *Leaves* dentate-serrate or pectinate-pinnatifid, or entire, often whorled. *Flowers* small, sessile or nearly so, in the axils of floral leaves or in nearly naked spikes; monoeious or hermaphrodite. **Male**; calyx-tube short, limb 2–4-fid or 0; petals 2–4; stamens 2–8. **Female**; calyx-tube deeply 4-furrowed, limb 0 or of 4 minute lobes; petals minute or 0; ovary inferior, 4- or 2-celled; styles 2 or 4, short, usually recurved, the stigmas plumose; ovules solitary
in each cell, pendulous. *Fruit* 4-furrowed, or separating into 4 or 2 carpels. **Distrib.** Species 15; cosmopolitan.


**Malacca; Griffith** (probably on Mount Ophir). **Distrib.** Mountains of the Malayan Archipelago and of the South of British India; Australia, New Zealand, South America.

**Order XLIV. RHIZOPHOREÆ.**

Trees or shrubs. **Leaves** opposite and stipulate (alternate and exstipulate in *Anisophylea*), usually coriaceous, glabrous; stipules interpetiolar, very caducous. **Flowers** axillary, usually bisexual (unisexual in *Anisophylea*), surrounded at the base by connate or cupuliform bracts, or ebracteate. **Calyx** more or less adnate to the ovary; limb produced beyond the ovary, 4–14-lobed; lobes valvate, persistent. **Petals** equal in number to but usually smaller than the sepals, entire, emarginate, 2-fid or lacerate. **Stamens** usually twice the number of the petals, in pairs, opposite to and partly embraced by them; rarely indefinite (*Kandelia*); anthers 2-celled, rarely multi-loculate (*Rhizophora*). **Ovary** more or less adnate to the calyx, from 5–1-celled by solution of the septa; styles connate (distinct in *Anisophylea*); stigma often lobed; ovules usually 2 in each cell, pendulous. *Fruit* coriaceous or woody, crowned or surrounded by the calyx-limb, mostly indehiscent, 1-celled, 1-seeded. **Seed** pendulous, arillate or not; albumen fleshy or 0; embryo inverted, small if surrounded by albumen, elongated if exalbuminous; radicle macropodous in the tribe *Rhizophoreæ*, perforating the apex of the pericarp and germinating while the fruit still adheres to the tree.—**Distrib.** Tropical plants; many sharing with an arboreal vegetation the muddy shores of the estuaries of rivers. **Genera** 17, species about 70.

**Leaves** opposite, stipulate; **style connate**:

**Tribe I. RHIZOPHOREÆ.** Embryo exalbuminous, with a large radicle germinating while the fruit is still on the tree:

- **Calyx** 4-lobed; petals 4, entire; stamens 8; ovary 2-celled ...
- **Calyx** 8–14-lobed; petals 8–14, 2-lobed or deeply emarginate; ovary 2–4-celled; stamens 16–28 ...

1. **Rhizophora.**

2. **Bruguiera.
Calyx 5- or 6-lobed; petals 5 or 6, their apices ciliate or with clavate or capitate bristles; stamens 10-12  3. Ceriops.
Calyx 5- or 6-lobed; petals 5 or 6, multifid; stamens indefinite; stigma 3-lobed  4. Kandelia.

Tribe II. Legnotideae. Embryo immersed in fleshy albumen, radicle not unusually large and not germinating in the fruit:

Flowers 5-8-merous in trichotomous cymes; calyx-tube minutely bracteolate, half-superior, the calyx-lobes erect; stigma small, not lobed  5. Carallia.
Flowers 5-merous, axillary, solitary or in pairs; calyx ebracteolate, half-superior, its lobes reflexed; stigma discoid, 5-10-lobed  6. Pellacalyx.
Flowers 4-5-merous, in axillary fascicles; calyx-tube ebracteolate, adnate to the base of the ovary, its lobes reflexed; stigma discoid, 5-lobed  7. Gynotroches.
Leaves alternate, exstipulate; style distinct

Tribe III. Anisophylleae. Leaves alternate and exstipulate; flowers unisexual; styles distinct  8. Anisophyllea.

1. Rhizophora, Linn.

Trees. Branches marked by leaf-scars. Leaves coriaceous, glabrous, opposite, mucronate. Stipules large, in pairs, interpetiolar, caducous. Flowers rather large, on axillary 2-3-chotomously-divided and few-flowered cymes. Calyx 4-lobed, surrounded at the base by connate bracteoles. Petals 4, entire, inserted on a fleshy disc. Anthers 8, subsessile, multi-loculate. Ovary 2-celled, half-inferior, projecting beyond the calyx as a fleshy cone; cells 2-ovuled; stigma bifid. Fruit coriaceous, ovoid or obconic, with the reflexed persistent calyx-teeth at its base. Radicle elongated, perforating the apex of the fruit and descending from the tree into the mud.—Distrib. About 5 species; frequent on muddy tropical shores.

Leaves elliptic; cymes longer than the petioles, usually 3-flowered; petals fleshy, lanate in front  1. R. mucronata.
Leaves oblong to oblong-lanceolate; cymes shorter than the petioles, 2-flowered; petals thin, glabrous  2. R. conjugata.

1. Rhizophora mucronata, Lamk. Dict. VI, 160, t. 396, f. 2. A large evergreen glabrous shrub or tree; young branches thick, with bold cicatrices, rather pale. Leaves elliptic, tapering to each end, the apex mucronate; upper surface reticulate when dry, the main nerves faint and depressed; the lower surface minutely rugulose and with black dots, even when dry the nerves invisible; length 5-7 in., breadth 2.5-4.25 in., petiole 1.2-1.75 in. Cymes axillary, slightly longer than the petioles, usually 3-rarely 2-flowered. Flowers 5-6 in. long, their pedicels shorter. Calyx-lobes coriaceous, triangular, subacute, glabrous.

In all the provinces, at the mouths of rivers; very common. Distrib. The Tropics of the Old World and of Australia.

The original specimens in the Calcutta Herbarium of *R. latifolia*, Miq. are only large-leaved specimens of this.

2. **Rhizophora conjugata**, Linn. Sp. Pl. 634. A small glabrous tree; young branches clavate, smooth, pale, the upper part with bold cicatrices. Leaves oblong to oblong-lanceolate, tapering to each end, the apex mucronate; when dry the upper surface faintly reticulate, the main nerves visible; the lower surface not showing the main-nerves but the midrib there prominent, remotely pustulate and minutely dotted; length 5-6 in., breadth 1-65-2-5 in., petiole 8-1-25 in. Cymes axillary, shorter than the petioles, 2-flowered. Calyx-lobes oblong, concave, acute. Petals slightly shorter than the calyx, thin, glabrous. Stamens 6-8; filaments short, anthers linear. Fruit inversely clavate, 1 in. long, the protruding radicle from a few inches to a foot long, cylindric; 25-3 in. in diam., when dry. DC. Prodr. III, 33; Blume Mus. Bot. I, 134; Wight Ill. I, 309; Kurz. For. Flora Burma, I, 447; Hook. fil. Fl. Br. Ind. II, 436. *R. apiculata*, Blume Flor. Jav. I, 91. *R. candelaria*, DC. Prodr. III, 32; Trimen Flora Ceylon, I, 151.

In all the Provinces, at the mouths of rivers and in tidal marshes. Distrib. The Tropics of the Old World.

2. **Bruguiera**, Lamk.

Trees or shrubs. Leaves usually coriaceous, oblong, quite entire. Peduncles axillary, cymose, or solitary. Flowers rather large, coriaceous. Calyx 8-14-merous, obconical or campanulate, ebracteate, adnate to the base of the ovary; lobes subulate-lanceolate, valvate. Petals oblong, equal in number to the calyx-lobes, 2-lobed or emarginate, appendiculate, embracing the stamens by pairs. Stamens 16-28; filaments filiform; anthers linear, mucronate, about as long as the filaments. Ovary 2-4-celled, included in the calyx-tube; cells 2-ovuled; style filiform.

J. II. 40
stigma 2-4-lobed, minute. Fruit coriaceous, included in or adnate to the calyx-tube, 1-celled, 1-seeded. Germination as in Rhizophora. 

**Distributed.** Species about 7, in the tropics of the Old World.

Flowers 1 in. long or upwards, solitary:

- Petals 2-lobed, each lobe with 2-4 apical bristles, otherwise glabrous ... ... ... 1. *B. gymnorrhiza*.
- Petals 2-lobed, the sinus between the lobes with one bristle; the edges densely clothed with short white hairs ... 2. *B. eriopetala*.
- Flowers not more than 5 in. long, in axillary cymes:
- Lobes of the calyx as long as the tube, spreading or reflexed; petals bifid, each lobe crowned by 3-5 pale hairs, their edges with scanty white hairs outside ... 3. *B. caryophylloides*.
- Lobes of calyx only one-fourth the length of the tube, erect; petals with broad emarginate apex, bearing 5 white flexuose hairs, the edges glabrous ... 4. *B. parviflora*.

1. **Bruguiera gymnorrhiza**, Lamk. Encycl. IV, 696; III. t. 397. A large glabrous evergreen tree; young branches stout, marked with cicatrices towards the apex. Leaves elliptic or elliptic-oblong, acute, the base cuneate; upper surface shinning when dry, the nerves faint; the lower dull, the veins invisible but the midrib very prominent; length 3.5-6 in., breadth 1.75-2.5 in., petiole 1.3-1.6 in. Flowers solitary, axillary, 1.25-1.5 in. long; the peduncles about 3.5 in., deflexed. Calyx coriaceous, campanulate, ribbed, cut for half its length into 12 narrow acute suberect teeth. Petals shorter than the calyx-lobes and equal to them in number, sub-convolute, two-lobed at the apex and with 2-4 bristles at the point of each lobe, pubescent at the base, otherwise glabrous. Stamens two opposite each petal and shorter than it, each alternate filament short; anthers linear. Fruit small, in the fundus of the calyx-tube, containing a single seed germinating *in situ* and forming a cylindric radicle 1-2 feet long prior to its fall. W. & A. Prodr. 311; Brand. For. Fl. 219; Miq. Fl. Ind. Bat. I, pt. 1, 586; Blume Mus. Bot. 136; Kurz For. Flor. Burm. I, 450; Hook. fil. Fl. Br. Ind. II, 437; Dalz. & Gibbs. Fl. Bomb. 95; Trime *Flora Ceylon*, I, 153. *B. Rheedii*, Miq. l. c. 587; Blume, l. c. 136; Wight Ic. t. 239; Dalz. & Gibbs. Bomb. Fl. 95; Hook. Ic. Pl. t. 397. *Rhizophora gymnorrhiza*, Lam. Sp. 634; Roxb. Fl. Ind. II, 460; Griffith. Ic. Pl. Asiatic, t. 645; Wall. Cat. 4874; Thwaites Eu. Pl. Ceyl. 120.

Tidal Forests in all the provinces. **Distributed.** Malaya, Australia, Africa.

2. **Bruguiera eriopetala**, W. & A. in Wight Ill. I, p. 210; Wight Icon. 239 B. A tree; young branches slender, with cicatrices towards the apex. Leaves oblong-lanceolate or oval-oblong, sometimes rather oblanceolate, acute, the base very cuneate; upper surface shining, the
nerves faint; the lower reddish-brown when dry, the nerves very faint or obsolete but the midrib prominent; length 3·25-4 in., breadth 1·25-1·65 in., petiole 6-7·5 in. *Flowers* 1-1·25 in. long, solitary, axillary; the peduncle short, decurved. *Calyx* as in *B. gymnorrhiza*, but the lobes only 10. *Petals* shorter than the calyx-lobes, deeply bifid, with a stout seta in the sinus between the two narrow lobes, the edges densely clothed with stout white hair, the apices of the lobes bearing one short bristle each. *Fruit* as in *B. gymnorrhiza*, but the germinating radicle shorter. Wall. Cat. 2451; Brandis For. Flora, 219; Hook. fil. Fl. Br. Ind. II, 438. *B. Rumphii*, Blume Mus. Bot. Lugd. Bat. I, 138. *B. parietosa*, Griff. Notul. IV, 670; IC. Pl. Asiat. t. 641.

In similar situations to the last, but not so common. Malacca; Griffith 2206; Maingay 642. Penang; Curtis 514. Pahang; Ridley 1045 C. Perak; Scortechini; Wray 2711. Distrib. Malayan Archipelago, Australasia.


In tidal Forests like the other species of the genus; in all the provinces. Distrib. Malay Archipelago.

4. *Bruguiera parviflora*, W. & A. Prodr. 311; Arn. in Ann. Nat. Hist. I, 369. A shrub or small tree; young branches slender, the cicatrices distant. *Leaves* oblong-lanceolate to elliptic-lanceolate, acute, much attenuate at the base; upper surface shining and showing the

Tidal Forests in all the provinces. **Distrib.** Malaya.


**Shrubs.** *Leaves* opposite, ovate or obovate. *Stipules* caducous, axillary. *Cymes* condensed. *Calyx* 5–6-merous, surrounded at the base by connate bracts. *Petals* 5–6, inserted at the base of a 10–12-lobed fleshy disc, emarginate or truncate; their apices ciliate or with clavate or capitate bristles. *Stamens* 10–12, filaments inserted between the lobes of the disc; anthers 2-celled. *Ovary* 3-celled (at least above), cells 2-ovuled; style short, stigma simple. *Fruit* obovoid, the reflexed limb of the calyx persistent at its base, 1-celled, 1-seeded. *Germination* as in *Rhizophora*. **Distrib.** Species 7; river-mouths, tropics of Old World.

*Flowers* sessile; petals setose-ciliate at the apex; anthers linear, longer than the filaments.

1. *C. Roxburghiana*.

*Flowers* pedicelled; petals with 3 short clavate processes at apex; anthers ovate, acute, much shorter than filaments.

2. *C. Candolleana*.

1. **Ceriops Roxburghiana**, Arn. in Ann. Nat. Hist. I, 364. A glabrous dwarf tree or shrub 2–4 feet high. *Leaves* elliptic, slightly obovate, or orbicular-elliptic, the apex rounded, the edges slightly recurved, rather narrowed at the base, (often somewhat abruptly); main nerves faint on both surfaces; the upper surface shining, the lower dull; length 2.25–3.75 in., breadth 1.5–2.25 in., petiole 7.5–1.15 in. *Cymes* axillary, shortly pedunculate, not branched; flowers 2 in. long, sessile, densely crowded. *Calyx* with 5 or 6 ovate-lanceolate sub-acute lobes. *Petals* oblong-obovate, the apex emarginate or sub-truncate, setose-ciliate. *Anthers* linear, much longer than the short filaments. *Fruit* clavate, 5 or 6 in. long, the protruded radicle a few inches long, clavate,

At the mouths of rivers, probably in all the provinces. Distrib. Tropical tidal forests of the old World.

2. Ceriops Candolleana, Arn. in Ann. Nat. Hist. I, 364. A glabrous shrub or dwarf tree 3–6 feet high. Leaves obovate-oblong, obtuse, sometimes emarginate, much and gradually attenuate to the base, the edges slightly reflexed, main nerves slightly visible on both surfaces when dry, length 1·75–2 in., breadth 1·1–1·5 in., petiole 6–1 in. Cymes axillary, peduncled, branched; flowers 25 in. long, on short pedicels. Calyx-lobes 5, oblong, sub-obtuse. Petals oblong-obovate, the apex truncate or emarginate and with 3 short clavate appendages. Stamens 10, nearly as long as the petals; the anthers ovate, acute, only about a fourth of the length of the filaments. Fruit clavate, 5 in. long, the protruded radicle a few inches to a foot long, (rarely longer,) gradually thickening to near the apex and then becoming acute, deeply grooved and ridged. Blume Mus. Bot. Lugd.-Bat. I, 142; Wight Ill. 209; Icones t. 240; Miq. Fl. Indl. Bat. Vol. I, Pt. 1, 590; Brandis For. Flora 218; Kurz For. Flora Burm. I, 448; Hook. fil. Fl. Br. Ind. II, 436; Trimen Flora Ceylon I, 152. Rhizophora timorensis, DC. Prod. III, 32.

At the mouths of rivers and in tidal swamps in all the provinces. Distrib. Tropics of old World.


A small tree. Leaves opposite, coriaceous, oblong, obtuse; stipules caducous. Peduncles axillary, dichotomously branched, few-flowered. Flowers rather large, white. Calyx 5–6-merous, surrounded at the base by connate bracteoles, adnate to the base of the ovary; lobes linear— lanceolate, valvate. Petals 5 or 6, bifid; the lobes multifid, segments capillary. Stamens indefinite, anthers small; filaments slender, exserted. Ovary 1-celled, half-inferior, prolonged above the calyx into a fleshy cone; style slender, stigma 3-lobed; ovules 6, fixed in pairs to a central column. Fruit ovoid, girt at the base by the reflexed limb of the calyx, 1-celled, 1-seeded. Radicle fusiform, very acuminate. Germination as in Rhizophora. Distrib. A single species; British India, Malaya.


Andaman Islands, and probably also in the other provinces.

5. CARALLIA, Roxb.

Trees or shrubs. Leaves coriaceous, glabrous, petiolate, ovate or elliptic; stipules caduceous. Peduncles short, rather thick. Flowers small, in short 3-chotomous axillary branching cymes, sessile and often crowded. Calyx-tube cylindric or campanulate, minutely bracteate at the base; limb 5-8-lobed, the lobes erect, short, valvate. Petals 5–8, inserted on the margin of a crenulated disk lining the calyx-tube, clawed, orbicular, 2-fid or entire, subserrate or lacerae at the apex. Disc epigynous, 10–16-lobed. Stamens inserted with the petals, filaments filiform; anthers small, oblong. Style subulate or filiform. Fruit small, globose, coriaceous, 1-celled, 1-seeded (unknown in two species). Seed globose-reniform, testa fibrous, embryo curved.—Distrib. Species about 12, natives of the Indian Ocean.

Cymes on peduncles as long as the pediolo, bearing numerous crowded sessile flowers 15 in. long ... 1. C. lucida.

Cymes on peduncles slightly longer than the pediolo, bearing from 3–5 shortly pedicelled flowers 1 in. long ... 2. C. Scortechinii.

Cymes on peduncles much longer than the pediolo, bearing 3 flowers 25 in. long on pedicels as long as themselves ... 3. C. eugenoidea.

1. CARALLIA LUCIDA, Roxb. Hort. Beng. 92; Corom. Plants III, t. 211. A small glabrous tree; young branches thin, dark-coloured when dry. Leaves coriaceous, varying from obovate to elliptic-oblong, oval or oblong-lanceolate; the edges recurved, entire or serrulate in the upper half or three-fourths, the apex usually shortly cuspitate, the base more or less cuneate; both surfaces shining and reticulate; the main nerves numerous, spreading and interarching freely; length 2½–3 in., breadth 1–1½ in., petiole 2½–3½ in. Cymes axillary and from the axils of fallen leaves, on stout peduncles about as long as the pediolo, densely umbellate, usually trichotomous. Flowers 15 in. long, sessile. Calyx-tube cylindric, its mouth with 6 or 7 short triangular incurved teeth. Petals equal in number to the calyx-teeth, orbicular, crenate, clawed, not embracing the stamens. Stamens twice as many as and longer than the petals, the filaments much longer than the ovate anthers. Fruit pisiform, glabrous, pulpy, 1-celled and usually only 1-seeded. Roxb. Fl. Ind. II, 481; Wall. Cat. 4880; Wight Ic. 605; Kurz For. Flora Burma, I, 451. O. integerrima, DC. Prodr. III, 33; Wight Ill. t. 90;

Perak; very common. Singapore, and probably also in several of the other provinces. Distrib. Malayan Archipelago, China, Australia, British India.

DeCandolle’s C. integerrima, published in 1828, is in my opinion merely the entire-leaved form of this very common Indian tree, the leaves of which are sometimes serrulate and sometimes entire. It is a tree which Roxburgh could not possibly have overlooked. He published and figured the serrulate-leaved form of it as C. lucida in his Coromandel Plants (1819), having previously given the name in his Hortus Bengalensis, p. 92. In the belief that C. lucida is the oldest name for this plant, I have followed Kurz in restoring it. DeCandolle’s name C. integerrima is however adopted by Mr. Bentham, and also by Mr. Henslow who described the Rhizophoreae in Hooker’s Flora of British India.

2. Carallia Scortechini, King n. spec. A shrub or small tree; young branches slender, opposite, smooth, dark-coloured when dry. Leaves lanceolate or ovate-lanceolate, shortly candate-acuminate, the base slightly cuneate; the edges entire, slightly revolute when dry; both surfaces shining, the lower with sparse black dots and with the numerous spreading main nerves slightly prominent; length 2-2.75 in., breadth 1-1.25 in., petiole 2-2.5 in. Stipules lanceolate, 25 in. long, caducous. Gynaece axillary, on pedicels slightly longer than the petioles, trichotomous, spreading, not crowded. Flowers 3-5, rather more than 1 in. long and about the same in width at the mouth, on pedicels nearly 1 in. long and bracteolate at the base. Calyx-tube campanulate, with 5 triangular lobes half as long as itself, their apices slightly inflexed. Petals 5, thin, reniform, erose-crenate, clawed, each embracing a stamen. Stamens 10, inserted on the 10-toothed epigynous disc, unequal. Ovary adnate to the calyx-tube, 5-celled, with 2 axile ovules in each cell. Style stout, as long as the calyx-lobes, stigma 5-lobed. Fruit unknown.

Perak; Scortechini 2023; King’s Collector 1013. Singapore; Ridley 5593.

The specimens collected by Scortechini are described by him as taken from a shrub 5 or 6 feet high, while those collected by Mr. Kunstler are noted as from a tree 30-40 feet in height. They resemble each other exactly both in flowers and leaves, and I have no doubt whatever that the two belong to the same species. I give this species a name with considerable hesitation; for it does not differ much from Roxburgh’s description of C. lancifolia. It also closely resembles C. cuspidata, Blume, in leaves, but has larger flowers.
3. **Carallia eugenoidea**, King n. spec. A tall tree; young branches slender, glabrous, reddish when fresh, black when dry. Leaves oblancoolate, the apex sub-acute, the base cuneate, the edges thickened and with black glandular dots, entire; upper surface shining when dry; the lower dull, the 6–8 pairs of spreading main-nerves slightly prominent; length 1-75–2-25 in., breadth 8–1-1 in., petiole 2–25 in. Stipules in pairs, lanceolate, 25 in. long, caducous. Cymes axillary, their peduncles an inch or more in length, bearing at the apex, on pedicels as long as themselves, 3 flowers 25 in. in length. Calyx-tube narrowly campanulate, with 5 triangular lobes as long as itself. Petals apparently none. Stamens twice as many as the calyx-lobes; the filaments alternately shorter, inserted on the 10-lobed disc. Ovary occupying the tube of the calyx, 5-celled, with 2 nearly pendulous ovules in each cell; stigma 5-lobed. Fruit unknown.

**Perak; Scortechini**, 326.

In the externals of the flowers and also in its leaves this has a superficial resemblance to a *Eugenia*; but the presence of stipules and the structure of the flower show it to be a true *Carallia*.


Trees with bifarious opposite petiolate entire or obscurely serrulate leaves and interpetiolate elongate caducous stipules. Flowers axillary, solitary or in pairs, minutely bracteolate. Calyx ebracteolate, its tube tubular-campanulate, adherent to the ovary at its base; the mouth expanded and with 4–6 short recurved valvate teeth. Petals 4–6, lacerate at the apex, inserted on the margin of the tube of the calyx. Stamens 8–12, incurved, inserted on the margin of the thin crenulated disc lining the calyx-tube. Ovary half-inferior, 5–10-celled. Style subulate; stigma discoid, 5–10-lobed; ovules many in each cell, fascicled, attached to the axis. Fruit fleshy, sub-globose, 5–10-celled, many-seeded. Seeds ovoid, with striate testa; albumen copious with the embryo in its axis; cotyledons flat, narrow; the radicle terete and elongate. Distrib. Two species, both Malayan.

Calyx-tube with 5 or 6 teeth; flowers 5-merous; leaves densely stellate rusty-pubescent beneath ... ... 1. **P. axillaris**.

Calyx-tube with 4 teeth; flowers 4-merous; leaves glabrous 2. **P. Saccardianus**.

1. **Pellacalxyx axillaris**, Korth. in Van der Hoev. & De Vr. Tijdsch. III, 20, t. 2. Young branches rusty-pubescent. Leaves thinly coriaceous, oblong, sometimes slightly wider above the middle, the apex shortly and abruptly acuminate, the base rounded; upper surface with a few small scattered sub-stellate hairs, or sub-glabrous when old, the midrib always pubescent; lower surface boldly reticulate and stellately
rusty-pubescent; main nerves about 12 pairs, conspicuous beneath, curving sharply upwards; length 4·5-7 in., breadth 1·25-2 in.; petiole 2-3 in., rusty-pubescent; stipules lanceolate, rusty-pubescent, 3·5 in. long. Flowers 25-35 in. long, on pedicels of about the same length, both rusty-pubescent. Fruit pisiform, fleshy, 2·5 in. in diam., crowned by the persistent wide upper part of the calyx. Benth. in Journ. Linn. Soc. III, 76; Griff. Notul. IV, 420; Ic. Pl. Asiat. t. 486.

Malacca; Griffith 2217/1; Maingay 638. Penang; Griffith; Curtis 937. Singapore; Ridley 6917; Anderson, 81. Perak; Scortechini 119; King's Collector, 1049, 2036.

2. Pellacalyx Saccardianus, Scortechini in Nuov. Giorn. Bot. Ital. XVII, 143. A small tree, young branches rusty-puberulous. Leaves thinly coriaceous, oblong, shortly acuminate, edges entire, base rounded or cuneate; upper surface quite glabrous, shining; the lower dull, paler, slightly reticulate, glabrous or sometimes puberulous near the midrib and nerves; main nerves 7-9 pairs, rather prominent beneath, spreading and curving upwards; length 4-7 in., breadth 1·6-2 in., petiole 0·25 in. Flowers about 25 in. long, on slightly shorter pedicels, rusty-puberulous. Calyx-tube as in P. axillaris but only 4-cleft. Petals 4, broadly oblong, emarginate, irregularly toothed towards the apex, narrowed and entire at the base. Stamens 8. Ovary usually 9-celled. Fruit as in P. axillaris, but glabrous. Hemsley in Hooker's Ic. Pl. 1546.

Perak; Scortechini 325. Wray 701, 1328. Malacca; Maingay 639.

This differs from P. axillaris, Korthals, in having glabrous or nearly glabrous leaves with only 7-9 pairs of main nerves, and also in its tetramerous flowers.

7. Gynotroches, Blume.

Trees or shrubs. Leaves coriaceous, shining; stipules deciduous. Flowers small, axillary, fascicled, the peduncles joined in the middle. Calyx ebracteolate, 4-5-partite; segments valvate, reflexed. Petals 4-5, inserted below the margin of an 8-10-lobe perigynous disc, clawed, spathulate, fimbriate-lacerate. Stamens 8-10, inserted on the disc, filaments filiform, anthers small. Ovary superior, adhering by a broad base to the calyx, ovoid-globose, 3-6-angled, 3-6-celled; style columnar, furrowed, conical at the base; stigma peltate, deeply 5-lobe; lobes emarginate, recurved; ovules 4 in each cell, ascending, fascicled. Berry globose, 4-6-celled, many-seeded. Seeds small, obovoid, testa crustaceous and wrinkled, albumen fleshy, embryo terete. Distrib. Species 2, both Malayan.

Gynotroches axillaris, Blume Bijdr. 219. A tree; young branches dark-coloured, smooth. Leaves oblong, or elliptic-oblong to elliptic, tapering to each end; the apex shortly and rather bluntly acuminate,

In all the provinces; common. **Distrib.** The Malayan Archipelago.

8. **Anisophyllea**, Br.

Trees and shrubs. **Leaves** exstipulate, distichous, obliquely ovate-lanceolate or elliptic, with 3-5 main nerves proceeding from the base (the nervation pinnate in one species), quite entire; the alternate leaves sometimes smaller or minute and stipuliform. **Flowers** monoeious, minute, in axillary simple or fascicled spikes, ebracteate or minutely bracteolate. **Calyx-tube** of 2 flower ovoid, adnate to the ovary, terete or ribbed; limb 4-fid, lobes erect. **Petals** 4, small, involute, entire, lobed or lacerate. **Stamens** 8; filaments short, subulate; anthers small, didymous, usually abortive in the females. **Ovary** inferior, 4-celled; styles 4, subulate, erect or recurved, stigmas acute or subcapitate; ovules solitary in each cell, pendulous, anatropous. **Fruit** coriaceous, oblong or pyriform, ribbed or smooth, 1-seeded. **Seed** pendulous, exalbuminous, testa coriaceous, embryo clavate, cotyledons very small or 0, radicle large. **Distrib.** Species 10, natives of Tropical Asia and Africa.

Leaves dimorphous ...
Leaves uniform:

Flowers apetalous...
Flowers with 4 petals:

Petals minute, deltoid ...
Petals thick, subquadrated, entire or submarginate 4. **A. Griffithii**.
Petals 3-fid at the apex ...
Petals divided to the very base into narrow segments ...

1. **Anisophyllea disticha**, Baill. in Adansonia, XI, 311. A shrub with ferruginous-pilose slender branches. **Leaves** dimorphous, in two
series; the longer oblong-rhomboid, subfalcate, acute, the base cuneate, subsessile, 3-nerved, puberulous or pubescent or sometimes nearly glabrous on both surfaces, 75–1.5 in. in length and about one-third or one-quarter as much in breadth; the smaller set stipule-like, lanceolate and only 25–3 in. long, inserted below the larger and overlapping their bases. Male flowers in short few-flowered axillary fascicles and racemes much shorter than the leaves, 0.5 in. in diam., on short pedicels; calyx with 4 broad lobes; petals shorter than the calyx, trifid; stamens 8, as long as the petals. Female flowers solitary, larger than the males, sub sessile; calyx-tube elongated, tubular, pubescent externally, connate with the ovary, crowned at the apex with 4 triangular lobes; petals and stamens as in the male; styles stout, shorter than the petals, truncate; stigmas 2-lobed; fruit narrowly elliptic, tapering to each end, with 8 vertical grooves, glabrous; seed oblong. Hook. fil. in Herb. Kew; Hensl. in Hook. fil. Fl. Br. Ind. II, 442. Anisophylella trapezoidalis, Baill. in Adansonia, XI, 311. Anisophyllum trapezoidalale, Baill. in Adansonia, III, 24, 26. Haloragis disticha, Jack Mal. Misc. VII, 19; Wall. Cat. 2519; Hook. Journ. Bot. I, 371; Calc. Journ. Nat. Hist. IV, 336.

In all the provinces except the Andamans and Nicobars; common. Distrib. The Malayan Archipelago.

The name Anisophylella was first given to this genus by Robert Brown, who however published no description of it. In 1823, Sabine (in a paper published in the Trans. Hort. Soc. Lond.) first used it in giving a popular description of a plant from Sierra Leone under the name A. laurina. Overlooking this publication, Don founded for that very plant the genus Anisophyllum, and named it Anisophyllum laurinum, and this name was published in 1849 in Hooker's Nigr Flora, 342. In the addenda and corrigenda to that volume, Don's name is however reduced and Brown's is restored. Baillon (in Adansonia III, 24 and 36,) applied the generic name Anisophyllum to three plants of which the present species is one. But, in a subsequent volume of Adansonia (XI, 310 and 378) and in his Histoire des Plantes (VI, 304), Baillon abandons Don's name Anisophyllum and adopts Brown's earlier one.

2. Anisophylella apetala, Scortechini MSS. in Herb. Calcutt. A tree 30–40 feet high; young branches slender, glabrous. Leaves membranous, oblong to elliptic or ovate-elliptic, or elliptic-lanceolate, candate-acuminated, the base rounded or slightly cuneate; both surfaces glabrous, minutely reticulate; the upper shining, the lower somewhat dull when dry; main nerves 5, springing from the apex of the petiole, the middle three bold, the two lateral rather faint; length 3–8 in., breadth 1.25–3 in., petiole 25–3 in. Racemes in lax few-branched extra-axillary panicles as long as the leaves, the rachises glabrous. Flowers monocious, depressed-globular, usually tetrameros, sometimes (fide Scortechini) pentameros. Male flowers on pedicels longer than
themselves; calyx deeply cut into 4 (rarely 5) triangular thick concave segments; petals none; stamens 4, exserted, the filaments dilated at the base; styles and ovary rudimentary. Female flowers on the same branches as the males, sessile; calyx-tube slightly elongated, the lobes of the mouth smaller than in the male, staminodes shorter than the calyx-lobes; ovary tetragonal, included in the calyx-tube, the styles exserted; fruit ovoid or elliptic, tapering to each end, glabrous, with vertical purple stripes, 2-3 in. long and 1-1.25 in. in diam.; pericarp woody, thick.

Perak; Scortechini, 684 and 1808; Wray 2340, 2758; King's Collector 2932, 4326, 4792, 6587, 6318, 7399.

This resembles A. Gaudichaudiana, Baill. in the shape of its leaves which are, however, much thinner in texture and more candate-acuminate. It differs from that, however, in having apetalous flowers, and in the males having longer pedicels. The fruit also differs, being pointed at each end and quite glabrous, whereas the fruit of A. Gaudichaudiana is obtuse at the ends and rusty-pubescent.

3. Anisophyllum Gaudichaudiana, Baill. in Adansonia, XI, 311. A tree 50-80 feet high; young shoots rather slender, glabrous, minutely lenticellate. Leaves coriaceous, broadly oblong to elliptic-oblong, entire, shortly and rather bluntly acuminate, the base rounded or slightly narrowed; both surfaces glabrous, dull when dry, with wide reticulations and 5, rarely 7, bold vertical curving main nerves springing from the apex of the petiole, the transverse connecting veins distinct; length 6-10 in., breadth 2.5-4 in.; petiole 25-3 in., stout, channelled, articulate at the base. Panicles axillary, solitary or in fascicles, much shorter than the leaves, with few short distant spicate rusty adpressed-pubescent branches. Flowers monoeccious. The males depressed-globose, mostly about .05 in. in diam., on short pedicels; calyx of 4 triangular concave fleshy segments; petals deltoid, much smaller than the calyx-lobes. stamens 8, incurved, pistil rudimentary. Female flowers sessile, longer than the males; the calyx-tube elongate, tubular, containing the ovary, its mouth with segments like the male; stamens none; styles 4, recurved. Fruit large, subpyriform or ellipsoidal, sub-oblique, obtuse, minutely rusty-pubescent, 3.5 in. long, and 2.25 in. diam.; pericarp woody, .5 in. thick. Seed solitary. Hook. Fl. Pl. 1551. A. grandifolia, Hensl. in Hook. fil. Fl. Br. Ind. II, 442. Cocculus ?? flavicans, Wall. Cat. 4976. Strychnos? grandis, Wall. Cat. 4454. Anisophyllum flavicans, Hook. & Thoms. Fl. Ind. 175. A. grande, Benth. in Journ. Linn. Soc. I, 79.

Penang; Gaudichaud, Maingay 1517, Curtis 521, Stolickza. Perak; King's Collector 2706, 2731, 5472; Ridley 3029.

On the principle by which Herr Otto Kuntze desires to guide botanical nomenclature Baillon's name A. Gaudichaudiana would have to give way to the name A.
4. Anisophylla Griffithii, Oliver in Trans. Linn. Soc. XXIII, 460. t. 48. A tree 40-50 feet high, with drooping branches; young branches slender, glabrous. Leaves thinly coriaceous, greenish-yellow when dry, lanceolate, ovate-lanceolate or broadly elliptic-lanceolate, the apex bluntly acuminate, the base cuneate, the edges entire and slightly revolute when dry; both surfaces glabrous and very minutely dotted, the upper shining, the lower rather dull; length 2'5-3'5 in., breadth 1'2-2 in., petiole 1'5-2 in.; a basal nerve springing from the apex of the petiole on each side and running close to the edge; main nerves pinnate, about 6 pairs, oblique, curving but slightly. Spikes solitary or in pairs, axillary or extra-axillary, slender, tawny-puberulous, 75-1 in. long, (1'5-2'75 in., *fide* Oliver), laxly-flowered. Male flowers '05 in. in diam., sessile; calyx-limb with 4 triangular coriaceous lobes; petals 4, shorter than the calyx-lobes, thick, broadly-oblong, subquadrate, entire or faintly emarginate; stamens 8, the 4 opposite to the petals attached to the latter, filaments dilated, anthers broadly-elliptic; styles 4, free, subulate, ovary imperfect. Female flowers like the males, but the calyx-tube elongated and containing the 4-celled ovary. Fruit globular-ellipsoid, obtuse at each end, glabrous, smooth, 1'75 in. long and 1'35 in. in diam. Laws. in Hook. fil. Fl. Br. Ind. II, 442.

Malacca; Griffith 2439. Penang; Curtis 148 and 1511. Perak; King’s Collector 7600.

This differs from all other Malayan species in the pinnate venation of its leaves. There are indeed two nerves which spring along with the midrib from the apex of the petiole and run round the edges, but the midrib has pinnate branches.

5. Anisophylla Scortechini, King n. spec. A tree 25-30 feet high; young branches slender, rusty-tomentose. Leaves falcately lanceolate-rhomboidal, the apex much acuminate, the base obliquely acute; both surfaces shining, the upper quite glabrous, the lower glabrous except for a few thin scattered brown apically-directed adpressed hairs on the intercostal spaces; the nerves (and particularly the middle one) more pubescent, especially towards the base; main nerves 3, 4 (from the splitting of the middle one) or rarely 5, springing from the apex of the petiole, the middle one straight, the two lateral curved; all prominent on the lower and deeply depressed on the upper surface; connecting veins sub-horizontal, prominent; length 2'5-3 in., breadth 6-1'25 in., petiole 1'5 in. Panicles extra-axillary, with only 1 or 2 branches, 5-1 in. long, rusty-pubescent. Male flowers '1 in. in diam., on pedicels as long as themselves, minutely bracteolate at the base; calyx-lobes 4 or 5, broadly ovate-acute, not concave, reflexed; petals
shorter than the calyx-lobes, 3-fid at the apex; stamens 8; styles 4, conical, rudimentary. Female flower larger than the male and with the calyx-tube elongated and containing the ovary; lobes of the mouth broadly ovate; stamens 8; rudimentary styles 4, stout, as long as the calyx-lobes; stigmas sub-capitate. Fruit ellipsoid, glabrous, '75 in. long and '4 in. in diam., glabrous, smooth; the pericarp woody.

PERAK; Scortechinii 1807. Wray 960 and 2100; King's Collector 5681, 8821.

A species closely allied to the Bornean A. rhomboidea, Baill. The latter species has however leaves of thinner texture, and their main nerves are more pubescent beneath while, instead of being deeply depressed on the upper surface, they are scarcely visible. The transverse veins are also finer and less visible than in the leaves of this, while the lower surface has numerous minute white scales; the leaves of this have no scales. The petals of A. rhomboidea are described by Baillon as flabellate-incised.

6. Anisophyllea Curtisii, King n. spec. A tree 30-40 feet high with drooping branches; young twigs slender, deciduously and sparsely adpressed rusty-pubescent. Leaves thinly coriaceous, elliptic-lanceolate, slightly oblique especially towards the rather abruptly and obliquely cuneate base, gradually tapering to the cuneate-acuminate apex; upper surface glabrous, not reticulate; the lower faintly reticulate, glabrous except for a few adpressed hairs near the base; main nerves 5, springing from the apex of the petiole, the two outer faint and running close to the edge, the three middle prominent on the lower surface but obsolete on the upper; length 2'5-3'25 in., breadth 8-1'25 in., petiole '2 in. Male and female flowers on distinct adpressed-pubescent spikes about '5 in long, each flower with a short blunt bracteole at its base. Male flowers '15 in. long, sessile, clavate; calyx-tube elongate, rusty adpressed-pubescent externally, its mouth with 4 broadly triangular lobes; petals 4, as long as the calyx-lobes or longer, cut almost to the base into filiform lobes; stamens 8, with filaments of unequal length, those with short filaments attached to the petals; styles subulate, ovary abortive. Female flowers '25 in. long, the calyx-tube longer than in the male and ribbed; lobes of the mouth reflexed. Petals as in the male but larger and with more lobes; stamens as in the male; style as long as the petals. Fruit unknown.

Penang; Curtis 746.

A very distinct species, at once recognised by its comparatively large flowers and deeply fimbriate petals; allied to A. rhomboidea, Baill. and to A. Scortechinii, King; but well distinct from either.

Order XLV. Combretaceae.
opposite, sometimes ternate, petioled, entire, simple (in Illigera 3-foliolate); stipules 0. Flowers bracteolate at the base, in the tribe Gyrocarpae cymose; in the Combretaceae spicate or racemose (the racemes often panicked); often polygamo-monoecious. Calyx-tube adnate to the ovary and produced above it (sometimes to a great length), the limb of 4–5 (rarely 4–7) valvate lobes. Petals 4–5 or 0, (rarely 6–7). Stamens 4–5 or 8–10, inserted on the calyx; (in the Gyrocarpeae the filaments with staminodes attached at the base, and the anthers dehiscing by recurved lateral valves). Ovary inferior, 1-celled; style simple; stigma simple or in Illigera sinuate, almost lobed; ovules 1–7 (usually 2–3), pendulous from the apex of the cell. Fruit coriaceous or drupaceous, generally indehiscent, ovate, angular or very commonly winged; in Calycoperes and Gyrocarpus crowned by the greatly enlarged calyx. Seed 1, without albumen; cotyledons in Terminalia and others convolute; in Combretum and others plano-convex. Distrib. Species about 320, in the tropics of the whole world; and in S. Africa outside the tropics.

Sub-Order I. Combretaceae. Calyx-lobes valvate; stamens without basal glands or staminodes; the anthers with longitudinal dehiscence. Ovules 2–7, suspended by long funicles.

Flowers in spikes or racemes:—

Flowers apetalous:—

Limb of the calyx deciduous ... ... ... 1. Terminalia.
Limb of the calyx accrescent ... ... ... 2. Calycoperes.

Flowers with 4 or 5 petals (except in Combretum apetalum):—

Limb of the calyx persistent, leaves alternate ... ... ... 3. Lumnitzera.
Limb of the calyx deciduous, leaves opposite:—

Calyx-tube prolonged above the ovary for less than 1 in. ... ... ... 4. Combretum.
Calyx-tube prolonged above the ovary for from '75–2'5 in. ... ... ... 5. Quisqualis.

Sub-Order II. Gyrocarpae. Calyx-lobes valvate or imbricate; stamens with glands or staminodes at their bases; anthers dehiscing by up-turned valves. Ovule 1, suspended by a short funicle. Flowers cymose:—

Scandent; leaves 3-foliolate ... ... ... 6. Illigera.
Trees; leaves entire ... ... ... 7. Gyrocarpus.

1. Terminalia, Linn.

Large trees. Leaves alternate or subopposite, exstipulate, entire or slightly crenulate, often with glands on the petiole or near the base of the midrib beneath. Flowers small, spicate, (the spikes sometimes panicked), hermaphrodite, the upper flowers on the racemes often males and the lower hermaphrodite; a narrow deciduous bract at the base of each flower. Calyx-tube produced above the ovary, having a campanulate
mouth with 5 short valvate triangular lobes, deciduous. Petals 0. Stamens 10, inserted on the calyx-tube; the epigynous disc within them densely hairy. Ovary 1-celled, inferior; style long, simple; ovules 2 or 3, pendulous from the summit of the cell. Fruit ovoid, various in size and texture, smooth or angular, or with 2–5 wings, indehiscent, coriaceous. Seed solitary, exalbuminous, cotyledons convolute. Distrib. Species 135; in the tropics of both worlds.

Sect. I. Fruit ovoid or elliptic, sometimes compressed, never winged, but sometimes keeled at the edges or obscurely 4–5-ribbed:—

Leaves broadly oblong, lanceolate-oblong to elliptic-oblong; fruit sub-clavate, obscurely 5-ribbed, glabrous, 2–3 in. long

1. T. citrina.

Leaves elliptic or ovate, acuminate; fruit oblong, obscurely 5-ribbed, slightly compressed on one side, 6–75 in. long, glabrous ...

2. T. Manii.

Leaves obovate, broadly elliptic or sub-rotund, minutely papillose on the upper surface, the petals very long (1·75–4 in.); fruit ovoid or globular-ovoid, minutely tomentose ...

3. T. belerica.

Leaves obovate, tapering to a very narrow base; fruit glabrous:—

Fruit elliptic, 2·25 in. long, with very thick coryck peri-
carp; leaves 3–4 in. long ...

4. T. phellocarpa.

Fruit obovate-ellipsoid, plano-convex, 1·5 in. long; leaves 5–6·5 in. long...

5. T. fœtidissima.

Fruit ellipsoid, somewhat compressed, keeled at the edges, 2 in. long; pericarp fleshy; leaves 6–9 in. long

6. T. Catappa.

Sect. II. Fruit narrowly elliptic, its edges produced into 2 broad leathery wings:—

Leaves obovate or oblong-obovate, 6–9 in. long, the peti-
oles 2·25–2·75 in.; fruit 1·25–1·75 in. long, its breadth (including the wings) 2·5–3·5 in. ...

7. T. bialata.

Leaves spatulate-oblanceolate, 3–4 in. long, the petioles 1·15–1·5 in.; fruit 75–1·25 in. long; its breadth (including the wings) 1·2–2 in. ...

8. T. subspathulata.

1. Terminalia citrina, Fleming in Asiat. Res. XI, 183. A glabrous tree 60–80 feet high; young shoots slender, rusty-pubescent, but at an early stage glabrous. Leaves thinly coriaceous, sometimes almost opposite, from broadly oblong-lanceolate to elliptic-oblong, on short bi-glandular petioles, the apex acute or shortly acuminate, the base cane-
ate or sometimes rounded; both surfaces when very young rusty-puber-
ulous, afterwards perfectly glabrous and shining, the lower minutely areo-
late-reticulate, the bottom of the areoles covered with white felt; main nerves 8–12 pairs, curving upwards, distinct on both surfaces when dry; length 3–6 in., breadth 1·25–2·5 in., petiole '4 or '5 in. Spikes in small panicles shorter than the leaves, axillary, deciduously rusty-puberulous.

**British India.**


**Nicobar Islands; Jelinek, Kurz Malacca; Griffith 2178. Maingay 643. Perak; King’s Collector 3173.**

This species and its variety *malayana* may be readily distinguished from *T. Chebula*, Retz (which in many respects it resembles) and from every other Asiatic Terminalia by the peculiar areolate reticulation of the under surface of the leaves.

2. **Terminalia Manii**, King n. spec. A tree 20–40 feet high; young shoots slender, deciduously rusty-puberulous, lenticellate. Leaves thinly coriaceous, almost opposite, not crowded, scattered, elliptic or ovalate, shortly and rather abruptly acuminate, the base rounded or somewhat cuneate and slightly oblique; both surfaces glabrescent or glabrous, minutely reticulate, the reticulations on the lower tesselate; main nerves 9–12 (rarely 14) pairs, spreading, curving upwards at the tips; length 3.25–6.5 in., breadth 2–3 in.; petiole 75 in. long, often with 2 sessile oblong glaads at the sides near its apex. *Panicles* lateral and terminal, with numerous spike-like rusty-puberulous ultimately glabrous branches shorter than the leaves when in flower, longer when in fruit. *Flowers* 15 in. in diam. at the mouth, each subtended by a linear puberulous bracteole as long as itself. *Ovary* narrow, cylindric, thickened and pubescent towards the base, the upper half and the mouth glabrous outside; the mouth cupular with inconspicuous broad shallow teeth, woolly inside. *Stamens* exserted, glabrous. *Fruit* oblong, tapering a little to each end, slightly compressed on one side, obscurely 5-ridged, quite glabrous, 6–75 in. long, and 3–35 in. in diam.; pericarp crustaceous, hard, thick.

**Nicobar and Andaman Islands; King’s Collectors.**

Named in honour of Mr. E. H. Man, C. I. E., Deputy Superintendent of the Andaman and Nicobar Islands, whose powerful help has made it possible to explore the Forests of these most interesting islands; a species of which the nearest ally is probably *T. citrina*, Roxb.

Leaves clustered at the apices of the branches, coriaceous, obovate, broadly elliptic or sub-rotund, the petioles long; the apex usually broad and rounded, rarely subacute; the base slightly cuneate, sometimes slightly unequal; both surfaces puberulous when young, glabrous and reticulate when old, the upper with numerous minute papillae; main nerves 6–8 pairs, spreading, prominent, the midrib prominent on both sides and sometimes with 2 glands near the sides of its base; length 4½–8 in., breadth 3½–4½ in., petiole 1½–5 in. Spikes axillary, slender, longer than the petioles, shorter than the leaves, rusty-pubescent. Flowers about 2½ in. in diam., those in the upper part of the spike male, those in the lower hermaphrodite. Calyx-tube short, stout, including the ovary, minutely tomentose, the mouth with broad triangular lobes, pubescent outside, densely villous inside. Staminodes much exserted. Drupes ovoid or globular-ovoid, densely covered with minute pale tomentum, when dried obscurely 5-angled, 1 in. long and 7½ in. in diam. W. & A. Prodr. 313 (excl. syn.); Wall. Cat. 3963; Wight Ic. t. 91; Thwaites Enum. 105; Dalz. & Gibs. Bomb. Fl. 91; Brand. For. Fl. 222; Kurz For. Fl. Brit. Burma I, 455; Hook. fil. Fl. Br. Ind. II, 445; Bedd. Fl. Sylvat. t. 19; Trimen Fl. Ceyl. I, 159. T. Gella, Dalz. in Hook. Kew Journ. III, 227. T. punctata, Roth Nov. Sp. 381; DC. Prodr. III, 13. T. eglandulosa, Roxb. Herb. (wrongly referred in Wildl. Sp. Fl. IV, 968). T. moluccana, Roxb. Hort. Beng. 33; Fl. Ind. II, 432.

Perak; Scortechini 1684; King’s Collector 8778. Distr. British India.

Roxburgh describes and figures (Corom. Plants t. 198; Fl. Ind. II, 431) a form of this with two glands at the apex of the petiole on the under surface of the leaf; but this form has not hitherto been collected in any Malayan country, and its occurrence in British India must be rare.

4. Terminalia phellocarpa, King n, sp. A tree; young branches rather slender, deciduously rusty-tomentose. Leaves crowded near the apices of the branches, coriaceous, obovate, blunt, tapering from above the middle to the petiole, slightly oblique at the base; both surfaces glabrous and shining, the lower widely reticulate and minutely dotted; main nerves 4–6 pairs, spreading but curving upwards; length 3½–4 in., breadth 1½–2 in.; petiole about 8 in., thickened towards the base, rusty-pubescent. Flowers unknown. Fruit elliptic, blunt at each end, 2½ in. long, breadth 1½ in.; the apex with a short sharp mammilla 1½ in. long, the pericarp thick, spongy, with horizontal layers of fibrous tissue, the endocarp woody.

Singapore; on Bukit Mandai, H. N. Ridley.

This has been collected only once, and the specimens are without flowers. I have named it from its corky fruit. In its leaves this greatly resembles the Philippine species T. nitens, Presl; but that has a very much smaller fruit than this; more-
over the petioles of its leaves are glabrous, whereas in this the petioles are pubescent.

5. *Terminalia fetidissima*, Griff. Notul. IV, 685. A tall tree; young branches as thick as a swan’s quill, puberulous, rather rough. Leaves coriaceous, obovate, minutely cuspidate, narrowed from above the middle to the acute base; upper surface quite glabrous, very shining when dry the lower duller, glabrous except the sparsely rusty-pubescent midrib and nerves; main nerves 7–9 pairs, spreading but curving upwards; length 5–6·5 in., breadth 2·25–3·25 in.; petiole about 8 in., terete. Spikes solitary, axillary, nearly as long as the leaves, rusty-pubescent. Flowers nearly all hermaphrodite, about 2 in. in diam.; their ovaries elongate, clavate, rusty-tomentose, each with a linear bracteole. Calyx-teeth sparsely hairy, the mouth rusty-villous inside. Drupe obovate-ellipsoid, subacute, plano-convex, glabrous when ripe, 1·5 in. long. Clarke in Hook. fil. Fl. Br. Ind. II, 445.

MALACCA; Griffith, Maingay 643½ and 644. Distrib. Burma.

In all the provinces; near the coast.

A magnificent species, at times attaining an enormous height, and usually with horizontal branches. The stem is frequently most picturesquely butressed. The embryo is estable, and is often known to Europeans in the East as the "Indian Almond." I have reduced to this T. procera, Roxb., the only tangible distinction between which and T. Catappa is said to be its obscurely 5-ridged fruit. But fruits with this peculiarity may be gathered from the same trees as those bearing the ordinary sharp-edged smooth fruit.

7. Terminalia bialata, Steud. Nomencl. II, 668. A glabrous tree 80-100 feet high; young branches stout and with large cicatrizes. Leaves crowded at the apices of the branches, alternate, thinly coriaceous, obovate or obovate-oblong, with long petioles, the apex abruptly and shortly cuspidate, narrowed from above the middle to the cuneate and usually oblique base; upper surface shining when dry, the lower dull and paler, the reticulations rather distinct on both; main nerves 7-9 pairs, spreading, rather distinct on both surfaces when dry; length 6-9 in., breadth 2'75-4'5 in., petioles 2'25-2'75 in. Spikes axillary, drooping, solitary, longer than the petioles but rather shorter than the leaves, rusty-puberulous. Flowers 2 in. in diam., sessile, the male flowers in the upper part, the hermaphrodite flowers in the lower, each with a minute deciduous bracteole. Calyx rusty-pubescent outside, densely rusty-villous inside; the lobes triangular, reflexed. Stamens exserted. Ovary villous. Fruit ellipsoid, tapering to each end, somewhat flattened on one side, covered with minute dense rusty tomentum and with 2 large slightly wavy, coriaceous, puberulous, horizontally striate lateral wings; length of fruit 1'25-1'75 in., breadth 5'75 in., the wings from 1'25-1'75 in. in width. Kurz For. Flora Burma, I, 456; Clarke in Hook. fil. Fl. Br. Ind. II, 449. Pentaptera bialata, Roxb. Hort. Beng. 34; Fl. Ind. II, 441; Wall. Cat. 3986.

Andaman, and probably also the Nicobar Islands. Distr. Burma.

8. Terminalia subpathulata, King n. spec. A tree over 100 feet high; young branches rather slender, deciduously puberulous. Leaves alternate, crowded near the ends of the branches, coriaceous, spathulate-oblanceolate, short-ly and bluntly cuspidate, tapering from near the apex to the long petiole, eglandular and sometimes slightly oblique at the base, the edges thickened and slightly revolute; upper surface glabrous and shining, the lower pale and sub-glanuous, both minutely reticulate; main nerves about 8 pairs, spreading and curving upwards, distinct; length 3-4 in., breadth near the apex 1'1-1'6 in., petiole 1'15-1'5 in. Spikes solitary, axillary, shorter than the leaves when in flower, longer
when in fruit, rusty-pubescent. *Flowers* 15 in. in diam., those in the upper part of the spike male, those in the lower hermaphrodite. *Calyx* minutely rusty-pubescent outside; the tube narrow, sub-cylindric in the female, tapering much upwards; the mouth wide, cupular and with 5 broadly triangular shallow reflexed teeth, shortly lanate at the base. *Stamens* exserted. *Fruit* narrowly elliptic, cylindric at the ends, 7½–1·25 in. long; the edges produced into 2 coriaceous, horizontally striate, glabrous wings each 6–1 in. wide.

**Singapore; Ridley 5733. Malacca; Derry 1037. Perak; King’s Collector 4529.**

### 2. Calycopteris, Lamk.

A diffuse sub-scandent shrub with drooping branches. *Leaves* opposite, shortly petioled, elliptic or ovate, acuminate, entire. *Racemes* dense, axillary, and crowded towards the ends of the branches so as to form large panicles. *Flowers* small, greenish, each with a lanceolate bract. *Calyx-tube* 5-striate, produced above the ovary; limb 5-fid, persistent and much enlarged in fruit. *Petals* 0. *Stamens* 10, the five upper ones between the calyx-teeth, the five others alternate with them and lower down on the calyx-tube. *Ovary* 1-celled, inferior; *style* subulate, simple; *ovules* 3, pendulous from the top of the cell. *Fruit* narrowly ovoid, 5-ribbed, villous, 1-seeded, surmounted by the enlarged calyx. *Cotyledons* convolute. The only species.

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PENANG; Wallich.  SINGAPORE; Lobb.  TRANG; King’s Collector.  
ANDAMANS; King’s Collector.  Distrib.  British India.  

There is a variety of this, with glabrous leaves and with the longer stamens equalling the calyx-lobes, to which Kurz has given the varietal name floribunda, his name for the typical form being C. nutans.  I have seen no specimens of the glabrous variety from any of the Malayan provinces.

3. Lumnitzera, Willd.

Large glabrous shrubs or small trees, growing in tropical salt marshes along with Mangroves and closely resembling them in habit.  Leaves clustered towards the ends of the branches, alternate, thickly leathery, subsessile, narrowly obovate, entire or scarcely crenate.  Flowers in racemes.  Calyx-tube with two adnate bracteoles near the base, oblong, narrowed at both ends, produced above the ovary; lobes 5, persistent.  Petals 5, oblong.  Stamens 10 in two series, or fewer.  Ovary inferior, 1-celled; style subulate, simple; ovules 2-5, pendulous from the top of the cell.  Fruit woody, elliptic-oblong, \( \frac{1}{2} - 1 \) in. (including the calyx-limb), longitudinally striate or nearly smooth.  Seed 1; cotyledons convolute.—Distrib.  Species 2; on the shores of the tropics of the Old World and of Polynesia.

Petals scarlet; stamens twice as long as the petals and of the same colour  ...  ...  ...  ...  ...  1. L. coccinea.

Petals white; stamens of the same colour and length as the petals  ...  ...  ...  ...  2. L. racemosa.


Andaman Islands.  Perak; King’s Collector 1180; Scortechini 1001; and probably in the Mangrove swamps of all the provinces; Distrib. British India, the Malayan Archipelago, North Australia and Polynesia.

4. Combretum, Linn.

Shrubs with long pendent or scandent branches. Leaves entire, petioled, opposite or more seldom alternate or ternate. Flowers hermaphrodite or polygamo-dioecious, in spikes or panicles, bracteoles small. Calyx-tube constricted above the ovary, short or long-produced, urceolate funnel-shaped tubular or campanulate; limb 4-5-lobed, deciduous. Petals as many as the calyx-lobes, (0 in C. apetalum) placed on the calyx-limb. Stamens twice as many as the petals, inserted in two series with them. Ovary inferior, 1-celled; style 1, subulate, simple; ovules 2-5, pendent from the top of the cell. Fruit with 4-5 wings angles or ridges, dry, generally indehiscent. Seed 1; cotyledons plaited or flat, in a few species convoluted. Distrib. Species 160, common in the tropics of America, Africa and Asia; also in South Africa.

Flowers 5-merous; fruit 5-angled
Flowers 4-merous; fruit 4-angled
Flowers 4-merous; fruit 4-winged:
Tube of calyx much elongate; flowers not squamose, buds ellipsoid, their apices very much pointed:
Flowers condensed in globose masses at the ends of the branches of the panicle
Flower-spikes elongated
Tube of calyx long; flowers squamose, buds globose, the apex rather acute
Tube of calyx short; buds not pointed:
Flowers squamose; leaves not cordate and with distinct petioles 3-4 in. long:
Fruit not compressed, its faces all narrow and equal, its wings broad and thin
Fruit compressed, two of its faces broad and two narrow, its wings short and thick
Flowers not squamose; leaves cordate and with very short petioles (0.05-15 in. long):
Leaves glabrous except the midrib:
Panicle and calyx with short thick glandular hairs
Panicles cinereous-tomentose; flowers puberulous;
fruit black when ripe and with narrow wings
Leaves, except when old, with long adpressed hairs beneath; panicles sericeous-tomentose; fruit paler-brown when dry, with broad thin wings.

1. C. trifoliatum
2. C. tetralophum
3. C. sundiacum
4. C. extensum
5. C. chinense
6. C. squamosum
7. C. Wrayi
8. C. Kunstleri
9. C. nigrescens
10. C. Scortechinii

Trang; King's Collector; doubtless also occurring in other provinces. Distrib. British India, Java.

2. Combretum tetralophum, Clarke in Hook. fil. Fl. Br. Ind. II, 454. A powerful climber; young branches slender, with minute brown rusty scales. Leaves opposite, thinly coriaceous, oblong-elliptic, shortly acuminate, the base cuneate; upper surface glabrous, shining, the lower with scattered brown glands when young and puberulous on the midrib and nerves; main nerves 7 or 8 pairs, oblique, ascending, inconspicuous on both surfaces; length 2·5–5·5 in., breadth 1–2 in., petiole 3–4 in. Spikes axillary, solitary, much shorter than the leaves, slightly scaly below the flowers, very scaly and puberulous between them. Flowers 1 in. in diam. at the mouth. Calyx-tube constricted above the ovary, the constricted part as long as the ovary; the mouth campanulate and with 4 ovate erect pubescent lobes. Petals slightly longer than the calyx-lobes but much narrower, linear. Disc and fundus of the mouth of the calyx rusty-villous. Stamens and style exserted. Fruit 75–1 in. long and half as broad, shining, dark-coloured, the edges very acute but not winged.

Malacca; Griffith 2195. Perak; King's Collector 1012. Distrib. Siam, Borneo.
3. Combretum sundiacum, Miq. Fl. Ind. Bat. Suppl. 327. A very powerful climber; young branches closely covered with deciduous scales. Leaves opposite, thinly coriaceous, broadly elliptic to elliptic-ovorbicular, abruptly and very shortly acuminate; the base rounded, rarely slightly cuneate, sometimes unequal-sided; both surfaces glabrous, the upper punctate and with very sparse scales; the lower with the scales more numerous and white with dark centres; main nerves about 6 pairs, oblique, curving slightly, not prominent on the upper surface but slightly so on the lower when dry; length 2·75–4 in., breadth 1·8–2·75 in., petiole '4–8 in. Panicles axillary and terminal, umbellate, longer than the leaves, the branches ending in dense globose minutely bracteolate spikes. Calyx-tube about '35 in. long, minutely pubescent, not scaly, 4-ridged along the ovary, above it cylindric, expanding upwards into a funnel-shaped mouth with 4 narrowly triangular-acuminate reflexed lobes; calyx inside with a ring of hairs at its base but not filled with long coarse hair, narrowly ovate and very acute in bud. Petals much shorter than the calyx-lobes, oval, not clawed, glabrous. Stamens exerted. Fruit about 1 in. long and nearly as broad, with 4 coriaceous horizontally-striate shining wings, and with a few minute scattered scales. Clarke in Hook. fl. Fl. Br. Ind. I, 458.

Malacca; Maingay 648. Singapore; Hullett 89; Ridley 4668. Perak; Scortechini 1016. King's Collector 4360, 4452, 5864, 7827; Wray 4272.

Readily recognised by its panicled inflorescence, the branches being umbellate and each ending in a globose spike of flowers with very acute buds which are not scaly.

4. Combretum extensum, Roxb. Hort. Beng. 28; Fl. Ind. II, 229. A large climber; young shoots rather slender, sometimes angled, very sparsely lenticellate. Leaves opposite or nearly so, coriaceous, broadly elliptic to sub-rotund, rarely ovate, the apex shortly and abruptly acuminate or sub-acute; the base broad and rounded, rarely slightly cuneate; both surfaces glabrous; the lower reticulate, punctate and slightly rough; main nerves 6 or 7 pairs, spreading, interarching a little way from the edge; length 4·5–7 in., breadth 2·75–4 in., petiole '6–1·5 in., stout. Spikes axillary and solitary, or sometimes in few-branched panicles, rarely terminal, often as long as or longer than the leaves, puberulous. Flowers '25 in. wide at the mouth when expanded; the buds ovate, very acute at the apices. Calyx-tube very long, ('35 in.) infundibuliform, puberulous; the mouth '15 in. long, deeply cut into 4 triangular acuminate reflexed lobes. Petals ovate-truncate or obovate, shorter than the calyx-lobes; calyx with a ring of hairs at the throat inside, otherwise nearly glabrous. Fruit when fully ripe about 1·25–1·5 in. long, and (including the wings) nearly as broad, wings scariosis, J. ii. 43
338  G. King — Materials for a Flora of the Malayan Peninsula.  [No. 1,  
glabrous or glandular-puberulous.  Wall. Cat. 3996; G. Don in Trans.  
rotundifolium, Roxb. Fl. Ind. II, 226; Wall. Cat. 3995.  C. Wightianum,  
Wall. Cat. 4007; W. & A. Prodr. 317; Wight Ic. t. 227; Dalz. & Gibs.  
Bomb. Fl. 90.  C. Horsfieldii, Miq. l. c. 609; Kurz in Flora 1871, p. 289.  
C. latifolium, Blume Bijd. 641; Miq. l. c. 609.  C. leucanthum, Heurck  
Kurz).  

MALACCA;  Derry 386.  ANDAMAN ISLANDS; very common.  Not com-  
mon in the other Provinces.  Distrib. British India.  

5.  COMBRETUM CHINESE, Roxb. Hort. Beng. 28.  A powerful  
climber; young branches slender, terete, with sparse minute scales.  
Leaves opposite, or in whorls of three (var. ternatum), thinly coriaceous,  
elliptic or elliptic-oblong, sometimes obovate, shortly and abruptly  
acuminate, the base slightly narrowed; both surfaces glabrous, sparsely  
squamulose like the young branches and inflorescence, the upper surface  
of a dark colour when dry, the lower pale-brown (pubescent in var.  
pubescens); main nerves 7 or 8 pairs, spreading, curved, slightly promi-  
nent on the lower surface, scarcely visible on the upper; length 3·25–5  
in., breadth 1·5–2·25 in., petiole 15–4 in.  Spikes solitary, axillary,  
longer than the leaves, many-flowered; the bracteoles linear, deciduous.  
Calyx-tube 25 in. long, slender at the base, expanding into a funnel-  
shaped mouth 1·5 in. in diam. when fully expanded, with 4 deep erect  
triangular acute scaly lobes, globular when in bud but the apex acute.  
Petals broadly obovate, clawed, longer than the lobes of the calyx,  
glabrous.  Disc and interior of calyx fulvous-pubescent.  Fruit 1–1·25  
in. long and 8–1 in. broad, with 4 slightly unequal scarious coriaceous  
horizontal striae sparsely squamulose wings.  Roxb. Fl. Ind. II, 230  
(not of G. Don); Kurz For. Flora Burma, I, 463; Clarke in Hook.  
Bot. 231.  

ANDAMAN ISLANDS; very common.  PERAK; Wray 2314, 2743.  
King’s Collector 4646.  

Var. ternatum; Clarke in Hook. fil. Fl. Br. Ind. II, 453; leaves  
often in whorls of three, usually obovate.  C. ternatum, Wall. Cat. 4002.  

Var. Porterianum, Clarke in Hook. fil. Fl. Br. Ind. II, 457; leaves  
elliptic-oblong, acuminate, never obovate, main nerves about 8 pairs.  
C. Porterianum, Wall. Cat. 4000.
Penang.

This variety does not appear to have been collected since Wallich's time. I much doubt whether it is worth keeping up even as a variety.

**Var. pubescens**, King. *Leaves* pubescent in the under surface.

**Perak; King's Collector 889.**

6. *Combretum squamosum*, Roxb. Fl. Ind. III, 231. A large creeper; young branches slender, cylindric, covered (like almost all other parts of the plant) with scales with broad pale margins. *Leaves* opposite, thinly coriaceous, broadly elliptic or elliptic-rotund, rarely ovate-lanceolate, shortly and abruptly acuminate; the base rounded, rarely sub-cuneate; both surfaces dull when dry and scaly, but without hairs; length 3·25–5·5 in., breadth 2·25–4·5 in.; petiole 3–4 in., scaly. *Spikes* axillary or terminal, solitary or in panicles, shorter than the leaves, few-branched. *Flowers* 1·5 in. in diam. at the mouth. *Calyx-tube* shortly constricted above the 4-angled ovary; the mouth cupular, with 4 broadly triangular teeth. *Petals* small, obovate. *Disc* and fundus of mouth of calyx fulvous-villoses. *Fruit* 75–1·5 in. long and nearly as broad (including the wings), with 4 wide thin membranous wings, squamose at the bottom of the deep grooves between the wings. Wall. Cat. 3387; Miq. Fl. Ind. Bat. I, pt. I, 607; G. Don in Trans. Linn. Soc. XV, 438 (inaccurate as to the floral symmetry); W. & A. Prodr. 317; Kurz For. Fl. Brit. Burma I, 463; Clarke in Hook. fil. Fl. Br. Ind. II, 456. *C. lepidotum*, Presl Bemerk. 142 (see Kurz in Flora 1871, p. 289). *C. Maluloea*, Wall. Cat. 3991.

Malacca; Malingay 648. Andaman Islands. **Perak; King's Collector 5083.** Penang; Wallich, King's Collector 1335, Curtis 258.

A species easily recognised by being everywhere covered with scales. Some of the Penang specimens have ovate-elliptic leaves; otherwise they do not differ from specimens from other places.

7. *Combretum Wrayi*, King n. spec. Young branches slender, striate when dry, glabrous but slightly scaly. *Leaves* opposite, coriaceous, narrowly elliptic, subacute or very shortly and bluntly acuminate, the base rounded; both surfaces reticulate, the upper glabrous and shining; the lower dull, glabrous elsewhere, but with some coarse hairs along the sides of the midrib near its base; main nerves 6 or 7 pairs, ascending, curved, slightly prominent beneath; length 2·5–3·5 in., breadth 1·15–1·5 in.; petiole 35–4 in., rather rough when dry, those in the upper part of the stem and in the axils of which the spikes arise much smaller. *Spikes* axillary, solitary, about 1 in. long, the peduncles glabrous, the floriferous part pubescent and scaly. *Flowers* few, in clusters of 2 or 3. *Calyx-tube* 1·5 in. long, shortly constricted above the ovary, the mouth campanulate and deeply cut into 4 triangular acute erect
teeth, every part densely covered with brown scales externally. Petals slightly exceeding the calyx-lobes, oblong-lanceolate, obtuse, glabrous, erect. Stamens 8, exserted. Fruit compressed, ovate, pointed at each end, dark-brown when dry, with 4 short wings, about 1'2 in. long and 6 in. broad on the compressed surfaces, the other two surfaces narrow and grooved, all parts sparsely scaly.

Perak; sea-shore at Matang, Wray 2504.

8. Combretum Kunstleri, King n. spec. A powerful climber; young shoots slender, terete, very slightly puberulous and with very few scattered rusty hairs intermixed. Leaves opposite, narrowly elliptic or elliptic-oblong, shortly and bluntly acuminate, slightly narrowed to the minutely cordate base; upper surface glabrous except the minutely pubescent midrib, shining; the lower dull, glabrous even on the midrib; main nerves 5-7 pairs, ascending, curving, length 3-5.5 in., breadth 1'1-1'85 in.; petiole 1 in. or less, glabrous. Panicles axillary and shorter than the leaves or terminal and much longer, pedunculate, with many short thick glandular hairs, the branches rather short and spreading, bracteoles shorter than the ovaries. Calyx-tube about 1 in. long, constricted both below and above the ovary, the limb widely campanulate and with 4 very shallow broad reflexed teeth, clothed outside with glandular hairs. Petals inserted near the edge of the calyx-limb and projecting beyond its lobes, broadly ovoid, reflexed, pubescent. Fruit 4-winged, tapering to the ends (when young), unknown in the ripe state.

Perak; King's Collector 3435, 6664; Scortechini 2014.

9. Combretum nigrescens, King n. spec. A slender climber 20-40 feet long; young branches rusty-puberulous and with sparse long rusty-silky hairs. Leaves opposite, membranous, black when dry, narrowly elliptic to oblong, shortly acuminate, the base rounded, the petioles very short; upper surface shining, glabrous except the rusty-sericeous midrib; lower surface with the midrib and main nerves rusty-sericeous, the intercostal spaces almost glabrous; length 2.25-2.75 in., breadth 1'75-1 in., petiole less than 1 in. Panicles terminal, lax, spreading, longer than the leaves, minutely cinereous-tomentose with a few long rusty hairs intermixed, the branches interruptedly spicate, bracteoles shorter than the calyx-tube. Calyx-tube only about 1'05 in. long; the limb rather longer, campanulate and with 4 rather shallow broad acute teeth, puberulous on the outer surface, pubescent on the inner, with a wing of hairs in the throat. Petals about as long as the calyx-lobes, broadly ovate or slightly obovate, blunt, puberulous on the outer surface, sericeous on the inner. Stamens 8, unequal, the outer row the longest. Fruit black when dry, shining, glabrous, with 4 narrow wings, 8 in. long and 4 in. broad.
Perak; King's Collector 3469, 8140.

10. Combretum Scortechinii, King n. spec. Young branches slender, softly sericeous-tomentose. Leaves opposite, thinly coriaceous, oblong-elliptic or sometimes oblong-oblancoolate, the base rounded or very minutely cordate; upper surface shining, glabrous except the depressed rusty-sericeous midrib; lower surface reticulate, with many long adpressed hairs near the base and along the prominent midrib, the nerves and intercostal spaces with shorter scattered hairs, when old almost glabrous; main nerves about 7 pairs, ascending, curved, prominent on the lower surface, slightly depressed on the upper, length 3·25–4·5 in., breadth 1·4–1·75 in., petiole 1–15 in. Panicles axillary and terminal, shorter than the leaves; the branches few, short and few-flowered, everywhere softly sericeous-tomentose. Calyx-tube 1 in. long, cylindric; the mouth slightly longer, widely campanulate, with 4 shallow broad acute reflexed teeth, softly tomentose like the tube. Petals 4, inserted near the edge of the calyx and projecting beyond it, broadly ovate-lanceolate, reflexed, pubescent. Stamens 8, exserted. Fruit with 4 thin sub-coriaceous wings, pointed at each end, glabrous, 1·25 in. long, and 6·5 in. broad.

Perak; Scortechini.

Collected only once, and the specimens are few.

5. Quisqualis, Linn.

Large shrubs scandent or subscandent. Leaves opposite, oblong or obovate, acuminate, entire. Flowers large, in short axillary or terminal spikes. Calyx-tube slender and much prolonged above the ovary, deciduous, its limb 5-lobed. Petals 5. Stamens 10, short. Ovary 1-celled; style filiform, partially adherent to the calyx-tube, stigma sub-capitate; ovules 3 or 4, suspended from the apex of the loculus. Fruit dry, 5-angled or 5-winged, coriaceous, subindehiscent. Seed solitary, cotyledonous plane. Distrb. Species 5, tropical Asian or African.

Calyx-tube less than 1 in. long ... ... 1. Q. densiflora.
Calyx-tube from 1·5–2·5 in. long ... ... 2. Q. indica.

1. Quisqualis densiflora, Wall. Cat. 4011. Young branches minutely rusty-puberulous. Leaves elliptic-oblong or oblancoolate-oblong, shortly acuminate, the base rounded or minutely cordate; upper surface glabrous except the pubescent midrib and main nerves; lower surface glabrous, the 6 pairs of curved ascending main nerves with tufts of hair in their axils; both surfaces shining and minutely papillose; length 3·5 to 4·5 in., breadth 1·5–2 in.; petiole 2–3 in., pubescent on the upper surface. Spikes axillary and solitary, or terminal and almost panicled, rusty-puberulous; bracteoles lanceolate, sub-persistent, rusty-
pubescent, 5-75 in. long. Calyx-tube produced beyond the ovary for 25-5 in., cylindric, rusty-tomentose; its mouth funnel-shaped and deeply divided into 5 narrow lanceolate-subulate lobes. Petals shorter than the calyx-lobes, oblong, obtuse, about 2 in. long, scarlet, rusty-pubescent on the outer side, nearly glabrous on the inner. Fruit oblong, shining, with 5 rather narrow unequal thin coriaceous wings, 1 in. long and 65 in. broad.

Penang; Wallich. Perak; Wray 3353.


Malacca, and probably truly wild; in the other provinces often cultivated as a garden plant. Distrib. Burma.

6. Illigeria, Blume.

Scandent shrubs. Leaves alternate, petiolate, with three entire petiolulated leaflets. Flowers in elongate lax peduncled cymes; bracteoles 1-3 at the base of each flower. Calyx-tube shortly constricted above the ovary; limb of 5 valvate oblong deciduous lobes. Petals 5, valvate, oblong, alternate with and as long as the calyx-lobes. Stamens 5, epigynous, filament near the base carrying on each side a staminode; authors dehiscing by lateral valves. Ovary 1-celled; style, 1, filiform,
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ending in a dilated undulate sinuate stigma; ovule 1, pendulous from
the apex of the cell. Fruit broadly 2-4-winged (2-winged in the
known Indian species), the wings veined. Seed with plano-convex (not
convoluted) cotyledons. Distrib. Species about 7, extending from
Khasia to Singapore, Malaya and the Philippines; and one aberrant
species in Angola having 5 leaflets.

Main nerves of leaves 2 or 3 pairs, oblique ... ... 1. T. appendiculata.
Main nerves of leaves 12-14 pairs, horizontal... ... 2. T. lucida.

1. Illicera appendiculata, Blume Bijdr. 1153; Nov. fam. exp.
p. 14. A powerful climber 40-80 feet long; young branches slender,
tawny-pubescent, soon becoming glabrous, striate when dry. Common
petiole about 3 in. long, with an annular swelling at the base, glabrous
or glabrescent. Leaflets thinly membranous, very variable in shape,
often oblique, oblong, elliptic to sub-rotund, the apex shortly acuminate
acute or sub-acute; the base cuneate or rounded, sometimes unequal-
sided; upper surface usually glabrous; the lower very minutely lepidote,
glabrous or pubescent all over or only on the 2 or 3 pairs of oblique
indistinct main nerves; length 3-5.5 in., breadth 1.75-4 in., petioles:
2-6 in. Panicles pendulous, very lax, 9-15 in. long, glabrous below
but usually pubescent towards the extremities, the branches cymose.
Flowers 2-35 in. in diam., on pubescent pedicels shorter than them-
selves. Calyx puberulous. Petals lanceolate, narrower than the lobes
of the calyx, their midribs thick. Stamens curved inwards, longer
than the staminodes when unfolded. Fruit narrowly oblong, taper-
ing at the ends, 4-angled, minutely tomentose, 1-1.25 in. long, two
of its margins produced into broadly oblong obtuse horizontally striate
puberulous leathery wings 1.25 in. or more in width. DC. Prodr. XV,
DC. Prodr. XV, Pt. I, 251; Clarke in Hook. fl. Fl. Br. Ind. II, 460;
Coryzadenia trifoliata, Griff. Notulæ, IV, 356.

Common in Perak and the Andaman Islands, and probably to be
found in all the other Provinces. Distrib. British India, in Burma
and Assam.

Variable in the shape and pubescence of the leaflets, the under surfaces of some
being rather densely pubescent, while others are almost quite glabrous. For a form
of the latter sort, the under surfaces of which are moreover somewhat glaucous,
Kurz suggested the varietal name pubescens. Individual plants vary also as to the
size of their flowers. The following, which I treat as a variety, was made a species
by Clarke in Hooker's Flora of British India.

Var. Kurzii, leaves glabrous, not lepidote, very coriaceous, the
margin recurved and thickened. I. Kurzii, Clarke l. c.

Malacca; Maingay 650, 649.
2. Illigera lucida, Teysm. & Binn. Nat. Tijds. Ned. Ind. XXVII, 29. A slender climber; young shoots puberulous, angled when dry. Common petiole 75–2 in. long, glabrous. Leaflets membranous, oblong or elliptic-oblong, often oblique, the apex shortly and bluntly acuminate; the base rounded and usually minutely cordate; both surfaces glabrous and shining; the lower reticulate; main nerves 12–14 pairs, horizontal, interarching far from the edge, slightly prominent on the lower surface, obsolete on the upper; length 3–5 in., breadth 1'25–2'25 in., petiole 15–3 in. Panicles axillary and terminal, very lax; the ultimate branches sparse, few-flowered. Flowers 3 in. in diam., on thin puberulous pedicels. Calyx-lobes oblong, sub-acute, glabrous except for a patch of white hairs at the base in front. Petals about as long as the calyx-lobes but much narrower, villous at the base. Stamens shorter than the petals, the anthers large, the filaments villous in the lower half. Fruit (fide T. & B.) 4-winged, two of the wings larger than the other two, glabrous, about 1 in. long. Miq. Fl. Ind. Bat, Vol. I, pt. I, 1094.

Perak; Scortechini 1610, Curtis 3182. Distrib. Java.

This differs from I. appendiculata, Bl. in having narrower leaflets, with much shorter petioles and more numerous nerves which are quite horizontal. The leaves are moreover quite glabrous and shining. The Perak specimens from which the above description has been taken agree absolutely with type specimens of I. lucida received at the Calcutta Herbarium from the Buitenzorg Botanic Garden.

7. Gyrocarpus, Jacq.

A tall tree. Leaves alternate, long-petioled, large, entire or lobed, clustered towards the ends of the branches. Flowers small, unisexual, very numerous, clustered in large branched cymes without bracts. Male flowers very numerous; calyx 4–7-partite; petals 0; stamens 4–7, inserted at the base of the calyx with as many alternate clavate glands; anthers 2-celled, dehiscing by valves; ovary 0. Female or hermaphrodite flowers few; calyx-tube adherent to the ovary, limb 2-partite, persistent, enlarging in fruit; petals and stamens 0; ovary 1-celled; style 0, stigma sessile; ovule solitary, pendulous from the apex of the cell. Nut bony, crowned by the elongate spathulate coriaceous calyx-lobes. Seed with convolute cotyledons. A single species.

Gyrocarpus americanus, Jacq. Select. Am. 282. t. 178. Young branches stout, glabrous. Leaves membranous, broadly round-ovate, acuminate, the base broad and sometimes sub-cordate; the base usually 5-nerved, the midrib with about 3 pairs of main nerves; length 4'5–6 in., breadth 4 or 5 in., petiole 3–5.5. Fruit sub-globular, about 1 in. in diam., minutely pubescent; the wing narrowly spathulate, 3 in. long. G. Jacquini, Gaertn. Fruct. II, 92; Roxb. Hort. Beng. 11, Cor. Pl. t.
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On the Sea-Coast in all the provinces. Distrib. Tropics generally.

The anthers of this species are two-celled and dehisce by upward-opening valves. Those of the genus *Hernandia* are also 2-celled, but dehisce by valves which open laterally. In habit and form of leaves *Gyrocarpus* much resembles *Hernandia*; whereas it is quite an aberrant form amongst *Combretaceae*, as is also *Illigera*. 
Novicæ Indicæ XV. *Some additional Leguminosæ.*—By D. Prain.

[Read February 3rd, 1897.]

The present paper contains descriptions of species that are new to India in the sense that they are not included in the account of this Order prepared in 1876 by Mr. J. G. Baker, F.R.S., the distinguished Keeper of the Herbarium, Royal Gardens, Kew, for Sir Joseph Hooker’s *Flora of British India*, Vol. II. Some of the species are new to science or at all events are not to be traced in any of the works in the library of the Calcutta garden and are not provided with names either in the Calcutta Herbarium or in that at Kew. Others are species already described elsewhere but not included in the *Flora of British India* because they had not been reported from within the limits of the Indian Empire up to the time when Mr. Baker’s account of the *Leguminosæ* was being prepared. And in order that these contributions may preserve the character of being in substance, as well as in form, supplementary to the *Flora*, definitions of species of both kinds have been given in the hope that they may prove helpful to members of our Society who use the *Flora* itself in the field.

In the *Flora of British India* Mr. Baker has indicated points that were doubtful to him and has urged the attention of Indian botanists to these points, in the hope that the difficulties may be removed by the supply of more adequate material. Some of these difficulties it has been possible from the possession of more recent and more adequate suites of specimens to satisfactorily settle; naturally, too, the more ample material at our disposal now, has indicated other difficulties where
formerly all seemed clear. And in this paper allusion is made to both these kinds of difficulties, wherever they have been detected.

From the present review the writer regrets to have had to exclude the large genus *Astragalus*; many species belonging to that genus have been added to the Indian Flora owing to the extension of the Indian Empire during recent years along its north-western frontier. It is his hope however to present to the Society at another time a separate review of the Indian species of *Astragalus* and of the closely allied genus *Oxytropis*, which has also for the present been omitted from consideration.

1. **PIPTANTHUS D. DON.**

1. **PIPTANTHUS NEPALENSIS D. DON.**

Add to localities of F. B. I.--Assam; Khasia; at Lailankote, etc., C. B. Clarke! G. Gammie! Jaintea; Prain! Manipur, on a hill north-east of Chingsow, Watt! Burma; Chin Hills, G. R. Dun!

2. **THERMOPSIS R. BR.**


**Eastern Temperate Himalaya; Phari; King’s Collectors! Distrib. Siberia, China.**

*General habit of the other Himalayan species. Rootstock woody. Leaves petioled, petioles short ⅓-½ in., leaflets glabrous above, downy below, ⅓ in. long, ½ in across, apex obtuse base cuneate. Stipules like leaflets and almost as large. Flowers verticillate 3-nate, stalks ⅓-½ in. Calyx finely downy, the three lower teeth hardly as long as tube. Pod distinctly stalked, 6-8-seeded, thin, flat, 2½ in. long, ½ in. across from suture to suture.*

An extremely interesting addition to the Himalayan Flora. In general appearance it much resembles the other species but is easily distinguished by its long narrow pods and its petioled leaves.

4. **ARGYROLOBIUM ECKL. & ZETH.**

2. **ARGYROLOBIUM ROSEUM JAUB. & SPACH.**

This species is said in F. B. I. to be ‘nearly or quite glabrous’ with leaflets truncate or emarginate and with corollas yellow tinged with red. The result has been that this species has been frequently sent to Calcutta, after comparison with the F. B. I. description, with the suggestion that it is either a new species or the one next to be described. Sometimes, but very rarely, it is nearly glabrous and occasionally all the leaflets are truncate or emarginate: much more usually, however, the leaflets are mucronate. The flowers are “rose” (*Jacquemont*) or “purplish”
1897.]

D. Prain—Some additional Leguminosae. 349

(A. O. Hume); "there is no trace of yellow" (Collett); the colour of the next species has been attributed in the F. B. I. to this one.


Hardly distinguishable in the herbarium from *A. roseum* of which it has the habit and foliage. The pods however are shorter, flatter, and few seeded; ½ in. long ¼ in. broad 3–6-seeded, strigose; the flowers are yellow, with a tinge of purple, and the upper lip of the calyx in place of being only 2-fid as in *A. roseum* is 2-partite almost to the base.

S. CROTALARIA LINN.

6. Crotalaria trichophora Benth.
Add to localities of F. B. I.:-BEHAR; Kurz!

8. Crotalaria vestita Bak.
This species is common on the Western Ghauts, as at Khandalla and Mahabaleshwar.

Add to localities of F. B. I.:-UPPER BURMA; Sandow Hill, *Prazer*!

Add to localities of F. B. I.:-NAGA HILLS; Kohima, *Clarke*!

11. Crotalaria ferruginea Grah.
Add to distr.:-YUNNAN (Anderson!)

12. Crotalaria acicularis Ham.
Add to localities of F. B. I.:-MADRAS PRESY.; Ganjam, frequent, *Gamble*! Anamallays, *Beddome*!

Add to localities of F. B. I.:-BURMA; South Shan States, *King’s Collectors*!

Add to localities of F. B. I.:-Anamallay Mts., *Beddome*!

17. Crotalaria alata Ham.
Add to localities of F. B. I.:-MALAY PENINSULA; Singapore, *Hullett*! *Ridley*!


Upper Burma; Popah Hill, 5000 feet, *Collett*!
A spreading shrub with stems 6-12 in. long densely grey velvety. Leaves sessile orbicular ½ in. across densely velvety especially beneath, stipules forming a broad wing for the whole extent of an internode, their points lanceolate-deltoid. Racemes 2-3-fl.d, and flowers often solitary, bracts small persistent ovate-acuminate. Calyx ½ in. densely silky, tube campanulate. Pod oblong 1 in. long, glabrous, its stalk ⅛ in., 20-30-seeded.

This plant, which has exactly the facies of Crotalaria scabrella W. & A. differs from that Southern Indian plant in having peduncles and stipular wings exactly like those of C. alata. On this account Sir H. Collett and Mr. Hemsley unite it with C. alata, which they can find no character to distinguish as a species from C. rubiginosa Willd. the plant to which Mr. Baker has referred C. scabrella. With this view the author cannot altogether agree though it is true that if we accept the treatment of the remaining forms in the Flora of British India it is logically necessary. After an examination, however, of 20 specimens, (seven gatherings), of Crotalaria rubiginosa and of 34 specimens, (ten gatherings), of Crotalaria scabrella the writer is convinced that the union of the two as varieties of one species, except on the comprehensive principle advocated by Collett and Hemsley which would recognise but one species with wing-like stipules, cannot be sustained. There are no intermediates between the two plants which, though not dissimilar in size, differ in habit, tomentum, shape and venation of leaves, size and shape of stipules, and above all in size and shape of pods—those of C. rubiginosa being ½ shorter and nearly ½ narrower than those of C. scabrella and being quite sessile while those of C. scabrella are stalked. As this character alone will quite sufficiently enable members to distinguish the two species in the field a detailed description of C. scabrella is not here given. It is otherwise however with C. Wightiana, also reduced by Mr. Baker to C. rubiginosa, which differs so widely that it is essential, in restoring it to the specific rank that it deserves, to provide a description.


South India; Dindigul Hills, Wight (Cat. n. 693! Wall. Cat. n. 5358! Kew Dist. n. 587!) Coonoor, 6000 feet elev., Gamble n. 1325é! Ceylon; Kandy, Thwaites! Watson! Pedrotalla, T. Thomson!

A shrub, 3-4 feet high, fastigiate branched. Stem and leaves beneath closely adpressed rusty-tomentose. Leaves very short-petioled 2 in. long, 1½ in. across, stipule ½ in. wide or more at top forming a wing for whole length of internode. Racemes 2-5-fl.d., bracts large persistent ovate-acuminate. Calyx ½ in. densely silky, tube short campanulate bracteoles inserted above the base, teeth lanceolate. Corolla pale-yellow slightly exserted, standard 1 in. long. Pod oblong, glabrous 2 in. long (including stalk ⅛ in.) ½ in. diam., 30-40-seeded.

A very distinct species.

22. Crotalaria triquetra Dulz.

Add to localities of F. B. L.:—Rajputana; Mt. Abu, common, King!
23. Crotalaria albida Heyne.
Add to localities of F. B. I.:—Malay Peninsula; Selangor, Ridley!
Also add the following variety:—
Var. inopinata; leaves rigid linear acute densely silky beneath, calyx densely silky. C. inopinata Prain MSS.
Shan Hills; Yindaw, King’s Collector!
This plant has exactly the calyx-teeth and precisely the pod of C. albida of which it moreover has quite the habit. The foliage and tomentum are however very dissimilar. The corollas on our specimens are not in a fit state for examination, and it seems better to place the plant for the time being under C. albida, though it is more likely that it will be found specifically distinct.

Var. typica; leaves oblong, broader upwards, obtuse; flowers few on lateral pedicels.
Var. umbellata; leaves oblong, acute; flowers many in terminal umbels. C. umbellata Wight in Wall. Cat. n. 5383.
West and South India; Dindygul Hills, Wight! Nediwattam, Gamble! Canara, Talbot! Mahabaleshwar, Cooke!
A very distinct plant perhaps deserving the specific rank claimed for it by Wight.

Var. patula Baker. C. patula Grah. in Wall. Cat. 5371.
Has also been collected, in a ‘wild’ condition, in Hort. Bot. Calcutta, doubtless having been introduced accidentally from Burma. Probably also quite a distinct species.

27. Crotalaria occulta Grah.
Add to localities:—Naga Hills; Kohima, common, Prain!

Add to localities of F. B. I.:—Chittagong, Upper Burma and Shan Hills; common.

29. Crotalaria sessiliflora Linn.
Add to localities of F. B. I.:—Nicobars; Kamorta, Kurz! (C. calycina Kurz, Journ. As. Soc. Beng. xliv. pt. 2. 147. not of Schrank).
Add to distrib.:—Java.

29b. Crotalaria burmanica Coll. & Hemsl. Journ. Linn. Soc. xxviii. 38; annual or perennial, laxly silky with long hairs; leaves narrowly oblong-lanceolate or the uppermost almost linear; flowers in elongated terminal racemes, with a number of empty tracts disposed along the stem between highest leaf and lowest flower, calyx middle-sized laxly clothed with spreading silky hairs, teeth oblong two upper rather broader; pod unknown.
Upper Burma; Shan Hills, at Pwehla, 4000 feet elev., Collett!
Stems over 2 feet high apparently simple. Leaves herbaceous, shortly petioled 1-1½ in. long, acute or sub-acute hirsute on both faces but especially beneath; stipules minute subulate. Racemes 10-15-fld. about 3 in. long, separated by an interval of equal length bearing only barren bracts from the leafy stem, bracts long setaceous persistent. Calyx ½ in. long, tube short campanulate. Corolla ½ in. long. Ovary sessile oblong glabrous many-ovuled.

That this species is nearly related to C. sessiliflora, as remarked by Genl. Collett and Mr. Hemsley, is evident; it however differs very markedly in having the upper surface of its leaves hirsute, and in having a space with only barren bracts intervening between leaves and flowers. In some respects its is allied to C. chinensis but differs in having many-fld. elongated racemes and in being unbranched. Till, however, it is known whether its pod is included or exerted its exact position cannot be determined.

30. Crotalaria chinensis Linn.
Add to localities of F. B. I.:—Malay Peninsula; Perak, Wray!
33. Crotalaria capitata Grah.
Add to localities of F. B. I.:—Manipur; Chingsow, Watt! Upper Burma; maymyo, King’s Collector! Saiktha, Prazer! South Shan Hills, King’s Collectors!

34b. Crotalaria perpusilla Coll. & Hems. Journ. Linn. Soc. xxviii. 37; diffuse laxly silky, stems and branches prostrate slender, leafy; leaves very small ovate-rotund, flowers few in lax terminal heads, calyx small densely villous, teeth all lanceolate the two upper rather the longer and wider, pod oblong (immature) hardly exerted.

Upper Burma; Shan Hills at Koni, 4000 feet elev., Collett!

A slender procumbent branched annual or perennial, branches 6 in. long or less, densely clothed with adpressed brownish hairs. Leaves short petioled rather close-set thinly herbaceous, ½ in. long ¼ in. wide, numerous, clothed on both surfaces with long spreading white hairs and minutely punctate; stipules 0. Racemes sub-capitate, 2-5-fld., flowers shortly pedicelled; bracts and bracteoles lanceolate persistent. Calyx ⅔ in. tube campanulate the two upper teeth sub-obtuse. Corolla ⅔ in. long, purple, slightly exerted. Pod sessile glabrous, hardly exerted (unripe), few-seeded.

Associated by Sir H. Collett and Mr. Hemsley with C. pusilla and C. hirta; appears to the writer to be most nearly related to C. priestleyoides.

36. Crotalaria neriifolia Wall.
Add to description of F. B. I.:—
Pod 1½—2½ in. long, narrowly oblong, thick-walled, glabrous, gynophore ½ in.

40. Crotalaria assamica Benth.
Add to localities of F. B. I.:—Upper Burma; Poneshee, Anderson! Chin Hills, King’s Collector! Shan States, Manders! King’s Collectors!

67b. Crotalaria uncinella Lamk. Encyc. Meth., ii. 200 (1790); shrubby, branches long, woody, spreading, slender, flexuous, slightly hirsute as are the leaflets beneath, leaflets rather large elliptic-obtuse entire; racemes many-flowered, corolla twice as long as calyx. Lamk.

MALAY PENINSULA; Pahang, Ridley! Malacca, Derry! Goodenough!

An almost stemless undershrub with several almost procumbent spreading branches, 1-2 feet long. Leaflets glabrous above, sub-equal or often the terminal rather larger than the other two, 1-1½ in. long, ½-¾ in. broad; petioles about 1 in.; stipules small acute rigid recurved glabrous above, hirsute beneath. Racemes lateral and terminal, 2 in. long, 20-25-fl., flowers close-set, bracts small recurved ovate-acuminate. Calyx hirsute, teeth lanceolate ½ in. long. Corolla ¼ in. yellow, far exserted, glabrous. Pod ¼ in., style sharply hooked, closely adpressed-pubescent, 2-seeded.

First described, from communicated specimens, by Lamarck as a native of Mauritius; again and independently, from introduced specimens, by Roxburgh, as a native of China; refused a place in the Indian Flora by Wight and Arnott and by Baker; now, having been sent from the Malay Peninsula, requiring to be formally added to the Indian list.

70. CROTALARIA INCANA Linn.

No doubt naturalized only; to the localities of F. B. I. must now be added Chittagong, King's Collectors! and Penang, Curtis!


This name is given as a synonym in F. B. I. It is however older than the name C. striata DC., which is more usually employed; having been adopted in the Kew Index it is necessary to use the name C. Saltiana in the F. B. I. also.

At the same time it has to be pointed out that some of the synonyms of the F. B. I. do not belong here. Crotalaria latifolia Roxb. ex Wight and Arnott, Prodr. i. 180, of which an authentic specimen exists in Herb. Calcutta, is not the same as C. Saltiana Andr. (C. striata DC.) It is however, the same as C. Brownei Bertero in DC. Prodr. ii. 130. But unfortunately, it is also the same as C. lanceolata Roxb. Hort. Beng. 54 and as that is the older name doubtless some bibliographers will say that it must be employed to designate the plant. But as this would involve the further displacement of Meyer's C. lanceolata, a name given with good reason to a South African species, it seems more in accordance with common sense to retain for the plant in question the name given to it by Bertero. Though named first in the Calcutta Garden the plant is a native of the West Indies and might therefore be left unnoticed, especially as it is no longer in cultivation in the Calcutta Garden, but for the fact that it turns out to have escaped, and become apparently as thoroughly naturalized as C. incana, in Chittagong.


CHITTAGONG; naturalized, King's Collector! Native of West Indies.
An erect shrub 3-6 feet high with robust sulcate stem and branches. Stipules minute setaceous, deciduous, petiole 2 in., leaflets 3-5 in. long, narrowed at both ends, glabrous above, obscurely silky below. Racemes 20-30-fl.d., 4-6 in. long, flowers close-set, much like those of C. Saltiana; pods also similar but somewhat more turgid and without appreciable stalk.

Exceedingly closely related to the Indian and African C. Saltiana but easily distinguished by its much shorter racemes with closely packed flowers and by its totally different foliage. The leaves of this species are exactly like those of C. bracteata, for which species, in the absence of fruits, this is apt to be mistaken. After an examination of 75 specimens of 29 different gatherings of the common C. Saltiana the writer finds that from such various localities as Sikkim, Western India, Ceylon, Bengal, Assam, Burma, Siam, Perak, Penang, Malacca, Singapore and Java, the species shows no tendency to vary; it never has any but obtuse leaflets and in no instance is even the larger terminal leaflet more than 2½ in. long.

75. CROTLARIA QUINQUEFOLIA Linn.

Add to localities of F. B. I. — Malay Peninsula; Kedah, Kunstler! Singapore, Hullett!

10. TRIFOLIUM LINN.


HIMALAYA; Simla, Gamble! Collett! Darjeeling; Jallapahar, King! NILGIRIS; Ootacamund, Schmidt! Wight! Clarke! King! DISTRIB. Europe.

Annual, stems 10-20 in. and leaves nearly glabrons. Leaflets truncate or notched, finely toothed; petiole short slender. Heads 4-20-fl.d., very small, flowers small turning ultimately brown. Calyx campanulate; pod obovoid.

This is so completely naturalised in the neighbourhood of hill-stations both in South and in North India that it must now be given a place in the Indian Flora.

12. TRIGONELLA LINN.

1. TRIGONELLA OCCULTA Delile.

Add to localities of F. B. I. — Rajputana; Marwar, King! CENTL. INDIA; Jerdon!

4. TRIGONELLA RAMOSA Linn.

No doubt Indian; localities of specimens in Herb. Calcutta are:—

UPPER GANGETIC PLAIN; Gohane, A. O. Hume! near Etawah, Duthie n. 4594! CENTL. INDIA; Jerdon! King! Rajputana; Jodhpur, King!

13. MELILOTUS JUSS.

1. MELILOTUS INDICA All. Flor. Ped. i. 308.

This being the older name must be substituted for the name M. parviflora.
15. LOTUS LINN.

1. LOTUS CORNICULATUS LINN.
Add to localities of F. B. I.:—
Tenasserim; on Taepo, at 5000 feet elev., Gallatly n. 836!
A very curious extension of distribution, seeing that the species has not yet been reported from Upper Burma or from the Himalayas east of Nepal.

17. INDIGOFERA LINN.

2. INDIGOFERA LINIFOLIA Retz.
Add to localities:—Upper Burma; Dr. King’s Collectors!

4b. INDIGOFERA SQUALIDA Prain; suffruticose, sparsely adpressed-pubescent, leaves subsessile ovate-lanceolate acute, flowers 12–18, in small sessile congested axillary racemes, pod straight tetragonous about 8-seeded, not torulose.

Upper Burma; Koni, King’s Collector! Fort Stedman, King’s Collector!

An undershrub 1½–3 feet high, branching near base only, persistently sparsely adpressed grey-pubescent. Stipules linear-subulate; petiole 0–2 in. long, lamina chartaceous 2 in. long, 7½ in. across. Racemes 3–5 in., rather longer in fruit. Calyx ½ in. white-pubescent, teeth long setaceous. Corolla purple, twice the calyx. Pod deflexed, 7½–1 in. long, the valves slightly adpressed-puberulous.

To leaves that, but for being sessile or nearly so, considerably resemble those of I. Brunoniana this species adds the habit, and practically the inflorescence and pods of the otherwise very different I. trifoliata.

5. INDIGOFERA CALONEURA Kurz.
Add to localities:—Shan Hills; Lwekaw, 4000 feet, Collett 706! Tenasserim; Taepo, 5000 feet, Gallatly 714!

6. INDIGOFERA BRUNONIANA Grah.

Recent gatherings of this species in Upper Burma show that it is as usual for the leaves to be 3-foliolate as to be simple. The species thus connects I. caloneura, which seems always to be 1-foliolate, with the next species.

6b. INDIGOFERA BELLA Prain; shrubby, leaves odd-pinnate, leaflets 7–9 large, ovate-acute, stipules deciduous, racemes close-flowered rather large, peduncled, individual flowers short-pedicelled, pods cylindric many-seeded with somewhat thickened sutures and a very sharp abruptly upturned beak.

Upper Burma; Myingin Hills, Praser! Kalay Hills, Praser! Pegu, Kurz!

A shrub 8–12 feet high; branches long virgate slender slightly 4-angled. Leaflets quite glabrous above, very sparsely puberulous and very glaucous beneath, 3 in. long, 1½ in. wide, rather conspicuously veined beneath; stipules deciduous, stipels setaceous sub-persistent, leaf-rachis 4–5 in. long, petiolules 2 in. Racemes up to 5 in. long, copious. Calyx campanulate ⅔ in., teeth short deltoid. Corolla white 6 in. long, standard thinly pubescent. Pod 2 in. long, glabrous, tip very abruptly recurved.

J. II 45
A handsome and striking species; apparently nearly related to a Central Chinese plant (Henry n. 3865).

8. Indigofera trigonelloides Jaub. & Spach.

Add to localities:—Panjab; Amritsar, T. Anderson n. 123!


Western India; Canara, on Wuddee Ghat and on Nilkhund Ghat, Talbot nn. 320! 788! Ceylon; Motale East, Thwaites n. 3811!

A shrub 3–4 feet high, branches few virgate cylindric. Leaflets thin, glabrescent above, finely hairy on both surfaces, especially beneath. Flowers numerous, racemes about as long as leaves. Calyx silky, tube campanulate, teeth short triangular acute. Pod 1½ in., slightly recurved and 4-angled, pointed and much constricted between the seeds, sparsely silky.

This has been compared by Mr. Baker and by Dr. Trimen with I. tinctoria; in the writer’s opinion the original comparison by Dr. Thwaites with I. flaccida (I. subulata) more truly indicates its natural affinities. It has quite the habit and appearance of I. subulata and is much less like I. tinctoria in facies. The F. B. I. compares I. subulata with I. trita but, so far as Calcutta specimens go, and we have 22 different gatherings of that species, all very uniform, the resemblance is far from striking; I. trita is always a much more rigid shrub than any of the three mentioned; I. subulata indeed is subcandent.

Both I. subulata and I. marginulata are described by Mr. Baker (the former by Dr. Trimen also), as having leaves with 5 leaflets; Mr. Baker qualifies the statement further on by saying leaflets “always 5 on the leaves of the main branches.” In specimens collected by Dr. Wight (Wall. Cat. 5475 and Wight, K.D. 667), almost all the leaves have 5 leaflets; also in specimens obtained by Mr. Gamble in the Anamallai Hills (Gamble n. 14592). In the only specimen of Dr. Roxburgh’s collecting at Calcutta (from Golconda) and in Ceylon specimens (Thwaites n. 1460, Beckett n. 2378), the majority of the leaves have 7 leaflets.

Dr. Trimen describes I. constricta as having 9 leaflets. This is true of Thwaites n. 3811 and Talbot n. 788 but in Talbot n. 320 as many of the leaves have 11 leaflets as have 9.

25. Indigofera hisuta Linn.

Add to localities of F. B. I.:—Singapore; Hullett!

28. Indigofera tinctoria Linn.

As Mr. Kurz has pointed out (Journ. As. Soc. Beng. xlv. pt. 2. p. 269) Indigofera Anii is a very common wild or semi-wild species in Burma. It has now similarly found its way into the Andamans and become quite naturalised. Specimens from India are very rare. Mr. Kurz proposes that I. Anii should be looked on as a variety of I. tinctoria, a proposal for which there is much to be said. But Mr. Kurz’s further belief that the Indigofera argentea var. coerulea of the F. B. I. should also be referred here seems quite untenable; that plant is, without any doubt, a form,
hardly even a variety, of the extremely distinct *I. argentea* Linn.—the species known as "Nil" in Rajputana. The "Nil" of most other parts of India—the Indigo plant (*I. tinctoria*)—is on the other hand known in Rajputana as "Jin-gini," all the use made of it being that its seeds are sometimes eaten during periods of scarcity. If the form referred to by Mr. Baker must be treated as a variety it would perhaps be better to substitute the name var. *brachycarpa* or var. *retusa* for the name var. *coerulea*; it happens that Dr. Roxburgh's *I. coerulea* is exactly = *I. argentea* Linn. and is not quite = *I. retusa* Grah. or *I. tinctoria* var. *brachycarpa* DC., both of these being exactly Mr. Baker's plant.

29. **Indigofera Wightii** Grah.

Add to localities of *F. B. I.*.—Tenasserim; Endiue-ghor, 1000 feet elev., Gallatly!

30. **Indigofera cylindracea** Grah.

Add to localities of *F. B. I.*.—Naga Hills; Pulinabadza, 7500 feet elev., *Prain*!

31. **Indigofera leptostachya** DC.?

Add to localities of *F. B. I.*.—Upper Burma; Maymyo and Lwekaw, Dr. King's Collectors!

32. **Indigofera atropurpurea** Ham.

Add to localities of *F. B. I.*.—Naga Hills; Mao, Clarke's Upper Burma; Bhamo and Maymyo, King's Collectors! Shan Hills, King's Collectors! Karen Hills, O'Reilly! Distrib. Yunnan, at Momien (J. Anderson).

33. **Indigofera dosua** Ham. var. tomentosa Bak.

Add to localities of *F. B. I.*.—Upper Burma; Shan Hills, common.

18. **Psoralea Linn.**

1. **Psoralea corylifolia** Linn.

Add to localities of *F. B. I.*:

Burma; Paghmyo, Wallrich! Poneshee, Anderson! Meiktila, Collett! Shan States, very common, King's Collectors!

In Burma the corolla is sometimes yellow, much more often it is reported as 'blue' or 'purple'; in India also it is more often quoted as 'blue' (Gamble) or 'white with carina purple-tipped' (Hooker and Thomson) than 'yellow.' The plant often reaches 5-6 feet in height.


North-West Himalaya; Gilgit, Giles! Distrib. N. Persia, Turkestan.

An erect annual 3-4 feet high. Branches firm, striated, villous. Leaves distinctly petioled roundish widely serrate, harsh, conspicuously dotted; petiole villous, blades glabrescent. Flowers 25-50 in elongated lax racemes. Calyx sub-sessile villous ⅛ in. long; teeth lanceolate the lowest slightly longest. Corolla bluish-white distinctly exserted. Pod obovate, densely villous, twice as long as calyx.
20. MILLETIA W. & A.

The genus *Milletia*, here retained because its species are familiar under that name to residents in the East, does not differ, as Baron von Mueller has shown, from *Wistaria*. Unfortunately though *Wistaria* has become most familiar as the name of the genus it is by no means the oldest and therefore is not the one that ought to be employed. As Sir J. D. Hooker and Mr. Jackson show (Index Kewensis vol. ii. p. 1232) there are at least four names with a prior claim to being used. The oldest of these is *Kraunhia* (Raf. Med. Rep. N. Y. v. 352 [1808]) and the propriety of restoring the use of this name seems to be unquestionable. Dr. Otto Kuntze, however, proposes to employ the name *Phaseoloides*,—a modification of his own, of *Phaseoloides*, a name employed before the time of Linnaeus—to indicate the genus. To this the writer cannot agree, because of the inadvisability of employing an adjective, even when a wrong spelling is adopted, as the name of a genus.


Tenasserim; Choungya, 4000 ft., Gallatly n. 531! Pegu; Tonkyeghat, Nakawachong, Kurz n. 1765! Upper Burma; Poneshee, J. Anderson!

A woody climber, the branches glabrous and lenticelled. Leaves 2 feet long; leaflets 7–10 in. long, narrowed from the middle towards both extremities, the base cuneate, the apex very long ciliate-acuminate, green and glabrous above, densely grey-silky beneath, the petiolules ¼–½ in. long and the rachis densely brown-tomentose. Racemes lateral a foot long, the lower half naked the upper densely set with fascicles of pedicellate flowers. Calyx ½ in., silky, scarcely toothed. Corolla ½ in., pale-pink, very silky. Pod (unripe) 2–3 in. long, sparsely coated with adpressed hairs, becoming ultimately glabrescent.

This is the Burmese plant referred by Mr. Kurz to *M. sericea*; it is difficult to decide whether it differs most from that species as to pods, which are narrower and become, even while young, glabrescent; as to flowers, which are about half the size; as to inflorescence, which is much longer and narrower, or as to leaflets which are densely silky beneath with much longer hairs, which taper gradually into a very long ciliate sharp point instead of being abruptly shortly bluntly cuspitate, and which are membranous in place of coriaceous.

*Milletia sericea* has never been sent to Calcutta from Burma.

4. MILLETIA PULCHRA Bth.


Assam; Silhet, De Silva (Wall. Cat. 5630 C) ! Naga Hills, below Kohima, 3500 ft., Prain! Manipur, at Laireain, 3000 feet, Watt n. 6,274!

This variety is very different in appearance, owing to its tomentum, from the typical plant; its leaflets are also larger.
Colebrooke has written on Wall. Cat. 5630 C "Tephrosia pulchra?"; it seems probable that Dr. Watt is right in claiming specific rank for the form. Since, however, neither DeSilva, Watt nor the writer have collected fruits, and as there is no difference in flower between this and typical *M. pulchra*, it seems better, till fruits are obtained, to treat it only as a variety.

5. **Milletia racemosa** Benth.


Add to localities of *F. B. I.*:—Behar; common, *Kurz*! **BURMA**; Pegu, Nagkawa, *Kurz*! Shan Hills at Toungyi, *King's Collectors*! Tenasserim, Thoughyen, *Gallatly*!

Like most *Milletias* this is slightly variable, but there is no essential difference between the Concan plant, and that from Behar and Orissa; the plant from Pegu and the Shan Hills is exactly like that from Behar, the plant in Tenasserim is exactly like that in the Concan and in Canara.

7b. **Milletia multiflora** Coll. § Hemsl. *Journ. Linn. Soc.* xxviii. 41; leaflets 9–13, usually 11, coriaceous, ovate-oblong to rounded, stipulate, minutely strigously hairy on both surfaces, at length glabrous, standard slightly silky, stamens 2-adelphous, pod sparsely silky indeliscent. Kraunhia multiflora *Prain* MSS.

**BURMA**; Shan Hills, *Collett* n. 553! *King's Collectors*!

A tree 30–40 ft. high, young branches rusty-tomentose. Leaflets obtuse 1–1.5 in. long, apex sometimes acuminate, sometimes rounded or even retuse, always rather firm, finely reticulated especially beneath; petiolules ½ in. Flowers in fascicled racemes, shortly pedicelled. Calyx silky even in fruit. Corolla 7 in. long. Pod almost woody, straight pointed, uniformly covered with white silky hairs that do not conceal the raised reticulate nervation, 4 in. long, 7½ in. across.

This is compared by its authors with *M. Brandisiana*; it seems also to have a marked affinity with *M. cana* which the writer does not, however, know well, there being but one example in Herb. Calcutta.

8b. **Milletia Wrightiana** *Prain*; leaflets ovate shortly cuspidate thickly chartaceous, at first uniformly softly velvety beneath, standard glabrous on the back, stamens monadelphous, pod flat on the face, woody, thin, sutures slightly thickened but not winged. Kraunhia Wrightiana *Prain* MSS.

**BURMA**; Shan Hills, *King's Collectors*!


Most nearly related to *M. glaucescens* from which it differs chiefly in the thinner pod not winged along the sutures and not lenticelled along the valves, also in its smaller bracts and its shorter puberulous rachis. The leaves when old are at times only pubescent on the nerves as in *M. pubinervis*, and at times glabrous beneath as in *M. glaucescens*. 
The species is named in honour of Mr. Wright of the Kew Herbarium staff.

9. **Milletia pubinervis Kurz.**

This is more like an *Otosema* than a *Eumilletia* because the standard is 2-calous; its racemes are not leaf-opposed. Its nearest ally among the species described in the *Flora of British India* is *M. glaucescens* Kurz, which also has a 2-calous standard. These two, with three other species—*M. Hemsleyana*, *M. Wrightiana* and *M. decipiens*, and with apparently a fourth from Borneo, of which the fruit is still unknown, and a fifth, *M. dehiscent*, from Java, constitute an extremely natural group of forms. This one has recently been obtained again in Tenasserim by Gallatly, but the fruit is still unknown.

9b. **Milletia Hemsleyana Prain**, Journ. As. Soc. Beng. lxvi. 2. 90; leaflets narrowly elliptic-ovate or lanceolate-acuminate, glaucous and softly pubescent ultimately glabrescent beneath except on main nerves, stipules large ovate deciduous, standard glabrous on the back, ovary pubescent, pod narrow thin glabrous, sutures slightly thickened not winged. Krauhnia Hemsleyana Prain MSS.

**Perak**; Pulo Kamiri, Wray 3310! 3608!

An erect tree, the young parts puberulous. *Leaves* 6–8 in. with puberulous rachis, leaflets 4–5 pairs, 2–3 in. long, chartaceous. *Racemes* axillary, rachis puberulous, slender, simple, bracts large lanceolate, pedicels capillary pubescent solitary or fascicled. *Calyx* pale-green tinted with claret, broader than deep, \( \frac{1}{3} \) in., densely pubescent. *Corolla* white faintly tinged with pink, standard \( \frac{1}{3} \) in. long, 2-callose at base. *Pod* 3–4 in. long, \( \frac{1}{5} \) in. wide.

This is very closely related to *M. pubinervis* and seems to be its representative in Perak. It is however readily distinguished by its large stipules nearly \( \frac{1}{4} \) in. long, and its large bracts.

The species is named in honour of Mr. Hemsley, Principal Assistant, Royal Herbarium, Kew.

9c. **Milletia decipiens Prain**, Journ. As. Soc. Beng. lxvi. 2. 90; leaflets lowest pair broadly ovate the rest elliptic-ovobate all obtusely acuminated, green on both surfaces, with a few sparse hairs on the midrib beneath; standard densely silky on the back, ovary pubescent, pod narrow thin glabrous, sutures not thickened. Krauhnia decipiens Prain MSS.

**Malay Peninsula**; Perak, Scortechini! Wray! Pahang, Ridley!

A spreading tree 40–50 feet high, 2–3 feet in diam., branches glabrous. *Leaves* 6–8 in., rachis glabrous, leaflets 4–5 pairs, basal \( \frac{3}{4} \) the others 2\( \frac{1}{2} \)–3 in. long 1–\( \frac{3}{4} \) in. across. *Racemes* slender, axillary, simple, 6–8 in. long; pedicels capillary, puberulous, solitary or fascicled. *Calyx* reddish, slightly pubescent. *Corolla* pink, standard above \( \frac{1}{4} \) in. long, 2-callose at base; ovary pubescent, ovules 4.

Very near the preceding but easily distinguished by the silky standard; also very near *M. glaucescens* but further easily distinguished by the different pod. The flower of this species is, but for its rather smaller size, remarkably like that of *Pongamia glabra* and can only be safely distinguished by its ovary having 4 instead of 2 ovules. Another species very closely related to this is the Javanese *Milletia dehiscent* (Pongamia dehiscent Koord. & Val., Bijdr. ii. 96) from which this perhaps only differs as a variety.
10. **Milletta monticola Kurz.**

This is not a **Milletta** but a **Derris**; it is not confined to Burma, but extends to the Khasia Hills, where it has been collected by Capt. Badgely and by Mr. Mann, and to the Daphla Hills where it has been obtained by Mr. Lister. It should therefore be known in the meantime as **Derris monticola**. But, from the description, it seems closely related to, and may prove to be the same as, the imperfectly known **Derris securata** Bak., of which the writer has seen no specimen.

It may be mentioned that, on the other hand, the species described as **Derris microptera** by Mr. Bentham has quite dehiscent pods and should be treated rather as a **Milletta** than as a **Derris**. There seems to be little doubt that it is the same as **Derris acuminata** Benth., and if so it must to be known as **Milletta**, or **Kraunhia**, **acuminata**.

10b. **Milletta macrostachya** Coll. & Hemsl. Journ. Linn. Soc. xxviii. 41; leaflets 9-11, membranous, ovate-oblong obtusely acuminate, stipellate, softly sparsely hairy ultimately glabrescent beneath, standard sparsely silky on the back; stamens diadelphous; pod flat long narrow rigidly coriaceous glabrous. **Kraunhia macrostachya** Prain MSS.

**BURMA**; Shan Hills, 2000 to 4000 feet, **Collett! King's Collectors!**

A small tree, about 20 feet high, young shoots glabrescent. Leaves 1-1½ feet long, leaflets shortly petiolulate 2-6 in. long, pale-green, glabrous above, sparsely covered at first with grey pubescence but ultimately glabrous beneath. **Racemes** axillary as long as the leaves or longer; flowers shortly pedicelled. **Calyx** wide, sub-2-labiate, the two upper teeth forming a deltoid lip. **Corolla** rose-coloured, nearly 1 in. long, externally puberulous; standard rounded. **Ovary** sessile pubescent. Pod quite glabrous.

11. **Milletta pachycarpa** Benth.

Add to localities of F. B. I. :—**UPPER BURMA**; Poneshee, J. Anderson! Shan Hills, at Koni, **Prazer!** Delete from localities of F.B.I. :—**MALACCA**.

In the Khasia Hills this is known as 'Kharina' and the fruits are used in poisoning streams to catch fish.

The Malayan plant referred to this species in the F. B. I. has very similar flowers, leaves and stems. But the leaflets are always smaller and the standard in place of being glabrous is very silky outside; the plant itself (Griffith n. 1769) is not at Calcutta but the recent Malayan gatherings identified with it at Kew belong to **Derris elliptica** Bth.

12b. **Milletta Dorwardi** Coll. & Hemsl. Journ. Linn. Soc. xxviii. 40; leaflets 5 ovate-oblong, cuspidate, coriaceous, stipellate, soon glabrescent beneath, standard densely silky on the back, stamens diadelphous.

**BURMA**; Shan Hills at Koni, **Collett! Prazer!**

An erect tree (**Collett** n. 773!) or a woody climber (**Collett** n. 759! **Prazer!**) young branches thickish and leaves beneath puberulous soon becoming glabrous. **Leaflets** 2-4½ in. long, paler beneath, stipels subulate. **Racemes** in a dense panicle above the leaves, flowers pedicelled 2-bracteolate. **Calyx** ½ in., densely silky, teeth rounded. **Corolla** 75 in., densely grey-silky. **Ovary** sessile densely villous; pod not seen.
Very closely related to *M. cinerea*; its smaller firmer leaflets and its much larger buds and flowers give it however, in all stages, a facies of its own.

The authors of the species had, they write, considerable hesitation about giving specific rank to this plant which they think may perhaps after all be only a variety of *M. cinerea*. Dr. King has very kindly examined the specimens with the writer and likewise agrees in thinking that Sir H. Collett and Mr. Hemsley were justified in according it specific rank. It is oftener a climber than a tree; fruits are still unfortunately wanting.


Add to localities of *F. B. I.*:—Sikkim; Terai at Panchenai and Chunbati, *Gamble* 689! 2240! Malay Peninsula; Perak, *Wray* n. 168! Ridley! Scortechini!

Both in Sikkim and in Perak this is an erect tree. Its affinities are altogether with *M. pubinervis*, *Hemsleyana*, *M. Wrightiana*, *M. dehiscens* and *M. decipiens*. Like these species it has a 2-callosoe standard and ought perhaps to be removed from the section in which it is placed in the *F. B. I.*

The following key may assist in explaining the relationships of the species of the group to which *M. glaucescens* belongs, all the members of which have exstipellate leaves, and all of which except *M. glaucescens* itself have densely silky ovaries.

Standard pubescent on the back, (flowers pink):—

Leaflets 5–7, thinly adpressed-silky beneath,

ovules 2... ... ... 1. *Millettia* (sp. borneensis.)

Leaflets 7–9 with only a few sparse hairs on midrib beneath:—

Ovules 4 ... ... ... 2. *Millettia decipiens*.

Ovules 5 or more... ... ... 3. *Millettia dehiscens*.

Standard glabrous on the back, (ovules 6):—

Standard longer than broad, flowers yellowish-white or white:—

Petals yellowish-white with purple veins, calyx black-purple, stipules and bracts small ... 4. *Millettia pubinervis*.

Petals white flushed with pink, calyx green tinged with claret, stipules and bracts large ... ... ... 5. *Millettia Hemsleyana*.

Standard as broad as long, flowers blue:—

Pod thin without lenticels, sutures not winged 6. *Millettia Wrightiana*.

Pod thick woody lenticular, sutures winged ... 7. *Millettia glaucescens*.

The Bornean species mentioned occurs in Mr. Haviland's collection from that island, of which a complete set is present in the Calcutta Herbarium. No fruit has been collected and as it has only 2 ovules it is not possible to predict with certainty whether it may prove a *Millettia* or a second species of *Pongania*, though the probabilities are somewhat against its belonging to the latter genus. In any case the writer is precluded from employing a distinctive name for the species since Mr. Haviland has expressly requested that none of his probably new species shall be named in Herb. Calcutta. The field-ticket of the specimen in question bears the marks "c. k. q. g."
18. **Milletia eriantha** Benth.

Add to localities of *F. B. I.*—Perak; Wray! Scortechini! Pahang; Singapore; Ridley!

22. **Milletia extensa** Benth.

This species must be deleted from the list. Its foliage, flowers and fruit are exactly those of *Milletia auriculata* Bak. If retained as a variety it can only be distinguished, and then not in every case, by its rather shorter racemes.

23. **Milletia leiogyna** Kurz.

This species also must be deleted; it is simply *Milletia racemosa* Benth., differing in no respect from the Indian plant. Roxburgh's Orissa plant does not in any way differ from the Concan one. The species is quite as common in Central India and in Behar as it is in the Concan. In Burma it extends from Tenasserim to the Shan Plateau.

25. **Milletia cauliflora** Prain, *Journ. As. Soc. Beng.* lxxvi. 2. 94; leaflets 13, upper oblong, lower ovate, base somewhat obliquely rounded, apex long caudate-accuminate; stipellate; flowers solitary from small conical papillae along leafless stem; pod closely silky-tomentose, not woody.

**Larut**; Perak, *Kunstler* n. 2558!

A shrub 6-8 feet high, with dark lenticelled bark and with short conical flower-bearing processes in axils of fallen leaves. *Leaves* clustered at apex of stem; stipules subulate, caduceus; rachis rusty-puberulous as are the petiolules and the sejaneous persistent stipels; leaflets thin, glabrous on both surfaces, bright-green, dull beneath with 5-7 pairs of prominent lateral nerves, shining above with nerves and midrib slightly impressed; the lowest leaflets 2 in. long, 1.25 in. across, terminal and upper 2-3 pairs 6 in. long, 2 in. wide. *Calyx* 2 in., glabrescent. *Corolla* apparently pink. *Pod* 3-3.5 in. long, 6 in. wide, narrowed towards base, slightly recurved, rigidly coriaceous, closely grey silky-tomentose.

A very distinct species with leaves very like those of *Milletia macrophylla* Hook. fil., but with fewer lateral nerves and with a very different inflorescence. The pods in this species have thinner valves than in any of the other Indian species except *Milletia pulchra* which, however, it in no other respect recalls. It is doubtful if this species belong really to *§ Otosema*; it resembles much in foliage and habit a Sumatran species* which has however different pods, extostipellate leaflets, and very different stipules; this species (*M. stipularis*) is an *Eunmillettia*.

* **Milletia stipularis** Prain; leaflets 17-19, upper oblong, lower ovate, base rounded, apex rounded abruptly narrowly caudate; extostipellate; flowers in short racemes from small conical papillae along leafless stem; pod glabrous not woody.

**Sumatra**; R. Roepit, 300 feet, *Forbes* n. 2948!

A shrub 8 feet high with ash-grey bark and with short conical raceme-bearing processes in axils of fallen leaves. *Leaves* 2 feet long with glabrous rachis, clustered at apex of stem; stipules very large, obliquely oblong, acute, 9 in. long, 25 in. wide, persistent; leaflets lowest pair 3 in. long, 1.5 in. wide; terminal and upper pairs 6-8 in. long, 2.25 in. across, glabrous on both surfaces, green shining above, dull with prominent midrib and 8-10 pairs of lateral nerves beneath. *Racemes* 1-3 from each papilla, 3-5 in. long, 10-15-fl., flowers shortly pedicelled, usually solitary on small produced nodes showing traces of 3-5 abortive or fallen flowers. *Calyx* 12 in.,
26. **Milletia albiflora** Prain, *Journ. As. Soc. Beng.* lxvi. 2. 92; leaflets 5, rarely 7, more rarely only 3, elliptic-lanceolate, apex caudate, subcoriaceous, glabrous; standard glabrous; stamens monadelphous; pod very large flat rather woody, finely brown-velvety.

