

FASCICLES OF FLORA OF INDIA

FASCICLE 4

SIMAROUBACEAE & BALANITACEAE

R. K. BASAK



**BOTANICAL SURVEY OF INDIA
P. O. BOTANIC GARDEN
HOWRAH-711103**

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Price : Rs. 10.00 ; £ 1.50 ; \$ 3.00

Printed by S. K. Nandi at Prabartak Printing & Halftone Ltd., 52/3, Bepin Behari Ganguly Street, Calcutta-700012 and Published by the Director, Botanical Survey of India, P.O. Botanic Garden, Howrah-711103.

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Date of Publication : 30th April, 1980

SIMAROUBACEAE †

DC. in Ann. Mus. Hist. Nat. Paris 17 : 422. 1811, "Simarubeae".

R. K. BASAK*

Trees or shrubs, mostly with bitter substances, sometimes aculeate. Leaves alternate to spirally arranged, usually pinnate, rarely simple, usually exstipulate or with caducous stipules. Flowers 3-5-merous, regular, unisexual or functionally unisexual or bisexual, many or few in axillary or rarely terminal, pubescent racemes or cymose panicles or corymbs or pendulous umbels, or solitary. Calyx 3-5-lobed, partly connate or free. Petals 3-5, free, greenish to variously coloured. Stamens equal to or double the number of petals, obdiplostemonous, rarely numerous, free; filaments slender, often with an inner scale at base; anthers 2-celled, oblong, dehiscing longitudinally. Female flowers often with rudimentary staminodes. Disk annular or elongated, entire or lobed, inserted between stamens and carpels, sometimes inconspicuous. Carpels 4-5, or fewer, at times few abortive, free or connate, sessile; ovary 1-5-locular; styles 1-5, distinct or connate; stigmas distinct or connate; ovule solitary in each locule, rarely 2, axile. Male flowers often with 4-5-lobed rudimentary ovary. Fruits drupes or samaras or schizocarps. Seeds solitary with membranous or leathery testa; endosperm scanty or absent; embryo rather large, straight or rarely curved with fleshy cotyledons; aril absent.

Pollen : Tricolporate, circular and subtriangular to triangular in polar view, subspherical to elliptical in equatorial view, suboblate and spheroidal to prolate in shape ($17-52 \times 16-32 \mu\text{m}$), sexine thicker than or sometimes as thick as nexine; colpi long, narrow and tapering with lalongate to square ora and surface pattern reticulate and striato-reticulate to striate [Basak in Bull. Bot. Surv. Ind. 5 : 381-397. 1963 (1964) & *ibid.* 9 : 63-67. 1967 (1968)].

Distrib. : 30 genera and *ca.* 200 species in tropical and subtropical regions of both the hemispheres, particularly in tropical America (Mexico to Argentina), in tropical West Africa and South East Asia. 6 genera and 12 species in India. The genus *Balanites* is segregated to a separate family Balanitaceae (Hutchinson, Fam. Fl. Pl. 3rd ed. 327. 1973).

† Editor for Fam. Simaroubaceae : DR. K. THOTHATHRI, Botanical Survey of India, Howrah-711103.

* Botanical Survey of India, Howrah-711 103.

1a. Leaves simple

2a. Leaves distinctly petioled, subelliptic to lanceolate, with scattered concave glands usually on undersurface. Flowers in pendulous, pseudo-umbels; filaments with basal scales; ovule solitary in each cell ...5. **Samadera**

2b. Leaves sessile or nearly so, linear spatulate, without any glands. Flowers in corymb-like cymes; filaments without basal scales; ovules 2 in each cell ...6. **Suriana**

1b. Leaves compound

3a. Branches armed. Leaves ternate or pinnate with winged rachis. Flowers bisexual ...3. **Harrisonia**

3b. Branches unarmed. Leaves pinnate. Flowers unisexual or both unisexual and bisexual

4a. Stipules caducous. Stamens pilose at base. Sepals and petals persistent in fruits ...4. **Picrasma**

4b. Stipules absent. Stamens glabrous. Sepals and petals not persistent in fruits

5a. Stamens twice as many as petals. Disk 10-lobed. Fruits winged ...1. **Ailanthus**

5b. Stamens as many as petals. Disk 4-lobed, Fruits not winged ...2. **Brucea**

I. AILANTHUS

Desf. in Mém. Acad. Sci. Paris 1786 : 265. t. 8. 1788, *nom. cons.* ; DC. Prodr. 2 : 88. 1825, '*Ailantus*'; Benth. & Hook. f. Gen. Pl. 1 : 309. 1862; A W. Bennett in Hook. f. Fl. Brit. Ind. 1 : 518. 1875; Engl. in Engl. & Prantl, Nat. Pflanzenfam. ed. 2. 19a : 390. 1931; Nooteboom in Fl. Mal. I. 6 : 215. 1962. *Pongelion* Adans. Fam. Pl. 2 : 319. 593. 1763.