**Malay Peninsula; Perak, common. Pahang, Ridley n. 2641!**

A large spreading tree sometimes 80-100 feet high (*Kunstler*) usually 30-50 feet, trunk 2-3 feet in diam. *Leaflets* 5-10 in. long, 1.5-2.5 in. across, lowest pair rather smaller, shining above, dull beneath; pedicule 25 in. *Flowers* in long narrow panicles longer than the leaves, from the upper axes of branches, often 1-1.25 ft. in length; individual racemes 4-6 in., flowers solitary on pedicels 15 in. long; peduncles, stamens and calyx all rusty-puberulous. *Calyx* 25 in. long, tube campanulate, teeth triangular rather shorter than tube, the two upper connate emarginate. *Corolla* pure-white, 75 in. long, standard orbicular 2-auriculate above the claw. *Vexillary* filament cohering half way up the staminal sheath, or at length free. *Ovary* puberulous. *Pod* linear, 7-13 in. long, 1.5-2 in. wide, softly brown-velvety.

27. **Milletia unifoliata** Prain, *Journ. As. Soc. Beng.* lxvi. 2. 93; leaflets solitary obovate-oblong or lanceolate, subcoriaceous, glabrous; standard glabrous; stamens monadelphous; pod large flat, rather woody, finely pale yellowish-velvety.

**Malay Peninsula; Pangkore, Curtis n. 1615! Perak, Wray n. 2836! Scortechini 124! 1023! 1711! Kunstler 4251! 4492! 8210!**

A spreading tree 30-40 feet high, trunk 1 foot in diam., branches glabrous, *Leaflets* with reticulations visible on both surfaces, 6-8 in. long, 1.5-3 in. wide, beneath dull, above shining. *Flowers* in very slender axillary panicles shorter than the leaflets, individual racemes short, few-fld., separated by intervals 1 in. long, peduncles pedicels and calyx-tube glabrous. *Calyx* 2 in. long, 2-bracteolate at the base, bracteoles ovate-lanceolate very small, teeth glabrous externally pubescent within. *Corolla* 75 in. long, pure-white, standard orbicular retuse, 2-calous at base of lamina. *Stamens* monadelphous in a sheath split along vexillary side. *Ovary* puberulous. *Pod* linear, 6 in. long, 1 in. across, tapering to both ends.

Very distinct owing to its 1-foliolate leaves but nevertheless very closely related to the preceding species, which in leaflets, buds, corolla and pods it much resembles.


Add to description of *F. B. I.:*—

A creeper over 100 feet long. *Leaves* light green. *Flowers* in small axillary panicles one-third as long as leaves, 2.5 in. long, 1.5 in. across, rachis and pedicels rusty-pubescent. *Calyx* campanulate, externally rusty-pubescent, 2 in. long, teeth wide-triangular half as long as tube. *Corolla* white tinged with pink, 5 in. long, standard orbicular emarginate, slightly puberulous externally.

Rusty-puberulous. *Corolla* purple, standard orbicular 3 in. long, emarginate, externally slightly pubescent, exauiculate. *Stamens* monadelphous. *Mature pod* quite glabrous, linear, straight, rigidly coriaceous, 3-4 in. long, 5-75 in. broad.

The flower of this species are like those of *M. caudata*, as are the pods; the standard is however without auricles.
Add to localities:—Selangor; 800-1200 feet, Kunstler 8759!

To the kindness of Mr. Ridley the Calcutta Herbarium owes the possession of excellent flowering and fruiting specimens from a plant cultivated in the Singapore Botanic Garden. Mr. Kunstler has collected in flower, in Selangor, specimens that agree in every detail with Mr. Ridley’s flowering specimens.

29. Millettia oocarpa Prain, Journ. As. Soc. Beng. lv. 2. 92; leaflets 9-13, oblong, subcoriaceous, terminal usually much larger than the others, rounded at base, apex acute, glabrous finely reticulate beneath; standard very sparsely silky externally; stamens monadelphous; pod large egg-shaped, softly dark-brown velvety.

Perak; Scortechini n. 429! Wray n. 2141!

A climber, leaves light-green above, whitish beneath, 6-8 in. long, rachis-puberulous, leaflets 2-3 in. long, 1-1.5 in. wide, terminal exceeding the others. Flowers in small axillary panicles one-half as long as leaves, rachis and pedicels slightly puberulous, 2.5 in. long, 1.5 in. across. Calyx campanulate, externally grey-puberulous, 2 in. long, teeth obscure. Corolla white tinged with pink, 5 in. long, standard uniformly sparsely puberulous externally, orbicular, entire. Stamens diadelphous, vexillary filament free. Ovary 2-ovuled, densely pubescent. Pod shape and size of a fowl’s egg, 3.5 in long, 1.75 in. in diam., densely softly brown-velvety.

Nearly related to the preceding species but very distinct by reason of its leaflets glabrous beneath, and its very different pod.


1. Tephrosia tenuis Wall.

Add to localities of F. B. L.:—Burma; Segain Hills, Wallich n. 5970! Shan Hills, King’s Collectors! Laccadive Islands; Cardamum, Alcock! Aucutta, Alcock!

2. Tephrosia candida DC.

Add to localities of F. B. L.:—Malaya; Singapore, T. Anderson n. 43! Hullett n. 670! perhaps introduced.


Var. coccinea Bak. (T. coccinea Wall.): in the light of the specimens received from Upper Burma since the plant was first issued by Dr. Wallich this seems to deserve recognition as a species. It differs more from typical T. tinctoria as regards foliage than does T. calophylla Bedd. and it has at the same time the long lax racemes on the strength of which T. calophylla is kept separate from T. tinctoria.

Burma; Prome, Wallich! Kurz n. 2529! South Mingyan, Prazer!

General habit of *T. tinctoria* but more slender, leaves 2¼ in. by ¼ in. Peduncles 1-3-fld., 2-3 in. long. Calyx, corolla and pod as in *T. tinctoria*. As represented by the large suites of specimens collected by Kurz and Prazer this is very uniform and distinct; the writer therefore has preferred Mr. Kurz's view to that expressed in the *Prodromus* and in the *Flora of British India* which are both based on the examination of Dr. Wallich's solitary gathering.


Further examination of the very extensive material in Herb. Calcutta serves to confirm the writer in the opinion expressed by him in 1892 that this plant must be re-accorded specific rank.


*Key to the Indian Species.*

Flowers small, bud straight (*Subgen. I. Eusesbania*):

Pods twisted, pendulous; flowers ½ in. long or upwards; (unarmed):

Perennial; stems woody; flowers ½ in.; pods 6 in. × ½ in., sutures undulate and valves widely depressed between the seeds; a small tree

Annual; stems pith-like; flowers ½ in.; pods 10–12 in. × ⅛ in., sutures straight, valves slightly abruptly depressed between the seeds; a swamp species with tree-like habit

Pods not twisted, erect or ascending (except at times in *S. cannabina*); flowers never exceeding ½ in.; all annuals with woody stems:

Leaves and branches sericeous-tomentose; (unarmed);

pods not torulose

Leaves and branches glabrous:

Stems and rachises of leaves smooth:

Stems erect, very tall; pods with straight sutures and undepressed valves oftenest spreading or pendulous, 4–8 in. × ½ in.

Stems diffuse procumbent; pods subtorulose erect 3–4 in. × ½ in.

Stems and rachises of leaves armed with weak prickles:

Stems erect; fruiting raceme several-podded; flowers ½ in.; pods 9–12 in. × ¼ in., sutures slightly undulate, valves widely depressed

Stems prostrate; fruiting raceme usually 1-podded, flowers ¼ in.; pods 3 in. × ¼ in. distinctly torulose

Flowers large (3 in. long); bud falcately recurved (*Subgen. II. Agati*):

1. *S. aegyptiaca*.

2. *S. paludosa*.

3. *S. sericea*.

4. *S. cannabina*.

5. *S. uliginosa*.

6. *S. uculeata*.

7. *S. procumbens*.

8. *S. grandiflora*.
An examination of the species of this genus that occur in Bengal, when living examples and not merely herbarium material are dealt with, shows that the only good account of them hitherto published is that by Dr. Roxburgh who treated them as species of Aeschynomene.

1. **Sesbania aegyptiaca** Pers.

The Jait, Jayti or Jaynti; a very familiar hedge plant in Indian fields and gardens. Its wood is still, as in Dr. Roxburgh’s day, highly reputed as a source of charcoal for gunpowder manufacture. The fact that this is a small tree, lasting for several years, has prevented any confusion between it and the other species in the field. In herbaria it is often mixed with the second species which like it has twisted pods and which has even larger flowers; in literature on the other hand, this second species is referred to *S. aculeata*. *S. aegyptiaca* is, by colour of flowers merely, separable into three varieties:

1. *typica*; flowers uniformly yellow. Sesban *P. Alpin, Pl. Ægypt. 81. t. 82; Kedangu Rheede Hort. Malab. vi. 49, t. 27; Emerus Burn. Pl. Zeyl. 93, t. 41. Plukenet, Phytogr. t. 165, f. 2.

Wight and Arnott refer here another figure of Plukenet’s, while they refer Rheede’s fig. to VAR. 3 and Burman’s to VAR. 2. Both the latter authors however speak of the flowers simply as yellow. This seems to be one of the original Indian forms, it is however much more rarely grown now-a-days than either of the other two varieties.

2. **VAR. picta**; standard externally dotted with purple. Plukenet, Phytogr. t. 164, f. 5. S. picta Pers. Synops. ii. 316; Lindl. Bot. Reg. t. 873. Aeschynomene picta Cav. Le. iv. 7, t. 314. Apparently not originally native in India though now very widely cultivated there. From a perusal of Rheede’s description and from Burmann’s diffidence about referring Plukenet’s figure of this plant to his Emerus it seems fairly clear that this variety had, in Rheede’s and Burmann’s time, already reached India from America, where it seems truly native. This particular variety is commoner in Bengal than the typical form but is not nearly so common as the next. In Burma on the other hand this and the next appear to be equally common.


This form is as common in Burma as the preceding and in Bengal is the one that is usually cultivated. It has long stood in Indian gardens as the representative of the name *S. picta*; this misapprehension, no doubt owing to reliance placed upon wrongly-named specimens distributed from the Calcutta Herbarium, has crept into the *Flora of British India*.

BENGAL; in stagnant pools near villages and in swamps, very com-
mom. BURMA; not infrequent in swamps and swampy pastures all over
the plains of Pegu, Kurz  Malay Peninsula; open marshy ground in
Kedah near rice fields, Kunstler n. 1712! Distrib. Java (Horsfield!)
Formosa (Henry n. 1802!)

A large tree-like annual reaching 12 ft. in height, stems 2 in. in diam. full of
white pith; no prickles on stems or leaf-rachises. Leaves 8–12 in., sessile, leaflets
10–30 pairs, sparsely hirsute above. Racemes drooping, 8–12-fld., about as long as
the leaves in whose axils they arise. Flowers yellow, the standard externally dotted
with small purple spots, ¼ in. long. Pods 10–12 in., always pendulous and always
twisted.

This is the familiar Kathsola of Bengal, so named because of its great similarity
in appearance to Aeschynomene aspera, the true Sola; the pith of this being a little
harder it is known as the Kath (woody) sola. Though it is preferable to use Rox-
burgh’s epithet “paludosa” for the species it must be pointed out that this is not
S. paludosa Jacq. That species, as the description of the flowers and fruits shows,
is S. uliginosa Sweet (Aeschynomene uliginosa Roxb.) Mr. Baker, it is true, identi-
ifies A. paludosa with A. uliginosa (Flor. Brit. Ind. ii. 115); both are Sesbanias and
both grow in swamps, but as they differ in habit, in foliage, in flowers and in fruit
it seems better to keep them separate. Mr. Kurz thinks this may have been what
Lonheiro meant by Coronilla cochinchinensis, but as that species has erect torulose
pods, the identification is impossible. Dr. Kuntze’s treatment of this form (Rev.
Gen. Pl. i. 181) which he reduces to S. aygptiaca, makes it clear that he never saw
the plant itself; his whole discussion is an excellent example of the unscientific
use of the imagination.

3. SESBANIA SERICEA DC. Prodr. ii. 266. S. aculeata var sericea
Benth. in Thw. Enum. 441; Bak. in Flor. Brit. Ind. ii. 115; Trimen,
Flor. Ceylon, 34.

CEYLON; Colombo, Ferguson!

There is no doubt that this differs specifically in the points noted by Mr. Baker.
The pods most resemble those of S. cannabina, the foliage that of S. paludosa. It
has been only once collected in Ceylon, and may possibly be an introduced species.

4. SESBANIA CANNABINA Pers. Synops. ii. 316; annual unarmed,
racemes few-fld., short but distinctly peduncled, pods very often solitary,
rarely more than 2, spreading or pendulous very rarely erect, rigid not
twisted, sutures stout straight, valves not depressed between the seeds.

INDIA and BURMA; cultivated only.

This is the Dhunchi plant which is quite as well known to European residents as
the Jaynti or the Kathsola, and which differs so greatly in habit, flowers and fruit
from these that by no licence can they be conceived conspecific. This is Aeshyno-
mene cannabina Retz. Obs. v. 26; Roxb. Flor. Ind. iii. 335; S. cannabina DC. Prodr.
ii. 265; S. affinis Schrad. in DC. Prodr. ii. 265. It must, however, be noticed that it
is not the S. cannabina of Wight & Arnott (Prodr. 215), as an examination of their
specimens and a perusal of their description shows. The fibre of Dhunchi is some-
times used instead of Jute fibre for various purposes, its chief employment being by
fishermen for nets and lines, the fibre having a reputation for resisting the effects of
water better than many others. But it is for its tall and slender stems which sometimes reach 20 feet in height without being more than 5 in. thick at the base, and which are always hard, never soft and pith-like as in S. paludosa, that the plant is mainly cultivated; these long lute stems are used as the wattles of which are constructed the walls of the houses wherein Piper Betle is grown.


Bengal; in swamps.

This species Dr. Roxburgh compares with the South Indian S. procumbens, and Wight and Arnott would endorse this comparison. What these authors mean precisely when they say that Roxburgh’s A. uliginosa is not the S. uliginosa of “authors,” is hardly clear, for there would appear to be only one published S. uliginosa, that of Sweet, which is founded, Sweet indicates, on the Aeschynomene uliginosa of the Hortus Bengalienis. It is just possible that the S. uliginosa referred to by Wight is S. paludosa (Aeschynomene paludosa Roxb.)

6. Sesbania aculeata Pers. Synops. ii. 316 (excl. citations Plunknett and Rheede); DC. Prodr. ii. 265; Bak. in Flor. Brit. Ind. ii. 114 (excl. all the varieties).

A weed of rice fields and swamps throughout India. Two more or less distinct varieties are recognizable. They differ, however, only in habit, the flowers and fruits of the two are identical and intermediates are numerous.


Wight and Arnott refer Roxburgh’s Aeschynomene cannabina, the Dhunchi plant, to S. aculeata. This is so obviously wrong that the only conclusion to be formed is that they never had an opportunity of examining a Dhunchi plant. And that they are right in regarding their S. cannabina (which the writer cannot separate specifically from their S. aculeata) as the plant that Retzius named Aeschynomene cannabina and that Willdenow named Coronilla cannabina, is highly improbable. The description given by Retzius really only fits well, among Indian Sesbanias, Wight and Arnott’s own S. procumbens. It is merely the fact that Retzius has said, on Koenig’s authority, that the plant to which he refers is the fibre-yielding species (and therefore the Dhunchi), which has led Roxburgh, whom the writer is quite willing to follow, to apply the name “cannabina” to the Dhunchi plant.


As already mentioned this is the species which best fits the description given by Retzius of Aeschynomene cannabina; the reasons that have led the writer to adopt the Roxburghian interpretation have been stated.

Often cultivated, especially in Southern India, as a support for the Pepper-Vine.


Key to the Indian Species.

Leaf-rachis suppressed ........................................ C. pygmaea.
Leaf rachis produced:—

- Leaf-rachis terminating in a naked point:—

  Leaf-rachis persisting as a woody spine after fall of leaflets;
  calyx-teeth long:—
  Ripe pods woolly within:—
    Pods short, hardly thrice calyx, hirsute externally ... C. Gerardiana,
    Pods long, 4-5 times calyx, glabrous externally ... C. brevispina.
  Ripe pods glabrous within:—
    Leaflets lanceolate, longer than broad:—
      Leaflets pubescent with long spreading hairs on both surfaces ... ... C. chumbica.
    Leaflets glabrous above, sparsely adpressed-pubescent below ... ... C. conferta.
  Leaflets hardly longer than broad, oblong or ovate:—
    Leaflets densely pubescent, pod glabrous ... C. polyacantha.
    Leaflets finely hoary, pods pubescent:—
      Pods turgid curved, abruptly pointed ... C. ambigua.
      Pods narrow straight, gradually tapering ... C. ulicina.

Leaf-rachis usually deciduous with leaflets; calyx-teeth short:—

Stipules persistent as strong spreading woody spines;
flowers solitary ... ... ... ... C. Aitchisoni.
Stipules weakly spinescent; flowers several from one node
Leaf-rachis bearing a leaflet at its tip:—
Leaf-rachis persisting after fall of leaflets ... ... C. crassicaulis.
Leaf-rachis not persisting:—

Leaflets retuse at apex ... ... ... ... C. cuneata,
Leaflets rounded at apex ... ... ... ... C. acaulis.

2. Caragana conferta Benth.

Add to description of F. B. I.:—

Pod linear acute, 1½ in. long, ½ in. across, straight, glabrous within,
externally sparsely covered with long spreading silky white hairs.

This has recently been collected in a complete state by Mr. Duthie in Astore;
Gudhai valley, 11-12000 ft., Duthie n. 12196!

3. Caragana Gerardiana Royle.

Add to localities of F. B. I.:—

Eastern Himalaya; at Ha-thom-py-ong, in Chumbi, Dr. King’s Collectors!

36. Caragana chumbica Prain; leaflets 8-12, narrowly ovate-lanceolate acute, densely pubescent, stipules pungent, flowers 1-2, short-pedicelled, pod glabrous within.
A shrub with close nodes, young branches pubescent with long spreading tawny hairs. Leaflets \( \frac{1}{2} \) in. long, tips pungent, whitish and densely pubescent with long silky hairs beneath, dark-green and sparsely pubescent above; leaf-rachis and lanceolate stipules both pungent-tipped and densely hirsute with long spreading tawny hairs. Calyx \( \frac{3}{4} \) in. long, externally very thinly grey-puberulous, pedicels \( \cdot 12 \) in. long only, in axis of small 2-3-jugate leaves, by the sheaths of which they are enclosed; bracteoles 0; calyx-teeth triangular, \( \frac{1}{2} \) as long as campanulate tube. Corolla twice the calyx. Pod \( \frac{3}{4} \) in. long, \( \frac{1}{8} \) in. wide, glabrous within, sparsely pubescent with spreading silky hairs outside.

A very distinct species resembling in many respects C. Gerardiana, but with different tomentum and very different pods.

4. **Caragana polyacantha** Royle.

Add to description of F. B. I. —

Pod linear acute, \( 1 \frac{1}{4} \) in. long, \( 1 \frac{1}{8} \) in. across, slightly curved; glabrous internally and externally.

Add to distribution: — KASHMIR; Gilgit, Duthie! Giles!


Scinde; Stocks! British Beluchistan; near Quetta, Hamilton! Ziarat, Lace n. 3697 (issued as C. Gerardiana)! Distrib. Beluchistan (Stocks !) S. Afghanistan (L. O. Rind !)

A small much branching shrub, with strong spreading spines 1-1\( \frac{1}{2} \) in. long. Leaves \( \frac{3}{4}-\frac{1}{2} \) in.; leaflets pale-green \( \frac{3}{4}-\frac{1}{2} \) in., leaf-rachises hoary-puberulous. Peduncle \( \frac{1}{2} \) in., 2-bracteolate close below the calyx (i.e., pedicels very short), pubescent with somewhat spreading hairs. Calyx adpressed-hoary, tube wide-campanulate, \( \frac{1}{2} \) in. deep, teeth triangular-lanceolate nearly as long as tube. Corolla \( \frac{1}{2} \) in. long. Pod \( \frac{2}{3} \) in. long, turgid, \( \frac{1}{3} \) in. wide.

This is nearest, as M. Boissier has already suggested, to C. polyacantha. A specimen named, and correctly named; C. ambigua, by Stocks himself, was sent by him to the Calcutta Herbarium with the locality "Scinde" on the ticket. All Stocks' other specimens, which have reached Calcutta either from Herb. Dalzell or from Herb. Kew, are marked "Beluchistan."


N.-W. Frontier; Kurram Valley, Aitchison n. 8! Distrib. Beluchistan (Stocks !)

J. ii 47
A small much branching shrub, with spreading spines rarely exceeding \( \frac{1}{2} \) in., usually slightly recurved and always weaker than in the preceding species. Leaves \( \frac{1}{3} \) in., leaflets pale-green \( 4-\frac{1}{2} \) in., leaf-rachises adpressed-puberulous with very short hairs. Peduncle \( \frac{1}{2} \) in., 2-bracteolate below the 1-2 slender pedicels, \( \frac{1}{4} \) in. long. Calyx sparsely adpressed-puberulous, tube wide-campanulate, \( \frac{1}{4} \) in. deep, teeth triangular half as long as tube. Corolla \( \frac{1}{4} \) in. long. Pod \( \frac{3}{4} \) in. long, not turgid, \( \frac{1}{2} \) in. wide.

M. Boissier suggests that this hardly differs from the preceding species; it differs however in spines, in flowers and in fruits so markedly that nothing could be gained by their union. Dr. Aitchison suggests (Journ. Linn. Soc. xviii. 43) that both C. ulicina and C. ambigua are perhaps only forms of an expanded species that would include C. brevispina. The writer, on the other hand, finds it necessary to recognise as specifically distinct from both of Stocks' species the plant identified by Dr. Aitchison with C. ambigua. The reasons for this will appear in the specific diagnosis and description which follow.

5b. Caragana Aitchisoni Prain; leaflets 6-8, very rarely 10, elliptic-mucronate, very sparsely adpressed-pubescent, stipules strongly spinous, flowers solitary on a long slender peduncle, pod glabrous linear not woolly within. C. ambigua Aitch. Journ. Linn. Soc. xviii. 43 not of Stocks.

N.-W. Frontier; Kurram Valley, Aitchison n. 549! n. 1220! Hazara, Bellew! Chitrál, at Broz, Harriss!

A large spiny shrub with greenish Laburnum-like bark and short stoutish spreading stipular spines \( \frac{1}{4} \) in. long. Leaves \( \frac{1}{2}-\frac{3}{2} \) in., leaflets pale-green, \( 4-\frac{1}{2} \) in. Peduncle very slender, jointed above middle, \( 4-1 \) in. Calyx \( \frac{1}{4} \) in. long, membranous, wide-tubular, externally sparsely pubescent, teeth short. Corolla \( \frac{3}{4} \) in., glabrous. Pod \( \frac{1}{2} \) in. long, \( \frac{1}{2} \) in. across.

This differs very much in pedicels, calyx and pod from the true C. ambigua. It is not possible to place it in C. brevispina, the calyx and pod are so different. It is nearest to C. microphylla Lamk. of which it has almost the calyx and quite the corolla and pods; it differs, however, in having much longer and thinner pedicels and shorter leaves with far fewer leaflets. From C. arborescens Lamk. var. \( \beta \). Ledeb. it is best distinguished by its thicker much smaller leaflets, and its compressed not cylindric pods.

5c. Caragana arborescens Lamk. Encyc. Meth. i. 615; leaflets 8-14, elliptic-mucronate glabrescent, stipules weakly spinous, flowers several together from one node on long slender peduncles, pod glabrous linear not woolly within. DC. Prodr. ii. 268; Ledeb. Flor. Ross. i. 569; Aitch. Journ. Linn. Soc. xviii. 44.

N.-W. Frontier; Kurram Valley, Aitchison n. 1129!

A tall shrub with very short weak spreading stipular spines \( \frac{1}{4} \) in. long. Leaves 1-2 in., leaflets \( \frac{1}{2} \) in. by \( \frac{1}{4} \) in., pale-green, thinly membranous. Peduncle very slender, jointed above middle, \( 4-1 \) in., 2-5 from the same node. Calyx \( \frac{1}{4} \) in. long, membranous, wide-tubular, externally sparsely pubescent, teeth short. Corolla \( \frac{3}{4} \) in., glabrous. Pod cylindric, \( 1\frac{1}{4} \) in. long, \( \frac{1}{2} \) in. in diam.

76. Caragana acaulis Bak. in Journ. Linn. Soc. xviii. 44; leaflets 7-9, flowers solitary.
1897.]

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N.-W. FRONTIER; Kurram Valley, Aitchison n. 1218!

Stemless; leaves rosulate crowning a slender elongated woody rhizome. Leaflets sessile obovate-cuneate, ¼-½ in. long, apex rounded or obtuse, petiole short, stipules small deltoid. Peduncle ¼-½ in. long. Calyx ½-¾ in., downy, teeth lanceolate half as long as tube. Corolla 1 in., standard ½ in. wide, silky, dirty-purple externally, yellow within. Pod linear, straight, thinly hoary, 18-20-seeded.

24b. CALOPHACA Fisch.

Perennial diffuse unarmed shrubs or undershrubs. Leaves odd-pinnate. Flowers solitary or umbellate on axillary peduncles. Calyx tubular, lobes almost equal or the 2 upper subconnate. Corolla exserted standard ovate or suborbicular, erect, margins reflexed; wings obovate-oblong, subfalcate, free; keel incurved about as long as the wings. Stamens 2-adelphous; anthers uniform. Ovary sessile, many-ovuled; style filiform, stigma small terminal. Pod linear, at length round or turgid; seeds subreniform. Species about 8; Oriental and North Asiatic.

1. CALOPHACA DEPRESSA Oliv. in Hook. Icon. Plant. t. 2304; leaflets 5-9, subalternate, oblong or obovate-elliptic the terminal obovate-cuneate, mucronulate, silky-pubescent; flowers very small solitary; pod turgid-cylindric mucronulate villous, 5-6-seeded.

Kashmir; Baltistan, 6000 feet, Giles: Indus Valley, 7-8000 feet, Duthie!

A small depressed shrublet, hoary tomentose in all its parts. Leaves ½-1 in. long, short-petioled; leaflets ½ in. or less with distinct petiolules; stipules small, ovate-lanceolate. Flowers on peduncles shorter than the leaves, ¼-½ in. long. Calyx, 3 lower teeth deltoid, 2 upper linear-subulate. Standard twice as long as calyx, shortly clawed, rounded, about as long as obtuse keel; wings shortly oblong-obtuse. Pod about ½ in. long, ½ in. wide.

25. GULDENSTÆDTIA Fisch.

3. GULDENSTÆDTIA MULTIFLORA Bunge.

Add to localities of F. B. I.:—Burma; Shan Hills at Saga, 4000 feet, and Koni, 4500 feet Collett!

28. TAVERNIERA DC.

1. TAVERNIERA NUMMULARIA DC.

Add to localities of F. B. I.:—Central India; Jerdon! Southern Deccan; Cleghorn!

The plant appears to be very rare in the dry parts of the Deccan; it has not as yet been reported from Rajputana, where, however, considering the eastward extension just noted, it probably occurs and where it should be looked for.

31. ONOBRYCHIS GÆRTN.

1. ONOBRYCHIS STEWARTII Bak.; leaflets oblanceolate, subacute; pod reniform, turgid, 1-seeded; perennial.
2. **Onobrychis laxiflora** Bak. in Journ. Linn. Soc. xix. 159; leaflets elliptic-obtuse 4-8-jugate the terminal not exceeding the lateral; pod circinnate flat semi-orbicular, 1-seeded; perennial.


Herbaceous, perennial, stems slender 1½–2 ft., finely puberulous. Leaf-rachis 3-6 in. long, including petiole ½–2 in.; leaflets 9-17, shortly petiolulate, ½–1 in. long, pale-green, obscurely canescent; stipules deltoid-acuminate, persistent. Racemes long-peduncled, lax, elongated, 6–9 in.; buds rather crowded; bracts minute scarious persistent. Calyx campanulate, obscurely pilose, ½ in.; teeth lanceolate as long as tube. Corolla 5 times calyx; standard glabrous, veined. Pod circinate, flat, semi-orbicular, faces areolate with hexagonal deepish pits, their walls sparingly spinescent; margins armed with numerous small teeth.

3. **Onobrychis nummularia** Stocks in Hook. Journ. iv. 146; leaflets ovate-orbicular or obovate-obtuse, mucronate; the terminal much exceeding the sometimes abortive lateral; pod circinate flat, orbicular, 2-seeded; annual. Boiss. Flor. Orient. ii. 545. O. taverniereefolia Stocks ex Boiss. l.c.

**NORTH-WEST FRONTIER**; British Beluchistan, very common. Distr. Throughout Beluchistan and Afghanistan.

An annual dwarf stemless herb, hoary-tomentose. Leaf-rachis, including very long petiole, 4–5 in., leaflets 3 or 5, or very often only the terminal present; terminal ½–1½ in. in diam. the others rarely exceeding ½ in., densely tomentose. Racemes long-peduncled, 6–8 in. long, rather lax, usually slightly exceeding the leaves; pedicels short, bracts rather long, ½ in., subulate. Calyx hirsute externally, including teeth ½ in., teeth subulate from broad bases twice as long as the short wide-campanulate tube. Corolla twice as long as calyx, under ½ in., standard puberulous, veined. Pod orbicular 2-locular, faces areolate with radiating pits, their walls little raised, unarmèd; margins beset with long cottony setae.

Nearly related to the Persian O. Aucheri Boiss., but differing by its 2-seeded pods. The two species recognised by M. Boissier were by Dr. Stocks himself latterly supposed to be only two varieties of one species. The writer finds too many intermediates in Herb. Calcutta to admit of his even separating them as varieties.

32. **Lespedeza Michx.**

**1. Lespedeza sericea** Miq.

Add to localities of F. B. i. :—Mountains of Behar and Cent. INDIA; very common. RAJPUTANA; Mt. Abu, common. UPPER BURMA; common.

A very distinct variety with long petiolate leaves, var. longepetioluta, has recently been collected in Upper Assam (Makum), by Mr. G. Gammie. This variety is common in South-West China.

6b. **Lespedeza sericopHYlla** Coll. & Hemsl. Journ. Linn. Soc. xxvii. 45; petiole distinct, leaves rather large, densely silvery-tomentose on both sides, calyx densely hirsute with long hairs.
**Upper Burma; Shan Hills at Toungyi, 5000 feet elev., Collett!**

A rather large shrub, the flowering branches thickish, angular, adpressed-silky. *Leaves* pinnately 3-foliolate, silvery-sericeous everywhere, shortily petiolulate, rachis and petiole 1–1.5 in. long; leaflets thick, soft, elliptic, terminal 1.25–1.75 in. long, 0.75–1 in. wide, lateral pair rather smaller. *Flowers* 0.5 in. long, in dense racemes, pedicels shorter than calyx, bracts small persistent. *Calyx* 2 in. long, sub-2-labiate, lobes narrow acute, the two upper almost completely connate, everywhere softly hirsute. *Petals* subequal glabrous; standard broad, claw very short; wings ob-long, claw long slender; keel 2-auriculate above the long, slender claw; long-beaked. *Stamens* 2-adelpous. *Ovary* shortly stipitate, bearded along the upper suture, elsewhere glabrous. *Pod* not seen.


**Burma; Nattoung Mts., Revd. Cross! Pegu, Bookee Ridges, 4–6000 feet, Kurz 1637! Tenasserim; Moolyet Range, common, Gallatly!**

A stout erect simple or branching shrub 2–4 feet high; all parts densely tawny-pubescent. *Leaves* 3-foliolate, petiole 6–8 in. hardly produced, densely villous; leaflets very shortly and stoutly petiolulate, 2–3.5 in. long, 1–1.25 in. wide, base cuneate or rounded, tip mucronulate, coriaceous, subrugose under the soft velvety pubescence, prominently nerved and everywhere softly tomentose beneath. *Flowers* 3.5 in. long, in very dense racemes 1.5–3 in. long, 7 in. across, pedicels shorter than the calyx, bracts small persistent. *Calyx* 2 in. long, sub-2-labiate, lobes subulate, everywhere softly hirsute. *Petals* subequal glabrous, standard broad. *Pod* dimidi-ovate, 25 in. long, silky.

A very fine and very distinct species.

**Subgen. II. Microlespedeza Maxim. Keel transverse obtuse, flowers often apetalous, 1–3 fasciculate, axillary. Small annuals.**


**Khasia; common, Mann! Clarke nn. 18604! 40531! 45227! Distribution. China; Corea; Mandschuria; Japan; Saghalien; Bonin.**

An annual herb 3–15 in. high, somewhat branched. *Stipules* striate, adpressed. *Leaflets* shortly petiolulate, rigid, midrib beneath adpressed-strigose, elsewhere glabrous except the ciliate margins, 35 in. long. *Bracteoles* 2, ovate, striate, ciliate, adpressed to calyx-base. *Calyx* narrowly campanulate, striate subangled plicate, 5-fid, teeth almost equalling tube, the two upper narrower and rather shorter than
the lower. Petals when present twice as long as calyx, subequal; standard obovate emarginate; wings linear-oblong; keel obtuse. Pod rounded.

An exceedingly distinct species, ascertained during recent years to be quite common in the Khasia Hills.

Subgen. III. Oxyramphis Wall. (Campylotropis Bunge; Maxim.)


Delete all localities except Nepal; Wallich (Cat. n. 5348)!


N.-W. Himalaya; Kamaon and Garhwal, very common, Govan (Wall. Cat. 5349/Б)! Wallich 5349/A! Royle! Griffith! Thomson! Anderson! King! Gambel! Lace! Hume! Stoliczka!

To Mr. Maximowicz Indian botanists are indebted for having pointed out that the Nepalese plant (L. macrostyloa) is very different from the representative form in Kamaon and Garhwal (L. stenocarpa); the two are easily distinguished by their pods, those of L. stenocarpa being grey-silky, narrowly oblong, and gradually tapering upwards to the base of the style, while those of L. macrostyloa are shortly broadly ovate, abruptly rounded at the apex whence the long style arises, and are tawny-pubescent. The leaves too of L. macrostyloa are only sparsely tomentose beneath, those of L. stenocarpa are densely so.

Mr. Maximowicz refers, in part, to L. stenocarpa another plant that occurs in the North-West Himalaya, of which Falconer n. 443 K. D. is an example. In this, however, he is certainly in error, for Falconer n. 443 includes two plants that cannot be referred either to L. macrostyloa or to L. stenocarpa but which are much more closely related to L. eriocarpa; one of them indeed is that species.

The F. B. I. gives Khasia as a locality of L. macrostyloa in the sense which incorporates the two preceding species. No botanist has, however, hitherto sent either L. macrostyloa or L. stenocarpa to Calcutta from the Khasia Hills.

8. Lespedeza eriocarpa DC.

Var. Falconeri Prain; petiole hardly produced, leaflets smaller ovate-acute, pods (young) more softly tomentose; habit spreading as in "L. paniculata Royle.” L. macrostyloa Maxim. in part, not of Bak.

Garhwal; Falconer n. 443 K. D. (flowering specimens only)! Simla; Elysium Hill, Gamble 4968!

The fruiting portion of the sheet of Falconer’s collection quoted is only L. paniculata Royle, which Mr. Baker very justly has reduced to L. eriocarpa. The plant represented by the flowering specimens will, in all probability, when more fully known have to be recognised as a species apart, L. Falconeri.

**North-West Himalaya:** Black Mountain, 6–9000 feet, *Duthie 7460! Hazara; Dohar, etc., in the Kagan Valley, Duthie’s Collector 19308! 19309! **Distrib.** Siberia, China, Japan.

A copiously branched erect shrub, with slender virgate rounded branchlets, adpressed-puberulous or glabrous. Petioles ‘5–1½ in. long; leaflets ovate-rotund, membranous, obtuse or emarginate, with a slender terminal mucro; green, glabrous, reticulate-venose above, glabrous or sparsely adpressed-puberulous beneath, the stipules slender subulate. **Racemes** axillary many-fld. lax, much exceeding the leaves, bracts and bracteoles minute; pedicels ½ in. *Calyx* ½ in., teeth ovate or lanceolate, obtuse or acute. **Corolla** purple, ‘35 in. long. **Pod** 2½ in. long, rounded-elliptic, mucronate, reticulate.


**Burma:** Shan Hills, 4–5000 feet, *Collett! King’s Collector!*

A handsome shrub, 10 feet high, branchlets slender, striate, puberulous, at length glabrescent, internodes abbreviated. **Leaves** pinnately 3-foliolate, petiole very slender 1 in. long, stipules persistent, narrow-lanceolate, 2½ in. long, leaflets shortly petiolulate, terminal ‘5–1 in. long, rather exceeding lateral, thin submembranous, obovate with rounded apiculate tips and cuneate bases, dark-green glabrous above, paler strigillose beneath; stipules obsolete. **Flowers** purple, ‘5–6 in. long, in dense, axillary *racemes* longer than the leaves with slender peduncles and capillary pedicels exceeding the calyx. **Calyx** glabrescent, lobes 5, ovate-acute. **Petals** glabrous subequal. **Pod** shortly stipitate, ovate-oblong, ‘4–5 in. long, glabrous, reticulate.

A very handsome species, nearest to *L. macrocarpa* Bunge, from China, which has, however, a ciliate pod.


Add to synonyms of *F. B. I.*:—Desmodium angulatum *Wall. Cat.* 5729 in part (letter I only).

This species is very common in the Shan States and in Tenasserim.


Also very common throughout the Shan Plateau.

33. **ALHAGI DESV.**


The *Flora of British India* adopts the view, suggested by Bentham and Hocker, that the various forms of *Alhagi* should be reduced to a single species. After a care-
ful analysis of examples of all the forms hitherto reported, the writer feels unable to accept this extreme view. He cannot, however, quite follow Mr. Boissier, I.c., in keeping A. gracorum Boiss. as a species apart from A. maurorum and would propose the recognition in the genus of only two species, viz.:—

1. *A. maurorum* Tournef. Cor. 54; DC. Prodr. ii. 352; ovaries silky.
2. *A. camelorum* Fisch. l.c.; ovaries quite glabrous.

The name given by Desvaux to the first-named species was *A. mannifera*; he did not anywhere use the name cited in the *Flora of British India*.

All our Indian specimens of *Alhagi* have glabrous ovaries and hence belong to the second species; those from the Panjab, North-West Frontier and North-West Himalaya are indistinguishable from the Persian and Armenian species of *A. camelorum*, while curiously many of those from Rajputana have the broader leaves characteristic of the form from Turkestan and Soongaria which Schrenk proposed to recognise as a species under the name *A. Kirghisorum*.

34. HEDYSARUM LINN.


Specimens of this species grown in the Imperial Garden, St. Petersburg, as well as others collected by Turczaninov and named by Dr. Regel, are indistinguishable from the plant named *H. lanistorum* by Mr. Bentham.

38. SMITHIA AIT.

1. *Smithia sensitiva* Ait.

Add to localities of *F. B. I.*:—Andamans and Nicobars; common, but only in the convict settlements, and evidently a recently introduced weed.

1b. *Smithia flava* Dalz. MSS.; stems not bristly, leaflets small, 16–20; flowers in short simple racemes, calyx-lips equal, corolla yellow; flowers much larger than in *S. sensitiva*. *S. sensitiva* var. flore majore *Herb. Ind. Or. H. f. § T.*

Western India; Concan, Law! Stocks! Canara, in damp rice fields *Talbot* n. 257!

General habit of *S. sensitiva*, but with much stouter sparingly branched stems and very much larger flowers.

This is only accorded specific rank because *S. javanica* Bent., from Java and Sumatra, which has corolla and pods very like those of *S. sensitiva* and mainly differs in having no bristles on the calyx and bracts, is so recognised.

5. *Smithia bigemina* Dalz.

Add to localities of *F. B. I.*:—Scinde; Stocks! Rajputana; on Mt. Abu, very common, King! *Duthie* n. 6627!


Add to localities of *F. B. I.*:—Naga Hills; Kohima, *Clarke* n. 41705! Burma; Pegu, Bookee ridges, *Kurz* n. 1633! Distrib. Formosa (*Henry* n. 1521!)

Add to localities of F. B. I.:—Burma; Arracan, amongst high grass along the sea-shores opposite Akyab, KURZ! Distrib. China.

Dalzell’s name, though proposed for the plant many years before Hance’s, was unfortunately not published till seven years later.

11. SMITHIA GRANDIS Benth.

This species is not confined to Sikkim, it has been collected in Bhutan by Parkes, in Assam by Fisher (where it was also collected 45 years ago by Simons), at the foot of the Akha Hills by one of Dr. King’s collectors, and in the lower Khasia Hills by Mr. G. Mann and Mr. C. B. Clarke. Dr. Griffith’s specimens, it now appears, came also from Assam, not from Sikkim.

12. SMITHIA BLANDA Wall.

Var. 3. humilis Prain; annual, stems slender short, leaflets as in var. racemosa; corymbs rather lax, calyx ¾ in., corolla 2 2/3 in. much larger than in any of the other varieties or than in the type. S. hirsuta Dalz. in Kew. Journ. iii. 135, not of Bak. S. humilis Benth. MSS. in Herb. Ind. Or. II. f. § T.

Western Ghats; at Mahableshwar, Cooke! Canara, Talbot n. 626! Concan; Stocks! Gibson!

40. ORMOCARPUM BEAUVR.

2. ORMOCARPUM GLABRUM TEYSM. & Binningd., Nat. Tijd. Ned. Ind. xxvii. 56; pod 6-7-jointed; joints oblong, thrice as long as broad, plicate smooth.

Andamans; common, probably only as an escape from cultivation.

General habit of O. sennoides, of which it seems to be only a cultivated form; the pods are, however, much longer, sometimes 6 in long, with larger joints which are never muricate. It must not be overlooked that the original description of this form was drawn up from cultivated specimens.

46. URARIA DESV.

* Upper leaves 5-9-foliolate.

2b. URARIA ACUMINATA KURZ, Journ. As. Soc. Beng. xlv. pt. 2, 235, 236; leaflets linear-lanceolate, glaucous-green not clouded, sharply acuminate; pedicels clothed with long bristles; joints of pod opaque and covered with a short sparse pubescence.

Burma; Pegu, Tonkyeghat, Kurz n. 1645! Shan Hills, Makhoye, King’s Collector! Madoe, King’s Collector!

General habit of both U. picta and U. crinita, but abundantly distinct from both in the nature of its foliage, the leaflets beneath having, as Kurz remarks, a very thin and lax net-venation.

In the Index Kewensis, U. acuminata is doubtfully referred to U. picta, a suggestion that would never have been made had specimens been available for comparison. The leaves, except for being narrowly sharply acuminate, have indeed much the
shape of those of *U. picta*, but have a very different venation, and are of somewhat different texture. The pods, however, which Mr. Kurz has described in a rather misleading manner, and the pedicels, are exactly like those of *U. crinita*; if it be necessary to reduce Mr. Kurz’s species to another it must be to *U. crinita* not to *U. picta* that it should be referred. But in the light of the ample material recently received, it seems clear to the writer that either reduction would be unjustifiable.

2c. **Uraria macrostachya** Wall. *Pl. As. Rav*. ii. t. 110; leaflets broadly ovate, subacute, not clouded; pedicels clothed with long soft spreading hairs; joints of pod straw-coloured dimpled shining, perfectly glabrous. *Wall. Cat.* 5675 I.

**Upper Burma**: Hills south of Kyali, *Prazer / Tenasserim*: Endine Ghor, *Gallatly!* *Distrib.* China, whence seeds were sent to Dr. Wallich.

General habit of the three other species of the group. Leaflets 7–8 in. long by 3 in. across, with the thin texture and wide venation of those of *U. acuminata*.

Dr. Wallich, when he first obtained seeds of this plant, supposed it to be a distinct species and had it figured for the *Pl. As. Rav.* as *U. macrostachya*. Subsequently he obtained from Silhet very fine specimens of *U. crinita*, and came to the conclusion (see his note on *Wall. Cat. Lith.* n. 5675 D. and his remarks in the text of *Pl. As. Rav.* ii. 8) that his *U. macrostachya* was the same as *U. crinita*; his Chinese plant (*Cat.* 5675 I.) he therefore subsequently issued as *U. crinita var. macrostachya*. It is worthy of remark that his Calcutta Garden specimens were all gathered without any of them being permitted to set their fruits, and most unfortunately Dr. Wallich has allowed himself to add as the fruit of the plant delineated on t. 110, a figure obviously derived from his Silhet specimens. In August 1835, he again sowed seeds sent him from China by Mr. Deard in January of that year; these flowered and fruited in Nov. 1836, and so for the first time it became possible to see that his reduction of *U. macrostachya* to *U. crinita* was altogether unnecessary. And although in the *Index Kewensis*, Dr. Wallich’s erroneous identification has been followed, it will be noticed that the *Flora of British India* has omitted the *Pl. As. Raviores* citation. As there was then no evidence that *U. macrostachya* was an Indian plant, Mr. Baker does not quote the species at all; its recent discovery both in Upper Burma and in Tenasserim renders it now necessary to supply a diagnosis.

**Leave 1- and 3-foliate intermixed.**

3. **Uraria lagopooides** DC.

This species is very easily recognised owing to its having been founded on the excellent figure by Burnmann—nor is there now any doubt that the *Hedysarum lagopooides* of Linnaeus is the same, excellent Chinese specimens agreeing in every respect with the Indian plant having recently been sent from Hainan by Dr. Henry. Dr. Roxburgh’s coloured drawing at Calcutta and Kew is an excellent representation also.

The species extends from Bengal and Assam throughout Indo-China to South China on the one hand and to the Nicobars (where it was collected by Mr. Kurz) and the Malay Archipelago on the other. In Burma it is remarkably common, and the flowers are there as often white or yellow as they are pink. For the plant, as it occurs in Java, Dr. Otto Kunze has proposed the varietal name "rhomboidea;"
there are some rhomboid leaflets on nearly every plant. This is Dr. Wallich's Uraria retusa in its entirety; Mr. Baker says that it forms part of Dr. Wallich's U. hamosa also, which may well be the case, for evidently Dr. Wallich misunderstood those Indian species, as elaborated by Dr. Roxburgh, of Hedysarum (or Doodia, as Roxburgh afterwards called them), that constitute the genus Uraria. The writer has not, however, seen an instance of this particular confusion among the Wallichian specimens.

To this species the most nearly related Uraria is U. alopecuroides Wight, (Doodia alopecuroides Roxb.), which differs in having a stouter habit, rather larger racemes with broader more shortly tailed bracts, and larger differently shaped clouded leaves. Wight and Arnott (Prod. 222) have suggested that U. alopecuroides may be the same as U. lagopoides Wall., which is impossible, because U. lagopoides Wall. is certainly U. lagopus DC.; in this Wight and Arnott have been followed by the F. B. I.

4. Uraria lagopus DC.

This species has been confused with the preceding by Dr. Wallich who issued it as U. lagopoides Wall. Cat. n. 5676 E. from Nepal and n. 5676 F. from Silhet, and still more hopelessly with the next two species by practically every Indian author who has dealt with the genus. The confusion is, as it chances, devoid of excuse since this is the most easily characterised species of its own group, owing to its having hirsute pods, those of U. lagopoides, U. alopecuroides and U. neglecta being quite glabrous.

From the synonyms given in the Flora of British India must be excluded U. alopecuroides Wight, (Ic. t. 290) regarding which no mistake is possible because it is a copy of Roxburgh's manuscript drawing; also Doodia alopecuroides Roxb. (Fl. Ind. iii. 368) which is the description of the plant there delineated, and Hedysarum alopecuroides Roxb. (Hort. Beng. 57), the earliest reference to the plant in question. The F. B. I. has referred here also a part of Uraria hamosa Wall., since it has identified Wall. Cat. n. 5081 C. with U. lagopus. This is not, however, possible; Wall. Cat. 5681 C. has glabrous pods with 3-6 segments, the segments being much smaller than those of U. lagopus.

The F. B. I. locates the species in Burma; no specimens from Burma have ever been received at Calcutta. Specimens have, however, been sent from the Chumbi Valley, the plant consequently occurs at a considerably higher level than the F. B. I. indicates.


This is Dr. Roxburgh's Doodia alopecuroides. Just as Dr. Wallich failed to recognise Roxburgh's D. lagopodioides, to which he gave the name U. retusa, so he failed to recognise D. alopecuroides and issued it as U. repanda. The plant is perhaps not specifically distinct from U. lagopoides; it certainly can never be referred to U. lagopus, for though it has the erect habit of the latter instead of the trailing habit of U. lagopoides, its bracts differ but slightly and its calyx, corolla, and pods do not differ at all from those of U. lagopoides.

The localities of the species are:—

Dehra Dun; Vicary! Behar; Kurz! Anderson! Wood! Clarke! Khasia Hills; G. Mann! Burma; Wallich! King's Collector! It probably came originally from Dehra Dun to Dr. Roxburgh; it was one of the species of which he received seeds from Genl. Hardwicke—these, as we know now, came mostly from the Sub-Himalaya tract. This species has not been collected in the Himalaya.
D. Prain—Some additional Leguminosë. [No. 2,

Wallich's name has been deliberately abandoned, partly because by so doing it is possible to conserve the oldest trivial epithet, under which Dr. Roxburgh characterised the plant more accurately than any subsequent author has been able to, but mainly because it is only by so doing that one can emphasise the need there is for a thorough change in our conception of the species of Uraria.


KAMON; Blinkworth! Vicary! King! Duthie! Gamble! Kangra, Stolicka! Darmsala, Clarke! Duars; Heawood! Assam; Masters! Bengal; Kurz! Clarke! Mishmi; Griffith!

Branches woody slender shorty pubescent. Leaves as in U. hamosa. Racemes exactly as in U. lagopus but with bracts quite as in U. hamosa; pedicels 2-3 times the calyx, densely crinate. Calyx ½-¾ in. Corolla purple, little exserted. Joints 2-6, pale to lead-coloured polished.

This is in reality one of the best characterised species in this troublesome genus. Its characters, as the above description shows, make it intermediate between U. lagopus of which it has the inflorescence, and U. hamosa of which it has the bracts and foliage. It agrees, as a matter of fact, in many more points with U. hamosa, with which Dr. Wallich wished to associate it, than with U. lagopus to which it has been referred by subsequent botanists. The pods are more like those of U. hamosa than those of U. lagopus, but they are glabrous, whereas in both these species the pods are hisrute. Dr. Royle has figured the plant as U. lagopoides, and in the text has referred it, equally erroneously, to U. lagopus; the E. B. I. account of the genus omits all reference to Royle's names or plate.

6. Uraria hamosa Wall.

This is Doodia hamosa Roxb. As in the case of D. lagopodioides which, not recognising it, Wallich issued as U. retusa and D. alopecuroideae which, not recognising it, he issued as U. repanda, so, not recognising D. hamosa, Wallich issued it as U. leptostachya. And just as Wallich mistook U. lagopus for U. lagopoides, so he mistook the species just described as U. neglecta for U. hamosa. By a happy accident, however, he did not always recognise his own U. leptostachya, and as he has chanced to issue one gathering of it (his Cat. n. 5681 B.) along with the plant that he supposed to be U. hamosa, Dr. Wight and after him Mr. Baker, have been able to employ this name and thus to conserve Roxburgh's trivial epithet for the species.

Wight and Arnott in their Prodr. 222 have not made any observation on the Wallichian confusion, the detection and elucidation of which we owe to Mr. Baker.

To the synonyms of U. hamosa should be added Doodia simplicifolia Roxb. from Chittagong which is a state of this species with leaves simple and acute at the apex, as they often are, instead of obtuse; also Uraria lagopus var. polysperma O. Kuntze, a reduction that it would have been impossible to suggest, so different is this plant from U. lagopus, were not authentic specimens of Kuntze's n. 6520, so named, before the writer.
6b. Uraria paniculata Clarke, Journ. Linn. Soc. xxv. 15, t. 4; stems erect, leaflets large narrow-ovate, acute, mucronate; racemes laxly paniculate, lower calyx-teeth not elongated.

NAGA HILLS; Kohima, 3000 feet, Clarke n. 40924!

Stems 3-6 feet high, small twigs and racemes covered with long spreading hairs brown below and with white tips, scattered in a close brown short tomentum; petioles 2 in. long densely-brown tomentose, leaflets 4-6 in. long, 2½-3 in. across, green and very sparsely hairy above, paler beneath more closely covered with brown hairs on midrib and veins, white over the interspaces. Racemes a foot long, nearly as wide, much branched laterally; bracts ovate-acute, externally brown-tomentose. Calyx ½ in., much as in U. hamosa. Corolla 2-3 times the calyx, rose-purple. Joints 5-6, black, pod completely exserted, with a few hairs on the sutures, otherwise glabrous, reticulated.

This is an extremely distinct species, nearest perhaps, as Mr. Clarke says, to U. hamosa but differing in the points that he notes. Its most striking peculiarity, which it shares with the next two species, is that its pods are far exserted.

6c. Uraria gracilis Prain; stems erect, leaflets small ovate-oblong, racemes laxly paniculate, lower calyx-teeth not elongated.

BURMA; Sagaing, Dr. King's Collectors!

Branches woody, very slender, shortly pubescent. Leaves very like those of U. hamosa, terminal leaflet ½ in. long, ½ in. wide, base truncate, apice retuse mucronate. Racemes axillary and terminal, all laxly paniculate; bracts very small ovate-acute, externally sparsely puberulous as is the calyx. Calyx ½ in., as in U. hamosa. Corolla 2-3 times the calyx, purple. Joints 4-6, black, puberulous, pod quite exserted as in U. paniculata.

Very like U. hamosa, but more slender than that species usually is and with very different, much smaller, not cuspidate bracts, also with different pods. In its lax inflorescence it resembles U. paniculata; this it likewise does in having exserted pods, but it is a much smaller plant with different tomentum and very different leaves and bracts.

* * * Leaves usually all 1-foliolate.

7b. Uraria latifolia Prain; stems erect, leaflets orbicular cordate at base, apex subacute or acute, racemes simple close cylindric.

BURMA; Fort Stedman, King's Collectors!

Branches stout woody, densely clothed with short spreading hairs. Leaves 5 in. in diam. shortly hairy on the raised veins below, secondary nervation very prominent; petiole 1½-2 in. Racemes terminal only, dense, 4-8 in. long; bracts narrow ovato-acuminate; pedicels ½-3 in., abruptly recurved at tip after flowering. Corolla white, exserted. Joints of pod 2-3, black, pubescent with short straight hairs.

The leaves of this species much resemble those of U. cordifolia for which at first sight it might be mistaken, especially as the flowers are white as in that species. But the inflorescence and bracts are totally different as are the pods which are more like those of U. crinita and U. acuminata.

7c. Uraria Colletii Prain; stems erect, leaflets orbicular cordate at base, apex subacute or acute, racemes copiously panicled.
BURMA; Pinmona, in forest, Collett! King’s Collector!


This combines the leaves of the preceding with the panicles and bracts of Lourea campanulata; like U. latifolia it is very nearly related to U. cordifolia, all three having very similar flowers. In U. cordifolia, however, the bracts are very different being narrowly lanceolate, and the inflorescence though paniculate is subdigitately so as in U. hamosa not laxly so as in Lourea campanulata and Urario Colletii.

47. ALYSICARPUS Neck.

2. ALYSICARPUS HAMOSUS Edgew.

Add to synonyms:—Hedysarum procumbens Roxb. Hort. Beng. 56; Flor. Ind. iii. 345.

The identity of this species with Roxburgh’s H. procumbens has been overlooked in the F. R. I.; in the Index Kewensis Roxburgh’s species is given as a synonym of Desmodium retroflexum which it does not much resemble.

6. ALYSICARPUS RUGOSUS DC.

At first sight it seems hard to possible to think that Alysicarpus rugosus and its var. styracifolius Bak. can be conspecific, but a very careful examination of the large suites of specimens at Calcutta shows that Mr. Baker’s treatment of this species is amply justified. It is however necessary in the writer’s opinion to recognise two other well-marked varieties besides those defined by Mr. Baker. These are:

Var. 4. minor; dwarf, diffuse, stems and leaves below glabrous, leaflets small oblong, ovate, or orbicular, obtuse or subacute, racemes short dense, bracts and calyx glabrous.

N. W. Himalaya; Griffith! Panjab; Pathankote, Clarke n. 22006! Rajputana; Abu, King! Kattiarwar; Rajkote, McNaghten! Western India; Gibson! Bengal; Lohardugga, Clarke n. 33937! Seebapore, Kurz! Assam; Nowgong, Simons! Burma; Shan States, King’s Collector!

This variety combines the habit of var. styracifolius with the glabrous leaves and stems, and the inflorescence of the true A. rugosus. It has been identified with var. Heyneanus by Mr. Kurz, but it has not the hirsute leaves and stems, nor has it the elongated racemes of that form; it has been referred to var. styracifolius by Mr. Clarke in which it is equally difficult to place it. It does not occur among Dr. Wallich’s specimens at Calcutta.

Var. 5. pilifer; ascending, stems and leaves below finely pubescent, leaflets lanceolate, racemes short dense, calyx conspicuously ciliatus. A. pilifer Wall. Cat. 5675. A. scariosus Herb. Ind. Or. H. f. 3 T. viz Grah.

S. India; Wall. Cat. 5675! G. Thomson! Burma; Shan Hills, King’s Collector!

This combines the habit of true A. rugosus with the inflorescence, etc., of var. styracifolius, and the recent communication of a large suite of specimens from
Burma with all the characters of the South Indian plant originally differentiated by Dr. Wallich, makes it more satisfactory to give the form varietal rank because its inclusion in var. styracifolius somewhat mars the symmetry of an otherwise very well characterised form; the establishment of this variety obviously involves the deletion of the synonym A. pilifer under Mr. Baker's var. styracifolius. It should be added moreover that Dr. King's Collectors note the corollas as yellow in this variety, all the others are noted as having them purple.

* * * Desmodiastrium. Calyx much longer than the first joint of the pod, its teeth not imbricated in the fruiting stage. Pods as in Desmodium.

9. Alysicarpus belgaumensis Wight.

10. Alysicarpus racemosus Benth.

This is reduced, in the F. B. I., to A. belgaumensis. It is, however, impossible to confound the two plants, their pods being remarkably different and no intermediates occurring; and there is hardly a doubt that Mr. Bentham was justified in giving the present one specific rank. There is, however, very considerable difficulty in separating this species from the two plants named by Dalzell Alysicarpus parviflorus and A. rotundifolius, both of which the F. B. I. has transferred to Desmodium. That these two are congeneric with Alysicarpus racemosus admits of no doubt; the question whether, with Mr. Baker, we are to treat A. parviflorus and A. rotundifolius as Desmodia or, with Mr. Dalzell, to treat them as Alysicarii is one that may be answered with much reason either way. But wherever these two are placed, A. belgaumensis and A. racemosus must accompany them. Compromises in taxonomy are necessary, indeed the systematic arrangement of species is essentially the art of happy compromise. But an arrangement which places one half of a natural group of forms in one genus, the other half in a second, strains unduly the privileges that the art of compromise allows.


Only distinguished from A. racemosus by its further-exserted pods and its rather longer pedicels; its leaves are occasionally 3-foliolate as in A. belgaumensis, the leaflets being oblong or lanceolate as in that species.


Fruits exactly as in A. parviflorus, from which it is distinguished by its rather larger, slightly exserted corollas and its obovate-oblong to orbicular leaves which are hardly distinguishable from those of A. racemosus. The writer's reason for proposing a new subgenus for this natural group is that the calyx-teeth in none of them become imbricated; hence all of them violate the limits of the section Macrocalycina as defined in the F. B. I., which includes two of them therein. His reason moreover for retaining the group in Alysicarpus rather than for transferring all four species to Desmodium, of which all have the pods, is that it seems better to locate the group in a small manageable genus like Alysicarpus, than to transfer them to one, like Desmodium, already of unwieldy bulk. As a matter of fact the group stands intermediate between these two genera, and indicates that probably they are not naturally separable.
The characters finally separating the two genera are, according to the Key in the *Flora of British India*, joints "turgid" in *Alysicarpus*, "flattened" in *Desmodium*. Yet the joints of the pods of *Desmodium umbellatum* without being broader are thrice the thickness of those in *Alysicarpus belgaumensis*. In the definitions of the two genera the only tangible distinctions are corolla "included" in *Alysicarpus*, "exserted" in *Desmodium*; after having described the corolla as exserted for the genus as a whole, it becomes necessary for the *F. B. I.* to indicate that one of the distinctive characters of *Desmodium parviflorum* is that the corolla is included. It seems therefore better to adopt an arrangement which excludes from *Desmodium* a species that, by its admission, violates the solitary distinctive generic character.

47b. NEOCOLLETTIA Hemsl.

A slender trailing herb rooting at the nodes. *Leaves* pinnately 3-foliolate; stipules rigid striate persistent. *Flowers* small axillary solitary or 2-3 together on a rather long slender peduncle, 2-bracteolate near the calyx; the peduncle bearing a large stipitate saddle-shaped bract enveloping the calyx. *Calyx* tubular 15-nerved subequally 5-lobed, lobes short rounded. *Standard* suborbicular without appendages; wings free, keel straight quite obtuse. *Stamens* diadelphous; anthers uniform. *Ovary* sessile, 1-ovulate; style inflexed. A single species.


Burma; Prome, Wallich 5974! Posoboio, in the plains, Collett n. 26!

Apparently perennial; stems creeping elongated very slender slightly strigose. *Leaves* trifoliolate, petiole slender 1-2 in. long; leaflets petiolulate, middle petiolule longest; membranous pale-green obcordate, ½ in. long, glabrous above, sparsely strigose beneath, stipules small; stipels minute subulate. *Flowers* under ½ in., peduncles rather shorter than the flowers, strigose as are the bracts and bracteoles beneath, and the calyx externally. *Petals* long-clawed, standard retuse, wings oblong, spurred and also toothed on lower margin; ovary glabrous.

An interesting genus more resembling a *Phaseolid* than a *Hedysarioid*, but with floral structure most closely approaching that of the next genus. The single species bears a considerable superficial resemblance to *Desmodium Rottleri* Bak. (*Eleiotis Rottleri* W. & A.), for which it may casually be mistaken. Ripe fruit is unknown, and it is to be hoped that members who may meet with the plant in Burma will kindly communicate complete specimens.

47c. PHYLACIUM Benn.

Climbing herbs. *Leaves* 3-foliolate; stipules persistent small linear or lanceolate, leaflets stipellate. *Flowers* in axillary racemes, shortly pedicelled, 2-bracteolate near the calyx, completely enveloped, as ultimately is the legume, in a large boat-shaped membranous much accres-

1. **Phylacium majus** Coll. & Hemsl., *Journ. Linn. Soc.* xxviii. 44. t. 7; young parts rather densely adpressed-hirsute; leaves densely hairy beneath; axillary racemes longer than leaves, sometimes paniculately branched; upper lip of *calyx* subentire deltoid-rotund, lower 3-lobed, lobes subequal ovate-rotund acute imbricated; pod turgid densely stipose not reticulated, both sutures convex.

**Burma;** Shan Hills, near Fort Stedman, Collett! Lwekaw and Makhoye, King's Collectors!

A slender climber; *leaves* pinnately 3-foliolate long-petioled, leaflets ovate-oblong, base rounded, apex tapering to an obtuse point, margin entire, rather thickly herbaceous, glabrous and green above, grey and densely adpressed-puberulous beneath, 3-4 in. long, 1½ in. wide, stipules and stipels linear, persistent, puberalous; petioles puberulous 2 in. long. *Racemes* 5-6 in. long, occasionally branching, fasciculate; flowers numerous. *Bracts* 1-1½ in. long, glabrous externally, hirsute within, at length scarious. *Calyx* ½ in., externally hirsute. *Corolla* glabrous, ⅔ in. long. *Pod* ¼ in.


**Perak;** near Gunong Pondo, 200-300 feet above sea level, in open jungle, *Kunstler* n. 8367! *Distrib. From Sumatra (Forbes n. 1436! n. 2646!) and Java to the Philippines.

A slender climber; *leaves* pinnately 3-foliolate, long-petioled, leaflets ovate-oblong, base rounded, apex obtuse, margin entire, thinly herbaceous, green on both surfaces, glabrous above, sparingly hirsute beneath, 2-3 in. long, 1½ in. wide, stipules and stipels linear, persistent, sparsely hirsute, petioles glabrescent, 1½ in. long. *Racemes* 2-10 together, about 1½-2 in. long, fasciculate, flowers few. *Bracts* 1-1½ in. long, glabrous externally, sparingly hirsute within, pale-green. *Calyx* ½ in., externally sparsely hirsute. *Corolla* white with pink tinge, glabrous, ⅔ in. long. *Pod* ¼ in.

50. **Desmodium** Desv.

1. **Desmodium umbellatum** DC.

This is a purely littoral species that extends, as so many of the class do, from W. Polynesia to the Mascarene Islands. It is scarcely truly Indian, being only report-

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ed from Ceylon and the Sundribans to the west of the Sea of Bengal. It is, however, extremely plentiful, to the east of that sea, on the shores of Southern Burma, of the Andaman and Nicobar Islands, and of the Malay Peninsula and Archipelago. All inland localities cited in botanical works for this species are erroneous.

VAR. hirsuturn DC. Prodr. ii. 325, not mentioned in the F. B. I. account of the species, looks very distinct on account of its more villous branches and petioles and its persistently pubescent pods, but is not perhaps a very valid variety. Strangely it is only known from plants grown in the Calcutta garden and in the garden at Buitenzorg, where (as the Collector's ticket notes) it was an introduction from Calcutta; Wall. Cat. n. 5687 D, Hort. Bogan. n. 2037 are good examples of the form. This 'variety' has been by Dr. Wallich and others confounded with the very different Wall. Cat. n. 5687 B., which at first apparently Dr. Wallich did consider separable, and which is a very distinct species.

1b. Desmodium Wallichii Prain; branches slightly angled, leaflets obtuse mucronulate, mesial rhomboid almost as long as broad, joints of pod large as long as broad, persistently hirsute. D. umbellatum Wall. Cat. 5687 B; Coll. § Hemsl., Journ. Linn. Soc. xxviii. 42, not of DC.

Upper Burua; Segain, Lime Hills, Wallich! Meiktia, Collett!

A shrub with densely fulvous young branches. Petioles ½-1 in., leaflets subcoriaceous, glabrous above, rather densely fulvous-tomentose beneath, the veins and veinlets very distinctly raised, end-leaflet 2½ in. in diam. Flowers subumbellate, the peduncle prolonged beyond the basal whorl. Calyx ½ in., silky, teeth longer than tube. Corolla ¾ in. Pod 1-1½ in., joints 3-4, strigose.

Dr. Wallich at first gave to this the MSS. name Desmodium rhomboideum. The name unfortunately cannot be used as there is a nomen nudum, D. rhomboideum Sweet, Hort. Brit. ed. ii. 151, which cannot refer to this plant. Sweet's name is one of those purely catalogue publications that give so much trouble to botanists. It was employed by its author to indicate Hedysarum rhombifolium Roxb. (not of Elloitt) a plant that was raised in the Calcutta garden from seed sent to Dr. Roxburgh from Upper India in 1811 by Genl. Hardwicke. Roxburgh allowed it to drop out of his lists for the subsequent Flora Indica, (he issued the name in the Hortus Bengalenensis) and he makes no reference to it in the manuscript copy of his description of Indian plants preserved at Calcutta. Dr. Wallich's annotated copy of the Hortus Bengalenensis shows that he did not know the plant, and Voigt's reference to it in the Hortus Suburbanus where (not knowing that Sweet had already taken the trouble to change its name) he calls it D. Harwickianum, is copied from Roxburgh's original reference. All the evidence now available points to its being the plant at present known as D. podocarpum.

1c. Desmodium rugosum Prain, Journ. As. Soc. Beng. lxxvi. 2. 137; branches terete, leaflets acute, mesial nearly twice as long as broad, joints of pod large, ½ times as long as broad, persistently hirsute.

Tenasserim; Lathorga, 2000 feet, common, Gallatly! Kedah; Langkawi, Curtis n. 2550!

A gregarious straggling shrub with glabrescent lenticelled branches. Petioles 1-1½ in., leaflets coriaceous, glabrous above, hirsute only on the very prominent veins and veinlets beneath, end-leaflet 6-7 in. long by 3 in. across, ovate-acute tapering in both directions from the middle, the base narrowly truncate. Flowers umbellate,
peduncles short. Calyx ⅓ in., teeth twice as long as tube. Pods ⅓-1 in., 2-4-jointed; strigose.

A very distinct species, resembling *D. umbellatum* in its inflorescence and *D. Wallichii* in the reticulated under-surface of its leaves, but differing extremely from both in the shape of its leaflets. Like *D. Wallichii* this is an inland species.

2. *Desmodium Cephalotes* Wall.


Sub-Himalyan tract from Dehra Dun (King! Duthie!) eastward. Very common throughout Indo-China, extremely rare in India proper.

**Var. congestum**; pod glabrescent, leaves and branches glabrous or only slightly silky. *D. congestum* Wall. Cat. 5723; W. § A. Prodr. 224. Hedysarum umbellatum Roxb. Flor. Ind. iii. 360 (not of Linn.)

Very common from Canara and the Concan southwards, also in Ceylon. Mishmi; Griffith! Upper Burma; Anderson! Pegu; Wallich! Kurz! Tenasserim; Parish! Chittagong; Hooker! Clarke!

The two varieties are very distinct; there is however little doubt that Mr. Baker is right in refusing to follow Drs. Roxburgh, Wallich and Wight in treating them as specifically separable. The typical *D. Cephalotes* is as rare in India as the variety "congestum" is in Indo-China.

2b. *Desmodium olivaceum* Prain; branches triquetrous, leaflets acuminate twice as long as broad, joints of pods small, broader than long.

**Upper Burma**; Chindwin Hills, Prazer! Maymyo, King’s Collector!

Shan Hills, King’s Collectors!

A shrub or small tree, with sharply triangular branches, densely clothed, especially along the angles, with long patent greenish-yellow hairs; petioles 1-1½ in., deeply channelled, densely villous, leaflets glabrous except midrib above, densely uniformly velvety beneath, end-leaflet 8 in. long, ¾ in. across. Flowers in dense globose heads, on short, angled, villous pedicles; calyx ⅓ in., teeth ⅔ as long as tube; corolla white, ⅔ in. Pod ⅔ in. long, sparsely strigose, joints 2 only, each broader than long.

Near to *D. Cephalotes* but larger in all its parts and with different tomentum and a very different pod.


Apparetly a rare species; the specimens originally described by Kurz were not collected by him but by Dr. J. Anderson, F.R.S., at Tagoung. The specimens previously collected by Dr. Griffith, which the F. B. I. suggests may have come from Tenasserim, came from Upper Burma; they were collected during the journey made by Griffith from Upper Assam through the Hukung Valley to Ava. The only recent collection of this species is from Mingyin, where it was obtained by Prazer.

7. *Desmodium laburnifolium* DC.

Add to localities of *F. B. I.*:—Upper Burma; Maymyo, King’s Collector!
8. Desmodium triquetrum DC.

To this species the F. B. I. has reduced Desmodium auriculatum DC., Desmodium pseudo-triquetrum DC., and Desmodium alatum DC. The three plants so named by M. De Candolle are, however, extremely distinct from Desmodium triquetrum and from each other, and as no intermediates occur even in places where two or more of the forms have been found growing side by side, it is highly probable that they should all be recognised as specifically distinct. It may, however, suffice if, for the present, they are dealt with as only subspecies of one somewhat variable "species."


Central, Western and Southern India and Ceylon. Assam, Khasia, Chittagong, Burma, Tenasserim, Perak. Distrib. Java, Tonkin, China (Hong-Kong only, and perhaps introduced).

This is common in both the Eastern and Western Peninsulas; it is somewhat remarkable that it has never been found in the sub-Himalayan tract where Desmodium pseudo-triquetrum is so common.

At Shaila in the Khasia Hills Mr. C. B. Clarke has found this (Clarke n. 14883) and Desmodium alatum (Clarke n. 14469) growing side by side; in the Island of Pak-tau, Tenasserim, Mr. Proudlock has similarly found this and Desmodium auriculatum growing together; in neither case were any intermediates collected.

Subsp. auriculatum; erect; pods firmly cartilaginous, glabrous throughout. Desmodium auriculatum DC. Prodr. ii. 326.

Silhet, Clarke! Coasts of Tenasserim and Andamans, plentiful. Distrib. Malay Archipelago, Mascarene Islands.

This appears to be almost purely a seashore species though it has been found on two occasions in Silhet, both times by Mr. Clarke. On the specimens from Mauritius in Herb. Calcutta, Bouton has suggested that it is an introduction from India. More probably, however, it is a member of the littoral flora of the Malay region which extends as far as, and includes the coast species of, the Mascarene group. The plant was originally described from Timor specimens.

Subsp. alatum; erect; pods thinly membranous, very broad, glabrous throughout. Desmodium alatum DC. Prodr. ii. 326 (not Hedysarum alatum Roxb.)

Assam; Khasia; Cachar; Chittagong.

This is the most palpably distinct of all the four forms included under Desmodium triquetrum. It is apparently confined to the area indicated, and has never been found in India, proper. De Candolle's description is unmistakable; he has, however, very unfortunately cited both the locality and the synonym given by Roxburgh for the genuine Desmodium triquetrum. Roxburgh expressly states that the pod of his Hedysarum alatum is "hairy:" this alone is sufficient to show that the "alatum" of Roxburgh and the "alatum" of De Candolle cannot possibly be the same plant.

Subsp. pseudo-triquetrum; diffuse; pods thin glabrous except along the sutures each of which has a line of adpressed hairs. Desmodium pseudo-triquetrum DC. Prodr. ii. 326. Hedysarum triquetrum Roxb. Hort. Beng. 56 and Flor. Ind. iii. 347 not of Linn.

Along the foot of the Himalaya from Dehra Dun, the Nepal and Sikkim Terai to the Duars; plains of Bengal, and valley of Assam, common. Khasia Hills, Clarke! Naga Hills, Prain! Watt!
Roxburgh has left no figure of his *Hedysarum alatum*, but his description fits *D. triquetrum* and *D. triquetrum* only. The account of his own *Hedysarum triquetrum* is incomplete because it does not fully describe the pods. Its prostrate habit, however, should almost have sufficed to indicate that this is the plant intended, and Roxburgh has fortunately left a drawing which proves that his *Hedysarum triquetrum* is not that of Linnaeus but is the *Desmodium pseudo-triquetrum* of De Candolle. Wight and Arnott (*Prodromus* 225) clearly never saw *D. alatum* DC., the plant which they supposed to be that species is *D. auriculatum*.

9. *Desmodium ormoarpoides* DC.


Add to localities:—Assam; Gauhati, G. Mann! Nichuguard, Clarke!

Mr. Clarke has indentified his plant with *D. teres* Wall, which mainly differs from *D. ormoarpoides* in having a very short petiole and is perhaps not specifically distinct; even in that case, however, *D. ormoarpoides* is the older name.


S. *Andamam*; Goplakabang, Hōbdapurb, etc., King! King’s Collectors! Pahang; Kwala Tembeling, Ridley n. 2605! Selangor; Ridley 7295!

10. *Desmodium teres* Wall.

This is evidently very rare or at least very local in Upper Burma. Mr. Prazer has sent to Calcutta a solitary specimen from Mingyin, the only one received since Dr. Wallich first found the plant.


Amend localities:—North-West Himalaya; very common from Kashmir, Clarke, to Kamaon, Blinkworth, etc.

The locality given by Roxburgh for Genl. Hardwicke’s plant is “Cawnpore;” this probably only means that it was from Cawnpore that Hardwicke despatched the seeds to Roxburgh. It is usual to suppose that the plants which were introduced to the Calcutta garden through the kindness of Genl. Hardwicke, came from the plains of Upper India; the writer has already had occasion to point out that, in the majority of instances, Genl. Hardwicke’s contributions that proved unfamiliar to Dr. Roxburgh have been found eventually to have come from Dehra Dun, the Garhwal Babur and the lower slopes of the North-West Himalaya.

Dr. Wallich sent this plant to Geneva among the specimens from Nepal that were described by M. De Candolle in the volumes of the *Prodromus* published before 1828, the year in which the dispersal of the Hon’ble East India Company’s
Herbarium was begun. Hence it happens that M. De Candolle gives Nepal as its locality in the Prodromus. As a matter of fact, however, Dr. Wallich did not collect this species in Nepal at all; his specimens came from Kamaon where they were collected by Mr. Blinkworth. The species is represented in the Wallichian herbarium by n. 5711 A. And a specimen of the North-West Himalayan species of which Wall, Cat. 5711 A, is an example has been kindly compared by M. Casimir De Candolle and Mr. Buser with the type of D. podocarpum in the Prodromus Herbarium; the result has been to show that the two are the same plant. Dr. Scully and Mr. Maries, the only other collectors who have sent plants from Nepal since Dr. Wallich's visit to that country, have equally failed to find D. podocarpum there.

Dr. Wallich's Cat. n. 5711 B. did come from Nepal. Unfortunately, however, under this letter was issued a mixture of two plants, neither of which is D. podocarpum. One of them is D. laxum DC. which was at a later date redescribed by Mr. Bentham as D. Gardneri. In the Flora of British India a compromise is adopted as regards D. laxum; the Himalayan examples of the plant are treated as belonging to D. podocarpum, though Mr. Baker deviates from Dr. Wallich's treatment to the extent of making them varietally distinct; the South Indian examples are, however, kept apart under Bentham's name D. Gardneri. In the Flora of British India Kamaon is given as a locality for D. laxum though no one has hitherto sent it from that region; Assam as a locality is omitted, though one of the specimens quoted (Wall. Cat. n. 5720) came from that province. And it will be observed that although, as a Nepal plant, Wallich merged it in D. podocarpum, as an Assam one be issued it as a distinct species, D. trinerve.

The other plant mixed with D. podocarpum by Wallich under n. 5711 B. is D. oxyphyllum DC., regarding the identity of which a wide-spread misunderstanding has arisen; the thanks of Indian botanists are due to M. Casimir De Candolle who, with Mr. Buser, has compared specimens of the plant with the type sheets in the Prodromus Herbarium, and has been so kind as to present to Herb. Calcutta, from his own herbarium, one of the actual Nepalese specimens that were originally sent to Geneva by Dr. Wallich and that formed the basis of D. oxyphyllum. He has thus finally removed any doubt that might exist as to the identity of the species.

Add to localities of F. B. I. :—Nepal; Wallich! Sikkim; from the Terai (Clarke 36801! Kurz!) up to 2000 feet elev., (King! Clarke 13195!) Eastern Duars, Heawood! Assam Valley at Goalpara, Hamilton! Gauhati, Simons! Sibsagar, Masters! Malay Peninsula; Perak, Wray n. 1608!

This species does not vary in any of its localities and is always very easily distinguished by its acuminate leaflets, boldly 3-nerved at the base, and by the very long stalks to its pods.

M. Casimir De Candolle and M. Buser have also kindly examined specimens of veritable D. Gardneri and find that D. Gardneri is true D. laxum DC.

14b. Desmodium oxyphyllum DC. Prodr. ii. 336; corolla small, bracts linear, minute, stalk of pod twice as long as calyx, pedicels short,

Himalaya; Sirmur; Vicary! Nepal; Wallich! Sikkim; Hooker! Gammie! Assam; Khasia, Hooker! Clarke! Mann! Naga Hills, Prain! Distrib. China, Japan.

Stems 2-3 feet, herbaceous, terete, branches angular glabrous. Stipules small. Corolla and pod as in D. podocarpum.

It may be admitted that this is the eastern representative of D. podocarpum but that it should be reduced, even as a distinct variety, to D. podocarpum the writer cannot believe. The foliage is totally different and there are no intermediates.

The confusion that has grown up round this and the two preceding species illustrates well the danger of placing too great a reliance on the numbered sheets of the Wallichian Herbarium. That these show a larger number of erroneous identifications than other issued collections is not implied; on the contrary, the Herbarium was carefully distributed by one of the most accurate botanists then living, with the assistance in particular families of some of the most eminent European systematists of their time. In spite of this errors were bound to creep in and the trouble caused by these errors in the families that had already been dealt with by Mr. De Candolle in those volumes of the Prodromus published before Dr. Wallich's Herbarium was issued, is so great that the writer would warn all botanists, who wish their results to be accurate, to place no confidence in the Wallichian name for a species of any of these families until he has confirmed it by comparison with the specimen so named in the Prodromus Herbarium. For Dr. Wallich put no number on any of the sheets that he sent originally to Mr. De Candolle and many of the identifications with species which Mr. De Candolle had described were manifestly made subsequently by Dr. Wallich without referring either to Mr. De Candolle's descriptions or specimens. The same remarks apply to the specimens sent by Wallich to Lambert and used by D. Don in the preparation of his Prodr. Flor. Nepal. Here, also, the difficulty is greater, since the keepers of the national Collections unfortunately failed to secure the Wallichian bundles in the Herb. Lambert, when Mr. Lambert's collection was dispersed.

In an angry pamphlet Dr. Griffith complained, when he came to act as Dr. Wallich's substitute, that the Calcutta Herbarium had been depleted by the distribution of the H. E. I. C. Herbarium. This was true; still on the whole Indian botanists may be said not to have grudged the rather wholesale dispersal, seeing that what was their loss was the gain of the great European Herbaria. It was besides always possible to begin afresh, and there has been brought together at Calcutta, since his time, a collection such as probably Dr. Wallich never dreamed of. But what has been in the highest degree detrimental to Indian systematic botany has been the peculiar way in which Wallichian specimens, no matter how fragmentary, have been converted into fetishes; and in which Wallichian names, in cases like the present, have been made to override names that, accompanied by intelligible descriptions, are to be found attached to the same plants in the Prodromus Herbarium. Indian botanists have never grudged the loss of the typical Wallichian specimens, but they have often felt, considering how these types have been misused, that it would have been a greater blessing to Indian botany, had the Wallichian Herbarium, by some happy accident, totally disappeared.
16. Desmodium Scalpe DC.
Add to localities of F. B. I. :— Manipur; Clarke n. 42029!

17. Desmodium obcordatum Kurz.
Add to distribution :— Sumatra (Teysmann n. 3909!)

18. Desmodium oblongum Wall.
Var. typica; leaves oblong, obtuse.
Add to localities of F. B. I. :— Manipur, Watt n. 5083!


Burma; Nattoung Mts., Revd. Cross! Mogouk, Cooper!

It is just possible that this variety may be specifically distinct from D. obtusum; this at least was the opinion of Mr. Kurz. Its fruits, however, are exactly like those of D. oblongum and are not like those of the plant to which he has referred it. The plant with which Mr. Kurz has united it has, besides, 3-foliolate leaves, while all our specimens of this have simple leaves. The latter difference, however, may not be of specific importance, since D. oblongum proper is described by Mr. Baker as having simple leaves, which is true of all our specimens at Calcutta except Wall. Cat. n. 5714 itself, where the leaves are 3-foliolate.

19. Desmodium oblatum Bak.

This, as the F. B. I. points out, is very close to n. 44. D. reniforme, which is also cited as occurring in Burma. Mr. Kurz has doubted (Journ. As. Soc. Beng. xlv. pt. 2. 230) that D. reniforme is Burmese; certainly all Kurz’s specimens from Burma, as well as the only Wallachian one at Calcutta (Wall. Cat. n. 5702—the Prome portion only) are D. oblatum rather than D. reniforme; recently, however, genuine D. reniforme has been received from Maymyo and elsewhere. But the plants do not appear to the writer to differ even as varieties; D. oblatum does not always have longer pedicels than D. reniforme, and some of our Maymyo specimens are interesting on account of their having the slightly indented pods of D. reniforme and the deeply indented ones of D. oblatum on the same branch.


Add to localities of F. B. I. :— Upper Burma; Mogouk, Cooper!
Add to distribution :— Szechuen, Pratt (n. 422!)

This appears to be no more than the representative in the Eastern Peninsula of the Himalayan D. sequax (n. 31). Except for the rather closer tomentum on the leaves beneath, and for the fact that the end-leaflet is rhomboid and obtuse in this plant, instead of ovate-oblong and acute as in D. sequax, it would be impossible to distinguish the two. From their position in the F. B. I. it might be gathered that the two plants differ as regards calyx. This, however, is not the ease, the calyx in the two is indistinguishable, as are the corollas and the pods.

Pratt n. 422 has been issued as D. grossicrenatum Franch. If this identification be correct then Mr. Franchet’s name becomes a synonym of D. sinuatunm. There is not, however, any authentic example of D. grossicrenatum at Calcutta.

21. Desmodium sambuense DC.

Add to localities of F. B. I. :— Burma; common from the Chiu Hills to the Shan Plateau.
This species is the Desmodium floribundum of G. Don (*Hedysarum floribundum of D. Don*). The *P. B. I.* suggests that it is the same as *D. sambuense* DC. (*Hedysarum sambuense* D. Don); this is undoubtedly the case. The name *D. floribundum*, used in the *P. B. I.*, only dates from 1832, whereas the names *D. multiflorum* DC. and *D. elegans* Lindl., given as synonyms, date from 1825 and 1826 respectively. Authors have accorded preference now to one, now to another of the rival names *D. floribundum* and *D. multiflorum*, while as a matter of fact the synonym that should have been used throughout is the one here employed.

*D. elegans* has thinner leaves, less hairy beneath, and blunter at the points than those of *D. sambuense* proper; *D. floribundum* (*D. multiflorum*) has more numerous racemes and smaller leaves than *D. sambuense* proper. But all sorts of intermediates occur, and it is impossible to separate the three even as varieties.

21b. *Desmodium kulhaitense* C. B. Clarke MSS.; leaflets entire, pedicels long, joints many small quite glabrous.

**Sikkim**; at Hee, 4000 feet, **Clarke** nn. 13096! 13109!

*Branches* woody, obscurely angled, sparsely hirsute. *Stipules* lanceolate, ½ in., leaflets subcoriaceous, wide-lanceolate, perfectly glabrous above, very densely velvety with adpressed grey-silky hairs beneath; end-leaflet 2½—4 in. long, ¾—1 in. across, on a petiolule ¼—½ in. long, gradually tapering upwards from junction of lower and middle thirds to a long subacuminate point, and downwards to a rounded or cuneate-truncate base; lateral leaflets almost sessile, 2—3 in. long, ½ to ¾ in. across, tapering upwards like the central but with a very oblique rounded base. *Racemes* rather copious, axillary and terminal, 5—8 in. long; pedicels usually ½ in., very slender, glabrescent. **Calyx** ½ in., teeth larger than tube. **Corolla** unknown. **Pods** 1—1½ in. long, under ½ in. broad; joints 6—8, longer than broad, without pubescence, finely reticulate-veined.

This plant is very nearly related to the preceding, of which it has the habit. But its less angular branches, its very different leaves, and its glabrous pods with finely reticulate joints borne on slender pedicels twice as long, make it very distinct. Mr. Clarke, the only botanist who has met with the plant, originally gave to his specimens the name now quoted, perhaps without any intention of incurring the responsibility of recognising it as specifically distinct; indeed he has, at a later date, himself reduced it to *D. multiflorum* (*D. sambuense*). Mr. Kurz, Mr. Brace, Dr. King and the writer having at different times independently examined Mr. Clarke’s specimens, and having all formed the opinion that his plant must be distinguished as a species, this opportunity is taken of providing the diagnosis necessary for its recognition; Mr. Clarke’s original tentative name, being an excellent one, has been adopted here.

The relationship of this plant is, however, even more close with the next species, of which it has the long-pedicelled flowers and glabrous pods, with joints reticulated externally, than it is with *D. sambuense*. But the species referred to (*D. khasianum*) has much larger pods, as large as in *D. serriferum* and in *D. tiliaefolium*, while the somewhat similar leaflets, also glabrous above, are smaller and much less hairy beneath.

21c. *Desmodium khasianum* Prain; leaflets entire, pedicels long, corolla large, bracts lanceolate, joints of pod many large quite glabrous, reticulate-veined. *D. serriferum* Wall. Cat. 5708 (C only, in J. II. 50

Khasia and Jaintea Hills; "Montes Sillet," i.e., Khasia, Gomez (Wall. Cat. 5708 C)! Khasia, 2-4000 feet, Hooker and Thomson! Griffith (Kew Dist. n. 1621, Field n. 359)! Gallaty n. 676! Mann n. 281! Clarke nn. 15154! 17813! 19167! 40415! 45119! Jowai, Dr. King's Collector!

Branches slender terete, soon glabrescent. Petiole \(\frac{3}{4}\) in. to 1 in. long; leaflets subcoriaceous ovate, terminal 2-2\(\frac{1}{2}\) in. long, 1 in. across, tapering from the middle to an abruptly short-acuminate apex and to a cuneate-truncate base, on a petiolule \(\frac{1}{2}\) in. long; lateral similar but smaller, shortly petiolulcd, 1-1\(\frac{1}{2}\) in. long and with a sub-equa...
forum. Nor are there any specimens from the Eastern Himalaya at Calcutta; all the Sikkim examples of a plant with flowers and fruits like those of *D. serriferum* have the obtuse or subacute leaves characteristic of *D. tiliasfolium*.

As has already been explained under that species, the true *D. ozyphyllum* is a member of § *Podocarpum* and does not bear the faintest resemblance to *D. serriferum*.

The var. *serriferum* of the F. B. I. has no existence. It is made up of two plants:—Wall. Cat. 5708 A.—which is, as it happens, exactly the same as Wall. Cat. 5708 B.; in any case, even had the two differed, the specimen under the letter A. must obviously have marked the type of Wallich’s species: and Wall. Cat. 5710 issued by Dr. Wallich as *D. polycarpum*—which it in no way resembles. Indeed, n. 5710 is not distinguishable from *D. tiliasfolium*, as represented by his n. 5707.

24. **Desmodium tiliasfolium** G. Don.

This species bears to *D. serriferum* very nearly the relationship that *D. sinuatum* bears to *D. sequax*; that is to say its floral structure is identical and it is only to be distinguished by the shape of its leaflets and the different degree of tomentum on its leaves. To this species Mr. Baker reduces *D. nutans* Wall. which has thicker leaves and very large lax panicles, and *D. argenteum* which has rugose almost coriaceous leaves very densely villous beneath. As represented by Dr. Wallich’s three sheets, viz., 5707 (*D. tiliasfolium*); 5713, (*D. argenteum*) and 5706, (*D. nutans*), it would be perfectly easy to define three “species.” But intermediates of all kinds abound and the writer has found it impossible to give satisfactory characters for separating them as varieties. The fruits of all three are identical and, indeed, hardly differ from those of *D. serriferum*, in which a monographer must, the writer believes, necessarily ultimately merge all three.

True *D. tiliasfolium* extends from the Kuram Valley, Aitchison! and Hazara, Stewart! to Sikkim, King! and Szechuen, Pratt! But it is very rare in Sikkim, and has never been reported from Nepal or from any portion of the Assam ranges. The other two forms are more local; *D. argenteum* extends only from Nepal westward to Chamba, while *D. nutans* seems to be confined to Kamaon and Garhwal and to be rare there.

The F. B. I. reports one or other of the forms, without indicating which, from Tavoy, but no one has hitherto sent specimens of the plant to Calcutta from any part of Burma. In Upper Burma its place appears to be taken by the not dissimilar *D. karenium*, which is at once recognised by its subulate calyx-teeth as long as the tube. In Tenasserim it is replaced by another very distinct species, *D. insigne*, which, with a calyx like that of *D. karenium*, is distinguished both from that species and from *D. tiliasfolium* by its persistent scarios bracts.

24b. **Desmodium karenium** Kurz in Journ. As. Soc. Beng. xlv. pt. 2. 228 and 232; leaflets usually large acuminate softly velvety-pubescent beneath, pedicels moderately long, bracts lanceolate deciduous, corolla large, joints many, densely clothed with minute brown-pubescence and with white spreading hairs intermixed.

Burma; Pegu, Bookey Ridges, 4500 feet, Kurz n. 1676/C. ! Thongyeeen, Brandis! Shan Hills; at Madoc, Lwekaw, and near Fort Stedman, King’s Collectors!

A shrub 4–5 feet high, branches black, angular, glabrescent. Petiole 4 in.; leaflets herbaceous 6 in. long, 3¼ in wide, green sparsely setulose-hirsute above,
densely velvety beneath with grey-silky pubescence, all ovate-oblong acuminate, the central wide-uneate at base, on a petiolule $\frac{1}{2}$ in. long, the lateral with very short petiolules, almost rounded at base, margins slightly repand-sinuate. *Racemes* copious lax axillary and terminal, very slender and usually shorter than the leaves, often compound, branched at base; pedicels $\frac{1}{2}$ in., very slender, finely puberulous, ascending. *Calyx* $\frac{1}{2}$ in., sparsely pubescent, teeth subulate as long as the widely campanulate tube. *Corolla* $\frac{1}{2}$ in. Pods 1-1$\frac{1}{2}$ in., joints 5-6, rather longer than broad.

This in general appearance resembles *D. tiliifolium*, but the black angular stems and the very different calyx and pods amply distinguish it. Though it bears less general resemblance to *D. sambuense* it is in reality most closely related to that species; it has similar stems, not however as in *D. sambuense* with lines of spreading hairs along the angles, and similar though much larger pods, the joints being four times the size of those of *D. sambuense*. The leaves also are very different in shape besides being many times larger; the calyx teeth, too, are much narrower in this species.

24c. *Desmodium insigne* Prain; leaflets very large, ovate-acute, densely hoary beneath, pedicels moderately long; bracts lanceolate scarious persistent, corolla large; joints quite glabrous reticulate-venose.

*Tenasserim*; at Endine Ghor, 1000 feet, *Gallally*!

Branches woody, angular, densely uniformly rusty-pubescent. *Petiolo* short, 1-1$\frac{1}{2}$ in. only; leaflets thick flexible subcoriaceous, green rugose and sparsely setulose above, densely persistently matted with whitish silky hairs beneath; all ovate-acute with rounded bases; the end one, on a petiolule that may be 2 in. long and always exceeds the petiole proper, 9 in. long, 6 in. across; the lateral almost sessile, 6 in. long, 4 in. across. *Racemes* copious lax, sometimes a foot long, axillary and terminal, the latter at times paniculate, pedicels $\frac{1}{2}$ in. finely downy, arising in fascicles from the axis of 2-3 lanceolate externally rusty-pubescent rigid persistent bracts. *Calyx* $\frac{1}{2}$ in., pubescent, teeth triangular, acuminate, rather shorter than the narrow-campanulate tube. *Corolla* $\frac{1}{2}$ in. *Pods* 1 in.; joints about 6, rather broader than long, quite glabrous.

A species very distinct on account of its peculiar persistent rigid bracts, disposed in groups along the rachis of the racemes and with fascicles of pedicels in their axils. The leaves, though of larger size, have the facies of those of that form of *D. tiliifolium* which constitutes *D. argenteum*.

24d. *Desmodium kinayanum* Prain; leaflets obtuse or subacute, softly grey-silky beneath, bracts small, pedicels short, joints broad densely shortly tomentose, the sutures densely pubescent with longish white hooked hairs.

*Burma*; Shan States at Saga, *King's Collectors*!

Shrubby, branches and petioles rusty-pubescent. *Petiolo* 2 in., leaflets rather thick, green, sparsely pubescent above, densely silky beneath, all broad obovate obscurely repand, bases wide-deltoid; central petiolule $\frac{1}{2}$ in. *Racemes* short dense 4 in. long, axillary and terminal pedicels $\frac{1}{2}$ in., erect, puberulous. *Calyx* $\frac{1}{2}$ in. wide, campanulate, pubescent, teeth subulate, remote, as long as tube. *Pod* 1$\frac{1}{2}$ in. long, $\frac{1}{4}$ in. wide, dorsal suture straight, ventral very slightly sinuate; joints usually 6, broader than long, the last apiculate, thin, tardily separating.

An exceedingly distinct species with pods altogether different from those of
any other Indian species. The corollas, said by the native collector to be blue, are absent from the specimens reported. The pods most resemble those of *D. gyranus*, but are altogether different in not opening along the ventral suture and in dehiscing transversely. The leaves recall those of *D. sinuatum*.


**Perak;** Valley of Batung Padang, 2000 feet, *Wray* n. 1441! *Distrib. Java, Tjiboddas* (Kurz n. 939! *issued under the name D. sequax; Zollinger; Junghuhn*).

**Var. glabrescens;** leaves sparsely covered with silky hairs beneath, secondary nervation prominent; pods quite glabrous.

**Tenasserim;** Meetan, 4000 feet, and Moolyet 5000 feet, *Gallatly! Moolyet, Beddome* n. 21.

A shrub 8 feet high, with dark glabrescent subterete branches. *Petioles* 2 in.; leaflets rather pale-green membranous, very sparingly puberulous above, beneath from densely velvety to sparingly puberulous, secondary nervation always prominent but in the Perak and Java form hidden by the denser pubescence; end-leaflet 5 in. long, 2½–3 in. across, its petiolule ⅓ in., its base wide-cuneate, lateral-leaflets 3½ in. long, 2 in. across, their bases obliquely rounded, their petiolules short. *Racemes* in rather lax terminal panicles 8–12 in. long; pedicels ½–⅔ in., puberulous, erecto-patent. *Calyx* very small ⅓ in. long, campanulate, puberulous, teeth triangular shorter than the tube. *Corolla* pale-violent ⅔ in. *Pod* dull-crimson, 2–2½ in. long, ½ in. wide, slightly indented on both sutures; joints 6–8, rather longer than broad, distinctly reticulatovenose, sparingly puberulous or glabrous.

A very distinct and beautiful species; the identity of the Perak plant with Zollinger's original specimens has been established by Mr. C. B. Clarke who kindly compared the *Desmodia* of Dr. King's Malayan collections with the material of the genus at Kew. Miquel's synonym " *D. scandens* Bl." refers to a plant that he elsewhere treats as a variety of *D. strangulatum*, and that was subsequently advanced to specific rank in the *F. B. I. under the name D. sinuatum* Bl. MSS.: Miquel's second synonym " *D. rubescens* Bl." refers to *D. sequax* Wall., which also occurs in Java (Kurz n. 965). But both of Miquel's proposals are untenable, for even if it be ultimately found necessary to merge *D. sinuatum* in *D. sequax*, it with still obviously be necessary to keep *D. megaphyllum* apart from both as a very distinct species.

26. *Desmodium gangeticum* DC.

Add to localities of *F. B. I.*:—*Penang; Pinara Bukit, Curtis* 2771! *Nicobars; Jelíněk* 233!

26b. *Desmodium virgatum* Zoll. *Nat. en Geneesk. Arch*. iii. 58; leaflet membranous or subcoriaceous, oblong entire acute, glabrescent

Chittagong; Rangamati, Clarke! Burma; Prome, Wallich (Cat. n. 5692 G. in part); Pegu, Kurz! Shan Hills, Collett! Perak; Scortechini n. 1594! Distrib. Malay Archipelago.

Stems suberect reaching 3–4 feet high, woody, slightly angular. Leaflet oblong 5–6 in. long, thinly clothed beneath with grey hairs. Racemes copious ascending 4–8 in. long, slender. Pod 1/2–2 in. long, 1/2 in. broad, 4–6 jointed.

This plant in habit and foliage resembles D. gangeticum; in flowers and fruits, D. latifolium.

27. Desmodium latifolium DC.
Delete the synonym D. virgatum Zoll.

31. Desmodium sequax Wall.

Very nearly related to D. sinuatum Blume, to which it bears the relationship that D. serriferum bears to D. tilifolium. The specimens from Mishmi collected by Dr. Griffith apparently include both “species,” those at Kew being referred by Mr. Baker to D. sinuatum. All the Mishmi specimens at Calcutta belong on the contrary to D. sequax, the end-leaflets being narrowed gradually to a point.

32. Desmodium concinnum DC.
Add to localities of F. B. I.:—Burma; Bookee ridges, Kurz!

The Burmese specimens are referable to var. amoena Bak., but intermediates from the Khasia Hills are so plentiful that the existence of this variety cannot be satisfactorily maintained.

33. Desmodium retroflexum DC.
Delete the locality “Tenasserim.”

34. Desmodium capitatum DC.
Add to localities of F. B. I.:—Perak; common, Kunstler n. 361! Scortechini n. 45! Tenasserim; Helfer.

35. Desmodium Griffithianum Bth.
Add to localities of F. B. I.—Burma; Chin Hills, King’s Collectors!

38. Desmodium polycarpum DC.

Some of the forms included by Dr. Wight and Prof. Walker-Arnott in this species are at least varietally distinct, notably that issued by Dr. Wallich as D. ovalifolium, in which the leaflets are narrowed to an acute apex and have sometimes a truncate or even subcordate base. This form is plentiful in Tenasserim, the Andamans, the Malay Peninsula and Sumatra. The D. polycarpum of the F. B. I. is rather a group of forms aggregated for convenience, than a well-defined species. The object of the aggregation is readily appreciable: it will be noticed, however, that the reasons for adopting it are the reverse of those made use of in the similar D. triquetrum group. There, all the forms whose foliage happens to be similar are grouped together in spite of their having somewhat different flowers and totally different fruits. Here, a number of forms with flowers and fruits that are not
easily distinguishable are brought together in spite of very great and apparently constant differences in foliage. Under this mode of treatment, if consistently applied, Desmodium sequax and D. sinuaturn should have been united, as also should \textit{D. serriferum} and \textit{D. tiliiformum}, and again \textit{D. reniforme} and \textit{D. oblaturn}.

40. \textbf{Desmodium rotundifolium} Bak.

41. \textbf{Desmodium parviflorum} Bak.

These two species do not accord at all well with the generic definition of \textit{Desmodium}, and are more conveniently referred to \textit{Alysicarpus}, in which they were originally placed by Dalzell.

42b. \textbf{Desmodium birmannicum} Watt; shrubby, suberect, leaflets 3, pedicels long, spreading or deflexed, bracts large, flowers and joints of pod small. \textit{D. oblongum} Kurz in \textit{Journ. As. Soc. Beng.} xlv. pt. 2. 226, 229 not of Watt.

\textbf{Burma;} Pegu, rather frequent, Kurz n. 1677 bis. ! 2532 !

A suberect undershrub with woody slightly angular slender branches, sparingly clothed upwards with longish adpressed whitish hairs. \textit{Pettiole} \(\frac{1}{2}\) in.; leaflets membranous elliptic, sparingly clothed with adpressed silky hairs on both surfaces, green above, glanscescent beneath; end-leaflet \(\frac{1}{4}\) in. long, 1 in. across, its petiolule \(\frac{1}{2}\) in. long; lateral almost sessile \(\frac{1}{4}\) in. long. \textit{Racemes} in laxly spreading terminal panicles a foot long or more; bracts large membranous subpersistent ovate-acuminate; pedicels \(\frac{1}{4}\) in. long, almost glabrous. \textit{Calyx} \(\frac{1}{4}\) in., teeth acuminate twice as long as the tube. \textit{Corolla} under \(\frac{1}{4}\) in. \textit{Pod} \(\frac{1}{2}-\frac{3}{4}\) in. long, \(\frac{1}{6}\) in. broad, minutely puberulous, splitting throughout along the lower suture; joints 4–6, only occasionally separating transversely.

A very distinct species which Mr. Kurz at first appears to have considered a variety of \textit{D. polycarpum}, but which he afterwards treated and issued as \textit{D. oblongum}. Dr. Watt, who has placed a MSS. description of the plant in \textit{Herb. Calcutta}, has, however, very justly proposed to treat it as a species. It is most nearly related to \textit{D. polycarpum}, but the lax panicles, very long pedicels and very differently dehiscing pods, amply distinguish it.

44. \textbf{Desmodium reniforme} \textit{DC.}

Very nearly, perhaps too nearly, related to this is \textit{D. oblaturn} Bak.

45. \textbf{Desmodium heterophyllum} \textit{DC.}

This seems to be the representative in Indo-China and Malaya of \textit{D. triflorum}. It occurs, but is rare, in S. India and Ceylon, while it is extremely common, as an indigenous species, in Burma, the Andamans and Nicobars, Tenasserim and the Malay Peninsula. \textit{D. triflorum}, which is so common in India, is rare in Burma, and in the Andamans and Malaya occurs only sparingly about the various settlements, with all the appearance of being a quite recent introduction from India.

49. \textbf{Desmodium gyroides} \textit{DC.}

Add to localities of \textit{F. B. I.} :—\textit{Perak; Kinta river, Kunstler} n. 765 !

56. \textbf{Shuteria W. \& A.}

1. \textbf{Shuteria vestita} \textit{W. \& A.}

Add to localities of \textit{F. B. I.} :—\textit{Daphla Hills; Lister \& Naga Hills;
Prain! Manipur; Watt! Burma; Poneshee, J. Anderson! North Shan States, Gacacre! South Shan States, King’s Collectors! Karen Hills, Brunitis! Pegu, Kurz! Tenasserim; on Moolyet, 5000 feet, Gallatly! Distrib. Java (Kurz 1103!)

The specimens from all these localities and from those mentioned in the Flora of British India agree exactly.

VAR. glabrata Bak.; (S. glabrata W. & A.) is hardly distinguishable as a variety. Its calyx, even in Wight’s original authentic examples, is not at all glabrescent, and the leaflets, though elsewhere glabrous, have a few hairs on the main-nerves beneath. None of Simons’ Khasia specimens at Calcutta belong to this variety; of sixteen different gatherings from the Assam Hills preserved in Herb. Calcutta, every specimen belongs to typical S. vestita.

The two other varieties of the F. B. I. are founded on plants that are specifically quite distinct from S. vestita.


Garhwal; Kumaon; Nepal. C. India; Pachmarhi, Duthie!

This species is very distinct from S. vestita, to which it has been reduced in the Flora of British India. It is easily recognised by its glabrous pods and by the more horizontal, early-forking secondary nerves of its larger leaflets.


Substitute for localities of F. B. I.:

Sikkim; very common, Hooker! Anderson! Clarke! Gamble! Bootan; Clarke! Khasia; fide Baker in F. B. I. Burma; Chin Hills, King’s Collectors! near Bhamo, J. Anderson! Shan Hills, Collett! Fulton! King’s Collectors! Pegu, Kurz! Karen Hills, Mason! Tenasserim; at Lathorggee, 2500 feet, Gallatly! Distrib. Sumatra (Forbes n. 1240!)

Mr. Kurz has distinguished two varieties which differ from each other exactly as Shuteria vestita proper and its var. glabrata do from each other, and are therefore hardly worthy of being distinguished. The writer, to avoid confusion, here follows the F. B. I. in keeping this species in Shuteria, to which it is referred on account of the axillary stamen being quite free from the others. But with the exception of this single character the plant is altogether a Pueraria, and as the definition of Pueraria in the Genera Plantarum admits species exhibiting this character, it will no doubt ultimately be necessary to readopt the view held by Mr. Kurz.

3. Shuteria ferruginea Bak.

This has recently been collected again in Nepal by Dr. Scully, and an examination of his and Dr. Wallich’s original specimens leads the writer to think that Mr. Baker’s view as to its generic position may be correct; Mr. Kurz, however, did not assent to it. There appear to be two varieties:

a. typica; bracts deciduous. S. ferruginea Bak in Flor. Brit. Ind. ii. 182. Nepal; on Sheopore, Wallich n. 5516! Scully n. 121! Sikkim; Kurz!
b. Var. bracteosa; bracts persistent. S. bracteosa C. R. Clarke MSS. Pueraria strobilifera Kurz MSS.

Sikkim; Clarke n. 13493! Khasia; G. Mann! Collett! Clarke n. 40338!

Both Mr. Brace and Mr. Clarke have independently noted their belief that this plant is a species of Shuteria distinct from any yet described, and in this they only share an opinion noted at a still earlier date by Mr. Kurz who, however, placed it, as he did S. hirsuta, in Pueraria.

The calyx-teeth of the Sikkim plant are rather shorter than in genuine S. ferruginea, but its bracts are exactly like those of the Khasia plant, in all three gatherings of which it is impossible to find a floral character that will separate the form from the Nepalese one. None of the gatherings of either variety has ripe fruits and in their absence the writer has not ventured to follow Mr. Clarke—and the other botanists whose opinion is quoted, in giving it specific rank. Should its validity as a species be ultimately established, the plant, if accepted as a Shuteria, will be known as S. bracteosa Clarke; should it prove a Pueraria, it will be P. strobilifera Kurz.


North-West Himalaya and Nepal; common.

This species is quite distinct from S. vestita; it is very closely related, however, to S. suffulta Bth., which is the representative form in Burma and which might be reduced to S. involucrata, as a variety, with rather more justice than S. densiflora can possibly be to S. vestita.

58. GLYCINE LINN.

1. Glycine javanica Linn.
   Add to distribution:—Sumatra (Forbes!)

2. Glycine pentaphylla Dalz.

Recent specimens of this from Canara, collected by Mr. Talbot, have all the leaves 7-foliolate.


Mr. Maximowicz in 1873 pointed out that Glycine Soja S. & Z. is not the cultivated "Soy," but is the wild species that was subsequently redescribed by Regel and Maack as Glycine ussuriensis. For this reason Mr. Maximowicz suggested the use of the name Glycine hispida, since Moench had named the "Soy" Soja hispida and because that name had become almost classical owing to its use in the Prodromus. As Sir J. D. Hooker and Mr. Jackson have adopted Mr. Maximowicz' suggestion in their Index Kewensis, and as Mr. Duthie has also followed it in his Field and Garden Crops, it is necessary to indicate the fact here. There is, however, no doubt that the "Soy" is Roxburgh's Dolichos Soja and it is almost equally certain that it is Dolichos Soja Linn.; it would therefore, in the writer's opinion, be far better to retain the name Glycine Soja for our plant, citing as our authority Bentham in Journ. Linn. Soc. viii. 266, and allow the name G. ussuriensis to be substituted for that of the wild species previously named G. Soja by Siebold and Zuccarini.

Mr. Baker says of the Soy, 'often cultivated'; this might lead to the supposi-
tion that it is a wild species in India. This it most certainly is not; even as an escape it is of rare occurrence. In connection with this it may be mentioned that in one of the few unequivocal instances of 'escape' among Herb. Calcutta examples, specimens collected by Mr. Kurz on the banks of the Ganges at Sahebganj) the plant, instead of having suberect, has long trailing stems; but for their greater hispidity the specimens might well pass as representing the wild G. ussuriensis. Very probably, therefore, Mr. Maximowicz' suspicion that the Soy is only a cultivated variety of the Ussuri plant may be correct.

59. TERAMNUS Sw.

2. Teramnus flexilis Bth.


60. MUCUNA ADANS.

The genus Mucuna Adans. is admittedly the same as the genus Stizolobium Pers.; the name given by Adanson in 1763 is therefore much older than that used by Persoon in 1807. By Persoon's own showing, however, the name Stizolobium did not originate with him but was first used by P. Browne in his History of Jamaica in 1756. There seems then, at first sight, as Dr. Otto Kuntze remarks (Rev. Gen. Plant. v. 206) no reason why the name Stizolobium should be suppressed. Dr. Kuntze has therefore proposed to recognize our genus Mucuna as Stizolobium P. Br.; this gives him the opportunity of enumerating all the species hitherto known, except those described by Persoon, as Kuntzean species.

But the subject bears closer examination. It is to be noted that the name Stizolobium was applied by Browne exclusively to species with seeds that have a small hilum. The only species of Mucuna (as now understood) with seeds having a large annular hilum, that Browne knew, was treated by him as the type of a distinct genus which he named Zoophthalmum. Adanson, it is true, in his generic description ascribes to the genus as a whole the seeds characteristic only of Browne's Zoophthalmum, but his citations show that he included in it one plant belonging to Zoophthalmum and another plant belonging to Stizolobium. There is therefore no doubt that the oldest name for the genus as a whole is, as De Candolle in Prodr. ii. 404 has indicated, the name Mucuna Adans. Persoon used the name Stizolobium, not in the sense of P. Browne, but as the precise equivalent of Mucuna Adans. And Kuntze's remark that Bentham and Hooker in the Genera Plantarum "incorrectly" attribute the name Stizolobium to Persoon is, to say the least, disingenuous. If the two "genera" of P. Browne are to be considered, as Kuntze apparently agrees to consider them, only parts of one genus, then the oldest name for that conjoint genus is Mucuna Adans. To quote as the name of the enlarged genus the word Stizolobium and to give as the authority for the name in this sense the reference by P. Browne, is to say and to claim something quite other than was said or claimed by the author of the name. Persoon can be quoted as the authority for the word in precisely this sense, but when quoted on Persoon's authority the name is not so old as the name Mucuna.*

* One may ask why, while he was about it, Dr. Kuntze did not try to revive the name Parvina of Rumphius, which is, no doubt, an older name for a species of Mucuna than any that Kuntze mentions.
If this hunting for prior names is to be made a pastime, which it appears to have become with a number of botanists who, if the truth must be told, mostly hold appointments wherein they are paid to do work far other and far more useful, then let the game be played, as games should,—fairly. When priority-mongers cease to be disingenuous,—when they cease to put into the mouths of authors expressions of opinion that the authors themselves did not utter, and would probably most strongly repudiate,—serious botanists, who are content to use nomenclature as a working-tool and not as a plaything, will be able to meet them halfway and to help in the task of bringing order out a chaos that, after all, is largely of their own making. This much, however, is certain; if good is to be done, it must be done by men of greater judgment than any who as yet have taken it upon themselves to criticise the nomenclature codified in De Candolle’s *Prodromus*, in the *Genera Plantarum* of Bentham and Hooker, or in Asa Gray’s *Manual*.

Turning from this profitless discussion to the species of *Mucuna* themselves, one finds that various groupings of these have been proposed from time to time. There are two very natural groups within the genus, readily determined by the nature of the seeds. In one group, which exactly corresponds to *Stizolobium* P. Br., the small oval seeds have a small lateral oblong-linear hilum; in the other, which equally exactly corresponds to *Zoophthalmum* P. Br., the large discoid seeds are provided with a large hilum that extends round from two-thirds to three-fourths of the periphery of the disc. So very natural is the distinction between the two groups that the writer, though he does not here venture to formally propose the step, is quite convinced that, were the genus adequately monographed, it would be found necessary to recognise in them two separate genera; when this happens the bibliographical discussion will end, of its own accord, in the restoration of both the generic names proposed by P. Browne.

In *Prodromus* ii. 405, De Candolle has practically recognised the groups in question but has only treated them as separate sections; he has used to designate them, in a sectional sense, the two generic names of P. Browne. M. De Candolle did not, however, note the error into which M. Adanson had fallen regarding the seeds; like Adanson, he has attributed to all the species a circumferential hilum. He has thus been led to use, in distinguishing his two sections, a purely external and, as we now know, a somewhat variable character,—the presence or absence of plaits and furrows on the sides of the pods. This has led to his inclusion in *Stizolobium* of one species (*M. gigantea*) that most certainly does not belong to the section.

In the *Genera Plantarum*, for the first time, Bentham and Hooker made full use of the natural character derived from the seeds. At the same time, however, they continued to employ the character used by M. De Candolle. They have consequently been led to recognise three sections:

1. *Citta*; including those species with a circumferential hilum and with plaits across the face of the pods.
2. *Stizolobium*; including all species with a small lateral hilum.
3. *Carpopogon*; including those species with a circumferential hilum but without plaits across the face of the pods.

This arrangement has obviously the great disadvantage of intercalating the very distinct and very natural group *Stizolobium* between two artificially separated portions of another equally natural group, similar in rank and importance to *Stizolobium*.

The name *Citta* is one that had been used generically by Loureiro, but it is not
clear why its use is preferred to that of Zoophthalmum; the limits of § Zoophthalmum DC. and § Citta Bth. & Hk. f. are exactly the same. The name § Stizolobium is used as in DC. Prodr., except that the species Mucuna gigantea is very properly excluded from the section; one of its varieties is placed in § Citta, while another variety of the same species forms, along with M. macrocarpa, the § Carpogon of Bth. & Hk. f. The name Carpogon is one that had been used in a generic sense by Roxburgh as the exact equivalent of Mucuna Adans. or Stizolobium Persoon. Of the convenience of the Genera Plantarum arrangement there can be no question, and the writer would only propose to deviate from it to the extent of treating Stizolobium, in the meantime, as a subgenus rather than as a section; the other two sections may be considered as together forming a second subgenus Zoophthalmum which, like Stizolobium, will probably at an early date be once more treated as generically distinct.

In the Flora of British India the arrangement advocated by Messrs. Bentham and Hooker has been rejected entirely. The genus is subdivided into four groups, to each of which is given the rank of a subgenus, and though, for three of the proposed subgenera, the sectional names used by Bentham and Hooker are retained, the definition and the limits of each of the three are altered. The section Citta is divided into two subgenera, Amphiptera Bak. and Citta "Lour." The first of these is distinguished by having wings down the sutures as well as plaits across the pods, while the second has plaits but no wings. This subdivision does not possess the advantage of being natural. Mucuna monosperma, placed in Citta, instead of being wingless down the suture as is postulated in the definition given of that subgenus, has wings that are sometimes as broad as those of M. imbricata which is the type of Amphiptera. The only actual difference between the wings in the two species is that in M. monosperma the plaits extend from the surface of the body of the pod quite across the wings; in M. imbricata the plaits do not extend quite across the wings. The difference then, in place of being a subgeneric one, is so slightly a difference of degree as to be, if taken alone, barely specific. The pods of M. atropurpurea and also of M. biplicata, which is included in M. atropurpurea in the F. B. I., do appear, when cursorily examined, to be wingless. But closer inspection shows that they are winged, exactly as in M. monosperma, with the transverse plaits continued across the wings, only the wings are here lebed to their bases between each pair of plaits.

The subgenus Carpogon is confined to species broadly winged down both sutures, thus limiting the subgenus to the single species M. gigantea. The Genera Plantarum section of this name includes species that are no more than ribbed down each side of the suture and thus, naturally enough, includes M. macrocarpa, which has long woody pods and has seeds with a circumferential hilum. But M. macrocarpa, in spite of its circumferential hilum, is put in Stizolobium by the F. B. I. thus again rendering the definition given in the Genera Plantarum inapplicable, since that restricts to the section Stizolobium those species that have a small hilum to the seeds. Most unfortunately Mr. Tanbert, in the authoritotive Natürlichen Pflanzen-familien, has adopted the quite untenable divisions proposed in the F. B. I. For not only is there no doubt that Bentham and Hooker are right in accommodating M. macrocarpa and M. gigantea in the same natural group, there is now equally no doubt that M. gigantea cannot be separated from the natural group containing M. imbricata and M. monosperma. The writer has collected, in the Andamans, specimens of M. gigantea, some of the pods of which have ridges across the face in exactly the position of the plaits in the other species.
Mr. Baker quotes Persoon as the author of his subgenus *Stizolobium*. But to Persoon *Stizolobium* was a genus including *all* Baker's subgenera. So he quotes Roxburgh as the author of the subgenus *Carpopogon*; the same objection applies here. The citation of Loureiro as the authority for *Citta* is however particularly unhappy, for it is in the highest degree probable, from a study of Loureiro's description and from the knowledge we now possess of its distribution and characters, that *Mucuna imbricata*, which is the basis of *Amphiptera*, is the species described by Loureiro as *Citta nigricans*; specimens of what is undoubtedly *M. imbricata*, noted as having white flowers with purple spots, have recently been sent from the Shan Hills to Herb. Calcutta; there is, therefore, not one character now left which militates against the identification of Loureiro's plant with *M. imbricata*. In any case since Loureiro's plant had 3-seeded pods, it cannot possibly have been either *M. monosperma* or *M. atropurpurea*, which constitute the *Citta* of the *F. B. I.*

Subgen. I. *Zoophthalmum*. Perennial climbers; seeds large flat, with a large hilum extending round the greater portion of their circumference.

§. *Citta*. Pods plaited across their faces.

1. *Mucuna imbricata* DC.

Add to localities of *F. B. I.*:—North-West Himalaya; Vicary! A. O. Hume! King! Manipur; Watt! Burma; Pegu, Brandis! Shan Hills; "flowers white and purple," King's Collectors! Andamans; common, King's Collectors!

Bracteoles at base of calyx in bud similar to bracts but many times smaller and more deciduous.

Nearest to this is perhaps *Mucuna Junghuhniana* [Stizolobium Junghuhnianum Kuntze (Rev. Gen. Pl. i. 208)] from Java, which differs in being strigously hirsute and in having pods with plaits extending partly across the wings. The plant referred to by Kurz (Journ. As. Soc. Beng. xliv. pt. 2, 246) as a new species near *M. atropurpurea* is *M. imbricata*; Mr. Kurz has himself made the reduction in Herb. Calcutta.

2. *Mucuna monosperma* DC.

Add to localities of *F. B. I.*:—Andamans; very common everywhere in the interior jungle. Distrib. Sumatra.

Bracts at base of pedicels small triangular, much smaller and much more early deciduous than the linear bracteoles exceeding the bud. One of the Calcutta examples of Wall. Cat. 5623 is *Mucuna imbricata*, the other is a mixture of *M. imbricata* and *M. macracarpa*; there is no *M. monosperma* whatever on either sheet. Wall. Cat. 5622 must be equally confused; Mr. Baker finds that the plant represented is *M. monosperma*; at Calcutta on the other hand 5622 is *M. gigantea*.

3. *Mucuna atropurpurea* DC. Zoophthalmum atropurpurnaeum

*Prain* MSS.

Delete from localities of *F. B. I.*:—Malacca.

The Malacca plant referred to *M. atropurpurea* in the *F. B. I.* belongs to a distinct species and proves to be *M. biplicata* Teysm. & Binnend.

short truncate, pod two-seeded twice as long as broad, plaits with reflexed double-margins. *Prain, Journ. As. Soc. Beng.* lxvi. 2. 66. M. atropurpurea Bak. in *Flor. Brit. Ind.* ii. 185 (as to the Malayan plant only). Zoophthalmum biplicatum *Prain MSS.*

MALACCA; MAINQAY. PERAK; very common, Kunstler! Scortechini! Wray! Penang; Curtis! *Distrib.* Sumatra (Forbes). Borneo (Teysmann).

A slender woody climber 30-40 feet long, with glabrous branches. *Leaflets* papery, dull-green, ovate-oblong cuspidate, 6-8 in. long, 5 in. across. *Racemes* 2 in. long, usually branching at the very base, occasionally further up; bracts and bracteoles much as in M *monosperma* but the latter much smaller and shorter than the buds. *Calyx* greenish-brown, 35 in. long, all the teeth minute densely bristly. *Corolla* dark-purple, 1-75 in. long, keel abruptly incurved at end, wings 1-25 in. long, standard ‘75 in. wide. *Pod* hardly stipitate, 3·5 in. long, 1-75 in. wide; plaits very close; bristles pungent, abundant, brown.

§ CARPOPOGON. *Pods* not plaited across their faces.

3b. MUCUNA ACUMINATA *Grah.* in *Wall. Cat.* 5621; *Prain, Journ. As. Soc. Beng.* lxvi. 2. 67. Zoophthalmum acuminatum *Prain MSS.*

Add to localities of F. B. I.;—Perak; Kinta, Kunstler! Singapou!; Chan Chu Kang, Ridley! *Distrib.* Java (Forbes).

This species is referred to in the *Flora of British India* under M *imbricata;* Its pod has now been reported and is like that of M *gigantea*; the species is therefore a member of § Carpopogon Bth. & Hk. f. It further resembles M *gigantea* in having a pale-green corolla. From M *gigantea* it is however easily distinguished by its short corymbose inflorescence, its long calyx-teeth, its much larger flowers, and its large boat-shaped floral bracts.

4. MUCUNA GIGANTEA DC. Zoophthalmum giganteum *Prain MSS.*

Add to localities of F. B. I.;—Bengal; Sundribuns, very common, Kurz! Heinig! Ceylon; Walker! Tenasserim; Tavoy, Gomez (Wall. Cat. n. 5622)! Malay Peninsula; Pahang, Ridley! Perak; Scortechini!

This species is very common in the Andamans where it has been collected not only by Kurz but by Liebig, E. H. Man, and the writer, who has obtained it on outlying islands like Narcondam, the Coco Group and Little Andaman, as well as on the main island. The locality “plains of Western Peninsula,” given in the F. B. I., the writer has been unable to authenticate. The only locality mentioned by Rheed, whose figure of the plant is excellent, is one near the sea in Mahabar; he says it occurs “in other places” than the one mentioned but does not say they are inland ones. The only place where Wight gathered it was at Negapatam on the Coromandel Coast; in Hooker’s *Botanical Miscellany* it is said to grow only near the sea.

The writer, who has given some attention to the various *Mucunas* in the field, has always found M *gigantea* a strictly littoral species elsewhere and more evidence is necessary before its inland occurrence in the Indian Peninsula can be credited. Mr. E. H. Man notes on a specimen that this, which the Andamanese know as chākum-da, is always found on the borders of salt-creeks and is in this respect quite unlike M.
monosperma, which the Andamanese know as pālē-da and which never grows near salt-creeks but always in the interior jungle. The lianes of M. gigantea form indeed one of the most striking features of the muddy margins of our Indian Mangrove-swamps. The writer when in the Great Coco was at pains to obtain one entire plant, the following were its measurements:—Diameter of main stem, close to the mud, 5 in.; at 4-6 feet from the mud there issued, from latent buds, 4 of the characteristic umbelliform pendent racemes of the species, with slender peduncles 8-15 in. long. The first branch was at a distance of 50 feet from the root, the first leaf was at a distance of 205 feet from the mud, about 200 feet from the only flowers on this particular plant; the leafy branches, only 15 in. in diam., extended 25-30 feet further. This feature of flowering from old wood has been met with in Mucuna monosperma as well.

During another journey the writer collected, on Little Andamans, specimens of M. gigantea with pods ridged, though not plaited, across the face, thus unfortunately invalidating the distinction between the “subgenera” Amphiptera and Carpopogon of the F. B. I.

5. Mucuna macrocarpa Wall.


Add to localities of F. B. I.:—Upper Burma; Poneshee, J. Anderson! Shan Hills plateau, 4000 feet, Collett! Pegu; in pine forests on the Bookee ridge, common, Kurz!

The Burmese plant always has the lowest calyx-tooth longer than in the Nepal and Sikkim plant. In specimens collected by the writer in the Khasia hills, however, the calyx is exactly as in those collected by Dr. J. Anderson at Poneshee and by Sir Henry Collett in the Shan hills. The pod is so exactly alike in the Burmese and in the Himalayan plants that the writer, instead of being able to adopt the suggestion of Sir Henry Collett and Mr. Hemsley that the Burmese one may be a new species, is not inclined to treat it as even varietally distinct.

The perennial stems and the large circumferential hilum of the seed, mark the species as undoubtedly a Zoophthalmum not a Stizolobium.

Subgen. II. Stizolorium. Stems above ground annual; seeds small ovoid with a small lateral hilum.


The Assam specimens recently issued by Mr. Clarke as M. exserta belong to this species.


This is not confined to the foot of the Himalayas; though found in that area it is less common there than in the forests of Central India and Chota Nagpur. The racemes of this are not always short, nor are the racemes of M. pruriens always elongated; the species are only distinguishable by their pods. These last are, however, as Mr. Baker points out, very different.
61. APIOS MECH.

APIOS CARNEA BTH.

Add to localities of F. B. I.:—BURMA; Chin Hills, King's Collectors! Shan Hills, at Fort Stedman, King's Collectors!

62. ERYTHRINA LINN.

1. ERYTHRINA INDICA LAMK.

This is, save when planted, a purely littoral species and is common in the jungles along the sea-face from the Sundribans at the head of the Bay of Bengal down the Burmese and Tenasserim coasts, occurring also along the shores of the Andamans and Nicobars; it is as plentiful in remote outlying islets like Narcondam as it is in the larger ones. In all probability it never occurs inland except as an introduced tree.

2. ERYTHRINA STRICTA ROXB.

Add to localities of F. B. I.:—ASSAM, MANIPUR, CHITTAGONG, BURMA, very common.

This species is, on the other hand, apparently altogether an inland one; it is, to judge by the number of undoubtedly wild specimens sent to Herb. Calcutta, quite as common in Indo-China as it is in India.

In the F. B. I., E. Spathacea Wall. (Lith. Cat. n. 5065) is cited as E. indica. In the Catalogue Dr. Wallich only wrote "E. Spathacea?"; on the sheets themselves he wrote "E. stricta Roxb.;" further, he queries in the Catalogue whether the sheets marked 5965 B. and 5965 C. are the same as 5965 A. Sheets B. and C. came from Kamaon and Hardwar respectively; 5965 C. is not represented in Herb. Calcutta and the writer cannot therefore express any opinion respecting it. But sheet 5965 A. at Calcutta, which came from a tree grown in the Calcutta garden, is as the ticket upon it states, E. stricta and not E. indica, and sheet 5965 B. at Calcutta, collected in Kamaon by Mr. Blinkworth, is E. suberosa Roxb.

3. ERYTHRINA RESUPINATA ROXB.

This interesting little species was found again in 1884 by Mr. C. B. Clarke on Parasnath.

5. ERYTHRINA SUBEROSA ROXB.

VAR. GLABRESCENS; leaflets as in type, but glabrescent beneath at an early stage.

NORTH-WEST HIMALAYA; Kamaon, Blinkworth! Bashahr, Lace! SIKKIM; King! BURMA; Pegu, Adamson! Brandis! Kurz! Shan Hills, King's Collectors!

This is, at first sight, very unlike E. suberosa owing to the absence of tomentum from the under surface of the leaves; the leaflets, however, are in shape and size exactly as in typical E. suberosa while the flowers, pods and seeds are indistinguishable. In Langkawi, off the Kedah Coast, Mr. Curtis collected one specimen of an Erythrina as to flowers exactly like this plant but with intensely prickly branchlets,—one of the features of all the varieties of E. suberosa is that the branchlets are almost unarmed. In the absence, however, of leaves and of fruits it is not possible to identify Mr. Curtis' plant. Very near to this, if not actually the same species, is E. microcarpa Koord. & Val. from Java, of which, however, the writer has only seen leaves and pods, not flowers.
7. **Erythrina lithosperma** Miq.


There is no doubt as to the accuracy of Mr. Kurz’s statement that the Indo-Chinese plant is exactly the same as *E. sumatrana* Miq., from Sumatra, of which there are authentic specimens in Herb. Calcutta. But the Java plant described as "*E. lithosperma Bl."* by Miquel, to which Mr. Baker has referred the present species does not differ even as a variety from the plant of Sumatra, the Malay Peninsula and Burma. It must, however, be recollected that Mr. Kurz has noted that *E. lithosperma* Bl., as described by Miquel, is not the true *E. lithosperma* of Blume which, Kurz says, was a plant introduced to Java from Mauritius. Messrs. Koorders and Valeton, in their recently issued Java Herbarium, issue the Java form of the species under review as *E. lithosperma*. They have, however, issued it as "*E. lithosperma Miq.," not as "*E. lithosperma Bl."*—their reason for this being that Blume’s *E. lithosperma* is only *E. indica*, and that the name is thus left free, but on Miquel’s authority, not on Blume’s, to designate our species.

*Erythrina holosericea* Kurz, *Journ. As. Soc. Beng.* xlii. pt. 2. 69, the validity of which Mr. Baker has already doubted, is a spurious species manufactured by combining in one description the characters of the flowers of *E. ovalifolia* and of the leaves of *E. lithosperma* which had been sent to Herb. Calcutta, by an officer of the Indian Forest Department, under the idea that they belonged to the same tree. The citation of this composite "species" as *Coralloidendron holosericeum* by Kuntze in that author’s *Rev. Gen. Plant.* i. 172, in a passage where he takes the opportunity to (as the writer thinks) unnecessarily resuscitate an obsolete generic name, might lead to the belief that Kuntze had taken the trouble to verify the validity of the Kurzian species, as to the existence of which Baker had justly expressed a doubt. Obviously Kuntze has done nothing of the kind, and any one but a botanist would be inclined to conclude, from a citation such as this, that the object of much of the bouleverusement effected by priority-mongers is less the restoration of generic names that may have been improperly suppressed than the search for opportunities of posing as the authorities for species of whose characters they are ignorant.

63. **STRONGYLODON Vogel.**

1. **Strongylodon ruber** Vogel.

Add to localities of *F. B. I.*:—*Andamans*; very common, *Prain! King’s Collector’s!*

64. **Grona Lour.**

1. **Grona Grahami** Benth.

Add to localities of *F. B. I.*:—*Bengal*; Manbhum, *Campbell!*

65. **Galactia P. Br.**

1. **Galactia tenuiflora** W. & A.

*J. 11. 52*
It would, for the purposes of the field-botanist, be better to recognise some of the "varieties" of this species as distinct. The following appears to the writer to be the most satisfactory arrangement.

   Var. typica = G. tenuiflora proper in F. B. I.
   Var. minor = var. 2. minor Bak. in F. B. I. (G. tenuiflora var. B. W. & A.)

b. Galactia longiflora Benth. in Ann. Wien. Mus. ii. (1838); Wight, Icones t. 482.
   = var. 1. lucida Bak. in F. B. I. (Glycine lucida Grah.)

This is very justly kept up in the Index Kewensis; by a lapsus unavoidable in a work of such magnitude Glycine lucida, which is the same thing, is referred not to G. longiflora but to G. tenuiflora. The F. B. I. does not quote Wight's figure or refer to his description.

   Var. typica = var. 3. villosa Bak. in F. B. I.
   Var. latifolia = var. 4. latifolia Bak. in F. B. I.

No diagnostic marks require to be given, as those given by Mr. Baker could hardly be improved on.


There is no doubt whatever that this is, as Mr. Kurz says, a Teramnus. It is however only Teramnus flexilis with the rachis of all the racemes unusually short. In pretty well any plant of T. flexilis some of the racemes are to be found abbreviated in this fashion, and by judicious collection both the "species" may be obtained from one plant. In the Index Kewensis, pending further research, both names are quoted. The two are, however, based on the same specimen, and Galactia oxyphylla must be now treated as a synonym of Teramnus flexilis.

67. SPATHOLOBUS Hassk.

1. SPATHOLOBUS ROXBURGHII BENTH.

There are two very distinct forms of this species—one with leaves glabrescent beneath, the other with leaves densely silky beneath. The latter was distinguished as Butea sericophylla by Wallich, and issued under that name as Cat. n. 5541. The specimens obtained along the Sub-Himalayan tracts from Garhwal to Assam, and those from the Chin hills and the Khasia range are of the first form—those of the second form include the specimens from Southern India and those from Tenasserim and Pegu. There is not however a single character of flower or fruit that can be used to separate the forms, and they are not even strictly geographical, for in 1862 Dr. T. Anderson collected at 2500 feet elevation in Sikkim an undoubted example of the common S. India form, and on the other hand Mr. Lawson has recently sent to Calcutta one specimen of the North Indian form from Travancore. In Chittagong and Upper Burma the two forms appear to be equally common and to grow side by side.

The F. B. I. "variety" platycarpa is not confined to the Concan; specimens with pods as broad as those described have been collected in Central India, in the Sikkim Terai, and in Chittagong, while some of those from Burma have pods 2 1/4 in. across.
But there is no difference between the plants bearing the broad and the narrower pods; it is at times possible to collect both “varieties” on different parts of one plant.

1b. **SPATHOLOBUS BRACIEOLATUS** Prain, *Journ. As. Soc. Beng.* lxvi. 2. 76; leaflets subcoriaceous almost glabrous beneath all ovate-lanceolate, flowers small, buds shorter than the narrow-lanceolate bracteoles.

**MALAY PENINSULA;** Perak, on Gunong Batu Patch, 3000 feet elev., *Kunstler* n. 8079!

A slender creeper 15-20 feet long with sparsely rusty-pubescent branches. *Petiole* 1-5-25 in., rusty-puberulous; leaflets glossy bright-green with minute scattered rusty-brown hairs on both surfaces, subequal and subsimilar, lateral nerves 8-9 pairs ascending, prominent especially beneath; 8-9 in. long, 3-5 in. across. *Panicles* terminal and axillary 1-5-2 ft. long, branches 4-6 in., rusty-pubescent, pedicels very short; bracteoles 2 in. *Corolla* 15 in., pale-brown pubescent, lower teeth sublinear shorter than tube. *Corolla* rather larger than calyx. *Pod* not seen.

In general appearance this most resembles *S. Roxburghii*, but the flowers are very different; it may perhaps be the same as *S. Roxburghii var. denudata* Bak. from Penang, which is not represented in Herb. Calcutta. It is quite unlike any other Malayan species.


**MALAY PENINSULA;** Perak, common, Wray! Scortechini! Kunstler! *Penang;* common, King! Abrams! Curtis! Malacca; common, Griffith! Maingay! Derry! Goodenough! *Singapore;* Hullett! Ridley! *Distrib.* Sumatra; Borneo; Java.

A robust woody climber with densely ferrugineo-pubescent branches. *Petiole* 3-4 in.; leaflets dull-green puberulous throughout above, densely beset with spreading hairs and reticulate-venose beneath, at times densely rusty-silky; the bases rather rounded, the end-leaflet 5-6 in. long. *Panicle* 8-10 in.; branches densely rusty-pubescent; pedicels distinct 2 in. long. *Corolla* 2 in. long; teeth deltoid. *Corolla* claret-coloured to dark-blue; 25 in. long, standard as broad as deep, notched at apex. *Pod* as in *S. gyrocarpus*, softly velvety, semi-transparent, 3-5 in. long, 7 in. broad at base, 3 in. wide at seed-bearing tip.

Mr. Ridley has collected twice at Singapore what is apparently a form of this species with the leaves densely silky beneath, thus repeating within *S. ferrugineus* the relationship that within *S. Roxburghii* is borne by *Butea sericophylla* to the typical *Butea parvijiora*.

The nearest ally of the species is *S. gyrocarpus*; it is however readily distinguished by its nearly always rather smaller leaves; its always different tomentum, its always larger flowers with much longer pedicels, and its differently shaped, more persistent bracts.

3. **SPATHOLOBUS ACUMINATUS** Benth.

The basis of this species is *Butea acuminata* Wall. (*Cat.* 5443) from Martaban. Since Dr. Wallich first obtained the plant it has been again collected in Martaban by
Dr. Falconer and by Mr. Stoliczka; more recently it has been reported abundantly by Dr. King’s plant collectors from the Andaman group.

Mr. Baker finds that Wall. Cat. 5907 from Burma, as represented in Herb. Kew, is the same as Wall. Cat. 5443. He also is of opinion that Wall. Cat. 5908 may likewise be the same species. The latter is not represented in Herb. Calcutta, but in the Calcutta collection Wall. Cat. 5907 is the very distinct species here described as Spatholobus roseus. Mr. Baker adds that Wall. Cat. 9054 from Penang, which is also absent from the Calcutta collection, most probably belongs here, and on the strength of this probability gives Penang as a locality for the species; one objection to this is that, in another place, the F. B. I. identifies Wall. Cat. 9054 with Deris thyrsiflora. There is at Calcutta, however, an example of Wall. Cat. 8082, issued by Dr. Wallich as a Sapindaceous plant, that certainly is a Spatholobus and possibly belongs to this species. But it is strange that no one has collected the plant in Penang since Dr. Wallich’s time.

S. purpureus Benth., referred to under S. acuminatus is, as Mr. Baker suspects, very distinct. Its fruits have recently been reported by Mr. Talbot.

Mr. Kurz refused to accept, in his Contributions to the botany of Burma, the genus Spatholobus as distinct from Butea; in this there is no doubt that Mr. Kurz was wrong. Moreover, in enumerating Butea acuminata he attributes to it “white” flowers, whereas Mr. Baker describes them as being bright-red. Most unfortunately no one has ever recorded the colour of the flowers of true S. acuminatus, but in any case, on consulting Mr. Kurz’s specimens, it is found that he never himself collected either the true S. acuminatus or the true S. roseus, and that the specimens on which his S. acuminatus is based belong to the two different species here termed S. squamiger and S. riparius, which are quite distinct from each other and equally distinct both from Wallich’s original Butea acuminata and Graham’s Pongamia rosea.

Mr. C. B. Clarke collected in the Khasia Hills in 1871 a plant (Clarke n. 14981) that must be nearly related to S. acuminatus. Yet to the writer it hardly seems to be that species; its leaflets have longer caudate tips, its stipels are longer, its stipules are different and it is especially unlike S. acuminatus in having the twigs hirsute with spreading hairs. As yet this form has not been met with by any other botanist and there are neither flowers nor fruits at Calcutta.

3b. Spatholobus purpureus Benth. ex Bak. in Flor. Brit. Ind. ii. 194; leaflets coriaceous, oblong, shortly bluntly cuspidate, rounded at base, the lateral pair obliquely, flowers small, calyx puberulous, teeth oblong-obtuse half as long as tube; pod sessile not much narrowed to the thick tip; wing shining glabrous.

W. INDIA; Canara, Stocks! Talbot n. 1630!

A lofty climber with glabrous branches. Petiole 1–3 in. long, leaflets dark-green glabrous, shining on both surfaces, end-leaflets 3½ in. long. Panicles short, 3–6 in. long, dense; pedicels equalling calyx. Corolla dark-purple, much exserted. Pod 4 in. long, 7 in. across below, 6 in. across at thickened apex, quite glabrous.

Recently specimens of this, in fruit, have been collected by Mr. Talbot at Digghi Ghaut; these show that the species is a very distinct one.

3c. Spatholobus squamiger Prain; leaflets membranous ovate-acute tip mucronulate, base wide-cuneate, panicles longer than leaves,
bracts at origin large, flowers small, calyx obscurely downy, teeth oblong half as long as tube. Butea acuminata Kurz, Journ. As. Soc. Beng. xlv. pt. 2. 243 not of Wallich.

Pegu; Kurz 2596!

A large climber, branches glabrous. Petiole 1–2 in.; leaflets pale-green, end one 3–4 in. long, 1½–2 in. wide. Panicle over a foot long very much exceeding the leaves, the peduncle with a collar of large lanceolate scarious bracts, each ¼ in. long, at its origin from stem. Pedicels shorter than calyx. Calyx ½ in. long, teeth obtuse. Corolla white. Pod not seen.

This differs from S. acuminatus (which it otherwise closely approaches) in having more numerous and ascending, not almost transverse, lateral nerves; in having, if Mr. Kurz’ and Mr. Baker’s notes be accurate, white not red flowers; in having leaflets that are not at all cuspidate; and in having much longer panicles whose peduncles arise from woody nodes, the long leaf-scales of which surround their bases.

3d. Spatholobus roseus Prain; leaflets papery, elliptic, shortly widely obtusely cuspidate, rounded at base, glabrous on both surfaces, flowers small, calyx obscurely downy, teeth oblong shorter than the tube. Pongamia rosea Grah. in Wall. Cat. 5907.

Martaban; at Phanoe, on the Salween river, Wallich n. 5907! Upper Burma; Kendat, Frazer!

A large climber, branches glabrous. Petiole 4–6 in. long. Leaflets pale grey-green, terminal 8 in. long, 4 in. wide, very shining on upper surface, quite glabrous beneath from the beginning. Pedicels very short, pedicels a foot long, lax, very sparsely flowered. Calyx ½ in. Corolla rose-coloured three times as long as calyx, limb of standard broader than deep, emarginate. Pod not seen.

Perhaps this may prove to be the same as Griffith n. 1678 which is referred to in the F. B. I. but which is not at Calcutta; it has a pod 6 in. long. This differs from S. acuminatus in the thicker much larger leaflets, with much shorter tips; also in the longer more lax panicles. From S. crassifolius it differs in having much broader leaves with more numerous nerves, and in having obtuse, not* acute, calyx-teeth; its nearest ally is the next species which has, however, very much thinner leaves with different nervation.

3e. Spatholobus Listeri Prain; leaflets membranous ovate-acute tip hardly mucronulate, base wide-cuneate, glabrous beneath, panicles shorter than leaves, bracts at origin small, calyx obscurely downy, teeth oblong half as long as tube, pod sessile narrowed at tip, puberulous.

Chittagong; very common, List er n. 98 ! n. 293 ! n. 323 ! n. 345 !

A large climber, branches glabrous. Petiole 1–2 in.; leaflets pale-green, end one 6–7 in. long, 3 in. wide. Panicle 3–6 in. long, shorter than the leaves, peduncle with a few small scarious bracts at its origin from stem. Pedicels shorter than calyx. Calyx ½ in. long, teeth rounded. Corolla apparently pink. Pod finely downy, 3–5 in. long, 7½ in. below, ½ in. wide at seed-bearing apex.

Very near to S. squamiger, having similar but larger leaves and laxer much shorter panicles that have much smaller and fewer bracts at their point of origin; also very near S. acuminatus but with different leaves, rather laxer panicles and a different pubescence on pod.
3f. Spatholobus merguensis Prain; leaflets very thick and rigid, oblong shortly cuspidate, base rather narrowly cuneate, quite glabrous on both surfaces, panicles rather shorter than leaves, bracts at their origin small, calyx finely downy, teeth triangular half as long as tube; pod not seen.

Mergui Archipelago; J. Anderson! Proudlock!

A strong climber, branches glabrous lenticelled. Petiole '5–1'5 in., leaflets 4 in. long, 2 in. wide. Panicle 3–5 in. long, almost equalling the leaves, peduncles with a few small scarious bracts at its origin from stem. Pedicels as long as calyx. Calyx '1 in., teeth subacute. Corolla claret-coloured.

Very near to S. Listeri and S. rossus; while resembling these in inflorescence it has a different calyx and very dissimilar leaves. The leaves, though somewhat unlike in shape, have the venation and consistence of those of S. crassifolius which species has, however, a totally distinct inflorescence and quite different flowers.

5. Spatholobus riparius Prain; leaflets thick, very rigid, obovate-obtuse, cuneate at base, lateral slightly obliquely, glabrous above, sparsely shortly puberulous on the nerves beneath, flowers small, calyx obscurely downy, upper and lower teeth oblong, lateral triangular, nearly as long as the tube, pod sessile narrowed to the tip.

Tenasserim; on Taepo, 5000 feet, Gallally! Pegg; on Tounkyeghat, Kurz n. 1709!

A low spreading tree (vide Gallally) hanging over streams. Leaflets very rigid but not so thick as those of S. crassifolius, with 6–8 pairs of almost straight, oblique lateral nerves much raised on both surfaces, cross reticulations beneath very distinct; shining above, dull beneath. Panicles a foot long, pedicels shorter than calyx. Calyx '1 in. Corolla pink, 2 in. long, limb of standard hardly as broad as long, emarginate at tip. Pod semi-transparent, finely downy, 3–5 in. long, '6 in. across below, '3 in. wide at thickened apex.

To this, owing to its having the same very distinctive calyx, the writer has referred Mr. Kurz's n. 1709 (which formed part of Butea acuminata Kurz, not of Wall.), although Mr. Kurz's specimen has not any leaves. By the leaves alone this is remarkably distinct from any of the other Indian species of Spatholobus. Possibly it may turn out to be the same as Pongamia rigida Grab. in Wall. Cat. 5908, which is not at Calcutta; should this prove to be the case the species must be known as Spatholobus rigidus.

6. Spatholobus maimayi Prain, Journ. As. Soc. Beng. Ixvi. 2. 79; leaflets thick and rigid, oivate-acute, rounded at the base, glabrous beneath, flowers small, calyx adpressed brown-puberulous, teeth all rounded one-third the length of tube; pod unknown.

Malacca; Maimay 611! Perak; Kunstler 3535! 4652! 6906! 10425! Scortechini 206! 1537! Wray 1270! Singapore; Ridley!

Branches glabrous. Leaflets rather like those of S. acuminatus but thicker, shorter, quite glabrous, 3 in. long, 1'75 in. wide. Inflorescence in terminal and axillary panicles 6–8 in. long. Pedicels shorter than calyx, bracts minute persistent. Calyx '12 in. long. Corolla '23 in. long, standard orbicular very slightly emarginate.
A very distinct species, which has in the field been referred by Father Scortezhini to Derris § Aganope and supposed by that learned botanist to be perhaps Miquel's Derris macrophylla. The presence sometimes, though not always, of stipels shows, however, that the plant cannot well be a Derris and indicates that it is almost certainly a Spatholobus. It is unfortunate that, of all the gatherings reported, not one should be in fruit.

7. Spatholobus dubius Prain, Journ. As. Soc. Beng. lxvi. 2. 79; leaflets rigid-ovate, acute, rounded at the base, adpressed-puberulous beneath, flowers small, calyx adpressed-pubescent, teeth half as long as tube triangular except the 2-fid upper; pod unknown.

Penang; on Gunong Bubu, Kunstler 7585! Penang; Curtis!

A large climber 100-150 feet long, stem 6–8 in. in diam. Leaflets like those of S. Maingayi but thinner, adpressed-puberulous beneath, and often larger, 2-6 in. long, 1½–3 in. wide; the upper leaves are at times 1-foliolate as in S. braeckeiolatus and in S. littoralis Hassk. Inflorescence in terminal and axillary spreading panicles, the former 8 in. the latter 4 in. long, sometimes several in same axil. Bracts small persistent. Calyx 12 in. long. Corolla 25 in. long, pure-white, standard orbicular retuse.

Also a very distinct species, but, like the preceding, in the absence of fruit not absolutely certainly a Spatholobus. It appears to be nearest to S. littoralis Hassk., from which it differs in having the lip of calyx toothed and in having the leaves uniformly adpressed-puberulous beneath.

8. Spatholobus Ridleyi Prain, Journ. As. Soc. Beng. lxvi. 2. 80; leaflets rigid, chartaceous, oblanceolate, apex acuminate, quite glabrous beneath, flowers small, calyx adpressed-pubescent, teeth very unequal, upper truncate the others rounded half as long as tube, pod sessile narrowed to the tip.

Singapore; cult. in Bot. Garden, original locality not given; Ridley 6401!


A very distinct species, though nearest to S. macropterus Miq., from Sumatra.

69. MASTERSIA BENTH.


There is only one species; therefore Mr. Bentham's name, which is nine years prior to that used in the F. B. I., must stand.

70. CANAVALIA ADANS.

3. Canavalia turgida Grah. in Wall. Cat. 5534; leaflets ovate or oblong acute rarely obtuse, racemes few flowered, pod few-seeded turgid;

LACCADIVES; Minikoi, Alcock ! Sundarbuns; Kurz ! Clarke ! Heinig ! S. India; Cochin, on sandy coasts, Rheede; Islands at mouth of Godaveri, Roxburgh. Burma; Arracan, Kurz ! Pegu, Prain ! Martaban, Cleghorn. ANDAMANS and NICORAS; common on the coasts. PERAK; SCORTECHINI ! Kunstler ! PENANG; WALLEN ! SINGAPORE; Hullet !

A glabrous perennial, climbing on bushes along the coasts. Leaflets as in C. ensiformis. Flowers as in C. ensiformis but fewer. Pod 5 in. long, 2-2½ in. wide, very turgid.

There is no doubt that this plant is specifically distinct from C. ensiformis, with which it has been placed in the F. B. I.; the separable endocarp at once amply differentiates it. This, however, is the plant to which the name C. obtusifolia properly belongs. For C. obtusifolia DC. is Dolichos obtusifolius Lamk. and Dolichos obtusifolius Lamk. is the plant figured by Rheede (loc. cit.). It is, moreover, Dolichos rotundifolius Vahl., of which indeed De Candolle had seen a specimen, thus confirming the conclusion that Roxburgh had already formed. This, from his drawing, is without any possibility of doubt Roxburgh’s Dolichos rotundifolius.

The plant named C. obtusifolius in the F. B. I. is certainly the plant figured by Dr. Cleghorn (Madr. Journ. n. s. i. t. 4) and is in all probability the Chinese plant that Roxburgh named D. obcordatus. The pods of the two are quite alike and differ totally from those of C. turgida. The writer cannot, however, separate this Madras and Chinese species from Dolichos lineatus Thunbg. (Canavalia lineata DC.), either by Thunberg’s or De Candolle’s descriptions, by the specimens in Herb. Calcutta received from Japan, or by the figure published in the Somoko Dusets, ed. ii. xiii. t. 20. In this indeed he only agrees with Mr. Baker. The true name of the C. obtusifolia of the F. B. I. is therefore C. lineata DC. In any case the species now being discussed should be put in some particular place; as arranged in the F. B. I. it is given, if it comes from India, under C. obtusifolia and, if it comes from Malaya, is made a variety of C. ensiformis; it cannot well be both.

71. DIOCLEA H. B. K.

1. Dioelea reflexa Hook. fil. Leaves beneath sparsely hairy or glabrescent.

Add to synonyms of F. B. I.:—Dolichos hexandra Roxb. Hort. Beng. 55; and delete the synonyms D. javanica and D. Fergusonii. Add to localities:—Andamans; very common.

Roxburgh’s Dolichos hexandra came from Silhet where Hooker and Thomson also afterwards found the species; in Herb. Calcutta Roxburgh has left a beautiful coloured figure of the plant. It is particularly plentiful in the Andamans. The vexillary stamen in both the Indian Dioclea is free at the base though not above; is rather shorter than the others and has a perfect anther; the anthers of the 9 stamens united in the keel-sheath are alternately perfect and abortive; there are thus 5 perfect anthers in the sheath and a sixth perfect on the vexillary stamen; hence Roxburgh’s very excellent specific name.

Chittagong; Kodala Hill, King's Collector! Ceylon; Ferguson! (Thwaites, C. P. 3817) ! Malacca; Maingay! Perak; common, Kunstler! Wray!

Leaflets not exceeding 4 in. in length, puberulous above and always densely velvety beneath. Flowers and pods as in D. reflexa, of which, as Mr. Baker thinks, this may be but a form. The two are, however, so easily recognised that it seems better, from the field-botanist's point of view, to keep them apart.

72. Pueraia DC.

1b. Pueraia sikkimensis Prain; calyx densely silky, teeth sub-obtuse shorter than the tube, bracts as long as buds, lamina of wings oblique sub-pathulate.

Sikkim; Terai, Anderson! Gamble! G. Gammie! Teesta valley, King! Rungeet, 1000 feet elev., Clarke n. 27263!

Stems wide-twining, young branches rusty-puberulous. Leaflets membranous, very broadly rhomboid, acute, terminal 6 in. long by 7 in. wide, glabrous above, very sparingly adpressed-pubescent beneath. Flowers in dense clustered racemes and panicles from nodes along the stem, usually only 4-6 in. long, pedicels short densely fascicled, densely rusty-tomentose as are the lanceolate bracts 25 in. long, and the rachis. Calyx 3 in. long, densely rusty-tomentose. Corolla large, 75 in. long, limb of standard orbicular, auriculate, 5 in. wide. Pod unknown.

A very distinct species, nearest to P. tuberosa, but very readily distinguished by its rusty instead of grey-silky pubescence, its larger bracts, and its much larger flowers.

2. Pueraia Candollei Grah.

Add to localities of F. B. L.:—Andamans; Coco Group, Prain!


Add to localities:—N.-W. Himalaya; Hardwar, Wallich!

Dr. Wallich's 5352 C., issued by some extraordinary oversight as Pueraia tuberosa, is this species. An original specimen of Dolichos frutescens, to which Dr. Hamilton has himself added name and manuscript description, shows that that species is Pueraia Wallichii. The writer is of the same opinion regarding P. composita Grah. as is Mr. Baker, and cannot follow Mr. Kurz even to the extent of making Graham's Burmese plant a variety of P. Wallichii.

A careful examination of the now abundant material of this species both from India and from China shows that Mr. Bentham's two proposed species are not separable even as varieties. Recently the species has been obtained by Mr. Clarke and by the writer in the Naga Hills of Upper Assam, and by Dr. A. Henry in Hupeh, so that its geographical area is probably continuous from Japan to Sikkim, where it is quite common.

7b. PuEraria CoLettii Prain; shrubby when young, sometimes climbing when older, pedicels in flower not exceeding the small calyx; pod pubescent 8–10-seeded. PuEraria sp. nov. Coll. & Hemsl., Journ. Linn. Soc. xxviii. 48.

Upper Burma; Shan Hills at Ywangoen, 4000 feet, Collett 654! Maymyo, King's Collectors! Fort Stedman, Indine, Taungyi, Saga, etc., very common, King's Collectors!

Perennial; when shrubby 5–6 feet high, with subterete velvety branches. Leaflets thickly membranous, usually densely velvety on both surfaces and not losing their tomentum even when aged; end one ovate-acute, 5–7 in. long, base cuneate from the middle, lateral similar but with oblique base, externally slightly rounded. Racemes spicate axillary, canescent, 8–10 in. long; bracts small soft usually falling; pedicels in fruit 25 in. Calyx 2 in., velvety. Corolla '4 in., purplish. Pod linear, flat, pale, 2 in. long, 25 in. wide, very uniformly 10-seeded, occasionally 1 or 2 abortive.

This is extremely near P. stricta Kurz, but differs in having longer axillary racemes with soft hardly persistent bracts; in having pubescent pods with thicker valves and in having densely pubescent, indeed almost velvety leaves, the pubescence persisting even when the plant is in ripe fruit. Sir H. Collett and Mr. Hemsley had already decided that this was probably an undescribed species, but in the absence of fruit were unable to provide a diagnosis. It is therefore named in honour of Sir Henry, who first collected it.

Sir Henry found it an erect shrub, as have all our native collectors save one, who notes that at Maymyo it was climbing. It is very strange that although this species has now been found so plentifully, none of our Calcutta collectors have again met with P. stricta, P. hirsuta or P. brachycarpa, three species described in this Journal (vol. xlii) by the late Mr. Kurz, and all of them described from rather inadequate material; none of the three are in flower and of none were there duplicate specimens for distribution, so that Mr. Baker when dealing with the genus in the Flora of British India had seen no specimens. That P. hirsuta is very distinct is certain; its leaflets have 8–10 pairs of lateral nerves that are of equal strength. Otherwise its general appearance is exactly that of the other three species, all of which have primarily sub-3-nerved leaflets, owing to the lowest pair of lateral nerves being stronger than the others. P. brachycarpa indeed looks as if it might only be a short-podded variety of P. stricta, and it is within the bounds of possibility that when their flowers are known it may be necessary to reduce the one to the other and to unite P. Collettii with the two.


The synonym usually quoted as Phaseolus decurrens is an error for P. decurvus, the latter being what Graham and Wallich actually wrote.

10b. PuEraria sueSpicata Benth. Journ. Linn. Soc. ix. 125; Kurz

North Bengal; at Dingra Ghat, Kurz! E. Bengal; Mymensingh, Clarke n. 7950! Sikkim; at Selim, 1000 feet, Clarke 36867! Bootan; Parkes! Duars; Mahakulgiri, Heawood! Silhet; Wallich 5557 A! Clarke 18502! 14341! Assam; Masters! Simons! Khasia; Clarke 44995! Naga Hills; Clarke 40819! Chittagong; very common, King's Collectors! Burma; Pegu, Wallich 5563! R. Scott! Arracan; Kurz! Tenasserim; Helfer! Gallatly!

It is impossible to assent to the reduction of this species to P. phaseoloides; the leaves are almost always more deeply lobed, the flowers are always very much larger—the calyx being 33, the corolla 8–1 in. long.; the pods are usually longer, are always broader and have the sutures, especially the dorsal, slightly thickened. There are moreover no intermediates to be found among the specimens in Herb. Calcutta, which include representatives of 20 gatherings of P. phaseoloides and 27 gatherings of P. subepicata.

73. PHASEOLUS LINN.

The species of Phaseolus cultivated and wild in India, stand much in need of careful revision and comparison with the types of the species originally named by Linnaeus. This remark applies with especial force to the species and forms of the section Strophostyles. Many very competent botanists have dealt with the subject in the light of Herbarium material in Europe; the only author who ever really knew the plants themselves was unable to collate his knowledge with the early references. And till another author who knows the plants themselves as Dr. Roxburgh knew them shall be able to deal with the subject, it is impossible to hope for a disentanglement of their very vexed synonymy or indeed to decide their exact specific limitation.

3. PHASEOLUS ADENANTHUS G. F. MEY.

Add to localities of F. B. I.:—Andamands; sea-coasts, King's Collectors! Narcondam, Prain!

4. PHASEOLUS TENUICAULIS BAK.

The specimen of P. sublobatus var. tenuicaulis Grah.—the basis of this species, is at Calcutta indistinguishable from Dolichos falcatus Klein.

8. PHASEOLUS ACONITIFOLIUS JACQ.

In the Index Kewensis it is stated that Roxburgh's P. aconitifolius of the Hortus Bengalensis and of the Flora Indica is not this species but is P. trilobus.

This is not what is said either by Wight and Arnott or by Baker; these authors are right. The Index Kewensis citation is perhaps based on the fact that on a figure of P. trilobus sent to the E. I. C. Museum, Roxburgh wrote "P. aconitifolius" by a lapsus calami. This has been mentioned by Wight and Arnott; but both in his Hortus Bengalensis and in his Flora Indica, Roxburgh indicated by the name P. aconitifolius the plant known in India as the Moth, which is undoubtedly P. aconi-

10. PHASEOLUS PAUCIFLORUS DALZ.

Add to localities of F. B. I.:—Rajputana; Mt. Abu, King!
This does not appear to the writer to differ specifically from *P. calcaratus*, though it seems a fairly distinct variety.


The writer quite agrees with Mr. Baker in considering that *P. Max* Roxb.—the *Krishna Mung*, and *P. aureus* Roxb.—the *Sona Mung*, are only varieties of *P. Mungo* Roxb.—the *Mung* itself. But the *Mash* or *Urd*, which is a totally different plant, yielding an entirely distinct crop, hardly deserves to be treated as specifically identical with *Mung*. The two plants perhaps differ as species of subordinate rank only, and from the monographer's point of view may be sufficiently differentiated if treated as subspecies. But in a *Flora* no good purpose is served by introducing academic refinements of this kind into the discussion, and it is better to treat the two plants apart from each other, as Indian cultivators and Government officers, from the necessities of the case, are compelled to treat them.

The unfortunate thing is that the name which Linnaeus gave to *Mung*, as is shown by his diagnosis and his reference to Dillenius' excellent figure in *Hort. Eltham.* t. 235, f. 304, does not conserve the vernacular name of the plant. This would not, of course, have mattered very greatly had Linnaeus not at a later date used the word *Mungo*, as his description of the plant shows, to designate not *Mung*, but *Tikari*. Roxburgh endeavoured to set matters right by reversing the names;—Roxburgh's *P. Mungo* is *Mung*; his *P. radiatus* is *Mash*. In Mr. Baker's account of the plants Roxburgh's treatment is followed, for the *P. Mungo* of the *Flora of British India* is *Mung* and is Roxburgh's *P. Mungo*, but not *P. Mungo* Linn.; Mr. Baker's *P. Mungo var. radiata* is Roxburgh's *P. radiatus*, but most certainly is not *P. radiatus* Linn., for it is not the plant figured by Dillenius.

The variety *glabra* of the *F. B. I.* (which is *P. glaber* Roxb., a plant introduced to the Calcutta garden from Mauritius) is a variety of *P. calcaratus*. The variety *Wightiana* is not a form of *Mung* but of *Mash*, as its short ascending pods show. And the writer thinks it possible that in *P. trinervius* of the *F. B. I.* (an older name for which is *P. sublobatus* Roxb.) we have the wild form from which perhaps both *Mung* and *Mash* have originated. All three, however, deserve, he believes, to be considered equally distinct now.

The three leading varieties of *Mung* (*P. radiatus* Linn.) may be readily distinguished as follows:—


3. **Var. grandis**; foliage medium-green, pods longer, spreading, seeds black. *P. Max* Roxb. *Flor. Ind.* iii. 295 *vix Linn.*, *Krishna Mung*, the least esteemed form of *Mung*. This is certainly an introduced form, probably from the Chinese Empire where it is widely grown from Shanghai to Yarkand. In S. China it is called *Luton*, "green-beans" (*A. Henry* n. 68); in Yarkand Dr. Scully notes that *this* is what is known as *Mash*, a name that in India is restricted to *P. radiatus* Roxb. (P. Mungo Linn.)—the *Mash*Kulai or *Urd* crop.

*P. Max* Linn. is a composite species. Wight and Arnott say that the plant from Hermann's herbarium included here, and on which the species was probably based,
has no flowers. The American plant quoted by Linnaeus under P. Maz is, according to Savi, a distinct species P. Hernandezii; the Cadelium of Rumphius (Herb. Amboin. v. t. 140) also quoted, is obviously a form of Glycine hispida Maxim., the Soy or Soja.

11b. Phaseolus Mungo Linn.

Of this there are two fairly distinct forms: —


2. Roxburghii; stema hirsute, diffusely spread but not scandent, seeds grey. P. radiatus Roxb. Flor. Ind. iii. 296 not of Linn. P. Roxburghii W. & A. Prodr. 246. “Udidi” Rheede Hort. Malab. viii. 50. The Urd or Māsh-Kulai; a very important Indian crop, totally different from, and much more important than, the Māng crop. Phaseolus subvolubilis Ham. in Wall. Cat. 5605, refered in the P. B. I. to the first form, is at Calcutta P. calcaratus Roxb. P. setulosus Dalz, referred in the F. B. I. to the second, has pods and seeds like those of P. trinervius, of which the writer treats it as a variety.


In a monograph of the genus Phaseolus the writer would feel inclined to reduce this (but as a sub-species, not as a mere variety) to P. Mungo in the wide sense which would make P. Mungo include both the Māng and the Māsh-Kulai under one name. In this plant we probably see the wild stock whence both cultivated plants were originally derived. Here there are three fairly distinct forms, though the two first are very close to each other and can only be separated by the colour of their tomentum; their pods and seeds are identical, as are their flowers. In the Flora of British India the two are referred to different species.


Behar westward to the Concan; thence south to Ceylon; Arracan.


Concan and Western Deccan only.

3. Var. grandiflora; flowers large, tomentum on stems and pods reddish. P. trinervius Kurz, Journ. As. Soc. Beng. xlv. pt. 2. 249 hardly of Heyne. This may prove to be more than varietally distinct, the septa between the seeds being decided narrower than in the two preceding varieties.

Burma; Pegu, Kurz, 1725! Martaban, Falconer 620! Distrib. Sumatra, Java.

Dr. Roxburgh’s name for this species has been omitted from the Flora of British India; regarding the plant Roxburgh intends, which is the Gora-māng, dispute is impossible, both on account of the native name and from Roxburgh’s figure. In the Index Kewensis Roxburgh’s P. sublobatus is given as = P. trilobus, an impossible identification for which the writer has failed to trace any bibliographic authority.

12b. Phaseolus Ricciardianus Ten. Ind. Sem. Hort. Neap. (1833) 4; stems flexuose clothed with fine deciduous spreading hairs, stipules large lanceolate, leaflets entire or faintly lobed, racemes usually branched,

**VAR. macrocarpa**; pod large, flat.

**NAGA HILLS**; Kohima, Watt. n. 734! CHITTAGONG; Kodala, King's Collector.

Leaflets narrowly ovate-lanceolate, 3-4 in. long by 1½-2½ in. wide; stipules 4 in. long, fixed a little below middle. Flowers yellow, 65 in. long, lower pedicels twice as long as calyx, bracteoles shorter than calyx. Pods 5 in. long, 4 in. broad, distinctly compressed, 8-10-seeded, seeds brown 2½ in. long, 2 in. across, with prominent white hilum set on one side towards lower end of seed.

It is with some dubiety that this Phaseolus is here referred to *P. Ricciardianus*. The stems, leaves and flowers agree well with those figured by Savi, and still better with those of Japanese specimens named *P. Ricciardianus* by Mr. Maxiowicz. But Savi (loc. cit.) describes the pod as terete and has figured a pod that is much smaller than the one in this plant. Not impossibly this Naga and Lushai vegetable may yet prove to be a distinct species.

13. **Phaseolus calcaratus** Roxb.

Very commonly cultivated and very variable. Besides the typical form, the following varieties may be noted:

a. **VAR. major**; foliage and tomentum as in type but flowers much larger. *P. hirtus* Wall. Cat. 5593 not of Retz.

KHASIA; Nunklow, Clarke n. 44819! NAGA HILLS; Jotsoma Prain! BURMA; cult. on the Salween, Wallach! Shan Hills, King's Collector!

This only differs from ordinary *P. calcaratus* by its larger flowers, and may be no more than a form of the type.

b. **VAR. glabra**; foliage and habit of **VAR. major** and of the type but leaves and stems almost glabrous; flowers as in **VAR. major**. *P. glaber* Roxb. Hort. Beng. 55.

PANJAB; at Pathankote, Clarke 21964! SIKKIM and BOOTAN; not uncommon. SILHET; Gomez (Wall. Cat. 5549 G. and 5589 H.) KHASIA; Clarke 14684! G. Mann 38!

Roxburgh describes the plant as not twining in the Calcutta garden; it does, however, twine when it has opportunity. The gatherings quoted will be found to agree extremely well with the plant Roxburgh depicts. In any case his *P. glaber* can by no possibility be a form of *P. Mungo* even in the widest sense; its pods are glabrous and, as if this were not sufficient, its seeds, as delineated by him, have not the hilum of Mung or of Māsh-kalai, but have the very different hilum and are quite the shape of those of the *Sutri* which is *P. calcaratus*; indeed, **VAR. glabra** is even less easily separable from typical *P. calcaratus* than is **VAR. major**. Wall. Cat. 5549 G., at Calcutta (which ought to be *Vigna Catjang* Endl.) is this same plant!


*P. torosus* Roxb. Flor. Ind. in. 298 only differs from this in having
pods torulose when ripe, and is probably but another form of the variety. Roxburgh received it through Buchanan-Hamilton from Nepal.

This is the very puzzling crop, sometimes called *Khasia Māng*, but known to the Khasias themselves as *Rumbajia*. It is certainly not a form of *P. radiatus*—the true *Māng*, still less is it a form of *P. Mungo*—the *Urd*. It does not, however, in the writer’s opinion deserve to be considered a distinct species, the flowers and fruits are so exactly of typical climbing *P. calcaratus*.

d. **Var. gracilis** Prain, Journ. As. Soc. Beng. lxvi. 2. 50; stems very slender twining, quite glabrous as are the leaves; leaflets usually narrower than in var. *typica*; flowers and pods as in the type.

**Malay Peninsula; Perak,** very common in open grassy places, *Kunstler* 990! 1035! 2467! *Wray* 1756! *Scortechini* 1476! *Pahang, Ridley* 1124! *Distrib. Sumatra* (Forbes!)

*Phaseolus subvolubilis* Ham. in Wall. Cat. 5605, referred at Kew by Mr. Baker to *P. Mungo* happens in Herb. Calcutta to be *P. calcaratus*.

14. **Phaseolus fuscus** Wall.

This has a naked style with a capitate stigma, and therefore not only is not a *Phaseolus*, but does not even belong to the subtribe *Euphaseoleae*.

15. **Phaseolus velutinus** Grah.

This species, placed in the same section as the preceding, has no better right to be included in the genus *Phaseolus*; quite as certainly it is not at all nearly related to *P. fuscus*; both are members of the tribe *Phaseoleae*; there all comparison between them ends. The nearest ally of *P. velutinus* is *Vigna lucens*, Bak., from which it is hardly distinguishable by foliage, by fruit, or by inflorescence, and is only to be separated by its larger flowers. Mr. Kurz has already pointed out that the two are unmistakably congeneric; he has, however, proposed to treat them as *Canavalia*. They do, as to pods, a good deal resemble *Canavalia*, but their stigmas being bearded differ so greatly that it is inconvenient to adopt Mr. Kurz’s proposal, and a preferable course is to treat this as the type of a distinct genus which will include *Vigna lucens* as well.

73.* **Dysolobium Prain.**

(*Phaseolus § Dysolobium* Benth. Pl. Jungh. 239, footnote.)

Twiners, usually woody, with 3-foliolate stipellate leaves. *Flowers* in copious axillary racemes, bracteoles inconspicuous deciduous, *Calyx* campanulate, the lower tooth lanceolate longer than the rest, but shorter than the tube, the two uppermost connate. *Corolla* much exserted, keel beaked and sometimes distinctly curved and laterally deflexed. *Stamens* diadelphous; anthers uniform. *Ovary* sessile many-ovuled, style filiform bearded below the oblique stigma. *Pod* thick woody suberete oblong villous, very markedly septate, with double septa between the velvety seeds. Species 4, Indian.

This genus is made to comprise four undoubtedly congeneric forms, three of which constitute the group *Dysolobium* founded by Bentham in 1851 (*Pl. Jungh. 239*)
as a section of *Phaseolus*. In the *Genera Plantarum* (i. 539) Bentham and Hooker, while still recognising the group, doubt whether it constitutes a section of *Phaseolus*, and suggest that it may be found preferable to refer it to *Vigna*. The natural character of the group is, however, somewhat marred in the *Genera Plantarum* by the inclusion of a species figured by Wallich as a *Phaseolus* (*Pl. As. Rar.* i. 6, t. 6) which Kurz has clearly shown to be a *Dunbaria* (*Journ. As. Soc. Beng.* xliii. 2, 186 ; xliv. 2. 255). Kurz, who treated the group in the sense originally understood by Bentham, recognised quite clearly that it can by no possibility be included in *Phaseolus*; he has consequently adopted a suggestion made in a MSS. note that Wallich has left in Herb. Calcutta, and referred all the *Dysolobium* to *Canavalia*. For this, at first sight, there is something to be said; the structure of the pod in all the species is very much that of *Canavalia*. When, however, it is considered that the calyx differs altogether from the calyx of *Canavalia*, that the style is bearded, and that the seeds are hirsute, it seems less convenient to adopt Wallich's suggestions than to adopt Bentham's. Baker has attempted a compromise; in the *Flora of British India* he still treats *Dysolobium* as a section of *Phaseolus*; he leaves it in, however, only two forms, viz. — the species of the group that has the longest beak to its keel, and the *Dunbaria* that has, by inadvertence, been cited as a *Dysolobium* in the *Genera Plantarum*; the other two he has referred to *Vigna*. The last species of the group he has, in the absence of flowers, dealt with tentatively as a *Psophocarpus*. Taubert (in Engler's *Natürlichen Pflanzenfam.* iii. 3, 380) has thrown no new light on the affinities of the group; on the contrary he has accorded it, without qualification of any kind, the treatment and the position regarding which the authors of the *Genera Plantarum* have so expressly enjoined caution.

That the group as originally recognised by Bentham forms, in consequence of its firm, septate pods and its hirsute seeds one of the most natural and definite genera in the whole of the *Phaseolidae* does not, the writer thinks, admit of question; to settle the dubiety that has prevailed as regards its proper position, it seems to the writer most convenient to adopt Mr. Bentham's name in a generic sense and to treat the forms it covers as a group apart alike from *Canavalia, Phaseolus* and *Vigna*.

**Key to the Species.**

**Racemes lax long-peduncled, flowers large; pods closely velvety-villous, seeds sparingly velvety; (pods keeled along suture but not winged) —**

Leaflets rounded cuspidate, chartaceous, hirsute on nerves beneath; flowers 1·75 in. long, keel with long laterally deflexed beak, style bearded down the face ... 1. *D. grande.*

Leaflets narrowed to a point, membranous, glabrescent; flowers only 6 in., long, beak of keel not deflexed, style penicillate round stigma ... 2. *D. lucens.*

Racemes dense short-peduncled; flowers small (3 in. long or less); pods softly hirsute with long hairs, seeds densely velvety; (beak of keel not deflexed) —

Leaflets roundish cuspidate; pod neither keeled nor winged 3. *D. dolichoides.*

Leaflets lanceolate; pod subquadrangular, prominently winged along the angles ... 4. *D. tetragonum.*
1. **Dysolobium grande** Prain. Phaseolus grandis Ham. in Wall. Cat. 5602; Benth. in Pl. Jungh. i. 239 footnote; not P. grandis Dalz. P. velutinus Grah. in Wall. Cat. 5615; Bak. in Flor. Brit. Ind. ii. 204. Canavalia grandis [Wall. MSS. in Herb. Calcutta]; Kurz. in Journ. As. Soc. Beng. xliii. 2. 185 and xliv. 2. 252.

North Bengal; Kurz! Sikkim! T. Anderson! Khasia; at Nungpo, Clarke n. 40703! G. Mann! Assam; at Goalpara, Hamilton (Wall. Cat. 5602)! Jenkins! Masters! Burma; Taong Doung Mts., Wallich (Cat. 5615 A)! Shan Hills, at Fort Stedman, Saga, etc., common, King’s Collectors! Distrib. Yunnan (J. Anderson!)

This species has a very long, deflexed beak to the keel of the corolla, hooked round so as almost to complete a spiral; in this respect it resembles, to a considerable extent, a Phaseolus; its pods and seeds are however totally unlike those of any Phaseolus. Nothing requires to be added to Mr. Baker’s excellent description.

In reducing this species to Canavalia Mr. Kurz has omitted to state that he was only following the treatment already proposed by Dr. Wallich in a manuscript note dated “25th October 1833.”


Chittagong; Hooker and Thomson! Pegu; Kurz n. 2550! Rangoon Cleghorn! Tavoy; Gomez (Wall. Cat. 5601!)

So remarkably like the preceding that without flowers it is difficult to distinguish the two species. The flowers are, however, very unlike; in the present plant they are less than half the size and have a much shorter beak to the keel than in D. grande. Again nothing can be added to Mr. Baker’s clear description.


Silhet; Wallich (Cat. n. 5600 A)! Hooker and Thomson! Assam; Jenkins! Masters! Simons! Chittagong; Clarke n. 8312! Arracan; Kolodyne valley, Kurz!

This, with the next species, makes a very distinct section of the genus Dysolobium.

4. **Dysolobium tetragonum** Prain; stems woody, brown-pubescent, leaves subcoriaceous entire lanceolate prominently veined; with copious adpressed bristly hairs, racemes many-fld. sub-sessile or shortly peduncled, corolla middle-sized, pod stout short straight square, the angles winged, the faces densely clothed with persistent firm short spreading greyish-brown hairs. Psophocarpus sp., Bak. in Flor. Brit. J. ii. 54
Ind. ii. 212. Canavalia tetragona Kurz MSS. (on specs.); Vigna tetragona Kurz MSS. (on covers) in Herb. Calcutta.

NORTH BENGAL; Alipur Duars, Heawood! Assam; Masters; G. Mann!

Stem wide-twining, densely clothed with persistent pale-brown pubescence. Stipules lanceolate minute; leaflets entire 4-6 in. long, 75-1 in. wide, bristly-hirsute on both surfaces. Racemes 2-3 in. long, sometimes nearly sessile; pedicels shorter than the calyx, bracteoles minute lanceolate. Calyx 1 in., clothed with adpressed hairs; teeth deltoid, lowest lanceolate. Corolla blue (Heawood), 3-4 times the calyx. Pod 2-2.5 in. long, '5 in. wide, firm, septate; the angles distinctly winged as in Psophocarpus.

Very nearly related to D. dolichoides, but amply distinct by its narrow leaflets and its Psophocarpus-like pods. Mr. Kurz apparently refrained from publishing this species because, like Mr. Baker, he only knew the plant in fruit. Excellent flowering specimens with full MSS. notes of the plant have recently been supplied by Mr. Heawood from the Alipur Duars, so that a description can now be given. In foliage and habit this greatly resembles Vigna Clarkei, but in that species the hairs on petioles and stems are reflexed, the flowers are yellow, and the pod is almost exactly like that of Vigna pilosa.

74. VIGNA SAVI.

2. VIGNA LUTEA A. Gray.

Add to localities of F. B. I.:—Ceylon; Thwaites! Laccadives; Alcock!

It is pointed out in the Index Kewensis that the oldest name for this, as a Vigna, is \( V. \) retusa Walp. Rep. i. 778, and the name \( V. \) lutea has accordingly been there changed to \( V. \) retusa. There seems no object in making this reduction, firstly because \( V. \) retusa Walp. is only partially equivalent to \( V. \) lutea A. Gray, since Walpers distinguished in the same work a \( V. \) anomalis which is part of this species; and secondly because Gray's name is now much better known than Walper's one. The name \( V. \) lutea has the further advantage of conserving the oldest specific epithet, since this is Dolichos luteus of Swartz (Prodr. 105) and of De Candolle (Prodr. ii. 398). Dr. O. Kuntze reduces this to the next species, and the two are certainly almost identical as regards flowers, fruits and seeds; their leaves are however very different, and the differences appear to be constant.

3. VIGNA LUTEOLA Benth.

Here again the Index Kewensis proposes that the oldest name for this as a Vigna, (\( V. \) glabra Savi), should replace the better known name \( V. \) luteola. The objections to the proposed change are parallel to those given under the preceding species. \( V. \) glabra is only part of \( V. \) luteola, for Savi recognised another species \( V. \) villosa that is also referable to \( V. \) luteola, while again Bentham's name conserves the oldest specific epithet, since this is Dolichos luteolus Jacq. (Hort. Vindob. i. 39 t. 90).

In the event of the adoption of Dr. Kuntze's view that \( V. \) lutea is after all only a form of \( V. \) luteola, his name for the two (\( V. \) repens) will have to be considered, since it is clear, as Kuntze says, that this is, perhaps both are, covered by the name Dolichos repens Linn. But this is apparently not the Phaseolus repens Grah. which Mr. Baker has renamed \( V. \) repens; of the last mentioned plant the writer has not seen specimens.
5. **Vigna vexillata Benth.**

To the synonyms of this species should apparently be added *Dolichos umbellatus* Thunb. *Trans. Linn. Soc.* ii. 339; at all events the Japanese species identified by M. Maximowicz and other authorities on the botany of Japan with *D. umbellatus* is identical with this. The Index Keuizens points out that the oldest name for this as a *Vigna* is *V. capensis* Walp. (*Linnea* xiii. 533), but it seems a pity to replace the familiar name *V. vexillata*, (which moreover retains the oldest specific epithet, since this is *Phaseolus vexillatus* Linn.), by one so unfamiliar and so inappropriate as the name *V. capensis*.

6. **Vigna brachycarpa Kurz.**

Of this there is but one specimen in Herb. Calcutta; it is in ripe fruit, and all that is known of its flowers is from Mr. Kurz's field-note that they were small and were yellow. The fruits and leaves, however, amply suffice to show that the plant is only a form of *Phaseolus sublobatus* Roxb. (*P. trinervius* Heyne).

8. **Vigna dolichoides Bak.**

This species is not a *Vigna*. It is certainly congeneric with *Vigna lucens* Bak., but it is at the same time equally certainly congeneric with *Phaseolus velutinus* Grah., and the writer has proposed to raise Mr. Bentham and Sir J. Hooker's section *Dysolobium* to the rank of a genus in order to accommodate these three species and another obviously congeneric one that Mr. Kurz has in MSS. named *Vigna tetragona*, but that Mr. Baker has tentatively placed in *Psophocarpus*.

9. **Vigna pilosa Bak.**

Add to localities of *F. B. I.*:—**Andamans**; very common, *King's Collectors*!

9b. **Vigna Clarkei Prain**; stems slender, finely pubescent with reflexed hairs, leaflets membranous narrowly lanceolate, entire, with a few adpressed hairs on both surfaces, racemes few-fld. peduncled, corolla small, pod slender dotted, with dense adpressed rusty-pubescence.

**Foot of Eastern Himalaya**; Dalkajhar in the Sikkim Terai, *Clarke* n. 37032! Mahakalguri in the Alipur Duars, *Heawood*, 74! 124!

Branches slender but firm, densely reflexed-pubescent as are petioles and peduncles. *Stipules* minute lanceolate, leaflets 4 in. long, under 3 in. wide. *Racemes* 5 in. or less, on peduncles 1-3 in. long; pedicels sparsely reflexed-pubescent 1 in. long, bracts and bracteoles minute. *Calyx* 25 in., teeth pubescent triangular as long as tube. *Corolla* 4 in., yellow. *Pod* 3 in. long, 2 in. in diam., subcylindric, densely adpressed-pubescent, 6-8-seeded.

A very distinct species with ripe pods much like those of *V. pilosa*, but with adpressed instead of spreading hairs

77. **Dolichos Linn.**

**Subgen. I. Lablab.**

1. **Dolichos Lablab Linn.**

It would be better to follow Roxburgh and Wight, who were thoroughly acquainted with the two plants cultivated in India that are united under this name
D. Prain—Some additional Leguminosae. [No. 2,

in the F. B. I.; even if the two are not to be treated as distinct species, they are, in any case, quite deserving of varietal rank. They may be distinguished as follows:—


Here, as in the case of Phaseolus Mungo and P. radiatus, Roxburgh has reversed the incidence of the Linnean names, no doubt because of the fact of that the epithet "lignosus" is so much more appropriate when applied to "Lablab" than when given to the plant to which Linnaeus assigned it. That D. lignosus Roxb. cannot be D. lignosus Linn., both Wight and Walker-Arnott in their Prodrromus, and Miquel in his Flora of the Dutch-Indies have already pointed out. But Wight and Arnott have considered that Linnaeus and Roxburgh had the same plant in view when describing D. Lablab. This is hardly possible; Roxburgh identifies with his "Lablab" the plant figured by Rumphius in Herb. Amboin. v. t. 136, an identification that is obviously just; Linnaeus gives this very figure as one of the types of his D. lignosus.


Mr. Baker's Phaseolus tenuicaulis is based on Wall. Cat. 5598 D. Excellent specimens, exactly agreeing with the Calcutta example of this sheet, were obtained by Dr. J. Anderson in Upper Burma, and Mr. Kurz, with these before him, has inadvertently published this name without noting that the plant is simply Dolichos falcatus. As Mr. Baker finds that the examples of Wall. Cat. 5598 D. which he has examined represent a Phaseolus, it must follow that Dr. Wallich mixed two plants under this letter. But from Mr. Baker's description the Phaseolus in question very closely resembles this Dolichos, and no one except Dr. Wallich has collected that Phaseolus in Burma or elsewhere.

7. Dolichos subcarnosus W. & A.

Exactly agreeing with this in fruit but with shorter and branching peduncles, is a plant common in Assam, Chittagong and Burma which has flowers like those of Vigna Catjang except in having the style penicillate round the stigma instead of bearded down the neck. The leaves however, are just as described by Mr. Baker and are not like those of Vigna Catjang.

The following numbered sheets may be quoted, and will indicate the difficulty that has been experienced in localising the species.

Garo Hills; at Dalangiri, Clarke n. 43117 (issued as Vigna Catjang) ! Chittagong; at Burundcherry, Clarke n. 19508 ! Pegu; Tongkyeghat, Kurz 1730; this forms.
part of Kurz's *Vigna sinensis* (Journ. As. Soc. Beng. xliv. pt. 2. 248), part of his *Phaseolus adenanathus* (loc. cit. 249), part of his *Lablab vulgaris* (loc. cit. 250) and, along with Kurz n. 2545, some part of Mr. Kurz's *Canavalia lucens*.

The pods are not like those of any other Indian *Dolichos* but recall those of a *Clitoria* or an *Apios*.

Considering how unsatisfactorily, even in the most authoritative works on the order, the various genera of *Phaseolidae* have been limited, the writer prefers at present to leave the species, as Mr. Baker has left it, in *Dolichos*.

70. **ATYLOSIA** W. & A.

**Subgen. 1. ATYLIA** Bth.

1. **ATYLOSIA Candollei** W. & A.

*ATylosia major* W. & A., reduced by Mr. Baker to *A. Candollei*, is a very distinct plant and is quite deserving of at least the rank of a variety.

2. **ATYLOSIA Geminiflora** Dalz.

This plant was unfortunately unknown to Mr. Baker; an examination of Dalzell's type specimens shows that the plant is not an *Atylosia* at all, but that it is simply Mr. Bentham's *A. platycarpa*, a species of § *Rhynchosioideae*, which section, by the way, the F. B. I. does not recognise. This section *Rhynchosioideae* is, however, an extremely natural one; it includes the two species *A. elongata* and *A. platycarpa*. These species in the *Flora of British India* are separated by a wide interval, and their natural affinity is not alluded to. The treatment the section has received at the hands of Mr. Taubert in Engler's *Naturlichen Pflanzenfamilien* is even more disconcerting. There, only one of the two species is admitted into the section, and Mr. Taubert does not tell us which of the two it is that he excludes.

4. **ATYLOSIA sericea** Benth.

Add to localities of the F. B. I.:— **RAJPUTANA**; Abu, *King! Duthie!*

5. **ATYLOSIA mollis** Benth.

Under this name Mr. Bentham has included two very distinct species, the diagnosis of the two being as follows:—

Leaves beneath densely uniformly grey-downy not reticulate, end-leaflet much longer than broad; flowers over 1 in. long; pod 2 in. long, 3 in. wide, 8–10-seeded, transverse depressions between seeds at right angles to the sutures, longer diameter of seeds across the pod . . . . . . . . . . . . **A. mollis**.

Leaves beneath more sparsely brown-pubescent, strongly reticulate, end-leaflet hardly longer than broad; flowers 75 in. long; pod 1–125 in. long, 6 in. wide, 3–5-seeded, transverse depressions between seeds oblique, longer diameter of seeds parallel to the sutures . . . . . . . . . . . . **A. crassa**.

In the Calcutta Herbarium the writer has analysed specimens of ten gatherings of *A. mollis* and thirty-nine gatherings of *A. crassa*, but has failed to find any intermediate state.

The distribution of the two species is quite distinct also. *A. mollis* is confined to the Himalayas from 2000 feet upwards; *A. crassa* does not enter the Himalaya proper though it extends from the foot of that range through the greater part of
India, Indo-China and Malaya. The synonymy and distribution of the two plants are as follows:


**North-West Himalaya;** Chamba, Clarke 24283! Kamaon at Chajoorie, Duthie 530! Garhwal; below Kinali, Duthie 3951! Route to Tehri, Davidson! Nepal; Wallich 5574! Sikkim; Rinchingong, T. Thomson! Anderson! Siriong, Clarke 13137! Lingcham, Clarke 25485! Namchi, King!


**Foot of the N.-W. Himalaya;** Hardwar, Wallich! Kamaon Bhabar, King! Dehra Dun, King! Nepal; Terai at Noakote, Wallich 5552! Rohilkund; T. Thomson! N. Oudh; R. Thompson! Bengal; Maldah, Clarke 26977! Chota Nagpore; Wood! Gamble! C. India; Sambalpore, Griffith! Pachmarhi, Duthie, 10372! S. India; Ganjam, Gamble 13658! Rampa, Gamble 16027! Vizagapatam, Gamble 21775! Jaipur Hills, Beddome! Concanc! Stocks! Dalzell! Assam; Brahmaputra Valley, Jenkins! Garo Hills, at 300 feet, Clarke 43126! Burma; common everywhere from Pegu and Bhamo to the Shan Plateau and the Karen Hills. Andamans; very common. **Distrib. Java, Philippines.**

The citation of *Atylosia glandulosa* as a synonym of this or of the preceding plant is no doubt a *lapsus calami*, since Dalzell describes his species as having solitary pedicels reflexed in fruit, pods with long spreading hairs bulbous at their bases, and a vexillum with 2 callosities. Both *A. mollis* and *A. crassa* have geminate pedicels as described by Mr. Baker, their pods are not covered with long hairs, and they do not have callosities on the vexilla. One result of the slip has, however, been that a little farther on the species already described by Dalzell as *A. glandulosa*, is redescribed in the *F. B. I.* as *Atylosia rostrata*. That species as it happens is, moreover, not an *Atylosia* at all but a *Dunbaria*.

The oldest name for *A. crassa* as a species is *Dolichos reticulatus* Ham. But there is already an older *Dolichos reticulatus* from Australia published in the first edition of Aiton’s *Hortus Kewensis*. As that also happens to be an *Atylosia* and now bears the name *A. reticulata* Benth., the writer has appropriated the specific epithet from the next oldest synonym, *Dolichos crassus*. Of *Dolichos blandus*, referred here by Mr. Baker, the writer has seen no specimen, and therefore refrains from giving the synonym a place.

48; branches and leaves beneath shortly densely grey-downy, stipules minute caducous, pod tomentose with long silky hairs.

BURMA; Shan Hills, 5000 feet, Collett 95! Maymyo, King's Collectors!

Branches and stems as in A. crassa and A. mollis. Leaves exactly as in A. crassa; flowers larger, 1-1.25 in. long, like those of A. mollis, but rather more numerous. Pods as in A. crassa except for being clothed with long spreading hairs.

There is no doubt that this is exceedingly nearly related to A. crassa and to A. mollis; it has the foliage of the former with the flowers of the latter but differs equally from both by its tomentose pods.

7. Atylosia kulnensis Dalz.

This species has no existence, the plant on which it is based being simply Dunbaria Heynei W. & A., from a different locality.

8. Atylosia grandiflora Benth.

This species is not represented in Herb. Calcutta; the description given in the F. B. I. would apply without difficulty to Dunbaria pulchra Benth.

Subgen II. Cantharospermum. This subgenus ought, in the writer's opinion, to receive the generic rank postulated for it by Wight and Arnott.

11. Atylosia elongata Benth.

The nearest ally of this species is A. platycarpa, along with which it forms the somewhat distinct section § Rhynchosiodes Benth.


Add to synonyms of F. B. I.:—Atylosia geminiflora Dalz. in Journ. Linn. Soc. xiii. 185; Bak. in Flor. Brit. Ind. ii. 212.

Add to localities:—Behar; Kurz! C. India; Jubbulpur, Beddome!

Sagor, Jordon!

15. Atylosia rostrata Bak.

This is the plant described by Dalzell as A. glandulosa but reduced in the F. B. I. to A. mollis. It is not an Atylosia but a Dunbaria.

81. DUNBARIA W. & A.


Add to localities of F. B. I.:—Concan; near Kulna in the Waree country, Stocks! Dalzell! Gibson! Canara; Wadde Ghaut, Talbot!

An examination of Dalzell's original specimens on which the species Cajanus kulnensis was founded, shows that they belong to a Dunbaria differing in no respect from D. Heynei.

D. Prain — Some additional Leguminosae.


Concan; Stocks! Central India; Godavery jungles, Beddome! Sagor, Jerdon! Bengal; Mymensingh, Clarke 7800! Burma; South Shan States at Lwekaw, King’s Collectors!

There is no doubt that this is a Dunbaria but it is not, as Mr. Kurz was inclined to think, the same as the preceding. Mr. Baker’s description is very good, but it does not mention the distinct callosities on the vexillum which mark it unmistakably as a Dunbaria; the fact has been overlooked that it was already a described species. The name Atylosia glandulosa, under which it is described by Dalzell, has been cited in the Flora of British India as a synonym of Atylosia mollis. Dalzell’s description of the species, however, calls attention to the calli on the vexillum, the bulbous-based hairs on the pods and the retrofracted solitary pedicels, whereas neither in A. mollis, nor in the species A. crassa which is mixed with A. mollis, do we find long hairs on the pods, neither have calli on the vexillum, neither have retrofracted pedicels; finally, in both the pedicels are geminate.

3c. Dunbaria fusca Kurz in Journ. As. Soc. Beng. xliii. 2. 186; xliv. 2. 255. Phaseolus fuscus Wall. Pl. As. Rar. i. t. 6; Cat. 5613; Bth. & H. f. Gen. Pl. i. 539; Bak. in Flor. Brit Ind. ii. 204.

This species has been already referred to under Phaseolus.

In the Genera Plantarum the figure of this species is—obviously by oversight, for its pod is flat not terete, and its valves thin not thick,—quoted as that of a Phaseolus § Dysolobium.

It is not a Phaseolus at all; its style is glabrous, not bearded, its stigma capitulate not oblique; the keel though beaked and with the beak moreover hooked, is not deflexed; more important still, the rachis is not nodiform. Finally the leaves are glandular beneath and though Dr. Wallich describes the leaves as having small deciduous stipels he figures none, and none of his specimens have any. But apart from the character of stipels the plant is certainly, as Kurz has pointed out, a Dunbaria; the mere presence of stipels has not been held by Mr. Bentham sufficient to outweigh all the other characters that go to distinguish the Cajanew—the subtribe to which Dunbaria belongs.

3d. Dunbaria bella Prain; stems glabrescent, stipules caducous, leaflets subcoriaceous, shortly hispid especially on the nerves above, trinerved and distinctly reticulate-veined, softly pubescent beneath, lanceolate-acute three times as long as broad, flowers in peduncled lax racemes, calyx-teeth short, corolla much exerted, pod recurved velvety 8–10-seeded.

Burma; Southern Shan States at Lwekaw, King’s Collectors! Tenasserim, Gallatly!

A woody climber. Branches firm terete at first sparsely puberulous. Petiole 1.5 in., stipels 0; leaflets 3–5 in. long, 1–1.25 in. wide, petiolules very short. Racemes overtopping the leaves, flowers rather smaller than, but as showy as in D. rostrata; pedicels 5–7 in. Calyx 0.35 in., broadly campanulate, glabrescent, all the teeth shorter than the tube. Corolla 0.6 in. long, keel broad-beaked; standard 0.75 in. across,
emarginate. **Pod** linear, 3-5 in. long, 5 in. wide, abruptly narrowed at tip, abruptly recurved at pedicel, closely softly velvety.

A very distinct and handsome species.

3e. **Dunbaria Scortechni** *Prain, Journ. As. Soc. Beng.** Ixvi. 2. 44; a slender climber, branches grey-velvety, leaflets exstipellate roundish-rhomboidal cuspidate, subcoriaceous, sparsely puberulous above, densely white-canescence below, flowers in long-peduncled rather dense racemes, calyx-teeth short, corolla exserted; pod recurved densely grey-canescence, 6-8-seeded.

**Perak; Dijong, Scortechni** n. 1841! **Kunstler** n. 908! **Ulu Bubong, Kunstler** n. 10852!

**Stem** slender firm slightly sulcate, 10-20 feet long. **Petiole** 2-3 in., stipules small caduceous; leaflets 2-5 in. long, 2 in. wide, petiolules 15 in., minutely stipellate. **Racemes** overtopping the leaves, on peduncles 4 in. long, grey-velvety like the stems; pedicels geminate 2 in. long. **Calyx** 3 in., lower tooth nearly as long as tube. **Corolla** 5 in. long, dark-brown externally, pale-yellow within, standard 6 in. across, orbicular entire. **Pod** linear, distinctly lineate, 2-5 in. long, 25 in. wide, narrowed at tip, abruptly recurved at pedicel, closely softly grey-canescence.

Also a very distinct species; distinguished from *Atylosia*, as **D. rostrata** and **D. bella** are, mainly by the pods not being depressed between the seeds.

**84. RHYNCHOSIA Lour.**

1. **Rhynchosia rufescens** *DC.*

Add to localities of *F. B. I.*:

**Assam; Brahmaputra Valley**, common, **Simons! Jenkins! Mann!**

**Burma; Katha, J. Anderson! Mingyin Hills, Prazer!**

4. **Rhynchosia aurea** *DC.*

In the **Flora of British India** this is made to include **R. capitata** *DC.*; from the field-botanist's point of view this is not entirely necessary as the two plants cannot be confused. The diagnosis between the two forms is as follows:

Racemes few-flowered, peduncle shorter than the leaves, naked; standard striped longitudinally with purple veins ... ... **R. aurea**.

Racemes many-flowered, peduncles longer than the leaves, with a slender leafless abortive shoot springing from near the middle; standard yellow without purple stripes ... ... **R. capitata**.

It is of little consequence whether we follow De Candolle and Wight and Arnott in treating the two as distinct species, or if we merely treat **R. capitata** as a variety of **R. aurea**. But it will be observed that the name "aurea" is rather more applicable to the plant to which it does not truly belong, than to the other.

6. **Rhynchosia suaveolens** *DC.*

Add to localities of *F. B. I.*:

**Upper Burma; Kyaukse, Sagaing, Collen, etc., everywhere common,**

**King's Collectors!**

7. **Rhynchosia avensis** *Benth.*

Excellent specimens of this plant have been recently received from Maymyo.

**J.** ii. 55
This is said to be the same species as *Atylosia candicans* Kurz, in *Journ. As. Soc. Beng.* xliii. pt. 2, 186. Had such been really the case, the publication of a different MSS. specific name for the plant as a *Rhynchosisia* was obviously unnecessary. As and there are some well-meaning but injudicious bibliographers who will hasten, if they read this note, to change the name, it is necessary to protect them against themselves and explain how matters stand.

Dr. Wallich issued two separate plants as *Dolichos candicans* Wall. Cat. 5567 and *Cajanus? candicans* Wall. Cat. 5576 respectively. These two plants resemble each other in that both have leaves woolly beneath; they differ totally in shape of leaflets. Mr. Kurz has however considered them conspecific and has based his "*Atylosia candicans*" on both. It is true that his description of *A. candicans* must apply mainly to *Cajanus? candicans*, for Mr. Kurz, in disposing of *Dolichos candicans*, ventured to do so although only one specimen was available to him for study and that specimen has neither flowers nor fruit.

By the rule that purists in nomenclature are so desirous of applying with Draconic rigidity it follows that the specific epithet "*candicans*," granted always that both the plants are *Rhynchosisia*, must go to *Wall. Cat. 5567* as the earlier number; *Wall. Cat. 5576*, the plant under discussion, being congeneric with the other but certainly not conspecific, had to receive a new epithet and has therefore been named *R. avensis* by Mr. Bentham. Mr. Kurz, in the Society's *Journal* xlv. pt. 2, 258, has by oversight transposed the citations and has identified *R. avensis* with precisely the plant that Mr. Bentham did not designate by that name.

15. **Rhynchosisia pilosa** Wall.

Dr. King's collectors have recently sent this from Sagaen, the locality in which it was originally discovered by Dr. Wallich. The pod is remarkably like the pod of *R. aurea* and the species must be transferred to § *Nomismia*.

20. **Rhynchosisia bracteata** Benth.

Add to synonyms of *F. B. I.*:—*Rhynchosisia mollissima* Dalz. in *Journ. Linn. Soc.* xiii. 186.

The original specimens on which Mr. Dalzell founded his *R. mollissima* are absolutely typical examples of *Dolichos bracteatus* Wall. Dalzell's name is the first that was given to the plant in its proper genus, but there are at least three other plants to which the name *R. mollissima* has been applied; it is therefore better to abandon Dalzell's name and to use Bentham's one, which has the further merit of conserving the oldest specific epithet.


Add to localities of *F. B. I.*:—Sikkim; Terai at Bamanpokri, Gamble! Assam; Brahmaputra Valley, Mann!

22. **Rhynchosisia densiflora** DC.

Add to localities of *F. B. I.*:—Burma; Sagaen, Wallich 5499 E! King's Collectors! Shan Plateau, common everywhere.

85. **FLEMINGIA** Roxb.

**Subgen. 1. Ostryodium** Desp.

Mr. Baker has reduced all the forms of this section, except *F. Chappar*, to *F. strobiliformis* R. Br.; the impossibility of adopting this course is obvious to those
who know the plants as they grow. The section includes four very distinct and easily recognisable Indian species; no forms connecting one with another have hitherto been found. The following key will enable their separation:

Erect shrubs 5-10 feet high; (leaves oblong or ovate-lanceolate, acute, rounded at base); bracts ¼-1 in. long:—

Lateral nerves all subequal 8-10 pairs; bracts 1 in., finely puberulous, usually all obscurely cuspidate (sometimes the highest slightly emarginate) ... ... 1. F. strobilifera.

Lateral nerves 4-6 pairs, the basal pair longer, stronger and more oblique than the rest; bracts ¼ in. softly hirsute with long hairs usually all slightly emarginate (sometimes the lowest obscurely cuspidate) ... 2. F. bracteata.

Low shrubs 1-3 feet high; bracts emarginate ½-¾ in. long:—

Leaves ovate subacute or obtuse with subcordate base, bract ½ in. long, sparsely hirsute on the nerves with long adpressed hairs; habit trailing ... ... 3. F. fruticulosa.

Leaves lanceolate with cuneate base; bracts ¾ in. long, softly pubescent with long spreading white hairs ... 4. F. fiuminalis.

1. FLEMINIA STROBILIFERA R. BR.: Bak. in Flor. Brit. Ind. ii. 227 (as to the typical form only).

This species has never been collected in the Himalayas. The following are the localities from which specimens in Herb. Calcutta have been reported.

SCinde; Campbell! RAJPUTANA; King! C. INDIA; Vicary! JERDON! Duthie! CONCAN; Stocks! Gibson! DECCAN; Cooke! Balaji Nene! Carnatic; Heyne! NALAMALLAI HILLS; Sim! Ceylon; Beckett! CHOTA Nagpur; Wood! Gamble! Behar; Ball! Hooker! Assam; Griffith! Mann! Jenkins! Simons! Peal! Silhet; Wallich! Khasia; Clarke! Jainse; Rita! Naga Hills; Masters! Collett! Lushai; Prazer! CHITTAGONG; Clarke! Gamble! King's Collector! CHIN Hills; King's Collectors! Yunnan; Anderson! Pegu; Kurz! TENASSEREM; Felconer! ANDAMANS; Man! King's Collectors! NICOBARS; Jelinek! Kurz! Perak; Scortechini! Kunstler! Pahang; Ridley! Singapore; Huilett! Penang; Wallich! Scott! Malacca; Griffith! Selangor; Ridley's Collector! Java; Kurz! Anderson! Celebes; Barclay! Siam; Schomburgk! Mauritus;—introd., (no collector's name)! JAMAICA; introd., Lane!

1b. FLEMINGIA BRACLETEA Wight, Ic. t. 268. F. strobilifera var. bracteata Bak. in Flor. Brit. Ind. ii. 227.

The following are the localities from which specimens of this species have been reported to Herb. Calcutta; it is by no means confined to the Eastern Himalaya and Burma; not a single Himalayan specimen has been sent from so high up as 1000 feet though it occurs all along the foot of the hills from the Kamaon Bhabar to the Eastern Duars.

NILGHIRIS; Wight! CONCAN; Ritchie! CANARA; Talbot! C. INDIA;
D. Prain — *Some additional Leguminosae.*

R. Thompson! Duthie! Ouddh; R. Thompson! Chota Nagpur; Clarke! Gamble! Behar; T. Thomson! Clarke! Garhwal; Bhabar, King! Kamaon; Terai, King! Nepal; Terai, Scully! Hieronymus! Sikkim; Terai, Kurz! Clarke! Bootan; Duars, Simons! Upper Burma; Anderson! King's Collectors! Pegu; McLellan! Brandis! Kurz! Yunnan; Anderson! Shan Hills; Fulton! Tenasserim; Gallatly!

1c. **Flemingia fruticulosa** Wall.

The following are the localities for this species so far as is known; as will be seen it is not confined to the Central Himalaya.

N.-W. Himalaya; Simla, dry spots in sunny woods, 7000 feet, Griffith! J. Anderson! near Simla at 5000 ft., Gamble! Dalhousie, Clarke n. 33! Clarke n. 22076! Mattiana, 5000 feet, Brandis! Garhwal, near Owra, 6–7000 feet, Duthie! Kamaon, King! A specimen of this collected by Dr. T. Thomson, but with no precise locality, has been issued in *Herb. Ind. Or.* as *F. strobilifera* and has been noted as occurring at 1000 feet; no other botanist has met with the plant so low down. Centl. Himalaya; Nepal, Wallich n. 5754!

Id. **Flemingia plumalis** C. B. Clarke MSS.; leaves narrowly lanceolate, base cuneate; bracts subsecundly disposed, softly pubescent emarginate.

Chittagong; Demagri, Clarke n. 19777! Burkul, Lister n. 117! Burma; Hukong Valley, Griffith n. 1675! Pegu, Kurz n. 2524! Shan Plateau at Makhoye, King’s Collector!

A small shrub 1–3 feet high; branches slender fluted, twiggy, velvety. Leaves subcoriaceous 2–5 in. long, 6 in. wide, green, adpressed-pubescent, above sparsely beneath densely; lateral nerves very oblique about 8 pairs, stipules scarious linear 3 in. long. Racemes 2–4 in. long; bracts erecto-patent, short-petioled, cordate, 4 in. long, all faintly emarginate. Corollas 2 in., finely pilose; teeth lanceolate exceeding the tube. Corolla pale, little exerted.

A very distinct form, evidently quite entitled to specific rank.

2. **Flemingia Chappar** Ham.

This species is quite common immediately to the south of Behar; it has been collected at Sambalpur by Griffith and in Ganjam by Gamble.

3. **Flemingia paniculata** Wall.

This species is quite common in Upper Burma and has recently been repeatedly sent from the Chindwin Valley, from the Baby Mines district, and from the Shan Plateau.

4. **Flemingia lineata** Roxb.

*Var. glutinosa* var. nov.; leaflets larger acute, flowers rather larger, all parts closely beset with sticky glandular hairs.

Burma; S. Shan States at Taungyi, King’s Collector! Tenasserim; on Taepo, 5000 feet, Gallatly!

This will probably require to be recognised at some future time as specifically distinct.
5b. **Flemingia precox** C. B. Clarke MSS.; branches terete, leaflets thin large acuminate glabrous, bracts linear firm hardly exceeding the buds, calyx-tube ribbed glabrescent, teeth thinly silky.

**Chittagong:** Clarke 19916! **CENTL. PROVINCES:** Chanda, Duthie 9408!

A tall shrub; woody subtriquetrous stems quite glabrous. **Stipules** medium; scariose, soon falling; petiole 3–4 in., triquetrous, deeply sulcate, slightly winged, leaflets subcoriaceous, 4–10 in. long, oblong narrowed to both ends, glabrous on both surfaces except for the faintly puberulous prominent midrib and 12–24 pairs of parallel oblique lateral veins beneath. **Racemes** dense, narrowly cylindric, 2–3 in. long, bracts overlapping, rigidly scariose, the longest only 25 in. long, margins silky otherwise glabrous; pedicels very short. **Calyx** 25 in., teeth linear, the lowest twice as long as the rest. **Corolla** as long as the lowest calyx-tooth.

A very distinct species, nearest to *F. stricta* and with similar foliage, but with totally different bracts.

6. **Flemingia Grahamiana** W. § A.

Add to localities of **F. B. I.**—**BURMA:** Shan Hills at Taungyi, **Collett**! Makhoye, etc., *King's Collectors*!

This is the plant alluded to under *Flemingia congesta* by Sir H. Collett and Mr. Hemsley (*Journ. Linn. Soc.* xxviii.) as a variety with clustered racemes.

7. **Flemingia congesta** Roxb.

This name in the *Flora of British India* is made to include a number of distinct and quite unmistakeable species. Some of these are treated as distinct varieties, others are simply merged in the type or in or other of these varieties. The following key may assist in distinguishing the plants themselves.

**Erect woody undershrubs with rather tall stems:**—

**Racemes condensé shorter than the petioles:**—

**Calyx** teeth longer than the tube, leaves green beneath:—

- Bracts and calyx sparsely grey-silky ...
- Bracts and calyx adpressed tawny-pubescent ...
- Calyx teeth shorter than the tube, leaves rusty beneath, the flowers very small ...

**Racemes elongated exceeding the petioles:**—

- Leaves densely uniformly rusty-tomentose beneath, petioles not winged...
- Leaves pubescent only on the nerves beneath, petioles slightly winged:—
- Bracts and calyx densely brown-silky, leaves reddish beneath, racemes not so long as leaves ...
- Bracts and calyx sparsely grey-silky, racemes rather lax as long as the leaves ...

**Low shrubs with a woody subterrestrial stem:**—

- Bracts and calyx glabrous or with short close pubescence ...
- Bracts and calyx with long silky pubescence ...

[The last species given in the key is united by Mr. Baker with *F. Wallichii* and not with *F. congesta.*]
The synonyms and distribution of these different species are as follows:


Of this there are two very distinct varieties:

VAR. *a. typica*; petioles not winged, leaves dark-green. (To this variety belong all the synonyms cited above).

Common everywhere throughout India, British Indo-China and the Malay Peninsula. Owing to this having been first described as *Crotalaria macrophylla*, Dr. O. Kunze has taken the opportunity of employing the name "*F. macrophylla* Kunze," with what precise significance he has failed to make clear.


This variety, though very widespread in Burma, seems to be rare in India.


HARDWAR; Hardwicke. NORTH BENGAL; Titalya, Kurz! EAST BENGAL; Mymensingh, Clarke 7830! Comilla, Clarke 14228! Assam; Sadiya, G. Gammie! Khasia; Hooker and Thomson! G. Mann! Clarke 18667! 38916! 40327! BURMA; Shan Hills, Collett 411! Martaban, Kurz! Distrib. China (Hupeh, Henry n. 1640).

The Comilla, the Sadiya, the Burmese, and some of the Khasia specimens accord well with the description given by Roxburgh of *F. prostrata*, which was not described by him from Indian specimens but from plants raised from Chinese seeds; the remainder either accord with *F. angustifolia* or serve to connect the two plants.

BURMA; Pegu and Shan Hills, very common.

This is the most easily separated of all the "Congesta" group, owing to the extreme smallness of its flowers. The form with which it might most easily be confused is *F. congesta* var. *viridis*; in this case, however, besides the smaller flowers, the red colour of the leaves beneath at once effects a diagnosis.


**NILGHIRIS; Wight!**

Almost as easily separated as the preceding, in this case owing to the soft uniform pubescence on the leaflets beneath. It might most readily be mistaken for *F. Grahamiana* but its leaves are more densely pubescent and its bracts are not all rigid.

7e. **Flemingia latifolia** Benth. in Pl. Jungh. 246; Miq. Flor. Ind. Bat. i. 163. *F. congesta* var. latifolia Bak. in Flor. Brit. Ind. ii. 229.

Of this very distinct species there are two marked varieties:—

Var. a. typica; bracts not broader than calyx, racemes more lax. *F. latifolia* var. genuina Kurz in Journ. As. Soc. Beng. xlv. 2. 261.

**HIMALAYAS; Hooker and Thomson! NAGA HILLS; Masters! BURMA; Maymyo, King's Collector! DISTRIBUT. JAVA.**

This most resembles *F. congesta*, but its bracts are broader, its racemes longer, its flowers larger; the bracts and calyx are densely brown-silky, and the leaves beneath have a reddish tinge from the sparse rusty tomentum on the nerves.

Var. b. *grandiflora* Kurz loc. cit.; bracts broader than calyx, racemes dense at first strobilatate, flowers larger.

**BURMA; Pegu, Kurz 1636! Shan Hills, King's Collector!**

A very distinct variety that it may yet be necessary to raise to specific rank.


**HIMALAYAS; from Chamba to Bootan. KHASIA, NAGA and MANIPUR Hills. BEHAR; on Parasnath, Hooker! Thomson! Anderson! Wood! NILGHIRIS; Wight!**

This cannot be mistaken for any of the preceding species owing to its long lax racemes; it has not yet been sent to Calcutta from Burma, Malay or China.

7g. **Flemingia nana** Roxb. Hort. Beng. 56; Fl. Ind. iii. 339; Wight, Ic. t. 389. *F. congesta* var. nana Bak. in Flor. Brit. Ind. ii. 229 (as to the foregoing citations only but not at all as to the plant described.)

**CANARA; Dongi, Talbot 960! C. INDIA; Sagar, Jerdon! BEHAR; Pachet, Kurz! Manbhum, V. Bull! Campbell!**
This could only be mistaken for the next species, not by any possibility for any of the preceding; the diagnosis as will be seen from the key is, however, sufficiently easy.

To what plant the F. B. I. diagnosis of var. nana refers it is impossible to ascertain because there is no example of Wall. Cat. 5748 A or of Wall. Cat. 5749 at Calcutta. Wall. Cat. 5748 B, which is here, is certainly quite distinct specifically from Roxburgh’s species.

Wight, Icones t. 389, is a black and white reproduction of Dr. Roxburgh’s own excellent coloured drawing of this species. And Wight’s, Icones t. 408, is a similar reproduction of the totally different F. procumbens Roxb. which has been redescribed in the F. B. I. under the name F. vestita.


BURMA; Pegu, Kurz! Prome, Wallich! Shan Hills, Collett!

This is undoubtedly correctly restored to specific rank by Sir H. Collett and Mr. Hemsley. After dissecting flowers of all the Calcutta specimens both of this and of F. nana the writer is convinced that the two cannot be united. The nearest ally of F. sericans is in reality F. ferruginea.

8. Flemingia Wallichii W. & A.
Delete from synonyms of F. B. I., both F. nana Wall., and F. sericans Kurz.
Delete from localities:—Prome and Martaban.


Roxburgh’s original coloured drawing of F. procumbens, of which Wight’s quoted figure is but a rough copy, shows that the species has nothing whatever in common with F. nana, but that it is on the contrary an excellent representation of the plant afterwards issued by Wallich as Dolichos vestitus and described since, in the F. B. I., as Flemingia vestita.

86. DALBERGIA LINN. FIL.

[The oldest name for this genus is Amerinnon Browne, Hist. Jamaica. 288, t. 31, f. 3; this has been pointed out by Sir J. D. Hooker and Mr. Jackson in their Index Kewensis and by Dr. O. Kuntze in his Rev. Gen. Pl. i. 158.]

2. Dalbergia latifolia Roxb.

It is singular that no one since the end of last century has found in the Andaman group Dalbergia emarginata Roxb. which both Mr. Bentham and Mr. Baker declare to be identical with the same author’s D. latifolia. Perhaps it occurs in the little explored Northern Island where at one time a settlement existed, but which no one visits now.
Dalbergia sissoides Grah., treated in the F. B. I. as a variety of D. latifolia, is apparently a distinct species, differing in flowers as well as in leaves. Mr. Baker further suggests that D. javanica Miq. may be same as D. sissoides; it differs somewhat in the greater persistence of the obvolute bracteoles that embrace the bud. But specimens that Messrs. Koorders and Valeton have recently issued, and others kindly sent from Java by Dr. Treub, show that Mr. Baker is perhaps justified in reducing D. javanica to D. latifolia.

3. Dalbergia ovata Grah.

Mr. Kurz keeps D. glauca separate from D. ovata as a species; in this he is perhaps right. D. glauca is the plant described in the F. B. I. as D. ovata var. obtusifolia.


Add to localities of F. B. I.:—Malay Peninsula; very common everywhere. Distrib. Borneo.

This is really, as Mr. Baker suggests, the same as D. pseudo-sissoo Miq. and Dr. Miquel's name, being the earlier, is the one that must be used for the species. For material of Dr. Miquel's species as well as for notes and drawings from all the types preserved in the Leyden Herbarium the writer is indebted to the great kindness of Mr. Suringar, who has also proved that D. Sissoo Miq. is not D. Sissoo Roxb. but is simply another form of the present species.

4b. Dalbergia Hulletti Prain, Journ. As. Soc. Beng. lxxvi. 2. 119; a small tree, leafless when flowering; flowers in short clustered racemes emerging from tufts of small rusty-pubescent triangular bracts in axils of fallen leaves, lowest pedicels longer than the rest all rusty-pubescent as are the peduncles, petal-claws as long as calyx, pod unknown. Amerimnon Hulletti Prain MSS.

Singapore; Hullett!

Branches glabrous rugose black, numerous blackish rugose rusty-puberulous branchlets densely covered with numerous clusters of racemes 1-1½ in. long, laxly rusty-pubescent. Lowest pedicels 3 in. long; bracteoles at base of calyx subulate very small. Calyx campanulate, densely rusty-tomentose, ½ in. long. Corolla 2–3 times as long as calyx, blade of standard orbicular. Stamens 9, rarely 10, monadelphous. Ovary glabrous with densely pubescent stalk, ovule solitary.

The pod being unknown this may prove a Sissoa near D. pseudo-sissoo or a Selenolobium near D. monosperma, the probability being however that it is a Sissoa. The nearest ally is an apparently undescribed species from Borneo (Haviland n. 2894) which has exactly the inflorescence of Hullett's plant and has flowers that only differ in having the ovary as well as its stipe densely woolly. The Borneo plant (which, by agreement with Mr. Haviland, cannot be described in Herb. Calcutta) has leaves with either solitary or trifoliolate leaflets, when trifoliolate the lateral leaflets are subopposed.

7. Dalbergia rubiginosa Roxb.

Roxburgh says that this has ten stamens; Wight and Arnott say that usually they have found only nine; Bentham, too, says there are only nine. The writer has examined very many flowers and has never found fewer than ten, in one bundle;
Wight and Arnott and Bentham could hardly, however, be mistaken and, at least sometimes, there must be nine.

In the F. B. I. it is said of this that it has the habit of *D. monosperma* but that it is readily known by its stamens and ovary. By its ovary it is usually easily known since here there are almost always more than the solitary ovule which marks *D. monosperma*. What exactly is meant by the difference as to the stamens of the two species is not very clear. The F. B. I. does not say, with Roxburgh, that there are 10 or, with Bentham, that there are 9 in *D. rubiginosa*. As regards *D. monosperma* however, it says there are two bundles of 5 each, which is never the case in that species. Except that in *D. rubiginosa* the sheath has apparently usually 10, and in *D. monosperma* only 9 filaments there is no difference between the two. They differ, however, decidedly as to leaves, the secondary nerves being more numerous in *D. rubiginosa*, and as to pods those of *D. rubiginosa* being thin membranous and reticulately veined on the wings as well as opposite the seeds. The plant that Mr. Kurz supposed to be this (*Journ. As. Soc. Beng.* xiv. pt. 281) is *D. confertiflora*.


This was supposed by Gardner to be only a form of *D. rubiginosa* of which it has exactly the pods and the flowers, though the calyx is more woolly, and the leaflets which are of a different shape, are densely rusty underneath; Mr. Bentham has very justly given the species a separate place. Mr. Baker, on the other hand, reduces it to *D. congesta*; the following diagnosis between the two species will indicate their distinctness.

Leaves rounded or obtuse, glabrous and strongly closely reticulate above, densely woolly beneath; calyx woolly; pod thin reticulate everywhere ... ... ... *D. Gardeneriana*.

Leaves retuse or emarginate finely sparingly puberulous on both surfaces, calyx glabrous, pod thick, faintly reticulate opposite seeds, elsewhere smooth ... ... ... *D. congesta*.


Var. *typica*; leaflets 7–9, oblong, glabrous or slightly puberulous.

Penang; 500 feet, Curtis’ Singapore; Hullett ! Malacca ; Maingay 547 ! Goodenough 1383 !

Var. *Scortechinii* Prain, *Journ. As. Soc. Beng.* lxvi. 2. 115; leaflets 11–15, elliptic, more closely puberulous, as is the inflorescence.

Malacca; Maingay 549 ! Scortechinii 1830 ! Singapore ; Ridley 6406 !

Distrib. Borneo.

Unfortunately neither Griffith’s Malacca plant nor Junghuhn’s Sumatra one—the two on which Mr. Bentham founded the species—are at Calcutta. The typical variety, as here distinguished, includes all the specimens at Calcutta issued from Herb. Kew. as *D. Junghuhnii*; the plant separated as var. *Scortechinii* has either been distributed unnamed or has been marked variously “near *D. Junghuhnii*” and “near *D. sympatethica*”.

It has the flowers of *D. Junghuhnii* exactly, and thus differs from *D. sympatethica* in having rather shorter petals. Its leaflets differ equally from those of *D. Junghuhnii* (as represented by Curtis’ Penang plant) and those of *D. sympatethica*; considering how closely the species of *Dalbergia* approach each other it may be necessary at some future time to treat *Dalbergia Scortechinii* as specifically distinct. Its pods are, however, at present unknown, and it is more convenient therefore to subordinate it in the meantime to *D. Junghuhnii*.
The question has been raised whether this is the lost *D. parvijlora* Roxb. The larger number of leaflets seems to the writer to be a fatal objection. This objection does not perhaps, apply so strongly to typical *D. Junghuhnii*, but there is another strong objection in the shape of the pods, which are described as falcate in *D. parvijlora*; this character makes it certain, in the writer's opinion, that, in spite of the great authority of Mr. Bentham and Mr. Baker, the lost *D. parvijlora* is to be sought for in the section *Selenolobium* Bth. (the genus *Drepanocarpus* E. Mey.) and not in the section *Sissoa* at all. To the objection that *D. parvijlora* has monadelphous stamens whereas the *F. R. I.* defines the section *Selenolobium* as having the stamens in two bundles of 5 each, it may be answered that this definition is due to an oversight and does not accord with reality, for *D. torta* (*D. monosperma*), which is the type of the section, has, as Mr. Bentham quite correctly says, only monadelphous stamens.


Add to localities of F. B. I.:—Chittagong; Lister! King's Collector! Burma; Kurz! Andamans; very common.

The writer has seen no specimen from Oudh. There are in Herb. Calcutta two from the Concan that profess to belong to this species; one comes from Herb. Ind. Or. H. f. § T. the other from Herb. Dalsell. Both are *D. volubilis*.


Mergui; Griffith! Malacca; Maingay! Singapore; Ridley!

12b. *Dalbergia Colletii* Prain; a tree, leaflets 9–15, ovate with rounded tip or ovate-lanceolate with blunt tip, puberulous above, pubescent beneath, flowers minute in ample terminal panicles with rather lax cymose branches, pedicels and petal-claws very short, pod lanceolate 1–2-seeded with very long stalk and long narrow tapering point. Dalbergia sp. *Coll. & Hemsl. Journ. Linn. Soc.* xxviii. 50. *Amerimnon Colletii* Prain MSS.

Burma; Shan Hills at 4000–5000 ft.; Ywangen, Collett 723! Lwe-kaw, King's Collectors!


A very distinct species with flowers as in *D. Junghuhnii*, fruits rather like those of *D. lanceolaria*, and leaves a little like those of *D. velutina* with which Sir H. Collett and Mr. Hemsley have compared it. It has, however, very much smaller and very different flowers and stipules. The collectors of the Calcutta Herbarium have recently brought in an abundant supply of fruiting speci mens so that a description of the species can now be given. The specimen in young fruit mentioned
by Collett and Hemsley as possibly the same has larger flowers, and proves on examination to be a *Dalbergaria* not a *Sissooa*. Its foliage is, indeed, remarkably like that of *D. Collettii*, but its leaflets are fewer and the tomentum is not grey.


This is more often planted than wild in the Concean and Canara; it goes there, according to a note in the Herbarium of Mr. Talbot, which has been kindly lent for study by its owner, under the name of "Chinese Blackwood." Mr. Bentham has described the stamens of *D. Melanoxylon* as being 10 in number and isadelphous, i.e., in 2 bundles of 5 each. But he quotes the species described and figured by Guillemin and Perrottet, loc. cit., as the plant he intends, in spite of these authors having described as either 9- or 10-stamened, the stamens being monadelphous with the central (vexillary) one rather longer than the others and rather more separated at the top from the lateral groups than the members of these groups are from each other; the figure, too, that Mr. Bentham cites, instead of showing 10 stamens in 2 bundles shows 9 in one bundle, the central one longer than the rest and according in other respects with the description. The description and figure referred to agree absolutely with the characters of Mr. Bentham's *D. Stocksii*, our present plant; after analysing flowers from every example, whether African or Indian, in Herb. Calcutta, the writer is convinced that whatever *D. Melanoxylon* Benth. (*Journ. Linn. Soc. iv. Suppl. 47*) may be, the true *D. Melanoxylon* Guill. & Perr. and *D. Stocksii* Benth. are one species.

14. **Dalbergia sympathetica** Nimmo.

In the Calcutta Herbarium, Wall. Cat. 5845B. (from Herb. Heyne) is also this species.


**Penang; Curtis! Perak, very common. Singapore; Hillett!**

Branches often twisted, the young ones finely grey-downy. Leaves 1½-3 in. long; leaflets moderately firm; thinly adpressed-pubescent beneath. Panicles distinctly peduncled with finely pubescent ascending curved branches, the ultimate branchlets secund. Calyx ½ in., pubescent, with 2 small obtuse bracteoles at base, teeth short obtuse except the lowest lanceolate. Corolla twice the calyx, petals-claws short, standard narrow, white. Stamens 9 monadelphous. Ovary glabrous except along the lower suture. Pod thin membranous greenish glabrous, 2½ in. long; 1 in. wide, 1-seeded, slightly cuneate at base and distinctly stalked.

Very nearly related to *D. Junghuhuii* and only differing by its much smaller leaflets and rather longer flowers which are arranged in smaller more numerous panicles. Also exceedingly like *D. sympathetica* from which it differs in its glabrous ovary, distinctly stalked pods and usually fewer leaflets not silky beneath.

14c. **Dalbergia Milletti** Benth. *Journ. Linn. Soc. iv. Suppl. 34*; scandent, leaflets 25-35, glabrous, crowded, linear-oblong obtuse or

Khasia; 2-4000 feet, G. Mann! at Shampung, Collett! at Maoksandrâm, Clarke! Distrib. China.

Branches sparsely clothed with fine brown pubescence. Leaves 3-6 in. long, leaflets a little like those of D. tamarindifolia, but usually rather shorter and always narrower besides differing in not being oblique. Cymes 1-2 in. long, slender. Flowers small hardly ½ in. long. Pod 1½-2 in. long, ½ in. wide, "swelled, scabrous, where the single seed is lodged" (Roxburgh).

Mr. Kurz has already pointed out in the Society's Journal (vol. xliv. pt. 2, p. 281) that there is something seriously amiss in the identification of D. rufa Grah. and D. multijuga Grah. with D tamarindifolia Roxb. That the flowers and foliage of D. tamarindifolia, as described by Roxburgh and as figured by him in the plate subsequently published in Wight's Icones t. 242, are those of D. rufa and of D. multijuga is certainly true. But the fruit described and figured by Roxburgh is, as Kurz was the first to remark, widely different. Mr. Kurz was apparently inclined to suppose that the Assam (or Sylhet) plant described by Roxburgh might have different fruit from that of the Burmese one. This supposition was only natural since a mixture of flowers of one species with fruit of another is an accident of which, such was his care and accuracy, there is hardly an instance in the whole of Roxburgh's work. The present is, however, such an instance. There are now at Calcutta examples of the pods of D. tamarindifolia from every locality between the Himalayas and the Malaya Archipelago and they never differ in any respect. Moreover, since Mr. Kurz wrote, both Mr. Mann and Genl. Collett have collected in the Khasia hills a plant that has a pod which accords exactly with Roxburgh's description and figure; this plant proves an analysis to be in all respects the same as the Chinese D. Milletti. Mr. Clarke too has collected specimens with the same pods; his plant only differs from Mann's and Collett's in having leaflets rather broader in proportion to their length. The figured pod in Wight's plate is, as in the original coloured drawing, shown detached. Probably what happened was that Roxburgh's living plants of D. tamarindifolia did not produce fruits in the Calcutta garden, and that one of the fruits sent by a correspondent from Silhet as those of Ketee, which is the vernacular name that Roxburgh quotes for D. tamarindifolia, was drawn along-side the figure made from a living plant. But the fruit so figured, instead of belonging to D. tamarindifolia, was that of the similar, but still very different, species just described.

It has been usual to quote Derris pinnata Lour. as the equivalent of D. tamarindifolia. The latest author to do this is Dr. Kuntze (Rev. Gen. Pl. i. 159) and on this assumption, for it is no more, he uses the specific name first used by Loureiro instead of that used by Roxburgh. This is but another instance of bibliographic alteration of name without reference to authentic specimens. Loureiro's plant had glabrous leaflets and therefore, unless it was misdescribed by Loureiro, an assumption that no one has the slightest right to make, it cannot be D. tamarindifolia. That it may be D. Milletti is not impossible, but so far no one has given such an account of the
root as might enable one to decide. The rediscovery of Loureiro’s plant in Cochin China ought to be easy, but till it takes place the writer prefers to let Derris pinnata remain a doubtful species.*


This species is very common in the Andamans, in addition to the localities mentioned in the F. B. I.; it occurs even on outlying members of the group like Barren Island. The description in Roxb. Flor. Ind. iii. 233, as to leaves and flowers applies to this species; as to fruit it applies to D. Milletti.

15b. Dalbergia burmanica Prain; a tree; leaflets 7–9, oblong-obtuse glabrous, flowers in congested sessile axillary panicles with corymbose branches, pedicels short, petal-claws as long as the calyx, pod unknown. Amerimnon burmanicum Prain MSS.

Burma; Ruby Mines district, King’s Collectors 1

A tree 25 feet high or higher, young branches and leaves finely puberulous, soon glabrous. Leaves 4 in. long, leaflets moderately firm, 1½ in. long, stipules small soon deciduous. Panicles sessile 1–2 in. long, the branches densely brown-pubescent; pedicels shorter than the calyx, the bracteoles at its base narrow lanceolate. Calyx ½ in., pubescent, teeth short obtuse. Corolla purple, 2–3 times the length of calyx, blade of standard oblong. Stamens 9 monadelphous. Ovules 1–2.

A very distinct species with leaflets like those of D. velutina but glabrous and less numerous, and with small not large stipules; combined with this we have an inflorescence exactly like that of D. tamarindifolia and flowers only distinguishable

* In connection with this genus Kuntze allows his desire for “pure priority” to carry him away so completely that he would use the name D. ferruginea (Roxb. Pl. Ind. iii. 228) in place of D. stipulacea (Roxb. Flor. Ind. iii. 233), because it is given on an earlier page. D. stipulacea Roxb. being submerged, he is able to resuscitate the otherwise inadmissible D. stipulata (Wall. Cat. 5868) and to employ it instead of D. velutina (Benth. Pl. Jungh. 255) a name proposed by Bentham in order to obviate the trouble of having a “stipulacea” and a “stipulata” in the same genus. As Kuntze is at the same time replacing the name Dalbergia by the older but quite unfamiliar one Amerimmon, he thus affords himself an opportunity of upsetting all the old synonymy; Dalbergia stipulacea becomes Amerimnon ferrugineum Kuntze; our D. velutina becomes A. stipulatum Kuntze; our D. tamarindifolia becomes A. pinnatum Kuntze. Even if this were final it would be, in the writer’s humble opinion, bibliography gone mad. But the worst of it is that it is anything but final. Kuntze’s want of care in comparing the account that Loureiro gives of Derris pinnata has made him assume the responsibility of the name Amerimnon pinnatum as designating Dalbergia tamarindifolia. As Derris pinnata cannot, unless Loureiro blundered in his description—and this Kuntze has no right to assume—be Dalbergia tamarindifolia at all, Kuntze’s name must be altered by the next bibliographic purist. More extraordinary still our bibliographer errrs in his own particular province. The names D. stipulacea and D. ferruginea were not first published on pages 233 and 228 respectively of the third volume of Roxburgh’s Flora Indica. They were issued first in the Hortus Bengalensis, D. stipulacea being published on p. 53 and D. ferruginea not till p. 98 of that work. So that after all, by Kuntze’s own “rules,” D. stipulacea is the prior name and the next “bibliographer” is recommended the happy task of undoing Kuntze’s alterations.
from those of *D. tamarindifolia* in being purple, not white, and in having narrower and rather longer bracteoles under the calyx. From both *D. velutina* and *D. tamarindifolia* it differs in being a tree. Also like *D. lanceolaria* its leaves only begin to appear after flowering has commenced. The pod being unknown this may be a *Selenolobium*; more probably, however, it is a *Sissoo*.

17. **Dalbergia purpurea** Wall.


This, as Mr. Bentham and Mr. Baker have pointed out, is very nearly related to *D. lanceolaria*. Mr. Bentham in describing the plant suggests that it may be a climber; Mr. Baker in his description omits the doubt and speaks of it as scendent. It is, however, the tree known as *Tabou-ben* or *Ta-pouk-ben* in Pegu. The species is based on *Wall. Cat*. 5869, but under this number Dr. Wallich, as in many other instances, has in the hurry of distribution confused two very distinct species; the specimen of *Wall. Cat*. 5869 at Calcutta is the same as *Wall. Cat*. 5859, which is *Dalbergia cana* Grah. The effect of this mistake has been very far-reaching and has led to quite a number of misidentifications in Mr. Kurz's admirable *Forest Flora*, the most authoritative work on Burmese trees.

*D. purpurea* differs, as Mr. Bentham and Mr. Baker point out, from *D. lanceolaria*, of which it seems to be the representative in Burma, in having a calyx with shorter teeth and in having a rather shorter corolla. It differs besides in having no callosity on the standard. It appears further to form no new leaves till flowering is over; in *D. lanceolaria* the new leaves begin to show while flowering is still going on.

18. **Dalbergia volubilis** Roxb.

This species is also very common in the Andamans; and all the specimens from the Western Ghauts seen by the writer that profess to be *D. confertiflora* prove to be *D. volubilis*.

19. **Dalbergia assamica** Benth.

This is, according to Mr. Peal, the tree known in Assam as *Medeloa*. Whether it is in no case a climber is not so clear as one would wish; there seems no foundation for the statement that it occurs in Kamaon. It is the Assamese representative of *D. lanceolaria* just as *D. purpurea* is the Burmese representative of that species.

20. **Dalbergia paniculata** Roxb.


Add to localities of *F. B. I.*:—Burma; common everywhere from the Hukung Valley (*Griffith* n. 1810!) and Bhamo (*J. Anderson!* to Pegu (*Kurz!*), the Karen Hills (*Eyre!* and Shan Hills (*King's Collectors!*)

22. **Dalbergia hircina** Benth.


Dr. Wallich has apparently made an usually grave confusion in connection with this species and *D. lanceolaria*. Mr. Baker finds that in London the true *D. hircina* Ham. is represented by *Wall. Cat*. 5871B only, 5871A being *D. lanceolaria*. This is
also the case at Calcutta. But in London Mr. Baker finds that D. robusta Wall. (Cat. 5849A) is D. lanceolaria, whereas at Calcutta it is D. hircina. In neither case, however, is it Roxburgh's D. robusta; Dr. Roxburgh's species is a Derris.

236. DALBERGIA HEMSLEYI Prain; a tree, leaflets 5-7 ovate-obtuse, ferrugineo-pubescent, flowers in peduncled axillary lax few-fld. panicles, pedicels longer than calyx, petal-claws medium, pod 1-3 seeded rather thickened and veined opposite the seeds. Amerimnnum Hemsleyi Prain MSS.

BURMA; Shan Hills, at Fort Stedman, Collett 682! Myingyan, Prazer! Indine, King's Collector!

Branches pedicels and leaves especially on the underside at first densely clothed with dark-brown tomentum. Leaves 4 in. long, leaflets usually 5, 1.5 in. long, 75 in. wide, firm, dull beneath, stipules small deciduous. Panicle about as long as leaves, branches densely brown-pubescent spreading, each 3-4-fld., pedicels 25 in. Calyx 1/4 in., lower tooth little exceeding the rest. Corolla twice the calyx. Pod 2.5-4 in. long, 8 in. wide, very like that of D. lanceolaria.

A very distinct species compared by Sir H. Collett and Mr. Hemsley with D. Collettii, but differing from that species in its larger flowers with 2-adelphous stamens and its rather larger and broader pods, also in its fewer leaflets with rusty-grey pubescence.

24. DALBERGIA CANA Grah.

This is described as a climber in the F. B. I. Mr. Kurz, who collected specimens that agree absolutely with Wall. Cat. 5859, has pointed out that it is a tree. The native name, Mr. Kurz notes on his specimens, is Town-kassoh. The specimen of Wall. Cat. 5869 (which ought to be D. purpurea) that is preserved in Herb. Calcutta belongs to this species.

24b. DALBERGIA KURZII Prain; a tree; leaflets 15-19 abruptly bluntly acuminate, flowers in long axillary panicles with corymbose branchlets, pedicels ebracteate as long as the calyx, calyx-teeth shorter than the tube, pod flat firm oblong-oblateolate, tapering to a pubescent stalk, elsewhere glabrous, brown, thickened and obscurely veined opposite the seed. D. purpurea Kurz, Journ. As. Soc. Beng. xlv. pt. 2. 279 (excl. cit. Wall. Cat. 5869); For. Flor. Brit. Burm. i. 344, not of Wall.

BURMA; Pegu, Maclelland (n. 8 in Herb. Ind. Or. H. j. & T.)! Brandis 1170! Kurz 1780! 1783! 2603! 2608! Kalay Hills, Prazer! Shan Hills, Alpin!

Branches, leaf-rachises and leaves beneath glabrous. Leaves 9-18 in. long, leaflets rigidly subcoriaceous 2-4 in. long, tapering to base, obovate abruptly bluntly acuminate rarely obtuse at tip, veinlets rather raised on lower surfaces. Panicles sparse appearing before the leaves, the branches finely brown-silky. Calyx purple, minutely puberulous, teeth lanceolate-deltoid. Corolla twice the calyx, white or pale-rose. Pod 3-3.5 in. long, 1.25 in. wide.

This plant is the Thit-poh of the Burmeses, the Dalbergia purpurea of all Mr. Kurz's writings. From the description it will be particularly obvious that it is not at all nearly related to D. lanceolaria and therefore cannot be the D. purpurea
described by Mr. Bentham. The origin of the discrepancy lies in the Wallichian mixture of specimens referred to under D. purpurea,—the sheets examined by Mr. Bentham and Mr. Baker exhibiting a plant nearly related to D. lanceolaria, whereas the one examined by Mr. Kurz is D. cana, a species with flowers so like those of D. Kurzii that they are only to be distinguished by their purple instead of white petals. The writer was at first inclined to think indeed that D. Kurzii was no more than a variety of D. cana, the differences of foliage and especially of fruit appear however to be quite constant. Mr. Kurz seems to have been quite aware, as a reference to his note in J. A. S. B. xlv. 2. 279 shows, that Dr. Wallich had here two plants under one number, since he quotes Mr. Bentham's reference to D. purpurea, 'in part' only. But obviously, as Mr. Bentham had access to the type specimen of 5869, while Mr. Kurz had no more than a distributed one before him, it was to the plant described by Mr. Bentham and not to his own quite different one that Mr. Kurz should have confined the name D. purpurea. But Mr. Kurz had already obscured the issue by identifying the real D. purpurea with D. paniculata, an identification which led him further into giving a description of the true D. paniculata under the name D. rígescens.

25. Dalbergia stipulacea Roxb.

Mr. Baker describes this as 'scandent,' Dr. Roxburgh says it is 'shrubby.' Both descriptions are accurate; in open land or along streams it is a shrub or small bushy tree reaching 20 feet or more in height. In the interior of forests it is a fairly strong climber.

25b. Dalbergia Wattii Clarke, Journ. Linn. Soc. xxv. 17. t. 5; a spreading tree; leaflets 9-11, glabrescent lanceolate-acute, flowers in small axillary panicles with racemose branches, pedicels longer than the calyx with conspicuous persistent bracts and bracteoles, calyx-teeth shorter than the tube, pod glabrous short-stalked veined opposite the seed. Amerium Wattii Prain MSS.

Manipur; Meitaphum, 5000 feet, Watt 6830! Mayung, 3500 feet, Clarke 42034!

Branches glabrous. Leaflets subopposite 2.5-3 in. long, slightly pilose beneath. Calyx puberulous 1/4 in. Corolla twice as long as calyx, standard orbicular emarginate. Pod 2-2.5 in. long, 75 in. wide, 1-seeded.

A very distinct species closely related to D. stipulacea but without the marked thickening of pod opposite the seed and with very acute leaflets that are almost opposite.

25c. Dalbergia Oliveri Gamble MSS.; a tree; leaflets 10-15, oblong-obtuse emarginate (acute when young) glabrous, flowers in copious spreading terminal panicles with racemose pubescent branches, pedicels about as long as calyx with conspicuous bracts and ultimately deciduous bracteoles, calyx-teeth short, the two uppermost rounded, the rest acute, the lowest longest, all glabrous except the ciliate edges, pod 1-2-seeded narrowed at base into a slender stalk, acute at tip, prominently veined and thickened opposite the seed. Amerium Oliveri Gamble MSS.

J. 11. 57
Upper Burma; Wuntho and Bhamo, J. W. Oliver!

Branches glabrous; leaves 6-8 in. long, leaflets 1-1.5 in. long, 5 in. wide. Calyx $\frac{1}{2}$ in. Corolla 3-4 times as long as calyx, standard orbicular, 2 in. broad, wings as long as standard, keel much shorter. Stamens in 2 bundles of 5 each. Ovary falcate, pubescent below, ending in a curved style. Pod 3-4 in. long, '9-1.2 in broad.

This is the Tamalan, a handsome tree with fine dark-red wood used for axe-handles, etc. The description is from a manuscript note by Mr. Gamble, accompanying specimens of the tree sent by him to Herb. Calcutta from the Imperial Forest School at Dehra Dun.

25d. Dalbergia Prazeri Prain; a tree; leaflets 15-17 obtuse, puberulous beneath, flowers in sparse axillary panicles, pedicels longer than the calyx, pod thin glabrous 1-3-seeded not much thickened opposite the seed.

Burma; Koni, Prazer!

Branches glabrous. Leaf-rachis 6-8 in., leaflets moderately firm obtuse, 1-1.5 in. long, glabrous above, sparsely rusty-pubescent beneath and glaucescent. Panicles much shorter than the leaves with only a few lax branches, bracteoles, if any, deciduous. Calyx densely pubescent, lowest tooth linear exceeding the others. Corolla unknown. Pod thin, ovate-acute, 2-4 in. long, 75 in. wide, gradually narrowed into a stalk much longer than calyx.

Evidently exceedingly closely related to D. stipulacea from which, except for the sparse pubescence on the leaves beneath and the hirsute calyx it is hardly distinguishable in flower; the pods, however, are totally unlike and this renders the separation of the two forms absolutely necessary.

26. Dalbergia torta Grah. in Wall. Cat. 5879.

Add to localities of F. B. J. — Bengal; Sundribans, very common, Clarke! Heinig!

This, being a much older name than the name D. monosperma Dalz., must be employed for the species.

Mr. Baker has defined § Selenolobium as having stamens in two bundles of 5 each thus implying that this is the case here. In D. torta, however, the stamens are, as Mr. Bentham has already described them, always monadelphous.

[29. Dalbergia stenocarpa Kurz.]

This is only D. hircina Ham., and must be deleted.

30. Dalbergia parviflora Roxb. Hort. Beng. 98; scandent, leaflets glabrous 5-9, ovate-lanceolate with obtuse slightly emarginate tips, flowers very small in axillary and terminal panicles with corymbose branches, pedicels very short, pod turgid when young falcate along upper, when ripe convex along both sutures if 1-seeded, and if more than 1-seeded torulose between the seeds. Flor. Ind. iii. 225; Mig. Flor. Ind. Bat. i. 132; Benth. in Journ. Linn. Soc. iv. Suppl. 33; Prain, Journ. As. Soc. Beng. lxvi. 2. 121. D. Cumingiana Benth. Pl. Jungh. 225; Journ. Linn. Soc. iv. Suppl. 32; Mig. Flor. Ind. Bat. i. 129. D. Zollingeriana Mig. Flor. Ind. Bat. i. 130. Drepanocarpus Cumingii Kurz, Journ. As. Soc. Beng. xlv. pt. 2. 282.
ANDAMANS; HELFER 1808! DINDINGS; CURTIS! PAHANG; RIDLEY!
Perak; very common. Distrib. Malay Islands.

Stem 30-80 feet long, branches glabrous. Leaflets 2-3½ in. long, 7½-1½ in. wide. Calyx ½ in. campanulate, teeth obtuse, upper two connate, lower three sub-equal as long as tube. Corolla white ⅛ in. long, claws of petals short. Stamens 10, monadelphous. Pod 7½-2 in. long, 6 in. wide.

This is one at least of the plants yielding the Kayu-lakka of commerce.

31. DALBERGIA MENOEOIDES Prain, Journ. As. Soc. Beng. lxvi. 2. 120; scandent, spineless, leaflets three, acute large, pod flat.

MALAY PENINSULA; Perak, SCORTECHINI 1392!

A wide-twinging shrub with twisting black branches. Leaflets usually 3, ovate-lanceolate, tapering to both ends, dark-green and glabrous above, sparsely adpressed-puberulous beneath, 3-3½ in. long, 1½-1½ in. wide. Flowers very few sessile, clustered at the tips of short puberulous axillary peduncles. Calyx ⅛ in. campanulate, teeth short subequal obtuse. Corolla more than twice as long as calyx. Stamens 10, monadelphous. Pod greenish semilunar flat glabrous firm, reticulated throughout, upper suture recurved; 1½ in. long, 7½ in. wide, 1-seeded; tip acute stalk rather longer than calyx.

A very distinct species.

32. DALBERGIA KUNSTLERI Prain, Journ. As. Soc. Beng. lxvi. 2. 121; scandent, spineless, leaflets 7-9 acuminate, coriaceous, glabrous, pod turgid.

MALAY PENINSULA; Perak, Kunstler!

An extensive climber 40-150 feet long, with puberulous branches. Leaflets dark-green above, dull-grey and when young densely pubescent beneath, elliptic-acuminate, 4-6 in. long, 2 in. wide, with very prominent midrib and secondary veins beneath. Flowers in axillary panicles, 4-6 in. long, with puberulous branches. Calyx ⅛ in., teeth longer than tube. Corolla ⅛ in., blue; standard orbicular. Pod finely puberulous, rigid, much thickened throughout, 1-2-seeded, 1½-2½ in. long, 9 in. wide, 3 in. thick, short-stalked, dark-brown, almost black when ripe but with grey lines along the sutures due to rupture of the epicarp.

A fine species very nearly related to D. reniformis, of which it has much the pods. These are, however, larger and thicker as also are the leaflets. The pod is quite indehiscent, but as it ripens the skin cracks along both sutures and a “grey seam” (to which Kunstler alludes in his field-note) is produced by the exposure of the suberous mesocarp along two lines parallel to each suture. Sometimes the pod consists of but one reniform segment; usually there are two, but the seed in the distal segment rarely matures and the epicarp consequently not giving way, there are usually no “seams” along the sutures of that segment.

87. PTEROCARPUS LINN.

1. PTEROCARPUS INDICUS Willd. Sp. Pl. iii. 904.

Delete from the synonyms of F. B. L.:—P, dalbergioides Roxb. Flor. Ind. iii. 236; also, P. Wallichii W. & A. Prodr. 267; also P. indicus Bedd. Fl. Sylvat. t. 23.

A very strange error has found its way into some of our most authoritative works
on Indian vegetation in the statement that P. indicus, even in the sense that makes the species include P. dalbergioides, is a native of India. Wight and Arnott, extremely careful and accurate authors, who have not confounded P. indicus with P. dalbergioides, are at pains, in describing P. dalbergioides, to say of it "Our specimens are from the Madras Herbarium and were perhaps from the Missionaries' garden." And Col. Beddome in figuring P. dalbergioides, which he does under the belief that he is figuring P. indicus, says of it "a very handsome tree said to be indigenous in Southern India, but I have never met with it wild." Even as a cultivated tree, P. indicus proper is so rare in India as to be practically unknown. When it is planted it goes as a rule under the name P. saxatilis, and is not usually supposed, even by botanists, to be the same as P. dalbergioides which has appropriated the name P. indicus though it has no special claim to it. The only distributed "Indian" examples of true P. indicus (except those grown in the Calcutta garden), that the writer has seen, are from the herbarium of K. S. Naidoo, who was formerly in Dr. Wight's service, and from Dr. Wight's own Herbarium (K. D. 809); curiously, Naidoo has labelled his specimens "Andaman red-wood tree" which is precisely what P. indicus is not. The diagnosis between the two trees so often confounded is as follows:—

Leaflets finely-veined throughout, pedicels longer than the calyx,
beak of pod distinctly raised above the outer base... P. indicus.
Leaflets with 5–7 pairs of distinctly raised veins beneath, pedicels
shorter than the calyx, beak of pod not raised above the outer
base... P. dalbergioides.

The distribution of P. indicus, as shown by specimens of the plant preserved in Herb. Calcutta is as follows:—


There are also specimens, from planted examples only, from Rangoon,
but the tree seems as thoroughly a stranger in Burma, north of Martaban,
as it is in India. Mr. Kurz does indeed say that it is "very rare along
the eastern slopes of the Pegu Yomah;" neither he, nor any one else,
has ever communicated any specimens from there.

Some vague opinions have been held regarding this tree, as to points other
than its geographical distribution. Thus it has been usual to say that Pterocarpus flavus Lour. is probably the same species. It is exceedingly difficult to understand why, for when one consults Loureiro one finds that he bases his species on a picture given by Rumphius of the Kayu Malapari of the Malays, the fruit of which Rumphius does not figure, and on another tree of which Loureiro knew the fruit but did not know the flowers. Moreover the description that Rumphius gives of the fruit of his tree does not even remotely agree with the description given by Loureiro. When one takes the trouble to look at Rumphius' figure and to read his description, one finds that his Malaparius has opposite leaflets and a wingless pod, and learns in fact that Rumphius' account of Malaparius is an excellent and un-
mistakable description of *Pongamia glabra*, one of the most familiar of trees to those who have collected on the coasts of Burma, the Andamans, or Malaya. *Pterocarpus obtusatus* Miq. has no foundation; it can be manufactured if one is careful to collect only the leaves toward the bases of branches; and *P. Zollingeri* Miq. is only *P. indicus* with its fruits collected at a particular stage of their development.

*P. Wallichii* W. & A., reduced to *P. indicus* by Mr. Bentham and also by Mr. Baker, is based on *Wall. Cat.* 5843D, which is not represented at Calcutta. There is at Calcutta, however, an example of *P. Wallichii*, named by Dr. Wight himself, collected in Western India by Stocks. This plant is not *P. indicus* at all, but comes nearer that variety of *P. Marsupium* (with less obtuse leaves and a broader pod) approaching *P. indicus*, which is mentioned by Mr. Bentham in *Journ. Linn. Soc.* iv. *Suppl.* 77.

*P. dalbergioides* Roxb. (the Andaman red-wood) is strictly confined, in a wild state, to the Andaman Group. It is now, however, frequently planted in India.


It must be by a mere *lapsus calami* that Mr. Kurz has stated in his *Forest Flora* that this is frequent in Martaban and Tenasserim, for neither he nor any other botanist has reported it from Tenasserim, and he has himself only once collected the species in Martaban. The tree is very widely distributed in Burma, where it is known as *Padouk*, a name that has however been applied in Tenasserim to *P. indicus* also, and by Burmese convicts at Port Blair to the Andaman Red-wood (*P. dalbergioides*) as well. The localities, as shown by specimens in *Herb. Calcutta*, are as follows:

- **Martaban**: Kurz! Pegu; Tonkyeghat, Kurz! Eyre! Brandis! Sir D. Brandis’ specimens have been named *P. indicus* by Mr. Kurz and form the basis of his remark (*For. Flora Brit. Burm.* i. 349) that *P. indicus* occurs in Pegu.
- **Upper Burma**: Karen Hills, Brandis 1159! Shan Hills, King’s Collectors! at Kyoukse, Kyoukmyoung and elsewhere, common, King’s Collectors! Chin Hills, King’s Collectors!


**Southern India and Ceylon.**

**Var. acuminata**; leaflets ovate cuspidate-acuminate, pods much larger than in type. *P. Wallichii* W. & A. *Prodr.* 267?

**Behar**: Rajmahal Hills near Sahibganj, Kurz! Deccan; Naundoshi, Tilak! Rajputana; Abu, Stocks n. 237! Concanc; Gujeh jungles, Ritchie! Canara, Yellapur, Talbot!

The flowers of this variety are not distinguishable from those of *P. Marsupium*, the pod however is somewhat different and most probably the plant is quite worthy of specific rank. It is often issued from herbaria as *P. indicus* which it does not, either as to the flowers, fruit, or texture of leaves, in the least resemble. Without having an opportunity of examining *Wall. Cat.* 5843D, on which “*P. Wallichii*” is based, the writer cannot venture to say if Stocks’ plant, so named by Wight, be the same. For this reason the name “*acuminata*” rather than the name “*Wallichii*” has, for the present, been given to the variety.

*Pterocarpus floribundus* Wall. *Cat.* 5846, a species to which neither Mr. Bentham nor Mr. Baker allude, is a *Derris* (*§ Aganope*).
Pongamia glabra Vent.

Var. typica; leaflets usually 5, occasionally 7, oblong or ovate, 2.5-3.5 in. wide, quite glabrous beneath; racemes always solitary, simple, pedicels 3-5 in. long, their bracteoles only subopposed and situated slightly above the middle. (Synonyms as in F. B. I. with in addition P. grandifolia Zoll. & Mor. Syst. Verzeich. 3; Miq. Flor. Ind. Bat. i. 147. P. mitis Kurz, Journ. As. Soc. Beng. xlv. 2. 128.—Rumph. Herb. Amboin. iii. t. 117.—Lamk. Ill. t. 603 (Pongamia).

Sea-coasts; Banks of Tidal rivers and mangrove swamps on all the coasts: only occurs inland as a planted species.

Var. xerocarpa; leaflets 7-9, very rarely 5, lanceolate, 1-1.35 in. wide, usually sparingly puberulous on the midrib and main-nerves beneath, racemes occasionally 2-3 in. an axil, sometimes sparingly branched, pedicels 25 in. long the bracteoles opposed and placed close under calyx. P. xerocarpa Hassk. Retz., ed. nov., 208.

Ceylon; Thwaites 1489! Pahang; Ridley! Kedah; Kunstler! Perak; Kunstler! Malacca; Derry! Distrib.; Java.

This well known littoral species is the Pongam of the Tamils, the Karanj of Hindustan, the Thin-win of the Burmese, the Malapari of the Malays.

It never climbs and only occurs inland as a planted tree on roadsides or in village groves; its timber is in use for making oil-mills in Northern India, solid cart-wheels in Southern India. The seeds yield the well-known "Karanj-oil," which is burned and is also used in skin complaints.

The typical variety occurs in two rather distinct forms that pass into each other, however, by all sorts of intermediates. These are:—1, a form with medium-sized leaflets and flowers (the original P. glabra) found everywhere; and 2, a form with decidedly larger leaflets and flowers (P. grandifolia Zoll. & Mor.) that, beginning in Chittagong, passes southwards through Arracan, the Andamans, the Nicobars, and Sumatra to Java, being evidently the most usual form along the whole line of distribution indicated; it nevertheless seems neither to extend westward to the Sundri-buns and India, nor eastwards to Tenasserim and the Malay Peninsula.

The plant here treated as var. xerocarpa was treated as a species by Hasskarl; an authentic example of his plant is preserved in Herb. Calcutta. The diagnosis now given shows that the characters which separate it from the type are individually trivial; yet it is, in general appearance, so unlike the type that there is some difficulty at first in believing them to be conspecific. On the other hand, this particular variety so closely resembles a species described as Millettia decipiens by the writer, and another described as Pongamia dehiscens (which is however also a Millettia) by Koorders and Valeton, that when no more than flowers are available it requires a careful examination of the ovary, (4-5-ovuled in the Millettias, only 2-ovuled in the Pongamia) to ensure accurate diagnosis. The fruits of the Pongamia are, however, exceedingly unlike the pods of the Millettias.

The name of this genus has been much debated. The question has been whether the name Pongam, proposed in 1768 by Adanson, modified by Lamarck in 1797 into Pungamia, and finally corrected by Ventenat in 1803 into Pongamia, is or is
not to be employed instead of the name Galedupa, used by Lamarck in 1786, and
though spontaneously abandoned by that author in 1797, readopted by Roxburgh in
1814.

The name Galedupa, if we quibble over refinements of spelling, does indeed
antedate the name Pongamia by 17 years and so cautious an authority as Taubert in
the Naturlichen Pflanzenfamilien has recently followed Roxburgh's usage and re-
adopted Lamarck's earlier name, thus abandoning the name familiarised by the usage
of authorities like De Candolle, Bentham, Hooker, Wight, Kurz, Baillon and a host
of others.

The usage readopted by Taubert appears to the writer to be highly inad-
sirable (1.) because the more familiar name (in the form Pongam at all events) long
antedates the name Galedupa; and (2.) because the use of the name Galedupa at all
was based on the identification of Caju Galedupa Rumphius (Herb. Amboin. ii. t. 13)
with Pongamia glabra. This is so manifestly an impossible identification that one
marvels at its ever having been suggested; Caju Galedupa, which is a Sindora, is
figured as having equally-pinnate leaves, dehiscent pods, and an arillate funiculus,
whereas in Pongamia glabra the leaves are unequally pinnate, the pods indehiscent,
the seeds not arillate and with a small hilum. Moreover Rumphius knew and
figured (Herb. Amboin iii. t. 117) Pongamia glabra itself, under its Malay name
Malapari. That Lamarck had detected his mistake before it was formally pointed
out in 1803 by Ventenat, is abundantly clear from his having in 1797 (Illustr. t. 603)
substituted the name Pungamia for the Encyclopaedia name Galedupa of 1786.

These being the facts of the case it disconcerts one to find that Kuntze
desires to deliberately revert to Lamarck's error; not only so, he proposes to employ
a modified form of Rumphius' term Caju (m)—which is precisely the synonym that
cannot possibly belong to the plant described by Lamarck—as the name of the plant
to which Lamarck's definition applies. Perversity in bibliography could scarcely
exceed this; nor perhaps could perversity in mere nomenclature. The Latin word
Arbor is, it has been tacitly admitted, tabùed as a generic name; it seems hardly fair
that, even under the ægis of Kuntze's authority, its Malay equivalent,—erroneously
transliterated, it is true—should be permitted to assert itself.

The Malaparius of the Herb. Amboin. was referred by Loureiro, in opposition
altogether to Rumphius' description of the pod, and in spite of his having figured the
leaflets as opposite, to the genus Pterocarpus. Miquel (Flor. Ind. Bat. i. 1082 addend.)
was the first to remove it from Pterocarpus; Miquel gave it generic rank, associating
with it a plant collected by Teysmann in Sumatra; this plant is unfortunately
not represented in Herb. Calcutta. In the Genera Plantarum (i. 465) the possibility
is suggested that Rumphius' and Teysmann's plant may be specifically distinct;
there is, however, nothing in Miquel's brief description to favour this suggestion;
on the contrary it seems clear that the 'Malapari' collected by Teysmann in Sumatra
is Pongamia glabra just as the 'Malapari' described by Rumphius from Amboina and
the 'Malapari' recently collected by Derry in Malacca both most certainly belong
to it. It is, however, to be noted that while Rumphius' figure clearly indicates the
typical plant, Derry's plant belongs to var. xerocarpa as, from the description of
the pubescent petiolules, evidently does Teysmann's.

89. DERRIS LOUR.

[The name Derris was proposed in 1790 for a genus that had already in 1775
been named Deguelia.]
1. **Derris scandens Benth.**

Add to localities of *F. B. I.*:—*Andamans*; very common. *Nicobars*; frequent.

3. **Derris robusta Benth.**

Add to localities of *F. B. I.*:—*Chittagong*; very common. *Pegu*; *Kurz!* *Brandis!* Distr. South-West Yunnan (*J. Anderson!*)

This is the well-known "Korai" of Assam and Silhet. Mr. Ellis gives the name "Junguria" as used in Chittagong, and Mr. Kurz notes the Burmese name as "Tepu-kan."

4. **Derris dalbergioides Bak.**

This tree is also very plentiful in Perak. In Malacca it has, according to Mr. Derry, two local names, "Assam hutan" and *Pekó Pétéi bilalong."

5. **Derris uliginosa Benth.**

As *Cat.* n. 5879 this was distributed by Dr. Wallich under the name *Pongamia uliginosa.* Under one of the letters, however, (*Cat.* n. 5879 E.) he issued a very different plant which in *Pl. Junghuhn.* 252 (adnot.) Mr. Bentham treated as the type of a distinct species (*D. affinis* Bth.); this plant, at a later date, Mr. Bentham identified with *D. trifoliata* Lour. and reduced to *D. uliginosa* as a variety (*Journ. Linn. Soc.* iv. *Suppl.* 108). The acceptance of the latter view should obviously have involved the substitution of the name *D. trifoliata* Lour., which dates from 1790, for the name *Derris uliginosa* Bth. which is based on *Robinia uliginosa* Roxb. (in *Willd. Sp. Pl.* iii. 1135) dating only from 1800. Fortunately, however, the rule was in this case neglected.

The statement that the pod of *D. uliginosa* may be 2-seeded is not borne out by specimens reported to Calcutta. The writer has examined 137 fruiting herbarium specimens as well as numberless living plants, and has never found a pod of *D. uliginosa* with more than one seed. He has seen specimens from the Khasia Hills, named *D. uliginosa,* that have 2-seeded pods, but these have always been specimens of another species. The present species is a purely littoral one, met with, as Roxburgh says, "on wet banks of rivers, nullas, etc." (he might have added *tidal* rivers for it never occurs away from the influence of the tide), or as Wight and Arnott remark in "swampy places near the sea." For Mr. Bentham's statement that it extends "over the plains of Central India, to Khasiya" and for Mr. Baker's "Eastern Himalaya" locality there is no foundation.

That *Derris trifoliata* Lour. cannot possibly be any form of *D. uliginosa* is quite clear from Loureiro's description; *D. trifoliata* has 2–3-seeded pods and white flowers, whereas *D. uliginosa* has only 1-seeded pods and has pink flowers. Besides, the racemes of *D. trifoliata* are described as "long," which is precisely what those of *D. uliginosa* are not. M. De Candolle, too, who saw Loureiro's specimens (see *Prodr.* ii. 415) did not identify them with Roxburgh's plant which he also had seen (see *Prodr.* ii. 416).

Whatever the relationship of *D. trifoliata* and *D. uliginosa* may be, it is absolutely certain that *Wall.* *Cat.* 5879 E. does not belong to *D. uliginosa*; its long panicles with smaller flowers and its more numerous prominent lateral nerves that run to the edge of the blade make it very different from *D. uliginosa,* the leaves of which have faint lateral nerves, hardly stronger than the secondary venation, that loop at their ends some way within the margin.
6. **Derris vestita** Bak.
7. **Derris elegans** Benth.

The large suites of Malayan specimens collected by Kunstler, large suites from the Andamans sent by Man, and large suites of Tenasserim specimens collected by Falconer and more recently by Froudlock, make it necessary to treat **D. vestita** as only a form of **D. elegans**.

Both **D. vestita** and **D. elegans** are reported in every case as having 'white' flowers. Father Scortechini was of opinion that his specimens must belong to a distinct species since, though they otherwise agreed with the F. B. I. description of **D. vestita**, they had differently coloured flowers.

The typical form of the species occurs in Perak and in Sumatra as well as in Martaban and Tenasserim. An unnamed sheet of Dr. Wallich's, (Wall. Cat. 7540) from Moulmein, belongs to the species. The form named **D. vestita** by Mr. Baker occurs in Perak as well as in Malacca and has been collected in Tenasserim, at Moulmein, both by Dr. Falconer and by Mr. Kurz.

10. **Derris cuneifolia** Benth.

This extends to Chittagong and Burma; the form, however, which occurs in Malaya, though united to the type by Mr. Baker, was distinguished by Mr. Bentham as a variety "**malaccensis**." Since Mr. Baker's account of the genus appeared, large suites, including many specimens with ripe fruit, have been sent from Perak; these show that it is better to separate the Malayan plant as a species. Incidentally too these suites of specimens seem to indicate that **Derris discolor** Bth. is only **D. cuneifolia** with ripe fruit; the writer has not, however, yet seen this directly demonstrated by suites of specimens from Sikkim or Silhet, where **Derris discolor** was found. **Amerimnum obovatum** Ham. which is the basis of **Pongamia obovata** Grah., as represented in Herb. Calcutta, belongs to this species.

106. **Derris malaccensis** Prain, Journ. As. Soc. Beng. lxvi. 2. 107; leaflets 5-7, rather large, elliptic, abruptly long-acuminate, subcoriaceous, racemes shorter than the leaves, standard glabrous, pod winged or wingless when ripe. **Deguelia malaccensis** Prain MSS.

**Var. typica**; pod distinctly winged, (as in a true **Derris**) along one or both sutures. **Derris cuneifolia** Bth. **Var. malaccensis** Bth. Journ. Linn. Soc. iv. Suppl. 112.

**Tenasserim**; **Moulmein**, **Falconer!** **Perak**; **Scortechini** 110! **Kunstler** 4028! 4149! 4504! 8551! **Penang**; **Curtis** 2735! **Malacca**; **Griffith!** **Singapore**; **Ridley!** **Distr.** **Borneo**.

**Var. aptera**; pod quite wingless when ripe (as in **Pongamia**)!

**Malacca**; **Maingay**, 613! **Perak**; **Kunstler**, 4518! 6428! There are also specimens from Perak (**Kunstler** 3190! **Wray** 2025!) almost exactly intermediate, as to fruit, between typical **D. malaccensis** and the variety **aptera**.

**Var. millettiodes**; pod as in **Var. aptera**, but dehiscing when ripe (as in **Millettia**). **Perak**; **Kunstler** 10696!

A climber 40-60 foot long, leaflets in all respects like those of **D. cuneifolia** except in their larger size and their long caduate-acuminate tips. **Flowers** as in **D.**

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cuneifolia but pale yellowish-pink and larger (65 in. long); ovules 4 (rarely 5). **Pod** larger; in the typical form distinctly winged down both sutures, in both varieties wingless. Possibly both varieties may prove specifically distinct.

The species seems intermediate between *D. cuneifolia* which has 2 (rarely 3) ovules, and *D. montana* Bth. from Java which has "about 8 ovules," and has leaves like those of *D. malaccensis*.

11. **Derris microptera Benth.**

This is described by Mr. Bentham and accepted by Mr. Baker as having a 2-callose standard. In Herb. Calcutta all the specimens with a 2-callose standard are easily referable to *D. cuneifolia*, whereas all those that agree with fruiting specimens of *D. microptera* have the standard ecallose. But the fruits of *D. microptera* are decidedly dehiscent, so that the species might be placed in *Millettia* to which genus indeed Mr. Gamble, Dr. King and Mr. Clarke have in the field referred specimens of the plant collected by themselves.

The species extends from Sikkim to the Khasia Hills where it has been collected by Griffith, by Oldham and by Clarke. The most marked feature of the species is its horse-shoe shaped seeds.

12. **Derris elliptica Benth.**

Add to localities of *F. B. I.*:—Chittagong; *King's Collector!*

To this species belong the Malayan specimens of "*Millettia pachycarpa*" mentioned in *F. B. I.* ii. 106. It is not the only *Derris* with silky petals, *Derris eualata* Bedd. shows the same character though it does not have it so well marked.

13b. **Derris andamanica Prain, Journ. As. Soc. Beng.** lxvi. 2. 104; leaflets 7–9, oblong, rather large, acute, racemes copiously panicked, with pubescent branches, pedicels twice as long as the calyx, corolla large, pod finely permanently silky, wings along both sutures subequal.

**Andamans; Coco Group, Prain! S. Andaman, King's Collectors! Nicobars; King's Collectors!**

A large creeper, with pale golden-brown-silky branches. **Leaflets** subcoriaceous glabrous, 4–6 in. long, 2–3 in. wide, veinlets distinct. **Flowers** in axillary panicles 6–18 in. long, pedicels 3 in. long, fascicled or in racemes on produced nodes. **Calyx** finely golden-brown-silky 15 in. **Corolla** white, 6 in. long, standard not callose. Pod ligulate thin, 3–4 in. long by 1 in. wide, 2–3-seeded, each wing '12 in. wide.

Nearest *D. eualata* but very distinct by its glabrous petals and its silky pod.

14. **Derris eualata Bedd.**

A species of this genus issued as *Dalbergia* sp. by Dr. Wallich (Cat. 5977) but not accounted for by Mr. Bentham or in the *F. B. I.* is the same as a plant collected by Col. Beddome at Nediwattam in 1881, and at the same place by Mr. Gamble in 1889; the same plant was also collected by Col. Beddome in the Tinivelly hills. The plant agrees well with Col. Beddome's and Mr. Baker's descriptions but it has silky petals; it may be this species, at all events it is none of the others described in the *F. B. I.*

15. **Derris Heyneana Benth.**

The limits of this species stand in need of definition. It is based on *Wall. Cat.* 5916 which is, unfortunately, not represented in the Calcutta collection.
Mr. Bentham identified with Wall. Cat. 5916 the plant issued as *D. paniculata* Wight (Herb. 920) and separated two varieties "β. parviflora" and "γ? brevipes." Mr. Baker has ascertained, however, that "γ? brevipes" is specifically distinct, and as regards the other two he reverses Mr. Bentham's judgment. He says that Wall. Cat. 5916 is not the same as Wight n. 920. which he makes a variety, while he gives the Concan plant, (Bentham's var. β. parviflora) as the equivalent of the type specimen. The point is of considerable importance because the two are very distinct; the Concan plant has a silky keel, the *D. paniculata* of Wight has all the petals glabrous; the two must be recognised as different species. What makes it most difficult to deal with the question in that *Wight* n. 920 is described by Mr. Baker as having considerably smaller leaflets than Wall. Cat. 5916. Its leaflets are, however, in reality much longer than those of the Concan plant referred to, or than those of the apparently closely related *D. eualata*. There is at Calcutta a specimen named "D. Heyneana var. brevipes" (Herb. Ind. Or. H. f. § T. n. 10) but it is exactly the same as the *D. Heyneana* of Dalzell and Gibson's *Bombay Flora* of which there is an authentic specimen at Calcutta—in any case it cannot be *D. brevipes* Baker because its pedicels exceed the calyx and its pods are quite glabrous. Members of the Society who live in Southern and Western India should endeavour to remove the difficulties that are connected with the differentiation of the species of this group.

16. **Derris marginata** Bentham.

Add to localities of *F. B. I.*,—**Chittagong**; Helingomara and Demagiri, *Lester!* Pegu; **Brandis!**


**Penang**; **Wallich**!


This is evidently very near to *D. marginata* and *D. amoena*; from the former it differs in having shorter pedicels bibracteate at their tips and in having more numerous prominent nerves to the leaves; from the latter it differs in having thinner pale leaves, and laxer panicles with spreading branches and more scattered flowers.


**Perak**; Scortechni 2180! **Distrib. Java**.

A stout rambling shrub with glabrous whitish branches. *Leaves* pale-green, 4-5 in. long, leaflets 2-25 in. long, 1-125 in. wide, with rounded base and obtusely acuminate apex, lateral nerves 4 pairs, faint below, invisible above. *Racemes* 1-1½ feet
long, branches 4–6 in., spreading, pedicels '4 in. 2-bracteolate close under the calyx.  
Corolla white, standard orbicular ecallose, with a green spot at the top of the claw.  
Ovary sparsely puberulous; ovules 4.  

This may, as Prof. Miquel thought, be a Brachypterum; it seems, however, on the whole to be more nearly allied to D. affinis, D. amoena and D. marginata, the two last of which are certainly members of the section Dipteroderris. Unfortunately the pod is still unknown.

19. DERRIS MAINGAYANA Bak.

In consequence of the communication of intermediate forms it seems advisable to treat this as only a variety of D. amoena.

21. DERRIS CANARENsis Bak.

The authentic specimens of Brachypterum canarensis at Calcutta cannot be separated by the writer from the Concan specimens collected by Stocks and included by Mr. Bentham in D. oblonga Bth. The fruits of the Concan and the Ceylon plants placed under D. oblonga may differ; unfortunately our Calcutta specimens of D. oblonga from Ceylon are in flower only.

22. DERRIS SINuATA Thw.

Add to localities of F. B. I.:—BENGAL; SunDribuns, very common.  
PERAK; Kunstler! Scortechni!

23. DERRIS THYRSIFLORA Benth.

Delete from localities of F. B. I.:—“Eastern Himalaya and the Khasia Mts.”

The species has never been reported to Herb. Calcutta from any locality north of Kedah on the mainland; it is found also in the Nicobars. Perhaps the Himalayan plant associated with this one is the next species, which though nearly allied is very distinct; the only circumstance that makes this conclusion doubtful is that the Himalayan plant in question is Dr. Wallich’s Pterocarpus floribunda, a species that neither Mr. Bentham nor Mr. Baker have accounted for, and one that is retained as a Pterocarpus in the Index Kewensis.

Mr. Baker cites Amerimnum obovatum Ham. MSS. as a synonym of this species. But the only specimen in Herb. Calcutta which Dr. Buchanan-Hamilton has, in his own handwriting, named Amerimnum obovatum is a specimen which Prof. Graham has, also with his own hand, named “Pongamia? obovata”; it constitutes Wall. Cat. 5897 and is, as Mr. Baker elsewhere says, only Derris cuneifolia. And Wall. Cat. 9054, which Mr. Baker likewise quotes as being Derris thyrsiflora, it is better in the meantime to omit. The plant so numbered is not represented at Calcutta; at Kew there are apparently two very distinct plants under the number because Mr. Baker has referred Wall. Cat. 9054 to Spatholobus acuminatus as well as to Derris thyrsiflora.

23b. DERRIS WALlichii Prain, Journ. As. Soc. Beng. lxvi. 2. 99; leaflets acute two and half times as long as broad, pedicels as long or longer than the calyx, pod broad not sinuate, distinctly winged down both sutures. Pterocarpus floribundus Wall. Cat. 5846.

Silhert; Wallich 5846! Cachar; Prazer! Khasia; Griffith 1770 [Kew Dist.]! Calcutta Collectors! at Manlfoo, Clarke 43825! Assam; King’s Collectors! Andamans; King’s Collectors!
Very similar to *D. thrysiflora* but easily distinguished by the florets with pedicels 2–3 in. long, instead of subsessile, and by the broader pods, 1·5–4·5 in. long, 1·5 across, with 1–2 seeds.

The Andamans specimens have rather thicker leaves than the Assam ones, and in this resemble *D. thrysiflora*, but the more numerous nerves to the leaves and the pedicelled florets and buds readily distinguish the plant. The Griffithian specimens have been issued as *D. thrysiflora*, those of Mr. Clarke as *D. marginata*, those of Dr. Wallich as *Pterocarpus floribundus*. It has been impossible to employ the specific name "floribunda," however, as there are already both an *Aganope floribunda* and a *Brachypterum floribundum* in the genus *Derris*.

**Doubtful species.**

**Derris acuminata** Benth.

This includes *Wall. Cat.* 5886 and *Wall. Cat.* 5901; the former at Calcutta is represented by two specimens and their flowers have a callose standard; they are in fact simply *D. cuwsifolia* Bth. *Wall. Cat.* 5901 is unrepresented at Calcutta, but the plant collected by Sir J. D. Hooker in Sikkim is here. It is the same as *D. microptera* Bth. or, to be more precise, it is the flowering part of the plant whose fruits are described by Mr. Bentham as those of *D. microptera*. What the plant with 2-callose standard described as *D. microptera* may be the writer cannot say, there being no authentic specimen here. But of the two very similar species that have been reported from Sikkim, that with long cuspidate leaves and with most of its nodes unproduced never has callosities on the vexillum, the one with its nodes all produced and with leaflets that are either obtuse or if acute are not cuspidate always has callosities. In any case the pod of the plant termed *Derris microptera* is dehiscent as in *Milletia*.

**Derris secunda** Bak.

This is based on *Wall. Cat.* 5890 which unfortunately is not at Calcutta. But a plant that exactly agrees with Mr. Baker's very clear description has been collected in the following localities:—

Daphila Hills; Torputu, 7400 feet, Lister! Khasia Hills; 5–6000 feet, G. Mann, 199! Badgeley! Burma; Nattingong Ms., Kurz.

To Mr. Baker's description it may be added that the leaflets are as often 9 as 7 and that in one specimen there are 11. The pods, collected by Capt. Badgeley, are thin strap-shaped 3–4 in. long, 8 in. wide, distinctly winged down the upper, very narrowly down the lower suture; seeds 2–3. This, as has already been remarked, is the plant described by Mr. Kurz as *Milletia monticola* which thus proves to be a *Derris* and must in all probability take the name *Derris secunda*.

**Derris polystachya** Benth.

Add to description of *F. B. I.*:—Pod thin flat ligulate-oblong, glabrous, flexible, finely veined, 3–4 in. long, 1·25–1·5 in. wide, the upper wing 25 in. wide, the lower narrower.

Add to localities:—Bootan; King's Collectors! Sikkim; J. Anderson! King! Gamble!

The pod is very like that of *D. marginata* to which it is closely allied, but is not so pale in colour; this now ceases to be a doubtful species.
DERRIS OVALIFOLIA Benth.

The only S. Indian plant in the Calcutta Herbarium that agrees with the figure given by Wight is that distributed from Wight's herbarium as n. 834 [K. D.] This in turn suits very well the description given of D. Wightii Baker.

DERRIS DISCOLOR Benth.

This, as has been already mentioned, is almost certainly merely that state of D. cuneifolia with ripe fruits.

89.* KUNSTLERIA PRAIN.

Climbing shrub with unequally pinnately 1–7-foliolate exstipellate leaves, stipules small deciduous. Flowers rather small in ample terminal thyrsoid panicles extending into the axils of the upper leaves, pedicels solitary, nodes not tumid. Calyx campanulate, teeth lanceolate, the two upper connate. Corolla distinctly exserted, standard ovate entire, keel boat-shaped, the petals slightly cohering. Stamens diadelphous, the upper one quite free from the other 9 and adnate at base to standard-claw; anthers versatile, uniform, on alternately short and long free filaments. Ovary sessile, few-ovuled, style incurved filiform, stigma capitate. Pod thin flat strap-shaped, membranous or coriaceous, indehiscent, style terminal, sutures not winged. Seeds 1–3, much compressed, oblong, radicle inflexed. Species 5, Malayan.

This genus has the habit of Spatholobus with calyx and almost corolla and stamens of that genus. It differs, however, in having solitary not fascicled flowers and in having exstipellate leaflets as well as in having a pod indehiscent throughout, with its seeds centrally not terminally situated, and thus not distinguishable from a Lonchocarpus pod. From Lonchocarpus, however, Kunstleria differs in having the flowers unfascicled, in having the calyx deeply toothed and in having the vexillary stamen free. As regards inflorescence Kunstleria repeats the characters met with in Derris § Aganope with which it further agrees in having a free upper stamen. But from Aganope, Kunstleria differs in having a wingless pod, a deep-toothed calyx, and in having the free stamen adnate to the claw of the standard.

The calyx characters suggest that the natural place for the genus might be in Phaseolew along side of Mustersia, but the absence of stipels and the fact that the leaves may be 5–7-foliolate, together with the rather marked affinities as regards pod with Lonchocarpus and as regards inflorescence with Aganope, seem to render it more advisable to place it in Dalbergiaceae beside Lonchocarpus and Derris.

1. KUNSTLERIA CURTISII Prain, Journ. As. Soc. Beng. lxvi. 2. 110; leaflet 1, glabrous or subscabridly pubescent, pod thin flat, densely rusty-pubescent, 2–3-seeded.

Var. typica; leaves above and petioles glabrous, beneath and petiolules sparsely adpressed-pubescent with white hairs, rachis and branches of panicles sparsely rusty-pubescent.

Penang; Tulloh Bahang, Curtis 3019!

Var. laxiflora; leaves on both surfaces subscabridly, petioles and
petiolules densely softly rusty-pubescent as are rachis and branches of the laxer more spreading panicles.

**Pangkore ; Tulloh Sera, Curtis 1632 !**

Leaves 5-8 in. long, leaflet ovate-lanceolate apex acute base rounded, 4-6½ in. long, 2½ in. wide, nerves ascending 4-5 pairs prominent beneath; petiole 7½-1½ in., petiolule 2½ in., attached subpeltately. Panicles 8-12 in. long, 5-8 in. across. Calyx '1½ in., teeth triangular, upper deltoid notched. Corolla 2½ in. long. Pod 5 in. long, 1 in. wide, rather distinctly reticulated, at least in the typical variety.

2. **Kunstleria Kingii Prain, Journ. As. Soc. Beng. **lxvi. 2. 110; leaves 3, glabrous on both surfaces, pod thin flat densely brown-silky, 1-2-seeded.

**Perak; Lavut, Kunstler 3830 ! 6870 ! 6935 !**

An extensive climber, sometimes over 100 feet long. Leaves 5-8 in. long, leaflets ovate-lanceolate, 4-6 in. long, 1½-2 in. wide, apex acute, base of lateral leaflets rounded, of central cuneate, nerves ascending 4-5 pairs prominent beneath; petiole 1½-2½ in., petiolule 2 in., attached marginally. Panicles 8-12 in. long, 5-8 in. across. Calyx '1½ in., teeth triangular except broadly deltoid bifid upper. Corolla dark-purple, 2½ in. long. Pod 2-4 in. long, '6 in. wide, 1-2-seeded, rather distinctly reticulated; seeds oblong, '2½ in. long, '5 in. wide, cotyledons thin and leaf-like, testa very dark-brown.

3. **Kunstleria Forbesii Prain, Journ. As. Soc. Beng. **lxvi. 2. 111; leaflets 5, rigidly coriaceous subscabrid above, densely ferruginous beneath, shortly sharply acuminate.

**Perak; Salama, Kunstler 3094 ! Distrib. Sumatra; (at Bigui Telok, Forbes 3241 !)**


4. **Kunstleria Ridleyi Prain, Journ. As. Soc. Beng. **lxvi. 2. 111; leaflets 5, firmly papery, glabrous on both surfaces, tips blunt-pointed, pod thin flat densely rusty-pubescent, 2-3-seeded.

**Singapore ; Ridley 6395 !**

Leaves 6-8 in. long, leaflets elliptic 2-3½ in. long, 1¼-2 in. wide, bases narrowed, apex tapering to a finally abrupt blunt point, nerves spreading 5-6 pairs rather prominent beneath, petiole 2-3 in., petiolules '2 in. attached marginally. Panicles 12-15 in. long, 4-5 in. wide. Calyx '1½ in., teeth triangular except upper deltoid slightly notched. Corolla 2½ in. long. Pod 6 in. long, 1¼ in. wide, very similar to that of K. Curtisii but with wider-meshed reticulations.

5. **Kunstleria Derryi Prain, Journ. As. Soc. Beng. **lxvi. 2. 112; leaflets 7, rigid subscabridly pubescent on both surfaces, with cuneate apex.
MALACCA; Machap Tebung road, Derry 1006!


92. SOPHORA LINN.

6b. **Sophora Bakeri** C. B. Clarke MSS.; leaflets 11-15 oblong, obtuse, at first sparsely pubescent at length glabrous above, densely-pubescent beneath, pedicels shorter than the finely silky calyx; corolla middle-sized, pod silky. **Sophora sp. Bak.** in *Flor. Brit. Ind.* ii. 251.

**BEHAR**; Parasnath, *Thomson*! *Kurz*! *Clarke*! Manbhum, *Campbell*!


Nearest to *S. Wightii* but, as Mr. Baker suggests, very distinct.

6c. **Sophora Dunii** *Prain*; leaflets 17-19, narrowly ovate-acute, tip mucronulate, glabrous above even when young, softly densely-pubescent beneath as are the leaf-rachises, pedicels half the length of densely-tomentose calyx.

**BURMA**; Chin Hills, *C. R. Dun*!


A very distinct species, only once reported. It much resembles, and is evidently most nearly allied to, *S. Bakeri* Clarke, but is very readily distinguished by its leaflets being quite glabrous above and its lower calyx-teeth being longer.

7b. **Sophora Prazeri** *Prain*; leaflets 9-13, oblong subobtuse or acute obscurely silky beneath, pedicels as long as the finely silky calyx, corolla white medium-sized.

**BURMA**; beyond Meiktila, growing near streams, *Prazer*.


A very graceful species nearly allied to *S. acuminata* to which it bears much the relationship that *S. Bakeri* does to *S. Wightii*. The pods have not, so far, been reported.
9. **Sophora mollis** Gr.  
**Var. Duthiei**; pods wingless.  
Chitral; Markanda, 5000 feet, Duthie 16048!

A very interesting form, differing apparently in no way from ordinary *S. mollis* except in the absence of wings to the pods. Its existence rather effectively disposes of the attempt sometimes made to sustain, as a genus apart from *Sophora*, the section to which the species belongs.

9b. **Sophora Griffthii Stocks in Hook.** Journ. iv. 147; flowers smaller, developed before the leaves in short crowded racemes, pods silky. Keyserlingia Griffthii, Boiss. Flor. Orient. ii. 630.

**British Beluchistan**; Quetta, etc., *Griffith Stocks! Rind! Hamilton! Duke! Lace! Duthie! Suleiman Range; Fort Monro, Sanders! Distrib. Throughout Beluchistan and Afghanistan.

A low spineless shrub, all parts densely shortly hoary-pubescent. *Leaves* 4–8 in. long, leaflets 21–41, rigid, adpressed silky, pubescent beneath, ovate or obovate, 25–45 in. long, racemes few-fld., 1·5–2 in. long, pedicels shorter than the calyx. *Calyx* 2 in. long, very oblique, densely silky, teeth triangular obtuse. *Corolla* yellow, 5 in. long. *Pod* finely persistently silky, the joints with 4 faint longitudinal ridges.

This is so closely related to *S. mollis* that there are some stages in which it is difficult to distinguish the two; the rather shorter racemes with fewer flowers and the shorter pedicels being then the chief distinguishing marks. The leaflets are, however, almost always more numerous, and when full-grown are much smaller, remaining too, silvery-hairy beneath. But while, with Boissier, placing this in *Keyserlingia* (= *Sophora* § *Edwardsia*), the writer would point out that it might with almost as great propriety be placed in *Eu sophora*, since even ripe pods have only 4 faint crenated ridges to represent the wings on the pods of *S. mollis*.

93. **Ormosia Jacks.**

2b. **Ormosia scandens** Prain, Journ. As. Soc. Beng. lxvi. 2. 147; scandent, leaflets 5–7, ovate or obovate, oblong, shortly acuminate, dark-green, racemes crowded in terminal panicles, pedicels shorter than calyx.  
Perak; Larut, Kunstler 3560!

A long climber sometimes reaching 100 feet, with glabrous branches. Leaflets coriaceous 6–9 in. long, acuminate, rounded at base, finely veined. Racemes in a terminal panicle reaching one foot in length, branches very finely grey-silky, bracts small, bracteoles subulate persistent. *Calyx* 25 in., grey-silky, three lower teeth deltoid as long as tube, two upper subconnate in a bifid lip. *Corolla* 35 in., white with reddish tinge, standard 25 in. across. *Ovary* with a line of hairs along upper suture, elsewhere glabrous; ovules 3. *Pod* unknown.

A very distinct species, differing much from the others by its scandent habit.

3. **Ormosia macrodisca** Bak.  
Add to localities:—*Singapore*; Ridley!

4. **Ormosia glauca** Wall.  
Add to localities:—*Sikkim*; Sivoke Hills, 2500 feet, Gamble 7555!  
Add to description of *F. B. L.*:—*Pod* hard, thick, 2–3 in. long, J. ii. 59
1·25 in. broad, the valves blackish, rugose externally, slightly swollen opposite the ripe seeds, each thickened into a distinct rib along the upper suture; seeds 2–4, bright scarlet, small (·35 in. long, ·25 in. wide), separated by partitions of the tawny suberous lining in which they are embedded, without any trace of arillus.

3b. Ormosia gracilis Prain, Journ. As. Soc. Beng. lxvi. 2. 148; leaflets 7–9, ovate-lanceolate, pale grey-green, flowers in terminal racemes, pedicels shorter than calyx, pod rather small, irregularly orbicular with compressed thick valves.

**Perak**; Larut, Scortechini ! Kunstler ! Wray !

A graceful tree with brown glabrous branches. **Leaflets** chartaceous, tips caudate-acuminate, 2·5–3 in. long, the veins immersed. **Racemes** in lax terminal panicles; bracts and bracteoles, especially the latter, minute but persisting. **Calyx** 2·5 in., finely silky, teeth rather longer than tube except the upper 2. **Corolla** pale-yellow, ·35 in. long. **Ovary** ovate-lanceolate; ovules 2. **Pod** hard, thick, covered with a bluish-grey bloom, 1·5 in. long, 1·25 in. wide. **Seed** usually solitary, oblong, 7·5 in. long, with a black adnate smooth aril.

A very fine and distinct species.

4b. Ormosia nitida Prain, Journ. As. Soc. Beng. lxvi. 2. 149; leaflets 7, obovate or elliptic very dark-green, shining above, flowers in terminal panicles, pedicels shorter than calyx, pod subcompressed with thin valves, seeds oval compressed bright-red, without arillus.

**Perak**; Goping, Kunstler !

A tree 30–50 feet high, with rusty-brown glabrescent branches. **Leaflets** very rigidly coriaceous, apex rounded abruptly cuspidate, glossy deep-green, 2·5–4 in. long, 1·5–2 in. wide, veins numerous slender. **Flowers** in fastigate panicles. **Calyx** 2 in. long. **Corolla** unknown. **Pod** irregularly oblong, 1 in. long, 7·5 in. across, thinly woody, rigid, quite glabrous, black externally, shortly stipitate. **Seed** usually, if not always, solitary, ·35 in. long, ·3 in. wide.

5. Ormosia microsperma Bak.

Add to synonyms:—O. coarctata Kurz, Journ. As. Soc. Beng. xlii. 2. 71, hardly of Jackson. Add to localities:—**Perak**; Kunstler !

Mr. Kurz’s reduction of *Chañolobium* Miq., to *Ormosia* is certainly just, but his further reduction of *C. septemjugum* and of *C. decemjugum* to each other and then to the species under review, seems somewhat premature; for the present Miquel’s plants should be known as *Ormosia* septemjugum and *O. decemjugum*. They appear to be more nearly related to the next species than to *O. microsperma* but seem at the same time quite distinct from each other as well as from both *O. microsperma* and *O. sumatrana*. Like many of Dr. Miquel’s species, these two were based on very inadequate material, certainly much too incomplete to have justified the foundation of a genus.

Add also as a new variety:—

**Var. Ridleyi** Prain, Journ. As. Soc. Beng. lxvi. 2. 151; pedicels distinct, pods more persistently pubescent.

**Singapore**; Selitar, Ridley 5574 !
The pods of this are not quite ripe. Mr. Ridley's field-note says they are hairy; should they prove to be quite persistently so it will probably be necessary to recognise in this plant still another species to be named *Ormosia Ridleyi*.

5b. *Ormosia sumatrana* Prain, *Journ. As. Soc. Beng.* lxxvi. 2. 150; leaflets 7–9 (rarely 5), short-stalked, veinlets beneath slender raised, pedicels shorter than calyx, pod subcompressed with thin valves, seed oblong; racemes in lax spreading panicles.

**MALACCA; BRISU, Holmberg!** DISTRIB. Sumatra.

A very great tree, with thinnish branches, grey-silky at length glabrescent. Leaflets ovate, or ovate-elliptic or obovate, 2–4 in. long, nerves spreading but prominent below, pale-green glabrous and glossy above, puberulous at length glabrescent beneath, rounded at base. Branches of panicle laxly spreading, tawny-silky. Calyx 2 in. long. Corolla pinkish-white with lilac-purple markings, 35 in. long. Ovary densely-puberulous almost always 3-ovuled. Pod irregularly orbicular if 1-seeded, oblong if 2-seeded, 1 in. across, 1–1.7 in. long, lineate between the seeds; valves thin woody rigid black glabrescent. Seed 1.5 in. long, 35 in. wide, bright-red, without arillus.

Closely related to *O. microspersma* but very distinct by its more lax inflorescence, smaller flowers, larger seeds and different leaves and bracts.


Add to localities:—SINGAPORE; Ridley! PAHANG; Ridley! DISTRIB. Banka; Borneo.

96. **CÆSALPINIA Linn.**

**SUBGEN. 1. Guilandinia Linn.**

2b. *Cæsalpinia minax* Hance, *Journ. Bot.* xxii. 365; var. **BURMA-NICA** Prain; leaves stipulate, leaflets small, bracts very large enveloping the young flowers in a strobilate head; bristles of pod subadpressed and pubescent.

**BURMA; Shan States, Fort Stedman and Saga, King's Collectors!** DISTRIB. China (var. *typica*)

Shrubby diffuse, branches at first downy at length glabrescent, with numerous straight or slightly hooked hard prickles. Leaves 1 foot long or more, pinnae 10–12, leaflets 6–10 pairs subsessile elliptic or oblong, setaceous apiculate; stipules subulate rigid 2–3-fd. Racemes long-peduncled many-flowered, simple sparingly branched near base; bracts large oblong-acuminate, tomentose, 75 in. long, 5 in. wide, pedicels 6 in. long, (in fruit becoming 1.25 in. long). Calyx 75 in. long. Petals obovate white, 1 in. long. Pods hardly stipitate, 4 in. long, nearly 2 in. wide, elliptic-oblong, compressed, apex obtuse and beaked near lower corner. Seeds 6–7, 75 in. long, 35 in. wide, almost cylindrical, testa black.

There being no specimen of the true *Cæsalpinia minax* at Calcutta with which to compare the Shan Hill plant above described, a specimen was sent to London for comparison with the type of Mr. Hance's species which is preserved in the British (Natural History) Museum collection. The comparison has been most kindly made by Mr. E. G. Baker and Mr. Britten; Mr. Baker has supplied the following note:—

"The Burmese plant is certainly very closely allied to *C. minax* Hance but differs "in the following points. The legume of *C. minax* is shorter by about 1⁄2 in., the
"bristles stand erect from the pod and are glabrous; the apiculus at the end of the "pod in the Burmese plant is longer and at the base more bristly than in C. minax. "The leaves not being in the same state in the two specimens cannot be quite de-"finately compared. The bracts of the inflorescence of C. minax have a narrow "white margin and the head is more broadly conical than in the Burmese plant."

Both Mr. Baker and Mr. Britten think therefore that the Burmese plant cannot be considered typical C. minax. One other difference may be mentioned; the flowers are noted as “white” in the Shan Hill specimens, Mr. Hance mentions “purple” in connection with the Chinese one. As a temporary measure it is treated here as only a variety of C. minax but it may ultimately be necessary to recognise in it a distinct species, to be known as Cesarpinia burmanica.*

**SUBGEN. 2. NUGARIA DC.**

3. _Cesarpinia Nuga_ Ait.

The species that is most nearly allied to _C. Nuga_ is _Mezoneuron sinense_ Hemsl. which, with the habit of _C. Nuga_, has also pods that are very similar in shape and in consistence and differ only in being narrowly winged down the upper suture. Perhaps the most convenient and at the same time most natural arrangement would be to remove _M. sinense_ from _Mezoneuron_ and at the same time to take _C. Nuga_ out of _Cesarpinia_ treating them as congeneric and as types of a genus _Nugaria_ equally related to, but equally distinct from, both _Cesarpinia_ and _Mezoneuron_. Still the mere fact of having pods slightly winged along the upper suture hardly prevents the Chinese species from being treated as a _Cesarpinia_, since _C. sepiaria_ presents in **SUBGEN. Eucesalpinia**, though not so markedly, the same peculiarity. The Chinese plant certainly must be removed from _Mezoneuron._

4b. _Cesarpinia parviflora_ Prain, _Journ. As. Soc. Beng._ 1xvi. 2. 230; puberulous, pinnae 18–24, leaflets 30–36, usually small, oblique, the lower corner auriculately produced, stamens little exerted, pod oblique 3–4-seeded; leaves stipulate; flowers very small and numerous.

**VAR. typica**; leaflets not exceeding ‘5 in., stipules lanceolate, deciduous.

**Perak**; at low elevations, _Kunstler! Wray!_

**VAR. ? stipularis** Prain, _loc. cit._; leaflets exceeding ‘75 in., stipules ovate-oblong, persisting.

**Perak**; in the plains, _Wray!_

A climber, or sometimes arborescent; prickles small and few. _Leaflets_ rachis 8–10 in. long; leaflets close sessile subcoriaceous, attached in middle of base but with lower corner auriculately produced. _Panicules_ very long, and usually again branching, the young branches rusty-pubescent; bracts small linear or lanceolate, deciduous; pedicels ‘5 in. _Calyx_ ‘5 in., puberulous. _Filaments_ densely woolly in the lower half. _Ovary_ sparsely puberulous. _Pod_ 1 in. long, ‘5 in. wide, like that of a miniature _C. Sappan._

This _Cesarpinia_ in foliage resembles _C. tortuosa_ and _C. microphylla_ but its pod is that of a small _C. Sappan_; by its very small greenish-yellow flowers it is quite distinct from all the other Indian ones. The variety may prove a distinct species.

* Since this was written the Calcutta Garden has succeeded in obtaining seeds of this very interesting species from the Shan Hills, and these have been distributed to the leading Botanic Gardens in both Hemispheres.

The species described as *C. cinclidocarpa* in the *Flora of British India* differs from the plant described by Dr. Miquel in having a glabrous calyx. There is no specimen of genuine *C. cinclidocarpa* at Calcutta for comparison with the Assam plant; but even if the two should prove to be identical, there is no reason why Dr. Buchanan-Hamilton's much older name should give place to Dr. Miquel's more recent one.

The species is also very common in Sikkim and Western Bhutan.


Add to localities of *F. B. I.*:—Penang; Rengra Bukit, 700 feet, *Curtis*!

Mr. Kurz proposes to reduce to this species, as a variety (var. latifolia), Dr. Miquel's *C. acanthobotrya* from Sumatra; an examination of an authentic specimen of Dr. Miquel's plant (*Diepenhorst* 2240, from Sumatra) leads the writer to believe that it is much better to treat the two as distinct species.

97. **PELTOPHORUM** Vog.

There are, in Herb. Calcutta, specimens of a very distinct species of this genus from Sumatra with flowers white, tinged with pink;* the generic diagnosis has therefore to be altered slightly in order to admit of its inclusion.

98. **MEZONEURON** Desf.


Martaban; Attran river, Wallich 5835! Pegu; Makhoye Hill, King's Collectors! Ceylon; Thwaites 3601!

The locality of Dr. Wallich’s specimens is given as Tenasserim in the *F. B. I.*; the species has not, however, been as yet collected farther south than Martaban. This most certainly is not *M. glabrum* Desf. for it has always opposite leaflets whereas those of *M. glabrum* are alternate; also it has pods with few remote seeds in place of having them numerous and close together as in *M. glabrum*. The leaflets of this species are more remote and fewer in number, they are also more broadly ovate, with obtuse

* The following diagnosis of this species may be given:—

**PELTOPHORUM GRANDE** Prain; flowering pedicels slightly exceeding the calyx, petals white with flush of pink.

**SUMATRA**; on hills near Napal Litjin, R. Rawas, at 2500 feet, *Forbes* 3163!

A very large tree, stem 7 feet in circumference at 6 feet from ground, young branches rusty-puberulous. *Leaves* distinctly petioled, 6 in. to 1 foot long; pinnae opposite 14-16, 3-6 in. long; leaflets 20-24, somewhat remote, ligulate, sessile, rounded, slightly unequal-sided, base cuneate, rigidly subcoriaceous, faintly adpressed-puberulous below. *Racemes* simple, rusty-puberulous as are the pedicels 3 in. long, and the calyx; bracts very sinuate caducous. *Calyx* 2 in. deep. *Pod* not seen.

A very distinct species.
The leaflets of *M. enneaphyllum* which have rounded tips and equal bases are larger and have a much broader wing than those of *M. enneaphyllum*; it is besides rather prominently widely reticulated throughout while the pod of *M. enneaphyllum* is smooth. Dr. Thwaites’ misidentification of the Ceylon plant with *M. enneaphyllum* in place of *M. furfuraceum*, has unfortunately found its way both into the *Flora of British India* and the *Handbook of the Ceylon Flora*.

Dr. Trimen suggests that *M. pubescens* may be included in this species; in this he follows Mr. Kurz who united (*Journ. As. Soc. Beng. xlv. pt. 2, 293*), *M. glabrum*, *M. enneaphyllum*, and *M. pubescens*. The recent accession of large suites of specimens shows, however, that Mr. Kurz’s proposition is altogether untenable and proves, moreover, that neither *M. glabrum* nor *M. pubescens* occurs in India.

3. **Mezoneuron enneaphyllum** W. & A.

Delete from localities: — Ceylon. Add to localities: — Andamans; Great Coco, Prain!


Burma; Taong-Doung, Wallich 5832! Meiktila, Collett 839! Prome, Kurz 2568! Shan States, King’s Collectors! Bhamo, King’s Collector! Andamans; very common. Ceylon; Thwaites 3815 in part!

This has alternate leaflets, much fewer in number than those of *M. pubescens* to which it bears something of the relationship that *M. glabrum* bears to *M. furfuraceum*; it is, however, just as distinct from *M. pubescens* as these two species are from each other.

Somewhat similar to this, but equally distinct, is a species from Tonkin (*Balansa 2149*). The leaflets resemble those of *M. hymenocarpum*, but are more densely pubescent; the pods, too, are very different, being firm and rigid. The calyx of *M. Balansa* likewise differs considerably from that of this species and resembles the calyx of *M. sulphureum*.

4b. **Mezoneuron Kunstleri** Prain, *Journ. As. Soc. Beng. lxvi. 2. 233; leaflets 7–9, medium, rigid ovate-acute, glabrous, stamens much exceeding the calyx.

Perak; Kunstler 895!


4c. **Mezoneuron andamanicum** Prain, *Journ. As. Soc. Beng. lxi. 2. 131. (Nov. Ind. v. 60).

5. **Mezoneuron sumatranum** W. & A.

Add to localities of *F. B. I.*: — Perak; Thaipeng, Scortechini 1766! Simput, Ridley 3083!

99. **Pterolobium** R. Br.

The three varieties of *P. indicum* distinguished in the *F. B. I.* form in reality three very distinct species.
1. **Pterolobium indicum** A. Rich.

Specimens of this have been collected by Dr. King in Dehra Dun and by Col. Beddome in the Godavery Jungles or the Circars, thus proving a considerably more extensive distribution northward and eastward in India than has been suspected hitherto; the majority of the specimens previously collected had been obtained in the Nilghiris or the Pulney Hills.


**Penang; Govt. Hill, 2500 feet, Curtis 3093! Malacca; Maingay 535! Tenasserim; Helfer (Fide Baker).**

A large climber, very strongly armed, somewhat resembling *P. indicum*. **Leaves** 4-8 in. long, pinnae 4-8 pairs, leaflets 8-10 pairs, subcoriaceous, glabrous, 6 in. long, 25 in. wide. **Pedicels** 25 in. long, racemes 150-200-fld. **Pod** 2 in. long, with an obtuse or obliquely acute wing 1.25-1.5 in. long, 5-7 in. wide.

**Maingay n. 535** which is *P. microphyllum* Kurz, and is in part *P. indicum* var. *microphyllum*, Bak., is represented in Herb., Calcutta by a specimen of which the leaf has only 7 pairs of pinnae. *Curtis n. 3093* from Penang is the same plant; its leaves have 4-8 pairs of pinnae; its leaflets are as described above. Obviously then it cannot be *P. microphyllum* Miq., which has linear leaflets 40-44 in number upon 14-16 pairs of pinnae. The Tenasserim plant mentioned in the *F. B. I.* is not at Calcutta; all our Burmese and Andamans specimens belong to the next species.


**Burma; common. Andamans; very common.**

A large climber; very weakly prickly, otherwise like *P. indicum*. **Leaves** 6-9 in. long, pinnae 7-8 pairs, leaflets 7-10 pairs, papery, 45 in. long, 25 in. wide. **Pedicels** 4-5 in. long, racemes 20-30-fld. **Pod** 2.5-2.75 in. long, with an obtuse wing 2 in. long, 7-8 in. wide.

The leaflets of this are rather larger and firmer than those of *P. indicum* but are neither so large nor so firm as those of *P. densiflorum* (*P. microphyllum* Kurz, not Miq.). The plant is much less formidably prickly than either of these; from the first it differs most markedly in pod, from the second most markedly in inflorescence. Mr. Kurz describes the flowers as white.

103. **Cassia Linn.**

1. **Cassia Fistula** Linn.

It should be noted that in Herb. Calcutta there is a gathering of *Cassia Fistula*, the well-known *Amaltas* or “Indian Laburnum,” from Chittagong, which is reported by one of our native collectors as having had pink flowers. It would be interesting if any of the members of the Society were able to confirm this report. The statement is not impossible since at least one other species of this section has both pink and
yellow flowers; but, if true, it is remarkable that a pink-flowered form of *Amaltás* should not have found its way into Bengal gardens.

2b. **Cassia javanica Linn.**

This species, which had not (see F. B. I. ii. 287) up to 1878 been reported from within the British area, has recently been sent by Mr. Wray from Perak. Mr. Wray gives "*Sibusoo*" as the native name of the tree; this name is usually applied to *P. nodosa* which is very plentiful in the Malay Peninsula. But, as Mr. Baker points out, the two species are very closely related and that they should bear the same Malay name is not therefore a matter for surprise.

4. **Cassia reigi réga Wall.**

Very many gatherings of this species have been received in Herb. Calcutta since Mr. Baker's description was written in 1878. At that time the flowers were still unknown; the following description of them is therefore necessary.

*Flowers* in showy corymbs, solitary or in pairs, from old nodes, on softly pubescent peduncles 1-1½ in. long, bracts large puberulous, ovate-cordate, long-acuminate 75 in. long, 5 in. across, lower pedicels 2 in. long, pubescent; calyx 5-partite to the base segments ovate softly velvety; petals oblong-obtuse clawed, 8-1 in. long; the 3 lower stamens longer than the rest with larger anthers and with nodose filaments.

The most puzzling feature about these specimens is that of the gatherings where the colour of the flower has been noted, some are said to be pink-flowered and just as many are said to be yellow-flowered; yet there is no character in the inflorescence, bracts, sepals or petals, whereby the two may be distinguished. The attention of members of the Society, resident in Burma, is therefore directed to the point and their assistance in clearing up the matter will be very gratefully received by Indian botanists. It may be added that all the specimens noted as pink-fl.d. are from Pegu; all the yellow-flowered ones come from the Shan Hills.

5. **Cassia occidentalis Linn.**

This does not appear ever to have the pale-lilac flowers described in the *F. B. I.*; the petals are pale-yellow faintly veined with orange.

6b. **Cassia hirsuta Linn. Sp. Pl. 378.** Mentioned in the *F. B. I.* under *C. tomentosa*: appears now to be quite naturalized in many parts of our area. The species in general habit most resembles *C. occidentalis*: like that species and like *C. Sophora* its leaves have a single large gland near the base of the petiole: it is, however, readily distinguished from both plants by its dense pubescence. In inflorescence it resembles *C. Tora* as its flowers are in subsessile pairs in the leaf-axils. Outwardly too its pods resemble those of *C. Tora* except that they are densely villous; the dissepiments however are transverse, not oblique, and the seeds are broadly ovate as in *C. occidentalis* not rhombohedral as in *C. Tora*. The following are localities from which specimens growing in a 'wild' state have been sent to Herb. Calcutta.

Mysore; Bababoodun Hills, Talbot 2343! Madras; St. Thomé, Pillay! Assam; Nowgong, Simons! Singapore; common, Anderson 44! Hulllett 75! Kunstler 317!
7. Cassia Tora Linn.

As defined in the F. B. I. this name covers two very distinct species:—1. Cassia Tora, with leaves glaucous or glanccescent beneath, very foetid; with short pedicels and smaller flowers, the pedicels in fruit not exceeding 35 in.; and with two glands on the leaf-rachis, one between each of the two lower pairs of leaflets.

2. Cassia obtusifolia Linn. (C. toroides Roxb.) with leaves green beneath, not foetid; with long pedicels and much larger flowers, the pedicels even in flower reaching 1 in.; and with one gland only on the leaf-rachis, situated between the leaflets of the lower pair.

C. Tora is common everywhere throughout our area; it is a native of the Eastern Hemisphere and may, as is sometimes stated, have become introduced in America; the writer has never, however, seen an American example; all the specimens bearing the name C. Tora that have been sent to Calcutta from America are C. obtusifolia. C. obtusifolia is common in some parts of our area, notably in Western India from Kanara northwards; in Scinde, Panjab and Rajputana, and in the Western Himalayas from Hazara to Garhwal and Dehra Dun; there are also some specimens from Behar and from Burma and it is quite common in Singapore. Elsewhere in India, if it occurs at all, it is very rare. It is an American species comparatively recently introduced to the Eastern Hemisphere.

The two plants differ so constantly and so markedly in such a number of particulars that they must be separated as species. The foetid small, strongly veined glaucous leaves, and short pedicels of C. Tora always accompany the existence of 2 glands to the leaf-rachis and, even on the most cursory examination, distinguish it from C. obtusifolia with its green leaves less prominently nerv'd, its long pedicels with very much larger flowers—characters always associated with the presence of but one gland on the leaf-rachis.

The confusion between the two plants goes back to Linnaeus who referred to C. Tora (which he defines as having leaves with 2 glands) the plant figured by Dillenius in Hort. Eltham. as t. 63, f. 73. That figure shows no glands. But Linnaeus is probably right in identifying it with the plant here described as C. Tora; at all events it has the strong nerves, the short pedicels and the quadrate pods of that species.

As C. obtusifolia, Linnaeus has quoted the figure by Dillenius in Hort. Eltham. t. 62, f. 72. This is likewise figured without glands, and since in diagnosing the species Linnaeus omits all allusion to glands, one is tempted to suppose that the name C. obtusifolia was based on this Dillenian figure. But this cannot be the case; M. De Candolle mentions having actually seen a specimen of C. obtusifolia Linn., and he defines the species as having leaves with a single gland. This sets the question at rest once for all, and makes it clear that so far as the plant itself is concerned, C. obtusifolia Linn. is the species that was later on more fully described and more accurately characterised by Roxburgh than it had been by Linnaeus, under the name Senna toroides.

All authors have agreed that the figure of Gallinaria rotundifolia Rumph., cited by Linnaeus as his C. obtusifolia, is without a doubt C. Tora; it has not been so generally noted that the figure in Dillenius (t. 62, f. 72), by its very name "faetida," by its pronounced nerves, and by its short pedicels would appear to differ from the real C. obtusifolia and would seem to be only another form of the plant shown in t. 63, f. 73, and therefore to be likewise C. Tora. In fact the only Linnean reference
that probably does go with the actual plant is that to Sloane's Hist. of Jamaica; this, oddly enough, Linnaeus refers only tentatively to his species.

Wight and Arnott have disposed of the difficulty by recognising the plant with one gland as distinct from that with two; they treat the former as a mere variety of C. Tora however, and they complicate matters still further by identifying with it Rheede's Tagera (Hort. Malab. ii. t. 53). Rheede's figure shows no glands at all any more than do the two figures of Dilleniuss. But its strongly veined leaves, its short pedicels and its short pods make it certain that it represents C. Tora and not C. obtusifolia.

Miquel deals with the two plants themselves exactly as Wight and Arnott do, but has been unable to resist the temptation of still keeping up a C. obtusifolia Linnaeus, apart from either. For this he cites Plumier's Plante Americane (Ed. Burmann) t. 76, f. 2, again a figure showing no glands; the plant itself Burmann describes as having a gland at the base of each pair of leaflets. This may mean that Miquel doubts the accuracy of M. De Candolle's statement that Linnaeus' specimen of C. obtusifolia has but one gland, or may imply that he prefers to follow Linnaeus as to his citations but not as to his plant. Plumier's figure is what constitutes var. B of Linnaeus' Cassia Tora; it has, according to Royen and to Burmann, but one gland. Miquel cites the Plumierian plate under var. a of his C. obtusifolia and var. a he describes as having two glands, while Linnaeus' name for the Plumierian plate he refers to his own var. B., which he says has one gland.

Mr. Baker proposes to unite the two species and it would have been very convenient had this been possible. But the differences between them are too marked and too constant to admit of this being done.

8b. Cassia levigata Willd. Enum. Hort. Ber. 401 is another species that, since Mr. Baker's account of the genus in the F. B. I. was published, has proved to be thoroughly naturalised in various parts of India, e.g., in the Nilghiris near Ootacumund, in Sikkim, and notably in the Khasia Hills near Shillong, at Cherrapunji and elsewhere.

In general appearance it resembles C. occidentalis but it has larger flowers and may further be at once recognised by its leaf-rachis having a gland between each pair of leaflets except the terminal pair. When mature it is very easily distinguished by its fruits which are short turgid cylindric obtuse and distinctly stipitate below, obtuse and apiculate at the tip, 2·5–3 in. long, 6 in. in diam., finely transversely striate. Seeds smooth broadly ovate, compressed, greenish-brown, shining, 2 in. long, 1·5 in. wide, 0·8 in. thick.

9b. Cassia holosericea Fresen. in Flora xxii. i. 54; stipules triangular reflexed rigid spinescent persistent; leaflets 10–16, velvety-pubescent, racemes narrow, pod flat oblong little recurved not crested in the middle, velvety-pubescent.

Scinde; Stocks! Dalzell! Talbot! Distrib. Westward to Abyssinia.

This very closely resembles C. obovata, for which indeed it is usually taken, but can be at once distinguished by its pubescent more numerous leaflets and by its pubescent less recurved, uncrested pods. In habit and in the dimensions of all its parts it agrees with C. obovata.
12. Cassia montana Heyne.
Add to synonyms of F. B. I.:—Senna glauca Roxb. Fl. Ind. ii. 351.
13. Cassia timoriensis DC.
Add to synonyms of F. B. I.:—C. xanthocoma Miq. Anal. Ind. i. 10.
Add to localities:—Western India; Kanara, Talbot! Malay Peninsula; Kedah, Curtis! Perak; Kunstler! Scortechini!
No collector has ever sent to Calcutta a specimen that could be said to accord with the description of C. fastigiata Vahl, reduced here in the F. B. I. Perhaps, as Wight and Arnott suggest, Vahl may have made some mistake as to the number of glands. In any case Vahl’s description is such that if C. fastigiata has to be reduced to C. glauca, it is under var. suffrutescens and not under the typical C. glauca that it must be placed.
18. Cassia mimosoides Linn.
Var. 1. dimidiata is C. dimidiata Roxb., a very distinct species with 5 stamens of which not infrequently the uppermost is smaller than the others and is sometimes even replaced by a staminode.
Var. 2. Wallichiana as to citation consists of two very distinct plants, both of which, as it happens, are mixed under Wall. Cat. 5320.
One of these is the same plant as C. myriophylla Wall. Cat, 5326—and is no doubt a mere variety of C. mimosoides distinguishable, with difficulty in many cases, by its rather longer leaflets. Like the type it has small flowers with apparently always 10 stamens and has the petiolar gland deeply embedded in the leaf stalk.
The other is the plant described by Mr. Baker as var. Wallichiana, easily distinguishable by its larger flowers: in this plant often only nine, sometimes only seven, of the stamens are perfect and the petiolar gland, though not stalked, protrudes distinctly above the upper surface of the leaf-stalk. The best name for the species is C. Leschenaultiana DC.
Var. 3. auricoma is only a more hirsute condition of the preceding. It is equivalent to C. Macerzi, but it should not be separated as more than a variety from C. Leschenaultiana.
Western India; N. Canara, Stocks! Talbot! Woodrow!
An undershrub or shrub sometimes 5 feet high, sparingly pilose. Leaves distichous 2–4 in. long, with an obscure sessile gland below the lowest of the 8–18 pairs of oval-oblong obtuse mucronate leaflets 5–1 in. long. Stipules persistent lanceolate-subulate. Flowers small 25–35 in. across, solitary or 2–5 together in short supra-axillary pedicels. Sepals 2 in long, outer acute, inner obtuse, apiculate. Pods erect nearly straight, flat, dehiscent, shortly pubescent, 7–11-seeded; fruiting pedicels stout, 15 in. long.
This species is said by Talbot to be common in North Canara. It is most like C. mimosoides var. Wallichiana but is readily recognised by its large leaflets, which dry black, and by its smaller flowers and fewer-seeded pods.
1. **Cynometra ramiflora** Linn.


**Malaya Archipelago;** Java, Horsfield! Amboina, Teysmann! Ceram, Teysmann!

This subspecies has never been collected in Indian territory; it may be necessary to restrict the name *C. ramiflora* to this and recognise in the next subspecies a distinct plant.


**Bengal; Sundribuns, common, Heinig! S. India; Malabar, Rheede (ic.)! Ceylon;** at Trincomalee, *Rottler* (part of *Wall. Cat.* 5816!)*) Burma; Arracan, Kurz! Martaban, Wallich 5817 A! Kurz! Tenasserim, Wallich 5817 C! Proudlak! Andamans; very common everywhere on the coasts.

Var. 2. *heterophylla* Thw., *Enum.* 97; the end leaflets acute much larger than the basal pair. *C. bijuga* *Miq. Flor. Ind. Bat.* i. 78. *C. ramiflora* *Bedd. Fl. Sylvat.* t. 315 *not of Linn.* *C. polyandra* *Miq. Anal. Bot. Ind.* i. 11, *not of Roxb.*


There are many intermediates between these two varieties, but there are no forms linking either of them with subspecies *genuina*. In a monograph of the genus it will probably be found advisable to recognise subsp. *bijuga* as specifically distinct and in that case it will be necessary to restore Wallich's name *C. mimosoides* (which is older than the name *C. bijuga*) to designate it. But it will always be well to keep the two varieties of *subsp. bijuga* apart as such.

*Wall. Cat.* 5816 is exceedingly confused—the following are the plants included under it in the Herb. Calcutta series of Wallich’s specimens:

5816 A. Herb. Madras = *C. cauliflora* L.
5816 B. Herb. Heyne = *C. cauliflora* L.
5816 C. Herb. Madras = *C. polyandra* *Roxb.* var. *typica*.
5816 D. *Trincomalee* = *C. ramiflora* (C. *bijuga*) var. *mimosoides*.
5816 E. Herb. Wight = *C. ramiflora* L var. *mimosoides*.
5816 E. Penang = *C. polyandra* *Roxb.* var. *Kurzii*.

2b. **Cynometra Beddomei** Prain; leaflets 6, flowers in rather lax oblong sessile solitary axillary racemes.

S. *India; S. Kanara, Beddome; Wynaad, at Tambacheri Ghat, 2800 feet, Beddome!**
A tree, leaflets thinly subcoriaceous, glabrous, oblique obovate-oblong, the lowest pair the smallest 2-3 in. long. Flowers in rather lax, few-fld. racemes, 1 in. long, outer bracts ovate-acute 25 in. long, pedicels faintly puberulous '5 in. long. Sepals '2 in. long, reflexed. Filaments twice the calyx. Ovary puberulous except along the side whence the style arises, which is quite glabrous. Ripe pods not seen.

This species is mentioned by Col. Beddome under t. 316 of the *Flora Sylvestica* and again by Mr. Baker under *C. inaequalifolia* in the *Flora of British India* ii. 268, apropos of S. Kanara specimens which the writer has not seen. In 1880 Col. Beddome sent to Dr. King from the Wynaad two specimens with the note:—"*Cynometra* n. sp. This is mentioned at tab. 316, *Fl. Sylvestica.*" They are in flower and in very young fruit, and the above diagnosis is made from them. The plant, as Mr. Baker suggests, is nearest *C. inaequalifolia* but is abundantly distinct from that species.

4. *Cynometra cauliflora* Linn.

The expanded filaments of this species make its flowers very readily distinguishable from those of *C. ramiflora* L. subsp. *genuina* which it much resembles in leaves.

It is a purely garden species without the slightest right to be considered indigeneous in India.

5. *Cynometra polyandra* Roxb.


*Penang; Jack* (Wall. Cat. 5816 E) ! *Kurz!* on Govt. Hill "Apl 1890" and "May 1893," *Curtis! Perak; Scortechini!*

This has the puberulous leaf-rachis of typical *C. polyandra* but its very different pod makes the writer believe that it may be necessary to recognise in it a distinct species, *C. Kurzii*. Up till now only leaf specimens of this have been obtained by Jack, Curtis and Scortechini, with a solitary fruiting specimen obtained by Kurz. There are no specimens of *C. polyandra* proper from Penang or from Malacca in the Calcutta Herbarium.


This genus has been long known but apparently usually little understood. First described by Ramphius under the name "Caju Galedupa" and quite unmistakably depicted in *Herb. Amboin.* ii. t. 13, it thus forms as to citation a part of the genus *Galedupa* Lamk. (*Encycl. Meth.* ii. 594 [1788]); the description there given applies, however, only to the "Pungam" of Rheede (*Hort. Malab.* vi. t. 3) which is the basis of the genus named *Pongam* by Adanson (*Fam.* ii. 322 [1763]) and which is still known under a less barbarous form of this name (*Pongamia*) proposed in 1803 by Ventenat; the form *Pungamia* proposed by Lamarck in 1797 on his discovery of the error of his identification of 1786, has not, for some reason, been generally accepted.

Willdenow (*Sp. Pl.* iii. 902 [1799]) in pointing out that his *Dalbergia arborea* is the plant described by Lamarck as *Galedupa indica* has been careful to exclude the Ramphian synonym. And Buchanan-Hamilton, one of the ablest critical botanists of his day, suggested the affinity of Ramphius' plant with *Copaifera*, to which it is indeed exceedingly closely allied. But in opposition to the sound judgment of Willdenow and in spite of the very happy suggestion of Hamilton, Wight and Arnott
have taken the unfortunate, and for them quite unusual, view of supposing that
Rumphius had made a mistake as to the number and position of the leaflets in his
figure. It has, however, been left to Kunze (Rev. Gen. Pl. i. 167) to revert to
the error of Lamarck's early work and to propose the use of a part of Rumphius
name, not for the tree that Rumphius describes and figures but for one that he has
accurately figured and described in another volume under the name Malaparius.

Miquel in 1860 (Flor. Ind. Bat. Suppl. 286) founded on fruiting specimens of a
species nearly allied to Rumphius' Galedupa the genus Sindora, while Bentham in 1865
founded on flowering specimens of a third species the genus Echinocalyx (Gen. Pl.
i. 584); Mr. Bentham expressed, however, a presentiment that the two plants
Sindora and Echinocalyx might prove congeneric. The discovery of other speci-
mens in the Wallichian Herbarium, where they had been treated by Graham as be-
longing to Guilandina, completely confirmed Mr. Bentham's surmise that Sindora
and Echinocalyx are congeneric and led to his publishing in Hooker's Icones Plantarum
a fuller account (Icones Plantarum xi. 11, t. 1017, 1018 [1867]) of the plants in
question. The two plates, however, do not, as Mr. Bentham for the moment believed,
represent the flowers and the fruit of one species. Plate 1018, representing the fruit
of this composite species, being a figure of Gulandina Wallichiana Grah. can alone
therefore be cited as Sindora Wallichii Benth. The plant figured on Plate 1017,
being a different species, will have to be cited as Sindora Echinocalyx.

Mr. Baker has reduced to this already composite species two others that are
equally distinct, viz. :— S. siamensis Teysm. and S. intermedia Bak. (as a variety);
Mr. Baker has also established a valid new species (S. velutina). Still another
species, which Mr. Baker seems for the moment to have overlooked, occurs in
Cochin-China, while Mr. Baker has himself tentatively referred yet another to the
genus Afzelia.

The only modification that it is necessary to make in Mr. Baker's generic
definition is to note that the pod is not necessarily armed with prickles on the face.

In the Key that follows, the opportunity has been taken of showing the relation-
ship to one another of all the known species of Sindora ; to the Key is appended a list
of the citations that concern each. In drawing up the Key it has been somewhat
difficult to present the species in a natural sequence, owing to the incompleteness
of the specimens as regards particular characters. The stipules, for example, in S.
velutina are unknown, so is the fruit; the flowers on the other hand are unknown
both in Sindora sumatrana and S. Galedupa. The position of S. velutina in the Key
and list may therefore be subject to revision when the missing parts are reported;
the character of presence or absence of prickles on the calyx-lobes cannot be used
satisfactorily.

**Key to the known species of Sindora.**

Pod armed on the face with strong straight prickles,
(unknown in S. velutina) :—
Pods subeqally rounded at base—the stipe and beak at
opposite ends of its long axis :—
Stipules large foliaceous ... ... ... 1. S. Wallichiana.
Stipules inconspicuous :—
Calyx lobes densely echinulate, leaflets small oval,
obtuse ... ... ... ... 2. S. Echinocalyx.
Calyx with only a few spinules near tips of lobes; leaflets large obovate retuse ... 3. **S. siamensis**.

Pods obliquely rounded at base — beak projecting laterally at right angles to direction of stalk —

Stipules large foliaceous (calyx-lobes not echinulate; pod under 1½ in.; leaflets 3-jugate) ... 4. **S. cochinchinensis**.

Stipules inconspicuous:—

Leaflets 3-jugate:—

Pods under 1½ in., leaflets glabrous, calyx unknown ... ... ... 5. **S. sumatrana**.

Pods over 2½ in., leaflets pubescent beneath, calyx echinulate ... ... ... 6. **S. intermedia**.

Leaflets 5-jugate, calyx not echinulate; pod unknown ... ... ... 7. **S. velutina**.

Pod unarmed on the face (leaflets 4-jugate, glabrous; stipe and beak at opposite ends of pod) —

Pod over 3 in. long ... ... ... ... 8. **S. coriacea**.

Pod under 2 in. long ... ... ... ... 9. **S. Galedupa**.


**Singapore; Wallich 5805! T. Anderson 41! Kurz! Malacca; Griffith!**

The Griffithian specimens cited belonged to the collection of Dr. McClelland and are quite distinct from other Griffithian specimens issued as "Dialium sp." [K. D. 1848]. In the field Griffith referred the specimens to "Cassia;" in Herb. Calcutta, however, Dr. T. Thomson has marked them "Schotia! sp." which much more nearly indicates their true position.


**Malacca; Griffith 1848! Maingay 562/1!**

The inconspicuous stipules, smaller leaflets and very densely spinescent smaller calyx amply distinguish this from *S. Wallichiana*. It will be observed that in the field Dr. Maingay had already detected the difference between this plant and the original *Guilandina Wallichiana*; it differs, however, the writer believes, more than merely varietally.


**Siam; at Rad-boerie, Teysmann 6050!**

This cannot possibly be reduced to *S. Wallichiana*; it differs in leaves and in flowers and to a less extent in fruit. Mr. Baker says it has leaves with 6 leaflets
but in almost every leaf on Teysmann’s original examples there are 4 pairs of leaflets.

The native name is given by Teysmann as “May-sak.”


The native name of this is given as “Caï-go;” it is said to be a fine tree 100 feet high.


Sumatra; at Meranjat in Palembang, Teysmann 3753! Moluccas; Bawean, where it is grown in gardens, Teysmann (Hort. Bog. 1766)!

Mr. Teysmann notes the Sumatra name for this as “Sindoor,” but gives the name in Bawean as “Saparantu.”


Malacca; Maingay 562! Pangkore; Scortechini 1064! Curtis 1630! Perak; Scortechini!

Scortechini describes this as a tree 100 feet high. Curtis notes its native name as “Sapétir” in Pangkore. The pods of this are obliquely rounded at the base so that the long axis of the pod is at right angles to the stalk; this alone makes it very easy to distinguish the species from S. Wallichiana and S. Echinocalyx.


Malacca; Maingay 607!

The writer has seen a specimen kindly lent by the Director of the Royal Gardens, Kew, to the Superintendent, Royal Botanic Garden. It is clearly a very distinct species, nearest apparently to S. cochinchinensis and S. intermedia; its fruits have not, however, been yet reported, and its position in the key will depend on whether the long axis of the pod be found to be continuous with that of the stipe or at right angles to it.


Malacca; Maingay 1. Ridley 2328! Penang; Curtis 430!

The Malacca name given by Mr. Ridley is “Sapétir;” this is the name used in Pangkore for S. intermedia. In Penang the name used is “Mirbau,” which is used on the Mainland for Afzelia palembanica.

This has exactly the pod of the other Sindoras, differing only from that of S. Wallichiana and S. Echinocalyx in being unarmed on the valves. From the next species it chiefly differs in the size of the fruits.

MALAYAN ARCHIPELAGO.

This species agrees with the preceding in number of leaflets and style of leaves as well as in having pods that are unarmed. It has smaller pods than any of the other species except S. sumatrana, from which it differs only in the absence of spines from the pods and in the long axis of the pod not being at right angles to the direction of the stalk. The reference of this plant by some writers to Pongamia glabra, in spite of its equally-pinnate leaves and its arillate funiculus, must be admitted to be incomprehensible.

The writer has examined a leaf specimen of S. sumatrana var. javanica Koord. & Val. The 4 pairs of leaflets suggest that it differs from S. sumatrana; the leaflets themselves seem to the writer to differ materially from those of S. sumatrana or indeed of any of the species represented in the Calcutta Herbarium. Neither flowers nor fruits are yet reported but it is highly probable that Messrs. Koorders and Valcon's plant either is an undescribed species, or—what would be even more interesting—is the long-lost Galedupa of Rumphius; the fact that its leaflets are in 4 pairs largely helps to strengthen the latter suggestion.

106. DIALIUM LINN.

1. DIALIUM OVOIDEUM Thuw.

Add to localities of F. B. I.:—TRAVANCORE?; Lawson!

The specimens from Travancore seen by the writer consist of fruits only, and it is not absolutely certain that they belong to this species because they are decidedly gibbous at the base which those of the Ceylon plant at Calcutta are not. At the same time they much more closely resemble the fruits of D. ovoideum than they do those of D. indum, the true Malayan Krangi. They may possibly prove to belong to a lost species, Dialium coromandelianum Hout., and it is to be hoped that members of the Society in Southern India will help to clear up the difficulty.

1b. DIALIUM INDUM Linn. Mantiss. i. 24; leaflets 5–9, all cuneate at the base, branches of the panicle ascending, pedicels shorter than the calyx, pod not velvety. Benn. Pl. Jav. Rar. 136, t. 30; Miq. Flora Ind. Bat. i. 79; Prain, Journ. As. Soc. Beng. lxvi. 2. 169.

PAHANG; Pijai, Ridley 2627! PENANG; Ayer Etam, Curtis! DISTRIBUT. Malay Archipelago.


This is the earliest reported Asiatic species of the genus, and it has become usual to assign to it in particular the Malay name Krangi, first made known to us by Bontius. As a matter of fact, however, the name Krangi appears to be generic in its significance,

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and to be applied to most, if not all the Malayan species of *Dialium*. Thus while, according to Bontius and Rheede, the name *Kranji* signifies *D. indum*, the field notes on specimens in Herb. Calcutta show that it may be applied to *D. laurinum* (Ridley 6437) to a form of *D. platysepalum* (Holmberg 821) to *D. Maingayi* (Curtis 440) and to what seems to be a form of *D. ambiguum* from Malacca (Derry 510 of 1892).*

According to Mr. Baker *D. indum* was not known from the Malay Peninsula up to 1878. Perhaps Mr. Ridley’s Pahang specimens are from wild trees, his field-notes and his references in the account of the *Flora of Pahang*, *(Trans. Linn. Soc. n. s. vol. iii)* do not make the point clear. Mr. Curtis’ Penang ones are pretty evidently from an introduced tree since they are noted as being from “Ayer Etam in Miller’s compound” and since he gives besides two alternative Malay names, *Kranji Burong* and *Kranji Padie*. The latter term is not used for any other specimen at Calcutta, but the name *Kranji Burong* accompanies a Malacca form of *D. platysepalum* (Holmberg 855) with clavate pods. Another specimen for which alternative names are given is one of *D. Maingayi* (Goodenough 1533) from Malacca, which is cited as *Kranji ambot* or *Kranji s’kellat*. No other specimen has the name *Kranji ambot* but the name *Kranji s’kellat* is used (Derry 89; Goodenough 1683) for two Malacca gatherings of the round-fruited form of *D. platysepalum* with somewhat congested panicles. The name *Kranji papan* is used (Goodenough 1321) for *D. laurinum* but this name is also twice employed by the same collector (Goodenough 1225; 1553) for that form of the totally dissimilar *D. platysepalum* that has rather flattened pods.

It has been occasionally said that Malay native names are more exactly applied than is usual in India. The above will perhaps show that even within the limits of so marked a group of species as the various *Kranji* trees, the incidence of Malay names may be as vague and as unreliable as the incidence of Hindi names can be.


**Perak**; Goping, *Kunstler* 4415!

A tree 100–130 feet high. Leaflets alternate or subopposite, ovate-lanceolate narrowly acuminate, apex entire, base cuneate, 4–5 in. long, 1.25–1.5 in. broad, coriaceous, rather dark-green shining above, dull and pale-green beneath, glabrous on both surfaces; petiolules short. Panicles terminal and axillary, 4 in. long. Pod subspherical, hardly compressed, oblique, prominently umbonate at tip, firm, 1-5 in. long, 1.35 in. wide, black. Seed solitary, subrotund, smooth, dark-brown, dull, 6 in. long, 5 in. wide, 2 in. thick. *Flowers not seen.*

2. *Dialium Maingayi* Bak.

Add to localities of *F. B. I.*—**Perak**; Scortechini 2052! Wray 3407! 3767! **Penang**; Curtis 440! 3031! **Malacca**; Goodenough 1533!

3. *Dialium laurinum* Bak.

Add to localities of *F. B. I.*—**Singapore**; Krangi, Ridley 6437!

**Pahang**; Ridley.

4. *Dialium patens* Bak.


* Derry 510 of 1890 is not the same plant; it is undoubtedly a form of *D. platysepalum*; it bears the native name *Sepan*, not *Kranji*. This is an excellent instance of the undesirability of giving the same number to two different gatherings.
Substitute for description of fruit and seed in F. B. I.:—Pod ovoid slightly compressed, apex not apiculate, fragile, black with a thin grey pubescence, '5 in. long, '35 in. wide, '3 in. thick. Seed solitary, nearly regularly oblong with angles rounded, '3 in. long, '25 in. wide, '15 in. thick, dark-maroon, slightly shining, neither striate nor reticulate.

5. Dialium platysepalum Bak.

Add to localities of F. B. I.:—Perak; Larut, Wray! Johore; Machap, Goodenough!

5b. Dialium ambiguum Prain, Journ. As. Soc. Beng. lxvi. 2. 172; leaflets 7 opposite or subopposite, rounded at base, faintly puberulous beneath.

Perak; Goping, Kunstler 6142! Malacca; Derry!

A tree 40-50 feet high, leaflets oblong rather abruptly shortly caudate-acuminate, apex obtuse entire, 4-5 in. long, 1·5-1·75 in. wide, very rigidly coriaceous, bright-green glossy and glabrous above, dull and faintly puberulous beneath. Panicles terminal and axillary, deltoid, slightly spreading, 5-8 in. long, 4-8 in. wide, pedicels '15 in. long. Calyx-tube obsolete, 15 in. long, ovoid in bud, segments subequal much imbricate, reflexed after flowering, densely brown-velvety on both surfaces. Pod unknown.

A species very nearly related to D. platysepalum but differing in having a silky-grey instead of dark-brown ovary, and in having opposite leaflets which are only very faintly puberulous beneath.


D. platysepalum var. Wallichii Bak. in Flor. Brit. Ind. ii. 270.

Besides differing in the points noted by Mr. Baker, D. Wallichii is unlike D. platysepalum in having the sepals glabrous within and the pod distinctly stipitate. It seems better therefore to treat it as specifically rather than as merely varietally distinct.

7. Dialium Kingii Prain, Journ. As. Soc. Beng. lxvi. 2. 175; leaflets 13-15 opposite, oblong subobtuse or obtuse, branches of the very large panicle erecto-patent, pods velvety.

Perak; Larut, Kunstler 4627! 8187!

A tree 100-150 feet high; leaflets opposite except the terminal one, oblong-lanceolate, apex abruptly cuneate or rounded with an obtuse or retuse tip, base cuneate or rounded, 2-2·5 in. long, 6-8 in. wide, very rigidly coriaceous, deep-green glabrous and shining above, rusty-pubescent beneath. Panicles terminal and axillary, deltoid, 6-8 in. long, 8-10 in. across. Calyx ovoid in bud, tube obsolete, segments subequal broadly ovate-obtuse; externally densely brown-pubescent, internally waxy white, closely puberulous. Pod irregularly spherical, 9 in. long, '75 in. across, velvety-black. Seed solitary, subquadrate, warm-brown, faintly longitudinally striate, '4 in. long, '4 in. wide, '2 in. thick.

106.* Koompassia Maingay.

Very tall erect trees. Leaves odd-pinnate with alternate leaflets. Flowers copious small obscure, in ample terminal panicles, bracts small
caducous. *Calyx-tube* very short conical, or none; sepals 5 lanceolate subequal, very slightly imbricated. *Petals* 5 subequal, their margins not meeting. *Stamens* 5, filaments short or very short; anthers equal basifixed, dehiscing by two apical pores. *Ovary* sessile, subglobose or slightly elongated, 1-ovuled; style short acute, stigma small, terminal. *Pod* oblong, compressed, winged throughout its circumference, narrowed and somewhat twisted at the base, indehiscent. *Seed* solitary situated near the middle of the pod, compressed, exalbuminous; cotyledons leafy, radicle short straight. Species 4, Malayan.


**Perak; Kunstler! Wray! Scortechini! Malacca; Maingay! Derry! Holmberg! Goodenough! Singapore; Ridley! Penang; Curtis! Dis-trib, Sumatra.**

A timber-tree 80–100 feet high, 3–4 feet in diam. *Leaves* 5–8 in. long; leaflets ovate-lanceolate or oblong-acuminate with obtuse slightly emarginate tip, coriaceous, 2–3 in. long, 0.125 in. wide. *Calyx-tube* obsolete, sepals ovate-acute, densely rusty externally. *Petals* oblong-obtuse, white, ½ in. long, slightly exceeding sepals, two and a half times as long as stamens. *Pod* oblong, compressed, 4–5 in. long, 0.125–1.5 in. wide, reticulately wide-veined opposite the seed. *Seed* solitary 1½ in. long, 0.65 in. wide, cotyledons foliaceous, cordate, 5-nerved at base; nerves conspicuous.

This is the well-known Malay timber-tree known as *Koompass.*

2. **Koompassia parvifolia** Prain, *Journ. As. Soc. Beng.* lxvi. 2. 166; leaflets 9–11 glaucous, closely pubescent beneath; panicles grey-silky; petals much shorter than sepals and stamens; anthers long, lanceolate; ovary subcompressed, nearly glabrous.

**Perak; Goping, Scortechini!**

A timber-tree 80–100 feet high. *Leaves* 3–4 in. long, leaflets elliptic-lanceolate with obtuse slightly emarginate tip, chartaceous, 1–2.5 in. long, 0.25–0.35 in. wide. *Calyx-tube* short conical, sepals ovate-lanceolate grey-silky externally. *Petals* elliptic, white, one-third as long as sepals, half as long as stamens. *Pod* not seen.

This is the timber-tree known to the Malays as *Tualang*; its wood is much used for building purposes.

108. **CRUDIA SCHRÉB.**

There are about 12 species of this genus in Malaya. The oldest name for the genus is *Touchirola* Aubl.; this name applies, however, more particularly to those species (the original *Touchirola aromatica*, also *Crudia bantamensis*, *C. gracilis* and *C. Wrayi*) that have only 3 or fewer than 3 leaflets; the remaining species form the group or section *Crudia* proper.

1. **Crudia zeylanica** Bth.
2. **Crudia glauca** Prain, *Journ. As. Soc. Beng.* lxvi. 2. 221; leaflets papery 7–8, glaucous, glabrous on the nerves elsewhere puberulous beneath, petioles and innovations glabrous. Touchiroa glauca *Prain MSS.*

**Perak**; Goping, Kunstler 8175!

A tree 50–70 feet high, stem 1'5–2'5 feet thick. *Leaflets* oblong-oblong, base slightly obliquely rounded, apex rounded and abruptly obtusely cuspidate, 2'5–4 in. long, 1'25–1'75 in. wide, dark-green glabrous above, very glaucous beneath. *Racemes* dense. *Pod* oblong tapering at both ends, beaked, closely shortly puberulous, 4 in. long, 2 in. wide, 6 in. thick. *Seed* solitary, large oblong, 1'5 in. long, 1'2 in. across, 4 in. thick.

Nearest of all the Malayan species to *C. zeylanica* Bth., the only Indian species described in the *F. B. I.*

3. **Crudia Curtisii** Prain, *Journ. As. Soc. Beng.* lxvi. 2. 220; leaflets papery 7–9, uniformly puberulous beneath, petioles and innovations grey-puberulous. *Touchiroa Curtisii Prain MSS.*


A tall tree 80–150 feet high, stem 2–3 feet thick. *Leaflets* obovate to oblong, base slightly obliquely rounded or cuneate, apex rounded and abruptly obtusely cuspidate, 2–3'5 in. long, 1–1'5 in. wide, green glabrous above, grey-puberulous beneath. *Racemes* rather lax; pedicels slender, 6 in. long, buds oblong, 1'5 in. long. *Calyx-lobes* pubescent externally, glabrous within. *Pod* oblong obliquely rounded at base, subequally rounded apiculate at tip, closely shortly puberulous, 3 in. long, 2 in. wide, 5 in. thick.

**Var.? Wallichii** Prain, *Journ. As. Soc. Beng.* lxvi. 2. 221; leaflets papery 7–9, uniformly densely softly velvety beneath, leaflets acute not cuspidate or caudate at apex. *Leguminosa Wall. Cat.* 5983. *Ignota Wall. Cat.* 8089. *Touchiroa Wallichii Prain MSS.*

**Penang**; **Porter! Wallich!**

*C. Curtisii* is known in Malacca as "*Kumpas ruman,"* The plant here tentatively treated as var.? *Wallichii* will probably, when flowers are reported, turn out to be a distinct species.

4. **Crudia speciosa** Prain, *Journ. As. Soc. Beng.* lxvi. 2. 222; leaflets papery 5, rarely 3, quite glabrous on both surfaces, petiolules glabrous, innovations glabrescent. *Touchiroa speciosa Prain MSS.*

**Punah**; "growing in the Rajah's Garden," *Curtis* 2955!

A handsome tree with slender pendulous glabrous branches. *Leaflets* oblong, base unequally rounded or truncate, apex abruptly tapering to a short acutely caudate tip, 2–2'5 in. long, 1–1'5 in. wide, dark-green above, paler beneath. *Racemes* rather dense; pedicels slender '35 in. long, glabrous as is the rachis, bracteolate below the middle. *Calyx-lobes* very sparsely puberulous externally, glabrous within. *Pod* not seen.

Nearest to *C. Curtisii* and *C. glauca*, but amply distinct from both.
5. **Crudia Scortechinii** *Prain, Journ. As. Soc. Beng. lxxvi. 2. 220*; leaflets papery, 11–13, uniformly tawny-puberulous beneath, petioles and innovations tawny-pubescent, pod rusty-tomentose. **Touchiroa Scortechinii Prain MSS.**

Perak; Goping, Scortechini 2029!

A tree 50–90 feet high. Leaflets lanceolate, base slightly unequally rounded, apex acuminate, 2–3 in. long, 1 in. wide, dark-green. Racemes rather lax, pedicels slender ‘4 in. long, tawny-pubescent like the angular rachis, bracteolate about the middle. Calyx-lobes sparsely-pubescent on both surfaces. Pod oblong, obliquely rounded at both ends, rugulose, 2½ in. long, 1½ in. across, flat. Seed 1 with a long funiculus.

6. **Crudia Caudata** *Prain, Journ. As. Soc. Beng. lxxvi. 2. 219*; leaflets coriaceous, 5–7, very long caudate-acuminate, leaf-rachis prolonged beyond ultimate leaflet, innovations and petioles densely rusty-pubescent. **Touchiroa Caudata Prain MSS.**

Johore; Ridley 6399! Distrib. Borneo.

A small tree. Leaflets oblanceolate, base rounded or deltoid, 2½–4 in. long, 1 in. wide, the narrow tip ‘75 in. long, dark-green shining above, dull and rusty-pubescent on the nerves beneath. Calyx-lobes densely rusty externally, glabrous within. Pod (young) linear oblong, obliquely rounded at base, obtuse apiculate at opposite end, compressed: 2 in. long, ‘75 in. wide, valves densely, shortly, subscabridly rusty-pubescent. Seed solitary.

An exceedingly distinct species.

7. **Crudia Wrayi** *Prain, Journ. As. Soc. Beng. lxxvi. 2. 222*; leaflets small 3, thinly papery, oblanceolate, racemes dense, rachis puberulous, flowers pedicelled. **Touchiroa Wrayi Prain MSS.**

Perak; Sungei, Larut, Wray 2974!

A small tree with slender glabrous branches. Leaflets cuneate at base, rounded and shortly abruptly acuminate at apex, 1½–2½ in. long, ½–1 in. wide, quite glabrous on both surfaces. Racemes dense 4–8 in. long, rachis angular puberulous, pedicels slender ‘2 in. long, bracteolate in middle, buds ‘1½ in. long. Calyx-lobes faintly puberulous externally. Pod unknown.

A member of the group of species to which the original species Touchiroa aromatica belongs, which is further represented in the east by the species *C. bantamensis* and *C. gracilis*. It is easily distinguished from all three by its much smaller leaves, and is further distinguished from the two Malayan species by its longer pedicels; from the American species it is distinguished by its larger racemes.

8. **Crudia Gracilis** *Prain, Journ. As. Soc. Beng. lxxvi. 2. 223*; leaflets large 3, firmly papery, ovate-oblong to oblong-lanceolate, spikes slender sparse strict, rachis glabrous. **Touchiroa Gracilis Prain MSS.**

Perak; Thaiping, "in low wet ground in dense forest, rare," Kunstler 8468!

A slender shrub 6–8 feet high, young branches glabrous. Leaflets cuneate or slightly unequally rounded at base, shortly caudate-acuminate at apex, glabrous on
both surfaces, 4·5–6 in. long, 2–3 in. across. Flowers sessile, buds oblong, 1·5 in. long. Calyx-lobes quite glabrous on both sides. Pod not seen.

This is the nearest, of the Peninsular species, to C. bantamensis (Touchiroa bantamensis Hassk.) from Bantam. It differs in having quite sessile glabrous flowers and a sparsely flowered, glabrous rachis.

109. SARACA Linn.

1. SARACA INDICA Linn.

After a prolonged study of the material in the Calcutta Herbarium, the writer can find no evidence that Saraca indica extends, as a wild species, to the east of the Irrawaddy. There are no specimens here from the Malay Peninsula, and those seen by Mr. Baker from Malacca must in all probability have been from planted trees. In Canara occurs a variety (var. puberula) with peduncles, pedicels, leaf-rachis, and petiolar aspect of stipules all puberulous to pubescent; Chittagong and Arracan specimens always have very much broader and larger leaflets than the normal plant though they are, like it, everywhere glabrous; they seem to constitute a distinguishable variety (var. latifolia). S. minor and S. Zollingeriana are probably best treated as distinct species.

ib. SARACA ZOLLINGERIANA Miq. Flor. Ind. Bat. i. 84; leaflets 6, petiolules short, bracteoles persistent ascending, sepals not half as long as calyx-tube, stamens 7. S. indica Wall. Cat. 5822 (F only) not of Linn.

MARTABAN; WALCH ! DISTRIBUT. ; JAVA.

A low erect tree. Leaves sessile or subsessile, lanceolate-oblong or lanceolate-acuminate to an obtuse tip, 6–8 in. long, 1·5–2 in. wide, less rigid than in S. indica. Corymbs dense 2–3 in. broad, pedicels glabrous very slender, 25 in. long below the small ovate acute ascending bracteoles. Sepals 2 in. long, orbicular, under one-third the length of calyx-tube. Filaments 3 times as long as the sepals, anthers much smaller than in S. indica. Pod as in S. indica.

Dr. King has noted of the plants of this species cultivated in Hort Calcutta, received from Java:—"Diffs from S. indica in having only 3 pairs of leaflets, "in having narrower sepals, in flowering later, and in having the smell of ripening "pears."

1c. SARACA MINOR Miq. Flor. Ind. Bat. i. 84; leaflets 2–6, petiolules short, bracteoles persistent spreading, sepals half as long as calyx-tube, stamens 8.

VAR. TYPICA; leaflets 6; bracteoles acuminate. JAVA.

VAR. BIJUGA; leaflets 4 or very often only 2, bracteoles obtuse. S. bijuga Prain, Journ. As. Soc. Beng. lxxvi. 2. 214.

PERAK; very common.

A tree 30–40 feet high. Leaves sessile, leaflets oblong-lanceolate acute, 10 in. long, 2·5 in. wide; in texture much thinner than those of S. indica. Corymbs rather lax, 4 in. long, 3 in. wide, pedicels very slender glabrous, 5–75 in. long below the large spreading oblong, obtuse bracteoles. Sepals 35 in., obovate-oblong. Filaments 3 times as long as sepals, anthers very small. Pod smooth, reddish-yellow, 8–10 in. long, 2·5 in. wide, obliquely cuneate at base, obliquely acute at apex.
This description applies only to the Perak plant which might perhaps with equal propriety be considered a distinct species, Saraca bijuga. Among Malayan species it most closely resembles S. triandra Baker, which also is very common in Perak and also as a rule has 2-jugate leaflets. But it is at once distinguished in flower by its glabrous peduncles and pedicles and its 8 stamens, and in fruit by its smoother larger pods not so oblique at the base or so obtuse at the tip.

2. Saraca cauliflora Bak.

Add to description of F. B. I.:—Pod 12 in. long, 2 in. wide, with a stout beak. 75 in. long.

Add to localities:—Perak; Scortechini!

This appears to be rather a rare species in the Peninsula. There are 2 lanceolate bracteoles 35 in. long, but they are extremely deciduous; the bracts, which are also very deciduous, are large oblong, 1 in. long.

2b. Saraca declinata Mig. Flor. Ind. Bat. i. 84; leaflets 12–16 (usually 14), petiolules long, bracteoles deciduous, corymbs rather dense, usually from thick old branches, sepals less than half as long as the calyx-tube, stamens 4. Jonesia declinata Jack. in Malay. Miscell. ii. 7. 74; Walp. Rep. i. 844.

Perak; very common. Parang; Ridley! Selangor; Curtis! Malacca; Goodenough! Ridley! Distelir. Sumatra; Java.

Extremely like S. cauliflora Baker, and when in flower only to be satisfactorily distinguished by analysis. Still the writer believes Mr. Baker's species to be, as species go in Saraca, a fairly separable one; not only is the character of 4 stamens always associated with shorter sepals, the pods are also distinguishable. Those of S. declinata are usually rather longer than those of S. cauliflora, being often 15 in. long; they never appear to be beaked as those of S. cauliflora are.

2c. Saraca thaipingensis Cantley ex Prain, Journ. As. Soc. Beng. lxvi. 2. 211; leaflets 14–16, petiolules long, bracteoles deciduous, corymbs very short dense and subsimple from thick old branches, sepals nearly as long as calyx-tube, stamens 4.

Perak; very common. Malacca; Derry!

This again in foliage and habit very closely resembles the two preceding species, but may be separated by its shorter denser corymbs on which many of the lower bracts persist for a considerably longer time; by the larger flowers, with much longer sepals, and by the much broader pods. In the two preceding species the pods are 2 in. across; in this they are always over 3 in. wide, and are besides rather thinner in texture. The corollas are not over 3 in. across; the stamens appear to be always 4 only.

3. Saraca lobbiana Bak.

Add to description:—Pod 12 in. long, 2·25 in. wide.

The pod is almost exactly like that of S. declinata in shape, i.e., it has not got a persistent beak; in size it is more like that of S. cauliflora. It differs, however, from both in having a longer stipe, 1·25 in. in length. In none of the flowers examined by the writer have more than 6 stamens been found, in a few of the flowers only 5 are present.
There is a species from Borneo as yet undescribed that approaches this very closely but that differs in having shorter racemes (springing in the same way from slender leafless branches), flowers with persistent bracteoles, only 4 stamens, and a more shortly stipitate pod. It has been distributed by Mr. Haviland with the mark d. u. e. d.; being one of Haviland’s plants, the writer is precluded from describing it.

3b. Saraca Kunstleri Prain, Journ. As. Soc. Beng. lxvi. 2. 218; leaflets 4–6, petiolules long, bracteoles caducous, corymbs in very long sparse terminal panicles, sepals about as long as calyx-tube, stamens 7.

Perak; Gunong Batu Pateh, 1500–2000 feet, Kunstler 8048!

Tree 20–40 feet high; branchlets zigzag glabrous. Leaf-rachis 5–10 in. long, glabrous, leaflets large diminishing downwards, ovate-acuminate base cuneate, distal 8–10 in. long, 3½–4 in. wide, basal if 2 pairs and central if 3 pairs 4–5 in. long, 2½–2½ in. wide, basal if 3 pairs 3½–4 in. long, 2–2½ in. wide; all papery glabrous on both surfaces, dark-green above paler beneath, main-nerves 6–9 pairs ascending, more prominent beneath. Peduncles glabrous 8–12 in. long, branches 1–2 in. long. Pedicels and calyx-tube very short, calyx-lobes ovate-oblong 2 in. long, glabrous. Filaments 7, anthers not seen. Pod falcate 4–6 in. long, 1½ in. wide, glabrous. Seeds 5–6 transversely ovate, 5 in. long, 7 in. across, 25 in. thick, testa black, smooth shining crustaceous.

A very distinct species apparently nearest S. Lobbian Baker. Unfortunately good flowers are not available for description.

3c. Saraca Griffithiana Prain; leaflets 8–12, petiolules short, bracteoles persistent ascending, sepals about half as long as calyx-tube, stamens 4, rarely 5 or 3.

Upper Burma; Poneline, J. Anderson!

A low tree. Leaves sessile or subsessile; leaflets oblong-lanceolate acute, 6–8 in. long, 1½–2 in. wide, subcoriaceous. Corymbs dense 3–4 in. broad; pedicels stoutish, 2½–3½ in. long, pubescent as are the peduncles; bracteoles small acute ascending amplexicaul. Sepals 2½–3 in. long, obovate-oblong. Filaments three times as long as the sepals. Pod not seen.

This species has been long known in the Calcutta Herbarium where it is marked “Saraca species in H. B. C. from Griffith’s collections.” Most probably therefore they had been obtained from plants raised from seeds brought by Dr. Griffith from his Ava journey, as it is only from Upper Burma that specimens have since been received.

The facies of the plant is that of typical S. indica but the peduncles and pedicels are pubescent as in S. palembanica and S. triandra and in S. indica var. puberula; the bracteoles too are here very much smaller, as in S. Zollingeriana; the stamens moreover are almost always 4, in several flowers 3 have been found, in one flower 5. With S. Zollingeriana it agrees in consistence of leaves and as to bracteoles, but it differs in having the pedicels pubescent and in not having 8 stamens. The species it most nearly resembles is S. palembanica but while it agrees in foliage, pubescence and number of stamens with that species, it has much larger anthers and stouter pedicels, and has altogether different bracteoles as well as a much larger calyx.

J. 11. 62
D. Prain — Some additional Leguminose.

3c. Saraca macroptera Miq. Flor. Ind. Bat. i. 1080; leaflets 8–12, petiolules short, bracteoles spreading persistent, pedicules and pedicels quite glabrous, stamens 4.

Var. typica; leaflets cuneate at base, corymbs lax, 3–4 in. long and broad.

Sumatra; Borneo.

Var. parviflora; leaflets truncate at base, corymbs dense, 1 in. long, usually in rings on thick old branches, flowers much smaller than in var. typica.

Perak; Kunstler!

A tree 30–40 feet high, stem 4–6 in. thick. Leaflets lanceolate acute 6–10 in. long, 1 5–2 5 in. across. Corymbs densely clustered, bracts persistent spreading or reflexed; bracteoles obovate, 2 in. long, spreading. Sepals 15 in. long. Filaments three times as long as sepals, anthers very small. Pod not seen.

This comes nearest a Bornean species (S. Hullettii) of which a description is appended.*


Perak; Scortechini! Penang; Curtis 647! 1386! Dindings; Bryant! Distrib. Sumatra.

A slender tree. Leaflets oblong-lanceolate acute, 8–12 in long. Corymbs sessile from old nodes on thick old branches, dense, 2–3 in. long, bracts persistent spreading. Flowers as in S. triandra. Pod not seen.

Except in the shape of the more numerous leaflets, and in the denser shorter corymbs, this species does not appear to the writer to differ specifically from S. triandra, an opinion which, judging from a note left by him in Herb. Calcutta, the late Father Scortechini appears to have been inclined to entertain.

4. Saraca triandra Bak.

Add to description of F. B. I.:—Pedicules and pedicels pubescent.

* Saraca Hullettii Prain; leaflets 4–6, petiolules distinct, bracteoles large spreading or reflexed, persistent, sepals longer than the calyx-tube, stamens 4.

Borneo; Sarawak, planted, Hullett 312! near Kuching, Haviland!

A tree. Petiolules 25 in. long; leaflets thin shining on both surfaces, ovate to ovate-lanceolate acute, corymbs short-pediculed, pedicules and pedicels quite glabrous, 3–4 in. long and broad. Bracts persistent spreading or reflexed; bracteoles ovate 25 in. long. Sepals 25 in., calyx-tube 2 in. Filaments 3–4 times as long as sepals. Pod oblong very oblique at both ends, 3 in. long, 1 5 in. wide, distinctly beaked; stipe slender 5 in. long.

With this appears to agree Beccari, P. B. 916, of which there are, however, only flowers at Calcutta. The species is evidently very closely related to S. macroptera, of which it has quite the flowers; the leaves with fewer shining leaflets are, however, very different from those of S. macroptera. To avoid the possibility of future confusion of the two species this diagnosis is given.
This species is extremely common in Perak as well as in Malacca. It has also been once obtained in the Dindings (by Bryant), and once in Penang (by Curtis, n. 163!). There is besides a specimen at Calcutta from Sumatra (Teysmann 3638!), named "Jonesia palenanica var. ?" which, while not precisely Miquel's *J. palenanica*, is not distinguishable from Mr. Baker's species; it may be necessary hereafter in monographing *Saraca* to treat *S. triandra* as only a variety of *S. palenanica*.

The synonym *Jonesia triandra* Roxb. must be deleted, for Roxburgh's *Jonesia triandra* is *Afzelia bijuga*. And, though it is not at all clear what *Jonesia scandens* Roxb. may have been, there is every reason to believe that it too belongs to some other genus. The fact that it was 'scandent,' for Roxburgh having said so enables that to be taken for granted, most certainly precludes its citation under *S. declinata* as Miquel, or under *S. triandra*, as Baker would suggest.

5. *Saraca latistipulata* Prain, *Journ. As. Soc. Beng.* lxvi. 2. 217; leaflets 12, stipellate, short-petioluled, bracteoles ascending amplexicaul persistent, stamens 2; stipules large, foliaceous, only connate at their bases between the petiole and the stem.

**Perak; Ridley!**

**Pediolules** 15 in., twice as long as the subulate firm persistent stipels; leaflets very firmly coriaceous, ovate-lanceolate acute or acuminate, bases almost equally rounded, 5 in. long, 1.5 in. wide, dark-green dull glabrous above, finely puberulous on the midrib beneath as also on the margins, the pediolules, leaf-rachis and stipels; stipules foliaceous sometimes 1.5 in. long, each with bold midrib, obliquely cordate, the outer free margin of each auriculate, the inner margins cuneate and connate throughout their lower third between petiole and stem. *Corymbis* very few-flowered (sometimes flowers subsolitary), clustered on warty nodes along thick branches hardly 75 in. long; pedicels puberulous; bracts persistent, bracteoles triangular puberulous. *Sepals* under 25 in. long. *Filaments* about twice as long as sepals. *Pod* oblong, 2 in. long, 8 in. wide.

A most remarkable species, which deserves perhaps to be treated as the type of a distinct section.

112. **Humboldtia Vahl.**

5. *Humboldtia decurrens* Bedd. ex Oliv. in Hook. *Ic. Plant.* xxiv. t. 2368; branches hollow, nodes constricted, spur of stipule large ovate subacute, leaves distinctly petiolated, *rachis winged*, leaflets 8-12, peti-olules 0; petals 5.

**S. India; Travancore, Beddome, Bourdillon!**

A tree 40-50 feet high, trunk 1 foot in diam., branchlets cinnamon-brown tomentose. *Stipules* obliquely lanceolate or ovate-lanceolate, 1.5-2.5 in. long, below the point of attachment obliquely ovate or reniform, leaf-rachis a foot long, leaflets elongate-lanceolate, 6-15 in. long, the lower shorter than the others, thinly coriaceous, base obtuse, apex acuminate. *Racemes* short axillary, solitary or paired, often hardly exceeding the stipules, bracteoles and sepals downy on the back, the latter 5 in. long. *Petals* oblanceolate or oval, as long as the sepals. *Pod* 3.5-5 in. long, 1-1.5 in. wide near the tip, tomentose.

This is at once distinguished from other species of *Humboldtia* by its alate rachis.
113. **AFZELIA SMITH.**

1. **AFZELIA RETUSA Kurz.**
   Add to localities of *F. B. I.*—Bengal; Sundribuns, *Ellis!*

   This has often a branched inflorescence and often also has acute leaflets, so that the only character left to distinguish it from *A. bijuga* is the absence of pubescence from its pedicels and calyx. It might be as well to treat it as only a variety of *A. bijuga.*

2. **AFZELIA BIJUGA A. Gray.**
   Add to synonyms of *F. B. I.*—Jonesia triandra *Roxb. Flor. Ind.* ii. 220.

3. **AFZELIA PALEMBANICA Bak.**

   The synonym *Intisia palembanica* Miq. must be deleted because Miquel’s plant, though near this, has very different, much larger bracts. It will be necessary for whoever may monograph the genus *Afzelia* to re-name this species *A. Bakeri.*

4. **AFZELIA ? CORIACEA is a Sindora.**

113b. **PAHUDIA Miq.**

Erect unarmed trees. *Leaves* abruptly pinnate with few pairs of opposite leaflets. *Flowers* racemose in sessile or peduncled terminal panicles. *Calyx* with a disc produced to the top of its somewhat elongated tube; sepal 4 much imbricated slightly unequal. Developed *petal* one, orbicular, short-clawed, the lower ones rudimentary or wanting. *Stamens* 7 declinate united high up into a slit sheath, the filaments unequal and free at the summit, and with 2 small staminodes at the base of the staminal tube; anthers small oblong dehiscing longitudinally. *Ovary* stalked few-ovuled, style filiform with a small terminal stigma. *Pod* large oblong, thick and woody, 2-valved, dehiscing, smooth. *Seeds* with a large basal arillate funiculus. Species 2, one Malayan, one Indo-Chinese.

1. **PAHUDIA XYLOCARPA Kurz in Flor. Brit. Burm. i. 413.**

   **SHAN HILLS; Dr. King’s Collector 134! DISTRIB. Siam.**

A tree with puberulous and pruinose branchlets. *Leaves* short-petioled, leaflets 2-3-paired, with distinct petiolules, ovate, rounded at base, slightly acuminate at tip, thinly papery, glabrous shining above, glaucous beneath, 3-3 ½ in. long. *Flowers* in a grey-pubescent terminal panicle, the individual racemes few-fld.; pedicels short thick; sepals grey-velvety obovate, concave, the outer pair about ⅛ in., the inner pair ⅓ in. long. *Pods* rhomboid oblong, thick-valved and somewhat turgid, 4-5 in. long. *Seeds* 2, compressed, orbicular, enclosed in a medullary endocarp, about 125 in. across, resting on a horny, arillate, much expanded funiculus.

A very interesting addition to the Burmese Flora. The species was first collected in Siam by Mr. Teysmann, and has recently been sent from the southern Shan Hills by one of the collectors of the Calcutta Botanic Garden.
114. BAUHINIA LINN.

1. BAUHINIA TOMENTOSA LINN.
Also in the Andamans, but possibly introduced.

2. BAUHINIA BRACHYCARPA WALL.
This still remains a doubtful plant. There is no example of Wall. Cat. 5786 at Calcutta, and the sheets here named B. brachycarpa by Dr. Wallich himself have been reduced by Mr. Kurz to B. acuminata; in making this reduction Mr. Kurz is certainly right.

3. BAUHINIA POLYCARPA WALL.
Add to description of F. B. I.:—Petals white, *35 in. long.

All dubiety has now been removed from this plant which is a very distinct species and has been recently reported from Makana in Tenasserim, at 2000 feet elev., and from many localities in the Shan Hills.

Its nearest ally is evidently B. timorana Decaisne (Nov. Ann. Mus. iii. 446) which, apparently by a lapsus calami, has been written B. timoriensis and reduced to B. racemosa in the F. B. I. and again in the Index Kewensis. A perusal of Decaisne’s description shows that his plant has little in common with B. racemosa beyond that both are Bauhinias. Decaisne gives no collector’s name and no exact locality in Timor. There are, however, examples in Herb. Calcutta of a species collected at Coepang in Timor by R. Brown in 1803 which agree exactly with Decaisne’s description. Brown’s plant is extremely closely related to B. polycarpa, its somewhat different bracts and denser racemes alone satisfactorily distinguishing it from Dr. Wallich’s plant; it does not, supposing it to be B. timorana, in any way recall or resemble B. racemosa.

Var. Kurzii Prain; leaves larger, 6 in. long, 8 in. across; pods rather longer (3.5 in.) and broader (5 in.); seeds about 10.

Pegu; Yomah, in high teak forest, Kurz 1783 bis!

This Mr. Kurz at first attributed to B. acuminata; its leaves much resemble those of that species but its pods are extremely unlike and resemble, on a larger scale, those of B. polycarpa to which Mr. Kurz has finally referred it. It appears to the writer highly probable that it will turn out, when more fully represented, to be a distinct species.

6. BAUHINIA MALABARICA ROXB.
The leaves of this species are not deeply bifid in any Calcutta specimen. Bauhinia acida Reînw. (Flora xxxi. 578) does not differ even as a variety. This species extends as far south as Tenasserim in the Eastern Peninsula, but has not as yet been reported from the Andamans or from the Malay Peninsula; it recurs, however, in Java and in Timor.

7/1. BAUHINIA TORTOSA COLL. & HEMSL. Journ. Linn. Soc. xxviii. 52, t. 8; erect or semi-scandent, leaves 7–9-nerved, slightly cordate, shallowly bifid, flowers in small dense lateral racemes, bracts small linear, pedicels a little longer than calyx, calyx-limb with broadly ovate lobes; style very short or 0.

Upper Burma; Koni, Collett 561! Prazer! Shan Hills; King’s Collectors!
A small tree or subscandent bush. Leaves shortly petioled subcoriaceous, shortly bilobed, lobes slightly angular at the apex, base cordate-rounded, broader than long, 1.5-2 in. across, glabrous above, tomentose beneath, the nerves rusty as are the petioles, the tomentum mixed with pellucid glands; petioles 3–4½ in. long. Racemes small dense 7½-12½ in. long; flowers 5 in. across, pedicels rusty-tomentose 2 in. long, bracts 1 in. long. Calyx-lobes rusty externally, broadly ovate-obtuse, spreading. Petals subequal obovate-spathulate one-third longer than calyx-limb, white. Stamens 10 perfect, alternately short and long. Ovary subsessile, densely villous, 2–3-ovuled, style almost absent. Pod dehiscent with woody valves, subfalcate, narrowly gradually to base, apex obliquely acute, 2 in. long, 4 in. wide, glabrous and brown externally, rufous-tomentose within except opposite the 1–3 seeds, ovate, compressed, 3½ in. long, 2½ in. across, their long axis set obliquely backwards across the pod; testa smooth, shining, reddish-brown.

Near B. malabarica Roxb., B. Faberi Oliv., and the next species.

7½. Buchinia enigmatica Prain; erect, leaves 11–13-nerved, slightly cordate, shallowly bifid, flowers in small rather lax lateral corymbs, bracts subulate, pedicels much longer than calyx, calyx-limb with broadly triangular lobes; style very short or none.

Upper Burma; Maymyo, King’s Collector! Shan Hills at Fort Stedman, King’s Collectors!

A small tree. Leaves shortly petioled, subcoriaceous, shortly 2-lobed, lobes rounded, sinuses wide, base cordate-rounded, broader than long, 4 in. across, glabrous above, faintly puberulous beneath and pellucidly gland-dotted, petioles 7½–1 in. long. Racemes corymbose 1½–2 in. long; flowers 7½ in. across, pedicels puberulous very slender the lowest 5½–6 in. long, bracts puberulous 2½ in. long, subulate. Calyx-lobes puberulous, broadly ovate-acute, spreading. Petals subequal oblong-elliptic-acute, twice as long as calyx-limb, pale-yellow or white. Stamens 10, perfect subequal. Ovary sessile, small, densely villous, 1-ovuled, style 0. Pod not seen.

At first the writer was inclined to consider this only a large leaved form of B. tortuosa to which it is obviously closely related, but the longer more slender pedicels, longer bracts, acute calyx-lobes and narrow pointed petals as well as the solitary ovules, forbid this treatment.


Recently collected specimens from Canara, sent by Mr. Talbot, are all dioecious. They do not in any other respect appear to differ from B. lawii Benth. which name should therefore be sunk.


Add to localities of F. B. I.: Malacca; Maingay 545! Perak; Kunstler 6261!

Add to description:—Pod oblong, woody, 4 in. long, 2 in. wide, externally finely adpressed rusty-pubescent; seeds about 4, much compressed, 1 in. long, 7½ in. across.

This species is extremely closely related to B. bidentata and differs chiefly in having larger flowers, leaves slightly pubescent beneath, and glabrescent pods. The character to be derived from the apex of the leaf, which is relied upon in separating species 11, 12 and 13 of the F. B. I. from species 14, 15 and 16 of that work, is not to
be absolutely depended upon; in the three first, as the very large suites of specimens in Herb. Calcutta show, the leaves are often bifid, in the three last they are as often entire at the tip.

12. **Bauhinia-Finlaysoniana** Grah.

**Penang; Curtis 295! Perak; Kunstler 3589! Scortechni 247!**

1463! Wray 2300!

Pods small black glabrous linear-oblong, 2 in. long, '6 in. across.

*Bauhinia Kockiana* Reinw. (Verh. Nat. Geschied. 87, t. 10) is very closely related to this species and to *B. cornifolia* but is quite distinct from both. It resembles *B. Finlaysoniana* in leaf and in pod, but differs in having a much longer calyx-tube, as in *B. cornifolia*; its pods and foliage, however, are quite unlike those of the latter species.

13. **Bauhinia lucida** Wall. Cat. 5779 A.

The *F. B. I.* has identified this with *Bauhinia emarginata* Jack, from Sumatra. Dr. Wallich's original note reads as follows:—"*Bauhinia emarginata* Jack, in Malay Miscel. App. 6. 75? Perhaps different by its long racemes which may render it a new species (*B. lucida* Wall)")

Jack's plant, by the original description, has more nerves (7-9) than the present plant which has 5-7 only, has long pedicels, and has tomentose ovaries; it is therefore clear that the Sumatra plant in question is distinct from the present one. In any case the use of the name *B. emarginata* should be avoided since it was already employed for a Mexican species (*B. emarginata* Mill. Dict. ed. viii. n. 5) when Jack's description was published.

Mr. Baker suggests that this may be *B. cordifolia* Roxb. and is not alone in this belief, for specimens from Hort. Bogor. show that *B. lucida* is, or was, in cultivation there under the name *B. cordifolia*. But Roxburgh's description, though perhaps too meagre to enable us to identify his plant, is sufficient to exclude the present one, since *B. cordifolia* is described as being smooth in every part.

13/1. **Bauhinia Wraty Prain, Journ. As. Soc. Beng. lxvi. 2. 191**; leaf rather broader than tube, gradually acutely pointed, calyx very small, limb as long as tube, petals broadly oblanceolate margin crenulate-sinuate distinctly clawed.

**Perak; Kunstler! Scortechni! Wray! Selangor; Kunstler!**

A shrubby cirrhose climber 15-30 feet long. Leaves flexible glabrous above, glaunescant and sometimes sparsely pubescent on nerves beneath, 2-3 in. long, 1\(^2\)5-1\(^2\)75 in. across, 5-nerved, base truncate, petiole '5-6 in. long. *Flowers* in dense close-fld. terminal and axillary racemes 2\(^2\)5-4 in. long, 2\(^2\)5 in. across; pedicels spreading, 1\(^2\)5 in. long, sparsely puberulous. *Calyx* glabrous, tube very slender cylindric '1 in. long, lobes '1 in. long spathulate. *Petals* pale yellow or white becoming pinkish, '6 in. long, externally pubescent. *Ovary* glabrous stalked, style distinct. *Pod* obovate to oblong-obtuse, stalk 2 in. long, 2-3 in. long, 1 in. across. *Seeds* 1-2, rarely 3, broadly ovate much flattened, '5 in. long, '4 in. across.

A very distinct species apparently connecting the sectious *Phanera* and *Lasiothema*. It cannot be confounded with any other Indian species but comes extremely near a Bornean plant (*Mottley 376; Haviland 95*) which differs in having cordate leaves, larger almost glabrous though similarly crenulated petals and quite
D. Prain—Some additional Leguminosae. [No. 2,


Add to localities of F. B. I.:—Nepal; Maries! Chota Nagpur; very common, T. Thomson! Kurz! Gamble! Wood! C. B. Clarke! Prain!

15. Bauhinia integrifolia Roxb.
Add to localities of F. B. I.:—Perak; Prov. Wellesley and Pahang, very common. Distrib. Sumatra.


Add to localities:—Perak; common. Selangor; Ridley! Johore; King! Hullett! Distrib. Sumatra.

The Malacca specimens referred here in the F. B. I. agree with B. cornifolia Bak. except in having bifid leaves with an extra pair of nerves; they have therefore been referred to that species rather than to B. bidentata from which their pubescent pods alone suffice to exclude them.

16/1. Bauhinia Kingii Prain, Journ. As. Soc. Beng. lxvi. 2. 189; scandent, cirrhose, pubescence ferrugineous, calyx-tube equalling the limb, ovary silky along the sutures, long stalked.

Perak; Scortechini! Wray! Selangor; Kelsall! Distrib. Borneo?

Leaves deeply cordate, often slightly subpeltate, narrowed gradually to an emarginate rarely entire often deeply 2-fid tip; nerves 5, pubescent beneath branch ing-outwards; rigidly coriaceous, 3'5–4 in. long, 2'5–3 in. wide; shining above. Flowers in lax lateral and terminal corymbs 3 in. long, 2'5 in. wide, sometimes forming large loose leafy zigzag panicles 6 in. across, often over a foot long. Buds pubescent; pedicels puberulous, the longest 1'25 in., spreading. Calyx-limb splitting into subequall ovate very shortly acuminate lobes, 25 in. long, 2' in. across; tube narrowly infundibuliform, 25 in. long. Petals subequal, bright-red (Wray), oblanceolate-obtuse, long-clawed, 8 in. long, 25 in. wide, externally rusty-pubescent. Ovary pubescent along sutures, stalk ultimately 2 in. long, style 25 in. long, curved, pubescent. Pod woody glabrous tapering to both ends, 2 in. long, 8 in. wide. Seeds 1–2, ovate, compressed, 3 in. long, 2 in. across.

A very distinct species. Beccari n. 885, from Borneo, is perhaps the same.

16/2. Bauhinia Scortechinii Prain, Journ. As. Soc. Beng. lxvi. 2. 188; leaf rather longer than broad, suddenly tapering in upper third to a deeply 2-fid tip; calyx-limb as long as tube; leaves densely-pubescent beneath.

Perak; Scortechini!

A cirrhose twiner with glabrescent branches. Leaves rigidly coriaceous, 3'5–4 in. long, 2–2'5 in. wide, 9- (rarely 7-) nerved, shallowly cordate or truncate. Flowers in short lax terminal racemes under 2 in. long, pedicels erecto-patent, lower not exceed-

Very nearly related to B. lucida Wall., but at once distinguished by its deeply bifid leaves which are tomentose beneath, and by its shorter, few-flowered racemes.

18. Bauhinia Kurzii Prain. (B. rosea Kurz, not Miq.) Add to localities: — Tenasserim; on Taepo, at 5000 feet, Gallatly! When Mr. Kurz published his description of B. rosea in 1873 he overlooked the fact that Dr. Miquel had already given the name (in 1844) to a quite different species from Dutch Guiana.

19. Bauhinia rufa Grah. Add to synonyms of F. B. I.: — B. Vahlii Kurz, Journ. As. Soc. Beng. xliv. 2. 289; For. Flor. Brit. Burma, i. 401, not of W. § A. Add to localities: — Pegu; Hills East of Toungoo, at 2000 feet, Brandis! Tenasserim; near Moulmein, J. Anderson! Calcutta Garden Collectors have also quite recently obtained it in the Assam valley, as well as in Silhet. Sir Dietrich Brandis has noted that the flowers are "white, fragrant."

Mr. Kurz reduced B. rufa to B. Vahlii, a somewhat unusual step to take seeing that, if the two had been conspecific, B. rufa was the older and therefore the preferable name. But as Mr. Baker has shown, the two species are perfectly distinct. B. Vahlii has never been found in Burma; both occur in Assam so that the areas which the two occupy overlap to some extent, but in a general sense B. rufa may be considered the eastern representative of the more widely distributed and much commoner B. Vahlii.


It should be noted that the original examples of B. semibifida came from Sumatra. This plant is usually much confused in herbaria with B. ferruginea. The species is not cürrhose; the flowers, when the plant is grown so far north as Calcutta, as a reference to Wallich's specimens or to Roxburgh's figure (reproduced by Wight) will show, are somewhat smaller than when the specimens come from Singapore, Sumatra or Borneo.

22. Bauhinia mollissima Wall. Add to localities: — Perak; very common. Kedah; Ridley! Malacca; Mainay!

As this name is considerably older than the name B. elongata Korth, one or other of our priority-hunters will be certain one of these days to propose its adoption; it may therefore be as well to alter it now. But it is obviously very undesirable that an insistence on the observation of this rule regarding priority should enable a
naked name like Wallich's to displace the name given by Korthals along with a full description and an excellent plate. B. Pottsii G. Don, Gen. Syst. ii. 462 is much better referred here than to B. ferruginea.


**Assam; Simons’ Silhet; fide Roxburgh.**

It has been a standing puzzle for many years to Indian botanists why Mr. Bentham, whose judgment, in all matters relating to Leguminosæ, deserves perhaps greater attention than that of any other author, should have decided that the plant cultivated in the Calcutta garden as *B. piperifolia* could not be Roxburgh's plant. Roxburgh's description is extremely meagre it is true, but the only apparent discrepancy lies in the number of nerves (given by Bentham as 4 for each lobe and therefore 9 for the whole leaf, by Roxburgh as 5-7) and the shape of the leaves, (given by Roxburgh as entire by Bentham as shortly bised at the apex). These are not really discrepancies; the upper leaves on twigs are most usually 5-7-nerved and entire; those below are most usually, though not always, 2-fid and 7-9-nerved. One point which both Roxburgh's and Bentham's diagnoses omit to note is that the leaves on root-shoots and on young plants may be completely 2-lobed to the very base exactly as in a species of the section *Lysiphyllum*. The plant is not ecirrhose.


**PEGU; Kurz! Tenasserim; Helfer 1879! 1880! PERAK; Scortechini 316! 1512! Wray 3960! Kunstler 4311! 4511! 6170! PENANG; Curtis 801! 1541!**

**Branchlets** slender at first finely silky. **Leaves** shallowly to deeply cordate, rigidly subcoriaceous, glabrous shining above, moderately large, quite entire or with 2 acute lobes reaching ¼ down; leaves on root shoots and on young plants quite bilobed to the base (as in § *Lysiphyllum*). **Flowers** in panicles of dense many-flowered short-peduncled corymbs; bracts long lanceolate persistent; pedicels slender ascending; never exceeding '5 in., usually only 3-35 in., clothed like calyx with grey-silky pubescence. **Calyx-tube** '5 in.; bud globose; limb usually not fully 5-cleft. **Petals** obovate clawed, densely silky on the back. **Ovary** densely silky, short-stalked; **style** produced, stigma small.

This plant was considered by Mr. Kurz as well as by Mr. Baker to be the same as *B. piperifolia*. An examination of Mr. Kurz's specimens, which form the basis of his descriptions in the *Forest Flora* and in his other papers, shows that what he has treated as *B. anguina* is in every case the present species. *B. anguina* does occur in Burma but all the specimens of that species have been treated by Mr.
Kurt as *B. macrostachya* Wall! The present species is extremely closely related to *B. piperifolia* but can be at once distinguished by its shorter pedicels, its much larger bracts, and its pubescent ovaries.

The name here adopted calls for explanation. This is evidently the same plant as the species somewhat rashly described by Miquel (from leaf specimens only) as *Phanera diptera*, which Miquel says had received from Blume the tentative MSS. name *Bauhinia diptera* Bl. But these dipteral leaves occur only on seedlings and root-shoots, and the name, being singularly inappropriate for the species as a whole, is better neglected. The species described in the *F. B. I.* as *B. glabrifolia* is really *B. piperifolia* Roxb. but as Mr. Baker has cited along with *B. piperifolia* specimens of the present one under his *B. glabrifolia*, the latter name has been retained for this plant; it must, however, be recollected that this is done to the complete exclusion of the plant described and the synonyms cited by Baker.

An incidental advantage of neglecting the name *Bauhinia diptera* Bl. is that it becomes thus unnecessary to alter the name of a very distinct species from Upper Burma described by Sir H. Collett and Mr. Hemsley as *B. diptera*, these authors having for the moment overlooked the fact that their name was preoccupied.

30/1. *Bauhinia tenuiflora* Watt ex Clarke in Journ. Linn. Soc. xxv. 18; cirrhose, pubescence thin ferrugineous, leaves 9-nerved not cleft to the middle, pedicels moderately long, calyx-limb very much shorter than the much elongated cylindric tube, petals sparsely pubescent externally.

Khasia Hills; Hooker and Thomson. Naga Hills; Watt 6915! Manipur; Clarke!


Very near *B. corymbosa* but with longer, less divided leaves and broader pods; also near *B. glauca* but with leaves less divided and calyx-tube very much longer.

30/2. *Bauhinia diptera* Coll. § Hems! Journ. Linn. Soc. xxviii. 53; cirrhose, glabrous, leaflets distinct, small, 3–4-nerved, pedicels long, calyx-limb 2–3-lobed, longer than the cylindric tube, petals glabrous exserted.

Burma; Shan hills, at Koni, Collett! Prazer! Ywanyen, Collett!

*Branchlets* slender glabrous; tendrils small few. *Leaves* very small and quite 2-lobed (as in § *Lysiphyllum*), leaflets sessile submembranous oval-elliptic 7½–1 in. long, rounded at both ends, rather pale beneath; stipules minute early deciduous. *Flowers* in lax subcorymbose 5–11-fld. racemes, lower pedicels 7½ in. long, *Calyx-lobes* 3½ in. long, apiculate, tube 25 in. long. *Petals* unequal narrowly spatulate, margins wavy, longest 7½ in. long. *Stamens* 3 fertile, filaments far exceeding the corolla-lobes, 1½ in. long. *Ovary* long-stalked, about 12-ovuled, glabrous, style 5 in. long, stigma small. *Pod* 2½ in. long, linear-oblong, 5 in. wide, glabrous, slightly transversely impressed between the seeds, narrowed to an acute beak; stipe 3 in.

A very distinct species not nearly related to any hitherto known form. The name B. diptera is, as has already been explained under B. glabrifolia, preoccupied. Owing, however, to its inapplicability to the more usual form of the species it was intended to designate, the original name B. diptera Bl. should be allowed to lapse. In the event, however, of our bibliographers being permitted to substitute the name B. diptera Bl. for the name B. glabrifolia Bak., it will be necessary to use, instead of B. diptera Coll. & Hemsl., the name B. Coletti for the present plant.


The only point wherein the F. B. I. description is inapplicable to the plant described and figured by Roxburgh and issued by Wallich as B. ferruginea and again described by Bentham as Phanera ferruginea, is as regards the length of the pedicels; these do not, even in fruit, reach half-an-inch in length. Korthal's plant is certainly not Wallich's and Roxburgh's and therefore is not B. ferruginea Roxb. As it happens, it forms the basis of Phanera excelsa Miq., which is quoted as a synonym of B. ferruginea var. excelsa and is thus apparently accounted for in two places in the F. B. I. As a matter of fact, however, the specimens from Malacca that form the basis of var. excelsa do not belong to Phanera excelsa Miq. (B. excelsa Bl.—B. ferruginea Korth. not Roxb.) Nor do they belong to B. ferruginea; they have petals almost glabrous externally and have long pedicels, and are the same as Phanera sumatrana Miq. which, in turn, is identical with B. semibijda Roxb.

Bauhinia Pottsii G. Don, by its description cannot possibly be B. ferruginea because of its having pubescent pods. There is nothing in Don's short description to separate it from B. mollissima Wall. (B. elongata Korth.) and it should be referred as a synonym to that species.

31/1. Bauhinia Ridleyi Prain, Journ. As. Soc. Beng. lxvi. 2. 185; cirrhose, pubescence very densely silky-ferrugineous, leaves 9–11-nerved cleft one-third down, pedicels very short, calyx-limb 5-cleft rather exceeding the ampullaeform tube, petals not exserted densely silky.

Perak; Scortechini! Kunstler! Penang; Ridley! Curtis! Johore; King and Hallett!


Near B. ferruginea but with denser pubescence and distinctly pubescent leaves; the very dense corymbs and short petals at once distinguish it from the other members of its group.

31/2. Bauhinia Griffithiana Prain, Journ. As. Soc. Beng. lxvi. 2. 183; cirrhose, pubescence bright-ferrugineous, leaves 9–11-nerved cleft one-third down, stipules large orbicular persistent, calyx-limb 5-cleft rather exceeding the ampullaeform tube, petals exserted densely silky.

MALACCA; Griffith! Maingay! Hervey! Derry! Holmberg! PERAK; Scortechnini! PARANG; Ridley 2606!

Very nearly related to the true B. ferruginea and differing mainly in having large orbicular persistent stipules '75 in. across, in having yellow instead of white flowers, and in having inflated instead of uniform fertile filaments.

31/3. Bauhinia Hulлетти Prain, Journ. As. Soc. Beng. lxvi. 2. 183; cirrhose, pubescence bright ferrugineous, leaves 9–11-nerved cleft one-third down, stipules large, persistent, pedicels long, calyx-limb 5-cleft rather exceeding the ampullaeform tube, petals far exserted densely silky.

PELANG; Curtis! Scott! Kunstler! PERAK; Wray! MALACCA; Holmberg!

Very nearly related to B. Griffithiana and with similar stipules which are however smaller (only 5 in. across) and hirsute; the leaves are also persistently pubescent and the corymbs are few-fld., the flowers are long-pedicelled (the pedicels 1·25–1·5 in. long), the calyx and petals rose-red.


BURMA; Pegu, Kurz 1680! Tenasserim, Gallaty! NICOBARS; Great Nicobar, Jelunk! DISTRIB. Sumatra.

A slender shrubby climber, tendrils circinate glabrous. Leaves rigidly subcoriaceous, cordate, 2·5–4 in. long, lobes subacute, glabrous above, persistently puberulous to pubescent beneath; stipules persistent rather large. Flowers in terminal corymbs, 3–4 in. long, lax-fld., pedicels 1·5–1·75 in. long; bracts lanceolate deciduous. Calyx-tube 4 in. long, sepals narrowly lanceolate coriaceous, distinct. Petals oblanceolate subacute clawed. Stamens 3. Ovary sparsely puberulous, style long slender glabrous, stigma rather small. Pod thin, oblong, glabrous, woody. Seeds 2.

Resembles B. nervosa in foliage and stipules and B. semibifida in petals.


Leaves thin glabrous beneath, ovary glabrous, pod short oval 1–2-seeded, glabrous; calyx-tube very short, limb 5-fld.

36/1. Bauhinia Championii Benth., Fl. Hong-Kong. 99; leaves thin adpressed-pubescent beneath; ovary pubescent, pod oblong, 3–5-seeded, glabrescent; calyx-tube very short, limb 5-fld.

SIKKIM; Tista Valley, common, King! Kurz! etc. ASSAM; Brahma-kund, Musters! DISTRIB. China.
A woody climber, branchlets hoary-pubescent. Leaves broadly cordate, 5-7-nerved, 2½-4 in. long, 2-3 in. broad, upper leaves often entire, the others divided at the tip into two broad obtuse or deltoid lobes. Racemes paniculate at end of branches, rarely simple; bracts minute linear; pedicels 35 in. Calyx-tube very short, lobes linear-lanceolate, 24 in. long. Petals white similar ob lanceolate, 25 in. long, sparsely pubescent externally. Stamens 3 fertile, 4 in. long. Pod 3 in. long, 1 in. wide; stipe 2 in. long.

Mr. Bentham refers this to § Phanera, but its floral structure is exactly that of § Lasiobema; indeed, it is only the presence of the very different pods that makes its specific separation from B. (Lasiobema) anguina possible.

36/2. BAUHINIA CURTISII Prain, Journ. As. Soc. Beng. lxvi. 2. 195; leaves thin glabrous beneath; ovary glabrous; pod oblong, 3-5-seeded, glabrous, calyx-tube very short, limb 5-fid.

KEPAL; Curtis 1682! 2619!

A woody climber, branchlets very faintly puberulous. Leaves ovate-oblong, 5-7-nerved, 2½-4 in. long, 2-2½ in. wide, upper sometimes entire, the others divided at the tip into two short slightly diverging deltoid lobes. Racemes simple or paniculate at end of branches, bracts minute linear; pedicels 5 in. Calyx-tube very short, lobes ovate-lanceolate, 15 in. long. Petals white similar spatulate, clawed, glabrous, 25 in. long. Stamens 3 fertile, 35 in. long. Pod 2½ in. long, 75 in. wide; stipe 1 in. long.

Very near B. Championii Benth., but with longer pedicels, smaller buds, shorter calyx-lobes, and much shorter stipe to ovary and pod. The ovary too is quite glabrous as are the leaves beneath.

36/3. BAUHINIA STRYCHNOIDEA Prain, Journ. As. Soc. Beng. lxvi. 2. 195; leaves thickly coriaceous quite glabrous polished shining; pod broadly oblong 2-4-seeded, densely pubescent, calyx-tube very short, limb large campanulate entire truncate with 5 minute projections on margin.

PERAK; Scortechini! Kunstler! Selangor; Kwala Lampar, Kelsall!

A woody climber 50-60 feet long; branches glabrous. Leaves ovate-acute, 5-nerved, the inner pair almost as strong as the pinnately branching midrib and often partly conjoined with its base; 3½ in. long, 2 in. wide. Racemes simple or paniculate at end of branches, bracts minute linear, pedicels 75 in. Calyx-tube very short, limb entire wide-campanulate, 2 in. long and broad. Petals red, the upper ovate slightly longer than the rest, the others spatulate obtuse, 35 in. long, all quite glabrous externally, slightly puberulous on midrib within. Stamens 3 fertile not exerted. Pod 4-6 in. long, 2 in. wide, densely pubescent externally. • Seeds ovate, compressed, 1 in. long; 6 in. wide, dark-brown.

This very remarkable species at first sight seems to deserve being treated as the type of a new section because of its curiously veined leaves, which have the nervation of a Strychnos rather than of a Bauhinia; its cupular entire calyx-limb is also quite different from that of any other Indian species of the genus. But the facies is so completely that of a thick-leaved Lasiobema that it is no doubt better to incorporate it in that section. Mr. Bentham in the Genera Plantarum has restricted to Lasiobema a solitary species, B. anguina; the species B. Championii is, however, so obviously a member of the same group, in spite of its longer pods, that
the writer without hesitation has widened the limits of the section so as to admit it. When B. Championii and the allied B. Curtisi are included there is nothing in the pods of B. strychnoidea to warrant its exclusion; the only differential character left is the entire calyx-limb, and that taken by itself seems barely sufficient to warrant the establishment of a new section.

37. Bauhinia monandra Kurz.

The oldest name for this species is B. Richardiana Wall, in Voigt. Hort. Suburb. 253 (1845) not of DC. The original B. Richardiana DC. (Prodr. ii. 517) from Guiana, which Dr. Wallich seems for the moment to have overlooked, has cordate entire leaves and therefore, though it is in other respects a doubtful species, cannot be this plant.

That this species is not (as Mr. Kurz and Mr. Baker have treated it) a native of India is beyond dispute; what its original country may be is, however, somewhat doubtful. The history of its introduction may be best given by transcribing verbatim the passage in Dr. Wallich's MSS. Catalogue of the Calcutta Garden (Vol. i, p. 542), whence Voigt obtained the name. This passage runs as follows:—

"Bauhinia Richardiana Wall. 'A tree.' No doubt a distinct species, with "large round-cordate two-lobed leaves smooth except a little pubescence on the nerves "and veins on the glaucous under surface, opaque above; 13-nerved; petioles "shortish; stipules lanceolate very small, as well as the young parts a little villous. "It is now (see date) in flower and a most beautiful plant. It is of the section "Casparea; large ovate, pointed, shortish but distinctly clawed pale-pink petals with "crispate margins and with very conspicuous darker-coloured dots; lip crimson and "spotted within, oblong and slightly three-lobed, channelled and pubescent at the "margins below."

"Madagascar; Mons. Richard, 16 May, 1840; germinated, 21st, same month; "August 22, 1841, it flowered; pod ripened, 6th December, 1841."

The time between receipt of seed and flowering seems remarkably short!

The subsequent history of the species in India may be briefly given. Specimens in the Calcutta Herbarium show that about 1855 it had become confused in the Royal Botanic Garden with Bauhinia (Phanera) variegata; and in the Serampore garden (though not in the Calcutta one) with Bauhinia aurantiaca, a species with 6 fertile stamens, which was first sent to India from the western shores of Madagascar by M. Gereve in 1833 and was again sent along with our present plant by M. Richard on 16th May, 1840, on that occasion flowering on the 22nd March, 1841.

It had also found its way to Southern and to Western India; the gardeners in Madras confuse it to this day with B. variegata; those of Bombay had examined it more closely, for specimens from the herbaria of Stocks and of Dalzell are named B. latifolia. They have thus placed it in the true section, since B. latifolia Cav. is a Casparea; an examination of Cavanille's original figure shows, however, that this is quite distinct from his plant.

At present the species seems to have altogether disappeared from gardens in Bengal, but it lingers in Martaban; doubtless, judging from Kurz's two quoted names (Shway-doh, and Shway-ton), in temple gardens. It has also been recently sent from Poona and from Chittagong.

It would be interesting to learn if the species be really a native of Madagascar or if it had been originally introduced to that island from elsewhere. The writer has failed to trace it in any work dealing either with African or American botany: one thing only is quite certain—it is not a native of India or of South-Easter n Asia at all.
122. PARKIA R. BR.


Penang; cult., Curtis! Perak; Thaiping, Scortechini! Larut, Kunstler! Distrib. Sumatra; Java, cult. (Hasskari!)

A tree 80–100 feet high. Leaf-rachis 8–10 in. long, pubescent; pinnae sub- alternate, 10–16 pairs, leaflets 50–70, 25 in. long. '1 in. wide, the secondary veins as well as the midrib distinct beneath. Peduncle 16–20 in., flowers in cylindric glabrous; lobes pilose. Pod 18–20 in. long, 2–2.5 in. wide, narrowed into a stalk 2–5 in. long.

A very distinct species; the Pete or Pethok of the Malays.

125. MIMOSA LINN.*

1. MIMOSA PUDICA Linn.

In this species, the stamens are always 4 in number, i.e. equal to and not, as the F. B. I. implies, twice the number of the petals.

126. ACROCARPUS W. & A.

1. ACROCARPUS FRAXINIFOLIUS Wight.

Add to localities of F. B. I. — Chittagong; Lister! Pegu; Kurz!

127. ACACIA WILLD.

2. ACACIA PLANIFRONS W. & A.

To this Mr. Baker has reduced A. Roxburghii W. & A. Wight and Arnott based their species on Roxburgh's figure of the tree he took to be A. eburnea, which certainly is not that species. Unless Dr. Roxburgh made a mistake in his drawing, a thing that is highly improbable, the F. B. I. reduction is clearly impossible, for A. planifrons has a terete pod and A. Roxburghii has a flat one. There are, as a matter of fact, two species that have been frequently reported from Southern India to the Calcutta Herbarium under the name A. planifrons; these are certainly exceedingly similar, still they can be separated by their leaves alone. The first, which has terete pods, has leaflets exactly like those of the types of A. planifrons W. & A. The second, which has leaflets exactly like those of Roxburgh's figure of "Mimosa eburnea," has never yet been reported in fruit; till its pods are available, the difficulty as regards these two forms cannot be satisfactorily settled.

6b. ACACIA KINGII Prain; pinnae short, crowded, 18–20, leaflets 22–28, heads axillary; pedicels with a whorl of bractlets.

SHAN HILLS; King's Collector!

* Mimosa niamaensis Roxb. is given in the Index Kewensis as an altogether doubtful synonym. By a lapsus calami the species is said to be African; it was from America, Roxburgh states, that the plant was received (Hort. Beng. 41) and the plant cultivated under this name in Hort. Calcutta has always been a form, hardly a variety, of Desmanthus brachylobus (Mimosa brachyloba), which was also received by Roxburgh from that continent.
A tree 30–40 feet high, with slender black slightly zig-zag glabrescent branches. _Spines_ stipular only, very small and weak, always under 2 in. long. _Leaf-rachis_ sparsely pubescent, 2–3 in. long with a large flat petiolar gland just below the first pair of pinnae; pinnae 1 in. long, leaflets ovate-oblong crowded, 2 in. long, 1 in. across, subcoriaceous, _Peduncles_ crowded in the axils of full grown leaves, 75 in. long, with ring of bracts above the middle. _Heads_ 4 in. in diam. _Calyx_ campanulate minute. _Corolla_ thrice the calyx, teeth short subacute. _Staminal-tube_ much shorter than that of corolla.

This species and the next are somewhat unlike any of the other Indian _Acacias_. The flower-head are exactly those of species of _Acacia_ of the _Parnesiana_ or the _arabica_ groups, but the connate filaments suggest that they are not _Acacias_. They do not bear much resemblance to any of the _Albizias_ or _Pithecolobiums_; in foliage, however, both plants recall some of the American species of _Calliandra_. The amount of union of filaments is not in the present plant very great, the staminal tube being hardly longer than the stipe of the ovary and, had there been no other to deal with, the writer would have felt but few misgivings about referring it to _Acacia_.

6c. **Acacia ? inopinata** _Prain_; pinnae long, distant, 12–14, leaflets 20–22, heads in lax panicles; pedicels with a whorl of bracts.

**Shan Hills; King’s Collector!**

A tree? with slender black straight glabrous branches. _Spines_ 0. _Leaf-rachis_ glabrous, 8–10 in. long, with two large flat petiolar glands below the bases of the 2 distal pairs of pinnae; pinnae 2 in. long; leaflets linear-oblong, 35 in. long, 15 in. wide, subcoriaceous. _Peduncles_ in fascicles of 3–4, on the branches of a lax, twice branching terminal panicle 1–1 1/2 feet long, secondary branches 6–8 in. long, tertiary branches 3 in. long, pedicels 6 in. long, slender, puberulous, with a ring of bracts just below the middle. _Heads_ 4 in. in diam. _Calyx_ campanulate minute. _Corolla_ thrice the calyx-teeth, short subacute. _Staminal tube_ almost equalling that of corolla.

A remarkable plant, evidently congeneric with and nearly related to the last species, but at the same time very distinct by reason of its staminal tube, formed by the more or less regular union of the filaments throughout their lower two-thirds to three-fourths. The writer was at first inclined to treat these two plants tentatively as _Calliandras_ and indeed issued specimens as such. His friends on the Kew staff, however, suggest that both should be treated as _Acacias_; in deference to their opinion this course is here adopted; it will be noted that the location of the present plant in _Acacia_ violates the one character on which the existence, not merely of the genus _Acacia_, but of the tribe _Acacieae_ depends.

7. **Acacia leucophloea** _Willd._

Under var. _microcephala_ (Grah.), Mr. Baker places both _A. microcephala_ Wall. Cat. 5263 and _A. densa_ Wall. Cat. 5262. The last mentioned is a form that is of frequent occurrence in the Shan Hills, it has fruits exactly like typical _A. leucophloea_ and the writer agrees with Mr. Baker in reducing it to Willdenow’s species. _A. microcephala_ Grah., however, has very different pods, never under 5 in. long or 5 in. wide and always glabrous; it is therefore, in the writer’s opinion, not only necessary to distinguish it from _A. leucophloea_ var. _densa_, but preferable to consider it, as Graham did, a distinct species.

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Why Kurz should be quoted as the authority for this species is not clear; he himself (see For. Flor. Brit. Burm. i. 421) attributes the authorship to Buchanan-Hamilton. The Index Kewensis gives the citation in such a manner as to make it appear that A. Suma Ham. and A. Suma Kurz are different plants; it permits the latter to stand and reduces the former to A. Sundra. However, the citation in the Index shows that it is "A. Sundra Wall.," not A. Sundra DC. to which A. Suma Ham. is equivalent, and as it immediately afterwards reduces "A Sundra Wall." to A. Suma, the Index corrects itself. Obviously, however, the authority to be cited is Hamilton, not Kurz.

Mr. Baker's diagnosis of the species is very effective and settles once for all the identity and the specific rank of "Suma" as opposed to what may be termed the "Khairs."

9. Acacia Catechu Willd.

10. Acacia Sundra DC.

There has always been some difficulty in deciding how many different forms of Kutch or Khair occur in India. Wight and Arnott seem to recognise only two, A. Catechu and A. Sundra. But their A. Catechu is A. Suma (the true A. Catechu apparently does not occur in South India at all, and there are certainly no specimens of it in Wight's herbarium); Suma is not a Khair, so that in reality Wight and Arnott only deal with one Khair. A. Suma, as Mr. Baker has clearly shown, cannot be confused with any of the "Khairs;" it has white bark and white flowers, and has petals hardly longer than the downy calyx; it may then be once for all definitely separated from the others.

Of these others Roxburgh recognised three, A. Catechu, A. catechuoides, and A. Sundra; Baker, reducing A. catechuoides to A. Catechu and retaining A. Sundra as a species, recognises two; Kurz (For. Flor. Brit. Burm. i. 422), recognises but one species, A. Catechu, though he divides it into two varieties which he terms Catechu proper and Sundra; these varieties correspond exactly to the two species given by Mr. Baker, for under Catechu proper Kurz mixes the A. Catechu and the A. catechuoides of Roxburgh. That Roxburgh was right is, however, very apparent when large suites of specimens, such as are preserved in the Calcutta Herbarium, are available for study. There are three equally distinct and very easily separable forms, exactly as Roxburgh pointed out, and though the writer, following Kurz, is only able to see in them different forms of one species, or at most three species of secondary rank, he is quite satisfied that all three are entitled to equal consideration.

The diagnosis of these forms is as follows:

Bark white, calyx downy, not much shorter than petals ... ... ... ... 1. A. Suma Ham.

Bark brown, calyx less than half as long as petals ... ... ... ... 2. A. Catechu Willd.; Kurz.

a. Calyx, petals and rachis covered with spreading hairs (=A. Catechu Willd).

b. Calyx and petals glabrous, rachis puberulous (=A. catechuoides Bth).

c. Calyx, petals and rachis all glabrous (=A. Sundra DC).
The distribution of the "Suma" and the three "Khairs" is as follows:—

Acacia Suma Ham.

South India; very common everywhere on the eastern side of the Peninsula from the Carnatic and Mysore to Orissa and Behar; (never reported as yet from Central India, the Western Deccan, the Concan, Rajputana, or the Panjab.) Assam; very common in the Brahmaputra Valley and also in Silhet; (never recorded from Burma.)

Acacia Catechu Willd.

Northern Punjab; Hooshiarpur, Aitchison! North West Himalaya, up to 3,000 feet; from Hazara, Stewart 400 bis! to Kangra, Clarke 24841! Sirmoor, Vicary! Simla, Griffith! Garhwal, at Srinagar, Thonson! on the Mussoorie range, King! Central India; Sangor, Vicary! Goona, King! Gwalior, Maries! Behar; common; Hooker! Clarke 17311! Kurz! Gamble 8887! Prain! Ganjam! Gamble, 13810! 13983! Burma; Pegu, very rare, Kurz! (This has never been reported from Rajputana, from the Concan, or from the Deccan; on the Eastern side of the Peninsula it has never been found south of Ganjam; it has never been found in the Eastern Himalaya or in Assam; in Burma it has only been found in Pegu; Kurz notes its name there as "Sha." )

Acacia catechuoides Benth.

Bengal; at Morung and Bangka, near Monghir, Hamilton (in Wall. Cat. 5228 B)! Pabna, among village bushes, Kurz! Sikkim Terai; Hooker! Gamble 4084! Clarke 26522! Heathwood 28! Assam; common; Griffith 1918! Jenkins! Masters! Simons! Burma; Irrawaday Valley, Wallich 5228 D! Pegu, Byre! Kurz 1749! 2580! 2581! Amarapura, King's Collector! (Though apparently quite common in Pegu and Prome this has neither been collected in the Shan Hills nor in Upper Burma to the north of Ava). Tenasserim; Tavoy, Gomez (Wall. Cat. 5228E); (this last is only in fruit and it is a little doubtful if it be A. catechuoides).

Acacia Sundra DC.

South India; very common from Coimbatore northwards to the Deccan, equally common in Kanara and the Concan. Kattiwar; at Rajkote, McNaghten! Rajputana; Mt. Abu, King! Burma; Segain, Wallich! Mandalay, J. Anderson! Meiktila, Collett 854! Shan Hills, common. (This species in India has never been reported from Orissa, Central India, Behar or from any locality to the east of these areas; in Burma, where it recurs, it seems to be common to the north and east of Pegu and Prome, but has never been recorded from either of these districts.)

This record of distribution, which is based on an examination of over 100 gather-
ings, shows that the 3 forms of "Khair" hardly overlap but appear rather to be representative one of another in tolerably well-defined areas. The fact that A. Sundra should fill the area to the south-west of that occupied by A. Catechu and should again recur in an indistinguishable form to the east of that occupied by A. catechuoides is perhaps as good a proof as any that all three are but manifestations of one species. It is interesting to note that the area occupied by A. Suma crosses that occupied by this amplified A. Catechu almost at right angles, and that though it is in Mysore intimately associated with A. Sundra, in Orissa and Behar with A. Catechu proper, and in Assam with A. catechuoides, it nowhere shows the least tendency to pass into any of these forms. In this, the writer believes, we have a very strong confirmation of the justice of Mr. Baker's treatment as opposed to that of Dr. Wight.

12. Acacia Senegal Willd.

Add to localities of F. B. I.:—

Rajputana; very common everywhere, King! Brandis! Moir! Duthie! Panjab; at Rhotak, Bailey!

17. Acacia Intsia Willd.

The writer quite thinks with Mr. Baker that A. oxyphylla Grah. is only a variety of A. Intsia.

A. Caesia, however, the writer agrees with Wight and Arnott and with Kurz in keeping separate. The crowded leaflets, always hairy beneath, make it very easy to recognise A. Caesia, even in the herbarium, and apart from the fact that its general facies is quite different from that of A. Intsia and that no one dreams of confounding the two as they grow. But A. pseudo-Intsia, referred to A. Caesia in the F. B. I., is a very distinct species that, though resembling A. Caesia in externals, is in reality more nearly allied to A. pennata than it is either to A. Intsia or to A. Caesia.

18. Acacia pennata Willd.

1. Var. canescens seems certainly a distinct species, easily separated from A. pennata by its longer pedicels and its pale, differently shaped pods. Very nearly related to this is another form from Burma, like A. canescens Grah. in other respects but with rather larger leaflets and with much larger pods; they have, however, the slightly thickened sutures that are found in the pods of true A. canescens. This large fruited form must be known as A. pennata var. macrocarpa or A. canescens var. macrocarpa according to the view that is adopted regarding A. canescens.

Typical A. canescens is common in Burma and also occurs frequently in Western India from Canara to Travancore; it appears never to have been collected in India to the east of the Western Ghaunts.

2. Var. arrophula also appears to the writer to deserve specific rank. The stipular gland is, however, quite the same as in true A. pennata and there are some specimens regarding which it is not easy to decide in the herbarium whether they should be referred to var. typica or to var. arrophula. The most satisfactory diagnostic characters seem to be the pubescent rachis never prickly beneath (typical A. pennata) and the glabrous rachis prickly beneath (A. arrophula Don.), but sometimes the rachis in A. arrophula is pubescent and prickly, sometimes glabrous and unarmed. No one could possibly confound the two in the field.

3. Var. pluricapitata would also certainly be better considered a distinct
species. The petiolar gland is totally unlike that of typical A. pennata or that of A. arrophula.


ASSAM: Talap, Lakhimpur, G. Gammie 160! MANIPUR; Young Shong Khong, Watt 6266! BURMA; Hukung Valley, Griffith 1930! Poneshee, J. Anderson! Pegu, Yomah, Kurz 1744! (the last with rather larger leaflets and without bloom.)

A large woody climber, armed with recurved thorns, stems thick, the young branches almost always pruinose; leaves up to 10 in. long, petiole short with a very large gland 1 in. above the base; leaflets sessile, up to ‘5 in. long, blunt, glabrous or with ciliate margins; heads ‘5 in. across, ovary glabrous. Pod unknown.

A very distinct species; the Pegu specimen above mentioned has been named var. laevis by Mr. Kurz and seems deserving of varietal rank. The pods described by Mr. Kurz as those of his plant belong, however, as his specimens show, to the quite different plant which must be treated as var. macrocarpa of A. canescens Grah., (A. pennata var. canescens Baker.)

20. ACACIA PSEUDO-INTSIA Mig. Flor. Ind. Bat. i. 12; pinnae 12–16, leaflets 40–60 ligulate-oblong, rigidly subcoriaceous crowded, apex rounded not cusped, bracts large ovate-acute. Prain, Journ. As. Soc. Beng. lxvi. 2. 249.

VAR. typica; leaflets minutely adpressed-puberulous beneath.

SINGAPORE; Hullett 835! Ridley 3631! 6177! DISTRIB. Sumatra, Java.

VAR. ambigua Prain, loc. cit.; leaflets quite glabrous beneath.

ANDAMANS; very common.

Prickles numerous, short, straight or recurved. Branchlets and leaf-rachises faintly puberulous, the latter with a very large gland near base of petiole and with 2–3 similar but smaller glands between the bases of the distal pairs of pinnae. Pinnae 3–4 in. long; leaflets subcoriaceous ‘5 in. long, ‘15 in. wide, dark-green above, grey beneath, quite glabrous above, faintly adpressed-puberulous beneath in var. typica, glabrous beneath in var. ambigua. Peduncles 2–4-nate very rarely solitary, ‘5 in. long (in type) to ‘75 in. long (in var. ambigua), bracts large ovate-acute, puberulous or (var. ambigua) glabrous; heads yellow, ‘4 in. in diam. Corolla yellow. Pod not seen.

A distinct species, much resembling in externals A. Intsia and A. Cesia but easily distinguished from both by its much larger bracts.

128. ALBIZZIA DURAZZ.

Khasia Hills; 3–4000 feet, Mann 388! Naga Hills; Giesseliere!
Distrib. S. China (Henry 6203).

A tall tree without prickles. Leaves glabrous with large gland near base of petiole and another between bases of last pair of pinnae; pinnae 6–12 (rarely 4), leaflets short-stalked rigidly subcoriaceous, main-nerve parallel with and slightly nearer the upper margin, 1–1.5 in. long, glabrous. Heads many-fl., peduncles 1–3 in axils of upper leaves, slightly puberulous, 2–2.5 in. long. Calyx 15 in., faintly puberulous. Corolla yellowish, silky externally, teeth long lanceolate. Stamens pink. Pod strap-shaped, firm, dark-brown, 6 in. long, 1 in. wide, 6–10-seeded, with a stalk 35 in. long.

Nearest to A. Lebbek; the long stalked-pod is, however, alone sufficient to separate it.


Penang; Pulo Jungah, Curtis! Nicobars; common, Jelinek! King’s Collectors! Distrib. Malay Archipelago.

An unarmed tree 30–40 feet high. Leaves with glabrous rachis, with a large sessile gland near its base; pinnae 4–8, leaflets subsessile submembranous oblique, 75–125 in. long, pale-green glabrous above, glaucous faintly puberulous beneath. Heads few-fl., peduncles short slender, the longest 1.5 in., corymbose on branches 1–3 in. long which are themselves corymbose panicled. Calyx 1 in. long, hardly toothed, pubescent. Corolla white, twice the calyx, the teeth ovate lanceolate, uniformly densely silky outside. Stamens pink. Pod strap-shaped, firm, greenish-brown, dull, tapering to both ends, 6–7 in. long, 1 in. wide, 12–16-seeded.

2. Albizia pedicellata Baker.

Add to localities of F. B. I.—
Perak; common, Kunstler 4474! 7988! 10436! Penang; Curtis 1921! Singapore; Ridley 6297!


Burma; Pegu; Bookee ridges and on banks of Swa-choung, Kurz! no locality, Wallich! Distrib. Bangka.

An evergreen tree without prickles, 80–100 feet high. Leaves with puberulous rachis with a large gland far above the base; pinnae 14–28; leaflets sessile, subfalcate, membranous acut glabrous, ‘6 in. long, ‘2 in. wide, main nerve almost median. Heads many-flowered, peduncles puberulous 5–75 in. long, 2–4 together in axils of upper leaves. Calyx ‘1 in., rather shorter than the puberulous pedicels, teeth very short. Corolla twice the calyx, externally pubescent. Pod unknown.

Mr. Kurz adopted the unusual course of describing this species without having seen either flowers or fruit. There was, however, a flowering example of the same plant in the Calcutta Herbarium, collected by Dr. Wallich, perhaps in Burma.
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though the exact locality is not noted; this specimen Mr. Kurz seems to have overlooked. Dr. Wallich’s specimen shows that *A. elegans* is not at all nearly related, as Kurz suggests, to *A. stipulata*, but that its true affinity is with *A. pedicellata* Bak.


**Burma**; very common. **Distrib. Siam (Teysmann); Java.**

A medium-sized tree, 30–50 feet high. Leaf-rachis glabrous or pubescent, with a gland far above the base and 2 or more between bases of distal pinnae; pinnae 8–12; leaflets obliquely oblong, articulated on the rachis, coriaceous shining dark-green above, paler, not glaucous beneath, 35 in. long, 15 in. wide, the midrib parallel with the upper edge and shortly removed from it. Heads small few-flowered very numerous, arranged as in *A. odoratissima*. Calyx as in *A. odoratissima*. Corolla very narrowly tubular. Pod firm flexible smooth glossy, 6–8 in. long, 1 in. wide, 8–12-seeded.

This is certainly, as Mr. Baker points out, very nearly related to *A. odoratissima* but is quite distinct by reason of its more numerous small leaflets and its narrower corolla. The name is most unfortunate, for the species bears very little resemblance to *A. Lebbek*. Though quite common in Burma, Mr. Kurz did not collect it there, and the species mentioned under that name on Kurz’ authority in *F. B. I.* ii. 299 is the tree afterwards published as *A. elegans* Kurz.

4. **Albizzia procera** Benth.

**Var. elata** Bak. is not separable as a variety. It is distinguished by having smaller leaflets less oblique at the base than in the type. Leaves with leaflets of this shape are common in *A. procera* but they are not smaller than in typical *A. procera*. It is true that in Roxburgh’s original coloured drawing of “*Mimosa elata*” the leaflets are shown small, but then Roxburgh has himself written on this drawing:—“*Mimosa elata* considerably less than natural size.” A more serious objection to the recognition of a *var. elata*, as apart from *A. procera*, is the fact that leaves with leaflets of both kinds, and consequently that both “varieties,” may be collected from different parts of the same tree.

The chief necessity for pointing out the non-existence of *var. elata* is the fact that, from omitting to attend to Roxburgh’s MSS. note on the drawing, Mr. Kurz and others have taken *A. Millettii* to be Roxburgh’s *Mimosa elata*. The spurred pulvinus of *A. Millettii*, however, at once separates it from Roxburgh’s plant.

5b. **Albizzia gamblei** Prain; leaflets of distal pinnae 10–14 subacute or acute, heads panicled, calyx campanulate, shortly pedicelled, A. Lebbek Gamble, Trees, Shrubs, etc., of Darjeeling Dist., 33 not of Benth. A. procera C. B. Clarke, Journ. Linn. Soc. xxv. 18 not of Benth.

**Eastern Himalaya**; Sikkim, Gamble 161 ! 7486 ! 9661 ! Naga Hills; Kohima, C. B. Clarke 41480 !

A tree 50 feet high. Leaves 2-pinnate; pinnae 4–6 with a large gland 25 in. above base of main-rachis and with large projecting glands on each secondary rachis at the bases of the distal pairs of leaflets; leaflets ovate-lanceolate 10–14 on the distal,
6–8 on the proximal pinnæ, in all cases decreasing downwards, apex acute, base cuneate from the middle, 75–2·25 in. long, 4–1 in. wide, pale-green above, glaucous beneath, sparsely adpressed-puberulous on both surfaces; stipules minute. Ultimate branches of panicle umbellate. Calyx: 1 in. long, puberulous externally, teeth minute, pedicels 0·05 in. Corolla twice the calyx, teeth lanceolate. Pod 6–8 in. long, 1–1·25 in. wide, thin, rather firm, strap-shaped, the base narrow-cuneate, the tip blunt; pale straw-coloured, very faintly reticulate; seeds 8–10.

This extremely distinct species bears no very close affinity to either of the species to which it has been referred. It agrees with A. Lebbek for which Mr. Gamble has taken it, in colour of pod and in having pedicelled flowers, but its leaves and leaflets are totally different. With A. procera, to which Mr. Clarke has referred it, it agrees in having the secondary rachises glandular as well as the main-rachis but the leaflets are quite different in shape and in colour, while its flowers and its pods in no way resemble those of A. procera.

The nearest Indian ally of the species is A. lucida from which, however, it differs markedly in size of leaves and leaflets and in having shortly pedicelled florets. Its nearest ally in the genus is A. tomentella Miq. (Flor. Ind. Bat. i. 20) which has leaflets similar in shape, size and disposition, but which differs in having the leaflets densely pubescent beneath and not glaucous, in having several glands (instead of one only) on the secondary rachises, and in having a broader, brown pod with a very different reticulation.


This species must be deleted. When Mr. Kurz published it as an Albizia he was treating Pithecolobium, to which the tree really belongs, as a section of Albizia. The true name of the species is Pithecolobium glomeriflorum Kurz (For. Flor. Brit. Burm. i. 430).


This species must also be deleted. There has always been some doubt as to the occurrence of this tree in India. In the Flora of British India two varieties are indicated, viz., typical Julibrissin said to extend from Hazara to Sikkim and var. mollis (Acacia mollis Wall.; Albizzia mollis Boiv.) extending from Simla to Nepal.

There seems, however, to be no such thing as A. Julibrissin in India, in a wild state, and the writer doubts if it be even cultivated. Certainly no one has ever sent specimens of A. Julibrissin to Calcutta; all the specimens received with this name prove on examination to be either A. mollis or, much more frequently, misidentified A. stipulata.


This is quite entitled to specific rank. Add to localities:—

Assam; Simons! Manipur; Watt!

Though recurring again to the east of the Brahmaputra without having been reported from anywhere between Nepal and the Assam Range, the tree shows no more tendency to resemble specimens of A. Julibrissin from China and Japan than does the North-West Himalayan form to resemble specimens of A. Julibrissin from the Oriental region.
8. Albizzia stipulata Boiv.
Add to localities of F. B. I.:—
Andamans; E. H. Man! Nicobars; Kurz!

Two varieties may be easily distinguished in the field, viz., var. typica with large stipules, and var. Smithiana (Mimosa Smithiana Roxb.) with small stipules. They cannot easily be separated in the herbarium as the stipules are somewhat deciduous in both; as they grow the two trees are wonderfully unlike and it would not be a matter for surprise to find that Roxburgh was justified in separating them. The typical A. stipulata is well known as the Sao in Assam and in Sikkim.

Add to localities of F. B. I.:—
Kedah; Curtis! Penang; Curtis! Kunstler! Perak; Scortechini!

This species is perhaps most easily recognised by the pulvinus enlarging into a recurved hook just below the leaf-base; it is always a climber.

Another species which has a similarly enlarged pulvinus is the Chinese Albizzia Millettii Bth. the oldest name for which is Mimosa corniculata Lour. (Fl. Cochin-Chin. 800). Why it deserves our attention here is because of its having been introduced to India and of its having been long cultivated in gardens under the name “Acacia Careyana Hort.” Mr. Kurz in a manuscript note in the Calcutta Herbarium, by way of criticism of the F. B. I., has expressed the opinion that Acacia Careyana is the true “Mimosa elata” of Roxburgh. This is not the case; Roxburgh has left a coloured drawing of his M. elata which shows that his tree does not have the pulvinus developed into a spur. Moreover Roxburgh has with his own hand written on the drawing “Mimosa elata considerably less than natural size”; consequently, the leaflets of Acacia Careyana, which are the size of those in the drawing, are considerably less than those of Mimosa elata. As has already been explained under A. procera, the writer is not only convinced that Mr. Baker is right in referring Mimosa elata to Albizzia procera, but is strongly of opinion that there is no variety “elata” really distinguishable from A. procera proper, the leaflets are not smaller in the variety than in the type and both kinds of leaflets (consequently both “varieties”) can be collected from the same tree.

A. Millettii has been collected in Tonkin by Balansa (nn. 1283 and 1290, both issued as A. procera) and recurs in Borneo whence it has been sent by Haviland, (nn. 57 and 2809).

Mr. Kurz has described in the Society’s Journal xlv. 2. 299 and again in For. Flor. Brit. Burm. i. 428 a Siamese tree under the name Albizzia Teysmanni. This has alternate leaflets and has no glands on the rachis and does not bear much resemblance to any Albizzia. Most probably it belongs to the suborder Caesalpinieae; his only specimen is in such a condition that Kurz was not justified even in suggesting a genus for it.

131. Pithecolobium Mart.


5. Pithecolobium affine Bak.
Add to localities of F. B. I.:—Burma; Hills east of Tonghoo, Brandis! Perak; Kunstler! Singapore; Ridley! Distrib. Borneo.

J. ii. 65
The pod is given as ¼ in. wide in the F. B. I. This is probably a misprint for 1½ in. wide which is about the true size; Bentham in originally describing the pod states that it is as large as that of *P. fasciculatum*, which is about 1¼—1½ in. across.


Add to synonyms of *F. B. I.*:—Albizzia splendens Miq. *Flor. Ind.* Bat. Suppl. 280. Add:—Distrib. Sumatra (Teysmann 4228!)

Mr. Kurz has already pointed out (Journ. As. Soc. Beng. xlv. 2. 129) that the species described by Mr. Bentham as *Pithecolobium confertum* in 1874, had been described by Dr. Miquel as *Albizzia splendens* 14 years before. It is therefore probable that Mr. Bentham never saw Dr. Miquel’s plant, the identity of which with *P. confertum* is undoubted. But as Miquel drew up his description from leaf specimens only, it seems neither to be necessary nor just to propose, according to what are said to be the essential rules of bibliography, to rename the species *Pithecolobium splendens*.


Nicobars; Nancowry, Jelinek; Kamorta, Kurz!


The Nicobarese name is “Kawas.” Mr. Kurz does not seem to have seen a specimen of *P. bubalimum* when he referred this tree to that species, or when he referred to that species *P. oppositum* Miq. This is at once distinguished from *P. bubalimum* by its different fruits, and from *P. oppositum* by its leaf-rachises being glabrous not puberulous and by its pinnae being 1-jugate not 2-jugate.


Add to localities of *F. B. I.*:—Perak, very common. Singapore; T. Anderson! Kurz! Ridley! Distrib. Sumatra (jide Miquel); Borneo.

*P. oppositum* Miq. is very near this. Its leaflets are not distinguishable but it differs in having puberulous petiolules and 2-jugate pinnae, so that it is to be hoped that it is truly specifically separable. Should it, however, prove to be identical with *P. microcarpum* then Miquel’s, though the prior name, surely ought not to be used, since that author described leaf-specimens only.

It is not absolutely certain that *P. fasciculatum* Benth. is the same as *P. ellipticum* Hassk., though it is probable that the two are one species. If this be so, however, it is preferable, even then, to use Hasskarl's name because Bentham's description does not so well accord with the characters of the plant and because Hasskarl's name has the advantage of preserving the oldest specific epithet.

By a *lapus calani* the *Index Kewensis* gives *Inga elliptica* Bl. as the name, and *Pithecolobium ellipticum* Hassk. as a synonym for this species; the reverse is the actual state of affairs.

Mr. Kurz identifies with this a species issued from Buitenzorg as *Pithecolobium macrophyllum* Teysm. & Binnend., of which Kurz's notice appears to be the earliest mention. The identification proposed cannot, however, be sustained; though the leaves of *P. macrophyllum* resemble those of *P. fasciculatum*, the pods are altogether different and are deeply lobed as in *P. lobatum*. As Mr. Kurz's mention dates from 1876 and as an American *P. macrophyllum* Spruce, was published in 1875, it is necessary to rename Teysmann's plant *P. Teysmannii*.

10. **Pithecolobium lobatum** Benth.


Add to localities:—*Penang*; *common. Perak*; *common. Singapore*;

Kunstler! Hullett!

It is not quite clear that *Mimosa Kaeringa* Roxb. and *M. Djiringa* Roxb. are the same. Roxburgh describes the former as having seeds enveloped in an edible pulp; Jack says the latter has seeds without arillus; Koorders and Valeton say the seeds themselves are eaten.


Being a *Pithecolobium* and not an *Albizia* this species must be transferred to the present position.

10/3. **Pithecolobium Kunstleri** Prain, *Journ. As. Soc. Beng.* ixvi. 2. 271; branchlets slightly pubescent, pinnae 2–4, leaflets 6, leaves with glands on the rachis below the bases of pinnae and leaflets, calyx tubular, pod not lobed.

Perak; Kunstler! Scortechini! Johore; Lake & Kelsall! Distrib. Bornico.

A low spreading tree with stem 8–12 in. thick; bark brown. *Leaflets palesish-green, glabrous above, puberulous beneath, ovate with rounded bases and caudate-acuminate tips, distal 3–4½ in. long, 1–2 in. wide; lowest 1–2 in. long, 5–1 in. wide; rachis of terminal pinnae 4 in. long, of small basal pair, when present, ♂ in. long only. Heads 4–8-fld., ♂–75 in. wide, pedicels short puberulous, arranged in lax terminal panicles. *Calyx* with spathulate pubescent bracteole, tubular, densely pubescent, 15 in. long, teeth short triangular. *Corolla* white, 5 in. long, densely silky externally, tube narrowly funnel-shaped, teeth lanceolate 12 in. long. *Pod* with a puberulous stipe 75 in. long, spirally twisted, dehiscent along lower suture, 8–10 in.
long. 6 in. wide; valves thinly coriaceous puberulous, not sinuate between the 8-10 ovate seeds which have long axes parallel with sutures, 7 in. long, 4 in. wide, compressed; testa thin crustaceous.

A very distinct species, nearly related to *P. bigeminum* Mart., but with much larger flowers and with a pod that differs markedly in being long stalked.

**Addenda.**

**24. Caragana Lamk.**


When arranging the *Caraganas* of the Calcutta Herbarium the writer unfortunately overlooked the fact that his friend Mr. Hemsley had already detected Dr. Aitchison's misidentification of this plant with *C. ambigua* and had published a description and figure of it under the above name, which must therefore replace the name *Caragana Aitcliisoni*, used on page 372.

**75. Pachyrhizus Rich.**

**Pachyrhizus angulatus Rich.**

Professor Oliver has recently given an excellent figure and description of this well-known plant (*Hook. Icon. Plant.* t. 1842). In the same work (t. 1843) is also given a figure and description of the S. American and W. Indian *P. tuberosus* Lamk., which is closely related to *P. angulatus* and is best distinguished by its almost entire leaflets and its larger broader pods. It has recently been introduced to Ceylon; its pods make an excellent vegetable; its seeds are poisonous.

*P. tuberosus* is related to *P. angulatus* exactly as *Phaseolus Mungo* is to *P. radiatus* and as *Dolichos lignosus* is to *D. Lablab*.

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**Noviciæ Indicæ XVI. More additional species of Labiatae.—By D. Prain.**

[Received May 26th; Read June 2nd, 1897.]

Since the writer presented descriptions of some additional species of this natural order to the Society, six and a half years ago, a few others have come to light that are additions to the Indian flora; descriptions of these, drawn up after the style of the *Flora of British India* are accordingly offered in the hope that they may be of use to members who use that work in the field.

**12. Pogostemon Desf.**


Add to localities of *F. B. I.;—Andamans; common, King’s Collectors!*

Granting that Pelletier's plant is specifically the same as *P. Heyneanus* Benth., which is what is contended in the F. R. I. iv. 633, then Bentham's name, dating as it does from 1830, cannot very well be supplanted by that of Pelletier which only dates from 1845. It may well be that the Patchouli plant, *P. Patchouli* Pelletier, is no more than a cultivated state of *P. Heyneanus*; the latter, however, is a common wild species without the Patchouli smell and with somewhat different leaves. The Patchouli is by no means a "common" garden plant in India; where its cultivation is attended to, it is said to be carefully grown along with *Piper Betle*. This cultivation is apparently confined to the Indian Peninsula; the plant flowers freely and profusely.

Var. *suavis* Hook. fil. This, which is *Pogostemon Patchouli* of Sir W. Hooker as opposed to that of M. Pelletier, is also the *Pogostemon suavis* of Tenore; it has, as Sir Joseph Hooker points out, a close affinity with *P. parviflorus*,—a wild plant that does not have the Patchouli smell. It bears in fact to *P. parviflorus* exactly the relationship that *P. Patchouli* bears to *P. Heyneanus*, and unless *P. Heyneanus* and *P. parviflorus* be themselves no more than forms of one species, a view in favour of which something might be said, it seems for the present better to keep *P. suavis* specifically apart from *P. Patchouli*. The writer, however, cannot find any character to separate *P. suavis* Ten. (*P. Patchouli Hook. not of Pelletier*) from *P. Cablin Benth.*, of the Philippines.

The *Flora of British India* is careful to exclude from Sir William Hooker's *P. Patchouli* the citation *Pucha-pat* of Wallich in *Kew Journ.* i. 22; the place which *Pucha-pat* is to occupy is not noted. The point is of importance, because Wallich's *Pucha-pat*, which is quite distinct from the Indian *P. Patchouli* Pelletier, is the plant that mainly yields the Patchouli and the Patchouli products of commerce; to this end it is assiduously cultivated on a considerable scale by Chinese colonists throughout the Malay countries. It is not clear that it is grown in China itself or indeed that the plant is known there; on the contrary there is much to favour the belief that it is in China replaced by one or more plants yielding the same odour. Unlike *P. Patchouli*, the *Pucha-pat* of Wallich is very shy of flowering, if indeed it ever does flower. Plants for example that were introduced to the Royal Botanic Gardens at Calcutta in 1834 and that have been freely propagated by other means than by seed from that period onwards have never once flowered, though a succession of the ablest gardeners in India have during the past 60 years made the flowering of the Malay *Patchouli* one of the objects of their lives.

Familiar acquaintance with the living *Pucha-pat* and a careful examination of the specimen of Sir William Hooker's plant in Herb. Kew, has convinced the writer that Sir William Hooker was absolutely right and that Wallich's *Pucha-pat* is only, at best, a cultivated race of Sir William's *P. Patchouli* which is, however, merely Tenore's *P. suavis* and is certainly not Pelletier's *P. Patchouli*.

The Patchouli smell is not confined to these two plants or even to the genus *Pogostemon*. Among Indian genera it is shared by *Mesona*, and in China it is associated with at least two species of the genus *Microtoena*, one of which, *M. robusta*, is employed on this account much as the Indian, or true, *Patchouli* is. That the other, *M. cymosa*, is so used has not been made clear; this latter plant occurs in Indo-China and in most cases is only doubtfully wild. It is not *always* Patchouli-scented, but when it is so scented it is apt, though it flowers freely, to produce only abortive fruits.
7. ORTHOSIPHON Benth.

** Calyx-throat naked; stamens included.

6. ORTHOSIPHON RUBICUNDUS Benth.

Var. ? macrocarpa var. nov.; leaves petioled, lamina very large 25–30 cm. long, 12–16 cm. across, calyx in fruit 15 mm. long, 7 mm. wide; petioles 5–7 cm. long.

BURMA; Attaran, Brandis 856!

This is almost certainly specifically distinct, though it is evidently most nearly related to *O. rubicundus var. rigida*. The flowers in the specimens seen are not good and it is inadvisable for the present to give the plant a specific status. The writer feels inclined to restore to *var. rigida* the specific rank claimed for it by Hamilton.

** Calyx-throat naked; stamens far exerted.

9b. ORTHOSIPHON WATTI Prain; leafy-stem puberulous 4-angled short, the portion above leaves elongated, glabrescent subterete; leaves decussately paired, pairs 4, the lowest small usually evanescent the second pair very large long-petioled much exceeding the 2 upper pairs, lamina irregularly cordate with subacuminate apex and irregularly crenate-serrate and acutely lobed margin, rather thick, sparsely puberulous above with adpressed brown hairs, beneath more faintly puberulous only along the nerves, racemes simple or subpaniculate at the end of leafless stem, bracts broadly cordate-acuminate, in young inflorescences overlapping to form a narrow strobilate spike, much exceeding pedicels; calyx puberulous campanulate, 2 lower teeth subulate; corolla-tube slender not twice as long as calyx, lower lip concave, upper 3-fld., filaments naked 2½ times as long as corolla; nules not seen. Orthosiphon sp. Prain, Journ. As. Soc. Beng. lix. 2. 296.

ASSAM; Manipur, Watt n. 7188! Naga Hills, at Konoma, Watt n. 11558!

Rootstock woody; leafy stem 6–10 cm. long with short branches in the axis of the 3 upper pairs of leaves, internodes about 1.5–4 cm., petioles of the large pair of leaves 8–10 cm., laminae 45 cm. long, 30 cm. across, of other pairs much smaller; stem between leaves and flowers 20–25 cm. long; racemes simple terminal 6–10 cm. long or with 1–2 pairs of similar lateral racemes in axis of larger bracts at intervals of 1–3 cm. below base of terminal raceme; whorls 6-fld., only 0.5 cm. apart, bracts 7 mm. long, 8.5 mm. wide, puberulous externally, glabrous above, margins not ciliate, pedicels 1 mm. long; calyx 5 mm. long; corolla tube 7–9 mm. long uniformly pubescent externally as are the lips, filaments inserted below apex of tube, 25 mm. long, stigma clavate subcapitate slightly notched.

Dr. Watt, who originally collected this very fine species, has again met with it in the Naga Hills and has presented an excellent flowering specimen to the Calcutta Herbarium from which it has been possible at last to make a complete description of the plant.
Though belonging to the group that includes O. scapiger, O. stamineus and O. Parishii it is, as the description will indicate, remarkably distinct from all three. It has somewhat the facies of a Coleus but the stamens are quite free and the stigma is not bifid.

8. PLECTRANTHUS L'HERIT.

§ Coleoides (F. B. I. iv. 621).

28b. Plectranthus Kunstleri Prain; rather stout, everywhere finely puberulous, leaves pale-green, large, petioled, ovate-acute with entire cuneate base and short entire sub-acuminate tip, margin elsewhere regularly crenate, cymes in stout branched panicles, corolla-tube exceeding the narrow lower lip, fruiting calyx rather large, two lower teeth subulate, two lateral ovate-acute, upper orbicular-ovate, nutlets oblong brown with darker tips, hardly shining.

Perak; Kwala Dipong, Kunstler n. 8240!

A shrubby plant 2-3 feet high. Leaves pale-green especially beneath and there sparsely glandular puberulous, darker and similarly faintly puberulous above, laminae 8-12 cm. long, 4-5 cm. wide, petiole 4-5 cm. long. Panicle large, branches ascending, flowers racemose. Fruiting calyx 5 mm. long, gland-dotted. Corolla pale-green faintly dotted, 10 mm. long, tube decurved and gibbous at base, one and a half times as long as boat shaped lower-lip; upper-lip rather short. Filaments free from each other from the point at which they are free from the corolla tube.

A very distinct species though nearest, on the whole, to P. articifolius.

30b. Plectranthus fulvescens Prain; erect, branched, the inflorescence hirsute fulvous-tomentose elsewhere glabrescent, leaves lanceolate hirsute finely crenate except at the narrow-cuneate base decurrent on the longish petiole, flowers whorled in long slender narrow racemes, corolla tube slender, longer than the lower lip, fruiting calyx densely fulvous with spreading hairs, two lower teeth acute, two lateral ovate faintly serrate, upper entire broad rounded, nutlets oblong, brown, shining. Coleus fulvescens Kurz MSS. in Herb. Calcutta.

Burma; Attran, Brandis 811!

Stem 4-angled glabrous below. Leaves faintly puberulous above, glabrous beneath, pale-green, membranous 10-15 cm. long, 4 cm. wide, tapering from the middle to an acuminate tip and a narrow cuneate base passing into a petiole 1-3 cm. long. Racemes 10-16 cm. long, 2 cm. in diam., leafless, rather dense-fld., rachis very hirsute with spreading tawny hairs, whorls 6-fld., flowers pedicelled. Fruiting calyx 6 mm. long slightly contracted above the nutlets. Corolla 8 mm., tube declinate, curved, apparently white, lips pale-blue.

The whorls of flowers somewhat resemble those of Coleus spicatus but they are more distant. Mr. Kurz has placed this in Coleus but the filaments are quite free from each other from the point where they are free from the corolla tube. The arrangement, however, below this point is such as to strongly support the view expressed by Sir Joseph Hooker (F. B. I. iv. 610) that at least all the species of
§ Coleoides might with advantage be merged in Coleus. This, to judge from his proposed treatment of the species, must have been the view of Mr. Kurz also.

9. **COLEUS** Lour.

1. **Coleus spicatus** Benth.
Add to localities of *F. B. I.*,—Burma; Shan Hills, common, Collett! King’s Collectors!

6. **Coleus atropurpureus** Benth.
Add to localities of *F. B. I.*,—Perak; Jenah, 200–300 feet, Wray 1759!

10.* **HYPTIS** Jacq.


MADRAS; BENGAL; and ASSAM. Introduced; though not so frequently met with as *H. suaveolens*, where it does occur it is just as plentiful and spreads as readily.

Stem rigid below, branches erect 60–100 cm.; leaves very variable from 2–8 cm. long acute or acuminate, margins sometimes serrate more often crenate-serrate, sometimes rather widely crenate, usually densely tomentose below sparsely above but at times glabrous on both sides. Racemes secund densely congested towards apex, interrupted below, simple or paniculately branched. Cymes 5–30-fl., at first capitate, bracts and subulate calyx-teeth crinite. Corolla small pale-purple, or yellowish-white with the lips purple spotted. Nutlets small, oblong, smooth, black.

The reason for the introduction of the species of this American genus is in every case the same; they are planted like the *Tulsi* (*Ocimum spp.*) in the precincts of sacred buildings and are usually to be found spreading from the neighbourhood of shrines and temples. Up till now *H. brevipes*, *H. capitata*, *H. suaveolens* and *H. pectinata* are the only forms that have established themselves in India but the naturalisation of other species is no doubt merely a matter of time.

55. **CYMARIA** Benth.

1. **Cymaria dichotoma** Benth.
Add to localities of *F. B. I.*,—Shan Hills; Fort Stedman, etc., common. Perak; Scortechin'i!
In the present paper I deal with a few occurrences of Indian birds noteworthy either on account of the rarity of the species, or by reason of their presence outside their usual limits. Most of the specimens alluded to are in the collection of the Indian Museum.

I follow the nomenclature and arrangement of the British Museum Catalogue of Birds.

*Rhytidoceros narcondami.*

When at the Andamans in April, 1896, I obtained, through the kindness of Majors Temple and Graham, and Lieutenant E. C. Doughty, four specimens of this rare species, which had been recently obtained on Narcondam. The skins had been only roughly prepared, and not sexed, but the plumage and dimensions show them to be those of two males and two females. They are all moulting.

The colouring corresponds well with that given by Mr. Blanford (*Fauna of British India, Birds, Vol. iii, p. 149*), and Mr. W. R. Ogilvie Grant (*Cat. Birds Brit. Mus., Vol. xviii, p. 386*). The tails are dirty, this no doubt being the grey stain noted in the British Museum catalogue description.

I take this opportunity of expressing my obligation to the Andaman residents for the kind hospitality and assistance afforded me on my visit to the Islands.

*Phasianus humiae.*

In December last Lieutenant-Colonel H. St. P. Maxwell, of the Indian Staff Corps, very kindly presented to the Museum a skin of this rare Pheasant, which he had obtained in the preceding mouth at Kairong in Manipur.

The specimen, which is in the plumage of the adult male, agrees very well with the description in the British Museum Catalogue of Birds, *Vol. xxii, p. 336*, and with Mr. Hume’s original description (*Stray Feathers, Vol. ix, p. 461*), except in that the longer upper tail-coverts are not plain grey, but are crossed by narrow dull chestnut bars.

Colonel Maxwell’s specimen differs much more from a fine male from the Ruby Mines, the only other example of this species which the Museum possesses, being that mentioned by Mr. W. L. Sclater (see *Ibis*, 1891, p. 152).
In this latter the white fringing of the lower back and rump feathers is so extended that the general appearance of these parts is silver-white, irregularly mottled with black where the more basal colouring of the feathers appears, whereas the other bird’s plumage shows here a beautiful scaled effect. Moreover the webs of these feathers in the Ruby Mines specimen are looser, and they are squarer at the tip. The difference in the individual feathers is shown in the accompanying woodcut, (which, however, much exaggerates the slight black terminal fringe in that of the Manipur bird.)

![Manipur specimen](image1)

![Ruby Mines specimen](image2)

Also in the Ruby Mines specimen the white shoulder-patch is larger and almost devoid of dark markings at the tips of the feathers. In this specimen also the longer upper tail-coverts, and to a less degree the grey part of the tail itself are of a lighter grey than the same parts in the Manipur bird.

Seen together with Colonel Maxwell’s bird, the Ruby Mines specimen seems worthy of specific separation, that is to say, as species are reckoned in the genus *Phasianus*. With a larger series of *P. humiae* however, the points I have mentioned would very possibly be found variable, and hence I content myself with drawing attention to the peculiarities of this bird, in hopes that other naturalists may be led to investigate the subject.
We are indebted to Major F. Graham for a specimen of the Jack-Snipe from the Andamans. The bird was shot, according to Major Graham, near Aberdeen on the South Andaman Island, on November 25th, 1896, by Lieutenant H. Turner of the Suffolk Regiment.

Jack-Snipe were unusually abundant in the Provision Bazaar this cold weather, and the Messrs. Dods inform me that they also found them singularly plentiful when out shooting in the vicinity of Calcutta.

Anas boschas.

In February, 1895, Mr. R. G. Hanland, of Gauhati, Assam, sent to the Editor of the Asian newspaper a Mallard which had been shot by Mr. Truninger at Behali Mukh, North Luckimpur, in Assam, on the 17th of that month. The bird was sent to me, and I was able to confirm Mr. Hanland’s identification of it. It was in adult male plumage, but not having been properly cured, the skin began to come to pieces, and I therefore did not preserve it, as the species was unmistakeable.

Funetta fulcata.

A bird-dealer from the Bazaar brought me a male of this species on January 3rd of the present year. It was in full plumage with the exception of the long tertials, which were only just sprouting, and not noticeable unless looked for.

As it was not in very good bodily condition, I had it killed for the Museum collection. It had the bill black; iris dark brown; feet dull grey, with black webs. The testes were small, and the windpipe much resembled that of the common Teal as figured in Yarrell’s British Birds, Fourth Edition, Vol. IV, p. 391.

Nyroca baeri.


This Pochard again occurred in the Provision Bazaar here during the present cold weather, but in far greater numbers than on the previous occasion, when all I saw, to the number of eleven, were obtained, as recorded loc. cit. This time the earliest date on which I observed any was November 25th, 1896, and I continued to note their presence pretty constantly till January 5th, after which I have no record of their occurrence. For a few days, not long after their first appearance, they were quite one of the common ducks of the Bazaar, being as numerous as White-eyes (N. africana). Out of perhaps twice that number seen, I bought in all twenty-nine specimens, twelve of which were transferred (not all immediately, however,) to the Museum collection; while three, a male and two females, remain at large on the
tank in the Museum compound, and a pair are still living in the Duck House at the Alipore Zoological Gardens, where several seem to have died, as I sent more there at different times.* Some birds were lost in various ways. Most of the birds observed were in immature plumage; I saw a few full-plumaged females, but no full-plumaged male.

The immature female is very like *N. africana* of the same age and sex, but differs from it in the dusky crown, and the absence of any rusty hue about the head except on the face. The size usually furnishes a better distinction, but I have seen some unusually small, though apparently clean-moulted, females, one of which is among our series obtained on this occasion. This bird is not larger than adults of *N. africana*, but is at once distinguishable by the above-noted limitation of the rusty hue, and the generally dusky blackish head and neck, whereon, however, are only faint indications of a green gloss.

All the males I saw had white irides, with the exception of one in which they were of a pale cloudy greenish-yellow. The white eye appears early, for I have noted it in specimens which were only just beginning to change the immature plumage for that of the adult. The young male appears (I have no preserved specimen of a very immature male) to have the same plumage as the young female. The bird on the Museum tank was pinioned and turned out there on December 13th, 1896, when only just beginning to change, and when caught on February 26th, 1897, was in full plumage, or nearly so; so also were two females caught with him, which were preserved, while the male was again released. Unfortunately I do not know exactly at what stage these females were turned out, but I am sure they were not in full plumage.

In all the females I saw the irides were brown, with the exception of two, which had the irides grey, and a mixture of brown and white, respectively.

The bills of the males are dark grey or greyish black, with a black nail and a grey patch at the tip; in the female the bill is darker, with the grey patch less distinct. The feet in both sexes are grey, with dark joints and black webs.

As to the habits of this duck I have little to say. In general appearance it is lighter and less "dumpy" than its near ally *N. africana*; the head and neck and general shape are less Fuliguline than in that species, and recall a Mallard somewhat. It of course swims

* These are now dead; the species does not bear confinement in an aviary well, unlike *N. africana*, which thrives better than any other Pochard. *N. baeri* is also more restless on the water when on a tank, judging from the three birds I still possess. From the male of these and the bird that recently died in the Zoological Gardens, it appears that the male in summer assumes the rusty facial patch of the female, and both become duller.
and dives excellently, and is a less clumsy walker than the common White-eye. The male has a curious habit of contracting its neck and jerking it backwards in a curve—no doubt a pairing-gesture. The lower part of the windpipe of the male is shown below, of about natural size.

_Erismatura leucocephala._

Two birds, an immature male and a female, of this species, were obtained in the Bazaar during the late cold season. The female was in a dying state when seen, and died by the time the bargain for it was concluded.

The male, for securing which I am indebted to our taxidermist, Mr. C. Swaries, lived for three days, but one of its legs was hopelessly injured, and it either could not or would not eat, although I tried it with several different kinds of food, in the hope of studying alive so interesting a species. Ultimately I reluctantly had it killed and preserved.

It was about the tamest bird I ever saw, continuing to dress its plumage even when being handled; in fact, its remarkable freedom from fear and its care of its feathers reminded me strikingly of a Grebe, (several of which I have also had) just as its habits when at large reminded Canon Tristram (_fide_ Dresser, _Birds of Europe_) of those birds. From the attempts it made, despite its injuries, to stand up, I have no doubt that it is able to do so, and probably to walk also, though doubtless it is not active on land. It floated low in the water, but not submerged, and the tail was kept more or less raised above the level of the back. This male had the throat entirely white and the black on the front and sides of the neck below this finely vermiculated with white; the back plumage is very pale, almost creamy in ground-tint, with chestnut feathers showing up here and there. The female was very much darker above, as well as more rufous. Her bill was black, while the male's was dull grey, somewhat greenish at the base. In both specimens the feet were grey with black webs, and the irides very dark brown. The windpipe of the male is expanded in the middle and narrowed towards the ends, but has no _bulla ossea._
F. Finn—Experiments with a Tupaia and a Frog. [No. 2, Merganser comatus.

A specimen of a Goosander, in very bad condition, sent to me in March of the present year by the Editor of the Asian, with the information that it was shot at Myitkiyana, Burmah, appears to me to be referable to the Eastern form. It is a female or young male.

Merganser serrator.

There is in the Museum collection an excellent specimen of this bird, not sexed, but by plumage a female or young male, obtained in the Calcutta Provision Bazaar on December 17th, 1889.


[Received April 29th, Read May 5th, 1897.]

The only other animals, besides birds and Calotes lizards, with which I have systematically experimented, are a Tupaia or Tree-Shrew (Tupaia ferruginea), and a Bull-frog (Rana tigrina); in each case a single individual only being used.

This being the case I have thought it as well to give the experiments on this Mammal and Amphibian together in one short paper, before dealing with the rest of the birds, my notes upon which much exceed in bulk all those I have hitherto published taken together.

Experiments with a Tupaia.

The Tupaia used in these experiments was bought in the Bird Bazaar, in July, 1895, and kept for most of the time in the aviary which I had used for birds: it was fed on boiled rice, fruit (plantain) and cooked meat. It used its fore-paws to hold the insects it ate, after the manner of a squirrel, and from its tameness and keenness after insects was a very satisfactory subject to observe. With it I made the following experiments, in 1895, about the time at which some of my experiments with Calotes (J. A. S. B., 1896, Part II, p. 42) were made.

July 15th. The animal being hungry, I offered it a Danai. genutia, which it took, but refused, apparently disliking the taste. I then gave it three non-warningly-coloured butterflies, which it was even less inclined to eat. All these insects were dead and rather dry however.

The animal had an hour or so before eaten cockroaches (Periplaneta americana) and plantain with relish.
Shortly after I could not find two of the non-warminly-coloured butterflies I had put in its cage, as above mentioned. In the evening, after having meanwhile given the Tupaia some meat and rice, the former of which it had some time ago eaten, (the latter it seemed not to like) I found the D. genutia still uneaten in the cage. The last non-warminly-coloured butterfly, a Catopsilia, I found outside the small cage in which the Tupaia at present was kept. I put it in the netting, but the animal would not take it.

I then offered it a Danais limniace and another Catopsilia, fresh specimens. These it smelt and would not eat.

Next I put in a live Catopsilia, which the Tupaia eagerly pursued, seized and ate. I then put in live specimens of D. genutia and limniace, one each, neither of which it would take. Then I gave successively a non-warminly-coloured butterfly much like those it had refused when dead, in the morning, and five Catopsilias, all these being alive; all were eaten, and the animal smelt about for more, while the two Danais recently given were still alive. It then readily ate a glossy green Muscid fly.

It then ate the Catopsilia which it had previously refused (see above), while within two inches of the living D. limniace.

Once or twice, in chasing butterflies, it grabbed at one or both Danais, but did not bite them.

July 16th. The two Danais put in the cage last night were still alive and unhurt, though the wings of the D. genutia were torn and rubbed. I had noticed the animal smellin this more attentively last night, and it was more inclined to seize it. The D. limniace was quite untouched. The Tupaia ate a piece of plantain, and later a cockroach, readily. I then took out these two butterflies, and offered them to Lizards (see Experiments with a Lizard, under this date, J. A. S. B., 1896, Part II, p. 46.)

I offered the animal to-day two plain-coloured caterpillars of a species living in stick cases, which it ate, but rubbed them first on the ground, and did not gobble them up immediately like the winged insects. It seemed to have no idea of getting them out of the cases for itself, though I saw it afterwards nibbling at one of these.

In the evening, the animal being now in the aviary, where there was plenty of meat, rice, and plantain, I put in with it a disabled Euploea, which it smelt and refused; then a disabled Junonia and another non-warminly-coloured specimen; these it ate readily. Then I gave it a disabled Danais genutia, which was also examined and refused. Two non-warminly-coloured specimens like the preceding were then eaten, wings and all, as usual. I then took out the Euploea, and offered it to a Lizard (see Experiments with a Lizard, loc. cit.)
July 17th. I put in the Tupaia's aviary, where there was still meat and fruit left over from yesterday, disabled specimens of Danais genutia and limniace, and Euploea, the last-named being that which I had removed on the preceding night. The animal smelt at, but did not take them, and an hour or so after they were still alive. I took out the Euploea and Danais, using the former again for Lizards (see Experiments with a Lizard, under this date loc. cit.) and returning the two latter later, after the Tupaia had had a fresh allowance of meat. They were both now dead; the D. limniace had been wounded and the D. genutia had lost two legs, but my notes do not state what had done this. At all events I now took them away finally.

July 18th. I gave the Tupaia in the morning a Neptis kamarupa (uninjured) which it readily seized and ate. Some of the meat given the animal yesterday was still at hand.

July 20th. Being unwell to-day, I was indebted to Mr. R. D. Oldham, of the Geological Survey, for making some observations. He gave the Tupaia (which was eager for insects, at any rate) a Papilio aristolochiae, which the animal attacked and killed, eating its head. However, it was not eager for it, and left it to greedily devour a non-warningly-coloured specimen.

In the evening, though there was still some meat, Mr. Oldham found the Tupaia had apparently eaten the body of the P. aristolochiae; it then greedily ate a non-mimetic specimen of P. polites, and another non-warningly-coloured specimen.

Two Danais genutia were then hunted by the animal; one was killed, but not eaten, and the other not even killed.

On the 22nd I found a D. genutia dead and uneaten, but being attacked by ants, in the Tupaia's cage, where there was also some meat and rice.

July 24th. I gave the Tupaia a disabled Danais genutia, which it smelt at and pawed, but left unhurt.

I then put in a disabled Papilio demoleus, which it ate, leaving most of the wings.

A large Catopsilia was then eaten more eagerly and entire. The animal had some meat left from yesterday.

The Tupaia then ate two or three other non-warningly-coloured butterflies (one of which had been offered to Calotes (see Experiments with a Lizard, under this date, loc. cit. line 30).

In the evening I gave the Tupaia (which had now only rice available) a larva of Polytelia gloriosae. This it did not seem to relish, as I saw it once flung aside and once dropped; but all, or nearly all, of it was eaten. These larvae are conspicuously coloured red, black and white, feed exposed, and do not appear to be touched by wild birds.
Another specimen was taken and dropped two or three times, and then left, still alive.

The Tupaia shortly vomited freely, and then ate a *Papilio eurypylus* I had just put in. I saw it vomit when being brought from the Bazaar in a “gharry” however, probably from fear.

Soon after I gave it a *Papilio demoleus*, which it ate greedily. I gave disabled specimens of *Danais genutia* and a non-warningly-coloured species, previously offered to Lizards (*Experiments with a Lizard*, under this date, loc. cit., line 32) to the Tupaia, which ate the latter and smelt and left the *D. genutia*, which I used again for a Lizard (loc. cit. line 36). The *Polytela* larva which it had tried, and which had been crawling about the cage, was now not to be seen.

*July 25th.* In the evening I gave the Tupaia another *Polytela gloriosae* larva, which it ate with less signs of dislike. It was seemingly hungry, and it did not vomit afterwards, but then I did not watch for this.

*July 26th.* I enticed the Tupaia, which was hungry, into its small cage with a living *Catopsilia*, which it ate.

I then put in two dead *Catopsilia*, and a *Danais genutia* and *D. limniace* alive. One *Catopsilia* was soon eaten, and the animal then smelt attentively at the *D. limniace*, but did not touch it. It then found and seized the other *Catopsilia*, but only ate the head, if anything.

I then put in a living *Euploea*, which the Tupaia smelt at and left.

Shortly afterwards, I found this and the two *Danais* still unhurt, while the *Catopsilia* left before had apparently been eaten, and another, put in alive, was also devoured.

About an hour afterwards the two *Danais* and the *Euploea* were still unhurt, though the Tupaia had had no food, and readily ate a cockroach.

After this I sent the animal to the Zoological Gardens at Alipore, where it was placed in a netted cage with another. Here I made a few more experiments with it a few days later.

*August 3rd.* I offered to the Tupaia (there was food, hard-boiled egg, in the cage) a *Papilio demoleus*, which it took and partly ate.

Then I put in a non-mimetic *Papilio polites*, which it ate all but the fore-wings and a piece of the hind-wings; it then ate all the rest of the *P. demoleus* except the fore-wings.

*P. aristolochiae* was then taken, killed, and left. Then the head was eaten, and the body again left.

Three specimens of *P. demoleus* were then readily eaten in succession.

The body and hind-wings of the *P. aristolochiae* soon disappeared, but I think I saw it under the sleeping-box in the cage, where no doubt
it had been taken by the other Tupaia. This was in fear of my animal, and had had none of the butterflies.

I put in another *P. aristolochiae*, which was smelt at by both the Tupaias, but not killed, though my animal then ate a *Catopsilia* given it.

Some time later I found this *P. aristolochiae* dead, and slightly bitten, but quite whole, having evidently been rejected.

It is obvious that this animal has a very strong objection to the "protected" *Danainae* and *Papilio aristolochiae*, as it so constantly refused them, and that in the case of the former absolutely, unlike the Babblers dealt with in my first paper (J. A. S. B. 1895, Pt. II, p. 344), which birds, caged under much the same conditions, generally showed their dislike of the *Danainae* merely by preferring other species.

**Experiments on a Bull-Frog.**

My experiments on this amphibian, which Dr. Alcock had been keeping for a little time for use in the Museum, and which he kindly allowed me to test upon this subject, were few and not long continued. But such as they are, I have thought well to insert them, if only for completeness. The experiments were made soon after I came to India, in 1894.

**November 2nd.** Offered a *Danais chrysippus* to the frog, which was being regularly fed on cockroaches; the butterfly was not touched.

**November 10th.** I put into the cage of the frog, instead of its usual meal of about a dozen and a half of cockroaches (*Periplaneta americana*), one cockroach only, and a *Delias eucharis*. Before long both insects had disappeared.

I then put in another *D. eucharis*, a *Danais chrysippus*, and a smaller non-warningly-coloured butterfly. Later on I found the *Danais* was gone. The others apparently remained.

**November 11th.** No butterflies left in the frog's cage.

**November 12th.** I put in the frog's cage a *Terias*, three *Delias eucharis*, and three cockroaches.

**November 13th.** To-day there were no insects in the cage, and about five cockroaches were put in by Dr. Alcock, and a *Danais chrysippus* by myself.

**November 14th.** The *Danais chrysippus* given to the frog yesterday was still there, alive; I saw none of the cockroaches, but did not specially look for them. I took out the *Danais*.

**November 15th.** To-day I put a female *Hypolimnias misippus* and a cockroach in the frog's cage; there were also two or three more cockroaches. I did not note what happened next day.

**November 17th.** No insects left in the frog's cage. I now put in
two cockroaches, but did not note when they were eaten, nor did I make any more experiments with this frog.

These experiments are hardly sufficient to form any conclusion as to the tastes of this Amphibian; but it would appear, if anything, to object to *Danais chrysippus* more than to *Delias eucharis*, and not very seriously to either. But sufficient opportunity for choice was not given.

A toad (*Bufo melanostictus*) which was also being fed on cockroaches, and had one in its cage at the time, did not touch a *D. chrysippus* put in on November 4th. But one such experiment is practically useless.*

A tree-frog did not eat some Skippers put in, but then as far as I saw it did not feed at all while I observed it.

* I note on August 24th, 1895, offering a large "glow-worm" to a small toad at Dehra Dun. The insect was followed about but left; and another small toad behaved in the same way. In this case the insect was probably too big; but subsequently a smaller one offered to a toad was not noticed. The toads were at liberty.

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**Description of Neptis praslini, Boisduval, and some species allied to it.**—By Lionel de Nicéville, F.E.S., C.M.Z.S., &c.

[Received May 11th;—Read June 2nd, 1897.]

*Neptis praslini*, Boisduval, and its allies form a very interesting little group of the large genus *Neptis*. They appear to be confined to the Moluccas, the Papuan group of islands, the Bismarck Archipelago, and Northern Australia. So long ago as 1832, Dr. Boisduval noted the very strong superficial resemblance of *Neptis* (*Limenitis*) *brebissonii*, Boisduval, from New Guinea, which is one of the species referred to in this note, to the butterflies of the genus *Tellervo*,† Kirby (*Hamadrys*, Boisduval, nec *Hamadrys*, Hübner, the type of the latter being *Papilio* (*Vanessa*) *io*, Linnaeus). The mimicry in this case by the brittle-winged edible *Neptis* of the leathery-winged unpalatable *Tellervo* is one of the most remarkable and complete in the entire range of the *Rhopalocera*. The sexes probably in all the species of the group here dealt with are well marked, the male having the inner margin of the forewing on the underside and the costal margin of the hindwing on the upperside broadly furnished with closely-packed shining grey scales which are wanting in the female. Both wings of the female also are somewhat broader and more rounded than in the male. Several authors have placed *"Limenitis" praslini* and its allies in the genus *Athyma*, which is certainly incorrect; they are all true *Neptes*.

1. Neptis praslini, Boisduval.


**Habitat:** New Ireland (the Neu-Mechlenburg of the Germans) (Boisduval); Cooktown, Queensland, N.-E. Australia (Staudinger).

**Expanse:**♂, ♀, 1·45 inches.

Dr. O. Staudinger has figured a female of *N. praslini* from Cooktown in N.-E. Australia, and says that the male hardly differs, but has a broad shining grey costal margin on the upperside of the hindwing, which is wanting in the female. I propose to consider Dr. Staudinger's figure as typical of the species. He goes on to say that "A somewhat larger but very similar species is the *N. brebissonii* of Boisduval from New Guinea, which I have received from Dr. Platen from Waigeu. This differs chiefly in the larger white spots, and in having a broad black costal margin on the underside of the hindwing. How it happens that these and several other similar species stand in Kirby under *Athyma*, I cannot say, as both species are so extremely similar to one another, and in this case it can hardly be considered to be mimicry." I am doubtful if Dr. Staudinger has correctly identified "*Limenitis* brebissonii, described from New Guinea, as Boisduval makes no mention of the three prominent white spots in the discoidal cell of the forewing present in all the species of the group of *N. praslini*. I possess a single pair of this species from Cooktown kindly sent to me by Dr. O. Staudinger. It is of course possible that these specimens represent a species distinct from true *N. praslini*, but in the absence of New Ireland examples it is impossible for me to say. Boisduval's original description of this species from New Ireland is very short, the specific definition being contained in the words "hindwing crossed at the middle by a large white band."

This species mimics *Tellervo zoilus*, Fabricius. In life the eyes of both species are bright yellow. The specimen figured is a male.
2. Neptis lactaria, Butler.


Habitat: Aru Isles; var. 1 a, Dory (Butler); Rubi, N.-W. New Guinea; Mysore and Jobi Islands (Kirsch); New Ireland; mainland of New Guinea (Godman and Salvin); Vaigheu and Mount Epa in southern New Guinea; Dorei in New Guinea; Ceram (Oberthür); Mansinam and Humboldt Bay, N.-W. New Guinea (Grose Smith); Ké Isles; Stephansort and Constantinhafen, German New Guinea; Waigiu or Waygiou (coll. de Nicéville).

Expanse: ♂, 2 4 to 2 5; ♀, 2 5 to 2 8 inches.

Description: Male and female. Underside, hindwing differs from typical N. praslini, Boisduval, from Cooktown, N.-E. Australia, in having the large discal white area of lesser size, not continued as far as the costal nervure and joined to the short basal streak in the subcostal interspace as it is in that species, in N. lactaria the basal streak is quite isolated from the discal white area. In other respects the two species, as far as my specimens go, do not differ.

Dr. A. G. Butler gives an excellent description of the species (except that he does not say what sex he is describing) as Athyma lactaria from the Aru Islands, and a var. 1 a "with a narrower band on the hindwing" from Dory, the latter probably being the Dorey or Dorei of N.-W. New Guinea. Messrs. Godman and Salvin also record A. lactaria from the mainland of New Guinea. Herr Th. Kirsch records it as N. praslini from Rubi on the mainland of N.-W. New Guinea, and from the neighbouring islands of Mysore and Jobi. He says: "In
the specimens collected in the first two localities [Kordo and Ansus] (on the islands Mysore and Jobi) the white marking is excessive, as the outermost of the three existing spots of the elongated band [i.e., the large triangular spot at the end of the discoidal cell of the forewing] is lengthened towards the outer margin, and runs into the [submarginal] row of spots. In the single specimen taken in Rubi on the mainland of New Guinea the white markings are, on the other hand, reduced to such an extent that the linear row of marginal spots on the underside of the hindwing is altogether wanting, and the inner row is formed of much smaller spots." Messrs. Godman and Salvin record *N. praslini* from New Ireland without remark. M. Oberthür records *N. praslini* from Waigiou and Mount Epa in southern New Guinea. He notes that the description of the species by Boisduval is very short, and would apply equally well to many closely-allied species of the same group, and that he considers it better to sink the *Neptis papua* described by himself to *N. praslini*. Mr. Henry Tryon records *N. praslini* as *Athyma praslinana* from Milne Bay in British New Guinea. M. Oberthür again described the species as *Neptis papua*, Boisduval MS., from Doreï in New Guinea and from Ceram. As noted above, he has sunk this name under *N. praslini*. Mr. Grose Smith records a long series of both sexes of *N. papua* from Mansinam and Humboldt Bay, N.-W. New Guinea, and says that "The white band which crosses the hindwing is of variable width, especially in the male."

Of *N. lactaria*, as identified by me, I possess three pairs from the Ké Isles, two females from Stephansort, and one pair from Constantin- hafen, both in German New Guinea, and two females from Waigiou. They are characterised by having the discal white band of the hindwing broad, occupying seven interspaces on the upperside, eight on the underside, broadest in the discoidal interspace, regularly tapering from thence to the abdominal margin, which it does not quite reach. The additional portion on the underside lies in the subcostal interspace. On the underside of the hindwing there are two marginal series of white spots, the anterior one consisting of eight large rounded spots, the posterior one of a similar number of smaller linear spots.

This species mimics *Tellervo zoilus*, Fabricius. The specimen figured is a female from New Guinea.
3. Neptis nausicaa, n. sp.

Habitat: Stephansort, German New Guinea.

Expanse: ♂, 2½; ♀, 2½ inches.

Description: Male. Upperside, both wings black, with shining pearly-white markings. Forewing with a short clavate streak towards the base, a quadrate spot at the middle, and a large triangular spot beyond the end of the discoidal cell; two small outwardly-obliquely-placed subapical spots; two much larger, the upper the larger of the two, well-separated rounded discal spots divided by the second median nervule; three widely-separated submarginal dots. Hindwing with a broad even-edged discal band, of equal width throughout, occupying seven interspaces, commencing on the inner margin and ending on the subcostal nervure; a submarginal series of five small round spots. Underside, forewing as on the upperside, but the four spots on the disc a little larger; the submarginal series consisting of six spots. Hindwing with a short streak towards the base of the wing in the subcostal interspace; the discal band a little broader than on the upperside, and with a small additional portion in the subcostal interspace; an obsolete series of elongated spots between the discal band and the submarginal series of spots; the latter consisting of eight spots, which are larger than on the upperside. Female. Upperside, forewing differs from the male in the submarginal series of spots being six in number instead of three. Hindwing has the discal band extended by an additional portion in the subcostal interspace in one specimen, but not in the other; the posterior edge of the discal band irregular, in the male it is even. Underside, forewing as in the male. Hindwing with the additional portion of the discal band in the subcostal interspace much larger than in the male.

N. nausicaa differs from N. lactaria, Butler, in the forewing in having the two discal spots divided by the second median nervule much smaller and consequently well separated, in N. lactaria they are conjoined; in the hindwing in having the discal band of the same width throughout and reaching the abdominal margin, in N. lactaria
it is of great width anteriorly, rapidly narrowing to the abdominal margin, which it does not quite reach; the anterior end of the discal band in *N. nausicaa* reaching much closer to the outer margin than in *N. lactaria*. On the underside of the hindwing there is a single subcostal streak, in *N. lactaria* this streak is much shorter, with an additional round spot placed posterior to it close to the base of the wing; and in *N. lactaria* there is a marginal series of eight linear spots, which are entirely wanting in *N. nausicaa*.

I am indebted to Mr. Henley Grose Smith for the gift of the specimens described.

This species mimics *Tellervo zoilus*, Fabricius. The specimen figured is a male.

4. *Neptis nemeus*, n. sp.

*Habitat*: New Britain.

*Expanse*: ♀, 2·2 inches.

*Description*: **Male.** Upperside, both wings black, with shining pearly-white markings. Forewing with a rather long clavate streak reaching to the base, a rather rounded spot at the middle, and a triangular spot beyond the end of the discoidal cell; three small outwardly-obliquely-placed subapical spots; two much larger, the upper the larger of the two, almost conjoined discal spots divided by the second median nervule; a submarginal series of six small spots, the series broken in the middle; a barely traceable marginal series of dots; an elongated bluish-white streak on the middle of the sutural area. Hindwing with the middle occupied by an oval patch consisting of five portions; a submarginal series of six linear spots. Underside, forewing with a pale streak defining the basal half of the subcostal nervure; all the spots on the disc more prominent than on the upperside, particularly the marginal linear series. Hindwing with the oval quinquepartite discal area as on the upperside; anterior to which there is a small round basal spot, and a lengthened pale subcostal streak; the submarginal spots
more prominent than above; with an additional marginal linear series of eight spots.

Apart from other characters, the oval white patch confined to the middle of the hindwing will at once serve to distinguish this species from *N. lactaria*, Butler, and *N. vausicaa*, de Nicéville.

Described from a single example which I have received from Mr. Henley Grose Smith.

This species mimics *Tellervo aequicinctus*, Godman and Salvin, or *T. hiero*, Godman and Salvin.

5. **Neptis dorcas**, Grose Smith.


**Habitat**: Biak Island, N.-W. New Guinea (Grose Smith).

This species is quite distinct from all those previously mentioned. It may be known from *N. lactaria*, Butler, as identified by me, by the extreme irregularity of the outer edge of the discal white band of the hindwing, that portion of the band lying in the discoidal interspace being outwardly greatly lengthened and projecting far beyond the line of the other portions. The sex of the two specimens described is not stated, but they are probably females.

In describing this species Mr. Henley Grose Smith refers twice to the "white oval patch" of the hindwing in *N. praslini* from New Ireland. From this I gather that Mr. Grose Smith identifies *N. praslini* with the species I have described as *N. nemeus*, though my specimen is from a different island, and may be distinct from the New Ireland form, and that he calls the species I identify as *N. lactaria—N. papua*. I have given my reasons above for preferring to apply Boisduval's name to the species which Dr. Staudinger has figured, and M. Oberthür has described as *N. papua*, and which the latter writer says is probably the true *N. praslini*.

This species mimics *Tellervo evages*, Godman and Salvin,* or *T. mysoriensis,†* Staudinger.


*N. satina*, Grose Smith, Nov. Zool., vol. i, p. 352, n. 111, pl. xii, fig. 3, † male (1894).

**Habitat**: Humboldt Bay, N.-W. New Guinea (Grose Smith).

This species differs from all those previously named in having no

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* This name is printed *evages* by Kirby in Allen's Naturalist's Library, vol. i, p. 29 (1894).
† Spelt misoriensis on p. 28 and pl. vi of the same work.

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streaks in the discoidal cell or triangular spot beyond the cell on the upperside of the forewing, though they are present on the underside. On the upperside of the hindwing the submarginal series of white spots is also absent.

7. **Neptis brebissonii**, Boisduval.

*Limenitis brebissonii*, Boisduval, Voy. l' Astrolabe, Ent., part i, p. 132, n. 3 (1832).

**Habitat**: New Guinea (Boisduval) ; Waigiou.

**Expanse**: ♀ , 2·5 inches.

**Description**: **Female. Upperside, both wings black. Forewing** with a small rounded spot just beyond the middle and a rather larger one at the end of the discoidal cell, both indistinct, white, irrorated with black scales; a subapical, outwardly oblique, well separated series of four white spots, the anteriormost very small, the second elongated and the largest, the third also elongated, rather smaller than the second, the fourth round, a little larger than the first; two large white spots on the disc, divided only by the second median nervule; two elongated white spots on the middle of the inner margin, divided only by the submedian nervure; a submarginal series of six small white spots, the four anterior ones round and pure white, the two posterior ones elongated, somewhat sullied with black scales. **Hindwing** with a broad discal white band, divided into eight portions by the crossing veins, not quite reaching the abdominal margin, ending anteriorly on the first subcostal nervule, the inner edge of the band straight, the outer edge somewhat irregular; a barely traceable submarginal series of whitish spots between the veins. **Underside, both wings black. Forewing** with a prominent quadrate spot just beyond the middle, a triangular spot beyond the end of the discoidal cell; the subapical and discal spots as on the upperside; a submarginal series of eight prominent quadrate white spots, the series broken in the middle, as there is only a small (instead of a large) spot in the second median interspace; an
obscure marginal series of elongated white spots between the veins. Hindwing with a short white streak on the costa at the extreme base of the wing; posterior to which is another short white streak; the discal band as above but wider on both edges; a prominent submarginal series of eight quadrate white spots; beyond which is a marginal series of six elongated white spots.

This is a very distinct species, differing from N. praslini, Boisduval, N. lactaria, Butler, N. nausicaa, de Nicéville, N. nemeus, de Nicéville, N. dorcas, Grose Smith, and N. satina, Grose Smith, in having two white spots on both sides of the forewing on the sutural area, these spots being absent in all the species mentioned above. Dr. Boisduval’s description of it is very short, but as far as it goes it agrees with my specimen described above.

Described from a single example sent to me by Dr. O. Staudinger.
Plates I, II, III, and IV, illustrating Mr. de Nicéville’s paper, are being prepared in Europe, and will be issued with a subsequent number of the Journal.
On New or Little-Known Butterflies from the Indo- and Austro-Malayan Regions.—By Lionel de Nicéville, F.E.S., C.M.Z.S., &c.

(With Plates I, II, III and IV.)

[Received May 20th;—Read July 7th, 1897.]

Family NYMPHALIDÆ.

Subfamily Danainæ.

1. Euplœa (Vadebra) elwesiana, n. sp., Plate I, Fig. 4, ♂.

Habitat: Bali; Lombok; Sambawa (Doherty).

Expanse: ♂, 3'0 to 3'2; ♀, 2'9 to 3'0 inches.

Description: Male. Upperside, both wings deep pitchy-brown colour. Forewing with the outer margin broadly pale brown, its inner margin even, broadest at the apex, slightly narrowing to the anal angle. Hindwing with the outer margin broader and paler than in the forewing, dirty-white in the middle; the costa broadly pale fuscous. Underside, both wings pale brown. Forewing dark pitchy-brown in the middle; a rather large reniform pale violet spot at the lower outer end of the discoidal cell; beyond which are three pale violet spots, the anterior one in the lower discoidal interspace linear, the one posterior to this oval, the posteriormost one the largest and oval; three or four submarginal white dots. Hindwing with a broad marginal white area not quite reaching the outer margin or the apex of the

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wing; a spot at the end of the cell, and five just beyond the cell, all of nearly equal size, small, rounded, pale violet; a submarginal apical series of three small rounded white spots; and a marginal apical series of five small round white dots. Female, differs only from the male in sexual characters, the inner margin of the forewing is straight instead of being slightly outwardly bowed; with, on the underside, a white streak in the middle of the submedian interspace.

Mr. Doherty* thus refers to this species under Euploea (Crasta or Vadebra) palmedo, Doherty: "An allied form occurs in Sambawa, with the margins broadly whitish as in E. [Vadebra] climena, Cramer [from Amboina and Ceram], and without the conspicuous subapical white band of the forewing" of E. palmedo. The species is nearest to Vadebra macleari, Butler,† from which it appears to differ in having the outer margin of the hindwing on the upperside much less broadly white, and of a dirty-white instead of "snow-white" shade, with no apical white spots, in E. macleari there are seven spots in two series, two and five; on the underside the outer white area differs as above. From Vadebra sepulchralis, Butler,‡ it appears to differ in having on the underside of the hindwing a continuous dirty-white marginal area, in that species this area is broken up into narrow elongated white spots between the veins. E. sobrina, Röber, from Goram, and E. neptis, Röber, from Flores (Tijd. voor Ent., vol. xxxiv, p. 297 (1891), are probably allied species, but in the absence of figures it is impossible to say if this is so with certainty from the short descriptions given of them.

Described from a male taken by Mr. W. Doherty in the low country of Bali in April, 1896, and two pairs captured by Herr H. Fruhstorfer at 2,000 feet elevation at Sapit in Lombok in May and June, 1896. The specimen figured is from Bali.

Subfamily Satyrine.

2. Lethe (Kerrata) lyncus, n. sp., Plate I, Fig. 8, ♂.
HABITAT: Native Sikkim.
EXPANSE: ♂, 2.2 inches.
DESCRIPTION: MALE. UPPERSIDE, both wings hair-brown, with a strong silky ochreous-bronzy gloss; a submarginal deep brown fascia. Forewing has the discoidal cell crossed by two dark brown bars, one at the middle, the other towards the end; a discal irregular dark brown

band from the costa to the submedian nervure, anteriorly broad and touching the disco-cellular nervules inwardly, posteriorly narrow, between the first median nervule and the submedian nervure inwardly oblique; a short subapical pale ochreous bar within the submarginal fascia reaching from the costa to the upper discoidal nervule. Hindwing with an indistinct irregular discal dark brown fascia; beyond which are five round dark brown spots decreasing in size from anteriorly backwards. Underside, both wings shining pale ochreous, with the markings darker ochreous. Forewing has the two discoidal bars as on the upper-side, the inner one broad, the outer one narrow, the space between them yellow; the discal fascia is broader and more prominent than above, its outer edge sharply defined; the discal area beyond is yellow becoming darker till it is almost lost in the submarginal fascia; the subapical spots as on the upperside three in number and white; the margin is somewhat broadly pale, bisected by a narrow straight brown line. Hindwing has a basal irregular dark fascia outwardly defined by a narrow yellow line; beyond which is a dark line from the costa to the submedian nervure where it ends between the points of origin of the first and second median nervules; a dark fusiform bar defines the disco-cellular nervules; a broad highly irregular discal fascia from the costa to the abdominal margin; a submarginal series of six black ocelli with white pupils, yellow iris, outer dark ring, with an outermost pale violet ring, the anal ocellus twinned, all the ocelli of nearly equal size, the first and fifth slightly larger than the others; the margin bears a somewhat broad ochreous line, defined on both sides by a dark brown thread, inwardly again with a pale violet line, somewhat dilated at the anal angle. Cilia cinereous throughout.

In India this species is nearest allied to L. tristigmata, Elwes, also from Sikkim, but it is smaller, the “male-mark” on the upperside of the forewing on the disc is barely traceable, on the underside of that wing the four (sometimes five) discal pale violet spots are wanting being replaced by a short subapical bar, with some other minor differences. It is still nearer to L. ocellata, Poujade,* from Mon-Pin in Eastern Thibet, and Omei-shan and Pu-tsu-fong in Western China, of which L. simulans, Leech, is a synonym, from which it appears to differ on the upperside of the forewing in the presence of the short subapical pale bar; the ground-colour of the underside is pale ochreous instead of “greyish-brown,” and the discal dark bands of the hindwing seem also to be somewhat differently placed. It is also apparently

* Devis ocellata, Poujade, Bull. Soc. Ent. France, sixth series, vol. v, p. x (1885); Lethe ocellata, Leech, Butt. from China, Japan, and Corea, p. 34, pl. iii, fig. 3, male (1892).
allied to *L. armandina*, Oberthür,* from Moupin and Western China, from which it differs in the discal fascia of the forewing on the upperside not being "bordered outwardly with yellowish," and the bands of the hindwing on the underside not being "violet-grey."

Described from a male taken in Native Sikkim at 10,000 feet, in August, 1895, kindly given to me by Mr. G. C. Dudgeon; and another in Mr. Dudgeon's collection from Gantok, also in Native Sikkim, taken at 7,000 feet in July, 1895.

3. *Ypthima megalia*, n. sp., Plate I, Fig. 5, ♂.

Habitat: North Shan States, Upper Burma.

Expanse: ♂, 1.9 inches.

Description: Male. Upperside, both wings shining hair-brown, with an indistinct submarginal fuscous fascia. Cilia cinereous. Forewing with the usual subapical deep black ocellus bipupilled with silver, outwardly defined with a dull yellow ring. Hindwing with a similar unipupilled subanal small ocellus. Underside, forewing pale brown, finely and evenly striolated throughout (except narrowly along the inner margin) with white and ochreous of a curious shade; the ocellus as above but larger, with the pupils metallic pale blue, and the outer yellow ring wider than on the upperside. Hindwing with no trace of ocelli; striolated as in the forewing, but the white and yellow striolae not so much intermingled, there being an ill-defined broad yellow fascia across the disc from the middle of the costa to the middle of the abdominal margin, followed by a still broader but equally ill-defined whitish fascia, which is broken into broadly on the middle of the outer margin by a large triangular patch of the yellow striolation.

*Y. megalia* comes into Group IX of Elwes' Revision of the genus *Ypthima*, Trans. Ent. Soc. Lond., 1893, p. 44, and is nearly allied to *Y. megalomma*, Butler, and *Y. insolita*, Leech, both from China. From the former (as figured by Leech in Butt. China, p. 86, pl. ix, fig. 2, male) it differs in its more elongate (less broad and rounded) wings, and the ocelli of both wings on the upperside very considerably smaller, half the size in fact. The ocelli in *Y. megalomma* appear to be variable as regards numbers, Mr. Leech's figure shows them as in *Y. megalia*, but in the type and in two others in Mr. Leech's collection there is an extra ocellus in the forewing on the underside in the first median interspace. *Y. megalia* differs from *Y. insolita*, l. c., pl. ix, fig. 1, male, in also having the ocelli much smaller; that species on both surfaces has a second ocellus in the first median interspace on the forewing, and three ocelli (one apical and two anal) on the underside of the hindwing.

*Debris armandina*, Oberthür, Études d'Ent., vol. vi, p. 16, n. 8, pl. vii, fig. 6, male (1881); *Zophoessa armandina*, Leech, Butt. from China, Japan, and Corea, p. 43 (1892).
Described from a single example for which I am indebted to Major F. B. Longe, R. E., captured in the Kokang State, 5,500 feet, North Shan States, on the Chinese frontier east of Bhamo, on 6th April, 1895.

Subfamily Nymphalinae.

4. Cynthia cyonia, n. sp., Plate III, Figs. 19, $\sigma$; 20, $\varphi$.

Habitat: Kê Islands.

Expanse: $\sigma$, 3'-4; $\varphi$, 3'-6 to 3'-8 inches.

Description: Male. Upperside, forewing differs from C. orahilia, Kheil,* from Nias Island, in the discal black line just beyond the discoidal cell being straighter and thereby more continuous; beyond this there is a series of six black lunules crossing the middle of the disc, the anteriormost one developed into a rounded spot, the posteriormost one W-shaped; beyond this again there are five small round black spots placed between the veins (one being wanting in the lower discoidal interspace), in C. orahilia there are never more than four, and usually three or two; the interior of the two submarginal black lines is more lunulated in C. cycnia; and the anteciliary black thread is narrower. Hindwing has the interior submarginal black line also more lunulated, and the anteciliary black thread also inconspicuous, in C. orahilia it is very prominent. Underside, both wings of a rich red-orange colour instead of ochreous; the discal black line almost perfectly straight instead of being irregular; the interior submarginal line more irregular; the markings otherwise similar. In outline C. cycnia has the forewing more produced at the apex, the outer margin consequently more deeply excavated; and the tail of the hindwing is rather longer. Female. Upperside, both wings dark ochreous, sprinkled throughout (except a broad discal paler ochreous area) with fuscous, in the male the ground-colour is rich dark red-orange; the markings almost precisely similar to those of the male, differing only in the forewing in the discal black line just beyond the discoidal cell being broader and lunulated instead of being almost straight; and the five discal round black spots are considerably larger. Underside, both wings differ from the male in being ochreous instead of red-orange; the markings similar. The female differs markedly from the same sex of C. orahilia as figured by Herr Gustav Weymer in having the discal area of both sides of both wings rich ochreous instead of pure white; the markings, however, are very similar.

As far as I am aware this is the only species of Cynthia which has

* Cynthia orahilia, Kheil, Rhop. Nias, p. 21, n. 36, pl. ii, fig. 9; male (1884); id., Weymer, Stet. Ent. Zeit., vol. xlvi, p. 262 (1885); idem, id., loc. vol. xlviii, p. 5, n. 2, pl. ii, fig. 3, female (1887).
the opposite sexes very similarly coloured, usually the male is tawny and the female green, with a broad discal white area: in the female of *C. cycnia* there is no trace of either of these colours. In fact, as far as coloration goes, the female is very similar to the male of *C. saloma*, de Nicéville.

Described from two males and two females received from Herr Georg Semper and Herr Heinrich Kühn.

*P. S.*—Since the above was put into type, I have received a pair of *C. erota austrosunda*, Fruhstorfer (vide Berl. Ent. Zeitsch., vol. xlii, p. (1897), from Lambok, to which species *C. cycnia* is very nearly allied. The male differs from that species in having the narrow discal black line on the underside of the forewing quite straight instead of irregular; and the female differs in having the discal band on the forewing considerably broader.

5. *Apatura pagenstecheri*, n. sp.


**Habitat**: Celebes (*Donggola*).

**Expans**: 2, 2·6 inches.

**Description**: Female. I propose to rename after Dr. Arnold Pagenstecher the species of *Apatura* he has identified and figured from Celebes in the work cited above. *A. parvata*, Moore, was described from “N. India,” and a male was figured. It occurs somewhat rarely in Sikkim, Bhutan, and the Khasi Hills, while Mr. Henley Grose Smith has recorded it, probably erroneously, from Sumatra. The female of *A. pagenstecheri* differs from the same sex of *A. parvata* in its considerably larger size, all the markings being much more conspicuous, especially the discal band across both wings, which is pure white as figured in *A. pagenstecheri* and ferruginous in *A. parvata*; in the former there is a submarginal series of fuscous lunules, placed outwardly against a whitish submarginal line, in the latter the lunules are replaced by oval spots, and the whitish submarginal line is entirely absent. Superficially *A. pagenstecheri* is more similar to *A. (Rokana) nakula*, Moore, from Java and Bali, but a comparison between Dr. Pagenstecher’s and my figures* will disclose at once the many points in which they differ.

6. *Neptis* (*Phaedyna*) *nectens*, n. sp., Plate I, Fig. 3, 2.

**Habitat**: Ké Islands.

**Expans**: 2, 2·7 inches.

**Description**: Female. **Upperside**, both wings deep black, with brilliant pure white markings. **Forewing** with a clavate streak in the

discoidal cell well separated from an almost quadrat spot beyond the cell; seven discal spots, arranged three, two, and two, the anteriormost spot very narrow and on the costa, the second elongated, well separated from the third, which is oblong with rounded ends; the two middle spots divided only by the second median nervule the largest, with rounded ends; the sixth spot small, placed just anterior to the submedian nervule; the seventh spot elongated, placed on the suture area; two marginal series of spots, the inner one consisting of eight small rounded spots, the outer one incomplete, five only in number, and somewhat elongated. **Hindwing** with a very broad discal band, broadest in the middle, tapering to either end, extending from the abdominal margin to the first subcostal nervule, consisting of eight portions, its inner edge straight, its outer edge rather irregular, being cut into by the black ground-colour where the veins cross the band; obsolete submarginal and marginal series of whitish spots, the inner series towards the costa only being plainly visible. **Underside**, both wings black, but of a more dusky tint than on the upperside. **Forewing** with the markings as above, but there is an additional fine lunulate line between the discal and marginal series of spots; the two marginal series of spots much more prominent and larger than above; the inner margin as far as the submedian nervure and first median nervule pale fuscous; the base of the costa orange. **Hindwing** with a short white streak at the base of the costa, posterior to this is a broader streak from the base to beyond the middle of the wing; the discal fascia as above, but broader, followed first by a fine narrow white line, second by a series of eight more or less lunular and prominent white spots, and third by two prominent disconnected marginal white lines, which are suffused with black between the second and third median nervules. **Cilia** black, here and there white. **Body** above black, beneath white.

Near to *N. shepherdii*, Moore, from New South Wales, Australia (Moore), and North-West New Guinea (*Grose Smith*), from the figure of which it differs in having the discal spots on the upperside of the forewing larger, and an additional spot anterior to the submedian nervure; the discal band of the hindwing being much broader; and from the description (as also my solitary specimen from New Guinea) in having the underside black, in *N. shepherdii* it is "ferruginous-brown, suffused in parts with paler brown." It is probably also near to *Phaedyma heliopolis*, Felder, from Dodinga in Halmahera (Gilolo) (Felder), and North-West New Guinea (*Grose Smith*), a species I have not seen.

Described from a single female in very fine condition received from Herr Heinrich Kühn.
7. Calinaga cercyon, n. sp., Plate II, Fig. 9, \( \sigma \).

Habitat: The road between Ta-Tsien-Lou and Mou-Pin, and the neighbourhood of Ta-Tsien-Lou, Western China (May, 1895).

Expans: \( \sigma \), 3.2 inches.

Description: Male. Allied to C. davidis, Oberthür, from Moupin, Kouy-Tehéou, Tsé-Kou, Ta-Tsien-Lou, Oua-Se, Yu-Tong, and Kitchang-Kou (Oberthür), Wa-ssu-kow, and Chow-pin-sa, Western China, and Chang-yang; Central China (Leech), differing therefrom on both surfaces in the ground-colour of both wings being pale straw-yellow instead of pale greenish-gray, and all the markings clear and unsullied, in C. davidis many of them are sullied with dusky scales, this is particularly noticeable in the discoidal cell of the forewing which has no dusky irrorations whatever except a very small outwardly oblique blackish bar beyond the middle; the pale streaks beyond the cell at the base of the median interspaces, and the very large one in the submedian interspace similarly have no dusky irrorations whatever; the outwardly-obliquely-placed discal series of spots from the costa to the third median nervule, and the submarginal series of seven rounded spots are also considerably larger. In the hindwing the discoidal cell has no markings whatever, in C. davidis there is usually a narrow outwardly bifurcated dusky streak, and the cell is always heavily bordered by dusky scales; all the spots on the disc are also much larger in the present species than they are in C. davidis; the submedian interspace also is at the base entirely free of dusky irrorations, while in C. davidis the anterior half between the internervular fold and the median nervure and first median nervule is dusky. It differs from C. buddha, Moore, in the ground-colour being pale straw-yellow instead of chalky-white, all the markings larger, especially those on the hindwing, the discoidal cell of the forewing being free of dusky irrorations, in C. buddha it is as dusky as in C. davidis, and it is also a much smaller insect.

M. Oberthür says that his original type specimen of C. davidis was a male, but from the figure I should say that it must certainly be a female. Mr. Leech in "The Butterflies of China, Japan, and Corea" has beautifully figured an undoubted male on plate xx, fig. 1. He notes on page 119 that C. davidis has two forms, the one from Moupin, Wa-ssu-kow and Chow-pin-sa in Western China being typical, while the one from Chang-yang in Central China, where it is common and "is the sole representative of the species, but also occurs sparingly in Western China, is greyish with the whitish markings well defined; the streaks and spots are often confluent, giving the appearance of a whitish insect with greyish marginal border and blackish venation." This description
apparently applies to *C. cercyon*, and as my specimens are distinguishable at a glance from typical *C. davidis*, both species being apparently constant (Mr. Leech does not hint at any intermediate form occurring), I have ventured to describe it. M. Oberthür (Études d’Ent., vol. xviii, p. 14 (1893), also apparently refers to this species in speaking of *C. davidis*, and says: “The whitish spots are often confluent, which gives these specimens a less grey and less dark appearance.”

I am indebted to M. Charles Oberthür for the gift of two specimens of *C. cercyon*, and five males and one female of *C. davidis*, the latter specimens shewing no variation whatever. A comparison between the figures of *C. davidis* and *C. cercyon* will make it apparent at once in what respects the two species differ. At present there are five species known of this interesting genus:—


Habitat: Himalayas; Assam.


Habitat: Western China.

(3) *Calinaga sudassana*, Melvill, Trans. Ent. Soc. Lond., 1893, p. 121, pl. vii, figs. 1, 2, *female* (? *male*).

Habitat: Mountainous regions about 100 miles N.-W. of Cheing Mai, Siam; Kunlon, Salwin Riven, N. Shan States, Upper Burma.

Mr. J. C. Melvill says that his type specimens (three) are females. To judge from the example in my collection from Upper Burma and from the figure I should say that all the known specimens are males.


Habitat: Tsé-kou, Thibet.

M. Oberthür notes that at Tsé-kou are found *C. davidis*, *C. buddha*, and *C. lhatso*.

(5) *Calinaga cercyon*, de Nicéville.

Habitat: The road between Tâ-Tsien-Loû and Mou-Piu, and the neighbourhood of Tâ-Tsien-Loû, in Western China.

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8. Charaxes (Haridra) aristogiton, Felder, Plate II, Figs. 11, 12; gynandromorphous example.


Habitat: Sikkim, Bhutan, Assam, Burma, the Malay Peninsula, Sumatra.

The gynandromorphous specimen of C. aristogiton, Felder, here figured, has been kindly lent to me by Herr Paul Möwis, who obtained it from a native collector at Darjiling in Sikkim. The true female of this species has not hitherto been known, though that of C. desa, Moore, which Dr. A. G. Butler and I consider to be the same species, is described and figured in Mr. Moore's "Lepidoptera Indica." I take this opportunity to state my opinion, in which Captain E. Y. Watson joins, than whom no one knows the butterflies of Burma better, that besides C. desa, which Mr. Moore restricts to Upper Tenasserim, C. adamsoni, Moore, from the same locality, is also synonymous with C. aristogiton. The species, as are all the tawny Charaxes, is variable, no two specimens in my collection being precisely alike, so that there is no gain to science (nor does it give expression to a real fact in nature) to pick out extreme individual varieties and give them distinctive specific names, more especially when, as in the present case, these varieties are not restricted to well-defined geographical areas.

In the Journ. A. S. B., vol. lxiii, pt. 2, p. 8, n. 7 (1894), I described and figured on pl. iii, figs. 1, 2, a gynandromorphous example of Argynnis niphe, Linnaeus, from Behar, and gave a list of four specimens of other Asiatic species known to me. Mr. Möwis informs me that he once purchased from a soldier at Deolali, Nasik, Bombay Presidency, a specimen of a Curetis now in Colonel Swinhoe's collection, which was very conspicuous, as the male side was copper-coloured, the female side white. He also obtained a specimen of Appias hippo, Cramer = A. hippoides, Moore, from Sikkim, which he parted with to Herr A. Böttcher of Berlin. I have come across other references to these monstrosities
INDO- AND AUSTRO-MALAYAN BUTTERFLIES
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INDO-AND AUSTRO-MALAYAN BUTTERFLIES
INDO-AND Austro-Malayan Butterflies.
from Asia. In Horsfield and Moore's Cat. Lep. Mus. E. I. C., vol. i, p. 158, n. 327 (1857), a "hermaphrodite" specimen of Diadema [Hypolinna] bolina, Linnaeus, is recorded from Canara in South India. Dr. A. G. Butler in Proc. Zool. Soc. Lond., 1866, p. 172, woodcut n. 1, p. 173, describes and figures a "hermaphrodite" Danais (Nasuma) ismare, Cramer, the left-hand side being a male (D. ismare), the right-hand side being a female (D. ismareola, Butler). Mr. H. J. Elwes in Trans. Ent. Soc. Lond., 1888, p. 408, n. 357, records a gynandromorphous specimen of Delias descombesi, Boisduval, from Sikkim. Dr. E. Haase in Iris, vol. i, p. 36, pl. iii, fig. 2 (1888), describes and figures a hermaphrodite specimen of Danais (Nasuma) ismare, Cramer, from Ceram. Herr Eduard G. Honrath in Berl. Ent. Zeitsch., vol. xxxiii, p. 499, woodcut fig. A (1888), figures from Minahassa (Celebes), Charaxis affinis, Butler, the left-hand side being a male (C. affinis), and the right-hand side a female (C. wallacei, Butler). This specimen is referred to in Dr. Staudinger's Ex. Schmet., p. 168 (1886). Mr. J. H. Leech in Butt. from China, Japan, and Corea, p. 436, pl. xxxiv, fig. 14 (1893), describes and figures a partially gynandrous example of Colias hyale, Linnaeus, from Japan; and at page 441, pl. xxxv, fig. 4, of the same work, a gynandrous Gonepteryx rhamni, Linnaeus, from Wa-shan in Western China. Finally, Herr Egon Kretzschmar in Iris, vol. vi, p. 160 (1893), records a hermaphrodite specimen of Lethe mekara, Moore, from "Hindostan."

9. Charaxes (Haridra) staudingeri, Rothschild.


Habitat : Java (Rothschild, Butler, Fruhstorfer, and coll. de Nicéville).

Expanse : 3’5 to 4’0 inches.

Description : Male. Upperside, both wings differ from Messrs. Grose Smith and Kirby's* and Mr. Moore's† figures of the same sex of C. nicholii, Grose Smith, from East Pegu, Burma, in having the ground-colour throughout dark ferruginous-brown, instead of dark brown at the base only with the outer half of the forewing blue-black. Forewing has both series of lunular discal white spots smaller, the inner series more or less obsolete save the two anteriormost spots; the yellowish-white longitudinal band extending nearly half-way along the inner margin in C. nicholii is reduced in C. staudingeri to a comma-shaped white spot in continuation of the outer discal series of spots; and there are no

* Rhopalocera Exotica, pl. Charaxes ii, figs. 1, 2, male (1887).
† Lepidoptera Indica, p. 246, vol. ii, pl. clxxxii, fig. 2, male (1895).
White marks on the margin. Hindwing differs in having the outer-third of the wing pure white instead of creamy-white, this area being of much less extent than in C. nicholii, with its inner edge nearly straight instead of deeply indented; the series of eight diamond-shaped, black, white-centered spots on the band twice as large and very conspicuous; the marginal line much more prominent. Underside, both wings agree almost precisely with the figure of the male of C. durnfordi, Distant,* from Sungei Ujong in the Malay Peninsula; but the dark discal band of the forewing is broader in C. staudingeri.

Described from three specimens kindly sent to me by Herr G. Hoppenstedt, captured in the Preanger district, a mountainous region near Batavia in North-Western Java; and one from Mount Gede, Western Java, 4,000 ft., captured by Herr H. Frubstorfer, and kindly sent to me by him. He has quite recently described the hitherto unknown female.

10. Charaxes (Haridra) connectens, n. sp., Plate III, Fig. 24, ♂.


Habitat: N.-E. Sumatra.

Expanse: ♂, 4½ inches.

Description: Male. Underside, forewing agrees with Messrs. Grose Smith and Moore's figures of the same sex of C. nicholii, Grose Smith, in having the basal area of the same shade of "dark brown" (dark castaneous), but is of greater extent, occupying the whole of the discoidal cell, and reaching nearly as far as the interior of the two discal series of white spots; differs also in having two additional elongated white spots forming a commencement to a third series just behind the costa, divided by the upper discoidal nervule; both discal series of white spots are also smaller, the spots apparently further apart owing to their smaller size; and the longitudinal band on the sutural area at the outer angle almost obsolete: differs from Mr. Distant's figure of C. durnfordi in having the basal area very much darker, being dark castaneous instead of "dark brownish-ochraceous;" in that species also the outer angle extending some distance along the outer and inner margins is pure white, in the present species the outer angle is only obsoletely sordid white: differs from C. staudingeri, Rothschild, described above, in having the basal area of a distinctly lighter shade than the outer portion of the wing (which is black), in that species it is dark ferruginous-brown throughout; and in having the inner discal series of white spots complete, in C. staudingeri the inner series is obsolete except the two anteriormost spots; and that species does not

* Rhopalocera Malayana, p. 432, n 9, pl. xl, fig. 8, male (1886).
possess the two spots of the third innermost series. Hindwing differs from C. nicholii in having the dark castaneous basal area of greater extent, therein agreeing with C. dumfordi and C. staudei, thereby reducing the breadth of the outer white area, which is pure white as it is in C. dumfordi and C. staudei, instead of creamy-white as in C. nicholii; the inner edge of the white band very uneven as it is in C. nicholii and C. dumfordi, in C. staudei it is nearly straight; the eight white-centered submarginal black spots of the same size as in C. dumfordi and C. staudei, but much larger than in C. nicholii; the marginal dark line prominent as in C. dumfordi and C. staudei, in C. nicholii it is obsolete. Underside, both wings with the ground-colour similar to that of C. dumfordi and C. staudei, but much lighter than in C. nicholii. Forewing has the dark discal band as broad as in C. staudei, therefore much broader than in C. dumfordi; in C. nicholii the ground-colour and markings are very obscure. C. everetti, Rothschild, Iris, vol. vi, p. 348, n. 1 (1894), and Nov. Zool., vol. ii, pl. viii, fig. 1, male (1895), from the Barram River, British North Borneo, is quite distinct from C. connectens, the upperside of the forewing has the white markings many times larger, as also are the submarginal black white-centered spots on the hindwing, while the ground-colour of both wings on the upperside is much paler, of a much less rich chestnut or ferruginous shade.

Described from a single example in my collection. Hofrath Dr. L. Martin possessed four males and a female of this species from N.-E. Sumatra, these specimens have probably passed into the possession of the Hon. Walter Rothschild. Burma, the Malay Peninsula, Sumatra, Java, and Borneo each has a local representative of this very distinct group of the genus.

Family LEMONIIDÆ.

Subfamily NEMEOBIINÆ.

11. Dodona draco, n. sp., Plate II, Fig. 14, ♂.

Habitat: North Shan States, Upper Burma.

Expanses: ♂, 1.5 inches.

Description: Male. Upperside, both wings glossy hair-brown. Forewing bears on the disc numerous pale ferruginous spots, those towards the costa being whitish. Hindwing bears on the outer half four somewhat obscure macular pale ferruginous bands; the anal lobe is black, bisected longitudinally by an ochreous line, which line is continued along the submedian nervure almost to the base of the wing. Underside, both wings clear brownish-ochreous, with pure white
markings; two subbasal decreasing white bands, commencing broadly on
the forewing at the costa, ending on the submedian nervure, commencing
again on the hindwing at the costa, near the anal angle approaching
each other and becoming very narrow, recurved to the abdominal
margin. Forewing with two short parallel white lines at the end of
the discoidal cell; placed anteriorly midway between these two lines
is a trifid white spot which reaches the costa, and posteriorly are two
other spots also placed midway between the cell lines, the anterior one in
the first median interspace, the posterior one placed a little outwardly as
regards the spot anterior to it in the submedian interspace; beyond
these two last-named spots are three other spots, the uppermost is
white and is in the second median interspace, the other two are black
and placed posterior to it; a trifid subapical spot from the costa to the
upper discoidal nervure; a submarginal series of small white spots;
and a fine white marginal line. Hindwing with a short narrow white
line on the middle of the disc from the second subcostal to the second
median nervure; two fine submarginal white lines; the anal lobe black,
bisected as above by an ochreous line, the lobe anteriorly defined by a
white line, anterior to this again is a fine black zigzag line extending
from the abdominal margin to the second median nervure; the abdomi-
nal margin bears three fine parallel white lines, the innermost on the
extreme margin. Antennae black. Thorax and abdomen above black,
beneath whitish. Cilia whitish.

Near to D. dipoea, Hewitson, which occurs in the Himalayas from
Mussoorie to Sikkim, and again in the Naga Hills; differs therefrom
in its smaller size, the clearer ochreous shade of the ground-colour on
the underside, all the bands and spots being pure white instead of more
or less ochreous or silvery, and the anal lobe being bisected by an
ochreous line. D. dracon agrees very closely with the two specimens
of a Dodona probably from Western Yunan referred to in the last para-
graph of the description of D. dipoea in Butt. of India, vol. ii, p. 311,
but those specimens are larger, the ground-colour on the underside is
of a more reddish shade, and all the markings are not of so pure a
white colour, nor are they quite so clearly defined.

Described from a single example taken at Kangmong in Hsenwi,
North Shan States, on 9th March, 1895, by Major F. B. Longe, R. E.,
who has generously presented the specimen to me.

Family LYCÆNIDÆ.

12. Castalius roxana, de Nicéville, Plate II, Fig. 10, ♂.

id., Watson, l. c., p. 661, n. 165.
Habitat: North Shan States and North Chin Hills, Upper Burma.

Expanse: ♂, 1·0 inch.

Description: Male. Upperside, both wings white. Forewing with a broad basal black area which is reduced at the middle of the costa to a fine line, and gives off a small black tooth at the end of the discoidal cell; the outer margin broadly but decreasingly black; from the second median nervule to the inner margin are two conjoined round black spots, the upper the smaller, the lower joined posteriorly to the outer black margin. Hindwing with a submarginal series of six round black spots placed in pairs; the outer margin narrowly black. Underside, both wings white. Forewing with an oblique basal black band which reaches the costa at about its middle; a submarginal series of conjoined round-ed black spots, the series broken at the second median nervule, the portion posterior to that veinlet being shifted well towards the base of the wing; the outer margin narrowly black, bearing an obscure very fine macular white line. Hindwing with the base narrowly black; the three submarginal pairs of black spots as on the upperside; the margin narrowly black, including a series of small white spots. Cilia black.

Allied to C. roxus, Godart, differing therefrom (as figured by Horsfield in Cat. Lep. Mus. E. I. Co., pl. ii, figs. 4, 4a (1828), from Java), in having the white area on the upperside of the forewing somewhat larger; in the hindwing the white area is twice as extensive, permitting the appearance of the three pairs of black spots near the margin which in C. roxus are lost in the outer black area occupying nearly half the surface; on the hindwing on the underside there are two black spots only in the middle of the submarginal series, in C. roxus there are three; and the marginal series of white spots on both wings are far more prominent in C. roxus than in C. roxana. Dr. O. Staudinger in Iris, vol. ii, pp. 95, 96 (1889), has described "Lycæna" roxus, var. angustior from Palawan in the Philippines; L. roxus, var. celebensis, from Celebes; and L. roxus, var. cohaerens from New Guinea, Timor, and Wetter. None of these varieties agree with the present form.

Described from a single example kindly given to me by Major F. B. Longe, R. E., which was captured by the donor in the Kokang State in the North Shan States on the Chinese frontier east of Bhamo, at 5,500 feet elevation. Capt. E. Y. Watson possesses another specimen from the Upper Chindwin Valley in Upper Burma, taken in March, 1893, and Colonel C. H. E. Adamson probably possesses a third specimen from Burma taken at Aloungdan Kathapa, in the Lower Chindwin District, in January.
13. Hypolycaena danisoides, n. sp., Plate III, Fig. 21, Ω.

Habitat: Ke Islands. [? Mansinam and Ceram, Grose Smith.]

ExpansE: 2, 1.4 inches.

Description: Female. Upperside, both wings differ from the figure of "Myrina" danis, Felder, Reise Novara, Lep., vol. ii, p. 240, n. 273, pl. xxx, figs. 12, 13, female (1865), from Halmahera (Gilolo), in having the discal white band fully twice as broad, with straighter edges, thereby greatly reducing the extent of the plumbeous ground-colour. Underside, both wings have the discal white band of the same breadth as in "M." danis, but that species as figured has its outer edge tinted with yellow, there being no trace of this colour in the species here described. Male (also of M. danis) unknown.

The lunular markings on the upperside of the hindwing are most gorgeously iridescent, varying in different lights from dull leaden-blue to brilliant purple and then to emerald-green. On the underside these markings are metallic (not iridescent) pale silvery-blue.

Described from a single specimen received from Herr Heinrich Kühn. It has only two subcostal nervules to the forewing, and appears to be a true Hypolycaena. This is probably the species referred to by Mr. Henley Grose Smith in Novitates Zoologicae, vol. i, p. 583, n. 267 (1894), under the name of Sithon danis, Felder, thus:—"One example from Mansinam [? Dutch N.-W. New Guinea]. The white area is more extended on both wings than in Felder's type, but I have specimens in my collection from Ceram, captured by Mr. Wallace, which agree with Mr. Doherty's specimen. Possibly it may be a distinct species." Mr. Hamilton H. Druce in Ann. and Mag. of Nat. Hist, sixth series, vol. xiii, p. 252 (1894) notes:—"Myrina danis, Felder, cannot, in my opinion, be placed in this genus [Hypochlorosis, Röber = Pseudonotis, H. H. Druce] as, besides possessing two tails and a distinct lobe to the anal angle, it presents a somewhat different arrangement of the nervules in the forewing, the costal nervure and the first subcostal nervule being bent towards each other and running side by side for some short distance. The palpi, as pointed out by Dr. Felder, are different, the third joint being longer and the second shorter; the eyes also are hairy. It is closely allied to Hypolycaena."

Genus Bullis, nov.

Very close to Britomartis, mihi, Journ. Bomb. Nat. Hist. Soc., vol. ix, p. 304 (1895), from which it differs only in the absence in the male of a large patch of androconia on the upperside of the forewing occupying the outer three-fourths of the discoidal cell, and extending into the discoidal and median interspaces; the apex of the forewing
is more produced, the outer margin consequently straighter; the second subcostal nervule arises nearer to the first than to the apex of the discoidal cell, in Britomartis it arises nearer to the end of the discoidal cell than to the first subcostal nervule; no third subcostal nervule. The eyes are naked. Type, Britomartis buto, de Nicéville, l. c., p. 308, n. 29, pl. P, fig. 41, male ( nec female).

(1) Bullis buto, de Nicéville.


Habitat: Ataran Valley and Daunat Range, Tenasserim, Burma; N.-E. Sumatra.

14. (2) Bullis valentia, Swinhoe, Plate III, Figs. 18, 3; 17, 7.


Habitat: Cherra Punji (Swinhoe); Khasi Hills, Assam.

Expanse: 3, 1·20; 7, 1·15 inches.

Description: Male. Upperside, both wings differ only from B. buto, de Nicéville, in having the blue coloration of a slightly richer and deeper shade and not turning to emerald-green in any light as it does in B. buto. Underside, both wings have the ground-colour of a darker, more plumbeous, shade. Forewing has the narrow discal macular band or line straight, not slightly outwardly curved; it is also more irregular and broken. Hindwing has the marginal black spot in the first median interspace less broadly crowned with yellow of a darker shade; and the short yellow band anterior to the anal lobe is half as broad and therefore further removed from the discal line, and of a deeper shade of yellow. Female. Upperside, both wings dull fuscous; cilia cine-reous. Forewing has the discoidal cell, the base of the wing, and the disc as far as the inner margin dull blue. Hindwing has the costa only broadly plumbeous or dull fuscous; the abdominal margin whitish; the rest of the surface dull blue; a small obscure round marginal black spot in the first median interspace; a marginal black thread inwardly defined with a still narrower white thread extending from the anal angle as far as the blue area reaches; the anal lobe small and black, bearing outwardly a few dull blue scales. Underside, both wings as in the male.

Described from nine males and one female kindly sent to me by the Rev. Walter A. Hamilton. The acquisition of both sexes of B. valentia makes it clear that the specimens of B. buto described by me are males and not females. The absence of the "male-mark" which is so conspicuous in Britomartis cleboides, Elwes, led me to conclude

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that my specimens were females, though the shape of the wings should have enlightened me as to their true sex. A closely allied species appears to be the “Tajuria” dominus from Kina Balu, Borneo, described by Mr. H. H. Druce in Proc. Zool. Soc. Lond., 1895, p. 600, pl. xxxiii, fig. 12, male, but that species has the “sexual mark” on the upperside of the forewing in the male more isolated, being outwardly bounded by a streak of the blue ground-colour, the apex of the hindwing is more broadly black; and on the underside the anal area of the hindwing is much more broadly yellow, the two patches being confluent instead of well separated. The shape of the hindwing also differs, it being much more produced at the apex in T. dominus than in B. valentia. As Mr. Druce has placed dominus in the genus Tajuria it is presumed that it has three subcostal nervules to the forewing unlike valentia, which has only two, though Colonel Swinhoe overlooked that fact. I had described this species as new before Colonel Swinhoe’s description of it was published. I have, however, since received a specimen of his species from him, and find that the two are synonymous, so my MS. name is of course suppressed.

15. Hysudra (?) hades, de Nicéville, Plate IV, Fig. 29, ♀.


Habitat: Danum Range, Tenasserim, Burma.

Expanse: 2, 1·5 and 1·7 inches.

Description: Female. Upperside, both wings hair-brown with a distinct gloss in some lights. Cilia cinereous. Forewing somewhat paler on the disc. Hindwing with the costal and abdominal margins somewhat paler than the rest of the surface; the anal lobe bearing a small obscure black and dull ochreous spot. Underside, both wings grey, of a paler shade than in the male, but all the markings precisely the same.

Described from two examples in my collection.

16. Rapala albapex, n. sp., Plate III, Fig. 23, ♂.


Habitat: Borneo (H. Druce); Labuan (H. H. Druce); Sandakan, North Borneo.

Expanse: ♂, 1·65 inches.

Description: Male. Upperside, both wings bronzy shining brown. Forewing with an elongated fusiform discal pale yellow streak, highly attenuated at both ends, occupying the posterior half of the discoidal cell but not reaching the base, extending beyond the cell into the lower discoidal interspace; the apex broadly dusted with white scales,
Indo-the, in the middle of the first median interspace. Hindwing with the costa as far as the subcostal nervure and the second subcostal nervure pale yellow, with two somewhat indistinct similar streaks in the subcostal and discoidal interspaces; the apex narrowly pale yellow; the abdominal margin broadly pale yellow; the anal lobe pale yellow, outwardly with a crescent of black scales; a white anteciliary line from the anal angle to just beyond the root of the tail; tail black with a white tip. Cilia of the forewing from the apex as far as the first median nervure white, with a prominent anteciliary black thread, posteriorly black; of the hindwing pale yellow at the apex, thence to the anal angle black. Underside, both wings pale yellow. Forewing with the inner margin whitish centred with fuscos; a large prominent black spot crossing the middle of the discoidal cell; a similar wedge-shaped one at the middle of the costa; and a smaller round one in the second median interspace; a prominent anteciliary black thread; the sexual tuft of hairs from the inner margin near the base of the wing turned under and forwards rather small and deep black. Hindwing with an elongated oval marking anterior to the anal angle commencing from the internal nervure, consisting of a pale yellow centre, bounded by a black line, and then an equally broad bluish-white line, this ring-spot gives off outwardly a short black line, which is posteriorly defined by a bluish-white line; a marginal black fascia, commencing very narrowly at the lower subcostal nervure, increasing in width till it reaches the third median nervure; in the submedian interspace a little removed from the margin is a clump of irrorated black scales; the anal lobe is black, crowned with a clump of pale silvery-greenish scales. Cilia of the forewing anteriorly whitish, posteriorly black; of the hindwing anteriorly as far as the lower subcostal nervure pale yellow, thence to the second median nervure black, thence to the anal angle white tipped with black. Antennae black, but the base of the club white. Frons and palpi pale yellow; a pale yellow line surrounding the eyes. Body above dark brown, beneath and legs pale yellow.

Mr. H. H. Druce has (l. c.) given a short description of this species, but did not name it. It can at a glance be distinguished from "Deudorix" domitia, Hewitson, from Malacca (Butler and Staudinger), Singapore (Hewitson), Sumatra (Grose Smith), Kepras, N.-E. Sumatra (de Nicéville and Martin), and Billiton Island (Snellen), by the pale yellow markings of both wings on the upperside, and by the apical white patch on the forewing; on the underside the ground-colour is of much paler shade of yellow.

Described from a single example kindly given to me by Mr. E. F. Sketchly, who captured it at Sandakan on the 10th May, 1888.
17. Delias dives, n. sp., Plate I, Fig. 1, ♂.

Habitat: Penang.

Expanses: ♂, 2-6 inches.

Description: Male. Upperside, both wings chalky-white, all the veins black. Forewing with the discoidal cell, especially outwardly, slightly dusted with black scales; the outer margin black, this black border extending along the veins for a short distance, the area between this black border and the end of the cell heavily sprinkled with black scales. Hindwing unmarked, except that the outer margin is narrowly black. Underside, forewing white; the costa broadly extending into the discoidal cell and all the veins heavily bordered with black, so that the ground-colour is reduced to narrow streaks between the veins; a sub-apical series of five prominent cordate white spots from the costa to the second median interspace, the first spot small, the second the largest, the rest decreasing in size, these spots shew through faintly on the upperside. Hindwing chrome-yellow; all the veins narrowly but prominently defined with black; the outer margin narrowly black inwardly defined by white spots between the veins.

Allied to D. agostina, Hewitson, from Sikkim, Bhutan, Assam and Upper Burma, from the same sex of which it differs on the upperside in having the forewing heavily infuscated on the outer half, on the underside of that wing in having the series of subapical spots smaller and fewer in number, the second spot of D. agostina being absent in D. dives; on the hindwing in having all the veins conspicuously defined with black, and with no submarginal black line inwardly defining the series of marginal white spots as there is in D. agostina. Other more distantly allied species are D. themis, Hewitson, from the Philippines, D. cathara, Grose Smith, from Kina Balu mountain in North Borneo, and D. agoranis, Grose Smith, from Burma. The D. singhapura of Wallace, from Singapore, Sumatra and North Borneo, is also closely allied, but the apex of the forewing as figured—the male by Wallace and the female by Grose Smith and Kirby—is greatly produced, and the black border to the hindwing on the underside is twice as broad, and encloses a row of six paired whitish spots between the veins. Herr H. Fruhstorfer has recently briefly described in "Societas Entomologica," p. (1897), Delias singhapura, subspecies distincta, from the Province Amuntai in South Borneo, which probably is another allied species, but without a figure it is difficult to make out exactly what it is like, especially as nothing is said about its outline.

Described from a single example in my collection.
18. **Parapieris** *chumbiensis*, n. sp., Plate I, Fig. 6, ♂.


**Habitat:** Chumbi Valley, Eastern Thibet.

**Expansé:** ♂, 2·2 inches.

**Description**: Male. **Upperside**, both wings pure dead chalky-white; the base thickly sprinkled with black scales. **Forewing** with a small black spot on the lower disco-cellular nervule; the costa very narrowly black; the apex widely black, this black colour rapidly decreasing on the outer margin till at the termination of the first median nervule it entirely disappears, the black colour extending narrowly along the veins on to the disc of the wing; a large round black spot on the middle of the second median interspace bounded by the veins; posterior to this spot is a small clump of black scales. **Hindwing** with the veins sometimes very narrowly black; a large round apical black spot placed between the subcostal nervules; with sometimes three discal small round black spots in the middle of each interspace posterior to the subapical spot. **Underside**, **forewing** with the ground-colour pure dead chalky-white; all the veins narrowly black, the disco-cellular spot larger than on the upperside, covering both the disco-cellular nervules; the apex and outer margin narrowly and decreasingly ochreous; all the veins black, that colour widening out on the veins as they reach the outer margin; the round black spot in the second median interspace as on the upperside; in continuation of which to the submedian nervure is a narrow streak of powdery black scales. **Hindwing** with the base of the costa rich chrome-yellow; the rest of the wing ochreous; all the veins broadly defined with black; with a powdery rather indistinct curved discal black band, the bifurcated streak in the submedian interspace as far as the discal band only rich chrome-yellow. **Cilia** throughout white. **Female** unknown.

Diffs from the same sex of *Pieris dubernardi*, Oberthür;† (to judge from his figure only, I have not seen a specimen) on the upperside of the forewing in the costa being less black, there is a line of the white ground-

* The genus *Parapieris* I propose for *Papilio callidice*, Esper (the type), and its allies. A full description of it will appear in vol. iv of "The Butterflies of India, Burmah and Ceylon" by myself. *P. chumbiensis* doubtfully belongs to the genus *Parapieris*, but I do not know any described genus in which it could be more appropriately placed.

† *Pieris dubernardi*, Oberthür, Études d'Entomologie, vol. ix, p. 13, pl. i, fig. 6, male (1884); *Aporia dubernardi*, Leech, Butt. from China, p. 467, pl. xxxvi, fig. 8, female (1894).
colour between the black costa and subcostal nervure, in _P. dubernardi_ the costa is entirely black as far as that vein; the discal black spots are smaller and isolated, in _P. dubernardi_ they are conjoined; on the hindwing the discal spots are all smaller, in the type the apical one is alone present; on the underside of the forewing the black spot at the end of the discoidal cell is larger and much more prominent, the discal black spots are much smaller and all isolated instead of being conjoined into a broad black fascia; the ground-colour of the apex of the forewing and the entire hindwing is of a different shade of yellow, in _P. chumbiensis_ it is ochreous, in _P. dubernardi_ it is “canary and nankin yellow;” and lastly the shape of the wings is quite different, being much shorter in the present insect, giving it a much more “chubby” appearance, in _P. chumbiensis_ the forewing measures 26 mm., in _P. dubernardi_ 31 mm., while the breadth of the wings is the same in both species.

“This species is only known to me from some eight or nine specimens, which were brought by a native employed by the late Capt. Harman, R. E., in surveying the Tibetan frontier, and may not occur on this side of the passes. It agrees very well with Oberthür’s figure and description, taken from two specimens obtained at Tsekou, in Eastern Thibet, which, like my own, were all males.” (Elwes, l.c., in Trans. Ent. Soc. Lond.) From these eight or nine specimens mentioned above Mr. Elwes has presented two to the Indian Museum, Calcutta, and they constitute the types. The species does not seem to have been met with again, and its exact habitat is not known, but as this side of the passes has been well explored entomologically the butterfly probably does not occur in British territory but in the Chumbi Valley, just across the dividing pass between Native Sikkim and Thibet. _P. dubernardi_ is found in Tsekou, Ta-chien-lu, Ni-tou, Wa-ssu-kow, and Chow-pin-sa, in Western China.

19. _Gonepteryx zanekoides_, n. sp., Plate I, Figs. 2, δ; 7, θ.

_Habitat:_ South Chin Hills, Upper Burma.

_Expanse:_ δ, θ, 2-1 inches.

_Description:_ Very near to _G. zaneka_, Moore, from the Western Himalayas. **Male.** Differs from the same sex of that species in having the forewing markedly broader, the costal margin not constricted at half its length* but straight, the apex not so produced. **Hindwing** distinctly broader than in _G. zaneka_, almost of the same shade of brimstone as the forewing, the outer slightly paler than the basal half of the wing, in _G. zaneka_ it is pale cream-colour of a uniform shade. **Female.** Forewing agrees in shape with that of the male, consequently differs from the

* Mr. Moore says that this is so in _G. zaneka_, by which I presume he means that the costa is slightly excavated in the middle, which is the fact.
same sex of G. zaneka in being broader, with a straight instead of excavated costa, and the apex less produced. Hindwing also broader than in G. zaneka. Otherwise similar to G. zaneka. The highly dentate hindwing in both sexes will distinguish G. zaneka and G. zanekoides from G. aspasia, Méntríes.

Mr. Moore’s figure of G. zaneka (Proc. Zool. Soc. Lond., 1865, p. 493, n. 35, pl. xxxi, fig. 18) is very bad; though the sexes are so different, I am unable to say which sex he has figured, and he does not furnish the information. Mr. Leech (Butt. China, p. 444 (1894) says that G. zaneka “Is probably only a local race” of G. aspasia, while it is with extreme doubt he allows the latter species specific rank, but says that it is probably a variety only of G. rhamni, Linnaeus. As far as India goes, however, G. zaneka and G. rhamni are absolutely distinct species, the male of the former can instantly be detected by its small size, difference in the colour of the wings, and the highly scalloped hindwing; while the female is markedly smaller, and also has the hindwing scalloped.

I am indebted to Capt. E. Y. Watson for a pair of this species, which were captured by Mr. L. A. Thruston at 7,000 feet elevation in the Southern Chin Hills during the rains. Capt. Watson has a second male specimen in his collection. Geographically G. zaneka and G. zanekoides are widely separated, and it is highly improbable that any species linking them together will be found in the mountains which lie between the Western Himalayas and Upper Burma.

Subfamily Papilioninae.

20. Papilio (Byasa) polla, de Nicéville, Plate IV, Fig. 28, ♂.


Habitat: North Shan States; North Chin Hills, 5,000 feet. 

Expanse: ♂, 5’0 inches.

Description: Male. Upperside, both wings shining black. Forewing with the usual three deep black longitudinal streaks in the discoidal cell, and similar ones between the veins on the disc. Hindwing with a large discal pinkish-white patch, the patch occupying the outer end of the cell, anteriorly bounded by the second subcostal, posteriorly by the first median nervule, the inner half of the portion in the first median interspace being heavily sprinkled with black scales, the outer edge of the patch is scalloped; four large submarginal carmine lunules all irrated with black scales, the anterior one in the subcostal interspace whitish; tail broadly tipped with carmine; the posterior end of the abdominal fold and the two tooth-like projections of the wing-membrane between it and the tail, as well as the first
projection beyond the tail, somewhat broadly edged with carmine. **Underside**, both wings as above but of a duller shade of black. **Forewing** as on the upperside. **Hindwing** with the discal pinkish-white patch extending quite up to the cell but not invading its outer end, the patch is inwardly continued from the first median nervure to the submedian nervure by a carmine spot; the submarginal lunules as above but of a pure rich carmine, the two interior ones continued to the outer marginal carmine edging to the wing, which latter is broader than on the upperside, as also is the carmine tip to the tail. Palpi, orbits, head, and thorax anteriorly carmine; thorax posteriorly and abdomen above black; thorax and abdomen beneath carmine; anal valves carmine; antennae and legs black.

Very near to *P.* (Byasa) *latreillei*, Donovan (= *P.* *minereus*, Gray), of which I have good series of males from Tehri Garhwal and Sikkim; differing therefrom on the upperside of the hindwing in the discal white patch being larger (placed further from the outer margin), extending into the discoidal cell instead of ending (as a rule) considerably before the end, and occupying anteriorly an additional interspace, in *P.* *latreillei* the patch is bounded in front by the discoidal nervure, in *P.* *polla* it reaches the second subcostal nervure; by the outer margin and the end of the tail being broadly edged with carmine instead of having black cilia only; on the underside of the hindwing in *P.* *latreillei* there is invariably a small white marginal spot in the subcostal interspace which is wanting in *P.* *polla*; sometimes in *P.* *latreillei* there are two small white spots, sometimes one only, usually none, in the discoidal interspace in continuation of the discal white patch, these in *P.* *polla* being developed into a very large quadrate white spot, which is, in fact, much the largest spot of the four forming the patch; the broad carmine margin is also very distinctive of *P.* *polla*, being wholly absent in the allied species.

Described from a single male for which I am indebted to Major F. B. Longe, R. E., captured in the Kokang State, 3,500 feet, in the North Shan States, on the Chinese frontier east of Bhamo, on 5th April, 1895, also from an exceedingly worn and faded female in Captain E. Y. Watson’s collection caught in the North Chin Hills of Upper Burma at 5,000 feet elevation in the rains. The latter appears to differ only from the male on the upperside of the hindwing in the white patch being continued posteriorly to the abdominal margin, or nearly so, and not reaching into the end of the cell.

21. *Papilio* (Sarbaria) *doddsi*, Janet, Plate IV, Fig. 30, ♂.


**Habitat**: Tonkin (Janet); South Shan States.
INDO- and Austro-Malayan Regions.

1897.

Expanse:♂, 5'1 to 5'5 inches.

Description: Male. Upperside, both wings black. Forewing a little transparent, somewhat sparsely sprinkled throughout (except narrowly along the outer margin) with rich deep green scales which are highly deciduous and easily removed; the usual three longitudinal deep black streaks in the discoidal cell, and similar streaks on the disc between the veins; the outer two-thirds of the submedian nervure, the first and second median nervules, and a similar streak in the submedian interspace bearing feather-like lengthened scales which are certainly a male secondary sexual character. Hindwing with the anterior half rich dark purple sprinkled as in the forewing with green scales; the outer half of the wing also similarly but more thickly sprinkled; an anal deep red ocellus with a large black centre in the submedian interspace, bearing in the middle of the red portion anteriorly an obscure violet line; an exactly similar lunule on the margin in the first median interspace; and traces of similar lunules in the second median and discoidal interspaces. Underside, forewing with the base black, the outer two-thirds whitish, becoming black again narrowly on the outer margin and widely at the apex; four prominent black streaks in the cell, with similar streaks between the veins on the disc. Hindwing deep black, the base and abdominal margin sparsely sprinkled with dull green scales; a prominent complete series of seven submarginal deep red lunules, each bearing anteriorly a violet line, the two anal ones developed into ocelli with large round black centres. Cilia black, but the internervular incisions white. Head, thorax and body above black, sprinkled with green.

Superficially resembling P. (Pangeranopsis) elephenor, Doubleday, of which I possess specimens from Jorehat and Cachar in the Assam province, and from Manipur, from which P. doddsi differs in the hindwing being one-third broader, the wing-membrane being produced into a very short and blunt tail-like projection at the termination of the second median nervule, in P. elephenor the hindwing is quadridentate; on the underside of the hindwing in having a complete series of submarginal red lunules, in P. elephenor the lunule in the second median interspace is entirely absent (vide Westwood's figure in Cab. Or. Ent., pl. xxxi, fig. 2*, male) or obsolete; and, most important of all, P. elephenor has the palpi, the orbits and the head beneath dark ochreous, and the abdomen at the base beneath and broadly along each side paler ochreous, while all these parts in P. doddsi are black. P. doddsi is almost precisely similar to P. dialis, Leech, from Western China, Butt. China, p. 532, pl. xxxii, fig. 4, male (1894), but that species has a long spatulate tail which in P. doddsi is reduced to a mere tooth. Though
superficially this species is nearest to *P. elephenor*, it is probably biologi-
cally more closely allied to *P. bianor*, Cramer, from China and Japan,
and its allies, all of which have long tales.

I possess a single male of this very beautiful and interesting
butterfly which I owe to the kindness of Col. Woodthorpe, R. E., who
captured it near the Siamese frontier when with the Anglo-French
Boundary Commission.

Since the above was written I find that this species has been
described by M. Armand Janet, who quite correctly points out that it is
probably a tailless form of *P. (Sarbaria) bianor*. It has, however,
the sexual cottony streaks far smaller and very inconspicuous instead
of large and striking. Major F. B. Longe, R. E., has also very kindly
given me a single male of *Euplexamina* (Zethera, Janet) *noirei*, Janet,
from the Nam Lim Valley, in the South Shan States, 2,500 feet, also
captured by the officers of the above-named boundary commission and
described in the same paper as *P. doddsi* (p. 216).

22. *Papilio (Paranticopsis) polynices*, n. sp.

Habitat: Sikkim; Upper Burma (Rothschild).

Expanses: *♂*, 3'4; *♀*, 3'8 inches.

Description: Male. Does not differ from the same sex of *P. indicus*
Rothschild.*

Female. Upperside, forewing differs from that sex of
*P. indicus* in being like its own male; *i.e.*, in having all the normal
hyaline markings present, in the female of *P. indicus* the submarginal
series of nine rounded spots only are present, the rest of the wing
being fuliginous. Hindwing has the hyaline markings rather broader
than in *P. indicus*. Underside, forewing as on the upperside. Hindwing
as on the upperside has the castaneous-fuscous ground-colour less exten-
sive, the hyaline markings therefore being broader.

This species (or subspecies according to Mr. Rothschild’s views) is
based on the female sex, which I have from Sikkim only. Mr. Rothschild
records a female from Upper Burma received from Mr. H. Fruhstorfer;
this locality requires confirmation I think before it is finally accepted.
Of *P. indicus* I have females from the Khasi Hills only, but none from
Burma, where the males are common.

23. *Papilio (Paranticopsis) phrontis*, n. sp.

Habitat: Sikkim; Bhutan.

Expanses: ♀, 2'8 to 4'2; ♂, 4'5 to 4'6 inches.

Description: Male. Does not differ from the same sex of
*P. xenocles*, Doubleday. Female. Upperside, forewing differs from the
same sex of *P. xenocles* in being like its own male; *i.e.*, in having all

* P. macareus *indicus*, Rothschild, Nov. Zool., vol. ii, p. 457 (1895); vol. iii, p. 68,
n. 202 (b) (1896).
the normal hyaline markings present and large, in *P. xenocles* they are smaller, and those in the discoidal cell and the four rounded spots immediately beyond it are sometimes nearly obliterated, though in some specimens they are all, or nearly all, fully developed; moreover in *P. xenocles* the ground-colour is browner, less fuscous, than in *P. phrontis*, and usually has a bluish tint or gloss which it never has in the latter. *Hindwing* differs in having the ground-colour of a more castaneous, less fuscous, colour, the anal chrome-yellow spot about four times as large, with all the hyaline markings more extensive, the one in the discoidal cell usually entire instead of being prominently divided into two markings. **Underside**, both wings have the ground-colour paler, and the hyaline markings larger, and all more fully developed, instead of being more or less obliterated as they are in *P. xenocles*. *Hindwing* has the anal chrome-yellow spot many times larger.

Mr. Rothschild in Nov. Zool., vol. ii, p. 458, n. 203 (1895) notes that “If the Assam [and Burma] females are all of the dark colour, and the Sikkim and Bhutan females of the light colour, *P. xenocles* must be divided into two local races, of which the Assamese [and Burmese] one would be typical.” I possess three females from Sikkim of *P. phrontis*, and eight females from the Khasi Hills and Tenasserim of *P. xenocles*, all of which appear to be quite constant to their respective regions, so that I am of opinion that they represent two distinct species or local races, rather than that the females are dimorphic, of which latter view of the facts there appears to be no evidence, though Mr. Rothschild says that the female of *P. xenocles* “is dimorphic.”

Family HESPERIIDÆ.

24. **Odina ortygia**, de Nicéville, Plate II, Fig. 15, ♂.


**Habitat**: Daunat Range, Tenasserim, Burma.

**Expanse**: ♂, 1 45 inches.

**Description**: Male. **Upperside**, both wings rich orange with black markings. *Forewing* with most of the veins outlined in black; the costa narrowly black, the apex widely black, the outer margin narrowly black; the inner margin still more narrowly black; the rest of the wing broken up by narrow black lines into spots of the ground-colour of various sizes and shapes. *Hindwing* with the costal, outer and abdominal margins all narrowly black, the rest of the surface broken up into irregular tessellations by intervening black lines. **Underside**, both wings marked precisely as on the upperside. *Antennae* black, the club (all except the whip-like point) almost entirely shining white beneath. *Palpi* black above, orange beneath. **Head** orange, but with a
narrow black line connecting the bases of the antennæ. Thorax orange, but streaked and barred with black. Abdomen orange, ringed above with black, the apex black. Legs mixed orange and black.

This species is probably the one recorded from India by Capt. E. Y. Watson as Odina hieroglyphica, Butler, in Journ. Bomb. Nat. Hist. Soc., vol. ix, p. 422 (1895), on the authority of a specimen so named in Colonel C. H. E. Adamson’s MS. list of his collection from Tounggya Sekkan, Upper Tenasserim, captured in February, 1881. O. ortygia is nearest to the specimen figured by Distant in Rhop. Malay., p. 470, n. 2, pl. xlv, fig. 25 (1886), as “Plastingia” hieroglyphica, Butler, from Perak, but that figure shews the black bands on the wings on both surfaces twice as wide. It is more distantly allied to the true “Plastingia” hieroglyphica, Butler, from Sarawak (Borneo), from which it differs on both sides in all the black markings being even more greatly reduced than in the Malayan Peninsula form, all the orange markings therefore greatly enlarged. It may be said (to judge from Mr. Butler’s figure of that species) that it is a black insect with yellow spots, while O. ortygia is a yellow insect with narrow black lines dividing the surface into irregular orange tessellations. Dr. Martin and I have recorded O. hieroglyphica from a single specimen from N.-E. Sumatra, but that specimen is not available to me for comparison, being now in the collection of the Hon. Walter Rothschild. Lastly, Herr Georg Semper in Schmett. Philipp., p. 314, n. 472, pl. xlix, fig. 11, male (1892), has described “Plastingia” cuneiformis from a single male from Mindoro in the Philippine Isles, which differs from O. ortygia in having the black areas still more largely developed even than in the Bornean O. hieroglyphica. All the species of this group seem to be excessively rare, I know of only six recorded examples. The type of the genus is Odina chrysomeleæna, Mabille, Bull. Soc. Ent. Belgique, vol. xxxv, p. cxiii (1891), from Mangkassar (Macassar) in Celebes, which is probably quite distinct from the other described species, though it is difficult to say how it differs from them as M. Mabille’s description is very short and is non-comparative.

Described from a single example in my collection.

Genus Inessa, nov.

Male. Forewing, costa very straight, if anything very slightly emarginate in the middle; apex acute; outer margin convex; inner angle acute; inner margin straight; costal nervure short, ending on the costa long before the upper end of the discoidal cell; subcostal nervules arising at progressively decreasing distances apart; discoidal cell narrow, short, extending to beyond the middle of the wing; upper disco-cellular
nervule strongly outwardly oblique; middle disco-cellular long, strongly inwardly oblique; lower disco-cellular short, upright; lower discoidal nervule arising much nearer to the third median than to the upper discoidal nervule; third median nervule arising at the lower end of the cell; second median arising well before the lower end of the cell; first median arising about twice as far from the second as the second does from the third; submedian nervure straight; secondary sexual character consists of an indistinct oblique discal streak of black modified scales arising about the middle of the submedian nervure and ending on the third median nervule near its origin, thus crossing three interspaces. Hindwing, considerably longer than broad; costa well arched throughout; apex rounded; outer margin rounded; anal angle rather acute; abdominal margin slightly convex; costal nervure slightly curved only, ending at the apex of the wing; first subcostal nervule arising well before the upper end of the cell; second subcostal arising at the end of the cell; disco-cellular nervules straight, outwardly oblique; discoidal nervule wanting; third median nervule arising at the lower end of the cell; second median arising just before its end; first median arising about twice as far from the second as the second does from the third—all the median nervules arising close to the lower end of the cell; submedian and internal nervures straight. Antennae long, more than half but less than two-thirds as long as the costa of the forewing, with an elongated, well-formed club, the terminal crook (which is at right-angles to the shaft) about as long as the broadest part of the club. Palpi wanting. Thorax moderately stout. Abdomen slender, reaching a little beyond the outer margin of the hindwing. Legs, foreleg, tibia with an epiphysis; hindleg, tibia with terminal and medial pairs of spurs. Type, Inessa ilion, de Nicéville.

This genus would appear to come near to Isoteinon, Felder, Idmon, de Nicéville, Arnetta, Watson, Itys, de Nicéville, Zographetus, Watson, and Isma, Distant.* but the loss of the palpi in the type makes it difficult to exactly locate it; the secondary sexual character will distinguish it from them all however.

25. Inessa ilion, n. sp., Plate IV, Fig. 33, ♂.

Habitat: Lombok.

Expanse: ♂, 1·3 inches.

Description: Male. Upperside, both wings shining fuscous, in

* Mr. Osbert Salvin writes to me that the unique type of the genus Isma (obscura, Distant), “Has a small tuft of hair on the upperside of the hindwing placed on the subcostal nervure along the upper edge of the discoidal cell; on the underside of the forewing near the middle of the inner margin in another tuft; the anal angle of the hindwing is very distinctly fringed as in the genus Lophoides, Watson.”
some lights the whole surface of a beautiful vinous colour; the markings translucent and colourless. Forewing with an elongated streak in the discoidal cell not reaching the base, inwardly ending in a fine point, outwardly broad, lying along the median nervure, its outer end touching a much smaller spot which reaches the subcostal nervure; three conjoined subapical dots, the middle one out of line with the rest, nearer the base of the wing; a series of four small discal spots placed in a straight inwardly-oblique line, the anteriormost the smallest, placed in the lower discoidal interspace, the next two increasingly larger in the median interspaces placed outwardly against the black sexual brand, the lowermost also placed outwardly against the brand, in the submedian interspace, touching that vein, small; an opaque ochreous streak along the basal half of the sutural area. Hindwing with a small spot in the middle of the discoidal cell; a very irregular discal band, formed of four portions, divided only from one another by the crossing veins; the anteriormost portion in the lower discoidal interspace somewhat quadrate; the two following portions elongated, out of line with the rest, projected towards the base of the wing, the anterior of the two rather the longer; the posteriormost portion in the submedian interspace somewhat hour-glass shaped, that is to say constricted in the middle on both sides, but that portion nearer the abdominal margin is larger than that portion touching the first median nervule. Underside, both wings fuscous, without any purple gloss. Forewing marked as on the upperside, except that the opaque streak in the sutural area is absent. Hindwing as on the upperside.

Described from a single example kindly given to me by Herr H. Fruhstorfer, and captured by him in the eastern province of Lombok at 2,000 feet elevation in April, 1896.

26. Isma idyalis, n. sp., Plate IV, Figs. 26, ♂; 32, ♀.

Habitat: Burma; Java.

Expanse: ♂, 1·2 to 1·3; ♀, 1·6 inches.

Description: Male. Upperside, both wings fuscous with a vinous gloss; and with subhyaline lustrous pale ochreous spots. Forewing with two elongated spots towards the outer end of the discoidal cell, the lower immediately below the upper and about twice as large; two or three subapical dots, the lower when present nearer the outer margin than the other two (which are immediately one above the other), and the smallest; three increasing discal spots; the uppermost in the lower discoidal interspace a mere dot; the middle one much larger, triangular, filling the base of the second median interspace; the lowermost very large, quadrate, in the lower median interspace, its outer edge concave, its inner edge convex; a rounded spot in the middle of the submedian
interspace, touching the submedian nervure. Hindwing with three conjugated spots in the middle of the disc, the middle one nearest the outer margin, the innermost one the largest. Underside, both wings fuscos, thickly irrorated or overlaid with ochreous scales. Forewing with the inner margin extending broadly on to the disc fuscos; the spots as on the upperside, except that the one in the submedian interspace is larger with diffused edges. Hindwing as on the upperside. Cilia pale ochreous-fuscos throughout. Antenne black, the tip of the club, excluding the whip-like tip, shining white beneath. Female. Upperside, both wings fuscos, lacking altogether the vinous gloss of the male, the base irrorated with ochreous scales. Otherwise as in the male.

Near to Isma bononia, Hewitson, described from Singapore, in my collection from Perak and N.-E. Sumatra, but that species has typically no spots in the discoidal cell of the forewing. Also near to Isma inarime, de Nicéville, from Perak, N.-E. Sumatra, Java, and Pulo Laut, but the spots on the hindwing are smaller and differently shaped; they are also more numerous in that species. Also near to Isma feralia, Hewitson, described from Java, occurs also in N.-E. Sumatra and Pulo Laut, but in that species all the spots are pure translucent white instead of lustrous pale ochreous, and the spot in the submedian interspace of the forewing is quadrate and extends right across the space instead of being round and touching the submedian nervure, reaching only to the middle of the interspace. Also probably near to Isma obscura, Distant, from Singapore, but that species has one spot only in the discoidal cell of the forewing, and none on the hindwing on the disc. Also near to Isma submaculata, Staudinger, described from Palawan in the Philippine Isles, but in my collection from Karwar, North Kanara, Bombay Presidency; Cachar in Assam; Daunat Range, Tenasserim, Burma; Perak in the Malay Peninsula; N.-E. Sumatra; and Pulo Laut, but that species has no translucent spots whatever on the hindwing. The only other species of the genus known to me is Isma corissa, Hewitson = Isotainon indrasana, Elwes and de Nicéville, from Burma, N.-E. Sumatra, Java, and Pulo Laut, which is altogether a differently-coloured and marked species from the rest of the genus.*

Described from three males from Tounghoo and one from the Daunat Range, both in Burma, and two females from Java. The type is from Burma. I have not received both sexes from one locality, and it may be that the Javan is distinct from the Burmese species, the former having

* See footnote on p. 571 ante. None of the species here mentioned of the genus Isma have male secondary sexual characters, and are therefore probably generically distinct.
the two spots in the discoidal cell of the forewing placed nearer the base of the wing, the inner edge of the discal spot in the first median interspace being much nearer the outer than the inner edge of the spots in the cell than in the Burmese specimens, in the latter they are more immediately anterior to the large discal spot, the inner edge of the three spots being almost in a straight line and perpendicular to the inner margin.

27. Pirdana distanti, Staudinger, Plate II, Figs. 16, ♂; 13, ♀.


**Habitat**: Malacca; North Borneo (Staudinger); Karen Hills; Perak (Elwes); Perak, Malay Peninsula; N.-E. Sumatra; Java.

I have described this species very fully in the paper above quoted, so it is unnecessary to redescribe it here, but I take the opportunity to figure it now.

Dr. O. Staudinger in Iris, vol. ii, p. 141 (1889), describes a *Pirdana (Hesperia) distanti* from a female from Malacca, which is the same specimen which was identified by Hewitson as *Hesperia ismene*, Felder, and by Distant as the male (probably) of *Pirdana hyela*, Hewitson. From Staudinger’s description of this specimen *P. distanti* differs from *P. pavona* in having the upperside “dull dark smoke-brown, consequentially quite different from the black, and green in the basal area, of *P. hyela*.” But the male of *P. pavona* (not the female) agrees with this description, the female *P. pavona* agreeing with the same sex of all the species of the genus known to me in having the basal areas of both wings on the upperside glossed with deep shining steel bluish-green. I should say therefore that Distant was right in considering the type of *P. distanti* to be a male and not a female as Staudinger says it is; if Distant is right my *P. pavona* will sink as a synonym of *P. distanti*. But should the type of *P. distanti* be a female, my species will stand, as the female of *P. pavona* is quite distinct from the female of *P. distanti*.

P.S. Since the above was in type, Dr. Staudinger has most kindly sent me a coloured drawing of the type of his species, which proves to be the male of my *P. pavona*, the latter name therefore sinking as a synonym. He writes to me that he has another specimen from North Borneo exactly like the type, and one other from Preanger, West Java, which is a little different.

28. Padraona paragola, de Nicéville, Plate IV, Figs. 25, ♂; 31, ♀.


**Habitat**: N.-E. Sumatra.

Having described this species very fully in the paper quoted above
I will not repeat the description here, but take this opportunity to figure both sexes.

29. **Halpe hyrtacus**, n. sp., Plate III, Fig. 22, ♂.

**Habitat**: Wynaad; North Kanara—both in South India.

**Expanse**: ♂, 1.3 to 1.5; ♀, 1.6 inches.

**Description**: **Male.** **Upperside**, both wings and cilia shining dark hair-brown. *Forewing* with two dots placed obliquely outwards towards the end of the discoidal cell, one or both sometimes absent; three conjugated subapical dots, and two on the disc at the bases of the median interspaces, all these dots colourless and transparent; the "male-mark" shining deep black and narrow. *Hindwing* immaculate. **Underside**, both wings dull fuscous. *Forewing* with the transparent dots as on the upper; the inner margin very broadly white crossed in the middle by the "male-mark"; the costa outwardly tinted with ochreous; the apex bearing some obscure elongated dark dashes outwardly bordered with ochreous. *Hindwing* bearing a broad discal pure white band, broadest on the abdominal margin, not reaching the costa, anteriorly marked with one or two dark brown dots, sometimes with two or three in the middle; the outer dark half of the wing bearing some obscure ochreous spots. *Palpi* above, *thorax* and *abdomen* concolorous with the wings, beneath and *legs* yellowish-white. **Female.** **Upperside**, both wings as in the male, but the ground-colour paler. *Forewing* with no "male-mark." **Underside**, both wings as in the male.

Nearest to *Halpe brunnea*, Moore, Lep. Cey., vol. i, p. 174, pl. lxx, figs. 4, 4a, *female* (1881), with which it agrees closely on the upper but except that the transparent dots are even smaller than in the same sex of that species; the "male-mark" is quite the same; differing, however, on the underside by the presence of the large white area on the inner margin of the forewing, and the broad discal white band on the hindwing. *H. hyrtacus* is a very distinct species, and cannot be confounded with any other.

Described from a single example kindly given to me by Mr. V. S. Fellowes Wilson, who captured it at Pandalur in the Wynaad District on the 2nd September, 1895. Also from three males and a female in the collection of Mr. T. R. Bell, who bred them at Tarimpur in the North Kanara District in February and March, 1895. The transformations of the species will be found described in Journ. Bomb. Nat. Hist. Soc., vol. xi, p. 49, n. 212 (1897).

30. **Halpe hazis**, n. sp., Plate IV, Fig. 27, ♂.

**Habitat**: Nias Island.

**Expanse**: ♂, 1.15 inches.

**Description**: **Male.** **Upperside**, both wings hair-brown; *cilia*
ochreous. *Forewing* with a translucent ochreous dot in the subcostal interspace; two similar spots placed inwardly obliquely in the median interspaces, the upper the smaller and elongated, the lower quadrate. *Hindwing* immaculate. *Underside*, both wings ochreous-brown; all the markings tawny or deep ochreous. *Forewing* with a small oblong spot in the discoidal cell at the origin of the second subcostal nervule; the dot in the subcostal interspace as on the upperside, with a minute dot immediately anterior to it, divided from it by the subcostal nervure; the median spots as on the upperside; a submarginal series of five quadrate spots divided by the veins, the uppermost posterior to the fifth subcostal nervule rather larger than the others, the posterior-most in the upper median interspace. *Hindwing* with an irregular discal series of spots from the apex to near the middle of the abdominal margin, the middle spot quadrate and much larger than the others; an outer discal series of five crescentic spots, the concavity of each directed forwards, commencing just posterior to the second spot of the discal series and ending anterior to the submedian nervure, the posterior-most spot much larger than the others. *Antennae* dark brown, the club posterior to the whip-like apex ferruginous. *Head* and *body* above dark brown. *Abdomen* beneath pale brown.

This species seems nearest allied to *Halpe moorei*, Watson, and is, as far as I know, the only species of *Halpe* occurring in the island, except *H. zema*, Hewitson, of which *Hesperia ormenes*, Weymer, is a synonym. *H. hazis* differs from *H. moorei* in lacking entirely the sexual brand of that species on the forewing, in that wing there are only three spots on the upperside instead of at least six, usually seven, and the spots are ochreous instead of white; the cilia is not checkered as it is in *H. moorei*; the markings of the underside are very similar, but there are fewer of them in the present species, and they are deep ochreous rather than whitish.

Described from a single example kindly sent to me by Herr H. Fruhstorfer.
EXPLANATION OF THE PLATES.

Plate I.

Fig. 1. Delias dives, n. sp., ♂, p. 562.
" 2. Gonepteryx zanekoides, n. sp., ♂, p. 564.
" 4. Euploea (Vadebra) elwesiana, n. sp., ♂, p. 543.
" 5. Ypthima megalia, n. sp., ♂, p. 546.
" 8. Lethe (Kerrata) lynce, n. sp., ♂, p. 544.

Plate II.

Fig. 9. Calinaga cercon, n. sp., ♂, p. 550.
" 10. Castalius roxana, de Nicéville, ♂, p. 556.
" 11-12. Charaxes (Haridra) aristogiton, Felder, gynandromorphous example, p. 552.
" 15. Odina ortygia, de Nicéville, ♂, p. 569.

Plate III.

Fig. 17. Bullis valentia, Swinhoe, ♀, p. 559.
" 18. " " " ♂, p. 559.
" 20. " " " ♀, p. 547.
" 24. Charaxes (Haridra) connectens, n. sp., ♂, p. 554.

Plate IV.

Fig. 25. Padraona paragola, de Nicéville, ♂, p. 574.
" 28. Papilio (Byasa) polla, de Nicéville, ♂, p. 565.
" 30. Papilio (Sarbaria) doddsi, Janet, ♂, p. 566.
" 31. Padraona paragola, de Nicéville, ♀, p. 574.
" 32. Isma idyalis, n. sp., ♀, p. 572.
" 33. Inessa ilion, n. sp., ♂, p. 571.
Some new Indo-Malayan Orchids.—By G. King and R. Pantling.

In two papers recently read before the Society we gave descriptions of about sixty new species of Orchidaceae from the Sikkim-Himalaya. In the present paper we offer descriptions of forty-six species from other parts of the Indian Empire which we believe to be hitherto undescribed. In order to assure ourselves of their novelty we sent either a specimen or a careful drawing of each of them to the Royal Herbarium at Kew for comparison. And to Mr. W. T. Thiselton Dyer, F.R.S., C.M.G., Director of that Institution, our thanks are due for his courtesy in having the comparisons most promptly and carefully made by Mr. R. A. Rolfe of the Royal Herbarium, who for many years has made Orchids a special study.

MALAXIDEÆ.

*Oberonia Gammiei*, n. spec. *Stems* very short, not tufted. *Leaves* ensiform, obliquely acuminate, slightly falcate. *Inflorescence* slender, decurved from the middle, longer than the leaves; the peduncle winged in its lower half, ebracteate, or with very few bracts near the raceme; the raceme sparsely-flowered, its rachis more slender than the peduncle; floral bract equalling the stalked ovary, oblong, blunt, erose. *Flowers* '05 in. long, brown, with pale margins. *Sepals* ovate, acute, entire. *Petals* ovata-lanceolate, erose, reflexed and lying on the ovary like the sepals. *Lip* slightly exceeding the sepals in length, broadly ovate in general outline, deeply concave, 3-lobed; lateral lobes long, narrow, coarsely serrate, their apices acute and pointing forwards; the terminal lobe rather small, transversely oblong, sub-entire; its apex truncate, divided into two short incurved sub-quadrate lobules by a sub-quadrate sinus. *Clinandrium* much wider than the anther. *Pollinia* elongate, obovoid.

In the Sunderbans; Lower Bengal; on trees; G. A. Gammie and R. L. Heinig, No. 92. At Rangamatia in the Chittagong Hill Tracts; Gamble, No. 6533; in flower from December to March.

This species is allied to *O. iridifolia*, Lindl., and to *O. recurva*, Lindl. It has, however, a much fewer-flowered raceme than *O. iridifolia*; the lip of this is concave, more distinctly three-lobed than in *O. iridifolia*, while the lateral lobes in this are serrate, not pectinate, and the terminal lobe is sub-quadrate with (except for the apical sinus) almost entire edges. This is a much larger plant than *O. recurva*, from which it also differs in the lip, which in that species is flat with large rounded crenate side lobes; while the terminal lobe is rather deeply divided into two oblong blunt lobules.
Oberonia subnavicularis, n. spec. Stems very short, tufted. Leaves unequal, ensiform, obliquely acuminate, length 1'75 to 6 in., breadth '25 to '5 in. Inflorescence scarcely so long as the leaves; its peduncle erect, terete, ebracteate; raceme much longer than the peduncle, slightly decurved, densely flowered, thick at the base and tapering to the apex; floral bract small, only half encircling the thick ovary, lanceolate, erose. Flowers about '05 in. long. Sepals broadly ovate, blunt, entire, reflexed on the ovary. Petals narrowly oblong, truncate, entire, also reflexed. Lip about as long as the sepals, broad, very concave from base to apex, entire, the edges coarsely retroserrate; the apex blunt, emarginate and with a broad tooth in the sinus; upper surface with a large depressed cordate nectary near the base. Lip of the anther acute.

Perak; Scortechini, No. 1202; in flower in August.

In externals this resembles O. iridifolia, Lindl.; but this differs in having a terete wingless peduncle, a small floral bract which only half encircles the ovary, linear-oblong blunt petals, and a very concave (not lobed) retroserrate lip with a large nectary near its base. The late Father Scortechini collected only three specimens of it, and of one of these he made a drawing which is now in the Calcutta Herbarium.

Oberonia Ritaíi, n. spec. Stems very short, tufted. Leaves linear-ensiform, acuminate, 1 to 5 in. long and 2 to 3'5 in. broad. Inflorescence recurved from about the middle, rather longer than the leaves; the peduncle short, terete, bracteate; the raceme densely-flowered; floral bract lanceolate, acuminate, erose, longer than the stalked ovary. Flowers 1'06 in. across, pale-green, sub-verticillate. Sepals and petals sub-equal, ovate, blunt, spreading, the latter with sub-crenate margins. Lip slightly longer than the sepals, and broader at the apex, 3-lobed, the basal lobes large, erect or slightly incurved, rounded or pointed, their bases connected by a deep semi-lunar nectary; terminal lobe large, ob-reniform, the apical sinus broad and with a broad triangular process at its apex. Capsule ovoid, ribbed, pedicelled.

Khasia Hills; at Jowai; elevat. 2000 to 3000 feet; S. E. Rita; Mann, G. A. Gammie; in flower in August.

A species belonging to the group to which belong O. myriantha, O. recurva, O. demissa and O. micrantha; but distinguished from all these by the large erect entire basal lobes of the lip and by its broad obreniform terminal lobe. We have named it after Mr. S. E. Rita of the Assam Commission, to whom we are indebted for much generous help in the collection of the orchids of the Khasia Hills.

Oberonia intermedia, n. spec. Caulescent; stems 1 to 3'5 in. long, tufted. Leaves equitant, acute, subfalcate, 1 to 2'25 in. long
and .25 to .35 in. broad. Inflorescence slender, decurved, about 4.5 in. long; the peduncle short and ebracteate, adnate to the uppermost and reduced leaf; the raceme many-flowered. Flowers about .05 in. long, verticillate; floral bract lanceolate, shorter than the ovary. Sepals subequal, ovate, acute, spreading. Petals linear-oblong, acute, spreading. Lip larger than the sepals and petals, broadly oblong in general outline, 3-lobed; the basal lobes rounded; apical lobe sub-rotund, somewhat contracted at the base, the apex broad and erose, otherwise entire.

Perak: Scortechini No. 1516 (with drawing).

A species allied to O. demissa, Lindl. and to O. micrantha, King and Pantling; but differing from both in having linear-oblong acute petals, and also in the shape of the basal lobes of the lip which in O. demissa are blunt and erose, in O. micrantha broad rounded and subentire, while in this they are oblong and entire. The apical lobe of the lip of this is also slightly different from that of the other two, being in outline more orbicular, and erose only at the apex. The leaves of this are moreover longer than those of O. micrantha, while the raceme differs from that of O. demissa in not being truncate.

Oberonia Proudlockii, n. spec. Whole plant six inches in height, or less. Stems very short, tufted. Leaves ensiform, acute, not falcate or only slightly so, fleshy but with thin edges, 1 to 2.5 in. long and .25 to .5 in. broad. Inflorescence about twice as long as the leaves, erect below but slightly decurved above; the peduncle about as long as the spike, fleshy, 2-winged, ebracteate; rachis of the spike thick; fleshy, terete. Flowers numerous, reddish-brown, .05 in. long, sunk singly in pits in the rachis, the perianth adpressed to its surface; floral bract covering the flower-buds, longer than the sub-sessile ovary, ovate-rotund, fleshy in the middle but with broad membranous laciniate margins. Sepals reflexed, ovate, acute, entire. Petals ovate-lanceolate, entire, reflexed on the ovary like the sepals. Lip broader but hardly longer than the sepals, convex, sub-quadrate; the base truncate and with an obscure rounded auricle at each extremity, slightly narrowed to the broad sub-truncate apex, the margins slightly and obscurely erose but not lobed; nectary small, elliptic-rotund, deep, situated at the base just under the column.

Nilgiri Hills; near Gudalur, Mr. R. L. Proudlock; in flower in September.

A species allied to O. pachyrachis, Reichb. fil., and O. orbicularis, Hook. fil., and still more closely to the Sikhim species O. pachyphylla, K. & P.; but differing from them all by its reflexed sepals and differently shaped lip.
OBERONIA CAUDATA, n. spec. Caulescent; stems about 1·5 in. long, tufted. Leaves four or five, distant, linear-ensiform, acuminate, falcate, '75 to 2 in. long, and '15 in. broad. Inflorescence adnate to the uppermost and reduced leaf, much decurved, about as long as the longest leaf; its peduncle short, ebracteate; the raceme laxly-flowered. Flowers solitary, about '05 in. long; floral bract ovate, entire, longer than the stalked ovary. Sepals subequal, ovate-oblong, acute, pale red, slightly reflexed. Petals linear-lanceolate, acuminate, reflexed, paler and more hyaline than the sepals. Lip much longer than the sepals or petals, 3-lobed; basal lobes ovate, acuminate, spreading; terminal lobe narrow, deeply divided into two caudate acuminate wavy divergent lobules.

Perak: Scortechini No. 315b.

A species allied to O. caulescens, Lindl., but differing by the adnate peduncle, the much narrower petals which are moreover acuminate, and also by the lip which in this has narrower basal lobes which also are acuminate. The apical lobules of this are moreover longer than in the lip of O. caulescens, and they are undulate.

OBERONIA ROLFSENA, n. spec. Stems about an inch long, tufted. Leaves ensiform, acute, falcate, rather thin, '75 to 1 in. long and about '25 in. broad. Inflorescence three or four times as long as the leaves, slender, decurved, puberulous; the peduncle shorter than the leaves, bracteate; raceme rather sparsely flowered for the genus; floral bract oblong, blunt, with erose hyaline edges, shorter than the glandular-hairy stalked ovary. Flowers '05 in. long, orange-coloured. Sepals subequal, ovate, obtuse, sub-coriaceous, entire, spreading. Petals linear, sub-acute, entire, spreading. Lip longer that the sepals and petals, broad and concave towards the base; basal lobes rounded, erect, entire, terminal lobe narrow, shortly bilobed at the recurved apex, its edges entire.

Perak: Scortechini No. 2193.

A species collected only once by the late Father Scortechini who made a drawing of it. The species is apt to be confused with O. ciliolata, Hook. fil., which it much resembles in general appearance, and in having a glandular-pubescent inflorescence; but it differs from that species in its lip, the terminal lobe of which in O. ciliolata is much broader than long and has fimbriate edges.

OBERONIA BERTOLDI, n. spec. Stems very short, tufted. Leaves coriaceous, narrowly lanceolate, acuminate; length '5 to 1·25 in., breadth '2 to '25 in. Peduncle of the inflorescence about as long as the leaves, slender, ebracteate; the spike rather longer than the leaves, many-flowered. Flowers '05 in. long, in verticels of about 6; floral
bract about as long as the ovary, lanceolate, erose-serrate. Sepals elliptic-oblong, sub-acute, entire, revolute. Petals lanceolate, coarsely serrate, spreading, the apices slightly incurved. Lip longer than the petals, ovate-elliptic, not lobed, the base rounded and entire, the sides with one or two irregular teeth; the apex deeply bifid, the lobules irregularly and coarsely toothed.

Perak; Scortechini No. 1525.

A species closely allied to O. Prainiana, King and Pantling, which was collected by Scortechini in Perak, but which has also been found at the base of the Sikkim-Himalaya. The lip of O. Prainiana, K. and P., differs from the lip of this in not being bifid, and in being irregularly lobulate-erose from base to apex; the petals also are longer. Named in honour of its discoverer, the late Father Bertold Scortechini.

Microstylis Andamanica, n. spec. Stem about 2½ in. long, covered by 2 or 3 loose sheaths with acute apices. Leaves three or four, membranous and plicate, broadly ovate-lanceolate, oblique, acute or shortly acuminate, rather abruptly and obliquely narrowed at the base to the sheathing petiole; length 3 to 5 in., breadth 1½ to 2 in., petiole about 1 in. long. Inflorescence about twice as long as the leaves; the peduncle ribbed, ebracteolate; the raceme rather laxly-flowered; the floral bract lanceolate, acuminate, shorter than the slender stalked ovary, reflexed. Flowers dull purple, 4 in. long. Dorsal sepal lanceolate, obtuse; the laterals oblong, obliquely acuminate. Petals linear, blunt, shorter than the dorsal sepal. Lip flat, ovate, tapering to each end; the apex pointed, entire; the base with two rather short falcate acute converging lateral lobes, their tips often touching or overlapping.

South Andaman Island; King's Collectors.

The nearest ally of this is no doubt M. Wallichii, Lindl., to which species Sir Joseph Hooker tentatively refers it as a form (Ann. Bot. Gard. Calcutta, Vol. V, Pt. 1, t. 2, fig. E, and Fl. Br. Ind. V, 686). Sir Joseph however expresses the belief that it will turn out to be a distinct species. Ample materials recently received from the Andamans show that this is really the case. The flowers are larger than those of M. Wallichii; they are uniformly of a dull purple colour, the apex of the lip being entire and acute, and the basal auricles falcate acute and converging, while both sepals and petals have recurved margins. In M. Wallichii, on the other hand, the apex of the lip is blunt and notched; the basal auricles are lanceolate, their inner edges straight and parallel, and their apices not converging.

Liparis Prazeri, n. spec. Terrestrial; pseudo-bulb narrowly ovoid, pointed, about one inch long, enveloped by one or two loose scarious sheaths, and bearing near its apex two sub-opposite leaves. Leaves
membranous, ovate, acuminate; the base rounded and passing abruptly into the short loose sheath, 7- to 9- nerved; length 3'5 to 5'5 in., breadth 2'25 to 2'75 in. Inflorescence much longer than the leaves, slender, striate; raceme as long as the ebracteate peduncle, few-flowered; floral bract lanceolate, shorter than the slender pedicelled ovary, reflexed. Flowers 4 in. long, pale-green with a shade of yellow, (fide collector) their ovaries nearly 5 in. long. Sepals lanceolate, reflexed, the dorsal narrower than the lateral pair. Petals linear; their margins, like those of the sepals, revolute. Lip deflexed from the very base, flat, broadly obovate, the margins entire, the base with two small rounded calli. Column almost straight, not winged at the apex and not dilated at the base.

The nearest ally of this appears to be the North-West Himalayan species L. rostrata, Reichb. fil., from which this however differs in having an entire lip with two calli at its base, a more elongated pseudo-bulb and almost sessile leaves. It also resembles L. deflexa, Hook. fil., but differs from that in having nearly sessile broader leaves and an entire lip. It belongs to the section Mollifolium.

Upper Burma; at Kendat; Calcutta Botanic Garden Collector; flowering in August; Kurz (without flower) No. 345.

Dendrobium Ritaeanum, n. spec. Stems slender, formed of chains of slender pseudo-bulbs with fibrous remains of old sheaths at the joints, branching; the branches consisting of sessile sub-cylindric pseudo-bulbs about 1'25 in. long and 2'25 in. thick. Leaf solitary, from the apex of the pseudo-bulb, lanceolate-oblong, sub-acute, 2'25 to 3'5 in. long, and 5 in. wide. Flowers 5 in. across, solitary on a very short peduncle; floral bract minute, triangular. Dorsal sepal ovate-lanceolate; the lateral pair falcate, sub-acute. Petals oblong, shorter than the sepals. Lip in general outline spatulate; the lateral lobes small, projecting, obliquely obtuse; terminal lobe deeply divided by a blunt apical sinus into two broadly elliptic blunt lobules; the disc between the lateral lobes occupied by a thickened purple area sub-spathulate in shape and having a slightly raised mesial line. Column and its foot rather long; mentum short, wide. Clinandrium laciniate; lip of anther 2-lobed.

Khasia Hills; elevation 3-4000 feet; collected by Mr. Rita, after whom it has been named.

A species belonging to the Section Cadetia and allied to D. Macraci, Lindl.; but with pale yellow, instead of white, flowers and with much smaller leaves; also having a very different lip from that species and more slender pseudo-bulbs.

Dendrobium Sordidum, n. spec. Stems erect, branching; pseudo-
bulbs 2 to 3 in. long, springing from the sides of stem, oblong, slightly sigmoid, wrinkled. Leaf solitary from the apex of each pseudo-bulb, narrowly oblong, blunt, entire, 3 to 3·5 in. long and about 5 to 7·5 in. broad. Flowers 7·5 in. across, solitary from a short minutely bracteate pedicel from the apex of the pseudo-bulb with the leaf. Sepals sub-equal, oblong, sub-acute, the dorsal rather wider. Petals narrowly oblong, acute, spreading and slightly reflexed like the sepals. Lip longer than the sepals in general outline, oblong-ovate; the side-lobes narrow with acute apices; the terminal lobe large, fleshy, sub-reniform, divided at the apex into two broad lobules separated by a rather wide blunt apical sinus, and the base of each lobule boldly undulate-crenulate; the disc between the side-lobes with two ridges straight at the base but much crisped and curved upwards. Column broad, its foot short, both deeply concave. Clinandrium dentate; lip of anther erose.

Burma; received at the Botanic Garden, Calcutta, from Mr. Peché, of Moulmain; flowering in June.

The petals and sepals are of a pale yellow colour, flushed with brown outside. The basal half of the lip is pale yellow spotted with brown; the terminal half is deep yellow. This species belongs to the Section Cadetia and is nearly allied to D. Macraei, Lindl., but differs from that species in having shrunk sub-sigmoidal pseudo-bulbs, and shorter leaves; and in having the mid-lobe of the lip more fleshy and the side lobes acute at the apex, while the face of the column and its foot are deeply concave. The species in the Herbarium is probably confused with D. Macraei.

Dendrobium Gamblei, n. spec. Stems pendulous, slender, 18 to 24 in. long, with short scarious sheaths at the joints. Leaves unknown. Flowers 7·5 in. across, in pairs from the joints of the leafless stem. Sepals and petals sub-equal, lanceolate, acuminate, with reflexed tips; the edges of the petals sub-undulate. Lip broadly elliptic when flattened out, not lobed, convolute throughout its entire length, the apex blunt, the edges fimbriate-seriate, the base entire and narrowed into a long claw; the upper surface with a broad central band from base to apex, glabrous and with two grooves in its basal half, densely villous in its apical half. Column much broader than its elongated narrow foot, with a lacinate nectary at its lower extremity; mentum elongate, slightly curved, spur-like. Lip of anther denticulate.

Dehra Dun: Mr. J. S. Gamble, after whom it is named; collected only once; in flower in July.

The sepals and petals of this species are pale greenish-yellow; the lip is pink except the villous band near its apex which is yellow. The flowers are inodorous. The species belongs to the section Endendro-
but the in floral stig-
the in D. macro-
stachyum, Lindl.; but in that species the margins of the lip are slightly erose, not deeply fimbriate-serrate as in this; the disc is naked in that, or has only a few scattered hairs; the nectary and anther are entire in D. macrostachyum, and the flowers, which are sweet-scented, are in racemes.

Bulbophyllum depressum, n. spec. Pseudo-bulbs obliquely depressed-ovoid, '25 in. long, produced at distances of '2 in. on a filiform rhizome. Leaf sessile, broadly ovate, acute, the apex shortly aristate, length '4 in. Flowers '2 in. long, solitary, from the bases of the pseudo-bulbs; the ovary slender, about as long as the flower; floral bract ovate, acute, shorter than the sessile ovary. Sepals equal, linear-oblong, acuminate, connivent. Petals fleshy, less than half as long as the sepals, oblong, slightly ob-lanceolate, acute. Lip shorter than the sepals, decurved from the middle; oblong, 3-lobed; the lateral lobes erect, large, broadly oblong, oblique, their edges irregularly dentate-serrate; apical lobe fleshy, blunt, entire, its base much thickened. Column very short, only about half the length of the foot, without teeth. Pollinia very unequal.

Khasia Hills; in wooded hollows between Jowai and Jhorain; Jaintia Hills; elevation 3000 feet; Pantling No. 627.

The sepals of this interesting little plant are greenish, shading towards the middle into dull purple; the petals and lip are of a uniform dull purple. The species is closely allied to B. Listeri, a species described in a former number of this Journal (Vol. LXIV, Pt. 2, page 334). But that has a lip with no lobes, and its column has long subulate apical processes; its lip moreover is linear-oblong. It is also allied in habit to B. Epicrianthes, Hook. fil., which has however totally different petals, being thread-like and pendulous.

Bulbophyllum Colletitii, n. spec. King and Pantling. Pseudo-bulbs oblong, '75 to 1 in. long, situated an inch and a half apart on a wiry rhizome. Leaf solitary, elliptic-oblong, blunt, suddenly contracted at the base, sessile; length '1.5 to 2 in., breadth '4 to '6 in. Scape not longer than the pseudo-bulb, bearing several sheaths and also 3 or 4 spathaceous bracts just under the 2- to 6-flowered terminal umbel. Flowers pale yellow, '3 in. across; floral bract spathaceous, lanceolate, as long as the shortly stalked ovary. Sepals sub-equal, linear, acuminate, the dorsal rather shorter. Petals lanceolate, finely acuminate, slightly shorter than the dorsal sepal. Lip oblong-ovate, fleshy, with a broad shallow triangular groove extending from the base nearly to the apex. Column stout, the apex with two long subulate teeth; stigmatic surface large and excavated; the foot as long as the column,
much curved. *Anther* with a triangular concave lip; *pollinia* very unequal, the inner pair very narrow.

Assam; collected by Mr. G. E. Rita and also by Sir Henry Collett, K.C.B., lately commanding the troops in Assam.

A species allied to *B. cauliíflorum*, Hook. fil., which is, however, a much larger plant with slightly different sepals and petals. The habit of growth of the two is moreover different, for this species grows in dense masses, whereas *B. cauliíflorum* is very straggling, and there is a difference of two months between the seasons of flowering of the two. This is allied also to *B. protractum*, Hook. fil., but has longer and more numerous flowers than that species, and the petals are lanceolate-acuminate; whereas *B. protractum* has narrowly elliptic sub-acute petals and it has also narrower pseudo-bulbs.

**Bulbophyllum obíanceolatum, n. spec.** *Pseudo-bulbs* none; rhizome stout, densely clothed with coarse fibres and roots. *Leaves* rising singly from the rhizome, ob-lanceolate, sub-acute, tapering in the lower half to the stout plano-convex petiole; length of blade 6 to 8 in., breadth 1·15 to 1·4 in., length of petiole 2 to 2·75 in. *Raceme* from the rhizome near a leaf, with its peduncle as long as or rather shorter than the leaf; the peduncle forming one-third and bearing several lax membranous sheaths each 5 in. long. *Flowers* numerous but not crowded, 3 in. across; floral bract lanceolate, about as long as the stalked ovary. *Sepals* spreading widely, linear-lanceolate, finely acuminate, 1-nerved, the dorsal smaller than the lateral pair and gibbous at the base; the lateral pair subfalcate. *Petals* one-third of the length of the dorsal sepal, linear, acuminate, 1-nerved. *Lip* half as long as the dorsal sepal, curved from the base, 3-lobed; the side-lobes erect, rounded, gradually merging in front with the narrowly oblong sub-acute fleshy apical lobe. *Column* very short; the apical teeth small, sharp, erect.

Perak; on Gunong Batu Pateh, at an elevation of 3400 feet, Wray, No. 980.

The flowers are said by Mr. Wray to be of a pale straw colour. The species is allied to *B. apodum*, Hook. fil., but has a longer raceme and larger flowers than that species; moreover the petals in this are much shorter in proportion to the dorsal sepal, and the lip has very different side lobes.

**Bulbophyllum linearífolium, n. spec.** *Rhizome* 15 in., thickly clothed with short scarious sheaths; *pseudo-bulbs* none. *Leaves* solitary, about 5 in. apart, linear, slightly curved, acute, narrowed at the base to a petiole 1 to 2 in. long; length of blade 4 to 6 in., breadth 3 to 5 in. *Inflorescence* very slender, erect, subflexuose, about half as long as the
leaves; the peduncle about 1 in. long, clothed with tubular scarious sheaths. *Raceme* 3 or 4 times as long as the peduncle; many-flowered but not crowded. *Flowers* 125 in. long; floral bract lanceolate, acuminate, as long as the slenderly stalked tumid ovary. *Sepals* equal in length, blunt, oblong, spreading, the lateral pair broader than the dorsal and very falcate. *P petals* only half as long as the sepals and much narrower, linear, blunt, 1-nerved, spreading. *Lip* oblong, acute, slightly decurved from the base to the acute apex, without side lobes, the upper surface grooved from the base to near the apex. *Column* very short; its teeth small, blunt.

Perak; Scortechini (without a number).

A species near *B. suavissimum*, Rolfe, but with much smaller flowers and entire not cerose petals. The leaves of this differ also from those of that species in being linear and not at all ob-lanceolate.

*Bulbophyllum shanicum*, n. spec. *Pseudo-bulbs* turbinate, minutely rugulose, 3 or 4 in. in diam. *Leaves* in pairs, coriaceous, narrowly oblong, blunt, abruptly narrowed at the sessile base; length 1·5 to 2·25 in., breadth 3 to 4·5 in. *Scape* from the base of the pseudo-bulb, erect, twice as long as the leaves; the peduncle with a few small scattered sheaths; *raceme* lax, about 12-flowered. *Flowers* 15 in. long, white; floral bract broadly lanceolate, acute, shorter than the stalked ovary. Dorsal *sepal* ovate-oblong, blunt; the lateral pair oblong, sub-falcate, obtuse, blunt. *P petals* as long as the sepals but much narrower, lanceolate, obtuse, entire in the upper half and minutely cerose in the lower. *Lip* as long as the sepals, oblong, obtuse, without lobes or auricles, pubescent on both surfaces. *Column* stout, with broad shallow wings about the middle, the apical processes bidentate; foot long, not much curved. *Anther* with the anterior lip pressed inward, the apex mammillate.

Shan Hills, in Upper Burmah; in flower during November; Calcutta Botanic Garden Collectors.

A species of which the nearest ally is probably *B. suavissimum*, Rolfe. This however has two leaves, whereas the leaf in that is solitary. The flowers of this are moreover smaller than those of *B. suavissimum*.

*Bulbophyllum Vanessa*, n. spec. *Rhizome* slender, wire-like; pseudo-bulbs ovoid-conic, closely approximate, 1 in. in length and .7 in. in diam, at the base. *Leaf* solitary, sessile, very coriaceous, narrowly elliptic-oblong, the apex acute and minutely bifid, the base much narrowed and convolute; length 8 to 10 in., breadth 1·5 in. *Scape* slender, erect, 10 to 12 in. long, with one or two tubular sheaths in the lower fourth, otherwise naked, 1-3-flowered. *Flowers* expanding singly, 3·25 in. across; floral bract membranous, lanceolate, acuminate, .25 in.
long, shorter than the sessile ovary. *Sepals* subequal, lanceolate, finely acuminate; the lateral pair slightly falcate, 1·5 in. long, widely spreading, many-nerved. *Petals* very small, broadly ovate, obtuse, only about 1·2 in. long. *Lip* rather thin in texture, nearly as long as the sepals, lanceolate, acuminate, narrowed to the minutely aristate base; the upper surface with a central furrow in its basal half and a shallow lamina at each margin of the furrow. *Column* semi-terete, about three times as long as the petals; its foot slender, longer than and at right angles to itself. *Anther-lip* acute.

Perak; by the Batong Padang river; Mr. Ayre.

This belongs to a section of the large genus *Bulbophyllum* founded by Mr. H. N. Ridley, Director of the Botanic Garden, Singapore, under the name *Intervallate* (Journ. Linn. Soc. XXXI, 276) for the reception of a small group of species remarkable for possessing "a tall stiff scape ending in a many-flowered raceme, the flowers of which expand one by one at long intervals of time, the rachis slowly elongating as they expand, so that, though in one species as many as eighty flowers are eventually borne on the raceme, no two are open at one time, and many weeks elapse between the opening of the first and last flowers." A similar method of flowering occurs in Blume's genus *Dendrocalla*, also in the well-known *Oncidium Papilio*, Lindl., and in some other orchids. This species is intermediate between *B. tarde-florens*, Ridley and *B. stella*, Ridley (Journ. Linn. Soc. XXXI, 276, 277), but differs sufficiently from both to merit specific rank. A single specimen of it, accompanied by a pencil drawing numbered 434, was given to one of us by the late Father Scortechini many years ago, and as it appears to remain still undescribed, we now publish it.

The sepals of this are greenish-yellow with reddish markings, and the lip is of a dull carnation colour. The flower is a very striking one from its great size.

*Cirkhopetalum Proudlockii*, n. spec. Leafless at flowering-time. *Pseudo-bulbs* crowded, broadly ovoid, sometimes almost hemispheric, polished, 5 in. long, and about as broad at the base. *Inflorescence* 1·75 in. long; the peduncle erect, filiform, naked; the raceme decurved, 5 in. long, bearing 6 to 10 flowers each 5 in. long and of a pale straw colour; floral bract lanceolate, much shorter than the slenderly stalked funnel-shaped ovary. *Dorsal sepal* lying parallel with the column, oblong; its apex sub-acute, and slightly reflexed; the lateral pair twice as long, oblong, blunt, lying close together under the lip, touching by their inner surfaces but not connate, their apices somewhat everted; edges of all entire. *Petals* as long as the column and much shorter than the dorsal sepal, triangular, entire, the apices aristate. *Lip* as long as...
the dorsal sepal, oblong-elliptic, blunt, concave specially at the base, tumid. Teeth of the column erect, triangular, sharply pointed. Anther papillose at the summit; pollinia in two free pairs, the inner of each pair much reduced. Stigma transversely oblong.

Nilgiri Hills; at Ootacamund, Mr. R. L. Proudlock.

A species which might be placed either in Bulbophyllum or in Cirrhopetalum. Its nearest ally is probably O. viridiflorum. It has been collected only by Mr. R. L. Proudlock, late Curator of the Botanic Garden, Calcutta, now Superintendent of the Government Garden at Ootacamund, who kindly sent specimens; Pantling's drawing No. 615.

**EPIDENDREÆ.**

*Eria Brandisii*, n. spec. Leafless at flowering-time. *Pseudo-bulbs* turbinate, slightly apiculate, smooth, shrunken when in flower, '4 in. in diam. *Scape* from the apex of the pseudo-bulb, erect, filiform, 2 to 3 in. long, with a loose scarious short sheath at the base, otherwise naked. *Raceme* about '75 in. long, with 6 to 8 flowers about '2 in. long; floral bract ovate, acute, scarious, longer than the thin pedicel of the ovary. *Sepals* sub-equal, erecto-patent, lanceolate, acute; the lateral pair sub-falcate. *Petals* shorter than the sepals, oblong, sub-falcate, tapered to the blunt apex. *Lip* lanceolate with a broad base and very short broad claw, without side lobes, the apex obtuse; upper surface with an oval callus near the base and with an obscurely thickened line proceeding from it to the apex. *Column* short, winged near the apex; the foot of about the same length, narrow. *Anther* broad; *pollinia* elliptic.

Burma; at Pym Kyoon, on an old tree; Sir D. Brandis; in flower during March.

Leaves of this are unknown. It belongs to the Griffithian genus *Bryobium*, which has justly been reduced to a section of *Eria* by Mr. Bentham and Sir Joseph Hooker.

Its nearest allies in the section are *E. Dalzelli*, Lindl., *E. nana*, A. Rich., and *E. muscicola*, Lindl., from which it differs in having larger flowers with which the leaves are contemporaneous.

*Eria shanensis*, n. spec. Pseudo-bulbs ovoid, 1 to 1.5 in. long. *Leaves* 2 or 3, membranous, narrowly oblong, absent at flowering time. *Racemes* one or two, from the axes of the undeveloped leaves, 2 in. long, few-flowered; the peduncle, short, naked. *Flowers* '35 in. long, white; floral bract broadly lanceolate, reflexed, about as long as the slenderly pedicelled pubescent ovary. *Dorsal sepal* linear-lanceolate; the lateral pair twice as broad, falcate, acute. *Petals* narrowly oblanceolate, sub-
acute, sub-falcate, all boldly nerved. Lip as long as the sepals, broad, sub-quadrate; the side lobes large, rounded; the end lobe small, triangular, acute, and with numerous small conical calli on its upper surface; the disc with two small oblong calli near the base and a central thickened line running from the base to the calli of the middle lobe of the apex. Column short, stout, the foot very short.

Shan Hills; Burma; collectors of Botanic Garden, Calcutta.

A species belonging to the Section Hymeneria and allied to E. myristiformis, Hook., which has however a different lip with distinct lateral lobes, two ridges on the disc, and ridges instead of conical calli on the terminal lobe. The pseudo-bulbs of this are moreover longer and the racemes shorter than those of E. myristiciformis.

Pholidota Wattii, n. spec. Pseudo-bulbs about 5 in. long, fusiform, much narrowed at the base, rising about an inch apart from a stout woody rhizome clothed with dark cinereous scarious sheaths. Leaves 2, narrowly elliptic, acuminate, much narrowed at the base to the short petioles; length about 6 inches, breadth 1·75 in. (probably often much larger). Inflorescence about 6 in. long; the peduncle sub-erect, 2 in. long, almost entirely clothed with stout imbricate unequal bracts; the raceme much decurved, 4 in. long. Flowers secund, distichous, somewhat crowded, 2·75 in. in diam.; floral bract broadly ovate, sub-acute, cymbiform, longer than the stalked ovary. Sepals somewhat unequal, all spreading; the dorsal broadly elliptic, blunter; the lateral pair narrower, subacute. Petals linear, acuminate, 1-nerved, spreading, about as long as the sepals. Lip 3-lobed; the lower part deeply saccate and with 3 shallow lamellae, its edges bearing the erect rounded narrow side-lobes, and with a small fold near their bases; apical lobe transversely oblong, entire, much recurved, its disc quite smooth. Column stout, slightly winged near the apex. Anther convex, with a truncate lip lying immediately on the upper margin of the dilated stigma, and bearing on the middle of its upper surface a small viscid mass which is attached to the attenuated apices of the 4 clavate pollinia.

The sepals and petals are straw-coloured with a dash of pale green. The side lobes of the lip are pale brown, the apical lobe being of the same tint as the petals. The column is also pale brown. The curious viscid borne on the edge of the lip of the anther serves to attach to each other the narrow ends of the clavate pollinia.

Assam; collected by Dr. George Watt, C.I.E., in whose honour we have named it.

A species allied to the Burmese P. advena, Reichb. fil., but differing from that species in having linear petals, and in the apical lobe of the lip being entire and ecarunculate.
VANDEAE.

Phalenopsis Mastersii, n. spec. Roots abundant. Leaves oblong-ovate, the apices bluntly apiculate, the bases narrowed, length 1.25 in., breadth .75 in. Raceme three times as long as the leaves, sparsely-flowered. Flowers about .5 in. across; floral bract small, much shorter than the filiform stalked ovary. Sepals oblong; the dorsal with recurved margins; the lateral pair flat, sub-acute, strongly reflexed, their surfaces touching below. Petals falcately oblanceolate, much and irregularly undulate. Lip small, much shorter than the sepals or petals; the side lobes triangular, acute, erect, the disc between them bearing a fleshy 3-crested callus; the apical lobe oblong, blunt, much decurved, entire. Column with two erect conical teeth near its base. Pollinia sub-globular, the candelicle oblanceolate, the gland large.

At the Nambur Falls in Assam; Masters, February, 1845.

A species allied to P. Esmeralda, Reichb. fil., but a much smaller plant and with flowers one-half the size of those of that species. This is described from a specimen in the Calcutta Herbarium which has been hitherto overlooked. The species has not, so far as we are aware, been collected since Masters' visit to the Nambur Falls fifty-two years ago.

Biermannia, new genus.

Epiphytal; stem very short. Leaves three or four, fleshy, linear. Raceme about as long as the leaves. Sepals sub-equal, ovate-lanceolate, the lateral pair attached to the base of the column. Petals shorter than the sepals. Column straight, with a short foot at right angles to itself. Lip attached at right angles to the foot of the column, as long as the petals, concave, fleshy, lobed or not; the disc with two or more calli; apex broad or sub-acute. Stigma large, orbicular. Anther depressed, apiculate, shortly beaked in front; pollinia 2, oval, attached by a subulate candelicle to a small gland. Capsule cylindric, ribbed, narrow. Two species, one in the Khasia Hills and the other in the Sikkim-Himalaya.

A genus allied to Doritis, but distinguished from it by the absence of forked appendages on the disc.

Biermannia quinquecallosa, n. spec. A small plant with erect stem scarcely one inch in length. Leaves fleshy, narrowly oblong, the apex minutely bifid, somewhat narrowed to the base, length about 1 in., breadth .25 in.; flowering-peduncle axillary, about as long as the leaves, bearing at the apex one or two flowers about .3 in. across; floral bract minute, much shorter than the cylindric sub-sessile ovary. Sepals and petals sub-equal, oblong, sub-acute; the dorsal free from the lateral
pair at its base. Lip inserted on the short foot of the column, nearly as long as the sepals and petals, ovate when flattened out; the margins entire and involute, the apex blunt, erose; the upper surface with a large erect conical mealy callus near the base and, towards the apex, four smaller globular calli arranged in a transverse row. Column stout, bearing the stigma low down. Anther with a broad truncate lip; pollinia 2, globose, colourless, slightly cleft behind; caudicle dilated near the pollinia, the gland elliptical. Capsule 1·5 in. long.

Jaintia Hills; growing on a tree of Pinus Khasiana at Jowai, at an elevation of about 4000 feet; Pantling No. 631; in flower during July.

This species is allied to B. bimaculata, King and Pantling (in Ann. Botanical Garden ined.) but is a smaller plant and its lip has side-lobes. The flowers are white, the lip alone being yellow. They appear singly and last for only half a day.

Saccolabium Collettianum, n. spec. Stem very stout, clothed in sheaths of fallen leaves. Leaves very coriaceous, flat with prominent midrib, narrowly oblong; bifid at the apex, the lobules blunt and unequal; the base not narrowed where jointed to the rather wide sheath; length 12 to 14 in.; breadth 1·25 to 1·4. Panicle slightly supra-axillary, rigid, shorter than the leaves; the branches few, spreading, few-flowered. Flowers 4 in. long; bract lanceolate, much shorter than the stalked ovary. Sepals broadly elliptic, blunt, spreading. Petals smaller, sub-acute, spreading. Lip two and a half times longer than the sepals and somewhat longer than the ovary, consisting chiefly of a long narrowly infundibuliform slightly curved spur without a septum, but slightly constricted in two places near the tip; the mouth of the lip wavy, side-lobes none; apical lobe a minute triangular protuberance from the mouth of the spur. Column short. Anther depressed, with a short truncate beak; pollinia 2, obliquely obovoid, bifid, diverging, attached by the cylindric caudicle to the large cuneately quadrate-cordate gland.

Shan Hills, in Upper Burma; Collectors of Calcutta Bot. Garden; in flower during July.

The flowers of this are rose-coloured, the tint towards the mouth of the spur being darker than elsewhere.

A species in habit much resembling S. ochraceum, Lindl., and S. longifolium, Hook. fil. (of the section Acampe). The flowers, however, are similar to those of S. ampullaceum, Lindl. (of Sir Joseph Hooker’s section Speciosa) but have a lip with a minute terminal lobe, whereas the terminal lobe of the lip of S. ampullaceum is large.

Saccolabium coarctatum, n. spec. Stem slender, pendulous, 2 to 4 in. long and 2·5 in. thick. Leaves pendulous, narrowly oblong, tapering
to the oblique but not bifid apex, narrowed to the base, sessile; length 6 to 8 in., breadth about 1 in. Racemes less than \('5\) in. long, short, extra-axillary, few-flowered. Flowers opening only one at a time, fugaceous, \('5\) in. long. Sepals narrowly elliptic, sub-acute. Petals shorter than the sepals, ob-lanceolate, acute. Lip rather shorter than the sepals, laterally compressed, sub-rhomboid when viewed from the side, chiefly consisting of a funnel-shaped blunt pouch, with straight upper edges, and a short horizontally-projecting bluntly-triangular, fleshy, smooth apical lobe. Column short, thick. Anther apical, horizontal, the lip trilobulate; pollinia 2, globose, the caudicle ligulate, the gland obovate.

Jaintia Hills at Amwee, elevation 3,000 feet; Pantling No. 625; flowering in June.

This species was collected by Mr. Pantling during the cold season of the present year. It flowered in cultivation in June. The flowers are white with purplish-brown markings on the column, and with small spots of the same tint on the sepals, petals, and lip. The apical lobe of the lip is of a bright yellow. This differs from all Indian species of the genus hitherto described by its curious pouched lip much compressed laterally. The flowers resemble those of the plant figured in the fifth volume of the Annals of the Calcutta Bot. Garden under the name Sarcochilus brachyglottis, Hook. fil. The lip of the present species has however no calli or septum inside it, and it is perfectly smooth; and the pollinia also are quite those of Saccolabium, being globose and not partite, and the column is without a foot.

Saccolabium crassilabre, n. spec. Pendulous; stem 2 or 3 in. long. Leaves coriaceous, flat, oblong; the apices sub-acute, entire, length 3\(^{5}\) to 5 in., breadth about 1 in. Inflorescence from the stem below the leaves; the peduncle 1\(^{5}\) to 2 in. long, slender, bearing a single short bract about the middle and, at the apex, 3 or 4 sub-umbellate flowers about \(\frac{75}{100}\) in. in diam.; floral bract ovate, acute, about one-fifth of the length of the stalked ovary. Sepals unequal, spreading; the dorsal elliptic, acute; the lateral pair larger, ovate-elliptic, acute. Petals slightly shorter and much narrower than the sepals, sub-spathulate, blunt, spreading. Lip attached to the sides of the column for its whole length, consisting of a deep wide pouched sac bearing two minute falcate side-lobes, the apical lobe reduced to a fleshy thickening of the apex of the sac, bearing a projecting callus inside near its base; the sac e Septate, but with a few stiff glandular hairs near the bottom of its anterior wall. Column short, with a cluster of papillae at its lower extremity extending into the sac of the lip. Lip of anther truncate; rostellum short, straight. Pollinia 2, colourless, deeply bipartite, attached in pairs to the small gland.
Khasia Hills; at an elevation of 3,000 feet; Pantling drawing No. 628; in flower during July.

The sepals and petals are of a dull yellow, the lip being white with irregular rose-coloured spots.

The characters of the flower in this plant are more those of *Saccolabium* than of any other Indian genus. The wide pouched lip, adhering to the column from its apex downwards, and expanding below its base into a wide espetate sac, is a character which brings this into alliance with the group of species in *Saccolabium* of which *S. calceolare* is the type. There is, however, in this no distinct apical lobe, but only a great thickening of the anterior extremity of the mouth of the wide sac of which the lip practically consists, and in this respect it differs from *S. calceolare* and its immediate allies.

*Sarcanthus Rolfeanus*, n. spec. *Stems* slender, pendulous. *Leaves* terete, 2 to 4 in. long, and about 12 in. thick. *Racemes* pendulous, 2-5 in. long, few-flowered. *Flowers* 33 in. across; floral bract minute, slender, subsessile. *Sepals* unequal; the dorsal ovate, concave, erect; the lateral pair oblong, very blunt, reflexed. *Petals* much narrower and somewhat shorter than the sepals, linear, blunt, reflexed. *Lip* about as long as the petals; side lobes large, oblong, blunt, entire; their apices oblique, subacute, directed forwards and slightly converging; apical lobe fleshy, triangular, its upper surface with a small antorse tooth; spur short, horizontal, much shorter than the ovary, dorsally compressed, imperfectly septate, the posterior wall near the mouth with a broadly saggitate callus with a straight line of short stiff hairs in front of it. *Anther-lip* acute; *pollinia* 2, each completely bipartite, the caudicle broad; the gland triangular, orange-coloured.

Moulmein; Burmah; ? Peché.

This plant, which flowered in the Botanic Garden, Calcutta, last June is believed to have been received from Mr. Peché, Moulmein. The sepals and petals are of a dark purplish-brown, and the lip is white or pale pink. The species is allied to *S. appendiculatus*, Hook, fil., but is more slender, has smaller flowers, with a shorter spur, the structure of which differs greatly from that of *S. appendiculatus*. The latter species moreover has not the peculiar saggitate callus on the column which is so conspicuous in this.

*Sarcanthus Kunstleri*, n. spec. *Stem* erect, rigid, often branching, 4 to 6 in. long. *Leaves* terete, fleshy, stout, horizontal or slightly decurved, 2.5 to 3 in. long, and about 2.5 in. diam. *Inflorescence* more than twice as long as the leaves, spreading or erect; the peduncle with one sheath at the base and a few shorter scattered along its length; bearing above a raceme or panicle with thickened rachis. *Flowers*
numerous, not crowded, 25 in. across; floral bract ovate, acuminate, minute. *Sepals* subequal, elliptic, obtuse, reflexed. *Petals* smaller, oblong, blunt. *Lip* fleshy, its base with a short wide slightly curved sub-horizontal spur; the lateral lobes at the mouth of the spur erect, broadly oblong, subfalcate, obtuse; apical lobe ovate, acute, concave; the interior of the spur with an imperfect septum directed backwards from its front wall and a large callus from the back wall almost touching the former. *Column* stout, papillose, with a short thick foot and a small rounded callus on each side of the depressed anther; lip of anther truncate in front; *pollinia* subglobose, grooved.

Perak; Kunstler.

This species was sent some years ago from Perak by the late Mr. Kunstler, who collected there for the Calcutta Botanic Garden. It flowered recently, and is now described as new. Its nearest ally appears to be *S. Williamsoni*, Reichb. fil. The septum of the spur characteristic of this genus is in this species incomplete, as it extends only about half way across the cavity. At the same time it is prominent, being thick and solid. On the back wall, right opposite it, there is a faint ridge corresponding to it, so that a slight extension would make the septum complete.

*Sarcanthus sagittatus*, n. spec. *Stem* short, 1 to 2 in. long. *Leaves* two or three, linear-oblong; the apex blunt and obscurely bilobed, narrowed to the base; length 6 in., breadth 0.75 in. *Peduncle* as long as the leaves, slender, bearing at its apex a short raceme of about 12 rather distant flowers 25 in. in diam.; floral bract minute, much shorter than the slender cylindric stalked ovary. *Sepals* subequal, elliptic, blunt, the dorsal erect, the lateral pair reflexed. *Petals* shorter than the sepals, oblong, blunt, reflexed. *Lip* with large triangular acuminate forward-pointing side-lobes; the apical lobe sagittate, its point curving upwards; the spur longer than the sepals, narrowly infundibuliform, septate to near its bifid apex. *Column* stout, bearing near its base a large smooth 2-lobed callus with two curved divergent horns at its apex; the rostellum with two deflexed plates. *Anther-lip* truncate, ciliolate; *pollinia* oblong, attached at a right angle to the very broad tapering caudicle, the gland ovate.

Khasia Hills, probably at Teria Ghat; Pantling, No. 629; flowering in June.

A very distinct species, with flowers somewhat resembling those of *S. Kunstleri*, K. & P., but with very different habit and leaves.

*Stereochilus Wattii*, n. spec. *Roots* hairy. *Stem* very short. *Leaves* horizontal, linear-oblong, flat, fleshy, unequally and bluntly bifid at the apex, not contracted at the base; length 3 to 4 in., breadth
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0.5 to 0.75 in. Racemes slender, glabrous, pendulous, bearing 4 to 9 flowers, 0.8 in. in diam.; floral bract minute. Sepals oblong, blunt, the petals smaller and subfalcate, all reflexed on the slender stalked ovary. Lip adnate to the base of the column; the hypochile directed backwards almost parallel to the ovary forming an infundibuliform fleshy spur, its mouth with shallow side-lobes having acute apices directed forwards; the spur with a large 2-ribbed callus at its mouth just below the column sepalate at its extremity, sub-quadrate, its base produced into small auricles, its apex blunt but with a minute apiculus, its upper surface with a mesial triangular thickening. Column long; rostellum very long and pointed. Anther depressed; pollinia 4, plano-convex, attached by pairs to a very long thin caudicle bearing a small broadly ovate gland on the outer side.

Assam; on the Dikku river, elevation 1000 feet. Dr. G. Watt field No. 542.

The genus Stereochilus was founded by Lindley to receive a species from Khasia and Burma which he named S. hirtus. He considered the genus to be allied to Camaroticls. Both these genera were reduced to Sarcochilus, R. Br., by Mr. Bentham (Gen. Plantar. III, 570). Sir Joseph Hooker, in treating the genus Sarcochilus, as Mr. Bentham understood it, (enlarged as it had been by the absorption, besides the two just mentioned, of the genera Pteroceras, Micropera, Chiloschista, Fornicaria, Cylindrochilus and Cuculla), remarks "a polymorphus genus no doubt to be dianmem-bered when better known." Encouraged by this remark, we are led to re-establish Stereochilus, relying as head-marks for the genus on the structure of the lip, on the very long beak of the rostellum, and on the length of the caudicle of the anticos pollinia.

Cleisostoma tenuicaule, n. spec. Stems slender, pendulous, about 12 in. long. Leaves thickly coriaceous, somewhat twisted, borne about half an inch apart on the younger part of the stem, linear-oblong; their apices acute, not notched, slightly recurved. Flowers solitary, leaf-opposed, 0.5 in. across, on a slender pedicel; floral bract very minute. Sepals and petals fleshy, subequal, spreading, oblong-oblongeolate, blunt; the lateral sepals slightly falcate. Lip fleshy, equalling or slightly exceeding the lateral sepals in length, narrowly oblong, tapering to the acute emarginate apex, deflexed from near the base, 5-lobed; the lowest pair of lobes near the base small and tooth-like, blunt; the pair at the base of the terminal lobe larger, conical, fleshy, pointing outwards; disc between the teeth sparsely pubescent; spur about one-third of the length of the stalked ovary and about as long as the sepals, horizontal, cylindric, tapering somewhat to the apex. Column short, bearing a linear callus on its anterior surface, curved upwards and hairy. Anther broad; pollinia 4 in 2 pairs, each pair globose and attached to a narrow caudicle with inflexed margins in its upper part; gland oblong, half as long as the caudicle, its upper end truncate.
Perak; collected by the late H. H. Kunstler. Pantling’s drawing, No. 575.

A species allied to *C. bipunctatum*, Hook. fil. The sepals and petals are of a pale orange colour, with bold transverse blotches of purplish-brown, the lip is pale yellow. The species, originally sent from Perak by the late H. H. Kunstler, has flowered in the Botanic Garden, Calcutta, for several years in succession.

**Neottiae.**

*Pogonia Parishiana*, n. spec. Whole plant 2 to 4 in. high, leafless when flowering. Flowering scapes one and a half to three inches in height, each enveloped at its base by a lax wide-mouthed sheath 5 to 1 in. long, and bearing about its middle a smaller narrower one. *Flowers* 1 to 3, each about 1 in. in length and of a pink colour; floral bract linear, longer than the pedicelled tumid ovary. *Sepals* and *petals* sub-equal, linear-lanceolate, acuminate. *Lip* a little longer than the sepals, elongated-rhomboid in general outline, 3-lobed in its anterior half; side-lobes small, bluntly triangular, their apices directed outwards, the disc between them sparsely pubescent, convolute round the column, apical lobe not convolute, much larger than the lateral lobes, triangular with a very broad base and sub-acute apex, the edges minutely undulate and the upper surface densely hairy.

Upper Burma; at Fort Stedman; Abdul Khalil, Collector for the Botanic Garden, Calcutta.

The leaves of this are unknown. The flowers somewhat resemble those of *P. biflora*, Wight; but in that species the terminal lobe of the lip is quite glabrous and emarginate, whereas in this it is sub-acute and pubescent in the upper surface. This also resembles the species referred to by Sir Joseph Hooker in the Flora of Br. India (VI, 119) of which Mr. Parish gave a drawing (but no specimen) to the Kew Herbarium, under the name *P. cuprea*, Parish MSS.

*Pogonia Khasiana*, n. spec. *Leaf* sub-rotund, 5-angled, green, about 1·75 in. in diam., cordate at the base, petiole 1 in. long. Flowering scape 3 in. high, with a single terminal flower, and two linear-oblong acuminate bracts, one at the base, the other at the middle. *Flower* 75 in. long; its bract ovate-lanceolate, acute, concave, shorter than the shortly stalked rather stout ovary. *Sepals* linear-oblong, acuminate. *Petals* of the same shape but smaller, all connivent. *Lip* somewhat shorter than the sepals, the basal portion clasping the column; the side-lobes triangular, their apices slightly up-turned, the apical lobe oblong-rhomboid, flat or slightly deflexed near the apex, its upper surface smooth and with a thickened line down the middle. *Column* slender, the apex dilated.
Jaintia Hills, near Jharain, south of Jawai, at an elevation of 3,000 feet; Pantling, No. 626, flowering in June.

A species near *P. macroglossa*, Hook. fil., but with smaller flowers and a lip with much larger side-lobes and a much broader apical lobe. The sepals and petals are of a pale olivaceous colour with brown stripes: the lip is greenish at the base, the side-lobes are white tinged with pink, and the apical lobe is white with bold rose-coloured spots.

**Pogonia foliosa**, n. spec. Whole plant a span in height. **Leaves** 2 to 4, appearing with the flowers, elliptic-lanceolate, acuminate, many-nerved, unequal, clustered at the base of the short stem, their bases sheathed by a wide loose tubular acute sheath. **Scape** 6 or 7 in. long, rising from among the leaves, erect, smooth, slender, with a closely fitting bract 1 in. long at the base and another half as long about the middle. **Raceme** 3- or 4-flowered. **Flowers** 65 in. long; floral bract lanceolate, acute, shorter than the slenderly-stalked ovary. **Sepals** membranous, subequal, free, linear-lanceolate, acute. **Petals** slightly shorter, ob-lanceolate, acute. **Lip** about equal to the sepals in length, obovate in general outline, convolute round the column, 3-lobed at the apex; the side-lobes triangular, entire, their apices acute, directed forwards and equalling the apical lobe in length; apical lobe much broader, rounded, its edges undulate-erose; the disc with three glabrous lamellae running from the base to near the apex, smooth in their lower two-thirds but pectinate in the upper third. **Column** slender, slightly dilated at the apex. **Anther** terminal, 2-celled, its lip 2-lobed; **pollinia** 2, coarsely granular.

Upper Burma; at Fort Stedman; Abdul Khalil, Native Collector of Bot. Garden, Calcutta.

A very distinct species of *Pogonia* belonging to the section of the genus which has the leaves contemporaneous with the flowers.

The few specimens known have leaves as described. But, with age, it is probable that the leaves become petiolate. The leaves and habit are those of a *Cephalanthera*, but the column is that of the genus to which we have referred it.

**Cephalanthera chartacea**, n. spec. Height of the entire plant 12 to 15 in. **Stem** short, stout, 3 in. thick at the base and enveloped by 2 unequal wide blunt foliaceous sheaths. **Leaves** 3 to 5, the sheath of the lowest leaf the largest and embracing those of the higher leaves. **Leaves** crowded, sessile, shortly sheathed, narrowly elliptic-oblong, acuminate, many-nerved, 4 to 9 in. long, and 35 to 1-15 in. broad. **Inflorescence** terminal; the peduncle longer than the leaves, naked, or with a single sheathing lanceolate bract 1 in. long close to the raceme, angled. **Raceme** short, few-flowered; floral bract ovate-
lanceolate, chartaceous, 75 in. long. *Sepals* subequal, lanceolate, acute, the petals rather narrower. *Lip* sessile on the base of the column, 3-lobed; the lateral lobes small, bluntly triangular; the apical lobe ovate, blunt; the disc with 5 vertical smooth parallel raised lines running from base to apex. *Column* short, stout, winged near the apex opposite the large concave stigma. *Anther* terminal, erect, 2-celled; *pollinia* 2, narrowly elongate, deeply bipartite.

Upper Burma, in the Southern Shan States, at Taungyi; Native Collector of Calcutta Botanic Garden.

Only two specimens of this are known, and the flowers of both are in bud. The description of the flower above given may therefore have to be modified in some of its details when fully developed flowers are collected. The clustered leaves form a pseudo-stem by their sheathing bases, an arrangement which gives this plant a very different facies from either of the two Indian species already described. The specific name has been given on account of the chartaceous nature of the floral bracts.

**GOODYERÆ.**

*Zeuxine andamanica,* n. spec. Whole plant 12 to 18 inches high; stem stout in its lower half, rooting at the base. *Leaves* 4 to 10, scattered over the lower half of the stem, lanceolate, acute; the petiole very short and expanding into a short wide scarious sheath; length 1.25 to 2 in., breadth 6 to 8 in., petiole about 1 in. Peduncle of the *spike* slender, elongate, with sparse thin hairs, and bearing 3 or 4 distant scarious narrowly tubular bracts about 5 in. in length. *Spike* 3 to 6 in. long, many - but rather laxly-flowered. *Flowers* 2 or 25 in. long; floral bract sparsely puberulous, about as long as the puberulous ovary, broadly ovate, 1-nerved, its edges erose, with a long acuminate apex. *Dorsal sepals* broadly ovate-elliptic, concave, subacute; the lateral pair narrower, acute, not spreading. *Petals* narrower than the sepals, dimidiatelly elliptic, subacute, connivent with the dorsal sepal to form a hood covering the column. *Lip* longer than the sepals; the hypochile globularly saccate and having a prominent incurved tooth near the base within each margin; mesochile constricted; epichile deeply divided into two broadly-oblong diverging lobes with truncate minutely erose apices, the broad sinus with a minute point in its apex.

Andaman Islands; Calcutta Botanic Garden Collectors.

A species near *Z. moulmeinensis,* Hook. fil., but having a longer denser spike, smaller flowers, narrower non-aristate petals, a lip-sac without septa, and much shorter petioles.

*Zeuxine Rolliana,* n. spec. Whole plant 15 to 18 in. high; stem sheathed at the base, 2 to 3 in. long. *Leaves* 3 or 4, alternate, close
together in the upper part of the stem, lanceolate to ovate-lanceolate, acute or subacute, the bases rounded, petiole 5 to 6½ in. long, expanding into a short broad lax sheath at the base; length 1·75 to 3 in., breadth 1·7 to 2·2 in. **Peduncle** three times as long as the stem, slender, bearing 3 or 4 distant lanceolate bracts; **spike** 2 to 3 in. long, the flowers numerous, after expansion rather distant, 2 in. across; floral bract lanceolate, acuminato, as long as the pubescent ovary. **Sepals** subequal, broadly triangular, acute. **Petals** as long as the sepals, broadly triangular, falcate, acute. **Lip** longer than the sepals and petals cymbiformly saccate in its lower half, the sac containing on each side three retroflexed short cylindric pointed processes; the anterior part with two horizontally divergent oblong lobes with truncate erose apices; the upper surface smooth in the living state. **Column** short, broad, the apex acuminato; its front with two vertical plates nearly touching by their margins, and a second and smaller pair situated obliquely at their bases. **Stigmas** 2, elliptic and somewhat oblique.

S. Andaman; at Dhani Kheri: G. King.

A species near Z. *moulmeinensis*, Hook. fil., but having smaller flowers, differently shaped sepals and petals, and three calli instead of a single callus on the interior of the lip on each side. In the living state the lip is glabrous; but when dry it has the appearance of being puberulous, from the contraction of some of the epidermal cells.

**OPHRYDEA.**

**Orchis sub-rotunda**, n. spec. Height of entire plant 7 to 9 in.; tuber oblong, entire, hairy. **Leaf** radical, solitary, sub-coriaceous, elliptic-ovate to sub-rotund, blunt or subacute; the base rounded, not narrowed but abruptly joining the short scarious tubular sheath; length 4 in., breadth 3 to 4 in. **Peduncle** 3 to 4½ in. long, smooth, bearing at distant intervals 2 or 3 linear-lanceolate acuminato bracts 5 to 7½ in. long. **Raceme** 3 to 4 in. long, bearing many but not crowded purple flowers each measuring about 5 in. across; floral bract ovate-lanceolate, acuminato, as long as the straight smooth ovary. **Dorsal sepal** broadly ovate, connivent with the petals to form a hood over the column, all ciliolate; lateral pair inserted partly on the spur, broadly-elliptic, falcate, subacute, reflexed. **Petals** elliptic with broad bases, subfalcate, subacute, nearly as long as the dorsal sepal. **Lip** orbicular, a little longer than the sepals, slightly narrowed at the base, the margins undulate, the upper surface densely and shortly hispid especially towards the middle, the base with 2 very short parallel thickened smooth ridges just above its junction with the foot of the column; spur subcylindric, nearly straight, parallel with but less than half as long as the ovary, as long as the reflexed lateral
sepals. Column short. Anther-cells close together, parallel; pollinia elliptic, somewhat compressed; the caudicles twice as long as the pollinia, thick, tapering to the broad ovate fleshy glands; glands covered by membranous pouches; staminodes small, rugulose, attached to the outside of the anther-cells, Stigmas 2, conjoined to form a narrow transverse band across the column between the anther-cells and their pollinia, and separated from the cells by a large erect ovate subacute tongue-like lamella.

Upper Burma; at Fort Stedman; Abdul Khalil, Collector of the Botanic Garden, Calcutta.

The flowers are purple throughout.

An extremely interesting species; remarkable for the large erect process interposed between the base of the anther-cells and the conjoined stigmas. The long caudicles pass outside this process, and emerge below the stigmatic surface where their glands are partially covered by membranous flaps from the sides of the column. In Habenaria secundiflora there is a resemblance to the structure here described in the two erect processes which form flaps in front of the pollinaria glands.

Habenaria Massoniana, n. spec. Whole plant about a span in height. Stem slender, with two or three blunt lax wide sheaths at the base. Leaves 2 or 3, rising very near the base of the stem, narrowly oblong-oblanceolate, acute or sub-acute, much narrowed to the sheathing base; length 2 to 4 inches, breadth .25 to .5 in.; stem above the leaves long, bearing at intervals 2 or 3 lanceolate acuminate bracts. Raceme 1.5 to 3 in. long, sparsely-flowered. Flowers .45 in. wide at the mouth; floral bract linear, acuminate, half as long as the slender shortly-stalked obscurely-beaked ovary. Sepals unequal; the dorsal broadly ovate or almost rotund, blunt; the lateral pair ovate-lanceolate, subacute. Petals linear, acute or subacute, about as long as the sepals. Lip longer than the sepals and petals, 3-partite almost to the base; the middle lobe linear, straight; the lateral lobes filiform, rather longer than the middle lobe, curved and diverging, also decurved; spur rather shorter than the ovary, slightly clavate towards the apex, very little curved. Column blunt. Anther-cells parallel, close together. Stigmas 2, oblong-pyriform, diverging, situated under the mouth of the spur.

Upper Burma; at Fort Stedman; Calcutta Bot. Garden Native Collector.

A species allied to H. viridiflora, R. Br., but that species has smaller flowers, differently shaped leaves, narrower petals and a longer more slender spur. It is also allied to H. Khasiana, Hook. fil. (but is a larger plant with much broader leaves), and to H. ditricha, Hook. fil., all members of the section Trimeroglossa. We have dedicated
this species to the memory of the late Rev. Dr. Masson, for many years a Missionary in Burma, who wrote an excellent book on the economic condition, agriculture and natural products of that country. The colour of its flowers is unknown. As we have seen only dried specimens we are unable to give accurate details of the pollinia and their appendages, or of the staminodes.

**Habenaria Prazeri**, n. spec. Height of the whole plant about 20 to 24 inches, the stem rather slender. Leaves clustered towards the base of the stem, linear-lanceolate, acuminate, 3 to 5 in. long and .75 to 1.15 in. broad; peduncle of the inflorescence with 10 to 14 equidistant linear bracts .75 to 1.5 in. long. Raceme about 7 in. long, rather sparsely-flowered. Flowers .4 in. across; floral bract linear, finely acuminate, thin in texture, as long as or longer than the shortly-stalked obscurely beaked, ovary. Sepals unequal; the dorsal broadly ovate, blunt: the lateral pair slightly longer and narrower, acute. Petals smaller than the dorsal sepal, ovate-lanceolate, acute, very slightly falcate. Lip equaling the lateral sepals in length, its basal half transversely elliptic, slightly concave; its apical half fleshy, linear; the spur stout, half as long as the ovary, cylindric, incurved. Anther-cells placed close together, parallel, their tubes up-turned.

Upper Burma, Prazer.

This is known only by a single dried specimen from an examination of which it has been impossible to make out with certainty the form of the pollinia and their glands, of the staminodes or stigmas. No account of them is therefore ventured upon. As Upper Burma gets better known, specimens of this will no doubt be forth-coming; and it is believed, that by the preceding description, this plant may be identified. The species is clearly allied to *H. latilabris*, Hook. f lil., and to *H. densa*, Wall., but it differs considerably from both in lip, spur, ovary, and in the clustered leaves. Like these species, it belongs to the section *Hologlossa*. It agrees with nothing in the Kew Herbarium.

**Habenaria linearis**, n. spec. Height of whole plant fifteen to twenty-seven inches. Stem slender, with several blunt tubular sheaths near the base. Leaves scattered along the whole stem from nearly the base, diminishing in size upward and passing into bracts towards the raceme, linear, acuminate, 2 to 4 in. long and .2 to .4 in. wide; the bracts smaller and somewhat lanceolate. Raceme 1.5 to 2 in. long, 3- to 6-flowered. Flowers white, about .75 in. across at the mouth; floral bract linear, finely acuminate, ciliolate, longer than the very slender, long-beaked sub-sessile ovary. Sepals sub-equal, lanceolate, the dorsal con-duplicate; the lateral pair falcate, spreading. Petals somewhat shorter than the sepal, narrowly oblong, tapering slightly to the blunt apex.
Lip slightly exceeding the sepals in length, lanceolate, the base with a slender claw, the apex blunt; the edges entire, decurved; the lower surface with a strong central keel from base to apex; spur clavate, incurved, slightly exceeding the ovary in length.

Upper Burma; at Saga; in the Southern Shan States; Collectors of Botanic Garden, Calcutta.

In habit this somewhat resembles H. commelinifolia. Wall., but the structure of the flowers is wholly different. This belongs to Sir Joseph Hooker's section Hologlossa. It is known only from dried specimens, hence no attempt is made to describe the column and the organs situated on it.

Habenaria Hawkesiana, n. spec. Height of entire plant about nine inches; tubers small, ellipsoid. Leaves whorled at the base of the stem, two or three, ovate-elliptic or elliptic, acute, slightly narrowed to the short wide sheath; upper part of the stem bearing 3 to 5 lax lanceolate scarious nearly equal bracts about 75 to 1 in. long. Raceme 2- to 4-flowered. Flowers large, white, rather, distant, 1'5 in. wide at the mouth; floral bract linear, acuminate, as long as the sessile shortly-beaked ovary. Sepals unequal; the dorsal ovate, acuminate; the lateral pair rather longer. Petals lanceolate, slightly falcate, membranous and many-nerved like the sepals. Lip a little shorter than the lateral sepals, entire, triangular, blunt, puberulous; spur two or three times longer than the ovary, incurved. Anther-cells wide apart, their tubes rather long; pollinia with caudicles nearly twice as long as themselves, triquetrons in the upper half, curved, the glands small. Stigmas confluent, occupying the whole width of the column above the very wide mouth of the spur.

Upper Burma; Prazer.

Collected only once by Mr. Prazer who secured only a few specimens. He describes the flowers as white, with the exception of the lip which is saffron-yellow. The species has been named in honour of Colonel H. P. Hawkes, C. B., late Commissary General in Burma, an ardent horticulturalist, and an excellent authority on Indian and particularly on Burmese, artistic metal work. It appears to be allied to H. plantaginea Lindl., but this has an entire lip, while the lip of that and of the section (Platyglossa) to which it belongs is characterised by being 3-lobed.

Habenaria neglecta, n. spec. Entire plant 12 to 15 inches high. Stem clothed in its lower part by several unequal lax scarious sheaths. Leaves 3 to 6, scattered along the stem, unequal in size, those in the middle being the largest, narrowly oblong, acute, not narrowed to the sheathing base, length 1'25 to 3 in., breadth '25 to '6 in.; stem above
the leaves slender, bearing 2 or 3 distant linear acuminate bracts. **Spike** 2 or 3 in. long, sparsely-flowered. **Flowers** 25 in. across; floral bract lanceolate, acuminate, entire, slightly longer than the sessile beakless ovary. **Sepals** oblong-lanceolate, blunt, keeled. **Petals** as long as the sepals but narrower, blunt. **Lip** fleshy, not longer than the sepals, adnate to the base of the column by the narrow claw, divided down to the claw into 3 very narrow lobes; the side-lobes longer and narrower than the middle one, linear, sub-acute, very slightly curved and spreading almost horizontally; the middle-lobes narrowly oblong, blunt, very fleshy; spur longer than the sepals and nearly as long as the ovary, almost straight and very slightly clavate. **Peristylus**, No. 13 Herb. Ind. Or. Hook. fil. and Thomson.


This differs from typical **Habenaria aristata**, Hook. fil. (figured by Wight under the name **Peristylus exilis**, Wight, Ic. No. 1698) in having the lateral lobes of the lip much shorter, the sepals and petals narrower and not all ovate, the spur longer and very slightly inflated towards the apex, and the floral bract longer than the ovary.

**Habenaria Maingayi**, n. spec. Entire plant 4 to 6 in. high; roots thickly fibrous, some of them expanding into small oblong tubers. **Stem** bearing a short sheath near the base. **Leaves** 3 or 4, sessile, crowded near the base of the stem, oblong-lanceolate, acute, 5 to 1.75 in. long and 1.5 to 4 in. broad; **Peduncle** of spike bearing 4 or 5 distant lanceolate finely acuminate bracts. **Spike** 1 to 1.5 in. long, 6- to 12-flowered, rather lax. **Flowers** 15 in. across; floral bract oblong-lanceolate, acute, as long as the slender sessile ovary. **Sepals** subequal, oblong-lanceolate, subacute, the **petals** slightly narrower. **Lip** as long as the petals, adherent by a short claw to the base of the column, 3-lobed; the lateral lobes broadly oblong, blunt, diverging, broader than the blunt mid-lobe, the margins entire; upper surface with a single small triangular tooth at the bases of the side-lobes; spur much shorter than the sepals, obovoid-globose.

Singapore; Maingay, Herb. prop. 3354 (Kew distrib. No. 1663).

This species differs from **H. tentaculata**, Reichb. fil. (**H. lacertifera**, Benth.), to which it has been referred, in having much narrower and more numerous leaves, flowers twice as large, and a lip with broader lobes.

**Note.**

We take this opportunity of giving a description, drawn up from a living specimen, of **Dendrobium parciiflorum**, Reichb. fil., a species originally published in 1845, by Griffith (under the name of **Aporum**
Jenkinsii) in the Calcutta Journal of Natural History, Vol. V, 367, t. 25. This species, owing to the reduction of the genus Aporum to Dendrobium, was named in manuscript Dendrobium parciflorum by Reichenbach filius, and under that name was published, without description, by Lindley in the Journal of the Linnean Society, Vol. III, (1859) p. 4; and this name was adopted by Sir Joseph Hooker in the Flora of British India, (Vol. V, 725). No specimen of this plant had been seen either by Lindley or Hooker, and none existed in the Calcutta Herbarium until last year when a living plant, collected by himself in Assam, was contributed by Mr. Giesslière. Mr. Giesslière's plant was described and was figured by Mr. Pantling, and the description is now published.

The specific name Jenkinii to which, as a member of a genus reduced to Dendrobium, this plant has by the law of priority a secondary claim, was given in 1839 by Wallich to D. Jenkinii, a plant now usually regarded as a form of D. aggregatum, Roxb.; and also by the late Dr. T. Anderson to a plant which turned out to be D. cumulatum, Wall.

Dendrobium parciflorum, Reichb. fil. MSS. ex Lindley in Journ. Linn. Soc. III, 4. Stems tufted, slightly flattened, 6 to 10 in. long and 2 in. broad. Leaves linear-lanceolate, acute or sub-acute, very fleshy, 1 to 1.75 in. long and 2.25 in. broad. Flowers white, single or in pairs from the apex of the stems, 1.25 in. long; floral bract minute, lanceolate, stalked ovary 1 in. long. Dorsal sepal ovate, oblong, blunt; the lateral pair much larger and broader; mentum large, elongate, curved. Petals about as long as the dorsal sepal, oblong, blunt. Lip oblong-elliptic with a slightly expanded apex, not lobed, slightly narrowed to the base; the apex broad, crisped, divided into two lobules by a minute triangular sinus; the upper surface quite smooth, white but with a yellow blotch near the apex. Column much shorter than its elongate much-curved 3-furrowed foot; mentum large, wide, curved in front. Anther with an entire truncate lip. Hook. fil. Fl. Br. Ind. V, 725. Aporum Jenkinii, Griff. in Calc. Journ. Nat. Hist. V, 367, t. 25.

Assam; the exact locality unknown; collected once about 1845 by Griffith, and once in 1896 by Mr. Giesslière: flowered in the Calcutta Bot. Garden.

A species of the section Aporum, but with unusually large flowers allied to D. terminale, Par. and Reichb. fil.
Notes on some Butterflies from Myingyan, Central Burma.—By Capt. E. Y. Watson, Indian Staff Corps, F. Z. S.

[Received June 15th;—Read July 7th, 1897.]

Myingyan, as well as the rest of Central Burma, upsets one's preconceived ideas of Burma, which is generally looked upon as a land of heavy jungle and marsh and as reeking of fever. This last attribute may be considered as more or less mythical as regards the whole of Burma, in which there is no more fever than in Central or North-Eastern India, while where it exists it is almost entirely confined to the "terai" country at the foot of the hill ranges.

In Myingyan, however, not only is the fever a negligible quantity but the forest is non-existent, and the marsh or paddy-land is restricted to very limited areas flooded by the river; in fact the general appearance of the country is more like that of the Deccan than of the traditional Burma, and there are many points of resemblance between Myingyan and a place such as Ahmednagar. What jungle there is consists of low thorny scrub; while the chief crops cultivated are jowari, cotton, and oil-seed (gingelly), the soil being what is known as "black cotton" or a very fair imitation of it. Myingyan may be taken as fairly typical of what may be conveniently termed "Central Burma," which may be said to extend from Mimbu northwards for some 150 miles; still further north the rainfall and general characteristics of the country again change and are very similar to those of Lower Burma and Tenasserim.

In Central Burma butterflies are comparatively scarce, and probably not more than 100 species would be found within ten miles of Myingyan as contrasted with some 300 odd which occur round Rangoon. The following notes are founded on a collection made by me from October to March, i.e., practically the dry-season, though as the total rainfall is something under 30 inches it is doubtful whether the district would have proved much more prolific during the rains. Several species of interest were met with, one of which has recently been described as new from Myingyan specimens.

No Euplæas were observed, though probably E. godartii, Lucas, and E. linnæei, Moore, occur at the beginning of the rains; Danaïs chrysippus, Linnaeus, and D. plexippus, Linnaeus, [ = D. genutia, Cramer], occurred commonly, and D. limniace, Cramer, more rarely.

A single Mycalesis was observed, probably a Oalysisme, but the species is doubtful, as the insect was not caught; Melanitis ismone, Cramer, was not seen but doubtless occurs, Lethe europa, Fabricius,
was represented by a single specimen and is probably rare. The most interesting satyrid was the *Ypthima* which I have recently named *Y. cerealis*; this was the only species of the genus met with, and it occurred in great numbers but only within very restricted areas, owing no doubt to the unequal distribution of its food-plant; one of its favourite haunts was among the low bushes which grow on the banks of the paddy-fields at the bend of the river, but it also occurred some miles away from these fields on high bare ground where the bushes were few and scattered.

Among the *Nymphalinae* there is not much of interest to record, the only species met with being *Ergolis ariadne*, Linnaeus, *A. phalantha*, Drury, *Junonia lemonias*, Linnaeus, *J. almana*, Linnaeus, *J. hiera*, Fabricius, and *J. orithyia*, Linnaeus; *Neptis leucothoë*, Cramer (form *eurymene*, Butler); *Hypolimnas bolina*, Linnaeus, and *H.* *misippus*, Linnaeus, of these the last species is rare in Burma, and to the best of my knowledge is only found in the more arid tracts, and I have no record of its occurrence south of Mimbu on the Irrawaddy.

Some sixteen species of *Lycenidae* were met with; the dry-season form of *Chilades laius*, Cramer, occurred commonly, also *O. trochilus*, Freyer; *Zizera lysis*, Hübner, was fairly common, and did not appear to differ from Indian specimens; *Z. otis*, Fabricius, of which *Z. sangra*, Moore, is a synonym, occurred in great numbers, this species in all its forms is quite distinct from *Z. indica*, Murray, originally described from Allahabad, which occurs commonly in Southern India. The difference between the two species does not lie in the shade of blue or extent of the black margins on the upperside as some writers have tried to make out, since these characters vary seasonally, there is, however, a well-marked and constant difference in the discal row of spots on the underside of the forewing, in *Z. indica* these spots are invariably prominent and black, encircled with white, in *Z. otis* they are brown, hardly darker than the ground-colour of the wing, and are encircled with grey, so that they do not stand out at all conspicuously, this difference will be found to be absolutely constant in all the seasonal forms, and can be readily recognised if Burmese and Southern Indian specimens be compared, though I am unable to say if the two species meet and occur together in any localities; if good series are compared other slight differences will be noticed in the marginal markings and disposition of the spots on the underside of the hindwing. *Azanus jesus*, Guérin, (the oldest name for *A. gamra*, Lederer), occurred rarely among *Acacia* bushes; Burmese specimens do not differ perceptibly from Indian ones. This is a rare species in Burma, and is only found in the arid tracts. A single specimen only of *Lycenesthes lyceanina*, J. II. 77
Felder, was met with, though it is probably not uncommon; *Talicada nyseus*, Guérin, which as far as Burma is concerned only occurs in the drier districts, was excessively common; Colonel Swinhoe has recently described the Khasia Hill race of this species as distinct from the typical South Indian race under the name *T. khasiana*, the only point of difference being that in *T. khasiana* the rows of white spots on the underside of the forewing are more pronounced than in typical *T. nyseus*, so that in the Burmese race one would expect these spots to be still more developed. This however is far from being the case, as in the Burmese specimens the spots are as a rule even smaller than in typical Southern Indian ones, while in many cases the spots are almost absent, the outer half of the wing being entirely black, with a few faint greyish irroration in place of spots, so that in this respect the Burmese race is nearer to the Southern Indian one than to the Khasi Hill one, which seems rather to suggest that the character taken by Colonel Swinhoe is not specific; Burmese specimens however differ from Southern Indian ones in having rather less red on the upperside of the hindwing, and in the chequering of the fringe being obsolescent instead of very pronounced, none of the differences however seem to warrant the Burmese race receiving a separate name. No *Nacaduba* or *Lampides* was observed. *Catochrysops strabo*, Fabricius, with its unnamed dwarf form, occurred commonly, also *C. pandava*, Horsfield, with its dwarf form *C. contracta*, Butler. I have recently been able to examine the type specimen of the last-named form, and find that it is not as suggested in "Butterflies of India, &c.," the dwarf form of *C. cnejus*, Fabricius, but of *C. pandava*, and has two seasonal races precisely similar to those of the larger race; *C. cnejus*, the dwarf form of which has been named *C. hapalina*, Butler, was not met with. Attention does not appear to have been previously drawn to the fact that all the three common species of *Catochrysops* which occur in India have corresponding dwarf forms, these dwarf forms are commoner in dry than in wet districts, and in arid tracts like Sind probably exceed the larger race in numbers. Of other named *Catochrysops*, *C. theseus*, Swinhoe, is a "sport" of *C. cnejus*, and the type of *C. nicola*, Swinhoe, is a female of *C. pandava*, somewhat intermediate between the two seasonal forms. *Tarucus plinius*, Fabricius, occurred commonly, also *T. callinara*, Butler, the two seasonal forms of the last species differ slightly in the tone of the dark markings on the underside, which in the rainy-season form are almost black and in the dry-season form are rusty-brown, the position, size and shape of the markings do not appear to differ in the two races, nor is there any perceptible difference in the shade of blue or breadth of the margins on the upperside.
T. callinara is a quite distinct species from one I have in my collection from the Deccan, the latter being the T. extricatus of Butler, which has the markings on the underside much more linear and run together than in T. callinara, in which they are rounded and well separated. The correct synonymy of the species of this genus is doubtful as neither T. nara, Kollar, nor T. theophrastus, Fabricius, can be identified with any certainty without an examination of the type specimens. T. callinara is I think without doubt identical with T. theophrastus as identified in "Butterflies of India," though not with the T. theophrastus of the British Museum, which includes several distinct species, and Mr. Butler informs me he does not now consider his T. extricatus to be distinct from T. nara as identified by him. T. callinara within Burmese limits is strictly confined to the dry tracts of Central Burma. T. alteratus, Moore, and T. venosus, Moore, both appear to be perfectly distinct species. I therefore recognise five species of this genus as occurring within Indian limits: T. plinius, which is found throughout the Indian region from Ceylon all over Peninsula India to Assam and Burma; T. callinara, which probably sinks to T. theophrastus, and is as widely distributed as T. plinius but affects drier localities; T. extricatus, which probably sinks to T. nara, and is confined to the dry regions of Western and North-Western India and the Western Himalayas; T. alteratus, confined to the North-West Himalayas; and T. venosus, confined to the North-West Himalayas and the plains of North-West India. Castalius rosimon, Fabricius, and Polyommatus baticus, Linnaeus, occurred commonly, and a single specimen of Amblypodia anita, Hewitson, was obtained. I have recently been able to examine the types of most of the described species of Amblypodia, and find that the common purple species which occurs in Burma is certainly the A. anita of Hewitson described from Siam, and that A. darana, Moore, and A. naradoides, Moore, are also synonymous with it, the males of the three named forms appear quite inseparable, while the females in Southern India and Ceylon are dimorphic, i.e., either blue or purple on the upperside, one form being almost as common as the other; in Burma, however, the purple female is the prevailing form and the blue female is excessively rare. This species occurs in Siam, the Andamans and throughout the greater part of India. A. narada, Horsfield, the type of which is in the British Museum and which was originally described from Java, is a quite distinct species, the male is much more blue than A. anita, and the female, which is purple, has a large extent of purple on the upperside of the hindwing. A. andersonii, Moore, is, as stated in the "Butterflies of India," almost without doubt identical with A. narada. A third species of the genus is the A. erichsonii of
Felder, the male of which is very brilliant blue with a broad black border to the forewing narrowing to the outer angle, this species is in the British Museum from the Philippines and Borneo. \textit{A. taoana}, Moore, of which the type is in the British Museum, appears to be identical with \textit{A. erichisoni}. \textit{A. arracana}, Grose Smith, is also probably referable to the same species. \textit{Aphnaeus syama}, Horsfield, occurred rather rarely, and a second species which I identify as \textit{A. schistaceus}, Moore, was slightly more common. This latter species belongs to the \textit{vulcanus} group of the genus, and is the only one of the group recorded from Burma.

Among the \textit{Pierines—Catopsilia catilla}, Cramer, \textit{C. crocale}, Cramer, and \textit{C. gнома}, Fabricius, were common, this last is probably the dry-season form of \textit{C. pyranthe}, Linnaeus, and has many other names, but I am unable to say which is the oldest. \textit{Nyctitona xiphoa}, Fabricius, and \textit{Neheronia hippia}, Fabricius, (=\textit{gwa}, Felder), occurred commonly, and \textit{Delias descombesi}, Boisduval, and \textit{D. hierte}, Hübner, rather rarely. A single male of \textit{Appias vacans}, Butler (the dry-season form of \textit{A. hippo}, Cramer) was obtained in December. \textit{Appias selmira}, Cramer, and \textit{Hypheina dapha}, Moore, were exceedingly common; the extreme rainy-season race was not met with, all the specimens obtained from November to March being either of the typical dry-season race or forms intermediate between the two races. \textit{Terias hecale}, Linnaeus, occurred commonly in its typical form during November and December, but almost invariably in bad condition, the dry-season form, \textit{T. excavata}, Moore, occurred commonly from November to January, and was replaced during February and March by the extreme dry-season form, \textit{T. swinhoei}, Butler. Yellow forms of \textit{Ieias} occurred in the utmost profusion, and showed the usual seasonal variation in the breadth of the dark margins on the upperside, and in the tone and markings of the underside; most of the specimens caught were typical \textit{I. moulmeinensis}, Moore, though several were typical \textit{I. pyrene}, Linnaeus, and a few typical \textit{I. pirenausa}, Wallace, while there were many intermediates between the three forms.

The only \textit{Papilio} noticed was \textit{P. demoleus}, Linnaeus (\textit{=P. erithonius}, Cramer), which was excessively common.

Among the \textit{Hesperiidae} no species could be said to occur commonly, but a few specimens were obtained of \textit{Baoris (Chapra) mathias}, Fabricius, \textit{Baoris (Parnara) bada}, Moore, \textit{Telicota augias}, Linnaeus, and \textit{Hesperia galba}, Fabricius. A single sex was obtained of \textit{Taractrocera ziclea}, Plötz, a species recently found to occur in Burma; also a few specimens of a \textit{Padraona} which I identify as \textit{P. mæsoides}, Butler, as well as of a second species which I believe is undescribed.
Note by Lionel de Niceville.

As regards the distinctness of *Zizera indica*, Murray, from *Z. otis*, Fabricius, I wrote in "The Butterflies of India, Burma and Ceylon," vol. ii, p. 121 (1890) that "There is no doubt that the former is strictly synonymous with *Z. sangra*, Moore [which Capt. Watson admits], which again is a synonym of *Z. otis*, Fabricius." The only authors who have referred to *Z. indica* are Mr. Murray who described it from Allahabad at the instigation of Mr. Moore, Mr. Moore who records it from Ceylon and the N.-W. Himalayas, Mr. Butler from Mhow and Formosa, Col. Swinhoe from Poona and Ahmednugger in the Bombay Presidency, and Dr. O. Staudinger with a query from Palawan in the Philippine Islands. I have a very long series of specimens of *Z. otis* from almost throughout India, Burma, Sumatra, Java, Celebes, &c. I have tried my utmost to separate these specimens into two species by the character of the spots on the underside of the forewing by which test Capt. Watson says they can be differentiated, but have failed, as though in some specimens the spots are "brown," (or more correctly pale fuscos) with grey borders, while others are deep black with prominent white borders, I have many specimens which are strictly intermediate. I gather that Capt. Watson restricts *Z. indica* to Burma and South India, but it must be held to occur in the N.-W. Provinces, from whence it was originally described. But Capt. Watson does not say where he considers *Z. otis* to occur. I consider *Z. otis* to inhabit all India and across Southern Asia to Hongkong, Burma, the Malay Peninsula, the Philippine Islands, and probably most of the islands of the Malay Archipelago, from many of which it has been recorded, chiefly by the German and Dutch writers, as *Z. lysizone*, Snellen.

With regard to *Tarucus theophrastus*, Fabricius, which Capt. Watson splits up into four distinct species in India, I am prepared to admit tentatively that the *T. venosus*, Moore, may be a distinct species; but that *T. callinara*, Butler (? typical *T. theophrastus*), *T. extricatus*, Butler (? *T. nara*, Kollar), and *T. alteratus*, Moore, are also distinct I greatly doubt. In this connection the notes by Dr. N. Manders in Ent. Month. Mag., vol. xxviii, p. 130 (1892) on the seasonal forms of *T. alteratus* and *T. theophrastus* found at Rawal Pindi in the Punjab may be studied with advantage.
Contributions to the Theory of Warning Colours and Mimicry. No. IV.
Experiments with various Birds. Summary and conclusions.—By

[Received May 27th; Read June 2nd, 1897].

Introduction.

In accordance with the intention implied in previous papers of
this series, (J. A. S. B. LXIV, Pt. II, 1895 p. 344; LXV, Pt. II, 1896,
p. 42; LXVI, Pt. II, 1897, p. 528). I give in this, the final paper
thereof, an account of my experiments with birds other than the
Babblers (Crateropus canorus) to which my first paper was devoted,
together with a general summary and conclusions.

Some of the experiments herein detailed had already been made
when my paper on the Babblers was published, and I have made many
others since.

Most of these have been made with birds of the Passerine order,
the largest and most important of all the groups of birds commonly
regarded as of ordinal value. And among these I have paid particular
attention to the birds of the Babbler group* generally, that being CRE

* Unfortunately great difference of opinion prevails among ornithologists as
to the extent and limits of this group of birds, the "family" Crateropodix or
Timeliidx of authors.

For the purposes of this enquiry I restrict the term "Babbler" to species be,
longing to Mr. Oates' (Fauna of British India, Birds, Vol. I), "sub-families"
Crateropodinx, Timeliinx, Sibiinx, and Liotrichinx. I have experimented with
none of the Brachypteryginx; and though inclined with Mr. Oates to rank the
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in which I am specially interested, so that I was led to keep many of
the species in order to observe them in life.

In fact, the experiments in this paper are often not very syste-
matic, since experimenting on this subject was not always my main
object in keeping birds at all.

The keeping of many specimens of one or several groups of birds
together is not the best possible way at arriving at experimental results,
and many of the present experiments were made under these conditions,
especially those in which Babblers of different kinds were concerned.
And for this I feel some apology is due to investigators.

Considering, however, the largely arboreal habits of many Bab-
blers, and their abundance in this Oriental region, I do not think that
any great harm will result from the particular attention I have given
to their tastes in the matter of insects.

SECTION I.

MISCELLANEOUS EXPERIMENTS WITH VARIOUS BIRDS, MOSTLY BELONGING TO
THE BABBLER AND BULBUL GROUPS, AND KEPT TOGETHER. SERIES A.

I commenced this series of experiments in 1895, soon after releasing
the Babblers dealt with in my first paper, J. A. S. B. LXIV, Pt. II,
1895, p. 344. The birds used were kept in the aviary vacated by these,
and were fed on seed and fruit.

The insectivorous birds at first put in were four Red-whiskered
Bulbuls (Otocompsa emeria) and five Liothrix (Liothrix luteus); but before
long one of the former and two of the latter escaped. Other birds were
put in afterwards, as noted below, including another species of Bulbul.

Bulbuls live largely on fruit, but also devour insects, in doing
which they do not use their feet to hold their prey, but depend entirely
on their beaks; they have considerable swallowing power. Many
species are found in the African and Oriental regions.

The Liothrix uses its foot to grasp its prey, like Crateropus canorus,
which it resembles in many of its habits. This bird is very active and
intelligent, and feeds on fruit and seed as well as insects. It is well-
known to amateurs of birds in England as the Pekin Robin; and has a
certain resemblance in size, &c., to the true Robin. It is common in the
Himalayas and extends into China.

Brachypodius or Bulbuls with the more typical members of the Babbler group
I here treat of them as a separate one, that being the position assigned to them by
several ornithologists.

They are less active on their legs and more so on their wings than the Babblers
proper, a very practical distinction in habits for those considering the relations of
birds to insects.
The experiments were usually on consecutive days.

I. Put into the aviary an insect-cage containing a number of non-warblingly-coloured butterflies (Papilio demoleus, Catopsilia and Junonia), with one Delias eucharis* and four Danais chrysippus. Two Catopsilias were taken when they came out by Liothrix, while a D. chrysippus was not. I then took out the butterflies and put them into the aviary through the netting. Presently a Bulbul deliberately took a D. chrysippus and ate it whole, though it might have had other butterflies.

I then saw another D. chrysippus eaten whole by a Bulbul. The Liothrix did not seem to attack them, though they took Junonias. I saw a Liothrix take a Catopsilia after rejecting a D. chrysippus. It then left this and took a Junonia, which it ate nearly whole.

I then saw a Bulbul take a D. chrysippus (the only butterfly near it) which it prepared to swallow, but dropped accidentally; what happened next I did not see.

II. Put into the aviary a number of non-warblingly-coloured butterflies and two D. chrysippus; the latter were not attacked by the Liothrix, but eaten whole by two Bulbuls, being the first butterflies attacked (they were nearest) by these birds, which did not, at any rate immediately, eat others. Both sexes of Elynnias undularis were among the insects put in, and I saw the females were not avoided by the Liothrix, but seized.

III. Put in a number of non-warblingly-coloured butterflies and four Danais chrysippus. One Danais was eaten by a Bulbul, and one taken and left by a Liothrix, these birds attacking other butterflies.

Another Bulbul took a non-warblingly-coloured butterfly, and a third a Papilio demoleus, which seemed to give it much trouble, and it did not eat it. A Bulbul then flew down and took and ate a D. chrysippus, though there were other butterflies on the floor. (I have seen a Liothrix peck the wings of a Catopsilia and then leave it).

Neither Liothrix nor Bulbuls offered to touch a Delias eucharis even when it fluttered close to them.

Two D. chrysippus and some other butterflies were uneaten, and the birds were going to roost, when I put in a number of Danais chrysippus, and some D. limniace and Euplæa. None were attacked as far as I saw. The Bulbuls should have been hungry, as there was no fruit in the cage at the time, though I then put in some.

* Another specimen of this species was the only butterfly that remained uneaten from the previous day, when I had given many butterflies and seen both warblingly-coloured and harmless species attacked, before regularly taking these notes.
IV. The Delias eucharis put in the previous day was still alive and not much torn, while of the other butterflies I found only wings left. There was no fruit in the cage but a partly eaten orange which I had put in at the same time as the butterflies. I put in some cockroaches, which, like the D. eucharis, were not attacked. Later on in the day I found the D. eucharis dead, but uneaten. The cockroaches got away under the drinking vessel.

I put into the aviary a large insect-cage containing various butterflies, mostly warningly-coloured ones; a Limenitis and two Danais (chrysippus and genutia) first came out, and the former was seized by a Liothrix, which could just as easily have taken a Danais. The Liothrix did not take any insects from the cage, but one then caught, tore, and apparently ate the D. genutia which had come out. They tried, however, to get at the insects through the glass, and then one came to the entrance and took a non-warningly-coloured butterfly.

I then took out the cage and put its contents into the aviary. I did not see the Liothrix eat any more Danais—on the contrary, I several times saw them take a non-warningly-coloured butterfly when they could easily have had one of these.

I saw a Bulbul swallow a D. chrysippus, and two D. chrysippus and a D. limniace taken, beaten, and dropped by this species. There was plenty of fruit in the cage.

When the birds were going to roost the only non-warningly-coloured butterflies left out of about a dozen were one Elymnias undularis ♂ (dead), and a Nepheronia hippia ♂. These two I took out and reserved, with two Danais chrysippus. (I could not find them, however, when I wanted them next day).

V. The Delias eucharis mentioned in the account of the experiments of the previous day, was still uneaten, though the other butterflies seemed to have been devoured.

I put in some more butterflies, and saw that though the Liothrix readily attacked Danais at first, they took non-warningly-coloured butterflies when they had the choice.

I now added to the collection two common Bulbuls (Molpastes bengalensis), and four Button-Quails (Turnix taigoor), and put in some more butterflies, including a Papilio aristolochiae.

This time again the non-warningly-coloured species were obviously preferred by the Liothrix.

At some time or other to-day I saw a D. chrysippus swallowed whole by a Red-whiskered Bulbul, and another eaten by a Liothrix, which species also ate a Danais limniace. I also saw a common Bulbul reject a D. chrysippus, many of which species had been given.
Next day all the butterflies were gone (I did not notice the Delias eucharis) but the Papilio aristolochiae, which was not even hurt till the afternoon, when a Bulbul killed it, and some bird, I think, afterwards ate the abdomen. Yet the birds had no insects to-day. The Liothrix often pecked at the wings lying about.

VI. I put into the aviary a number of butterflies, the non-warningly and warningly-coloured species being fairly equal in number, the former comprising Catopsilia, Junonia, &c., and the latter being chiefly Danais chrysippus.

The Liothrix only attacked non-warningly-coloured species at first, as far as I could see, and the Button-quails also seemed to like these best, for I saw one swallow a Catopsilia, and they eagerly pursued Liothrix which had one of these or another non-warningly-coloured butterfly in their possession. On the other hand, I saw a D. chrysippus worried by one, but I am not sure that it was eaten.

The Common Bulbuls made no attempt to eat any butterflies but one D. chrysippus, which was taken and I think eaten by this species, even with other butterflies about. I saw the Red-whiskered Bulbuls eat two D. chrysippus; I forget whether at this particular time there were non-warningly-coloured butterflies about, but when there were these birds made no attempt to eat them.

The Liothrix afterwards attacked and ate some of the warningly-coloured kinds; I saw an Euplæa and a D. genutia taken and eaten even when two Elymnias undularis ♂ were in the aviary. I had put in two males of this species and one female (in bad condition and much torn) with their upper surface displayed; but the first bird that came (a Button-Quail) chose the female first.

The Bulbuls had no food for two hours at least, and ravenously devoured part of a plantain put in. When the birds went to roost the only butterflies unhurt were a Papilio aristolochiae and some D. chrysippus; a P. demoleus lay dead.

A P. polites was soon killed, though I did not see it done, and I think a Button-Quail ate it.

VII. Next morning all the butterflies appeared to have been eaten but the Papilio aristolochiae, which was still alive, though in the afternoon I found it dead, but uneaten.

About 5 p.m. I put in first a Delias eucharis, which was attacked and devoured whole by a Button-quail, which had yet not eaten the P. aristolochiae.

I then put in another P. aristolochiae and a P. polites, together. The latter was almost immediately attacked by the Liothrix, and I think partly eaten, while a Button-Quail swallowed the remainder.
former was not molested by either kind of bird, though they looked at it. Having given a Liothrix a Huphina phryne in my fingers from outside, I then offered, one in each hand, a Hypolimnas misippus ♀ and a Junonia. The latter was taken, but it was nearest the bird; immediately afterwards another Liothrix tried to take the Junonia.

I repeated the experiment with this mimic and a Catopsilia; this time the bird chose the Catopsilia, though not nearest.

I repeated the experiment with the mimic and another Junonia; the bird crossed over from the perch nearest the Hypolimnas to that nearest the Junonia, and took this.

I repeated the experiment with the Hypolimnas and a Huphina phryne; the birds were timid, but both insects were approached, and the head of the Hypolimnas snatched off; but when I left both stuck in the netting, a Liothrix took the Huphina; it was taken from it by a Button-Quail. I stuck the mimic and a small ferruginous butterfly in the netting; the first Liothrix chose the latter.

I put in a Danais chrysippus, which a Liothrix immediately seized, and I saw it at least partly eaten, I suppose by the same bird.

I offered a D. chrysippus to the Button-Quail, which took and killed it, but it was taken from them and eaten by a Liothrix.

I put in two P. demoleus and two D. chrysippus; one of the former was taken and rejected by a Red-whiskered Bulbul. I saw one Papilio eaten by a Button-Quail, and I think the other was. Of the D. chrysippus one was swallowed whole by a common Bulbul, and one killed by a Button-Quail, which lost it to a Liothrix, which ate it.

I put in then six D. chrysippus, which were attacked by the Liothrix and Red-whiskered Bulbuls, and I saw two swallowed by the latter birds. While some of these Danais were alive, I put in three more, and saw two worried and partly at least eaten by Button-Quails.

As the birds were now going to roost, I ceased experimenting, leaving three D. chrysippus and a P. aristolochia, alive, and another of the latter species dead, in the aviary. There was still a little fruit left, and there was always seed in the cage.

The Bulbuls had no chance at any non-warningly coloured butterflies.

VIII. Next day, no butterflies visible in the morning but the two Papilio aristolochia, that left living still alive, though injured. I put in specimens of Danais genutia, D. chrysippus, and D. limniace, and Euplea, which were attacked readily by the birds. I saw a Button-Quail swallow an Euplea, and a Liothrix drop one. This I have seen Liothrix do before, but I believe it will eat this species.

There was no fruit in the cage. All the butterflies soon disappeared. I put in some fruit, which the Bulbuls ate ravenously.
IX. Next day there was no trace of the two Papilio aristolochiae but a wing.

I put in first a Delias eucharis, which a Button-Quail ate. Then I put in a Danais chrysippus, which was soon seized by a Liothrix.

I then put in three non-warningly-coloured butterflies, and one each of D. chrysippus, D. genutia, and D. limniace. The Liothrix first took two of the non-warningly-coloured specimens, then one took the D. genutia, and then another the third non-warningly-coloured specimen. The D. genutia ultimately fell mostly to the share of a Button-Quail, and the D. limniace appeared to be eaten by a Liothrix.

While the D. chrysippus was still alive in the aviary, I put in one specimen each of D. genutia and D. limniace, and also a Catopsilia and a Junonia. The latter was seized by a Liothrix, and a Button-Quail attacked all three Danais, but finished by eating the Catopsilia. A Liothrix then ate the D. genutia.

While these still were in the cage D. limniace (alive) and D. chrysippus (dead), I put in three fresh specimens of D. genutia and D. chrysippus, and Euploea, and several non-warningly-coloured specimens. These last were soon attacked by the Liothrix, and the Button-Quails ate some, though the former D. chrysippus lay there dead.

A Liothrix, seizing by accident a D. limniace and a non-warningly-coloured butterfly together, let the Danais drop and retained the other.

While the Danais only were still noticeable in the aviary, I put in a Junonia, which was soon seized by a Liothrix, obviously by choice, as the others were mostly close by.

One D. chrysippus was then attacked by a Button-Quail, and part at least eaten by a Red-whiskered Bulbul. The non-warningly-coloured butterflies were now all gone; two Button-Quails swallowed the Euploea and a D. chrysippus, which a Red-whiskered Bulbul (weakly) had tried to eat. The D. limniace had also by this time disappeared (I think eaten by a Liothrix after the non-warningly-coloured butterflies were gone); the D. genutia was still alive.

I then put in one specimen each of P. politæ, P. demoleus, D. chrysippus, D. limniace, and Euploea.

The birds now mostly wanted to rest, but the Button-Quails (assisted perhaps by a Red-whiskered Bulbul) soon finished all but a D. genutia and a D. limniace, and these were soon dead and mangled.

I then put in a number of D. chrysippus, two or three D. genutia and two Euploes, a Junonia, and an Elymnias undularis 2.

The Junonia was unmistakeably singled out for attack and seized by Liothrix, which next attacked the two Euploes, and I saw one eaten, and have no doubt the other was.
I saw *D. chrysippus* attacked both by this species and by Red-whiskered Bulbul, and then left off watching, being convinced already that *Liothrix* preferred the non-warningly-coloured butterflies. I was not so sure about the Bulbuls, which I saw this time neglected all butterflies, when both sorts were together, and yet they eat warningly-coloured ones.

The birds had had a good meal of fruit before I began experimenting. The fate of the *Elymnias undularis* ♂ I did not see, but I expect that, like *P. polites*, it was not a good enough mimic to escapes as I have seen it before seized by *Liothrix*. The rest of the butterflies were soon eaten.

**Experiments with various Birds. Series B.**

About this time I released all the Bulbuls. A day or two afterwards I noticed a bit of a *Papilio aristonochiae* on the floor. For several days now the birds had practically no insects but those they could catch casually. I gave them, however, two *Euproctis* moths one day. One was eaten by a Button-Quail the other by a *Liothrix*, which latter did not seem to relish it much. Wild birds do not seem to eat this species, though helpless by day at any rate and easy to see. I then commenced another series of experiments.

I. I offered a *Nepheronia hippia* ♂ with a *Danais limniace*, a *Catopsilia*, and two other non-warningly-coloured butterflies. These last three were seized by the three *Liothrix*, and a Button-Quail disabled the mimic, which I took out.

I offered the *N. hippia* with a non-warningly-coloured species, and the *N. hippia* was taken first, by a *Liothrix* (it was nearest). *D. limniace* was as yet untouched.

I put in *Euploea*, *D. chrysippus*, and two non-warningly-coloured species, one a *Huphina phryne*. The former was taken by a *Liothrix*, but the bird hardly had a fair choice.

I put in *Euploea*, *D. chrysippus*, *D. limniace*, and a *P. polites*; none were taken at once, but a *Liothrix* found and took a non-warningly-coloured one. Then *Euploea* was taken.

I put in several *D. chrysippus*, with a *P. demoleus* and a *P. polites*, and a non-warningly-coloured specimen, which was picked out by a *Liothrix*.

A Button-Quail turned away from a *D. chrysippus* and ate the *H. phryne* previously put in, as mentioned above, and I suppose dropped by *Liothrix*. Soon after this I saw a *Liothrix* eat an *Euploea*; and soon after I saw another eat a *D. limniace*, and another take a *D. chrysippus* which had been refused by a Button-Quail. The *Papilios* were still alive, as also one *D. limniace*, one *Euploea*, and several *D. chrysippus*. 

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**References and Notes:**

1. The fate of the *Elymnias undularis* ♂ I did not see, but I expect that, like *P. polites*, it was not a good enough mimic to escapes.

2. Wild birds do not seem to eat this species, though helpless by day at any rate and easy to see.

3. I then commenced another series of experiments.

4. I offered a *Nepheronia hippia* ♂ with a *Danais limniace*, a *Catopsilia*, and two other non-warningly-coloured butterflies. These last three were seized by the three *Liothrix*, and a Button-Quail disabled the mimic, which I took out.

5. I offered the *N. hippia* with a non-warningly-coloured species, and the *N. hippia* was taken first, by a *Liothrix* (it was nearest).

6. *D. limniace* was as yet untouched.

7. I put in *Euploea*, *D. chrysippus*, and two non-warningly-coloured species, one a *Huphina phryne*. The former was taken by a *Liothrix*, but the bird hardly had a fair choice.

8. I put in *Euploea*, *D. chrysippus*, *D. limniace*, and a *P. polites*; none were taken at once, but a *Liothrix* found and took a non-warningly-coloured one.

9. Then *Euploea* was taken.

10. I put in several *D. chrysippus*, with a *P. demoleus* and a *P. polites*, and a non-warningly-coloured specimen, which was picked out by a *Liothrix*.

11. A Button-Quail turned away from a *D. chrysippus* and ate the *H. phryne* previously put in, as mentioned above, and I suppose dropped by *Liothrix*. Soon after this I saw a *Liothrix* eat an *Euploea*; and soon after I saw another eat a *D. limniace*, and another take a *D. chrysippus* which had been refused by a Button-Quail. The *Papilios* were still alive, as also one *D. limniace*, one *Euploea*, and several *D. chrysippus*.
II. Next day, the only butterfly not torn was *Papilio demoleus*, and it soon disappeared.

I put in three *Atella phalanta* and one each of *Danais genutia*, *D. chrysippus*, and *Euploea*.

Two *Atellas* were seized by two *Liothrix*; the third *Liothrix* took the *Euploea*.

A Button-Quail ate the *D. genutia*, and then an *Atella*, which I don’t think the birds saw at first.

The *D. chrysippus* was soon seized by a *Liothrix*.

I put in *Euploea*, *D. chrysippus*, and two non-warly-coloured butterflies. The latter were taken by *Liothrix*, one, an *Elvmnias undularis* ♂, being obviously chosen in preference to *D. chrysippus*. While the *Euploea* and *D. chrysippus* were untouched, I put in one *D. chrysippus*, one *D. genutia*, and two *Catopsilias*. The *Catopsilias* were chosen by *Liothrix*.

While two *D. chrysippus*, a *D. genutia*, and an *Euploea* were in the aviary, I put in a *Huphina phryne*, which was taken by a *Liothrix*. I put two more in, but they were in a corner, and the birds did not seem to see them.

I put in then, the two *D. chrysippus* and a *D. genutia* and *Euploea* being still alive, two *Papilio demoleus*, and two *P. polites*. One of the last fell to the ground and was swallowed whole by a Button-Quail; none of the other butterflies were attacked, not even the two *H. phryne*, which I picked out and put on a box. Here the *Liothrix* looked at them and one picked them up. Yet at this time a *Liothrix* caught mosquitoes.

The female Button-Quail (which had eaten the *P. polites*), now after many attempts swallowed the *D. genutia*, which was obviously too big for her. She had previously attempted to swallow an *Euploea*, which when she left it was long pecked at by the male, and pulled to pieces, but little if any was eaten.

I put the two *Huphina phryne* on the floor, and a *Liothrix* pulled one about, but hardly touched it, though these birds took the remains of the *Euploea* and picked at them.

However, a *Liothrix* soon after ate one of the *H. phryne*, while there were two *P. demoleus*, two *D. chrysippus*, and a *P. polites* in the aviary. I then put in a *Neptis leucothoe*, which was seized by a *Liothrix*, which dropped it, and another carried it up on to a box at the top of the aviary, where I did not see what happened further. then took out and reserved the two *D. chrysippus* and *P. demoleus*, and the *P. polites*, (a mimetic specimen), and reserved them, all unhurt. Part of a *H. phryne* still lay on the floor of the cage.

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When I put in the butterflies I had reserved, the Danais was first attacked, then the P. polites; the P. demoleus was left a little time, then it disappeared, as the other two species had done.

III. I put in two Danais chrysippus and one D. genutia and three non-warningly coloured butterflies. The Liothrix took the latter first; then one took the D. genutia. The female Button-Quail apparently ate the two D. chrysippus, but she had no fair chance at the others.

A Papilio aristolochiae put in was not touched by any of the birds. But a few hours after only a wing was left.

I put in one D. chrysippus and Euploea and two or three non-warningly-coloured ones. These were taken first.

I put in a female of N. hippia, which was eaten by a Button-Quail.

I put in some Danais with Huphina phryne and other non-warningly-coloured specimens where the Button-Quails could have a choice; they did not seem eager for any, and certainly did not pick out the non-warningly-coloured ones. A Liothrix went on tearing a Euploea even among these, and I think ate it.

Soon the Button-Quail ate a greyish butterfly, and a Liothrix took one of the H. phryne, while two D. chrysippus were still left.

An Elymnias undularis ♂️ was in a corner, so I put it between the two D. chrysippus, whence a Liothrix took it.

In the evening I put in one each of D. chrysippus, D. genutia, D. limniace, and Euploea, with a similar number of non-warningly-coloured butterflies. The Liothrix deliberately picked out three of these; I did not see whether they got the fourth. The Button-Quail swallowed the D. chrysippus. Then a Liothrix took the Euploea.

IV. Next day, the Danais limniace put in yesterday had been eaten. I put in an Euploea with two Nepheronia hippia ♂️. A Liothrix took the Euploea first, before I was fairly out of the aviary. Only the undersides of the N. hippia were visible.

When all these were eaten, I put in two Papilio demoleus, two P. polites (not much like P. aristolochiae,) and two D. chrysippus. A P. demoleus was first taken, by a Liothrix. P. polites seemed to be looked at by these birds with some suspicion; yet one was soon taken, and another seized, pecked, and left, by them. This specimen, however, and both the P. demoleus (one of which I think was swallowed by the female Button-Quail) disappeared before one Danais did. This, however, afterwards disappeared.

V. Next day, I put in one each Danais chrysippus, D. genutia and Euploea, with three non-warningly-coloured butterflies. The Liothrix took at the first attack the Euploea and two of the non-warn-
ingly-coloured butterflies, while next one took the third, a Catopsilia, in distinct preference to the D. genutia. The D. chrysippus was swallowed by the female Button-Quail. I then saw an Elymnias undularius and a Huphina phryne, (which I put in) both taken by Liothrix, when there was another D. chrysippus in the aviary; but I doubt if they properly saw the latter. I then put in four Papilio demoleus and two D. chrysippus (one of the latter species being in the aviary still). A P. demoleus was first seized, by a Liothrix. The female Button-Quail took a D. chrysippus, but neglected the P. demoleus. A Liothrix then attacked the other P. demoleus but did not kill it; nor did the Button-Quails notice it, as it fluttered on the floor. I then turned in some small young cockroaches, which were greedily eaten by the Button-Quails, and also taken by Liothrix, (as, indeed, happened yesterday). Yet on that occasion I saw a Liothrix leave a cockroach, after having butterflies as now.

I saw the male Button-Quail look at and leave P. demoleus. Some hours afterwards all these butterflies were gone, and I put in two male Hypolimnas and two Euploea. The first Liothrix took an Euploea, the second a Hypolimnas, a Button-Quail the other Hypolimnas, and Liothrix the other Euploea. All were eaten as far as I could see, but I don't think by their original captors exclusively.

I put in two more Euploea, and two Junonias of different species; the first Liothrix took an Euploea, the second a Junonia. A Button-quail got the other Junonia. A Euploea was still in the cage when I put in a small Lycænid, which was eaten whole by a Liothrix. It was still there when I put in a Huphina phryne. This was not attacked at once; I blew it down, and a Button-quail ate it. The last Euploea was then eaten by a Liothrix.

I put in a protective Satyrid and a D. chrysippus. A Button-quail ate the former. The D. chrysippus was still untouched when I put in several more, with one D. genutia, one D. limniace, and three P. polites. The Liothrix attacked none at once. A Button-quail pecked at P. polites and swallowed a D. chrysippus whole.

VI. The male Button-quail was now lost.

I put in three Junonias and one each of Danais chrysippus, D. limniace and Euploea. The female Button-quail got one Junonia, and a Liothrix took the Euploea, while a second Junonia was in a corner. I blew it out, when a Liothrix distinctly chose it before the two Danais. I think the Button-quail got the third Junonia.

While the two Danais were in the cage, I put in two Junonias. A Liothrix distinctly chose one before the D. chrysippus; the Button-quail got the other.
I put in another Junonia which was soon taken by Liothrix, though the Danaïs were still there. However, a Liothrix which had got part of the Euplœa, did not leave it for the Junonia.

I then put in several non-wariningly-coloured and "protected" butterflies; the former nearly all disappeared first.

VII. I put in two Catopsilias and two Delias eucharis. The former were seized by Liothrix.

I put in four Euplœas and four non-wariningly-coloured butterflies. An Euplœa was first taken by a Liothrix; then the rest of the non-wariningly-coloured specimens disappeared. I saw two taken before Euplœas by the Liothrix. While three Euplœas were left, I put in another non-wariningly-coloured butterfly, which was immediately seized by a Liothrix.

I then put in some more butterflies, including Danaïs chrysippus, D. genuitia, Papilio aristolocheæ and a blue and black species, two Huphina phryne and P. demoleus. I put in one H. phryne before the other, but a Liothrix looked at and did not take it, and one of these birds took one of the Euplœas. All this time the Button-Quail did not attempt to eat the Delias eucharis, while it swallowed two D. genuitia. The blue and black Papilio was killed and left by a Liothrix, swallowed by the Button-Quail. The H. phryne were eaten, by Liothrix I think, while some other butterflies yet remained untouched.

At the end of the afternoon only the two Delias eucharis were left, dead but uneaten, on the floor.

I then put in two or three non-wariningly-coloured butterflies and three Euplœas; the Liothrix preferred the former. While one Euplœa remained untouched, I put in a D. chrysippus (a Liothrix had just taken one of the species) and three non-wariningly-coloured butterflies, all of which latter were taken by the three Liothrix. This in spite of two of them, Atella phalanta, being tawny like the Danaïs.

While the Danaïs and one Euplœa were untouched (a Liothrix was eating another Euplœa) I put in another non-wariningly-coloured butterfly. The first Liothrix was regarding it closely, when another took it.

I then put in six D. chrysippus, two P. demoleus, one P. politæ, one D. limniææ, and one Nephéronia hippia ♂. This last was the first seized by a Liothrix, which left it. It was, however, ultimately eaten by a bird of this species. But they seemed less keen on butterflies than previously.

VIII. Next day in the morning I found only the two Delias eucharis and a Papilio aristolocheæ left. In the evening they still lay there.

I put in two P. politæ. The first, a non-mimetic one, was looked
at, but not touched, by the first Liothrix and the Button-Quail; the second, though much more like *P. aristolochiae*, was very soon taken by a Liothrix.

I then put in some *Danais chrysippus*, *D. genutia*, *D. limniace*, and *Euplœa*. The Button-Quail swallowed two *D. chrysippus* at least. I think the *Euplœas* disappeared first.

IX. In the afternoon, next day, all the butterflies were gone, but the two *Delias eucharis* and the *Papilio aristolochiae* left before. The aviary was now cleaned out, and I put in two *P. aristolochiae* and a *P. polites* (not much like the protected species). The latter was at once seized by a Liothrix. One of these birds and the Button-Quail looked at but did not touch, the others. I put in an *Euplœa* and three *Junonias*. Two at least of the latter were taken by Liothrix in obvious preference to the former. I put in five more non-warningly-coloured specimens. One was seized by a Liothrix, the *Euplœa* being still there. A Liothrix then took one from the Button-Quail, as had happened with one of the three *Junonias* above-mentioned.

Another *Junonia* was put in, and seized by a Liothrix. All the five non-warningly-coloured butterflies were eaten before the *Euplœa*, or any of half-a-dozen *Danais chrysippus* and a *D. genutia* which I had now put in.

X. I put into the aviary two *Papilio aristolochiae* and two mimetic specimens of *P. polites*. The first one, put in together with the two *P. aristolochiae*, was deliberately looked at and taken by a Liothrix. Then I put in the second, dead, on the floor. The Button-Quail immediately attacked it, but a Liothrix took it away twice; for the former bird left it at first, after knocking a bit off. The Liothrix evidently observed the difference in these two species. I then put in some *Danais chrysippus*, and one each of *D. limniace*, *Euplœa*, and *P. demolens*. The Button-Quail attacked the last, and the Liothrix ate part of it, and then one took the *Euplœa*, but with no great eagerness. I saw none of the *D. chrysippus* eaten, and the *P. aristolochiae* were not killed.

XI. Next day, no butterflies left but the two *Papilio aristolochiae*, which were able to fly away.

I added two common Bulbuls (*Molpastes bengalensis*) to the aviary.

I then put in the evening three *Danais chrysippus*, an *Euplœa*, and several non-warningly-coloured butterflies, including some *Papilio polites* and a *P. demolens*. The *Danais* and *Euplœa* were not taken by the Liothrix as long as any others remained.

The Bulbuls showed no distinct tastes, but were very wild.

XII. I put in, in the morning, several non-warningly-coloured butterflies, with some *Danais chrysippus* and an *Euplœa*. The former
all disappeared before the *Danaina*, most being taken by the Liothrix, but one large specimen by a Bulbul. The latter birds were hungry. I saw a Liothrix take a *Junonia* when close to the *Euplea*.

I then put in two *Papilio polites*, one of which was immediately attacked by a Liothrix, *D. chrysippus* being at hand. A *P. demoleus* was eaten before the other butterflies, which had, however, disappeared in the evening, when I put in some more, mostly *D. chrysippus* and *Euplea*, with two *Delias eucharis*. I did not see these taken. A solitary *Junonia* given was seized with obvious preference by a Liothrix.

**Experiments with various Birds. Series C.**

The present series was conducted with one of these Liothrix only,* but several Bulbuls were used; the two *Molpastes bengalensis* noted a few lines above, and two each of the Red-whiskered (*Otocompsa emeria*) Yellow-vented (*Molpastes leucothis*) and White-crested (*Pycnonotus sinensis*) species (not Indian). The Button-Quail had been removed.

I. I put in four *Danais chrysippus* and about six non-warningly-coloured butterflies. The Liothrix took one of the latter, and the Common Bulbuls ate two *D. chrysippus*. I also saw this species taken by one Yellow-vented Bulbul; the other took a non-warningly-coloured butterfly. A bird of this species then ate readily a *Delias eucharis* given, though they had had non-warningly-coloured butterflies, and there was also fruit.

When all the butterflies put in were gone, I introduced six or seven *Papilio polites* and a *D. limniace*, and three *Huphina phryne*. A White-crested Bulbul ate one of the *P. polites*, and one tried at the *D. limniace*, and I think ate the head, but a Common Bulbul took the butterfly away and swallowed it. The Liothrix took a *P. polites*.

Two *Huphina phryne* were the last butterflies I saw eaten, one by a Yellow-vented Bulbul and one by a White-crested.

II. Next day I put in three *Papilio aristolochiae* and two *P. polites*. I saw the Liothrix with one of the latter, and a Common Bulbul eat readily a *P. aristolochiae*. And as all the insects soon disappeared, the Bulbuls must have eaten the others also.

III. Next day I put in nine non-warningly-coloured butterflies, two *Eupleas*, two *Danais limniace* and a *D. chrysippus*. The last was taken by a Common Bulbul, though there were plenty of other butterflies, and eaten as far as I saw, and this bird then took a non-warn-

* But all were together with these Bulbuls a little while, and at this time one day I put in a number of butterflies, mostly "protected" kinds. I thought the Bulbuls did not much relish them, but all soon disappeared. I think I saw a Common Bulbul drop an *Euplea*. 
ingly-coloured specimen. A Red-whiskered Bulbul made its first attempt on a *D. limniace*, though non-warningly-coloured butterflies were at hand. The Liothrix took two of these latter. The White-crested Bulbuls took some non-warningly-coloured butterflies, and pecked and left *Euploeas* and *D. limniace*, the only Danaids I saw them try; this when the other butterflies were gone.

The Yellow-vented Bulbuls ate only non-warningly-coloured butterflies as far as I saw.

The last two butterflies left were an *Euploeas* and a *D. limniace*. But a Red-whiskered Bulbul took and swallowed the *Danaids*, and the White-crested Bulbuls, after much battering of it, apparently disposed of the *Euploeas*, which they evidently did not relish. One of these latter birds had eaten a *Papilio polites* I put in readily enough, and two *P. demoleus* disappeared, I suppose eaten by the Bulbuls. There was very little left, and the birds appeared to be hungry.

In the evening I put in a *P. aristolochiae*, which was seized and killed by a White-crested Bulbul; this bird did not appear to relish it much, and seemed inclined to abandon it, when it was snatched away by a Yellow-vented Bulbul. After this bird had knocked off all the wings, a Red-whiskered Bulbul got the body but soon dropped it. Then one White-crested Bulbul took and dropped it; then the other bird of this species manipulated it for a time till it was snatched away and ultimately eaten by one of the Yellow-vented species!

IV. I put in some *Euploeas* and *Danaids chrysippus* and one or two *D. genutia*, with a few other butterflies.

The Liothrix took a *Junonia*, a Yellow-vented Bulbul a *D. chrysippus*. I saw a White-crested Bulbul take and drop a *D. chrysippus*; nevertheless one of these birds ate one, the other an *Euploeas*. I then saw a White-crested Bulbul take and drop an *Euploeas* with apparent distaste.

All the butterflies were soon taken, the few non-warningly-coloured ones disappearing first. These were smaller. A female *Elymnias undularis* was eaten, I do not know by what bird, but it did not seem to be avoided.

In the evening I offered the Liothrix the choice of *Nepheronia hippia* ♀, and a rather larger non-warningly-coloured species. After some hesitation he took the latter, and a Yellow-vented Bulbul immediately seized the *Nepheronia*, but I took this away.

I then offered it again to the Liothrix with a male of the same species, and he took it (the female). But he was perhaps in fear of a Common Bulbul which approached. However, he dropped it accidentally when I scared him off to try again fairly, but I found the Bulbuls made this impossible, so I allowed them to get both specimens.
I then put in a number of butterflies, mostly Papilio polities and P. demoleus, with several Eupleas, one or two D. genutia and D. chrysippus, and one P. euryplius and two or three other non-warningly-coloured butterflies.

A Yellow-vented Bulbul attacked first one of the last-named. A White-crested Bulbul took and rejected an Euplaea, but I saw one of these birds swallow a P. polities, and one eagerly pursue a Junonia, which was ultimately taken by a common Bulbul, I think because it was nearest; at any rate the bird left it, and took a P. demoleus. Then the Liothrix, which had had a P. polities, took this Junonia.

I saw one of the White-crested Bulbul's flick away a P. demoleus as if distasteful, but I also saw a specimen of this butterfly manipulated by a bird of this species.

While P. polities and P. demoleus were still available, a male Elymnias undularis, which had escaped from a White-crested Bulbul early in the progress of this experiment, was alive in a corner apparently unnoticed. I blew it out, and it settled further up, when after a little time a Red-whiskered Bulbul took and ate it.

One White-crested Bulbul then after long manipulation swallowed a P. demoleus, not appearing to relish it.

The P. euryplius was attacked by a Yellow-vented Bulbul, but I found it later, apparently unhurt save for the loss of a wing. Yet a little while afterwards it had disappeared, while a P. polities and P. demoleus were still left alive when the birds roosted. There was fruit in the cage.

V. Next day, both these butterflies left overnight had disappeared.

At the end of the afternoon (there being fruit in the cage) I put in eight Danais chrysippus, and a similar number of non-warningly-coloured butterflies, and a hawk-moth. I placed these on the ground, decapitated, instead of offering them alive as usual.

I saw Bulbuls of the Yellow-vented, White-crested, and common species eat D. chrysippus, and these were all gone before the other butterflies, which were inconspicuous on the sand. But the Liothrix saw and selected the latter, and did not eat any Danais, though he had been eating their heads with those of other butterflies as I picked them off. I saw one White-crested Bulbul eat a Danais and then a Junonia, while its fellow was engaged with a non-warningly-coloured species. The Yellow-vented Bulbul I saw eat a Danais did not seem to like it much. I then put in a D. genutia, an Euplaea (dry and without abdomen) and a male Nepheronia hippia, dead. A Common Bulbul ate the D. genutia, and a White-crested one the Nepheronia. I put in
then a live *Euthalia lubentina*, which was eagerly chased; a Yellow-vented Bulbul either lost it or let it escape, and a Common Bulbul swallowed it. I have seen the common *Euthalia* eaten on this occasion and before. Even the *Euploea* soon disappeared.

VI. About this time I put in a number of "protected" butterflies of several species with a *Papilio demoleus*, which the *Liothrix* took. I saw a White-crested Bulbul swallow a *Danais chrysippus*.

VII. I put into the aviary three *Danais chrysippus* and seven non-warningly-coloured butterflies. I did not see what the *Liothrix* took.

The Yellow-vented Bulbuls took non-warningly-coloured ones, one Common Bulbul a *Danais chrysippus*, and the other a non-warningly-coloured species.

I saw a White-crested Bulbul reject a *D. chrysippus*, and both of them reject non-warningly-coloured specimens. All the *D. chrysippus* were eaten by the common Bulbuls, except part of one which a Red-whiskered Bulbul took (other butterflies all gone apparently) and a Common Bulbul snatched away.

The White-crested Bulbuls did not seem eager for any butterflies. There was fruit in the cage at the time.

I then put in some *Papilio polites*, some mimetic, but most not so, with one *P. aristolochiae*.

The *Liothrix* did not take any. I saw a White-crested Bulbul with one of the mimicking specimens; the other also had a *P. polites*, and one bird at least appeared to eat its prey. The common Bulbuls swallowed one at any rate. All of this species soon disappeared. But the *P. aristolochiae* was looked at by the *Liothrix*, and pecked by both the White-crested Bulbuls, which afterwards cleaned their beaks with evident disgust; one of these birds had I think disabled the insect at the first attack.

I then put in two *Neptis kamarupa*, with a *D. limniace*, three *P. demoleus*, and a *Delias eucharis*. One of the *Neptis* was swallowed by one White-crested Bulbul, while the other bird of this species took a *P. demoleus*; I did not see whether it ate it. One pecked and left the *D. eucharis*. I saw one try at the *D. limniace* at first, but it escaped. I also saw this butterfly get away from a Common Bulbul, but a Red-whiskered Bulbul seized it, and it soon disappeared. Soon the *P. aristolochiae* and the *D. eucharis* were the only butterflies left. The *Liothrix* took none of these butterflies, though eating fruit and the head of something.

This same individual again took part in a further series of experiments, which I record below. Three more *Liothrix* were added, the other birds used now being a Chloropsis (*Chloropsis aurifrons* or...
malabarica) some Zosterops and two Yellow-vented (one new) and one Red-whiskered Bulbul only. The Chloropsis is a leaf-hunting bird, arboreal in habit, and also capturing insects on the wing. It does not use its foot in manipulating its prey, and swallows large insects with difficulty. The genus is widely distributed in the Oriental region. The Zosterops are very small birds, and of little or no importance in this connection.

**Experiments with various Birds (on plain diet) Series D.**

I. Offered the Chloropsis heads of different butterflies; he ate those of non-warningly-coloured species readily, but refused heads of Danais chrysippus, wiping his beak after trying these. I put a number of live Euplœas and a D. chrysippus into the aviary, and one of the former was seized by a Yellow-vented Bulbul, while a Liothrix soon after took another, which I did not see it eat. In fact, I soon afterwards saw one of these birds take and drop one. I offered the Chloropsis a Papilio polites, and while he was looking at it a Liothrix (the original bird) took it away, and proceeded to eat it, while there were plenty of Euplœas about. The birds had had very few insects for several days.

I then pulled off the wings of a P. polites and offered the body to the Chloropsis, which he took very readily, but dropped it (after some manipulation), as also did two Liothrix in succession.

The other day the Chloropsis had readily seized a large non-warningly-coloured butterfly, but it was snatched from him.

I then put in specimens of D. limniace, genutia, and chrysippus, and P. demoleus, none of which I saw taken, though I saw a Liothrix catch a D. genutia (I think) and let it go again, and the Chloropsis flew at some butterfly but did not catch it.

The Yellow-vented Bulbul apparently ate the Euplœa which, as stated above, it attacked, and I saw a bird of this kind attacking another Euplœa.

I offered the Chloropsis a male Elymnias undularis. He took it immediately, and manipulated it till he lost it by accident, and a Liothrix (the original bird) took it. I cannot say whether this bird ate it, as I saw a Yellow-vented Bulbul with part. Just then another Liothrix had an Euplœa. While watching the Chloropsis I saw a Liothrix take and drop a D. genutia.

The Chloropsis then readily took and with some trouble ate a Junonia. He readily eats small moths and flies.

I left the Liothrix at night attacking Euplœas, but they were not eager. Next day all the butterflies were gone.
I now released one of the Yellow-vented Bullbuls, which was weakly, and added a Red-whiskered Bulbul. I must also have put in another of the former species, though my notes do not say so (see infra).

II. I gave an *Acræa violæ* to the birds; a Liothrix took it, but a Yellow-vented Bulbul snatched it and after much mumbling, ate it. Removed the Red-whiskered Bulbul again.

III. Put in in the morning several "protected" butterflies, mostly *Euplæas*, with one *Delias eucharis*. The birds were not keen, except one of the Yellow-vented Bullbuls; the butterflies, however, were all gone later on.

I offered the head of an *Acræa* to the Chloropsis, but I am not quite sure what he did with it. He took and dropped the head of a *Papilio nomius*; but ate two heads of *P. demoleus*, and several heads of non-warningly coloured species. I then put in three *Junonias* and a male *Hypolimnas* with two *P. demoleus*. One Yellow-vented Bulbul immediately attacked the *P. demoleus* and ate one; a Liothrix got the other, and at the same time other Liothrix got most of the non-warningly-coloured butterflies; I saw the last taken as the Bulbul finished eating its prey.

I then put in a *Junonia*, another non-warningly-coloured butterfly, and two *Acræas*. The *Junonia* was soon seized, I think, by a Liothrix, and a Yellow-vented Bulbul then took the second non-warningly-coloured one, which it apparently ate. It then ate in succession the two *Acræas*, apparently with no great relish; but this Bulbul, owing I think to its small bill, is not good at eating butterflies.

One of the *Acræas* had been tried and left by a Liothrix, and another was trying it, but left it quite readily on the Bulbul's approach.

The keenness of the Liothrix for the *Junonias* contrasted strongly with their indifference to the *Euplæas*.

I then put in the *P. nomius*, which was before long seized by a Liothrix. A Bulbul also appeared anxious to obtain it. Presently it was dropped,—how, I did not see—but soon taken again by another Liothrix. A Zosterops took it from him, and commenced to eat it, when a Bulbul snatched it, then a Liothrix got it again, and I think it was eaten by one of the last named. I have seen the Chloropsis with bits of wing in his bill, once of *D. genutia*, and just now he swallowed a bit of an *Euplæa*'s wing.

I now (next day) commenced to give the birds a daily supply of live maggots, a man coming for the purpose, who also gave grass-hoppers. As this alters the conditions of the experiments somewhat, I commence here a new series, begun next day.
Experiments with various Birds (on more liberal diet) Series E.

I. I offered two Terias to the birds; a Liothrix took and left one, then, with no great relish, apparently, ate the other. Meanwhile another Liothrix took and left the first specimen. This was not eaten immediately at any rate, but next morning I did not see it.

II. I put many "protected" butterflies into the aviary, mostly Euploea and Danais limniace, but also a D. chrysippus or two and a Papilio aristolochiae. The Liothrix soon attacked the Euploes, and a Yellow-veuted Bulbul took a D. limniace, which it ultimately swallowed, I believe, after much trouble. I also saw it with an Euploea, and (I believe the same bird) with another D. limniace.

I put in a Catopsilia, which was soon taken, though (as above stated) there were many other butterflies, by a Liothrix, which was tearing it to pieces, when her own mate forcibly drove her off, and after pecking at the butterfly with no great relish, left it. I saw an abandon-ed Euploea close by, and this morning I have seen Liothrix eating these.

A Zosterops took an Euploea, and picked it a bit but then dropped it.

The Chloropsis attacked the butterflies, but did not seem able to manage them. But later in the day I saw him swallow with some trouble the body of an Euploæ. Only a few butterflies were now left; of these an Euploea and a D. chrysippus were feeding on the birds' fruit. The Catopsilia was now gone.

I saw a Liothrix leave the body of an Euploea after stripping off the wings.

Later on, towards evening, I gave the Chloropsis a very small non-warminibly-coloured butterfly, which he ate, and after that a Terias, which he also ate.

I offered him two heads of D. chrysippus, the first of which he flicked away, and the second he only just touched once. He then immediately took and ate the head of a Catopsilia. I could not get him to touch the heads of two Euploas, but it was near roosting-time.

One Euploea and the P. aristolochiae were still uneaten. I took out the Euploæa and put in a Catopsilia, which was soon taken and disposed of by Liothrix, apparently with no great relish.

III. Next day in the morning while there were still maggots in the cage, gave the Chloropsis a skipper, which he ate with difficulty, getting it the wrong way at first. In the evening, the Papilio aristolochiae put in yesterday had its wings pulled off, but was still uneaten. I put in another, and several non-mimetic P. politæ. The birds did not seem eager for them, although a Liothrix had taken a non-warminingly-coloured butterfly readily, before they were put in.
I put in three *Terias* and a *Huphina phryne*, which were all eaten by the Liothrix in preference to *P. polites* and *aristolochiae*, but with no great relish, as I saw one bird leave a *Terias*.

A Liothrix picked off part of the abdomen of a *P. polites* and left it, still living, with signs of (apparent) dislike. However, one of these birds (I do not know whether the same) returned to the attack, and most, if not all, of the insect was eaten. I saw a Liothrix take up and drop the body of yesterday's *P. aristolochiae*; to-day's specimen had not been molested as yet.

When the birds went to roost, three *P. polites* and the *aristolochiae* were left.

IV. Next day in the morning, all the *Papilio polites* had been eaten, but the *P. aristolochiae* had not, the last specimen not being even torn. Later on I saw the dried body of the earlier specimen lying about, and some wings, presumably of the other. I put in one specimen each of *Euploea*, *Danais genutia*, *chrysippus* and *limniace*, with about an equal number of non-warningly-coloured butterflies. The Liothrix and one or both Yellow-vented Bulbuls attacked the latter and consumed them all before the *Danais* were touched; the first insect taken being one of the non-warningly-coloured ones, by a Bulbul, which bird however swallows even smallish species with difficulty (see above).

The Chloropsis swallowed pieces of wing from the non-warningly-coloured species, but I did not see if this was by preference. (This morning the birds had had no maggots so far as I knew). A Liothrix attacked the *D. genutia*, but did not eat it all, and the three other "protected" butterflies were still alive when I put in, shortly after, another *D. genutia* and *chrysippus* and a non-warningly-coloured specimen. The last was soon taken by a Liothrix.

A *D. chrysippus* was then pecked and left, at the same time that another Liothrix was eating a *D. genutia*. I then put in a *Neptis kamarupa*, which was looked at by one Liothrix, taken and eaten, after rather tentative pecking, by another.

Meanwhile the Chloropsis attacked the *Euploea*, but did not capture it. This *Euploea*, the *D. limniace* and *genutia* and two *D. chrysippus* were still uneaten when I put in a dead and rather dry specimen of *Papilio demoleus*, which the Chloropsis seized, but when he had battered off most of the wings, he lost it to a Liothrix, which in turn appeared to have lost the body to a Bulbul, which bird ate it.

I saw the Chloropsis look at the *Euploea*, and then take a piece of dead wing. When I left the birds a Liothrix was eating *D. genutia*, and another attacked and left *D. chrysippus*.

When all the above butterflies seemed to have been eaten, in the
evening, I put in about twenty *Euploëas* and a male *Hypolimnas*. This last was singled out for persecution by the Liothrix and a Yellow-vented Bulbul, and though its size and activity gave trouble, it was at last, falling in the water vessel, caught firmly by one of the former birds, and eaten by a bird of this species, which threw up the body once, but eagerly took it again.

Meanwhile the other Yellow-vented Bulbul was worrying an *Euploëa*, which I suppose it ate. I saw no other *Euploëas* eaten at the time, and both the unoccupied Bulbul and the other Liothrix wanted to get the *Hypolimnas* from its owner. I saw *Euploëas* taken and relinquished by Liothrix at least twice, though they ate rice and milk (for the last few days I have been giving them sweetened sop made thus or with bread, which seems much to their taste and probably lessens their readiness for butterflies).

The dry body of one *aristolochie* was still about. At night about a dozen *Euploëas* were still left in the cage.

V. Next morning some of the *Euploëas* put in over-night were gone, but two or three remained alive. In the evening all were eaten. I then put in a male *Hypolimnas* and a female *Nepheronia hippia*. The former was first attacked by a Liothrix, but before it succeeded in catching it, another seized the mimic, which had settled with its wings closed while the other was being chased.

I saw a Bulbul in possession of both, but the *Hypolimnas* was snatched from it by a Liothrix just as it had nearly got rid of the wings.

I put in five *Papilio aristolochie* and two non-mimetic specimens of *P. polites*. One of the latter was soon knocked into the water, and another taken and torn by a Liothrix, which (or another of the same species) was about to eat the body, when a Bulbul snatched it and appeared to eat part.

I found the bodies of four *Euploëas* in the cage, as well as the old *P. aristolochie*, though the birds had much fewer maggots this morning than usual.

I took the first *P. polites*, still living, out of the water and laid it on the ground. But both it and the *P. aristolochie* were untouched when the birds roosted.

To-day they ate none of the plantain supplied, seeming to prefer the rice and milk. For a day or two I have noticed little plantain was eaten.

VI. Next day the *P. polites* was not to be seen, but none of the five *P. aristolochie* had been eaten, and two at least were still alive.

I then put in five *Danais chrysippus* and three *D. limniace*, which were not touched.
I put in then an *Atella phalanta* and a *Huphina phryne*. The former was soon taken by a *Liothrix* and discussed by these birds, but they left the body, and the Chloropsis, to which I offered it, soon dropped it.

The *Huphina* was then taken by a *Liothrix*, but he somehow dropped it, and the Chloropsis took it, and after much manipulation swallowed it.

There were maggots in the cage at the time, besides fruit.

I then put in a dead specimen of *Papilio demoleus*, which was taken by a *Liothrix*, but not eaten. However, another *Liothrix* soon took and began to tear it, but I next saw it in the possession of a Bulbul, from which a *Liothrix* took it when the Bulbul had nearly got rid or the wings (which the Yellow-vented species seems to find it necessary to do), and part was eaten by one of these birds, which did not seem eager for it.

Just after the *P. demoleus*, I put in a dead *D. limniace*, which no bird touched.

I then took away the maggots.

An hour or so later the *D. limniace* were all dead, but not eaten, while all the *D. chrysippus* were gone. The *P. aristolochiae* were also intact, and the four bodies of *Euplotes* noticed yesterday still lay about.

Towards evening I put in a *Catopsilia*, a female *Elymnias undularis*, a male *Hypolimnas*, and some *Danais genutia* and *D. chrysippus*.

First a *Liothrix* attacked the *Catopsilia*, then another the *Hypolimnas*, which escaped. Before it was captured (as it lay in the water) a *Liothrix* took the *E. undularis*.

I took the *Hypolimnas* out of the water, with the *Catopsilia*, which, partly eaten, had fallen into it; while doing this I let a *D. genutia* escape.

The Chloropsis had been hotly pursuing the possessor of the *Catopsilia*.

I also found the *E. undularis* uneaten, except the head.

The birds were not eating much plantain even, apparently preferring the sop.

There were now one *D. genutia* and three *D. chrysippus* in the cage.

However, the Chloropsis soon took the *Catopsilia*, and I think finished it, for it disappeared. Meanwhile a *Liothrix* pulled to pieces the *Elymnias* and rejected it.

During this the *Hypolimnas* was again attacked by *Liothrix*, but remained alive, though its wings were much torn.

Then one seized it and took it upon a box in the cage.

I offered the rejected abdomen of the *Elymnias* to the Chloropsis, which carefully crushed and then ate it.
I then saw the *Hypolimnas* being discussed on the floor by a Liothrix, but another of these birds snatched and I suppose ate it, for on looking it was not to be found.

I then took out the five *P. aristolochiae* and three of the *D. limniace*, none of which had been eaten, though all of the latter and two of the former were headless. One of the *P. aristolochiae* was still alive. I offered its head to the Chloropsis, which took and rejected it.

While looking for these I found a *D. chrysippus* not quite dead. As it was rather dry I suppose it was not one of the last lot put in, all of which were unhurt and also the *D. genutia*; I threw all these *Danais* out, and all but the nearly-dead one flew away.

VII. After a live *Danais limniace* had been for some time in the cage, and there were maggots there, I put in a dead *Catopsilia*, and single live specimens of *Junonia*, male *Hypolimnas*, and female *Elymnias*.

The Chloropsis immediately took the *Catopsilia*, and the *Junonia* was next taken, I think, by a Liothrix.

I then killed the *Elymnias* and placed it so as to show its mimetic upper surface, and it was attacked and left by a Liothrix, then attacked again, and finally I think eaten by one of these birds, which did not seem to relish it much, as I saw the body on the floor, though this was soon taken.

The *Hypolimnas* was in a corner and was taken last of all, not till I stirred it up, when it was taken by a Liothrix, close to where the maggots were kept, and I think one of these birds ate it.

I then put in a live *Euploea* and two *Danais chrysippus*, one of which latter was soon killed or disabled.

Yet in the evening none had been eaten, not even the *D. limniace* mentioned above, and a *D. genutia* I put in was only attacked by the Chloropsis, and not with determination by that bird, which, however, pursued quite eagerly a non-warlingly-coloured specimen then put in, as also did a Liothrix, but it escaped them, apparently, as I found it behind the water-vessel. On throwing it out, a Liothrix soon took it, and I think it was eaten by this species, as I saw one tearing it, and could find no body.

I offered an *Acrea* to the Chloropsis, which took, chewed, and dropped it; I did not see what happened to it afterwards. I then gave this bird a *Terias*, which he ate.

I took out one of the *D. chrysippus*, which could fly, leaving one other of this species, a *D. genutia, D. limniace*, and *Euploea* in the cage.

To-day and yesterday the birds had a double allowance of maggots.

To-day they had rice and milk, but not, I believe, yesterday. Even when they have this sop they eat papya, though not caring for plantain.
Early next morning I found all the butterflies left over-night still uneaten. The birds had neither butterflies nor sop on this day.

VIII. I put in in the morning, while the birds had plenty of maggots, single specimens of *Euplœa, Danaïs limniace* and *chrysippus, Acrea, Neptis, and Papilio demoleus*, two *P. polites* (non-mimetic), one *P. clytia* and several non-warply-coloured butterflies including another small Papilio (I think *P. eurypylus*). Most of these were living.

The Chloropsis first attacked, a *Catopsilia;* then a Yellow-vented Bulbul, a small non-warply-coloured specimen, which I think it dropped.

Then I saw a Liothrix and a Bulbul with a non-warply-coloured one. The Bulbul left the body of this; but the bird is not healthy.

I do not think the Chloropsis managed to swallow his prey. I saw him try and leave the Neptis, which a Liothrix took, and picked off the wings at any rate, while there were non-warply-coloured butterflies about. But at this time I saw a Liothrix eating plantain.

Here I took out the sickly Bulbul to release it, and meanwhile a Liothrix got out; while keeping the door open to let it in again, one *P. polites* got away, but no other butterflies as far as I saw.

The small *Papilio* was now attacked by a Liothrix, but only the head was eaten.

Lately I saw a Zosterops seize a partly eaten non-warply-coloured butterfly and peck at a *Catopsilia* in the water. I did not see any eaten. I saw a Liothrix drop a *Catopsilia* and make no attempt to recover it.

I then saw a Liothrix take the rejected small *Papilio*, and afterwards found of it only wings and a bit of the thorax.

I saw a Liothrix peck and leave a *Catopsilia*, of which six lay about, uneaten or nearly so.

I found the body of the *Neptis* outside, and put it in, when it was taken and dropped by a Liothrix.

I saw one of these birds eat the body of, I think, a large non-warply-coloured butterfly, which body I had seen lying about. There were also a bit of thorax and wings of a non-warply-coloured butterfly outside; this I gave to the Chloropsis, but did not see what he did with it.

When I left the *Catopsilia* were being attacked.

An hour or more afterwards I found that the mimic had been torn, and its head eaten—not the body. The *D. chrysippus, D. limniace,* and *Euplœa* were intact and alive.

The head of the *Acrea* had been pulled off, but lay near, and the body was quite intact, and wings nearly so.
All the other butterflies had been eaten, even P. demoleus and P. polites, which had not been attacked when I left.

There were still plenty of maggots. These were gone in the evening, but the D. chrysippus and Euplœa were still intact; however, earlier in the day I found the mimic gone, and the D. limniace minus wings and head.

IX. Next day, I found the D. chrysippus and Euplœa still remaining, and took them out.

I then added one Common Bulbul and one of the Red-whiskered species. The former I shortly removed for a few days.

Soon after putting these birds in, I put in some Danais genutia, D. chrysippus, and Euplœa, with some Catopsilias.

These last were devoured first by the Liothrix and partly by the Chloropsis. The Red-whiskered Bulbul beat off the wings of an Euplœa and swallowed the body. Yet all day, as far as I saw, a D. chrysippus and Euplœa remained uneaten; there were also plenty of maggots in the cage.

X. In the evening I offered the Chloropsis a large grey fly, which it ate readily as usual. Then I gave two glossy-green flies, which it chewed and dropped; but these were eaten readily by Liothrix. The Chloropsis then ate another grey fly. There were maggots and fruit in the cage, besides seed.

XI. Next day the maggots in the aviary being all eaten, I put in, in the evening, one specimen each of Danais chrysippus, D. genutia, and D. limniace, one Euplœa, and three Catopsilias.

The Chloropsis immediately attacked the last and battered one for some time, till a Liothrix took it away.

Another Liothrix got a second specimen, but these birds did not attack as readily or as soon as the Chloropsis. I saw one make a flight at the Euplœa when Catopsilia was available; it did not catch it.

As the last Catopsilia had been killed by a Liothrix, I put in a male Hypolimnas. At this time all the "protected" species were unhurt, and part of a Catopsilia lay about, which a Liothrix then ate. Meanwhile another snapped at the D. genutia. I then turned out the Hypolimnas, which had got behind a tin. It was not attacked at once, but looking after dark I found only a wing or two of it left, while the three Danais and the Euplœa were roosting unharmed in the aviary. There was still fruit to be had.

XII. Next day, when I first looked at the birds early in the morning all the four butterflies, (Danais and Euplœa) left last night were still unhurt, though soon after I found the latter dead. They remained untouched even though the birds had had no maggots yet, and also after
these were given, and I then took them out; before which was done, I saw the D. genutia flutter unharmed before the very bill of a Liothrix.

XIII. I first gave the Chloropsis a Catopsilia. I put into the aviary one each of Danais chrysippus, genutia, and limniace, Euplœa, Papilio aristolochiae, and Neptis, all unhurt. I saw none attacked except the last, and the Liothrix which attacked it did not follow up the attempt. When, however, I put in two non-warningly coloured butterflies, they were attacked and eaten by these birds. There was now no sign of the Catopsilia just put in. The Neptis disappeared, but may have got out, as I have seen one do once, which I caught.

There were no maggots in the cage, and only a little fruit. The Chloropsis to-day seemed not much to relish a small grey fly given him and lost it without much concern.

After dark I looked in the aviary and found the three Danais, Euplœa, and P. aristolochiae roosting unhurt.

XIV. Next day, the five "protected" butterflies left last night were all unhurt this morning, yet when I put in a male Hypolimnas, it was soon taken by a Liothrix, and the Red-whiskered Bulbul ate some fruit.

I put the Common Bulbul in again.

After some time I saw a Liothrix tearing the Danais limniace. No maggots had been given yet, and I could not find the body of the D. limniace, so I presume the bird ate it. Soon after I found the D. genutia had been eaten, and the Euplœa had disappeared, though there were now maggots in the cage; and about an hour later the D. chrysippus had been eaten.

I put into the aviary later (where there was fruit and rice-and-milk) one specimen each of D. chrysippus, D. genutia, and D. limniace, Papilio demoleus, Euplœa, and male Hypolimnas and Elymnias, also P. polita, one mimetic and one not. These were not all put in exactly at once, and the P. demoleus was first attacked, but not killed, by a Liothrix. It was, however, eaten by the Red-whiskered Bulbul, while a Liothrix was tearing the non-mimetic P. polita. The abdomen of this specimen was eaten, after much fuss, by another Liothrix. The Elymnias next disappeared, taken, I think, by the Common Bulbul. This bird next attacked the Hypolimnas and ate it whole, apparently.

The Papilio aristolochiae left in last night I found at mid-day, minus its head, and in the evening I saw its crushed but uneaten body. Danaids and Euplœa not eaten to-day.

Next day, I found early in the morning the three Danais and Euplœa still uneaten, and two, D. chrysippus and genutia, apparently unhurt. There was fruit in the cage. Only the wings of the mimetic
P. polites remained, but in such a position that I suspected ants might have eaten them.

I think the Danaids and Euploea were all eaten later on.

XV. I put in three Catopsilia, and one specimen each of Danais chrysippus and limniace and Euplea. All were dead and rather dry. But although maggots and fruit were available, the Chloropsis immediately, and the Liothrix soon after, attacked the Catopsilia. I think part of them was eaten, but afterwards I found one body, and saw the Chloropsis drop its prey or part of it, which the Red-whiskered Bulbul seized, but also dropped, I think, for I found a dry crushed thorax. None of the Danaines were eaten at present.

The Chloropsis was apparently eating the rejected body of the Catopsilia when a Liothrix took it.

XVI. Next day, there being plenty of maggots, fruit, and bread-and-milk in the aviary, I put in nine non-warningly-coloured butterflies, and one specimen each of Danais chrysippus, genutia, and limniace, Euplea, and Acrea, all dead or disabled.

They were not touched immediately, but before long a Liothrix took a non-warningly-coloured one, and then another did the same. The latter dropped its prey, and I found the abdomen on the floor, which the Chloropsis ate when offered, after much pinching.

The Red-whiskered (apparently) and Common Bulbuls then each took a non-warningly-coloured specimen and ate it. The former bird rejected one non-warningly-coloured specimen which was rather dry, but then ate another. I then saw a Liothrix eat part of a non-warningly-coloured specimen.

The Common Bulbul then ate the D. genutia, when it might have taken a Catopsilia. This last specimen, the small dried one, and an Elymnias undularis ♂ were the only non-warningly-coloured ones left. The Liothrix on this occasion behaved much as I have seen done with "protected" butterflies, pecking their prey about much. The Red-whiskered Bulbul pecked and refused the Acrea, which specimen had been also refused by the Liothrix which had refused the small dry non-warningly-coloured specimen.

The Common Bulbul descended and ate the Catopsilia, which had been dropped by the Chloropsis, which in turn had got it after a Liothrix. The same Bulbul then flew down and pecked the Elymnias, which I had moved nearer the "protected" specimens, but then flew up, perhaps frightened. This Elymnias was now apparently the only non-warningly-coloured specimen left. I now saw it pecked and left by the Red-whiskered Bulbul, which had previously been eating some fruit near it. Then a Liothrix took and tore it, and then dropped it,
whereupon the Red-whiskered Bulbul again got it and ate part; perhaps the Liothrix might have also eaten some. But from their marked lack of eagerness one might infer they did not relish it much. The Red-whiskered Bulbul then took and dropped the *D. limniace*.

Later on in the day the Danaines and *Aceina* had apparently been eaten; I saw the wings of the latter; yet there were still maggots left.

I then put in two *Catopsilia*, a *Junonia*, and one specimen each of *Euploe", D. genutia and chrysippus*, all alive. A Liothrix seized the *Junonia*, and the Yellow-vented Bulbul attacked a *Catopsilia*, but failed to secure it. However, the Common Bulbul got and swallowed one of these, while the Yellow-vented again attacked the other, which was also persecuted by the Chloropsis. Then the Yellow-vented Bulbul got a good hold of the *Catopsilia*, and was worrying it, when the Red-whiskered snatched it and swallowed it after much battering.

None of the Danaines had been attacked yet, though the Chloropsis tentatively pecked the *D. genutia*. The *D. chrysippus*, however, was soon attacked by the Liothrix and Red-whiskered Bulbul, the latter bird at least eating part of it, though apparently with no great relish. I then saw the *Euploe* pecked at by a Liothrix and then by the Red-whiskered Bulbul, which wiped its beak afterwards; this bird soon afterwards returned to the attack, beat off two of the *Euploe*'s wings and swallowed it. Meanwhile a Liothrix pecked at the remains of the *D. chrysippus*. Not long afterwards the *D. genutia* had disappeared entirely. There were plenty of maggots still left.

XVII. A few days after, I put into the aviary in the morning (there being fruit and maggots there) one specimen each of *Dannis chrysippus, genutia, and limniace, Euploe", Aceina, and Neptis*, with several non-warningly-coloured butterflies, *Catopsilia*, &c. A Liothrix took first and dropped the *Aceina*. The Chloropsis attacked a non-warningly-coloured butterfly, but missed it. Then a Liothrix pecked and left a non-warningly-coloured one, which the Red-whiskered Bulbul took and ate. Meanwhile the Chloropsis took a *Catopsilia*, part of which he apparently swallowed. A Liothrix took another non-warningly coloured butterfly, but dropped it. The Red-whiskered Bulbul then descended and took a *Catopsilia* which it battered and then left for an *Elymnias*; then it left this and returned to its original prey, and swallowed this after much trouble. The first insect eaten by the Common Bulbul was this *Elymnias*. A Liothrix pecked at the body of a large non-warningly-coloured butterfly, which it or another had stripped of the wings, and I think ate it. About this time I saw a Zosterops beating the body of a small non-warningly-coloured specimen on the perch. The Red-whisker-
ed Bulbul soon after attacked another Catopsilia, but allowed the Chloropsis (which had previously been attacking these) to take it. The Red-whiskered Bulbul then attacked a male Hypolimnas, and ate it with less trouble than the Catopsilia. It then attacked another Catopsilia, which a Liothrix somehow got, and the Common Bulbul also wanted it. The Liothrix did not seem eager, and another of these birds got the insect, and afterwards the Chloropsis had it.

Then the Common Bulbul ate a bit of a Catopsilia. It then made two or three flights to where the D. limniace and Euploea were sitting uninjured on the wire-netting, but did not take either. However, it took and ate whole the D. chrysippus, the first "protected" butterfly eaten on this occasion. But the Catopsilia in the possession of the Chloropsis was now the only non-warningly-coloured butterfly visible.

The Neptis and Acrœa had also disappeared, but I saw no wings about, nor did I see them eaten; probably they got through the netting. The Chloropsis now succeeded, apparently, in eating the body of the Catopsilia. There were plenty of maggots.

About an hour afterwards the remaining butterflies (Euploea, D. genutia, and limniace) were gone, some wings only of the D. limniace remaining.

In the evening I put into the aviary (where there was plenty of fruit, but no maggots, these having been taken out) one specimen each of Neptis, Euploea, D. genutia and limniace, and several non-warningly-coloured butterflies.

The Chloropsis soon took a Catopsilia, which it ultimately ate, I think. A Liothrix took the Neptis (the wings only of which I found afterwards), and the Red-whiskered Bulbul a Catopsilia, which it apparently swallowed. The Common Bulbul took a male Hypolimnas, which escaped, but the bird caught it again and with difficulty swallowed it. A Liothrix took and picked a Catopsilia, which I think it ate; I found no body.

While one Catopsilia, the two Danais and the Euploea were still left, I put in another Neptis, which a Liothrix took at once.

The Yellow-vented Bulbul seized a Catopsilia, which escaped; this was the first butterfly touched by it to-day. Ultimately a Liothrix ate nearly the whole of this specimen. Before this also the second Neptis had apparently been eaten.

When the birds had roosted the D. genutia, D. limniace, and Euploea still clung uninjured to the netting.

XVIII. Next morning, only the Danais limniace was uneaten, of the butterflies left over-night, and this was headless; later on the body also had apparently been devoured.
In the evening, maggots and fruit being available, I put in a small plain-coloured dragon-fly, which was looked at by the Chloropsis, and seized by a Liothrix.

Then I introduced two specimens of Danais limniace and one each of D. chrysippus, Papilio eurypylus and a mimetic P. polites, with four non-warningly-coloured specimens.

A Liothrix soon took and ate whole one of the last named, a small one. The Chloropsis took another, which apparently escaped. A Liothrix then took the P. eurypylus, which was taken from it by the Common Bulbul and swallowed either by that bird or the Red-whiskered species.

I now took out one D. limniace and put in an Euploea.

A Liothrix now attacked with no great zest a non-warningly-coloured butterfly, which another Liothrix took. I had put two of these butterflies into a more prominent position.

The last non-warningly-coloured specimen, a Catopsilia, had got behind a dish, whence the Common Bulbul seemed to wish to take it, so I threw it out. The Chloropsis, however, got it, but it escaped twice from this bird, which at last swallowed it with great difficulty.

The two Danais and Euploea with the P. polites were still unhurt. Next morning, all these were still alive, and the two Danais not even hurt; but some maggots also remained from the previous day. I thereupon released all, and all could fly, except the P. polites, which was weak and had been in the water.

XIX. The Red-whiskered Bulbul having been released, I offered to the birds (which at this time had had no butterflies for about a fortnight, but had plenty of maggots and other food) a Junonia and a Danais limniace. Neither insect was attacked at once, though the Chloropsis and Liothrix paid some attention to the former.

I then put in a male and female of Hypolimnas bolina, while the other two butterflies had not as yet been touched; neither were these Hypolimnas at once. Presently, however, a Liothrix seized the male, but it got away easily, and was not pursued. Shortly after I found the Junonia missing, and the body of the male Hypolimnas, minus head and nearly the whole of the wings, on the floor. The Chloropsis soon took, beat, and at last swallowed it.

The birds may not have been very eager for insects, since twice today during these experiments I saw the common grey house-flies unmolested in the cage.

Next morning I found the female Hypolimnas being torn by a Liothrix; it seemed to be already dead. The D. limniace had not even been killed, and was, I think, removed when the aviary was cleared.
The birds now had no butterflies for several days, and I commenced a new series of experiments, having considerably changed the personnel of the aviary, which now contained only three Liothrix and two Zosteryops, the Chloropsis and Yellow-vented Bulbul, and a Sibia (Lioptila capistrata) and Mesia (Mesia argentaeris). The last two species resemble Liothrix in their feeding habits, and the latter is a very close ally of that bird. This occasion was the first on which these two birds had butterflies from me, having been newly introduced.

With these I made the following experiments, of which I give the dates.

**Experiments with various Birds (on liberal diet) Series F.**

*April 30th.* I put in two male Hypolimnas, one Euploea, one Papilio panope, all decapitated. A Liothrix got one Hypolimnas, and the Mesia the other, but the Sibia took the insect away from the latter bird. I then put in four more non-warningly-coloured butterflies, all decapitated. The Chloropsis soon had one. While one was still left, I saw the Mesia peck the Euploea, but the bird was frightened off. I put in another decapitated non-warningly-coloured specimen.

I noticed a non-warningly-coloured specimen (which I may have overlooked before) in the food-vessel, which the Sibia soon seized. There were plenty of maggots in the cage, as always lately. I saw the Mesia eat part of a non-warningly-coloured specimen close by the Euploea.

The birds were more eager for butterflies to-day. Nevertheless a Liothrix which had attacked the last non-warningly-coloured specimen, abandoned it, to be soon attacked and apparently eaten by the Sibia.

Only the P. panope and Euploea were now remaining, and I put in three females and one male of Elymnias undularis. But when I left the birds none of these had been eaten, though a wing had been pulled off from one female. One had got turned underside up before this.

I put in a Nepheronia hippia with its wings closed. The Sibia took and dropped it. I then took out the three female Elymnias. I saw the Chloropsis at least once drop the head of a non-warningly-coloured butterfly.

*May 1st.* On looking early this morning I found that the Euploea appeared to have been devoured with the exception of the thorax and three wings. The other butterflies left overnight, the male Elymnias, the Papilio panope and N. hippia, were uneaten, though the head of the latter was missing. I took out the P. panope. Early in the day I took away nearly all the maggots, but there was other food in the cage when, in the evening, I put in decapitated specimens of P. panope, Euploea, and six non-warningly-coloured specimens, one of them a Catopsilia. Almost
immediately the Sibia and a Liothrix had each taken one of the non-
warningly-coloured ones, and soon another Liothrix had a third, the
Catopsilia. I then saw the Sibia take another close by this insect, which
it swallowed whole, though as big as Pontia rapae. This bird then
took a third non-warningly-coloured butterfly, but a Liothrix took this
away after it had partly picked off the wings; however, as I found what
appeared to be this specimen on the floor afterwards, I suppose the
Liothrix dropped it.

In fact, the Liothrix now, being probably pampered, seem to be-
have with non-warningly-coloured insects much as the larger Babblers
used to do with Danaids.

I think the Sibia finished up the last two non-warningly-coloured
butterflies, including one which had been apparently dropped. The
Euplæa and its mimic P. panope remained untouched.

May 2nd. Early in the morning Euplæa and P. panope were still
untouched by the birds, even before maggots were given. Later, after
the birds had received their ration of these insects, I found that the
P. panope had disappeared all but one wing, while even by evening the
Euplæa was untouched.

There had been maggots and other food in the cage all day, and I
now put in three male Elymnias undularis, and one each of Papilio
eurypylus, P. panope, P. demoleus, Danais genutia, D. limniace, and Catop-
silia, all decapitated, and a live P. aristolochie.

The Sibia first took an Elymnias, which the Mesia snatched; the
former bird then ate the Catopsilia. Then it took another Elymnias,
but after pulling off part of the wings, dropped it and wiped its beak on
the perch. Then it took and dropped the P. eurypylus, wiping its beak
slightly.

I think the Mesia ate the first Elymnias.

A Liothrix then took the Elymnias which the Sibia had rejected
and ate it, apparently with no great relish. Both from the conduct of
this bird and that of the Sibia one might have thought the insect un-
palatable.

The Sibia then took the third Elymnias, but soon dropped it, whole,
and wiped its beak. Yet it evidently wished for more butterflies. I
then saw the Mesia with this specimen.

I next put in three non-warningly-coloured butterflies; immediately
the Sibia seized one, and had torn off much of its wings, when a Liothrix
took it. However, the former bird soon took another, tore off its wings,
and apparently ate some. Meanwhile the Elymnias taken by the Mesia
had disappeared.

The Sibia then ate the P. eurypylus, with some slight signs of

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disgust, as I thought. I then found the body and part of the wings of a non-warningly-coloured butterfly beneath the Sibia's last perch; but the bird soon ate this body, which it had possibly dropped previously.

Afterwards I saw the Sibia eat another non-warningly-coloured butterfly. The *P. demoleus*, *panope* and *aristolochiae*, the *D. genutia* and *limniace*, and the *Euplœa* which had been there all day, were still left when the birds went to roost.

**May 3rd.** In the morning all the butterflies left over-night remained for some time. Later on the *Papilio panope* had been devoured, and the *P. demoleus* had disappeared.

I then released the *P. aristolochiae*, which now seemed slightly injured, but flew away. Later still the *Danais genutia* and *D. limniace* had apparently been eaten, as I only found wings about; and subsequently to this the *Euplœa* had disappeared, a small bit of wing only being left.

In the evening, there being plenty of maggots and other food in the cage, I put in a *Neptis*, which was seized by a Liothrix; this bird was pursued by the Sibia, which took the butterfly, but soon rejected it, when it was swallowed whole by the Yellow-vented Bulbul.

I then put in one specimen each of *D. chrysippus*, *D. genutia*, and *D. limniace*, *Euplœa*, *P. demoleus*, and a much worn *P. panope*, with a male *Hypolimnas*. This last was soon seized by the Sibia, which ate it after tearing off the wings, not without trouble, partly on account of its toughness, and partly by reason of the other birds; one Liothrix tried to snatch the prey, even hanging from it for a moment. Another Liothrix then took the *P. demoleus*, but dropped it and wiped its beak. The *Euplœa* was then taken by that Liothrix which had tried to rob the Sibia of its prey. The Mesia, however, snatched it from this bird, but let it go, and it flew freely about in spite of this treatment.

The *P. panope* soon appeared to be injured, perhaps by Liothrix, but I did not see any bird touch it; it was much rubbed, and hardly recognizable.

**May 4th.** This morning all the butterflies (*Euplœa*, *Danais chrysippus*, *genutia*, and *limniace*, *Papilio panope* and *demoleus*) left over-night were uneaten. The *D. genutia* had got behind a vessel, so I took it out, and soon after found it minus some of its wings, but uneaten; while of the *P. panope* only the two fore-wings and the thorax remained. The insects had obviously been tried by the birds. The *D. chrysippus* had also been maned, and a little later I found it minus its head, by which time the abdomen of the *D. genutia* had also disappeared; I think I had noticed previously that its head was gone.

Some time later I saw the *Euplœa*, *D. limniace*, and *P. demoleus*
still untouched. The *D. chrysippus* was no more torn, but was behind a dish. This, and the *Euplæa* remained a long time, but at last the latter appeared to have been eaten, and I found the *D. chrysippus*, rather dry, behind a vessel. There were still maggots and a little other food in the aviary.

I made only two more experiments with these birds. On another day, later, seeing one or two Liothrix peck at a *Danais genutia* (which I had let out) on the outside of the aviary, I put in a nearly-dead specimen of that species, but it was not attacked. The birds had maggots and other food. On a second occasion I noted that the Chloropsis twice took and refused a very harmless-looking small fly, which Liothrix ate readily.

I omit some other experiments made with Mesias and Bulbuls, the general tastes of the latter birds having been made manifest in those already given, and the former showing the same tastes as Liothrix.

I have noticed a keenness for butterflies in other captive birds of the Babbler group, the White-crested Jay-thrush (*Garrulax leucolophus*), the Yellow-eyed Babbler (*Pyctorhis sinensis*), the Orange-bellied Chloropsis (*Chloropsis hardwickii*), &c, and I think all of them probably devour these insects when at large.

**SECTION II.**

I pass now to the consideration of some insectivorous birds of other groups, with which I have experimented singly, a more satisfactory method. The birds were mostly kept in cages with upright bars, and therefore the butterflies given them were in most cases killed to prevent their escape. My most important experiments under these conditions were made with Drongo-Shrikes, representing a well-marked and very characteristic and abundant group of Passerine birds in the Oriental region. They are birds of fair size and take their prey commonly on the wing, either swallowing it whole, or holding it in one foot while picking off the wings, &c.

I have used two species, the Bhimraj or Racket-tailed Drongo (*Dissemurus paradiseus*), about the size of a Magpie and apparently, from its habits in captivity, more or less omnivorous, and the smaller and much commoner King-Crow (*Dicrurus ater*) which is more strictly insectivorous. I had several Bhimrajs, but only give my experiments with the healthiest bird. It was fed on meat, fruit, and insects, with sato (meal) made up into paste.

I am indebted to Drs. Alcock and Anderson for taking care of this bird and others during an absence from Calcutta on my part. The experiments were made at the close of 1896.
Experiments with Bhimraj.

November 10th.—Gave the Bhimraj several butterflies. It ate, with persuasion, two *P. aristolochiae* and a *P. polites* (a mimetic specimen) pulling off the head of the first of the former species. It ate several *Danais chrysippus* and three *D. genutia*, all of them (except about two of the former) without persuasion, the insects being simply put to its bill.

There were maggots available.

November 11th.—The Bhimraj readily ate all the butterflies given it, including *Papilio aristolochiae*, *P. polites*, *P. demoleus*, *Catopsilia*, *Danais chrysippus*, *D. genutia*, and *D. limniace*, of which last two one specimen only was given, of the rest two or more. Persuasion was only needed with the *D. genutia* and the last *D. chrysippus* when the bird, rather hungry at first, was becoming satiated.

November 12th.—The bird, when it had no food in the early morning, ate a *Junonia* and took and refused a *Papilio aristolochiae*. The latter remained uneaten all day. Meat and grasshoppers had been given. In the evening the bird ate a *P. demoleus*, and two *P. polites*. At first it ate only half of the last specimen of *P. polites*, then trying and rejecting the *P. aristolochiae*, and then eating the other half of the *polites* when offered. It then ate two specimens each of *Euplexa*, *Danais limniace*, and *D. genutia*.

November 13th.—The first food given to the Bhimraj to-day was three *Catopsilias* and three *Danais chrysippus*. It ate a *Catopsilia* first, and ate all of these before eating any of the *Danais*, though it picked up and rejected one of them. Afterwards it ate two of these *D. chrysippus*, and I put in two more. In the afternoon the Bhimraj ate a *Junonia*, though the three *Danais* and yesterday’s *P. aristolochiae* were in the cage uneaten, (one *Danais* was minus its head).

November 16th.—The Bhimraj having had no butterflies for two days, I gave it a *Danais chrysippus*, which it was careless with, and allowed it to escape. Then I offered a *Papilio aristolochiae*, which was several times taken and rejected. Then I gave the bird a mimetic specimen of *P. polites*, which it ate, without persuasion. It then refused a *D. genutia*, and ate, with pressing, a *D. chrysippus*; then, readily enough, a *Catopsilia*. I could not induce it to eat a second *D. chrysippus*.

The *P. aristolochiae* was not dead when taken out, though its wings were torn.

November 17th.—In the morning I gave the Bhimraj (which had no fresh food by it) a *Danais chrysippus* and a *Papilio aristolochiae*, neither of which it would eat, though it tried them. Soon after it ate grasshoppers.
In the evening it ate a non-mimetic *P. polites*. Then it tried and refused a *Euploea*, then readily ate a *Catopsilia*. Next, though pressed, it refused a *Danais genutia*, but ate two *Catopsilia* readily, and after again rejecting this *Danais*, ate four more *Catopsilia*.

November 18th.—The *Danais genutia* left overnight was gone this morning, but the "sweeper" might have removed it from the cage. I gave the bird first a *Delias eucharis* and then a *Catopsilia*, both of which it ate with equal readiness. Then I gave it a *D. chrysippus*, which it tried more than once, eating a bit of wing, but finally rejected. This insect then flew away, in spite of having been taken hold of both with bill and foot by the bird. Then I gave a *D. genutia*, which was tried and refused at first, but eaten whole when offered again. Then a *Catopsilia* was given, and eaten at once. The bird then ate one each of *D. genutia* and *D. chrysippus*, but would not eat a second specimen of the latter, which I accordingly took out.

November 20th.—I gave the Bhimraj, which was not hungry, a *Delias eucharis*, which it tried and refused, repeating the refusal when the insect was again offered. It did not even touch a *Papilio aristolochiae*, put on the floor, but ate two *P. demoleus*, one immediately, and the other when picked up and offered to it. It then ate two *Catopsilia*, but not a third, though eating a locust.

November 21st.—In the morning I saw the Bhimraj look at, but not touch, the *Delias eucharis* and *Papilio aristolochiae* which had been left in its cage from yesterday. I then gave it a *Catopsilia* and a *Danais chrysippus* on the floor of its cage. It looked at the *Danais*, and took and ate the *Catopsilia*. I then put in a *D. limniace*, which the bird did not notice much, if at all, and certainly did not touch. Then it refused even to try a fresh *P. aristolochiae*, but ate with persuasion a mimetic *P. polites*. I left the two *P. aristolochiae*, the *D. eucharis*, and *D. limniace* in the cage, and put in three *D. chrysippus*.

After the butterflies left had been taken away, I then gave the bird, which was hungry, two specimens each of *Junonia, Catopsilia*, and *D. chrysippus* on the floor of the cage. It picked up and ate first the *Catopsilia* and then the *Junonia*, though it picked up and dropped one of the *Danais* before eating the second of the latter. Then, leaving the two *D. chrysippus* in the cage, I put in two *Papilio demoleus* and a *D. genutia*; the bird did not eat these, though eagerly eating meat, and they remained uneaten all day, and were left in at night.

November 22nd.—The butterflies left overnight were all uneaten this morning, and the bird, though pressed, refused to eat a fresh *Papilio demoleus*, so I took all out.

November 24th.—I gave the Bhimraj a *Papilio demoleus*, which it
tried carefully and rejected. *Danais chrysippus* was also tried and rejected, and *Delias eucharis* barely touched even, while *Junonia, Atella phalanta*, and another non-warningly-coloured species were readily eaten as also was a *Catopsilia*. The bird tried to catch a *D. limniace* and one or two *D. chrysippus*, which escaped. The sweeper removed the *D. chrysippus* and *D. eucharis*.

In the evening the bird ate, with persuasion, two *Junonia*, but would not eat *Papilio polites* (non-mimetic) nor *Euplcea*. Finally just at dusk it ate with persuasion a *Huphina phryne*. It had food with it on both occasions, but the meat was stale in the morning.

*November 25th.*—In the morning the *Papilio polites* left overnight was gone, the *Euplcea* being left. There was food in the cage.

I gave the bird two more *P. polites* on the floor of the cage, one mimetic, and one not. It took the non-mimetic specimen first, and ate it, then the mimic, but showed no great eagerness in either case. I then put in a *P. aristolochiae*, which was tried and rejected. Then I put in four *Junonia* and one specimen each of *Delias eucharis*, *Danais genutia* and *chrysippus*; the *Euplcea* and *P. aristolochiae* still remained there. One *Junonia* was eaten at once; then the *D. eucharis* was picked up and dropped; then two more *Junonia* were eaten, and the fourth taken up and dropped. This action the bird apparently repeated once or twice (judging from the insect's varying position in the cage), but it finally ate it when offered by hand.

To-day it seemed not very eager for any butterflies.

In the evening, when the bird was hungry, I gave it (having transferred it to the aviary) dead specimens of both the mimetic and ordinary forms of *P. polites*. It took the non-mimetic form first and ate it, and then took and ate the mimic. I then put in one specimen each of *Euplcea*, *Danais chrysippus*, *D. genutia*, and three *Papilio demoleus*, all alive.

The bird took and dropped the *Euplcea*, and took and mauled, but did not kill, a *P. demoleus*. Later, when the bird had gone to roost, I missed this specimen, but found all the rest untouched, and removed them. From appearances next morning I think ants ate the *P. demoleus*.

*November 26th.*—The bird was not hungry when I gave it, in the afternoon, two *Catopsilia*, and one each of *Papilio demoleus*, *Euplcea*, and *Danais chrysippus*, all dead, the *Euplcea* and *P. demoleus* being the specimens I had taken out last night. One *Catopsilia* first disappeared; I saw the bird attacking these. Then the bird ate some meat and left the other butterflies. It would not eat the other *Catopsilia*, even when pressed, nor the *D. chrysippus*, which I also pressed on it. I then again pressed it to eat the *Catopsilia*, which this time it consented to do. I
let the bird out for a time, leaving the *Euphleia*, *Danais*, and *P. demoleus* in the aviary. But all three were uneaten when the bird went to roost, and also when I looked next morning.

After this the bird was transferred to the Alipore Zoological Gardens, where it still is.

**Experiments with King-crow.**

The first bird of this species I got was sickly and soon died. Not however, before it had rejected a *Danais chrysippus* after tearing off the wings, and eaten a *Tertis* whole.

The next bird, with which I experimented more than two years after, was healthier and older, but did not do well in captivity. In fact, when I ultimately released it, it was so weak as to fall a prey to a kite, a bird it would naturally attack and tease. It was kept part of the time in a small, and part in a large cage, both with upright wires, and fed on maggots and grasshoppers. I performed with it the following experiments, also towards the end of 1896. November 16th.—I gave the bird two *Papilio demoleus* and a *Danais limniace*. The *Papilios* were very soon eaten, though the bird was wild, (and hungry too, I think); the *D. limniace* was not eaten. I then put in another *P. demoleus* and one each of *Danais genutia* and *D. chrysippus*. The bird tore off the wings of the *P. demoleus*, but left the body; it did not touch the *Danais*. I then put in a *Junonia* and a *Catopsilia*; the latter was eaten at once, but the former soon disappeared also and not long after the body of the *P. demoleus* also, the *Danais* being untouched. I left these in the cage, as night came on.

November 17th.—The *Danais* left overnight were gone to-day, but I do not know whether the bird ate or the sweeper removed them. I gave the bird in the morning, when it was hungry, a *Danais genutia* and a *D. chrysippus*; it immediately took the *genutia* and tried to swallow it whole. It must have eaten both, for they disappeared, and I saw it swallow a body after picking off the wings. I then put in three *D. chrysippus*, one of which had been refused by the Bhimraj (see Bhimraj under this date) and the *Papilio aristolochiae* also refused by that bird. I soon saw the King-crow eat one *D. chrysippus*, and not long after found only one left out of the three, with torn wings. The *P. aristolochiae* was uneaten. Yet the bird soon after ate grasshoppers when given.

By the evening only the *P. aristolochiae* was left, with more torn wings than before. I then gave the King-crow, which should have been hungry, a non-mimetic specimen of *P. polites*, which it at once ate, nearly whole. I then put in a *Delias eucharis* and a *Catopsilia*, the latter
of which it at once took and ate. I then put in one specimen each of
D. genuita and chrysippus, and three smaller Catopsilias, two of which last
were soon eaten. Next I put in the Euplexa refused by the Bhimraj
(see Bhimraj under this date). It was not taken by the King-crow,
though soon after the third Catopilia disappeared from the cage. I put
in two more Catopsilias, one of which was eaten at once. The other
remained till dusk, and I took it out with the Euplexa, D. genuita and
chrysippus, and P. aristoloched, which last I threw away. But the
D. eucharis had disappeared, though I did not see the bird eat this, and at
any rate it had eaten four or five Catopsilias before it could have
done so.

November 18th.—I offered the King-crow the Euplexa, the two
Danais, and Catopsilia taken out last night. It ate first the Catopsilia,
and then the D. genuita, quite readily. Then I put in four Catopsilias,
three of which were eaten immediately, and not long after the other
disappeared, the D. chrysippus and Euplexa remaining. Quite soon after,
the D. chrysippus was eaten. Soon after this the bird took the Euplexa,
pulled off the wings and swallowed the body, but threw this up again
and left it. But some time after this also was gone.

In the evening I gave the bird a Delias eucharis and three Catopsilias;
it picked up and ate all of the latter immediately, then picked up and
dropped the Delias. Soon after, while this D. eucharis was still left, I
put in specimens of Papilio aristoloched and demoleus, Junonia, and
Danais chrysippus. The P. demoleus was taken first, and next Junonia
disappeared. Then the D. chrysippus, which had been refused by Bhim-
raj (see Bhimraj under this date) was eaten quite readily, as was
usually the case when this bird ate "protected" species, so far as I
saw.

November 19th.—In the morning, the Delias eucharis (with part of
wings torn off) and Papilio aristoloched left in the cage overnight, still
remained. I put in three Danais chrysippus, two of which were imme-
diately swallowed whole, and the third eaten after the wings had been
pecked off a little. I then gave the bird two more D. chrysippus, one of
which it took, and I left it holding the insect in its foot. This dis-
appeared, the other specimen and the D. eucharis and P. aristoloched
being still left, but soon after the wings of this second Danais were
plucked off and it was eaten. Some little time afterwards I gave the
bird a Junonia which it did not touch as far as I saw, though it had
been recently eating maggots, of which it had lately but short
allowance. I gave it plenty of these now, and by evening nearly all
were gone, but the three butterflies (Junonia, D. eucharis, P. aristolo-
chae) were still uneaten. I put in a female of Elymnias undularis
a Junonia (of another species), and a Catopsilia, of which the last was immediately eaten. I put in another Catopsilia, which the bird ate after plucking off the wings.

I then took out the two Junonias, Elymnias, P. aristolochiae and D. eucharis from the cage, as it was getting dark, and threw away the last, which was very dry.

November 20th.—I gave the King-crow, which was hungry, the two Junonias, the Elymnias (with its wings closed, as indeed before) and a Danais chrysippus. One Junonia was soon taken, but the bird, after tearing off a bit of wing, rejected the insect, possibly because it was dry. But soon after all I had put in were gone. I then put in two Catopsilia and two Delias eucharis; the former were eaten immediately, the latter not touched. I then gave the bird a Papilio demoleus, which it took, and pecked at the wings, and the insect soon disappeared, though I did not see it swallowed. I then put in the P. aristolochiae which I had taken out the previous night, with a non-mimetic P. polites. Before long I saw the bird pluck off the wings of the P. polites and eat it. The two Delias eucharis and the P. aristolochiae were still untouched. I then put in a P. demoleus, and a Danais chrysippus and genutia; almost immediately the bird plucked the wings from the Papilio and ate it, and soon after did the same with the D. genutia. Soon after this maggots were given to the bird. Some time after these and the D. chrysippus were gone, while the two D. eucharis and the P. aristolochiae were left; and long after this, in the evening, these butterflies still remained, though one Delias was minus the head and one hind-wing, and the other also torn. A locust given to the bird had disappeared. I then put in three P. polites, two of the mimetic, and one of the non-mimetic form, and also a P. demoleus. This last, which was not put in quite simultaneously with the others, was almost immediately seized by the bird, which a little after, took and ate in my sight the non-mimetic P. polites. I then put another P. aristolochiae in the cage. Then I saw the bird pick up one of the remaining P. polites by the wing and drop it. I put in a Catopsilia, and a locust; the bird took the butterfly. Later, at dusk, I saw it eating the locust.

I afterwards took out the two P. polites and the fresh P. aristolochiae.

November 21st.—In the morning, the bird being hungry, I put in the two mimetic Papilio polites, with a Danais limniace and chrysippus. The D. limniace was immediately taken and eaten.

Soon after I took out the two Delias eucharis and the one Papilio aristolochiae, which had remained in the cage all yesterday, and up to now, and threw them away, putting in instead the second P. aristolochiae which
I had taken out last night, with two more *D. chrysippus*. Soon after one of the *P. polites* had disappeared, although the other, with the three *D. chrysippus* and the *P. aristolochiae* were left. This I observed after I had let the bird out, unfortunately to meet the fate above described.

About this time I also experimented with a Shama (*Kittacincla macrura*) one of the smaller or Robin-like members of the great Thrush group. These birds, as every observer knows, peck their prey to pieces, and do not use their feet to hold it, thus differing widely from their relatives the Babblers, which are a more tropical group. The Shama, however, and many other Thrush-like birds inhabit the Oriental region. This bird was hand-reared and very tame, and I experimented with it in a cage, feeding it on maggots, meal-paste, and small green (dried) insects.

With regard to the probability of birds of this group attacking butterflies, I may say I have seen a Redstart (*Reticilla sp.?*), in nature, at Dehra Dun, seize a very large *Catopsilia* I put out for it, decapitated, and apparently it satisfactorily disposed of it.

**Experiments with Shama.**

November 26th.—I put in the Shama’s cage a *Catopsilia*, and afterwards another non-warningly-coloured butterfly, a small greyish species. Both disappeared and were doubtless eaten by the bird.

November 27th.—I put in the cage of the Shama (which was not hungry) a *Catopsilia* and a *Danais chrysippus*. The bird was soon pecking at the former, which shortly disappeared; the *Danais* had also been pecked. A moment after the bird was attacking this, but the body remained uneaten, though most of the wings were picked off. I soon after put in a *Delias eucharis* and a *Junonia*, the latter of which was immediately pecked about and eaten, while the *Delias* was pecked once or twice and left. I then put in another *D. chrysippus*, which the bird pecked to pieces, but did not eat; it then pecked about and ate a male *Nepheronia hippia* which I put in. A little time after this, I found that the abdomen of the second *Danais* given had disappeared; I put in a third specimen and two *Catopsilias*, both of which latter the bird pecked, and then started to attack one, disregarding the *Danais*, and soon ate it. Then it began upon the other, which soon disappeared. The (body of the) first *Danais* given, and the third, with the *D. eucharis* remained uneaten. However the bird soon attacked this third *Danais*, but did not eat it. I then put in four *Catopsilias*, which were immediately attacked, and soon disappeared, the three “protected” specimens being still left. I then put in two *Papilio demoleus*. These were attacked, but less eagerly, but ultimately part of one was apparently eaten, and most of the wings stripped from the
other, while *D. chrysippus* and *D. eucharis* still remained. Later I found, lying in a dry state outside the cage, part of the body of one of these *P. demoleus*, and dried bodies or parts of two *D. chrysippus*. The *D. eucharis* disappeared, I did not notice at what exact time.

In the evening I gave the bird, which was not hungry, but had no butterflies in its cage, three *P. demoleus* and a *D. chrysippus*. It attacked one of the former, but did not persevere, but took and pecked at the *Danais*, and then left it, having apparently eaten its abdomen. I then took out the *Papilio* and put in a *Junonia* and a Delias *eucharis*; the *Junonia* was immediately seized, and soon devoured. I then put in a Catopsilia, which was at once seized, and soon disappeared. I then again offered a *P. demoleus*, which the bird pecked at and left. The *D. eucharis* was not touched, and as the bird was about to roost, I took out both it and the *P. demoleus* and threw them away.

November 28th.—In the morning, the Shama not being hungry, I put in two of the *Papilio demoleus* taken away yesterday, together with a *Danais genutia*. The bird pecked first at a *P. demoleus*, then at the *Danais*; it picked this about a good deal, but nevertheless I left it attacking a *demoleus*, and soon found that one of these had disappeared, and the other was much torn, while the *Danais* was intact. I then put in four Catopsilias, all of which disappeared, while the *P. demoleus* and *D. genutia* were uneaten; the bird, however, pecked at all, I think, of these Catopsilias before eating any; also it picked up and dropped the *D. chrysippus* (left from yesterday) before it had eaten one, and pecked the *genutia* about while a Catopsilia's abdomen still remained. Some time after the *D. genutia* had been pecked quite to pieces and its abdomen was gone; the bodies of the *D. chrysippus* and *P. demoleus* were left.

They were still there in the afternoon, and the bird was not hungry. I put in one specimen each of *Junonia, Catopsilia* and *D. chrysippus*. The bird did not show much eagerness. First I saw it hold the *Junonia* for some time; then I was put in time to see the Catopsilia swallowed, the *Junonia* having meanwhile disappeared; then it began to peck the *D. chrysippus*, and I put in a *P. demoleus* of which the wings were already largely torn away. Very shortly after I found only its forewings, while the *D. chrysippus* was untouched. I then put in another *P. demoleus*, intact, and a *D. genutia*. Soon after I found outside the separated thorax and abdomen with part of the wings, of the *D. genutia*, and the *P. demoleus* minus one wing. I put both back, and the bird pecked the *P. demoleus* and ate the body. The *D. chrysippus* more recently put in was still untouched; I took out the body of the specimen that had remained all day, also that of the *P. demoleus* mentioned *supra* as remaining with it; these were dry.
November 29th.—In the morning, the bird not being hungry, I found the *Danais chry-sippus* left overnight in the cage still whole, and the abdomen of the *D. genutia*. I put in another *D. chry-sippus*, and a *Papilio demoleus*, of which the latter was first taken, pecked about, and eaten, and the bird was pecking the *Danais* when I put in a non-mimetic *P. polite*. The bird left the *Danais* and pecked off one of the wings of the *P. polite*, and then remained quiet for a little. Soon after I found the *P. polite* had been pecked to pieces, and its body was gone. The head of the *D. chry-sippus* put in was also missing. After the bird had been pecking at this insect, I put in a *D. limniace* and a *P. demoleus*. The bird attacked the *Danais* first, pecked off the wings, and ate the abdomen; it then attacked the *D. demoleus*, not very eagerly. Some time after I found the body of the latter, stripped of the wings, outside. I put it in the cage, and the abdomen at all events disappeared, though there were the body of one *D. chry-sippus*, and the thorax and wings of another, still there. On emptying the cage, I found the abdomen of some large butterfly behind the tray, and some heads, and bits of thorax there and in the tray itself.

Later on, the bird being still not hungry, I put in two *D. chry-sippus* and a *P. demoleus*. The bird pecked at all three, and left them for a while. The *Papilio* was the first attacked, so far as I saw, but a *Danais* was more pecked. Then the *P. demoleus* was again attacked. I was now away for some time, and on returning in the evening found all three butterflies uneaten, and threw them away.

December 1st.—I put in in the morning, the bird not being hungry, two *Danais limniace* and a *Papilio demoleus*. The Shama first attacked a *limniace*, but ate none.

Some hours later, I put in one specimen each of *Junonia, Atella phalanta*, and *D. chry-sippus*.

The Shama first ate the *Atella*, and then attacked the *Junonia*, which soon disappeared. I put in one non-mimetic *Papilio polite* and two *P. aristolochiae*. One of the latter was first attacked, but two or three hours afterwards I found it outside, with its wings much torn; the other was almost intact, while the *P. polite* had been pecked to pieces and its body was gone. The *P. demoleus* and the two *D. limniace*, put in early, were still there, the latter having been more attacked than the former, if indeed this *Papilio* had been touched at all. The *D. chry-sippus* was untouched. At night, after the bird had gone to roost, I examined the cage and found one *D. limniace*, the *D. chry-sippus* and *P. demoleus* uneaten; the other butterflies were not to be found.

December 2nd.—I removed from the Shama's cage, early, the three butterflies (*D. limniace* and *chry-sippus, P. demoleus*) left overnight; and
later gave the bird (which was not hungry) one male *Nepheronia hippia*, and two *Danais genutia*. First it pecked a *D. genutia*, then attacked the *Nepheronia*, battered off its wings, and ate it, though I did not witness the actual swallowing. Some hours later I found one *D. genutia* in a mangled state outside (and also an abdomen of this species), and the other not at all. I put that which I had found in again, and some hours later found it also gone.

*December 4th.*—I offered the Shama two non-mimetic specimens of *Papilio polités*, and a *P. aristolocheia*. The two former were torn up, and their bodies not to be seen; this happened in the case of one very soon, and in that of the other after some time; the *P. aristolocheia* was not eaten. The bodies of two large non-wariningly-coloured butterflies (one a *Euthalia*) disappeared, while one *P. polités* still remained.

I then put in two *P. demoleus* and a female *Nepheronia hippia*. Some time after I found the latter pecked to bits, and its body mostly gone; the same was the case with one of the *P. demoleus*; of the other I found the body outside. I offered it again, and found this time the abdomen outside; this I put in again. The *P. aristolocheia* still remained uneaten, as did the heads of the *P. demoleus*.

Afterwards I found the *P. demoleus* abdomen gone, and then gave the bird two *Huphina phryne*, and one *Delias eucharis*, the former of which it immediately ate. Very soon also I found the *Delias eucharis* had been pecked to pieces, and its body was gone. I then put in a *P. demoleus*, which at night had disappeared. The *P. aristolocheia* was still left, though it had been pecked.

*December 5th.*—I put into the Shama's cage a *Papilio aristolocheia* and a mimetic *P. polités*; the latter was eaten, or at any rate disappeared, and I put in a *P. demoleus*, which was soon attacked, the *P. aristolocheia* being untouched or nearly so. About this time I took out the other *P. aristolocheia* (left from yesterday). The *P. demoleus* was soon disposed of, and its body disappeared; some little time after this also happened with the *P. aristolocheia*. The bird only had "meal-paste" by way of food, and this was also the case early yesterday. I now put in a *Danais genutia* and a *Catopsilia* of about its size; the latter was taken at once and swallowed almost whole; and a male *Nepheronia hippia* nearly as big had its wings battered off and body eaten. I then put in a *Huphina phryne*, two *Atella phalanta*, and one (smaller) *Catopsilia*, all of which were eaten in the order named; I saw most of them swallowed, all but the *Catopsilia* whole; a *Delias eucharis* put in with them remained untouched like the *D. genutia* previously put in. But immediately after, the bird attacked this *Danais*, whereupon I put in a *P. demoleus*; this however, was not attacked,
the bird preferring to attack both the Danais and the Delias. Some time after, (maggots having meanwhile been given) the *P. demoleus* had evidently been eaten and the *D. genutia* was gone. I put in two *P. demoleus* and another *D. genutia*; the latter was attacked. Not long after the two *P. demoleus* had been pecked to pieces, and mostly eaten; the wings of the *D. genutia* had been pecked, but the body was intact; the *Delias eucharis*, which I had noticed as having been pecked when I put in this last lot, was also intact, all but the head. But some time later both the Danais and Delias had apparently been treated like the *P. demoleus*.

**December 6th.**—In the morning I gave the Shama a non-mimetic *Papilio polites* and a male *Nepheronia hippia*; the latter was attacked first, and both were apparently eaten, as I could not find them later.

**December 7th.**—I gave the Shama, which was not hungry and had had insects given it, a *Huphina phryne*, a *Delias eucharis*, and two small *Catopsilia*. Some time after all had evidently been eaten; I did not see which had been taken first.

I then put in one *D. eucharis*, one *D. chrysippus*, one *Catopsilia*, and three *Junonia*. Not long after I found that all had been eaten except *D. eucharis* and *D. chrysippus*, the former of which was minus its head. While these were left I put in two *Papilio demoleus* and two *D. genutia*. Soon after one of the latter had disappeared, leaving no trace. The others remained for some time with the butterflies previously left, but at night the other *D. genutia* had evidently been eaten, and the wings of the *D. chrysippus* had been picked off. But its body was left, as also were the *D. eucharis* and one *P. demoleus*.

**December 8th.**—The butterflies left last night were still in the cage this morning, almost all of the wings of the *P. demoleus* having been picked off. I put in a non-mimetic *P. polites*, and soon found that it had been pecked to pieces and the body was gone. I then took out the others. Even most of the wings of the *P. polites* seemed later to have been eaten. I put in, before the bird had yet had any insects, a *P. demoleus*; some little time after I found this also with its wings pecked, but not eaten. I took out the bird and put it into another cage.

**December 9th.**—I put into the cage of the Shama, in the morning, when it had insects, a male *Elymnias undularis*. A little later the bird had evidently eaten this.

I then put in the cage a non-mimetic *Papilio polites*, and two *P. aristolochiae*. Looking afterwards, I found the bird had apparently eaten one *P. aristolochiae*, a small specimen, the other and the *P. polites* being left. Afterwards I saw the bird attacking the latter, and later found it had eaten both. Some time afterwards I found the head of the *P. aristolochiae*. 
December 10th.—I put in the Shama's cage two Papilio aristolochiae and a non-mimetic P. polites, but they were not eaten. I left them there, and found, about an hour later, that the bird had pecked to bits and apparently eaten the P. polites and one of the P. aristolochiae, the second P. aristolochiae still remaining; but afterwards I found that this also had apparently been eaten.

December 12th.—The Shama being hungry, I put in its cage a Papilio aristolochiae and P. demoleus. The bird pecked the P. demoleus to pieces and apparently ate the body. I put in another. After it had attacked this, I put in two Atella phalanta, which after a little time disappeared, all but bits of wing. At roosting-time the second P. demoleus had apparently been eaten, and the body of the P. aristolochiae lay outside the cage.

December 13th.—I must have put back the body of the P. aristolochiae found outside last night, for I note only the abdomen left this morning. The bird had received food (green insects) overnight.

December 16th.—I put into the Shama's cage a Euplæa and a large non-warningly-coloured specimen. The bird first went for the Euplæa, but before long attacked and pecked about the other, which I just missed seeing swallowed whole.

Later, I gave the bird an Euthalia and another Euplæa; the former was attacked first, but afterwards dropped and the Euplæa picked up; but the Euthalia was taken again, its wings battered off, and the body apparently eaten; I did not see it. I put in then a Junonia and a Papilio demoleus, and not long after both had disappeared except part of the wings of the latter. The Euplæas were still uneaten.

I put in a Huphina phryne, which was immediately seized, and swallowed nearly whole.

At night the Euplæas were still uneaten though when I looked in in the afternoon the bird had no food; I gave it some green insects then.

December 17th.—The bird had some of the green insects left in its cage this morning, and also the butterflies left overnight. I put in a non-mimetic Papilio polites and a small P. aristolochiae. The bird did not attack at once, but soon I found bits of wing only left of the P. polites, and the P. aristolochiae untouched, or only slightly torn as to the wings. I put in a P. demoleus which the bird attacked before very long, and soon it disappeared, all but one wing; the P. aristolochiae still remaining.

I then put in a small "Blue," a Terias, and a Junonia. The bird first took and swallowed the last of these; then it appeared to eat some bugs; then it pecked the wing of the P. aristolochiae, and then took the Terias. This soon disappeared, all but two bits of wing; I did not see it swallowed. The bird then pecked the P. aristolochiae again.
I then put in a Junonia, which was attacked and swallowed; then another P. demoleus, which the bird at once attacked, but left to eat the "Blue" with less readiness than I should have expected. It soon attacked the P. demoleus again, and the insect disappeared, all but parts of wings, whereupon I put in another.

I now had the cage cleaned, taking out this P. demoleus and P. aristolochiae, and also the two Eupleas, which had remained, all this time, and which I now threw away.

Later, after the bird had had no food for two hours or so, I put in again these two Papilio, together with two Junonias of different species; these latter almost immediately disappeared, all but some pieces of wing, and I then saw the bird batter the P. demoleus and eat the body. P. aristolochiae left.

December 18th.—The P. aristolochiae was still uneaten to-day; the bird had food by it.

I put in the Shama's cage another P. aristolochiae, and one specimen each of Papilio demoleus, Danais genutia and D. limniace. The bird attacked, first D. genutia, P. demoleus, and D. limniace, then D. genutia again, then D. limniace again, then it attacked D. genutia a third time, and then attacked P. demoleus, pecked off the wings, and ate the body. I noticed that with the Danaids it attacked the end of the abdomen—not so with the P. demoleus. It then pecked the D. limniace, and then apparently (for the insect seemed to have been moved) for the first time the P. aristolochiae.

Some time after (maggots having been given in the meantime) I found the D. limniace pecked to pieces, but not eaten, except probably the head, which was missing. The D. genutia was missing, but next day I found it behind the water-tin. The P. aristolochiae was still there; its wings had been pecked. There were green insects as well as maggots in the cage.

Two hours or so after this, the Shama, though there were still green insects in its cage, had apparently eaten both the D. limniace and P. aristolochiae.

This ended the experiments with this species, as on the next day I released the bird, which disappeared.

I also made a considerable number of experiments at this time with a Starling, the Indian Sturnus menzbieri probably, a bird practically identical with the common European species. Starlings are omnivorous and feed largely on the ground, like Thrushes, and so are probably less important as enemies to butterflies than some other birds. They do not use their feet in feeding, but this species at any rate can dispose of a large prey easily enough by swallowing it whole.
Experiments with Starling.

December 8th.—The Starling having been put into a cage in which was a specimen of Papilio demoleus, soon apparently ate the insect; and also I think a Catopsilia and another (brown) non-warningly-coloured butterfly.

December 9th.—I put in the cage of the Starling, which was, I think, hungry, a specimen each of Junonia, Danais chrysippus, Delias eucharis, and Catopsilia. The bird ate the Junonia and then the Catopsilia, whole. I then put in a Junonia of another species, which was also eaten whole. Very soon after I found the D. eucharis and D. chrysippus also gone. Later on I put in a Junonia and a Huphina phryne, together with another D. chrysippus and D. eucharis. The bird ate first the Junonia, then the Huphina, and then the D. eucharis. I left the D. chrysippus, which had not yet been touched, in the cage, and soon after found it outside. I put it in again, with a D. genutia and D. limniace, and gave the bird at the same time a tin of bread-and-milk. Very soon I saw it energetically attack the D. limniace and swallow it, though the biggest butterfly given. Later I found the D. genutia untouched, though the D. chrysippus had long disappeared and the bird ate maggots; and in the evening, though the bird had eaten up all these and also the artificial food, this D. genutia was still untouched. A young cockroach given in the afternoon had soon disappeared.

December 10th.—I put in the Starling’s cage, where the Danais genutia given yesterday still remained, torn but uneaten, the body, in two pieces, of a large yellow-underwinged moth; it soon disappeared.

Later, when there was no food in the cage, I put in one specimen each of Atella, Euthalia, Papilio demoleus, and Euploea. The Euthalia was eaten immediately, but though the bird picked up the P. demoleus and touched the Euploea, it did not seem inclined to eat them or the Atella. Yet it ate green insects (Iassidæ) readily when given. I took out the Euploea, P. demoleus, and Atella, leaving in the D. genutia. Later on I put them in again, with a Junonia and a Catopsilia.

The Catopsilia only disappeared, and I left the rest, putting in another Atella and a Delias eucharis. An hour or two later one Atella and the Junonia lay outside; none had been eaten. I put back those found outside, and added another D. eucharis.

After the bird had roosted I examined the cage and found none of these butterflies eaten.

December 11th.—Although there was no food in the Starling’s cage, the butterflies left overnight (two each Atella phalantha and Delias eucharis, one P. demoleus, Junonia, and Euploea with the old D. genutia) were uneaten in the morning, at first. Later, first the P. demoleus dis-
appeared, and afterwards I saw the bird eat part of the *Junonia* (I had put in part I found outside). The other butterflies were not eaten for some time, though they had been pecked, and the bird ate maggots (which had been given) readily. It also greedily ate a green tree-cricket. I put in another *P. demoleus*, and an hour or two later found one of this species nearly intact, but with much pecked wings, and part of another, outside. I put them in, and the fragmentary one soon disappeared. Of one *D. eucharis* also only a bit was left; the others had not been eaten. The bird had now no other food but these butterflies and I put in a third *A. phalantha*.

An hour or so after, the bird had apparently eaten only a bit of one of the previously-given *Atellas*, and the bit of *D. eucharis*; however I now saw it attack the *P. demoleus*, and eat some, leaving only a little. At roosting-time it had done no more.

December 12th.—The state of things in the Starling's cage was still the same. I found a piece of a butterfly outside, which I put in, and saw there was another fragment inside too, one of which was part of a *P. demoleus*, and the other might have been this or *D. eucharis*. I took both out, and also the two *Atellas*, the *Delias eucharis*, *Danais genutia*, and *Euploea*. Later, the bird being hungry, as there was no food in the cage, I put in a *D. genutia* and two *Junonias* and an *Atella*. The bird immediately devoured the two *Junonias*, and pecked and rejected *Atella*. However, this butterfly soon disappeared, and I put in another with a *Papilio demoleus*, *D. limniace*, and *Euploea*. The bird picked out and swallowed the *Atella*, then pecked at the *P. demoleus*, which it apparently ate, as I only found bits of wing. Then, after pecking at a *D. chrysippus*, and perhaps at others, it swallowed the *Euploea*.

I then put in a *Huphina phryne* and four *Junonia*, all of which the bird ate at once. It then shortly pecked and ate the *D. limniace*, and by roosting-time both the *D. genutia* and *D. chrysippus* had also disappeared. I have not noted when the last named was put in.

I then put food, green insects, into the cage.

December 13th. The Starling in the morning, though not hungry, ate the abdomen of a *Papilio aristolochiae* from the Shama's cage.

I put in two *Danais chrysippus*, and some time after they were still uneaten, though one or both were minus heads; when, however, I put in a *Junonia*, the bird immediately ate it, though it had plenty of green insects. These two *D. chrysippus* remained uneaten all day in the Starling's cage. Next day by evening one had apparently been eaten, the other not. The bird had both green insects and bread-and-milk as food.
December 16th.—I put in the cage of the Starling, which was not hungry, several small butterflies, *Terias, Huphina phryne*, a *Catopsilia*, an *Atella phalantha*, and a small brown non-warlingly-coloured species. All but *Atella* were soon eaten. The *Danais chrysippus* left two days ago was still in the cage. I then put in a *Danais limniace*, *Delias eucharis*, and two *Papilio demoleus*, and soon after found all these gone but the *Delias eucharis*, a wing or so of the *D. limniace*, and the head of one *P. demoleus*. The *Atella* had also disappeared, all but a bit of wing, but the old stale *D. chrysippus* still remained.

At night, though at one period in the afternoon I found no food in the cage, when I gave the bird some green insects, this *D. chrysippus* and *D. eucharis* were still uneaten.

December 17th.—The two butterflies left overnight, and some green insects, were still in the bird's cage when I put in a fine large *Papilio aristolochiae* and a *P. demoleus*. Immediately the bird attacked the *P. aristolochiae* and greedily swallowed it whole, and very soon after the *P. demoleus* also.

I then put in a *Danais limniace* and three *P. demoleus*. The bird attacked the *Danais* first, but left it and took and swallowed a *P. demoleus*; then it again attacked the *Danais* (possibly because it fluttered, not being quite dead), and left it to eat a *Papilio*; the third *P. demoleus* then disappeared, evidently swallowed like the others.

After having given another *P. demoleus* to the Starling, I gave it two *Junonia* of different species; these soon disappeared.

The Starling certainly attacked the last *P. demoleus* before the *D. limniace* I had put in earlier, and apparently ate part of it. I saw it attacking the *Danais*, however and it apparently ate part of it. But I found part of it, and also parts of three *P. demoleus*, so that all could not have been eaten whole as I thought.

The *D. chrysippus* which had been so long in the cage was also broken up, but the *D. eucharis* remained.

I now had the cage cleaned, and the butterflies removed.

December 18th.—I gave the Starling, which had food by it, a *Papilio aristolochiae* together with a *P. demoleus*. The bird looked at the *P. aristolochiae* and took and swallowed the other.

I then put in a fresh *P. aristolochiae* and an *Atella phalantha*. The bird at once ate the *Atella* without noticing the *P. aristolochiae*, and then merely looked at the latter.

I then offered a *Neptis* and a *P. demoleus*. The Starling timidly advanced, seized, and swallowed the *Neptis*. It seemed to fear the *Papilio*, which was not quite dead, and lay with its wings spread facing the bird, which however seized and ate it as soon as it had swallowed the other.
I then gave the Starling a Huphina phryne, and another non-warningly-coloured butterfly, both of which it ate at once, as also an Atella which I then gave it.

I took out the second P. aristolochiæ.

I put in then Euplœa, D. chrysippus, and D. genuita. The bird at once ate the Euplœa.

Some time after, maggots having been given to the bird in the meantime and eaten, I found in the Starling's cage the one P. aristolochiæ left there untouched, also the D. chrysippus; the D. genuita had been pecked to pieces, but not eaten, except perhaps the head. The bird had now no food but a little fruit, so I gave it some green insects.

Two hours or so after, the Starling, in whose cage some insects still remained, had not eaten the butterflies above-mentioned (P. aristolochiæ, D. chrysippus and D. genuita); nor were they eaten when I looked next morning. After this I ceased experimenting, and took the bird to the Zoological Gardens.

Experiments with Mynah.

I also made at different times a few experiments with a close ally of the Starling, the Common Mynah (Acridotheres tristis) with birds at liberty.

July 9th, 1895.—I gave a Papilio demoleus to a wild Mynah which I had seen trying to get at some butterflies in an insect-cage. The bird knocked off most part of this butterfly's wings and flew off with the body.

July 11th.—I put a disabled Danaïs genuita in the compound, when a Mynah, which was on a building, came down almost at once, seized and battered the insect, and ate most of it; I found the head and a bit of thorax (attacked by ants) and some wings on the ground.

I then put out another, and a Catopsilia; but they remained unnoticed by the Mynahs for some time.

July 17th.—I put a disabled Catopsilia and D. limniace in view of two Mynahs. One of them took first the Catopsilia, which was nearest, then the Danaïs, beat them on the ground, singly and together, knocking off a fore-wing of each; it then flew with them to a high building, where I did not see what followed.

November 2nd.—I put out a disabled Papilio aristolochiæ and P. demoleus on a lawn. Two Mynahs came near, and one ran to the P. demoleus and pecked it about, while the other, after looking on and possibly pecking the insect also, went up to the P. aristolochiæ, which it pecked, but left almost immediately.

On going up to the spot, I found the P. demoleus uneaten, but minus its head, and the other intact, though motionless.
Experiments with Hornbill.

With these birds also my experiments have been few, but interesting results were got from some of them.

The species was the common Black and White Hornbill (Anthracoceros) and I experimenting with two specimens, but the first bird, which was allowed to go about the compound with clipped wings was unfortunately soon stolen, and the second did not care about insects at all. The following, therefore, applies to one bird only.

December 8th, 1896.—Hornbill, though not eating table-scraps and fruit very well, ate a Skipper, and ravenously devoured two grasshoppers.

December 12th.—I offered the Hornbill some dry dead butterflies from other birds' cages. It readily ate Catopsilias, Atellas, a bit of Papilio demoleus and of some other butterfly; also a Delias eucharis, after rubbing this last. It took, rubbed, and refused Danais chrysippus and D. genutia and Euplæa.

I then offered it more butterflies, many of them dead and dry. It ate several Catopsilias, one Huphina phryne, and several Junonias, although it was not without trouble that I got the bird to eat one of these last, and another it would not eat at all. It also refused one P. demoleus, though eating another of this species.

It would not eat D. chrysippus and genutia, nor Papilio aristolochiae, though the two former were fresh, and it afterwards ate many dried grasshoppers.

December 13th.—Offered the Hornbill, which had had some fruit, two Catopsilias and two Danais chrysippus.

It ate the Catopsilias, but took and refused the D. chrysippus. Also on another occasion today it refused a D. chrysippus. It ate, when pressed, a protectively-coloured moth.

SECTION III.

Summary and Conclusions.

I have nothing to add to what I said concerning Mammals and Reptiles, &c., in the papers devoted to them (J. A. S. B., LXV., Pt. II, 1896, p. 42; LXVI., Pt. II, 1897, p. 528), for I do not intend to compare them with Birds, since my experiments with the former were limited to one species of each class. I shall therefore confine these remarks to Birds only.

The common Babblers (Crateropus canorus) dealt with in my first paper (J. A. S. B., LXIV., Pt. II, 1895, p. 344) ate the Danaine butterflies readily enough in the absence of others, but when offered a choice showed their dislike of these "protected" forms by avoiding
them. This avoidance was much more marked when the birds were at liberty, though even so a few of the objectionable butterflies were eaten.

*Delias eucharis* and *Papilio aristolochiae* were also disliked by this bird, more especially the latter.

Although I did not experiment on any of them at liberty, my experience with the Liothrix (*Liothrix luteus*), Mesia (*Mesia argentauris*), Bhimraj (*Dissemurus paradiseus*), King-crow (*Dicrurus ater*), Starling (*Sturnus menzbieri*) and Shama (*Kittacincla macrura*) was similar, in that all of these birds objected to the *Danainæ*, *Delias eucharis*, and *Papilio aristolochiae*, (especially, as a rule, to the last) in comparison with other butterflies, or absolutely.

I never saw the Chloropsis (*Chloropsis aurifrons* or *malabarica*) or the Sibia (*Malacias capistrata*) eat any "nauseous" butterfly, except that in the case of the former, one *Euploea* body and a few bits of wing were eaten.

The latter bird refused with apparent dislike the male of *Elymnias undularis*, which should be palatable, and was as a matter of fact usually liked by the birds to which I offered it. Another mimetic species, *Papilio polites*, was not very generally popular with birds, but much preferred to its model, *P. aristolochiae*.

The Hornbill refused *Danainæ* and *Papilio aristolochiae* absolutely, but ate the only *Delias eucharis* given.

In several cases I saw the birds apparently deceived by mimicking butterflies. The Common Babbler was deceived by *Nepheronia hippia* and Liothrix by *Hypolimnas misippus*. The latter bird saw through the disguise of the mimetic *Papilio polites*, which, however, was sufficient to deceive the Bhimraj and King-crow.

I doubt if any bird was impressed by the mimetic appearance of the female *Elymnias undularis*. But this is not a first-rate imitation, and a mimic is put to a very severe test when offered to a bird in a cage or aviary.

Young hand-reared birds, like the Shama and Bhimraj, had no instinctive knowledge of the "nauseous" forms, and ate them quite readily at first, but soon gained experience. Birds caught when old, when watched from the first, like the Sibia, first Mesia and Starling, appeared to know and avoid unpalatable species. The latter bird's action in greedily devouring the first whole *Papilio aristolochiae* given, and then avoiding this species, seems to show it did not know this insect, and had no general prejudice against Warning Colours.

So far the results of these experiments on the whole bear out the

* The first Mesia had not this species offered to it, but those subsequently kept had, and evidently disliked it.
accepted theory, but certain birds, like the Lizards, were more indiscriminate in their tastes.

The two Red-vented species of Bulbuls (*Molpastes bengalensis* and *Otocompsa emeria*) when they would eat butterflies at all (some were very reluctant to do this) showed little discrimination, and often devoured the *Danainae* as readily as other kinds. The contrast in this respect between these birds and Liothrix, when kept under the same conditions, was very noticeable.

The Yellow-vented species (*Molpastes leucotis*) though the only bird by which I saw *Acraea* eaten, was rather more discriminating on the whole towards the *Danainae*, and all three agreed in objecting, as a general rule, to *Delias eucharis* and *Papilio aristolochiae*.

With the White-crested Bulbul the experiments were too few to be of much use, but it does not seem to be very discriminating.

The Button-Quail (*Turnix taigoor*) was also very ready to eat the *Danainae*, and objected to the other two protected forms above specified. But I do not consider the tastes of this little ground-bird of any importance, and in fact did not keep it for experiment.

The Bulbuls offer a more serious difficulty, as they are very common birds, and undoubtedly do eat butterflies in a wild state. I have myself seen a wild individual of one of the Red-vented forms eat a white butterfly. Experiments should be made by those who have the opportunity with wild Bulbuls getting their own food.

Mynahs (*Acridotheres tristis*) in the few experiments made, cared little for butterflies, or showed no great discrimination when taking them, though at liberty.

Though most birds which are at all insectivorous with which I experimented, captive or wild, showed more or less desire for butterflies, some would not eat them at all, Crows (*Corvus splendens*) for instance.

I conclude from these experiments—

1. That there is a general appetite for butterflies among insectivorous birds, even though they are rarely seen when wild to attack them.

2. That many, probably most species, dislike, if not intensely, at any rate in comparison with other butterflies, the "warningly-coloured" *Danainae, Acraea violae, Delias eucharis,* and *Papilio aristolochiae*; of these the last being the most distasteful, and the *Danainae* the least so.

3. That the mimics of these are at any rate relatively palateable, and that the mimicry is commonly effectual under natural conditions.

4. That each bird has to separately acquire its experience, and well remembers what it has learned.

That therefore on the whole, the theory of Wallace and Bates is
supported by the facts detailed in this and my former papers, so far as they deal with Birds (and with the one Mammal used). Professor Poulton’s suggestion that animals may be forced by hunger to eat unpalatable forms is also more than confirmed, as the unpalatable forms were commonly eaten without the stimulus of actual hunger—generally, also, I may add, without signs of dislike.

To future experimenters I would offer the following hints derived from my experiences as detailed in this series of papers.

1. Use animals at liberty for experimenting with if possible.
2. If these are not available, confine your subjects singly, and feed them well and naturally, letting them be neither hungry nor pampered. Cages should be of portable size (about two feet every way) and made (for birds) of half-inch mesh wire netting with plain wooden floor without a tray. This is to prevent insects getting out or being concealed.
3. Use wild-caught specimens in preference to hand-reared ones.
4. Remember that the best and often the only way to determine an animal’s tastes is to offer it a choice.


[Received 25th November; Read 1st December, 1897.]

The Islands of Bali, Lombok and Sambawa in the Malayan or Eastern Archipelago extend almost in a straight line from Java on the west to Flores on the east; Sumba or Sandalwood Island lies to the south of Flores; all the islands are adjacent, with narrow straits between them. In continuation of this line of islands from west to east are Flores, Adanara, Ombai and Wetter, with Timor, the largest island of them all, lying to the south of the two latter. Herr J. Röber in Tijd. voor Ent., vol. xxxiv, pp. 261-322 (1891), has written a paper on the butterflies of Flores, Wetter, and Timor; while Mynheer P. C. T. Snellen has in the same periodical, vols. xxxii, p. 98 (1890), and xxxiv, p. 229 (1891), described the butterflies of Flores. Unfortunately neither of the present writers possesses any considerable collections of butterflies from any of these islands, but which should certainly be compared with those given in this paper. As far as possible we have brought together
the names of all the species recorded from the islands dealt with. This paper is mainly based on the collections made by Mr. William Doherty in Bali, Lombok, Sambawa and Sumba in Elwes' possession, while Herr H. Fruhstorfer has kindly sent de Nicéville some seventy-nine species collected by himself in Lombok. All species recorded from any of the islands taken together considered herein not seen from any one of them by the writers are indicated by an asterisk (*) prefixed to their names. The number of species recorded from each island in this paper is as follows:—

<table>
<thead>
<tr>
<th>Island</th>
<th>Species</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bali</td>
<td>201</td>
</tr>
<tr>
<td>Lombok</td>
<td>189</td>
</tr>
<tr>
<td>Sambawa</td>
<td>181</td>
</tr>
<tr>
<td>Sumba</td>
<td>158</td>
</tr>
</tbody>
</table>

These numbers are remarkably even, but they show a steady diminution as one proceeds from west to east. Java has at least 500 distinct species of butterflies, Sumatra still more.

Mr. Doherty records about 135 species from Sambawa, several of which, however, he could not name as he had lost the specimens. For instance, at the end of his paper he writes: “My Sumbanese Hesperidæ have suffered more than any other family, and I have been compelled to omit a number of species, a Halpe, two Parnaras, a Parata, etc.” On page 157 of his paper he says he obtained about 140 species from Sambawa and Sumba.

Mr. Doherty numbered the species he obtained from Sumba, the total being 130, but of these one species, Stictoploea lacordairei, Moore, was inadvertently entered as from Sumba, while it really was obtained in Sambawa. In counting up the number of species he mentions, the total is 140 (omitting the Euploëa), so that there were eleven species he was unable to name for want of specimens when writing his paper.

Dr. Pagenstecher in his first paper on the butterflies of Sumba records 34 species only as received by him, but several of these are not included in Mr. Doherty's list.

Dr. Pagenstecher in his second paper records 57 species from Sambawa, and 88 species from Sumba, many of these being new records. His total from both islands is 110 species.

Mr. Fruhstorfer names 176 species from Lombok, and a “Narathura” and two Arrhopalas are unnamed, a total of 179 species.

Mr. Fruhstorfer gives 28 species from Bali, of which he described three as new.

Between the islands of Bali and Lombok is found the deep depression in the sea-floor which is generally known as “Wallace's Line,” and is supposed to faunistically divide the Indo-Malayan and Austro-Malayan regions. In the three islands of Lombok, Sambawa and Sumba dealt with in this paper which lie to the east of this line, there...

The only papers relating to Sumba and Sambawa are:—


**Family NYMPHALIDÆ.**

**Subfamily Danaidæ.**

This subfamily has been arranged in the order given by Mr. F. Moore in "A Monograph of the Limnaina and Euplœina" in the Proceedings of the Zoological Society of London for 1883, pp. 201–324. It is a little remarkable that no species of *Nectaria*, *Hestia*, *Gamana*, and *Ideopsis* appear to occur in the islands dealt with here.

1. **Danais** (Radena) *vulgaris*, Butler.

Sambawa (Doherty). Mr. Doherty says that a *Radena* occurring in Sambawa "Appears to be a representative of *R. vulgaris*, and is common everywhere. I have now no specimens, and am unable to compare it with its allies." On a subsequent visit to the island, Doherty obtained it again, and there are two pairs in Elwes’ collection, who notes that
"They have the markings paler and on the hindwing broader than in Javan specimens."


Bali (Doherty), Lombok (Moore, Doherty and Fruhstorfer), Sambawa? (Doherty). Doherty records a *Radena* from Sambawa, and says it "is very close to the Javanese *R. juventa*, and is confined to the higher country, though I have taken it as low as 1,500 feet. I have now no specimens, and am unable to compare it with its allies." In Elwes' collection there are specimens of this species from Bali, Lombok and Sambawa collected by Doherty, and Fruhstorfer also records it from Sambawa.

Sumbawa (Pagenstecher), Sumba (Doherty and Pagenstecher).

Sumba (Doherty).


Bali (Doherty), Lombok (Fruhstorfer), Sambawa, Sumba (Doherty). Mr. Fruhstorfer records three species of the subgenus *Tirumala* from Lombok—*D. (T.) melissa hamata*, MacLeay, *D. (T.) limniace conjuncta*, Moore, and *D. (T.) limniace donia*, Fruhstorfer. As regards the first of these it has always been held that it is confined to Australia. Its coloration is very deep blue, and it is a well-marked species. Mr. Fruhstorfer's identification is probably erroneous. The second species is restricted by the describer to Java, but is in our opinion an absolute synonym of *D. limniace*; Mr. Moore not admitting that the last-named species is found in Java. The third species is described in Berl. Ent. Zeitsch., vol. xlii, p. 120 (1897). All our specimens of *Tirumala* from Lombok are certainly *D. limniace*. Mr. Fruhstorfer gives both *D. hamata* and *D. limniace* from Sambawa, and *D. hamata*, *D. limniace* and *D. donia* from Sumba.

Sambawa and Sumba (Doherty). Dr. Pagenstecher in his first paper records this species under the name of *D. hamata*, Maclay, from Sumba. Mr. Moore restricts this species to Java.

Sumba? (Doherty). Mr. Doherty notes, "I also recorded a form of *D. gautama* in Sumba, but no specimens have turned up."
8. *Danais (Tipumala) septentrionis, Butler.

Lombok (Fruhstorfer). Fruhstorfer does not record this species from Lombok, though it certainly is found there. Perhaps he has identified it as *D. melissa hamata*, MacLeay.


Lombok (Fruhstorfer), Sambawa (Doherty and Fruhstorfer). Fruhstorfer says that *D. erebus*, Röber, from Ceram, Goram and Flores, described in the same year as *D. haruhasa*, is the same species.


Sumba (Doherty).

11. *Danais (Limnas) chrysippus, Linnaeus.

Lombok (Moore), Sambawa, Sumba (Doherty). Mr. Doherty notes that his specimens are somewhat intermediate between typical *D. chrysippus* and *D. bataviana*, Moore. Mr. Elwes says that of five specimens from Sambawa in his collection, four are dark-coloured like those from Bali and Lombok, and one female is paler, so that he considers *D. bataviana* to be an inconstant variety of *D. chrysippus*. All the specimens of this species in de Nicéville’s collection from Lombok are quite constant and are typical *D. bataviana*.

12. *Danais (Limnas) bataviana, Moore.

Bali (Doherty), Bali, Lombok (Fruhstorfer). This species can typically be recognised by the dark ferruginous colour of the ground on the upperside of both wings in both sexes. The markings are quite as inconstant as are those in *D. chrysippus*, Linnaeus. Mr. Moore restricts it to Java.


Sambawa, Sumba (Doherty as *D. genutia*, Cramer). Mr. Doherty says his specimens are intermediate between typical *D. genutia*, Cramer (*plexippus*), and *D. intensa*, Moore. We think it highly improbable that typical *D. plexippus* is found in these islands.

14. *Danais (Salatura) intensa, Moore.

Lombok (Moore and Fruhstorfer). We have very numerous specimens of this species from Lombok which are quite typical *D. intensa*. It is, we think, almost certain that the Sambawa and Sumba species (see above) are also *D. intensa* rather than *D. plexippus*. Mr. Fruhstorfer describes a *D. (Salatura) genutia partita*, from Lombok and Sambawa,
in Berl. Ent. Zeitsch., vol. xlii, pp. 119, 121 (1897), but our Lombok specimens do not appear to us to differ from typical \textit{D. intensa}, from Java, Lombok and Borneo (Moore).

15. \textbf{Danais (Salatura) litoralis}, Doherty.

Lombok (Fruhstorfer), Sambawa, Sumba (Doherty). Mr. Fruhstorfer places this species in one paper as a synonym of \textit{D. affinis}, Fabricius, var. \textit{a}, \textit{hegesippinus}, Röber, from Bonerate and Kisser Islands, described in the same year as Doherty’s species, in his last paper he restricts \textit{D. hegesippinus} to Lombok and Sambawa, and records \textit{D. litoralis} from Sumba. Mr. Elwes notes that he possesses one specimen only, but does not say from what island, while de Nicéville has never seen it.

16. \textbf{Danais (Ravadeba) philo}, Grose Smith.


Sambawa (Doherty and Grose Smith). There are two pairs of this species in Elwes’ collection, and a single female (the type) is in the collection of Hon. Walter Rothschild.

17. \textbf{Danais (Bahora) philomela}, Zinken-Sommer.

Bali (Doherty).

18. \textbf{Danais (Chittira) orientis}, Doherty.

Lombok (Fruhstorfer), Sambawa, Sumba (Doherty and Fruhstorfer). Mr. Doherty says that this species appear to belong to Mr. Moore’s genus \textit{Badacara}, though he places it in \textit{Chittira}. Mr. Elwes says it is very near to \textit{D. (Badacara) nilgiriensis}, Moore, but he is unable to follow the minutiae of Mr. Moore’s “genera,” so cannot say whether it is a \textit{Chittira} or a \textit{Badacara}. Mr. Fruhstorfer places it in the subgenus \textit{Caduga}. Without seeing a specimen de Nicéville is unable to say to which subgenus it should properly belong.


Bali (Doherty), Lombok (Fruhstorfer), Sambawa (Doherty and Fruhstorfer). Mr. Fruhstorfer records this species from Lombok and Sambawa as \textit{E. (Vadebra) sepulchralis}, Butler, and \textit{in litt.} to de Nicéville says that \textit{E. elwesiana} and \textit{E. neptis}, Röber, from Flores, are both synonyms of that species, which was originally described from
Java. We have no specimens of *E. sepulchralis* with which to compare *E. elwesiana*, but as Mr. Butler's description and figure of his species differ from de Nicéville's of *E. elwesiana*, we have kept them distinct.

P. S.—Since the above was written, Mr. Fruhstorfer has recorded *E. sepulchralis* from Lombok and Sambawa.

20. **Euplœa (Menama) deheerii**, Doherty.

Lombok (*Fruhstorfer*), Sambawa (*Doherty and Fruhstorfer*). If we have correctly identified the hitherto undescribed female of this species, it differs considerably from the male, the upperside of the forewing being strongly instead of slightly glossed with iridescent violet colour, though this character is rather variable; the submarginal series of spots are very much larger and more numerous, the series being usually, complete from the costa to the anal angle, though one specimen has two spots only and another four, these spots being white in the middle, broadly surrounded with pale violet, and there are six marginal white dots in pairs between the veins from the submedian internervular fold to the lower discoidal internervular fold; in some specimens these dots are wanting; on the hindwing the marginal series of dots is usually complete, and the submarginal series consists of from two to eight decreasing spots, while the male has two or three only. The underside presents much the same differences as on the upperside, except that in the forewing the submarginal series of spots form an even curve instead of being highly irregular in position as they are in the male, in the latter sex the spot in the second median interspace is far removed inwardly from the line of the others, and the spot in the first median interspace is also out of line, though less so than the spot anterior to it. The species is a very variable one in both sexes.


Lombok (*Fruhstorfer*). It is unusual for two species of the same subgenus of *Euplœa* to occur together; perhaps this species is one of the numerous varieties of the last named.

22. **Euplœa (Tronga) sp.**

Sambawa? (*Doherty*). Mr. Doherty obtained a species probably of this subgenus in Sambawa, but the specimens were lost before he could identify them.

23. **Euplœa (Tronga) crameri**, Lucas.

Bali (*Doherty*). These specimens appear to be typical, having the
marginal and submarginal series of dots on the upperside of the forewing very small, almost obsolete. *E. bremeri*, Felder, has them large and conspicuous. In all other respects the two species agree exactly.


Lombok (*Fruhstorfer*). A single much torn male has been received by de Nicéville, who has so identified the specimen but with great doubt. It has the sexual brand broad, and thirteen mm. in length; the double marginal series of white spots on the upperside of the hindwing pure white and prominent; it is certainly distinct from the two species which follow. It was originally described from Java.


Lombok (*Fruhstorfer*). This may be the species last named, but de Nicéville’s specimen differs greatly from typical *E. pinwilli* from the Malay Peninsula and Sumatra.


Lombok and Sambawa (*Fruhstorfer as E. eindthoveni, sic!*). We presume Mr. Fruhstorfer refers to this species, though he alters the spelling of its name in four particulars. We would again remark that it is unlikely that three species of the same subgenus are found together in one small island. As far as we are aware, *E. eyndhovii* is confined to Java.

27. *Euplœa (Penoa) sp.*

Sambawa (*Doherty*). Mr. Elwes notes that his Bali and Sambawa *Penoas* are *E. eyndhovii*, Felder, = *E. menetriesii*, Felder, the latter name having priority, and differ only from Perak specimens in having the marginal spots on the hindwing shorter and whiter. Mr. de Nicéville has seen no *Penoa* from Bali. Perhaps Elwes’ specimens are what de Nicéville has called *E. geyeri*, Felder.


Lombok (*Fruhstorfer*), Sambawa (*Pagenstecher and Fruhstorfer*). We are unable to identify this species from the description and figure in Jahr. des Nass. Ver. für Natur., vol. xlix, p. 132, n. 53, pl. iii, fig. 2, male (1896) with anything in our collections. Mr. Fruhstorfer transfers it doubtless correctly to the subgenus Isamia.

29. *Euplœa (Crastia or Vadebra) palmedo*, Doherty.

Sumba (*Doherty and Fruhstorfer*). Recorded by Dr. Pagenstecher in his first paper as *E. palmeda* [sic].
Sumba (Doherty and Fruhstorfer).

Bali (Doherty and Fruhstorfer).


Lombok (Fruhstorfer), Sambawa (Doherty and Fruhstorfer). Originally described from Flores. A very distinct species.

Sumba (Doherty and Fruhstorfer).

34. *Euplæa eucala*, Staudinger.

E. eucala, Staudinger, Iris, vol. viii, p. 373, pl. vii, fig. 4, male (1895).

Sambawa (Staudinger and Fruhstorfer). Referred to by Dr. Pagensstecher in his second paper as *E. eucalle* [sic]; the reference also is incorrect. Mr. Fruhstorfer also spells the name erroneously.

Bali (Doherty and Fruhstorfer).

36. *Euplæa* (Calliplæa) sambavana, Doherty.

Lombok (Fruhstorfer as sambavana, sic!), Sambawa (Doherty and Fruhstorfer). Mr. Elwes notes that the male from Sambawa has the upperside of the forewing of a deeper colour than in *E. mazares*, Moore, but that the markings are similar to those of the latter species from Java and Bali, and that at best *E. sambavana* is only a local race of *E. mazares*.

37. *Euplæa* (Calliplæa) mazares, Moore.
Bali (Doherty and Fruhstorfer). Mr. Fruhstorfer quite incorrectly transfers this species to the subgenus Selinda.

38. *Euplæa* (Calliplæa) sambana, Doherty.
Sumba (Doherty and Fruhstorfer).

Bali (Doherty), Lombok and Sambawa (Fruhstorfer), Sambawa, Sumba—stated by Elwes to be in his collection (Doherty).
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40. **Euplœa (Salpinx) meizon**, Doherty.
Lombok (Fruhstorfer), Sambawa, Sumba (Doherty and Fruhstorfer).

41. **Euplœa (Salpinx) leucostictos**, Gmelin.
Bali (Doherty).

42. **Euplœa (Isamia) sp.**
Sambawa (Doherty). Mr. Doherty notes that “An undescribed Isamia occurs in Sambawa.” Mr. Elwes has three males and one female of this, and notes that it is allied to *E. chloë*, Guérin, but as a separate description is required for each specimen owing to the great variability of the species, he cannot name it on this material. See No. 28 ante.

43. **Euplœa (Stictoploœa) lacordairei**, Moore.
Lombok (Fruhstorfer as lacordairi, sic!), Sambawa (Doherty and Fruhstorfer). Recorded from Sumba by Doherty, but he informed de Nicéville that this was a mistake, Sambawa being meant. There is a male from Sambawa in de Nicéville’s collection.

44. **Euplœa (Stictoploœa) melolo**, Doherty.
Sumba (Doherty and Fruhstorfer). Recorded by Dr. Pagenstecher in both his papers as *E. melelo* [sic]. There is one male in de Nicéville collection.

**Subfamily Satyrinae.**

45. **Mycalesis (Orosotriœna) medus**, Fabricius.
Bali (Doherty), Lombok (Fruhstorfer), Sambawa, Sumba (Doherty).

46. **Mycalesis (Calysisme) perseus**, Fabricius.
Bali, Sambawa, Sumba (Doherty).

47. **Mycalesis (Jatana) wayewa**, Doherty.
Lombok (Fruhstorfer), Sambawa, Sumba (Doherty). The *Mycalesis merops*, Grose Smith, Nov. Zool., vol. ii, p. 80, n. 11 (1895), recorded from Sambawa by Mr. Grose Smith, Sumba by Dr. Pagenstecher, and Lombok by Mr. Fruhstorfer, is almost certainly a synonym of *M. wayewa*. Mr. Grose Smith described *M. merops* from Sambawa, Adonara and Pura.

Bali (Doherty), Lombok (Fruhstorfer).
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49. **Mycalesis (Loesa) oroatis**, Hewitson.
Bali (Doherty).

50. **Lethe (Nemetis) minerva**, Fabricius.
Bali (Doherty), Lombok (Fruhstorfer).

51. **Lethe (Debis) manthara**, Felder.
Bali (Doherty). Mynheer P. C. T. Snellen in Tijd. voor Ent., vol. xxxv, p. 4, n. 4 (1892), says that *Debis manthara*, Felder, is the same as *Debis mekara*, Moore; but this is incorrect, they are abundantly distinct in the female sex, on the upperside the ground-colour of both wings in *D. mekara* is ferruginous, in *D. manthara* it is dull ochreous; *D. mekara* has the discal macular band of the forewing pure white and highly angled, with a duplicated subapical white spot, while *D. manthara* has the discal band inconspicuous, curved (instead of angled), and pale ochreous, with no subapical white spot; while on the hindwing the five submarginal black spots are much larger in *D. manthara* than in *D. mekara*. The males of the two species are very similar, though *D. manthara* is much the paler on the upperside of both wings.

52. **Lethe europa**, Fabricius.
Bali (Doherty), Lombok (Fruhstorfer), Sambawa, Sumba (Doherty).

53. **Lethe dyrta**, Felder.
Bali (Doherty), Lombok (Fruhstorfer), Sambawa (Doherty).

54. **Ypthima leuce**, Doherty.
Lombok (Fruhstorfer), Sambawa, Sumba (Doherty). Mr. Doherty describes the sex-mark of the male of this species as “whitish,” but it is in this species, as in all the species of *Ypthima* in which it is present, more or less black. This is the species from Flores given by Mynheer P. C. T. Snellen in Tijd. voor Ent., vol. xxxiv, p. 236, n. 12, pl. xv, fig. 1, female (1891), as *Y. baldus*, Fabricius.

Bali (Doherty). Originally described from Java.

56. **Ypthima philomela**, Johanssen.
Bali (Doherty and Fruhstorfer), Lombok (Fruhstorfer), Sumba (Pagenstecher as *Y. baldus*, Fabricius). This is the *Y. baldus* of Mr. Elwes’ monograph of the genus (Trans. Ent. Soc. Lond., 1893, p. 14, n. 10, pl. i, figs. 15, 16, clasp and ædeagus of the male). See also the late

57. *Ypthima huebneri, Kirby.

Sumba (Pagenstecher). This record requires confirmation we think, as the species has never before been obtained out of the continent of Asia except in Borneo. Dr. Pagenstecher gives the Y. philomela of Hübner from Java as a synonym, a species with six ocelli in pairs, while Y. huebneri has only four ocelli, arranged one and three. He also gives the Y. florensis of Snellen, from Flores, as another synonym, but this surely is an absolutely distinct species from either of the others, as it has only two very large ocelli on the underside of the hindwing, as figured in Tijd. voor. Ent., vol. xxxiv, p. 235, n. 11, pl. xiv, fig. 3, male (1891). Dr. Pagenstecher makes three mistakes in the reference to this species, the page is 235 not 225, the plate is 14 not 4, and the figure is 3 not 3a. In de Nicéville's opinion Y. florensis is a synonym of Y. asterope, Klug.

58. *Ypthima asterope, Klug.

Sumba (Doherty).

59. Erites medura, Horsfield.

Bali (Doherty).

60. Melanitis ismene, Cramer.

Bali, Lombok, Sambawa, Sumba (Doherty). Mr. Doherty and Dr. Pagenstecher record this species under the name of M. leda, Linneus, but according to Dr. A. G. Butler, that species is confined to Amboina (Ent. Month. Mag., vol. xxi, p. 246 (1885). Mr. Fruhstorfer records both M. ismene and M. leda from Lombok. This is probably a mistake. The species is markedly affected by dry and wet weather, probably Mr. Fruhstorfer keeps distinct the ocellated and non-ocellated forms, which de Nicéville has bred the one from eggs laid by the other.


Lombok (Fruhstorfer). From the figure of this species in Berl. Ent. Zeitsch., vol. xli, p. 386, pl. ix, fig. 5, female (1897), it appears to be quite a distinct species from M. ismene. Mr. Fruhstorfer says it is a local race of M. belinda, Grose Smith, Nov. Zool., vol. ii, p. 79, n. 10 (1895), from Adonara. It is more than probable in de Nicéville's opinion that Grose Smith's name will stand for the species.
Sambawa, Sumba (Doherty).

Subfamily Elymniiæ.

63. Elymnias protogenia, Cramer.

Bali, Sambawa (Doherty), Sumba (Pagenstecher), Bali (Fruhstorfer as *E. protogenia baliensis*, Fruhstorfer). Doherty records this species from Sambawa as *E. undularis*, Drury, and says that no Elymnias is known from Sumba (but Dr. Pagenstecher has since recorded it from thence as *E. undularis*) or Timor (but in de Nicéville's collection is an Elymnias from Timor received from Dr. Staudinger with the MS. name *E. undularis*, var. timorensis). *E. protogenia* was originally described from Java, and differs but slightly from the *E. undularis* of Drury, which has precedence. Mr. H. Fruhstorfer in "Societas Entomologica," 1896, describes the Bali local race as *E. protogenia baliensis*, but it is, as far as our specimens of both sexes show, identical with typical *E. protogenia*. The paper in which this species is described is simply peppered over with misprints. Dr. Staudinger has issued the Sambawa form with the MS. name of *E. sambawana*, which has in the male the outer margin of the hindwing on the upperside of a somewhat deeper ferruginous colour than in typical specimens from Java and Bali, but does not otherwise differ.

64. Elymnias nigrescens, Butler.

Bali, Lombok (Doherty), Lombok (Fruhstorfer as *E. nigrescens meliophila* and *meliophila*). The male is barely distinguishable from the same sex of *E. protogenia*, Cramer, the female is of course abundantly distinct from the same sex of that species. Even as a local race we do not think that *E. meliophila* can stand. Our single female from Lombok is brown on the upperside of the forewing with little or none of the purple gloss shown in females from Perak. This brown form occurs also in Sumatra with the more common purple form.

65. Elymnias dara, Distant.

Bali (Doherty). *E. dara* was described from Borneo, *E. albofasciata*, Staudinger, from Palawan in the Philippines. The former name has priority. Mr. Moore in Lep. Indica, vol. ii, p. 156, keeps them distinct, but it is doubtful if specimens from the typical localities have ever been compared together. They are probably one and the same species.

66. Elymnias (Melynias) pretextata, Fruhstorfer.

Bali (Doherty), Lombok (Fruhstorfer). Recently described in
“Societas Entomologica” by Mr. H. Fruhstorfer from Lombok as E. casiphone praetextata.


Lombok (Fruhstorfer). Originally described from Java. The species which follows differs from it only in having on the upperside of the hindwing a single series of narrow ochreous-white spots instead of a second and third series anterior to the first extending towards the base of the wing.

68. **Elymnia** (Melynias) exclusa, de Nicéville, n. sp.

**Habitat**: Bali, 2,000 to 4,000 feet, March, 1896 (Doherty).

**Expanse**: $\delta$, 3·0 inches.

**Description**: Male. Differs from the same sex of E. casiphone praetextata, Fruhstorfer, from the low country of Bali and from Lombok, in having the upperside of the forewing entirely deep uniform velvety black, without markings, in that species the ground-colour is fuscous becoming outwardly much paler, with a submarginal series of six bluish-white spots. Hindwing differs also in having the ground-colour much darker, with a submarginal series of four prominent elongated ochreous-white spots placed between the veins, these being obsolete in that species; it is heavily clothed on the disc with long black hairs. Underside, both wings much as in that species. Differs from E. erinyes, de Nicéville, from the Battak mountains of North-East Sumatra, in the forewing being shorter, less elongated, and on the upperside of the hindwing in not having a series of elongated pale streaks between the veins. **Female unknown**.

Mr. de Nicéville will figure this species in a later paper. In de Nicéville and Elwes’ collections are single males.

Subfamily *Amathusiinae*.

69. **Amathusia phidippus**, Johanssen.

Bali (Doherty), Lombok (Doherty and Fruhstorfer).

70. **Discophora celinde**, Stoll.

Bali (Doherty).


Lombok (Fruhstorfer). Messrs. Doherty and Fruhstorfer credit this species erroneously to Wallace.
72. Discophora sondaica, Boisduval.
Bali (Doherty).

73. Zeuxidia luxerii, Hübner.
Bali (Doherty).

74. Clerome arcesilaus, Fabricius.
Bali (Doherty).

**Subfamily Acreiæ.**

75. *Acrēa andromacha*, Fabricius.
Sumba (Pagenstecher).

76. Pareba vesta, Fabricius.
Bali (Doherty).

**Subfamily Nymphalīæ.**

77. Ergolis ariadne, Linnaeus.
Bali, Lombok (Doherty), Lombok (Fruhstorfer), Sambawa, Sumba (Doherty).


Mr. Doherty writes: "I believe *E. merione* also occurs in Sambawa."

79. Euripus halitherses, Doubleday and Hewitson.
Bali (Doherty). The female is of the form "Diadema" nyctelius, Doubleday (= *E. cinnamomeus*, Wood-Mason), the upperside having the forewing purplish, and the hindwing brown.

80. Cupha erymanthis, Drury.
Bali (Doherty and Fruhstorfer), Lombok (Fruhstorfer), Sambawa, Sumba (Doherty).

81. Atella phalantha, Drury.
Bali, Lombok, Sambawa, Sumba (Doherty), Lombok (Fruhstorfer).

82. *Atella sinha*, Kollar.
Sambawa, Sumba (Doherty). Dr. Pagenstecher in his second paper records this species from Sumba as *A. egista*, Cramer. That species is entirely different from *A. sinha*; de Nicéville has it from the Ké Islands
and Cairns in Northern Australia. *A. propinqua*, Miskin, described from Australia, is a synonym of *A. egista*.

83. **Cethosia penthesilea**, Cramer.


Bali, Sambawa, Sumba (*Doherty*), Lombok (*Fruhstorfer*). Mr. de Niceville has this from Bali, Lombok and Sumba only. A single male of *A. penthesilea exsanguis*, Fruhstorfer, received from Mr. Fruhstorfer and taken by him at Ekas, Lombok, in May, 1896, is practically inseparable from two male specimens from Sumba, also received from the same gentleman, and the typical form from Java. Cramer’s figure appears to be slightly exaggerated, the white subapical hand on the upperside of the forewing being rather wider than in any Javan specimens in our collections.

84. **Cethosia narmada**, Fruhstorfer.


Lombok, Sambawa (*Fruhstorfer*).

85. **Cethosia narmadoides**, de Niceville, n. sp.

**Habitat**: Bali (*Doherty*).

**Expanse**: ♂, 2.9 and 3.2 inches.

**Description**: Male. **Upperside**, both wings differ from the same sex of *C. narmada*, Fruhstorfer, from Lombok, in having the outer marginal black areas much narrower, thus leaving the discal and basal red areas much larger, occupying the whole of the discoidal cell in the forewing instead of the posterior half only; and in the hindwing leaving quite free the outer discal series of round black spots, instead of extending right up to and more or less including them. **Forewing** has the subapical oblique series of markings reddish-ochreous instead of whitish, much larger and more numerous than in *C. narmada*, in the latter the anterior of the three subapical spots is widely separated from the two posterior ones. **Underside**, both wings have the ground-colour much paler, in *C. narmada* it is heavily suffused with black; the discal pale ochreous band is much broader in the present species. **Female unknown**.

The figure of *C. narmada* does not agree with the specimens of that species in de Niceville’s collection received from and named by Fruhstorfer. Instead of having on the upperside of the forewing three subapical spots only, there is a nearly complete series as in *C. narmadoides*;
and on the hindwing the outer discal series of black spots is free of the marginal black band, thereby agreeing with \textit{C. narmadooides}, instead of being absorbed in the band. Mr. de Nicéville will figure the species in a later paper. It is described from two male specimens taken by Mr. W. Doherty in the low country of Bali in April, 1896. Mr. Fruhstorfer writes to de Nicéville that he has "Just received from Sambawa a typical \textit{C. narmada}, and that it is found in that island with \textit{C. tambora}, Doherty, while Lombok has only one species. \textit{C. cyane}, var. \textit{sambava}, Pagenstecher, from Sumba, is very distinct on both surfaces from either of the above-named species. I have it also from Kalao, the small island near Tanah-Djampea between Celebes and Flores. \textit{C. sambana} has on the upperside of the forewing a very large subapical band instead of a small one as in \textit{C. tambora} and a narrow one in \textit{C. narmada}, and has on the underside of the hindwing a submarginal orange-yellow band instead of a black one in \textit{C. tambora} and a brownish one in \textit{C. narmada}.", In the absence of specimens or good coloured figures of all these species, it is exceedingly difficult to identify them.

86. \textit{Cethosia tambora}, Doherty.

Sambawa, and doubtfully from Sumba (Doherty). In Dr. Pagenstecher’s first paper he records this species and gives a very full description of it as \textit{C. cyane}, Drury, var. \textit{sambana}, from Sumba. In his second paper, p. 137, n. 62, he records it from Sumba and Sambawa correctly as \textit{C. tambora}, and figures a female (not a male, as stated by him), the sex described by Doherty. Males of \textit{C. tambora} from Sambawa in our collections differ from this figure in having the subapical ochreous band on the upperside of the forewing narrower, and the marginal black band on the upperside of the hindwing also much narrower. \textit{C. tambora} is a very distinct species, the blue-black and ochreous-white coloration of the underside being quite remarkable. We have seen no specimens from Sumba. Should that local race be distinct, Dr. Pagenstecher’s name \textit{C. sambana} can be applied to it. See No. 85 ante.

87. \textit{*Cynthia dejone}, Erichson.

Sambawa, Sumba (Doherty as \textit{C. dejone}, sic!). This is probably a wrong identification, as far as we know \textit{C. dejone} is confined to the Philippine Isles. Mr. Doherty has the following note regarding this species: "A single male, Sumba, interior. Common in Sambawa, where the females vary to a remarkable extent, some being as red as the male, while others are dark green insects like \textit{Parthenos}. Intermediate forms are common." Dr. Pagenstecher in his second paper records the species as \textit{C. arsinoë}, Cramer, which is quite a distinct species from the Moluccas and New Guinea. See the next species, No. 88.
88. Cynthia austrosundana, Fruhstorfer.

Lombok, West Sambawa, Sumba (Fruhstorfer). We have a pair of this species from Lombok, three males from Sambawa, and two males from Sumba; it seems to be a very distinct species. Mr. Fruhstorfer describes it in "Societas Entomologica," No. 7, for July, 1897, as a subspecies of C. erota, Fabricius. In the Berl. Ent. Zeitsch., vol. xlii, p. 4 (1897), Mr. Fruhstorfer changes the name to C. austrosundu!

89. *Helcyra chionippe, Felder.

Sumba (Doherty).

90. Apatura (Rohana) nakula, Moore.

Bali (Doherty). One female only obtained. As far as we are aware, this is only the second specimen known of this sex, the type of the species, also a female, from Java, is unique in the British Museum, and has been figured by de Nicéville in Journ. Bomb. Nat. Hist. Soc., vol. ix, pl. N, fig. 6, female (1895).

91. Herona pringondani, Fruhstorfer.

Bali (Doherty). This species has been figured by de Nicéville from Java in Journ. A. S. B., vol. lxiii, pt. 2, p. 4, n. 3, pl. iii, figs. 5, male; 4, female (1894). Bali specimens are quite the same.

92. Precis ida, Cramer.

Bali (Doherty and Fruhstorfer), Lombok (Fruhstorfer), Sambawa, Sumba (Doherty).

93. Precis iphita, Cramer.

Bali (Doherty and Fruhstorfer), Lombok (Fruhstorfer), Sambawa, Sumba (Doherty).

94. *Junonia atlites, Johanssen.

Lombok (Fruhstorfer as J. laomedia), Sambawa, Sumba (Doherty). Recorded by Dr. Pagenstecher in his first paper as J. laomedia, Linnaeus.

95. Junonia almana, Linnaeus.

Bali (Doherty), Lombok (Fruhstorfer), Sambawa, Sumba (Doherty). As J. almana and J. asterie, Linnaeus, are unquestionably one and the same species, the former being the dry-season, the latter the wet-season form, and the former name having priority, it must be used for the species, though the wet-season form probably alone occurs in the above-named islands. The Sambawa and Sumba form has been named by Doherty J. ii. 87
J. asterie, var. sumbae. It differs but slightly from the typical form. The Bali specimens also are var. sumbae, as are probably also the Lombok ones, which we have not seen.

96. *Junonia villida, Fabricius.

Sumba (Doherty). Originally described from Australia, and in de Nicéville's collection from thence, and from the Ké Isles, German New Guinea and the Solomon Isles. Mr. Doherty spells the name "vellida" incorrectly.

97. Junonia erigone, Cramer.

Bali (Doherty), Lombok (Fruhstorfer), Sambawa, Sumba (Doherty). Messrs. Doherty and Fruhstorfer record this species under the older name *J. aonis*, Linnaeus, the former remarking that "The species is certainly very close to the Javanese *J. erigone*." As, however, *J. aonis* cannot be identified with certainly, though it is probably an older name for the Indian and Chinese *J. lemonias*, Linnaeus (confer Aurivillius, p. 169), we have thought it better to follow Dr. Pagenstecher in his second paper in identifying the species under Cramer's name. We have specimens of *J. erigone* from Java, Bali, Kalao, and Sumba which are indistinguishable.


Sumba (Doherty). Mr. de Nicéville possesses a single male from Sumba given to him by Mr. Doherty.


Lombok (Fruhstorfer), Sambawa, Sumba (Doherty). Mr. Doherty records this species as *J. orithyia*, Linnaeus, but the form occurring in the above-named islands is more likely to be Hübner's local race than the typical form from China. Dr. Pagenstecher also records it as *J. "orithya"* and *orithyia* from Sumba in both his papers.

100. Neptis (Rahinda) hordonia, Stoll,

Bali (Doherty), Lombok (Fruhstorfer), Sambawa, Sumba (Doherty).


Bali (Doherty).

102. Neptis vikasi, Horsfield.

Bali (Doherty).
103. Neptis leucothoe, Cramer.
Bali, Lombok, Sambawa (Doherty), Lombok (Fruhstorfer).

104. Neptis sumba, Doherty.
Lombok (Fruhstorfer), Sambawa, Sumba (Doherty). We have one male from Sambawa and both sexes from Lombok which we identify with this species, described by Doherty as N. nandina [=soma], var. sumba. He says that a somewhat different form from the typical Sumba one occurs in Sambawa.

105. Neptis susruta, Moore.
Bali (Doherty). Bali specimens agree absolutely with Sumatran specimens.

106. *Neptis aceris, Lepechin.
Bali (Fruhstorfer), Sumba (Pagenstecher). Mr. Fruhstorfer credits this species to Esper. It is probable that our N. susruta, Moore, is the same species as Fruhstorfer’s N. aceris. The latter is usually held to be restricted to Europe, Central and Northern Asia and Japan. Dr. Pagenstecher’s specimens also are probably N. susruta.

107. Neptis (Phaedyma) columella, Cramer.
Bali (Doherty), Lombok (Fruhstorfer), Sambawa, Sumba (Doherty). It is a little remarkable we think that no species of Cirrhochroa appears to occur in any of the islands treated in this paper, as at least four species are found in Java.

Lombok (Fruhstorfer), Sambawa, Sumba (Doherty).

Bali (Doherty), Lombok (Fruhstorfer), Sambawa, Sumba (Doherty).

110. *Hypolimnas saundersi, Wallace.
Sumba? (Doherty). It was originally described from Timor.

111. Hypolimnas anomala, Wallace.
Bali (Doherty), Lombok (Fruhstorfer), Sambawa? (Doherty).

112. Lebadea martha, Fabricius.
Bali (Doherty).
113. Limenitis procris, Cramer.

Bali (Doherty), Lombok (Fruhstorfer), Sambawa, Sumba (Doherty). Mr. Elwes notes that the Bali form differs in having smaller apical spots to the forewing, and a shorter band to the hindwing; the ground-colour of both wings being rather darker; but a Sambawa specimen is intermediate. Mr. H. Fruhstorfer in Ent. Nach., vol. xxiii, p. 59 (1897), has recently described L. procris neutra from Java and Lombok. Mr. de Nicéville has only seen specimens from Java, and these are inseparable from the typical form which was described from China. Mr. Fruhstorfer calls the form from Malacca, Sumatra and Borneo L. procris agnata. See also his remarks on both these local races in Berl. Ent. Zeitsch., vol. xli, p. 311 (1896).

114. Limenitis hollandii, Doherty.

Bali (Doherty), Lombok (Fruhstorfer), Sambawa (Doherty).

115. *Athyma perius, Linnaeus.

Lombok (Fruhstorfer), Sambawa, Sumba (Doherty).

116. *Athyma sp.

Lombok (Fruhstorfer). Mr. Fruhstorfer records a new species of Athyma near A. amhara, Druce, from Lombok.

117. *Athyma karita, Doherty.

Sumba (Doherty). Mr. Doherty says that this "Species seems intermediate between A. venilia and A. amhara." But the former species is a Neptis and not an Athyma, and was described by Linnaeus.

118. Athyma nefte, Cramer.

Bali, Sambawa (Doherty). This is probably the species recorded from Sambawa by Dr. Pagenstecher in his second paper as A. sele-nophora, Kollar.


Sumba (Doherty).

120. Euthalia (Tanacea) stygiana, Fruhstorfer.

Bali (Doherty, Fruhstorfer), Lombok (Fruhstorfer). This species has been recently described by Mr. Fruhstorfer in Berl. Ent. Zeitsch., vol. xli, p. 385 (1897), from Lombok. It is very near to E. pelea, Fabricius, from Java, of which "Adolias" palguna of Moore, also described from Java, is a synonym, but may be known by the ground-colour of both
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sides of both wings in both sexes being darker, and the discal white band of the forewing on both sides in both sexes being anteriorly more completely divided into two portions by a broader band of the ground-colour.

121. **Euthalia (Tanaecia) singoradja**, Fruhstorfer.

 *Bali (Doherty)*, Singoradja Island near Lombok (Fruhstorfer). If we have correctly identified this species, it bears the same relation to *E. trigerta*, Moore, from Java, as *E. stygiana*, Fruhstorfer, does to *E. pelea*, Fabricius. A description of it will be found in Berl. Ent. Zeitsch., vol. xli, p. 385 (1897). The ground-colour of both wings on both surfaces is much darker than in *E. trigerta*, and there are some differences also in the details of the markings, especially on the underside.


Lombok (Fruhstorfer). Only two specimens obtained by Mr. Fruhstorfer, one he has kept, the other is now in the collection of the Hon. Walter Rothschild.

123. **Euthalia nivepicta**, Fruhstorfer.

 *Lombok (Doherty and Fruhstorfer)*. Described by Mr. Fruhstorfer in Berl. Ent. Zeitsch., vol. xli, p. 384 (1897), from Lombok. Our single female from that island has the discal whitish band on the upperside of both wings more strongly developed than in typical *E. aconthea*, Cramer, from Java; otherwise all the markings are similar in both species.

124. **Euthalia sp.**

 *Sumba*? (Doherty). Mr. Doherty notes “An Euthalia, dark like *E. garuda*, Moore, seems also to inhabit Sumba, but none were taken.”


 *Bali (Doherty)*.


 *Lombok (Fruhstorfer)*.


 *Sumba (Doherty)*.

Lombok (*Fruhstorfer*).

129. **Symbrenthia hippoclus**, Cramer.

Bali (*Doherty*), Lombok (*Fruhstorfer*), Sambawa (*Doherty*). The white form of the female is found in Lombok, it is not known if the yellow form also occurs in that island, or what form or forms occur in Bali; both forms fly together in Java.

130. **Symbrenthia hypselis**, Godart.

Bali (*Doherty*). Agrees exactly with Javan specimens.


Bali (*Doherty*).


Bali (*Doherty*), Lombok (*Fruhstorfer*), Sambawa, Sumba (*Doherty*).

133. **Cyrestis nivea**, Zinken-Sommer.

Bali, Sambawa (*Doherty*).

134. **Cyrestis nais**, Wallace.

Lombok (*Fruhstorfer*), Sambawa (*ex Staudinger*), Sumba (*Doherty*).

135. **Cyrestis fruhstorferi**, Röber.


Lombok (*Fruhstorfer*).

136. **Cyrestis lutea**, Zinken-Sommer.

Bali (*Doherty*).

137. **Cyrestis periander**, Fabricius.

Bali, Sambawa (*Doherty*).

138. **Cyrestis (Chersonesia) rahria**, Moore.

Bali (*Doherty*).

139. **Cyrestis (Chersonesia) peraka**, Distant.

Bali (*Doherty*).

140. **Doleschallia bisaltide**, Cramer.

Bali, Lombok, Sumba (*Doherty*), Lombok (*Fruhstorfer*). In de Nicéville's collection there are two females of this species (*= D. pratipa,*
Felder) from Lombok. It has the ground-colour of the upperside of both wings much paler than in D. polibete, Cramer, the ochreous areas in the forewing are larger, consequently the black band at the end of the discoidal cell is narrower, with only one subapical white dot.

141. Dolkschallia folibete, Cramer.

Lombok (Fruhstorfer). In de Nicéville's collection there is a single female of this species. It has the ground-colour of the upperside of both wings much paler than in D. polibete, Cramer, the ochreous areas in the forewing are larger, consequently the black band at the end of the discoidal cell is narrower, with only one subapical white dot.

142. *Charaxes (Eulepis) athamas, Drury.

Lombok (Fruhstorfer), Sambawa, Sunuba (Doherty). Mr. Fruhstorfer records C. phrixus, Röber, from Lombok, a species considered by Dr. A. G. Butler to be a synonym of C. athamas (Journ. Linn. Soc. Lond., Zoology, vol. xxv, p. 383, n. 92 (1896).

143. *Charaxes (Eulepis) batavianus, Fruhstorfer.

Lombok (Fruhstorfer). Mr. Fruhstorfer writes to de Nicéville that he intends shortly to describe this local race of C. athamas, Drury, in Ent. Nach., vol. xxiv (1898), from West Java and Lombok.

144. *Charaxes (Eulepis) alphius, Staudinger.

Lombok (Fruhstorfer), Sambawa (Butler). Mr. Fruhstorfer records this species from Lombok as C. athamas alphius. Dr. Butler gives it full specific rank.

145. *Charaxes (Eulepis) fallax, Röber.

Lombok (Fruhstorfer). Mr. Fruhstorfer records this species from Lombok as C. attalus, Felder, and places C. fallax, Röber, as a synonym of it. Dr. Butler gives C. fallax full specific rank (l. c., p. 385, n. 95), and places C. attalus, Felder, as var. 5 of C. athamas, Drury. Mr. Fruhstorfer writes to de Nicéville that he intends to describe in Ent. Nach., vol. xxiv (1898) the species he records as C. attalus as C. attalus lombokianus, that he has seen the type of C. attalus, and that C. fallax is a synonym of it.
146. Charaxes (Eulepis) moori, Distant.

Bali (Doherty), Sumba (Pagenstecher). Dr. Pagenstecher spells this name “moorei” incorrectly in both his papers, as also does Dr. Butler (l. c., p. 385, n. 96).

147. Charaxes (Eulepis) hebe, Butler.

Bali (Doherty).

148. *Charaxes (Murwareda) eudamippus, Doubleday.

Sambawa? Sumba? (Doherty). Mr. Doherty says he saw a very large Charaxes in the above-named islands apparently of the eudamippus group.

149. *Charaxes (Murwareda) jovis, Staudinger.


Sambawa (Staudinger), Sambawa, Sumba (Pagenstecher). This is probably the species Mr. Doherty saw in Sumba but failed to capture, which he says was something like C. pyrrhus, Linnaeus, from Amboina.

150. *Charaxes (———) ocellatus, Fruhstorfer.


Lombok (Fruhstorfer). This species is said to be allied to C. orilus, Butler, from Timor, the male of which is figured, and differs very greatly from the female of C. ocellatus figured by Mr. Fruhstorfer.

151. Charaxes (Haridra) bayta, Moore.

Bali (Doherty).

152. Prothoe franckii, Godart.

Bali (Doherty).

Family LEMONIIDÆ.

Subfamily LIVYTHÈINÆ.


Lombok (Fruhstorfer), Sumba (Doherty).


Lombok (Fruhstorfer), Sambawa, Sumba (Doherty).
Bali (*Doherty*), Lombok (*Fruhstorfer*), Sambawa (*Doherty*).

**Subfamily Nemeobiinae.**

Bali (*Doherty*). Mr. Doherty spells this name "phlegyas," which is classically more correct.


Lombok (*Fruhstorfer*), Sambawa (*Grose Smith and Doherty*), Sumba (*Pagenstecher*). Mr. Doherty recorded this species from Sambawa as *Z. phlegyas*, but it was the present species he obtained, *Z. retiarius* at that date (1891) not having been described.

Bali (*Doherty*).

**Family Lycaenidae.**


Bali, Lombok (*Doherty*), Lombok (*Fruhstorfer*). Mr. Elwes notes that a male from Lombok has less white coloration on the upperside of both wings than a male from Bali, which latter has less white again than in specimens from Java. The females from all three islands are similar.

Sambawa, Sumba (*Doherty*).

Lombok (*Fruhstorfer*).


Bali, Sambawa, Sumba (*Doherty* as a var. of *G. boisduvali*, Moore). Mr. Elwes notes that he has carefully considered Doherty’s remarks on this subspecies, and he would ignore the var. *acragas*. He has both sexes of *G. boisduvali* from Perak, Java, Bali, Pulo Laut and Sambawa, all of which are the same. He believes that *G. irroratus*, Druce, and *G. irroratus*, var. *assamensis*, Doherty, are synonyms. Mr. H. H. Druce says that *G. irroratus* is inseparable from *G. boisduvali*, Moore.

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163. Paragyrdus horsfieldi, Moore.

Bali (Doherty), Lombok (Fruhstorfer). Mr. Elwes notes that two pairs of this species in his collection from Bali agree better with Mr. H. H. Druce's figures of P. moorei (Proc. Zool. Soc. Lond., 1895, p. 562, pl. xxxi, figs. 5, male; 6, female), from Kina Balu mountain in North Borneo, than with any of his (Elwes') Malayan P. horsfieldi, but as the type of this is probably the Javan form, and one in his collection from Java is P. moorei rather than P. horsfieldi, it seems to him that if they are distinct, which he doubts, it is the peninsular form and not the island one which wants a new name.

Mr. Elwes wishes this note to remain as written, but de Nicéville would point out that Mr. H. H. Druce says that P. horsfieldi occurs in Malacca, Sumatra, Java and Borneo, that the underside of P. moorei is "pure white," which is not the case in P. horsfieldi, and that specimens from Bali in de Nicéville's collection are P. horsfieldi and not P. moorei.

164. Logania sp.

Sambawa (Doherty). The specimens received, so Mr. Elwes notes, are not quite the same as L. marmorata, Moore, L. sriwa, Distaut, L. massalia, Doherty, or L. lahomius, Kheil, but he thinks it is impossible to decide what it is without a thorough study of the whole group, and the genitalia compared. Mr. de Nicéville has not seen these specimens from Sambawa.

165. Zarona jasoda, de Nicéville.

Bali (Doherty). One pair only received. Mr. Elwes notes that they agree on the underside with Burmese specimens, the male, however, is rather green than blue on the upperside. The female is so like the figure of Z. zanella, de Nicéville, that whether these are the same species or not, he has now but little doubt that Z. zanella is the female of Z. jasoda.

166. Pithecops hylax, Fabricius.

Bali (Doherty), Lombok (Fruhstorfer).

167. Neopithecops zalmora, Butler.

Bali, Sambawa, Sumba (Doherty).

168. Spalgis epius, Westwood.

Bali, Sambawa, Sumba (Doherty).

169. Megisba malaya, Horsfield.

Bali, Sambawa, Sumba (Doherty). The tailed form only obtained
by us. Doherty does not say anything regarding the tails of the specimens he captured.

170. *Chilades* trochilus, Freyer.
Bali, Sambawa, Sumba (Doherty).

171. *Cyaniris* akasa, Horsfield.
Bali (Doherty), Lombok (Fruhstorfer), Sambawa (Doherty).

172. *Cyaniris* puspa, Horsfield.
Bali (Doherty), Lombok (Fruhstorfer), Sambawa, Sumba (Doherty).

173. *Cyaniris* musina, Snellen.
Lombok (Fruhstorfer). Identical with Sumatran specimens.

Lombok (Fruhstorfer). Identical with specimens from Java.

175. *Cyaniris* placida, de Nicéville.
Lombok (Fruhstorfer). This species is found also in Java and Sumatra.

176. *Zizera* gaiika, Trimen.
Sambawa, Sumba (Doherty). Mr. Doherty records this species under its synonym, *Z. pygmsea*, Snellen.

177. *Zizera* otis, Fabricius.
Bali, Lombok (Fruhstorfer), Sambawa, Sumba (Doherty). Mr. Doherty records this species under its synonym, *Z. lysizone*, Snellen.

Sumba? (Doherty). Mr. Doherty records a third species of the genus from Sumba, which can only be this we believe.

Lombok (Fruhstorfer).

180. *Niphanda* tessellata, Moore.
Bali (Fruhstorfer). Mr. Fruhstorfer spells the name “tessellata.”

Lombok (Fruhstorfer), Sambawa, Sumba (Doherty). Mr. Doherty records this species under its synonym, *E. parrhasius*, Fabricius.
182. **Nacaduba macrophthalmia**, Felder.
Bali, Sambawa, Sumba (Doherty).

183. **Nacaduba herms**, Felder.
Bali (Doherty), Lombok (Fruhstorfer), Sambawa, Sumba (Doherty).

Bali (Doherty), Lombok (Doherty and Fruhstorfer), Sambawa (Fruhstorfer), Sumba (Doherty). Mr. Fruhstorfer found this species very commonly in Lombok. The female type specimen from Sumba is in de Nicéville's collection. The references to the figure given by Doherty in the text of his paper, p. 182, n. 79 and p. 197 are incorrect, the figure is n. 11, not 9, as stated by him.


Sambawa (Snellen). Myneer P. C. T. Snellen has described this species in Dutch from Java and Sambawa. We are unable to recognise it, not knowing that language, and it has not been figured. As he compares it with *Nacaduba perusia*, Felder, from Amboina (Felder), Amboina, Celebes and Java (Snellen), we have placed it in that genus. *N. perusia* is very close to *N. laura*, Doherty, the figure of the male of the former almost entirely agrees with our specimens of the male of the latter. Mr. de Nicéville thinks it probable that *L. subperusia* is the same species as *N. laura*, Doherty, which certainly occurs in Sambawa.

186. **Nacaduba noreia**, Felder.
Bali (Doherty), Lombok (Fruhstorfer), Sambawa, Sumba (Doherty). We have both the tailed and tailless forms from Bali, the Lombok form is tailed, both forms are found in Sambawa, and we have no specimens from Sumba, so cannot say whether the form occurring in that island is tailed or tailless or both. Mr. Doherty records it under its synonym, *N. ardates*, Moore, without remark.

Bali (Doherty), Lombok (Fruhstorfer), Sambawa (Doherty).

188. *Nacaduba dana*, de Nicéville.
Sambawa, Sumba (Doherty).

189. **Nacaduba ancyra**, Felder.
Lombok (Fruhstorfer), Sumba (Doherty). Described by Doherty as
a new species from S.-E. Borneo, Java and Engano as *N. pseustis*, and from Sumba as *N. gaura*. Other synonyms are *N. aberrans*, Elwes, *Plebeius subfestival*, Röber, *Cupido almoda*, Druce, *N. amaura*, H. H. Druce, and *N. maniana*, H. H. Druce. The species has an immense range, from the Malay Peninsula to Australia and the Western Pacific. It is apparently nowhere common, and but few specimens exist in collections, which is probably the reason why various authors having obtained a single example or so from a new locality have jumped to the conclusion that it is a new species, and described and named it at once.

190. **Jamides bochus**, Cramer.

Bali *(Doherty)*, Lombok *(Fruhstorfer)*, Sambawa, Sumba *(Doherty)*. From Mr. Doherty’s notes it would appear that the Sumba form is distinct from the Sambawa one.


Lombok *(Fruhstorfer)*. It is a most unusual thing for two species of *Jamides* to occur on one island, and we think that Mr. Fruhstorfer’s identification of the present species must be incorrect.

192. **Lampides aratus**, Cramer.

Sumba *(Doherty)* and *Pagenstecker*. Mr. Doherty described and figured this species as *L. masu*, the type, a male, being in de Nicéville’s collection. Mr. Doherty’s references to the figure of this species are incorrect in the text of his paper, p. 184, n. 86, and p. 197, the figure is n. 9, not 11 as stated. In his description Mr. Doherty does not say from whence his specimens came, but the type male ticketed by Doherty is from Sumba. He has written on the ticket “Probably = *L. aratus*, Cramer.” The type female is probably lost. Other synonyms are *Plebeius lucianus*, Röber, *Lampides caerulea*, Mathew, and *Lampides ætherialis*, Butler.

193. **Lampides margarita**, Martin.

Lombok *(Fruhstorfer)*, Sambawa *(Doherty)*. The Lombok female and the Sambawa specimens (one pair) agree almost absolutely with typical Sumatran ones (two pairs) in de Nicéville’s collection.

194. **Lampides celeno**, Cramer.

Bali *(Doherty)*, Lombok *(Fruhstorfer)*, Sambawa, Sumba *(Doherty)*. Mr. Doherty spells this name “celæno.”

195. **Lampides elpis**, Godart.

Bali *(Doherty)*, Lombok *(Fruhstorfer)*, Sambawa, Sumba *(Doherty)*.
196. *Lampides anops, Doherty.
Sumba (Doherty).

197. *Lampides schatzi, Röber.
Sambawa (Pagenstecher). Dr. Pagenstecher's reference to the plate on which this species is figured is incorrect, it should be pl. iv, not pl. x. It was originally described from Batjan. Herr Röber has sent de Nicéville a female example from Goram.

Sumba (Pagenstecher).

Lombok (Fruhstorfer). The description of this species has not reached us.

Lombok (Fruhstorfer). We have seen no description of this species.

201. Catochrysops strabo, Fabricius.
Bali (Doherty), Lombok (Fruhstorfer), Sambawa, Sumba (Doherty).

Lombok (Fruhstorfer), Sumba (Doherty). Mr. Doherty spells this name “cneius.”

203. Catochrysops pandava, Horsfield.
Bali, Sumba (Doherty).

204. *Tarucus theophrastus, Fabricius.
Sumba (Doherty).

205. Tarucus telicanus, Lang.
Lombok (Fruhstorfer), Sambawa, Sumba (Doherty). "Papilio" telicanus was described in 1789, "Hesperia" plinius, Fabricius, which is the same species, in 1793, so the former name has four years’ priority. "Lampides" cassioides and pseudocassius, Murray, is usually considered by Australian entomologists to be a distinct species, but it is another synonym. The butterfly has a very wide range, occurring in Central and Southern Europe, almost throughout Africa, Southern Asia, Formosa, Australia, and the Pacific Islands. Mr. Roland Trimen, F. R. S., agrees with de Nicéville in considering T. telicanus and T. plinius to be synonymous.
206. **Castalius rosimon**, Fabricius.
   Bali (*Doherty*), Lombok (*Fruhstorfer*), Sambawa, Sumba (*Doherty*).

207. **Castalius ethion**, Doubleday and Hewitson.
   Bali (*Doherty*), Lombok (*Fruhstorfer*), Sambawa, Sumba (*Doherty*).

208. **Castalius roxus**, Godart.
   Bali, Sambawa, Sumba (*Doherty*).

209. **Polyommatus beticus**, Linnaeus.
   Bali, Lombok, Sambawa, Sumba (*Doherty*), Bali, Lombok (*Fruhstorfer*).
   Mr. Doherty spells this name "*beticus*.”

210. ***Amblypodia narada***, Horsfield.
    Sumba (*Pagenstecher*).

211. **Iraota timoleon**, Stoll.
    Sambawa (*Doherty*).

212. **Surendra quercetorum**, Moore.
    Sambawa (*Doherty*).

213. **Surendra vivarna**, Horsfield.
    Bali (*Doherty*):

214. ***Arrhopala araxes***, Felder.
    Sumba (*Doherty*). Dr. Pagenstecher in his second paper records the species under *A. amantes*, Hewitson. We must await Mr. Bethune-Baker’s monograph of this and allied genera before arriving at a final identification of the Sumba form.

    Bali (*Doherty*). Mr. Elwes notes that the blue coloration on the upperside of the hindwing extends more nearly to the outer margin than in typical Indian specimens, thereby reducing the width of the outer black border.

216. ***Arrhopala pseudocentaurus***, Doubleday.
    Lombok (*Fruhstorfer*).

217. **Arrhopala apidanus**, Cramer.
    Bali (*Doherty*), Lombok (*Fruhstorfer*), Sambawa (*Doherty*). Mr. Doherty records this species as a “var.” from Sambawa, and gives
Hewitson the credit of describing it. Doherty's genus Flos cannot stand.
Mr. G. T. Bethune-Baker informs us that the only species of the
genus Arrhopala he possesses from these Islands is the ordinary form of
A. apidanus from Sambawa.

Mr. Fruhstorfer records two unnamed species of Arrhopala, and a
third unnamed species under the synonymic genus Narathura, all from
Lombok.

218. Curetis thetis, Drury.

Bali, Sambawa, Sumba (Doherty). Mr. Doherty describes the
species from Sambawa and Sumba as C. malayica, Felder, var. kiritana,
Doherty. Females from Bali are fulvous and black on the upperside,
the white and black females appear to be confined to India, though
fulvous females are also found occasionally on the continent; fulvous
females alone are found in the Malayan Archipelago.


Lombok (Fruhstorfer).

220. Ilerda epicles, Godart.

Bali (Doherty). Both sexes agree with the typical form from Java,
and are quite distinct from the Sumatran form, I. ila, de Nicéville,
and the Indian and Western China form, which may perhaps stand as
I. phoenicoparyphus, Holland, described from Hainan Island, though that
species cannot be identified under that name from the description and
rough figure alone, and we have seen no Hainan specimens. The type
is probably a female, not a male as stated.

221. Aphnæus lohita, Horsfield.

Bali (Doherty).

222. Tajuria travana, Hewitson.

Bali, Sambawa (Doherty).


Lombok (Fruhstorfer).


Lombok (Fruhstorfer). Mr. Fruhstorfer in describing this species
in Societas Entomologica, n. 7, July, 1897, gives no indication as to
what species it is allied.
225. Hypolycaena sipylus, Felder.
Lombok (Fruhstorfer), Sambawa, Sumba (Doherty). This species is apparently very common in Lombok.

226. Hypolycaena erylus, Godart.
Bali (Doherty), Lombok (Fruhstorfer), Sambawa, Sumba (Page- stecher).

227. Chliaria sp.
Bali (Doherty). A single male specimen received. Mr. Elwes notes that the blue coloration on the upperside of the forewing reaches the outer margin and comes nearer to the apex of the wing than in any other species of the genus possessed by him, and that it is perhaps a race distinct from C. othona, Hewitson.

228. Zeltus etolus, Fabricius.
Bali (Doherty).

229. Cheritra freja, Fabricius.
Bali (Doherty).

230. Horaga privigna, Fruhstorfer.
Bali (Doherty), Lombok (Fruhstorfer).

231. *Horaga bellula, Fruhstorfer.
Sambawa (Doherty and Fruhstorfer).

232. Marmessus ravindra, Horsfield.
Bali (Doherty).

233. Loxura atymnus, Cramer.
Bali (Doherty), Lombok (Fruhstorfer), Sambawa, Sumba (Doherty). Mr. Doherty credits this species to Linnaeus.

234. Araotes lapithis, Moore.
Bali (Doherty).

235. Deudorix epijarbas, Moore.
Bali (Doherty), Lombok (Fruhstorfer). Mr. Fruhstorfer spells this genus "Deudoryx."
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236. **Rapala varuna**, Horsfield.

Bali (*Doherty*), Lombok (*Fruhstorfer*), Sambawa, Sumba (*Doherty*). Mr. H. H. Druce has recently shewn that *R. orseis*, Hewitson, is a synonym of *R. varuna*, Horsfield. Mr. Doherty records both species in his paper, a pair of *R. orseis* from Sambawa, and *R. varuna* from Sambawa and Sumba. Whether or no he obtained two distinct species of *Rapala* of this group in Sambawa it is impossible to say without seeing his specimens.


Bali (*Doherty*), Lombok (*Fruhstorfer*).

238. **Rapala pheretima**, Hewitson.

Bali (*Doherty*).


Bali (*Doherty*). A single male obtained at 3,000 ft. elevation.


Bali (*Doherty*), Lombok (*Fruhstorfer*), Sambawa, Sumba (*Doherty*). Mr. Doherty spells this name “*iarbas*,” which is classically more correct.


Lombok (*Fruhstorfer*).

242. **Sinthusa amba**, Kirby.

Bali, Sambawa? (*Doherty*). Mr. Doherty says he obtained a species of *Sinthusa* in Sambawa, which was probably the above-named species, though it may have been *S. mulika*, Horsfield, = *S. amata*, Distant.

Family **PAPILIONIDÆ**.

Subfamily **Pierinæ**.

243. **Leptosia xiphia**, Fabricius.

Bali (Wallace as *Pontia nina*, Fabricius), Bali, Lombok (*Fruhstorfer*), Sambawa, Sumba (*Doherty*). Mr. Fruhstorfer refers to this species from Lombok as *L. xiphia chlorographa*, Hübner. This latter species appears to us to be a pure synonym of *L. xiphia*. In his Bali paper he spells the name “*ziphia*.”

244. *Delias aglaja*, Linnaeus.

Sambawa (*Doherty*). Mr. Doherty says that he saw two specimens
of D. pasithoë, Linnæus, var. (which species according to Heinrich Ritter von Mitis, who has monographed the genus, is a synonym of D. aglaia), on Mount Haruhasa in Sambawa at nearly 5,000 feet elevation.

245. Delias oria, Doherty.

Lombok (Fruhstorfer), Sambawa (Doherty). This species has been figured by Grose Smith and Kirby in Rhop. Ex., pl. Delias iii, figs. 5, 6, male; 7, female (1893), and by Dr. Pagenstecher in Jahrb. der Natur., vol. xlix, p. 123, n. 30, pl. ii, fig. 8, female (1896). Von Mitis and Pagenstecher both treat this species as a var. of D. descombesi, Boisduval, but in our opinion it is quite distinct. Dr. Pagenstecher’s reference to Messrs. Grose Smith and Kirby’s plate is incorrect, it is pl. iii, not pl. iv.

246. Delias glauce, Butler.

Bali (Doherty). Agrees exactly with specimens in our collections from Sumatra, except that the black border on the upperside of the hindwing in the male is a little narrower. It was originally described from Borneo.

247. Delias hyparete, Linnaeus.

Bali (Doherty and Mitis), Lombok (Mitis), D. hyparete varietas? Sumba (Pagenstecher). We have not seen specimens of this species from Lombok. Our Bali examples agree with Cramer’s figure of D. autonoe in having on the underside of the hindwing a complete series of seven vermilion spots placed between the veins in the middle of the marginal black band.

248. *Delias fasciata, Rothschild.


Sumba (Rothschild, Grose Smith and Kirby, Pagenstecher). Dr. Pagenstecher in his second paper says that he named this species D. hyparete var. sambana in his first paper, but we cannot find any reference to that name therein, though he describes D. hyparete, varietas?, see n, 247 above. In his reference to his figure, p. 170, he gives Grose Smith instead of Rothschild the credit of having first described D. fasciata. The species does not appear to be in any way allied to D. hyparete, as stated by Pagenstecher in his first paper. Messrs.
Grose Smith and Kirby suggest that *Delias fasciata* is the female, and *Delias sambawana*, Rothschild, is the male of one and the same species. But their figure of the female of *Delias fasciata* is very different from Rothschild's figure of the female of *Delias sambawana*.


*D. sambawana*, Rothschild, Nov. Zool., vol. i, p. 662, n. 5 (1894); vol. ii, pl. viii, fig. 5, female (1895); id., Grosé Smith and Kirby, Rhop. Ex., pl. Delias iv, figs. 2, 3, male (1895).

Sambawa (Doherty, Rothschild, Grosé Smith and Kirby).


Sambawa (Fruhstorfer and Pagenstecher as *D. peribawa*, sic!) From Dr. Pagenstecher's figure of this species it appears to be quite distinct. In the text, p. 123, he says that he has figured a female, but at p. 170 he says a male; the latter is probably correct.


Lombok (Fruhstorfer). Mr. de Nicéville has a pair of this species only from Lombok. The female agrees precisely, except in being smaller, with the figure of the same sex of *Delias sambawana*, Rothschild; the male, however, differs from the figure of the same sex of that species on the underside of the hindwing in having the ground-colour of a paler yellow, less orange, shade, the black band within the submarginal series of vermilion lunules and the marginal black band both much broader, and the submarginal series of vermilion lunules half as broad.


Lombok (Fruhstorfer). We have not seen this species, nor has it been figured. As *Delias minerva*, Fruhstorfer, as well as *Delias livia*, are at best but local forms of *Delias peribawa*, Godart, from Java, we think it somewhat improbable that both should occur in one small island and be distinct species.
Mr. Fruhstorfer refers to *D. wallacei*, Rothschild, from Bali. The species was originally described from Celebes, and Mr. Fruhstorfer probably meant that island when referring to it. Dr. A. G. Butler in his revision of the genus, Ann. and Mag. of Nat. Hist., sixth series, vol. xx, p. 153, n. 35 (1897), sinks *D. wallacei* under *D. peribsea*.

Von Mitis records *D. egialea*, Cramer, from Bali and Lombok with a query. We have seen no specimen of this species from either island, and doubt its occurrence there.

253. **Catopsilia crocale**, Cramer.

Lombok (Fruhstorfer), Sambawa, Sumba (Doherty). Neither Doherty nor Fruhstorfer obtained the species in Bali, though it certainly must occur there. We consider *C. crocale* and *C. catilla*, Cramer, which are usually kept distinct, to represent one and the same species. Wallace records it from Lombok as *Callidryas hilaria*, Cramer, which is another synonym. Mynheer M. C. Piepers in his latest paper on the Migrations of Butterflies (Nat. Tijd. voor Ned.-Indië, vol. 1, pp. 198–253 (1897) says on page 219 that “Papilio” *pomona*, Fabricius, is the oldest name for this butterfly. Both *P. pomona* and *P. crocale* were described in 1775, but as Cramer alone figured it, we prefer to use his name.

254. **Catopsilia scylla**, Linnaeus.

Bali (Doherty and Fruhstorfer), Lombok (Fruhstorfer and Wallace), Sambawa and Sumba (Doherty). Mr. Doherty credits this species to Boisduval.

255. **Catopsilia pyranthe**, Linnaeus.

Bali (Doherty and Fruhstorfer), Lombok (Fruhstorfer), Sambawa (Doherty). Dr. Pagenstecher records this species in his second paper as *C. chryseis*, Drury, which is a synonym we believe of *C. pyranthe*. Hitherto it has not been recorded from Sumba, though it almost certainly occurs in that island.

256. **Terias hecabe**, Linnaeus.

Bali (Doherty), Lombok (Fruhstorfer), Sambawa, Sumba (Doherty). In Dr. A. G. Butler’s recent revision of the genus *Terias* from the Old World (Ann. and Mag. of Nat. Hist., seventh series, vol. i, pp. 56–82 (1898), no species is given from the islands treated on in this paper. Our numerous specimens of the *T. hecabe* group from Lombok agree so exactly with examples taken by de Nicéville in Hongkong of the wet-season form that no words can convey any impression as to the slight
almost imperceptible, differences that exist between them. But Dr. Butler restricts *T. hecabe* to Hainan Island, and to Southern China from Hongkong Island to Tonkin, so he would probably give another name to our specimens from the Lesser Sundas Islands. In our opinion wet-season *T. hecabe* from South China agrees with and is indistinguishable from the only form of *T. hecabe*, which is the rainy-season one, found in Lombok, and doubtless also in Bali, Sambawa and Sumba.

257. *Terias blanda*, Boisdruval.

Lombok (*Fruhstorfer*), Sambawa (*Pagenstecher*). Mr. Doherty says he obtained “several varieties” of *T. hecabe*, Linnaeus, in Sambawa and Sumba, which may include this species, but we have failed to recognise it from the description.

Dr. A. G. Butler places *T. blanda* as a synonym of true *T. hecabe*, which, as noted above, he restricts to Hainan, South China and Tonkin. But he keeps *T. anemone*, Felder, (with *T. mandarina*, De Lorza, *T. mariesii*, Butler, *T. hybrida*, Butler, and *T. connexiva*, Butler, as synonyms), as a distinct species from Japan, Chusan Island, and round the south-eastern coast of China from Shanghai to Hongkong. The dry-season form of the Hongkong *T. hecabe* is undoubtedly *T. mandarina*, and de Nicéville in Hongkong and Japan has caught every intergrade between it and the broadly black-bordered *T. hecabe*. Therefore de Nicéville thinks that Dr. Butler’s *T. anemone* is undoubtedly the same species as true *T. hecabe*.


Lombok (*Fruhstorfer*). We have three females of this easily recognised species from Lombok. Dr. Butler says that *T. tecmessa*, de Nicéville, is a dry-season form of *T. silhetana*, Wallace. This is not so, if anything, it is a wet-season form with broad black borders. But in North-Eastern Sumatra, from whence the types of *T. tecmessa* came, no dry-season forms of *Terias* occur, as the seasons are practically wet ones all the year round.


Bali (*Fruhstorfer* as “Eurema” *vallivolans*), Lombok (*Fruhstorfer* as *Terias vallivolans*). This species was described by Butler in Ann. and Mag. of Nat. Hist., fifth series, vol. xi, p. 420, n. 71 (1883), from Mindanao in the Philippine Isles. Mr. Distant in Rhop. Malay., p. 306, n. 4, pl. xxvi, fig. 17, *male* (1885), describes and figures it from Singapore, and says that he “Considers it probable that this is but another variety of *T. hecabe*.” Since the above was in type Dr. Butler has placed *T. vallivolans* under *T. silhetana*, Wallace.
Sambawa, Sumba (Doherty).

261. Terias tilaha, Horsfield.
Bali (Doherty).

Lombok (Fruhstorfer). Compared with T. tominia, Vollenhoven, which latter is allied to the last-named species.

263. Terias diversa, Wallace.
Bali (Doherty). We have a single female only, which has the ground-colour white, by which character Dr. A. R. Wallace has differentiated the female of this species. It is probably only an occasional aberration of T. hecabe, Linnaeus, in which species such "sports" are not very rare. Dr. Butler restricts this species to the Philippines, though Dr. Wallace gave seven distinct localities for it.

264. Terias sp.
Sambawa (Doherty). A single male in Elwes' collection. It is allied to T. andersonii, Moore, and as in that species has black cilia, but has all the markings on the underside fewer in number than usual. It may be that species, but from a single example it is difficult to say. Dr. Butler places T. andersonii as a synonym of T. suava, Boisduval, which latter is, in his opinion, the Indian representative to T. hecabe, Linnaeus. In Watson's and de Niceville's opinion T. andersonii is a very distinct species.

Lombok (Fruhstorfer). Originally described from Formosa and North India. This species appears to be nothing but T. leeta, Boisduval, the underside "yellow." Capt. E. Y. Watson in his revision of the Indian species of Terias was unable to recognise it with certainty. In de Niceville's collection are specimens from Dehra Dun in N.-W. India, which agree very well with the original description, and are only a seasonal form of T. leeta. Dr. Butler places it as synonym of T. leeta.

266. Terias libythea, Fabricius.
Bali (Doherty), Lombok (Fruhstorfer), Sambawa (Doherty). Recorded by Doherty from Sambawa as T. drona, Horsfield, which is a synonym.
Lombok (*Fruhstorfer*), Sambawa, Sumba (*Doherty*).

268. Ixias reinwardthii, Vollenhoven.
Bali (*Doherty* and *Wallace*), Lombok (*Wallace* and *Fruhstorfer*), Sambawa (*Doherty*), Sumba (*Pagenstecher*). Mr. Elwes notes:—"I have this species from Bali, Lombok, Sambawa and Flores. The males vary but little. The female, however, from Sambawa is small, with some orange coloration on the forewing and a trace of yellow on the hindwing on the upperside, whilst those from Bali are orange-lemon or white on the forewing, without any suffusion on the hindwing. The name of *I. kühni*, Röber, is given in the British Museum collection to specimens from Bali, but I consider *I. kühni* to be a synonym of *I. reinwardtii*. [With reference to this last remark, both sexes of *I. kuehni* are figured from Wetter; it is an excellent species, and quite distinct from *I. reinwardtii*.—L. de N.] *I. venilia*, Godart, is probably [certainly —L. de N.] another species. It has both wings yellow on the upperside, and according to Fruhstorfer is confined to East Java."

269. *Ixias baliensis*, Fruhstorfer.

Bali (*Fruhstorfer*). Is this really distinct? It was described from a single male. Mr. Fruhstorfer says it is intermediate between *I. reinwardtii*, Vollenhoven, and *I. kuehni*, Röber.

270. *Ixias venilia*, Godart.
Sumba? (*Doherty*), Sumba (*Pagenstecher*). Mr. Doherty records a species near *I. pirene* (*pyrene*), Linnaeus, from the Sumba coast, several times seen, but no specimen taken. Dr. Pagenstecher records *I. venilia* from Sumba, which is probably the same species.

271. *Huphina temena*, Hewitson.
Lombok (*Wallace* and *Fruhstorfer*), Sambawa (*Doherty*), Sumba (*Pagenstecher*).

Bali (*Fruhstorfer*). Probably the same species as the next, "*Papilio* coronis having been described from China and the Coromandel Coast.

Bali (*Wallace and Doherty*), Lombok (*Fruhstorfer*).
274. *Huphina vaso, Doherty.

Lombok (Fruhstorfer), Sambawa (Doherty, Oberthür). This species has been figured by M. Oberthür in Études d'Entomologie, vol. xix, p. 5, pl. iii, fig. 18, male (1894), as Pieris (Huphina) vaso. Dr. Pagenstecher in his second paper records this species from Sambawa as "Pieris" nerissa, Fabricius, which is a totally different species. Mr. Fruhstorfer records it from Lombok as H. corea vaso.


Bali (Doherty and Fruhstorfer).

276. *Huphina eirene, Doherty.

Sambawa (Pagenstecher), Sumba (Doherty). Dr. Pagenstecher in his second paper places this species under "Pieris" amalia, Vollenhoven.


Lombok (Wallace and Fruhstorfer), Sambawa (Doherty). Dr. Pagenstecher in his second paper places this species under "Pieris" amalia, Vollenhoven, which is, in de Nicéville's opinion, a synonym of Huphina lea, Doubleday. H. naomi is quite distinct from H. lea. Some of our females of H. naomi from Lombok and one from Sambawa respectively are very dissimilar, that sex from the former island being usually extremely dark on both surfaces, so that the white ground-colour of the wings is greatly obliterated, though others again are almost as light as our Sambawa specimen. One might say that the darkest females from Lombok are twice as dark as the light female from Sambawa. Till large series of both sexes of all the species of Huphina from all the islands can be compared, it is impossible to be sure how many distinct species or what seasonal forms occur. In India H. nerissa, Fabricius, and its local race H. phryne, Fabricius, are subject to extensive seasonal dimorphism, the form flying in the rainy-season being extremely dark, while that flying in the dry-season is very light. Whether this phenomenon occurs in the Malayan Archipelago or not we are unable to say.

278. *Huphina julia, Doherty.

Sambawa (Pagenstecher), Sumba (Doherty and Oberthür). This species has been figured by Doherty, by M. Oberthür in Études d'Entomologie, vol. xix, p. 5, pl. iii, figs. 11, male; 17, female (1894), as Pieris (Huphina) julia, and by Dr. Pagenstecher in Jahr. des Nass. Ver. für Natur., vol. xlix, p. 119, n. 20, pl. i, fig. 2, male (1896), as Pieris julia.

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279. **Huphina mentes**, Wallace.

Lombok (Wallace and Fruhstorfer), Sambawa (Doherty). Dr. Pagenstecher records this species from Sambawa in his second paper as "**Pieris** pitys", Godart, originally described from Java, and figured from thence by Lucas, but given from Timor only by Dr. A. R. Wallace. Mr. Fruhstorfer says that **Pieris synchrona**, Röber, from Flores and Alor, both sexes of which are figured, and **Pieris pitys**, Snellen (nee Godart), from Flores, are synonyms of **H. mentes**. Mr. Fruhstorfer keeps **H. pitys**, Godart, and **H. mentes**, distinct, while Mynheer Snellen places **P. mentes** as a synonym of **P. pitys**. This group of the genus is a very difficult one, and till long series of both sexes from all the islands are brought together and compared, the confusion at present obtaining cannot be avoided.

280. **Huphina tamar**, Wallace.

Bali (Wallace and Doherty).

281. **Belenois java**, Sparrman.

Bali (Doherty and Fruhstorfer), Lombok (Fruhstorfer), Sambawa (Doherty), Sumba (Pagenstecher). Recorded by Wallace from Bali and Lombok as **Pieris coronea**, Cramer, which is a synonym.

282. **Appias albina**, Boisduval.

Bali (Doherty), Lombok (Fruhstorfer), Sambawa, Sumba (Doherty). Under **Appias paulina**, Cramer, a species strictly confined to Ceylon, Mr. Doherty has the following note:—"Two forms [of the male] of this very puzzling group occurred both in Sumba and in Sambawa. One was all white, with only a slender dark marginal line, resembling **A. albina** [this is typical **A. albina**]. The other had the hindwing and the apex of the forewing bright ochreous-yellow below, resembling **A. lankapura**, Moore, but without the dark apex [on the upper side of the forewing. In de Nicéville’s opinion **A. lankapura** is a synonym of **A. paulina**, and is therefore found only in Ceylon]. It generally had a black or gray discal spot on the forewing." Dr. Wallace records white females [de Nicéville’s Form I] from Lombok under "**Tachyris** paulina", Cramer. In Lombok three forms of the female occur, the first is white on both surfaces, the second is white above and mostly chrome-yellow below, the third is primrose-yellow on both surfaces. Mr. de Nicéville calls the wholly white female Form I, and our Lombok females agree well with the figures of "**Catophaga neombo**, Boisduval," in Moore’s Lep. Cey., vol. i, pl. 1, figs. 3a, 3b, female (1881). The female which is white above and mostly chrome-yellow below,
de Nicéville calls Form II, and it is figured by Moore in Lep. Cey., vol. i, pl. li, figs. 1, la, female (1881), as the female of Catophaga laukapura, Moore, though all the black markings in the Lombok variety are not as strongly developed as in the Ceylonese form figured. The female which is primrose-yellow on both surfaces de Nicéville calls Form III, and it has been figured from Java in Horsfield and Moore's Cat. Lep. Mus. E. I. C., vol. i, pl. iia, fig. 3, female (1857), as Pieris noombo, Boisduval, and is almost certainly the Tachyris albina, Boisduval, ab. flava [flavia, Fruhstorfer, sic!] of Röber, Tijd. voor Ent., vol. xxxiv, p. 282 (1891), from Flores, Kissar, Wetter and Letti. It is not known if all three forms of the female occur also in Bali, Sambawa and Sumba, but it is probable that they do. It must be understood that the figures referred to above in Lep. Cey. do not actually portray our Lombok specimens, but they are given here to indicate the form of coloration displayed by them.

283. Appias leis, Hübner.


Lombok (Fruhstorfer and Doherty), Sambawa (Doherty and Grose Smith), Sumba (Pagenstecher). Besides the two synonyms of A. leis given above, others in de Nicéville's opinion are Pieris galatea, Felder; Pieris amasene, Boisduval [nec Cramer]; Pieris agave, Felder; Pieris zoe, Vollenhoven; Tachyris urania, Wallace; Tachyris jacquinotii, Wallace [nec Lucas]; Tachyris alope, Wallace; Catophaga roepstorffii, Moore; and Tachyris mata, Kheil. Dr. Pagenstecher records A. leis in his second paper as Tachyris zoe, Vollenhoven, from Sumba. Like A. albina, Boisduval, the female of this species is trimorphic. We have received a good series of both sexes from Lombok, three females are Form I, with the broad black band on the upperside of the forewing not bearing the usual five white spots, and the underside being white, this form having been named ab. umbratilis, Fruhstorfer, in Berl. Ent. Zeitsch., vol. xli, p. 392 (1896), vol. xlii, p. 10 (1897); and three specimens are Form II, with the underside of the hindwing yellow, which is the ab. saucela, Fruhstorfer; Form III, with both wings on the upperside yellow, has not been received, but not improbably it is the ab. citronella of Fruhstorfer, described in Berl. Ent. Zeitsch., vol. xli, p. 392 (1896), vol. xlii, p. 10 (1897). Mr. de Nicéville does not propose to criticise Mr. Fruhstorfer's remarks on Appias albina, Boisduval, and A. leis. The latter gentleman has quite failed to understand those
species, but his position is not singular, probably no two writers think similarly on the subject, and it is only recently since de Nicéville has written up the genus for the fourth volume of his "Butterflies of India, Burmah and Ceylon" that he has himself come to any definite conclusion regarding them.

284. **Appias lyncida**, Cramer.

Bali (*Doherty* and *Fruhstorfer*), Lombok (*Fruhstorfer*), Sambawa (*Doherty*). Dr. A. R. Wallace records it from Bali and Lombok. Mr. Doherty notes, "I have dubiously recorded *Appias lyncida* from Sambawa." We have since received it from that island.


Lombok (*Fruhstorfer*).


Lombok (*Fruhstorfer*).

287. **Saleotara nathalia**, Felder.

Sambawa, Sumba? (*Doherty*). Mr. Doherty notes that from Sumba he obtained a female which he supposed to be that of *A. (Saleotara) nathalia*.

288. **Hedomoia glaucippe**, Linnaeus.

Bali (*Doherty* and *Fruhstorfer*), Lombok (*Fruhstorfer*), Sambawa, Sumba (*Doherty*). Mr. Fruhstorfer records this species from Bali and Lombok as *H. javæensis*, sic! and *javæensis*, sic!, Wallace, a species described in 1863, as "*Iphis* glaucippe, loc. var. (3) javæensis," from Java, but as Dr. Wallace dropped that name in his paper "On the *Pieridae* of the Indian and Australian Regions," published in 1868, we have followed him, as our specimens from Java, Bali and Lombok hardly differ from the typical race from India.

289. **Nepheronia valeria**, Cramer.

Bali (*Doherty* and *Fruhstorfer*), Lombok (*Wallace, Doherty and Fruhstorfer*), Sambawa, Sumba (*Doherty*). Our numerous specimens from Bali, Lombok and Sambawa agree well with the original figure of the male of this species from Java. Mr. Fruhstorfer in *Berl. Ent. Zeitsch.*, vol. xlii, p. 11 (1897), has described *N. valeria nindana* from Lombok, but we do not consider the Lombok race to be distinct from the Javan. Mr. Doherty says that a different species of *Nepheronia* is, he thinks, found in Sumba.
Subfamily Papilioninae.

In this subfamily we have followed the order given by the Hon. Walter Rothschild in "Novitates Zoologice," vol. ii, p. 167 (1895), in his paper entitled "A Revision of the Papilios of the Eastern Hemisphere, exclusive of Africa." As Elwes is not prepared to accept Rothschild's trinomial nomenclature for local races, de Niceville has raised all such to full specific rank while indicating in all cases what Mr. Rothschild considers to be the parent species.

290. Troides naias, Doherty.

Sambawa, Sumba (Doherty). Treated by Rothschild as a subspecies of T. haliphron, Boisduval, the typical form of which is from Celebes and the adjacent small islands. Mr. Rothschild does not consider that "Ornithoptera" naias, var. sambavana, Doherty, from Sambawa, can be separated from typical O. nais from Sumba. Rothschild spells the name "sambawanus." Dr. Staudinger has described and figured this species as Ornithoptera socrates from Sambawa and Wetter. Mr. de Niceville has males only from Sambawa and Sumba, which cannot be distinguished one from the other.

291. Troides helena, Linnaeus.

Bali (Doherty). The Bali form appears to agree with the typical one from S.-E. Sumatra and Java. Given full specific rank by Mr. Rothschild.


Sambawa (Rothschild). Described by Rothschild as a subspecies of T. helena, Linnaeus.

293. Troides sagittatus, Fruhstorfer.


Lombok (Fruhstorfer). We have seen males only of this subspecies of T. helena, Linnaeus. They have no white internervular streaks on the forewing on the upperside whatever. On the hindwing the costal black band extends as far as the middle of the subcostal interspace, that is to say, there is a large golden-yellow streak anterior to the first subcostal nervule; there is usually only one submarginal black spot in the first median interspace, which is joined to the marginal black lunule, but in one specimen there is a small round isolated spot in
the first subcostal interspace. In de Nicéville's collection is a single male which agrees with the aberration pluto of Felder in having the hindwing reddish-yellow ("old gold") instead of clear yellow. This specimen has three pairs of faint whitish streaks between the veins on the underside of the forewing, but none on the upperside. The ordinarily-coloured males do not differ from typical T. helena, Linnaeus. This subspecies if distinct is based on the female sex, the one figured by Fruhstorfer, which we have not seen.


Sumba (Doherty). Given full specific rank by Mr. Rothschild.

295. Papilio aristoloche, Fabricius.

Bali (Doherty and Fruhstorfer). Our Bali males have four small white spots beyond the discoidal cell of the hindwing as in some Javan specimens of typical P. aristoloche, some Javan specimens have them twice as large, others but little larger; one Bali specimen has these spots very faint on the upperside. The Bali form approaches the Sambawan local race, which has only three small spots. Mr. Rothschild gives this species full specific rank.

296. Papilio austrosundanus, Rothschild.

Sambawa (Doherty). Mr. Doherty says that the Sambawa form (which he calls P. aristoloche, Linnaeus, but Fabricius first described it) is "normal," but as it has only three discal small white spots on the hindwing, it deserves a subspecific name. Mr. Elwes notes: "The male of the Sambawa form is exactly like one from Camorta in the Nicobar Isles in my collection. If this form must have a varietal name, I think P. camorta, Moore, should be used." Described by Mr. Rothschild as a local race of P. aristoloche, Fabricius. Mr. de Nicéville has not seen specimens from Sambawa.

297. Papilio lombockensis, Rothschild,


Sawela, Lombok Island, 1,000-2,000 feet (Doherty), East Lombok, 2,000 feet (Fruhstorfer). This form, which is treated by Mr. Rothschild as a subspecies of P. aristoloche, Fabricius, has no white spots on the disc of the hindwing, and is usually known as P. antiphus, Fabricius. Mr. Rothschild in Nov. Zool., vol. ii, p. 252 (1895) notes that his specimen of P. aristoloche antiphus, Fabricius, from Lombock,
captured by Wallace, is of small size, but does not differ from certain Bornean and Sumatran individuals. Subsequently, however, he elected to give the Lombok form subspecific rank. Mr. Elwes notes that "P. antiphus is quite as good a species as many more, unless you can show a complete series of intergrades between typical P. aristolochiae, Fabricius, and P. antiphus, Fabricius." [Mr. Rothschild in treating P. antiphus as a local race or subspecies of P. aristolochiae does not say he has seen all intergrades between the typical forms of both, but he notes that the latter has "two, three, four, or five discal spots to the hindwing," which is very close indeed to the former which has no white spots]. "I can distinguish my Lombok from Borneo, Sumatra and Nias P. antiphus by the shape of the anal spot on the underside of the hindwing, and if it is a var., it is a var. of P. antiphus, and not of P. aristolochiae."

298. Papilio nyx, de Nicéville.


Bali (Doherty). This species is allied to P. nox, Swainson, from Java. Females only have been obtained.

299. Papilio sumbanus, Fruhstorfer.

Sambawa, Sumba (Doherty), Sumba (Fruhstorfer). Mr. Doherty records this species as P. erichthonius, Cramer, which is the correct classical spelling of erithonius, a synonym of P. demoleus, Linnaeus. Mr. Fruhstorfer treats this species as a local race of P. demoleus. Mr. Rothschild records it from Sambawa and Sumba as P. demoleus sthenelinus, Rothschild. We have seen no Sambawa specimens, they may be distinct from the Sumba form, in which case Rothschild's name can be used for that local race, the type of which is from Alor Island. The description of P. sumbanus has not been published up to the date of passing final proofs of this paper. In some of his letters to de Nicéville, Fruhstorfer says he has named it P. pictus.

300. Papilio demolion, Cramer.

Bali (Doherty), Lombok (Fruhstorfer). Given full specific rank by Mr. Rothschild.

301. Papilio palawanicus, Staudinger.

Bali (Doherty), Lombok (Fruhstorfer). Mr. Rothschild treats this species as a local race of P. helenus, Linnaeus. From typical P. helenus
it appears to constantly differ in having the series of submarginal red lunules on the underside of the hindwing in the male incomplete.

302. **Papilio eiseriatus**, Rothschild.

Sambawa, Sumba (*Doherty*). Mr. Rothschild gives this species subspecific rank under *P. helenus*, Linnaeus.

303. **Papilio memnon**, Linnaeus.

Bali (*Doherty* and *Fruhstorfer*). Given full specific rank by Mr. Rothschild.

304. **Papilio merapu**, Doherty.

Sumba (*Doherty*). Treated by Mr. Rothschild as a local race of *P. memnon*, Linnaeus.

305. **Papilio clathratus**, Rothschild.

Lombok (*Fruhstorfer* and *Doherty*), Sambawa (*Doherty*). This also Mr. Rothschild places under *P. memnon*, Linnaeus, as a local race.


Sambawa (*Rothschild*). This is a local race according to Mr. Rothschild of *P. canopus*, Westwood, from Northern Australia. It is one of the most marked instances amongst the few that exist in the islands treated in this paper of an Australian element in the butterfly fauna. Mr. Rothschild has figured it in *Nov. Zool.*, vol. ii, p. 342, pl. viii, fig. 3, *male* (1895).


Patadala in Sumba (*Rothschild*). Mr. Rothschild treats this as a local race of *P. canopus*, Westwood. The female has been figured by Dr. Pagenstecher in his second paper.

308. **Papilio theseus**, Cramer.

Bali (*Doherty* and *Fruhstorfer*), Lombok (*Fruhstorfer*), Sambawa, Sumba (*Doherty*). A local race of *P. polytes*, Linnaeus, according to Mr. Rothschild. Mr. Doherty spells the latter name "polites," which is classically more correct. The female from Lombok is of the Form II, which mimics *P. aristolochiae*, Fabricius. Mr. Rothschild notes that "The Sambawa examples have the white band of the hindwing rather narrower than specimens from other localities."

Sumba (*Doherty*). This species was described by Doherty as *P. marenba*, but Honrath’s name has priority. The latter writer erroneously gave the habitat as Sambawa; it is found only in Sumba. M. Oberthür has figured the male type example and described the female in “Études d’Entomologie,” vol. xix, p. 2, pl. iii, fig. 12, *male* (1894), under Doherty’s name. Dr. Pagenstecher has written a note on it in *Ent. Nach.*, vol. xxii, pp. 151-153 (1896). Mr. Rothschild gives it full specific rank.


Bali (*Doherty*), Lombok (*Doherty and Fruhstorfer*), var., Sambawa (*Doherty*). Mr. Rothschild separates off the Lombok and Sambawa forms as a local race as *P. peranthus fulgens*, Röber, in which Mr. Fruhstorfer follows him as far as the Lombok race goes. We are unable, however, to trace any differences in either sex between typical *P. peranthus* from Java, and *P. fulgens* from Bali, Lombok and Sambawa. In writing to de Nicéville Mr. Fruhstorfer says that the Lombok and Sambawa form will be described as *P. transiens*, Fruhstorfer, and the Alor form as *P. peranthus phoebus*. The Tanah-Djampea form is *P. peranthus intermedius*, Snellen. None of these local races can in our opinion be separated from the parent form.


Bali (*Doherty*), Lombok (*Fruhstorfer*), Sambawa (*Doherty*). One specimen from Bali in de Nicéville’s collection agrees very closely with Eimer’s figure and description of his *P. antiphates javanicus* from Java, and both the Java and Bali forms are markedly different from the continental form in having the marginal markings on the upperside of the hindwing entirely densely black, instead of black mixed with grey powdering; other specimens from Bali are normal. Mr. Rothschild treats this species as a local race of *P. antiphates*, Cramer.


Sumba (*Pagenstecher*). Mr. Rothschild considers this species to be a local race of *P. aristeus*, Cramer.


Sambawa (*Doherty*). Treated by Mr. Rothschild as a local race of *P. euryplus*, Linnaeus. Dr. Pagenstecher has figured it in *Jahr. des Nass. Ver. für Natur.*, vol. xlix, p. 112, n. 12, pl. i, fig. i, *male* (1896). *J. ii. 91*
314. Papilio eurypylides, Staudinger.

Lombok (Fruhstorfer as eurypylus, sic! eurypilides, sic!) Sambawa, Sumba (Doherty). Treated by Mr. Rothschild as a local race of P. eurypylus, Linnaeus. Dr. Pagenstecher has figured it in Jahr. des Nass. Ver. für Natur., vol. xlix, p. 112, n. 13, pl. i, fig. 3, male (1896). Mr. Rothschild notes that in Sambawa both P. sallastius and P. eurypylides fly together.

315. Papilio axion, Felder.

Bali (Doherty). Treated by Mr. Rothschild as a local race of P. eurypylus, Linnaeus. A single specimen received, which agrees exactly with Javan examples.

316. Papilio sarpedon, Linnaeus.

Bali (Doherty), Lombok (Fruhstorfer), Sambawa (Doherty). Mr. Rothschild records P. sarpedon adonarensis, Rothschild, from Tambora in Sambawa, but says that the four specimens he possesses “Stand exactly intermediate between P. adonarensis and Indian P. sarpedon in the shape of the hindwing.” Our single specimen from Sambawa is absolutely inseparable from typical P. sarpedon. The Bali and Lombok form is also typical P. sarpedon, though Mr. Fruhstorfer refers the Lombok form to P. sarpedon jugans, Rothschild. If Mr. Rothschild’s local race P. adonarensis is retained, it must be restricted to specimens from Adonara Island, from whence the type was obtained.


Waingapoeng in Sumba (Doherty). Treated by Mr. Rothschild as a local race of P. sarpedon, Linnaeus.

318. Papilio agamemnon, Linnaeus.

Bali (Doherty), Lombok (Fruhstorfer).

319. Papilio exilis, Rothschild.

Sambawa, Sumba (Doherty). Treated by Mr. Rothschild as a local race of P. agamemnon, Linnaeus.

Family HESPERIIDÆ.

320. **Celenorrhinus leucocera**, Kollar.  
Bali (*Doherty*).

321. **Celenorrhinus spilothyrsus**, Felder.  
Bali (*Doherty*). We have three specimens from Bali and one from Mount Arjuno in Java which may constitute a distinct local race of this species. They are, however, only distinguishable from typical *C. spilothyrsus* by the almost complete disappearance of the spots on the underside of the hindwing. They have the costal spot of the forewing on the upperside white instead of yellow, thus resembling Malabar and not Ceylon specimens.

322. **Celenorrhinus saturatus**, Elwes and Edwards.  
*C. saturatus*, Elwes and Edwards, Trans. Zool. Soc. Lond., vol. xiv, p. 120, pl. xviii, fig. 6, male; pl. xxii, figs. 5, 5a, tegumen and clasp of male (1897).  
Bali (*Doherty*).

323. **Coladenia dan**, Fabricius.  
Bali (*Doherty*), Lombok (*Fruhstorfer*), Sambawa, Sumba (*Doherty*).

324. **Satarupa dire**, de Nicéville.  
Bali (*Doherty*). Originally described in the genus *Daimio*.

325. **Tagiades japetus**, Cramer.  
Bali (*Doherty*), Lombok (*Doherty* and *Fruhstorfer*), Sambawa, Sumba (*Doherty*). This species was described as new from Sambawa and Sumba by Doherty as *Tagiades brasidas*, which is a synonym of the widely-spread *T. japetus*.

Bali, Sambawa (*Doherty*). Generally this species resembles *T. atticus*, Fabricius, but has in the male the tibial pencil of hairs brown instead of yellowish-white, and a different form of clasp, which has been figured; and sometimes (not always) with two white points placed one above the other near the apical third of cell 1a (the submedian interspace) in the forewing on the upperside.

327. **Tagiades atticus**, Fabricius.  
Lombok (*Fruhstorfer*). This may be the last-named species.
328. *Odontoptylum angulata*, Felder.
Bali (*Doherty*), Lombok (*Doherty and Fruhstorfer*), Sambawa (*Doherty*). *Achlyodes sura*, Moore, is a synonym of this species. Mr. de Nicéville has caught *O. angulata* in Hongkong, from whence it was originally described, and these Chinese specimens agree absolutely with Indian ones.

Sambawa (*Doherty*). Described as *Abaratha hyperides*.

330. *Odontoptylum* sp.
Sumba (*Doherty*). Mr. Doherty says that a species allied to his *Abaratha hyperides*, but more like *A. angulatus* [sic!], Felder, was found in Sumba, but no specimens have survived.

Bali, Sumba (*Doherty*).

Bali (*Doherty*).

Bali (*Doherty*). *K. hector*, Watson, has the orange band on the upperside of the forewing narrow, *K. xanites* has it broad.

Bali (*Doherty*).

335. *Suastus tripura*, de Nicéville.
Bali (*Doherty*). Originally described in the genus *Tagiades*.

Sumba (*Doherty*).

Bali (*Doherty*), Lombok (*Doherty and Fruhstorfer*), Sambawa, Sumba (*Doherty*). This species is better known as *Taractrocera nigrotimbatus*, Snellen.

Bali, Sambawa, Sumba (*Doherty*). Mr. Doherty notes that he is doubtful of the identity of his Sambawa and Sumba specimens with the Indian form.
339. Isma vulso, Mabille.


Bali (Doherty). Originally described from Java. The type of the genus Isma is I. obscura, Distant, which is congeneric with the more recently described "Isoteinon" iapis, de Nicéville, that species having been taken by Watson to be the type of his genus Lophoides. The genus Isma has seven years priority over Lophoides. Messrs. Elwes and Edwards incorrectly give Isma as a synonym of their genus Scobura.


Sambawa (Doherty).

341. Inessa ilion, de Nicéville.


Lombok (Fruhstorfer).

342. Matapa aria, Moore.

Bali (Doherty), Lombok (Fruhstorfer).

343. Matapa shalgrama, de Nicéville.

Bali (Doherty).

344. Erionota thrax, Linnaeus.

Bali (Doherty), Lombok (Fruhstorfer), Sambawa (Doherty).

345. Gangara thyrsis, Fabricius.

Bali (Doherty).

346. Hidari irava, Moore.

Bali (Doherty).

347. Notocrypta feisthamelii, Boisduval.

Bali (Doherty), Lombok (Fruhstorfer), Sambawa, Sumba (Doherty). This is probably the species Mr. Doherty recorded from Sambawa and Sumba as Plesioneura restricta, Moore.

348. Notocrypta albifascia, Moore.

Bali (Doherty). Originally described from Hatsiega in Upper Tenasserim. Mr. de Nicéville has not seen specimens from Bali, so does not know if they are typical or not.
Bali (*Doherty*), Lombok (*Fruhstorfer*), Sambawa (*Doherty*).

Bali (*Doherty*).

Lombok (*Fruhstorfer*), Sambawa (*Doherty*).

Bali (*Doherty*), Lombok (*Fruhstorfer*).

Bali, Sambawa, Sumba (*Doherty*).

Bali (*Doherty*), Lombok (*Fruhstorfer*), Sambawa, Sumba (*Doherty*). This is probably the species recorded from Sambawa and Sumba by Doherty as *Tilicota* [*Telicota*] *maeosoides*, Moore. This last de Nicéville has never been able to satisfactorily discriminate, but it is almost certainly a synonym of *T. dara*, and Messrs. Elwes and Edwards sink it under *T. dara*.

Sumba (*Pagenstecher*). Originally described from Amboina. It is unknown to de Nicéville, but certainly is not a true *Pamphila*. Messrs. Elwes and Edwards place it in the genus *Telicota*, but Mr. Heron in 1894 made a new genus for its reception.

Bali (*Doherty*).

357. *Halpe zema*, Hewitson.
Bali (*Doherty*). Mr. Doherty says that an unidentified species of *Halpe* occurs in Sambawa.

Bali (*Doherty*), Lombok (*Fruhstorfer*), Sambawa, Sumba (*Doherty*).

Bali (*Doherty*), Lombok (*Fruhstorfer*).
360. **Parnara (Chapra) sinensis**, Mabille.

Bali (Doherty). Better known perhaps as *Chapra prominens*, Moore, which is a synonym.

361. **Parnara conjuncta**, Herrich-Schäffer.

Lombok (Fruhstorfer), Sambawa, Sumba (Doherty). Given by Doherty under its synonymic name, *Parnara narooa*, Moore.


Bali (Doherty), Lombok (Fruhstorfer), Sambawa (Doherty). This species is better known as *Parnara toona*, Moore.


Bali (Doherty), Lombok (Fruhstorfer).

364. **Parnara guttatus**, Bremer and Grey.

Bali (Doherty).


Lombok (Fruhstorfer). Mr. Doherty says that “Two unidentified species of *Parnara* occur in Sumbawa,” one of which is probably *P. contigua*, Mabille.

366. **Ismene ionis**, de Nicéville.

Lombok (Fruhstorfer), Sambawa (Doherty). This species was originally described from Western Java and Sambawa in Journ. Bombay Nat. Hist. Soc., vol. ix, p. 403, n. 49, pl. Q, fig. 61, male (1895). The female from Lombok (hitherto undescribed) is the same expanse as the male; on the upperside of both wings the base is clothed with ochreous instead of orange-yellow setae; the forewing has no sexual brand; on the underside the hindwing has the discal band much broader than in the male, and pure dazzling white instead of purplish-white. Mr. Fruhstorfer has sent two males and a female from Lombok to de Nicéville.

367. *Ismene iluska*, Hewitson.

Sumba (Pagenstecher). Dr. Pagenstecher records this species from Sumba as *I. ilusca* [sic!]. *Ismene iluska* was originally described from Macassar in Celebes. It is probable that Dr. Pagenstecher’s specimens are really *I. ionis*, de Nicéville. See No. 366 ante.


Bali (Doherty), Lombok (Fruhstorfer), Sambawa, Sumba (Doherty).
On the manifestation of Social Instinct in the Common Babbler (Crateropus canorus).—By B. B. Osmaston, Indian Forest Service. Communicated by the Natural History Secretary.

[Received November 25th; Read December 1st, 1897.]

The existence of a "moral sense" in animals is so often questioned that I feel bound, in justice to the birds, to put on record an account of a scene of which I was a witness, which seems to prove that in some kinds of birds at least social instinct at all events is present in a highly developed form.

In the summer of 1895 I caught and trained a young "Shikra," the Indian Sparrow Hawk, (Astur badius), to catch Mynahs and other small birds. One morning in August, while walking round my garden with the Shikra on my hand I saw a party of "seven sisters" (the Jungle Babbler, Crateropus canorus) feeding on the ground. At my approach they all flew up into a tree, and as I came still nearer they began to fly across one by one to another tree. I threw the Shikra up at one of them, which she succeeded in capturing after a short chase, bringing it down to the ground in her firm grip. The rest of the Babblers,
however, hearing the cries of their captured "sister," came down to the rescue without the slightest show of hesitation, and in a shorter time than it takes to tell were engaged in a spirited attack on the Hawk, apparently using both beak and claws in their effort to make her relinquish her hold.

The result was unexpected, for before I could reach the spot the Shikra had let the Babbler go and had taken refuge in a neighbouring bush, whilst the "seven sisters" not improbably rather elated at the success of their plucky little affray, collected together in a mango tree and poured forth volumes of abuse at the head of their vanquished enemy.

Note.—Since writing the above I have many times flown a Shikra at C. canorus always with the same result, viz., that so long as I kept out of the way the Babblers would attack the Hawk en masse and give her a real 'bad time.' I never let them actually rescue their 'sister,' as it would have been very demoralizing for the Hawk, but I have not the least doubt but that they would have succeeded in making it so warm for the Hawk that she would have been only too glad to let go and be off. More than once she had begun to utter her cries of alarm, preparatory to letting go, when I arrived on the scene and drove off the Babblers. On one occasion I ran up quickly and actually caught a Babbler on the Hawk's back (the Hawk having another Babbler in her claws) holding on so firmly that I had the greatest difficulty in making it leave go! I think therefore I have fairly proved now that Jerdon's attribution of cowardice to this species (Birds of India, vol. ii, pt. i, p. 62), is not always correct.

B. B. O.

Notes on various species of Grebes, with especial reference to the power of walking and digestion possessed by these birds.—By F. Finn, B. A., F. Z. S., Deputy Superintendent of the Indian Museum.

[Received November 25th; Read December 1st, 1897.]

The remarkable birds forming the family Podicipedidae of ornithologists have long possessed for me especial interest, and I venture here-with to record my observations on several of the species, which I have had the good fortune to study in captivity, and thus to observe under conditions which have, I hope, enabled me to set at rest some doubts concerning certain particulars in their economy.

I shall follow wherever possible the nomenclature and arrangement of Mr. H. E. Dresser, who in his Birds of Europe, Vol. VIII, has given excellent figures and accounts of most of the species with which I shall here have occasion to deal.

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In January 1896 I procured from the Calcutta Bazaar a fine specimen of this species, which, however, had its legs broken or dislocated at the hock. In consequence of this, though the feet retained their normal position, it was quite helpless on land, and could only paddle very feebly in the water.

I nevertheless kept it for some days closely confined in a small cage, in the hope that the injured limbs might recover, but although the bird after a day or two fed well upon fish, and seemed strong and lively, its feet got no better, and when I ultimately turned it out on the Museum compound tank it soon disappeared, having probably drifted ashore and been stolen, or fallen a prey to some jackal.

When confined, though as above noted, it took ordinary fish readily (I have seen it eat a dozen as large as large sprats and thicker, and then want more) it did not seem to like prawns, nor would it eat a small siluroid fish which I offered.

On two occasions I saw it deliberately eat one of its own feathers which came out while it was pluming itself, an operation in which, like Grebes generally, it was exceedingly assiduous.

It did not, however, reproduce either feathers or fish-bones in the form of "castings," as suspected by Yarrell (British Birds, Vol. IV, p. 121, Fourth Edition); I am certain of this, having had the bird under such close observation. I did, however, notice that its excrement was gritty, as if containing particles of comminuted bone; and I think that anyone who reads the evidence given on this point by Thompson in his "Birds of Ireland," Vol. III, pp. 173–189 (reference given by Yarrell *loc. cit.*) will agree with me that there is every reason to believe that this points to the conclusion that no castings are formed, and that feathers and bones are either actually digested or passed out in a comminuted condition.

This bird was of course in winter plumage, but kept its short ruff and ear-tufts expanded when in the cage. It had the "bill pink" except the upper chap at the tip along the ridge and down to the nostrils where it was dark lead-colour. The iris was brilliant red.

Owing to the crippled condition of the bird I was unable to make any observations as to the power of walking in this species; but this deficiency I was able to supply when at home on leave last October, a young bird having been acquired by the London Zoological Gardens. This specimen, as my own had been, was very savage, drawing blood freely from my hands when I attempted to make it move. Although inclined merely to squat and shove itself along, it could and did walk, but with reluctance, and for a short distance only, standing up on its toes
and waddling along very clumsily. It frequently used its wings to aid it when running, these being full-grown, though the head was still covered with variegated down, already indicating the form of the ornamental plumage on this part.

Some years ago, also in the London Zoological Gardens, I was able to observe the specimen of the large American Grebe, Podiceps (Aechmophorus) major, which the Society then possessed. This also seemed able to advance only a few steps at a time, waddling along a little way, and then flopping down on its breast, although it had been some time in the gardens, and was presumably in good health and not cramped or frightened; the latter conditions obtaining to a certain extent in the case of the Great Crested Grebe above alluded to, for this was better on its legs the second time I saw it.

*Podiceps nigricollis.* The Eared Grebe.

Early in the present year on February 11th, I got a male individual of this species from the Calcutta Bazaar, a sufficiently remarkable locality for it. This bird was weakly, and I found it dead on the third day after I obtained it, though it had fed freely on small prawns and fish. It was gentle and did not peck. Though I had it for at least one night in a cage, I found no "castings;" yet, as in the case of the large species, I twice saw it eat one of its own feathers. It walked freely, several yards at a time, in an erect position, as stated by Dresser, who correctly figures it and other Grebes in this attitude. It had the bill lead-grey, dark on the ridge down to the nostrils, and whitish at the base and on the under surface of the mandible. The iris was reddish orange, with a yellowish-white inner ring, and the feet olive-leadan, dark on the under surface of the toes and the outer side of the shank.

The specimen (22115 in Bird Register) has been stuffed in the standing attitude for the Bird gallery in the Museum.

*Podiceps fluvatilis.* The European Dabchick.

I once observed the gait of this bird on land, in the case of a specimen confined in the aviary in the Fish-House at the London Zoological Gardens. It walked on its toes in the ordinary manner of birds, with an awkwardness which reminded me at the time of a diving duck, only in this case it was even more marked, as might be expected, I have often observed this species in a wild state, and have once seen it half run, half fly, over a narrow strip of grassy ground between two ponds; otherwise I never saw it ashore when wild. But to argue from this that it cannot walk would be like denying the cat the power of swimming because this beast is proverbially averse to water.
Podiceps albipennis (Sharpe). The Indian Dabchick.

I have had many examples of this species of various ages, and have consequently had ample opportunities of observing it. It frequently remains standing up for some time, and walks and runs about quite actively, and can even jump a little, helping itself frequently when running with its wings. Some specimens are less ready and able to walk than others and more inclined to shoved themselves along when squatting, but I attribute this to fatigue or to flurry caused by fright. Any bird which is a clumsy walker normally will naturally blunder in its gait when hurried.

In the early part of December 1895, I got from the Bazaar a young specimen of this bird which I kept for some time in a cage, letting it out to swim and feed in any convenient receptacle for water, from an earthen pot to a large masonry tank. It soon became remarkably tame, and before I had had it a week was inclined to follow me about, and seemed restless when confined and unable to get to me. I have let it out in my room and have had it come and squat down by my feet. In fact, when the photograph* exhibited (which I owe to the kindness of Mr. T. H. Holland of the Geological Survey) was taken, I could not get the bird to stand still unless my hand was near. At the same time it exhibited much fear of natives, diving in fright when they approached, when it would let me lift it out of the water in my hand. In addition to intelligence, it showed much courage, on two occasions attacking a dog, and once a Scissor-billed Tern, which easily beat it off: the dog of course had not the chance of retaliating allowed it. Its power of resisting injury was also remarkable; on three occasions (twice within a few minutes) it fell at least a yard on to a stone or concrete floor, and was not hurt, though it did not attempt to save itself with its wings.

The quills on these were not quite grown when I got it, and the head was likewise covered with variegated down. While I had it confined I never saw it bring up "castings," nor has this been the case with any of this species that I have kept; nor did I see any feathers swallowed by them, even in the case of a moulting bird.

I ultimately turned this bird out on the tank of the Museum compound, where after remaining tame for a day or two, it speedily became wild. It was inclined to associate with a Coot, which did not appear to be anxious for its society; but towards the ducks I from time to time put on it exhibited what looked very like animosity, attacking

* This is not clear enough for reproduction,—most unfortunately, as it shows the bird in its normal standing position; i.e., on its toes like an ordinary bird; though I have seen it also in the plantigrade posture.
them at first most vigorously. I fancy, however, that this was merely juvenile mischief, for it became more peaceable as it grew older.

When I placed the Great Crested Grebe above alluded to on one occasion on the tank, its small relative hastily approached, and diving below, could be easily seen through the clear water to come and peck the large bird’s toe, rising to the surface out of reach.

It hunted insects and crustaceans when at large, as well as fish, and appreciated a varied diet of these when in captivity. It often came out on to a piece of brickwork, especially at first, to plume itself, and I have even seen it resting there.

I never saw this or any other specimen use its wings when diving; when performing this action it used both feet together, while in swimming it moved by alternate strokes.

This bird had lost nearly all its quills towards the end of January 1896, though they had only recently been fully developed. By this time also the head appeared to be feathered. On the 2nd February the quills were nearly grown again, as I find from my notes then taken.

In the following month (March) I procured an adult, and turned this also out on the tank, and the two soon became friendly. I observed before turning out the new bird that, although hungry, and searching for food with its head under (a common action) in the water in which I placed it, it nevertheless refused to eat a sharp-toothed Goby; it took, however, a spider and some mole-cricket. At the end of March I noticed that this specimen also had moulted all its quills, so that this must be the usual mode of moultling in this species of Grebe at all events. *

Soon after this I went to the Andamans, and on my return could not distinguish with certainty my old pet from the new dabchick. I did see, indeed, one of them make a Whistling Teal fly out of the water; and if this were the young bird at its accustomed mischief, it had by this time advanced nearly into full breeding plumage, which was not the case with the other bird; but this is, I should think, unlikely.

After this one of these dabchicks disappeared. I often saw one fly short distances in the evening, and noticed that it alighted “anyhow,” letting the feet trail behind all the time, and not putting them out in front like a duck or gull.

* I have observed a similar complete moult of the quills in the Common Coot (Fulica atra) the Waterhen (Gallinula chloropus) and in a species of Porphyrio. In the case of the Coot the observation has been previously made by St. John (Natural History and Sport in Morayshire), but I noticed it independently on the tank here. The Moorhen I noticed in St. James’ Park in 1897, and the Porphyrio in the Calcutta Zoological Gardens.
One of the birds, I think the same, remained on the tank for at least a year after this, but ultimately disappeared. As before indicated, I have had other specimens, and noted in these also the power of walking denied to the Grebes by some observers. On two occasions I experimented with some in order to find if they could rise off the ground and get on the wing. The results of the experiments have left me somewhat in doubt on this point. In the first case a bird let loose on a lawn was able to raise itself a foot or so from the ground, and I note that it "could evidently have flown off if in good form." This was early in the present year, and the other day I repeated the experiment with another bird, which could hardly clear the ground, but it was, I think, in a weak state at the time, for it could not walk far at a time, and when turned out on the tank came out of the water, a thing I have seldom seen a healthy Dabchick do. In fact, I believe these birds sleep in the water from what I have seen.

The iris in this species is brownish yellow, but I noticed that in my young bird it was hazel at first, and in a still younger one, downy all over, and with no feathers on the wings, it was brown.

The beak is buff, black along the ridge, and green at angle of mouth.
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