Trees, younger parts brownish hairy. Leaves long-petioled, tufted at the ends of branches, pari or imparipinnate; leaflets opposite to subopposite, oblique, acuminate, entire or toothed, petiolulate. Flowers pubescent, mostly unisexual or functionally unisexual, in dense axillary and terminal panicles; male flowers foetid during anthesis. Calyx 5-lobed, connate. Petals 5, induplicate valvate in bud, longer than calyx lobes. Disk flat, thick, 10-lobed. Stamens 10 in male flowers, obdiplostemonous, inserted at the base of the disk; filaments subulate; in female flowers barren and reduced or absent. Carpels 2-5, free, laterally compressed ; in male flowers rudimentary or absent; styles free or connate; stigmas peltate; ovule 1, anatropous. Fruits 1-5, linear or oblong lanceolate, 1-seeded samaras, wing membranous; seeds lenticular, exalbuminous; testa thin; cotyledons 2, plano-convex.

Distrib. : 5 species in tropical and subtropical areas. TURKMENISTAN, INDIA, NEPAL, BURMA, SRI LANKA, MALAYSIA, THAILAND, CAMBODIA, LAOS, VIETNAM, INDONESIA, CHINA, JAPAN, AUSTRALIA. 4 species in India including 1 introduced and naturalised.

1a. Leaflets toothed or lobed

2a. Leaflets with a few short teeth or lobules only near the base. Petiolules less than 1 cm. Petals woolly. Main vascular bundle towards the seed in the margin of the samara ...**1. A. altissima**

2b. Leaflets coarsely toothed. Petiolules 1.5-3.0 cm. Petals glabrous. Main vascular bundle towards the seed intramarginal ...**2. A. excelsa**

1b. Leaflets entire

3a. Leaves with large black glands on the undersurface near the base. Petals puberulous. Female flowers with 5 carpels. Main vascular bundle towards the seed in the margin of the samara ...**3. A. integrifolia**

3b. Leaves often with hairy small glands on the undersurface near the margin. Petals glabrous or nearly so. Female flowers with 3-4 carpels. Main vascular bundle towards the seed intramarginal ...**4. A. triphysa**

1. **Ailanthus altissima** (Mill.) Swingle in J. Wash. Acad. Sc. 6 : 495. 1916; Nooteboom in Fl. Mal. I. 6 : 220. 1962. *Toxicodendron altissimum* Mill. Gard. Dict. (8th ed.) no. 10. 1768. *Ailanthus glandulosa* Desf. in Mém. Acad. Sci. Paris 1786 : 265. t. 8. 1788; A. W. Bennett in Hook. f. Fl. Brit. Ind. 1 : 518. 1875; Duthie, Fl. Upper Gang. Pl. 1 : 144. 1903 (Repr. ed. 1 : 135. 1960); Nair, Fl. Bashahr Him. 54. 1977.

Tree of Heaven (Eng.)

Trees, deciduous, about 25 m high. Leaves 30-50 cm long, pubescent or glabrous; leaflets 4-10 pairs, 5.0-15.0 × 1.5-5.0 cm, lanceolate, obliquely divided by the midrib, teeth near the base bearing glands beneath, acuminate at apex. Panicles 10-20 cm long. Calyx lobes 1 mm long. Petals 2-4 mm long. Filaments filiform, twice as long as anthers or longer. Ovary 1.5 mm long, glabrous; styles connate up to the middle; stigmas 5-lobed, peltate. Samaras 3.0-5.0 × 0.6-1.2 cm, linear oblong, membranous, somewhat spirally twisted.

Type : China (specimen grown from seeds at Chelsea Garden in England by P. Miller) : *Miller s.n.* (BM?).

Fls. : Apr.-July;

Frts. : May-Aug.

Distrib. : INDIA : Introduced and more or less naturalised in the

hills of north western India up to 1800 m. Haryana, Himachal Pradesh, Kashmir, Punjab, Uttar Pradesh; in northern India often planted as ornamental and avenue tree; CHINA. Cultivated and naturalised in temperate and subtropical regions of the world.

Chr. No. : $2n=80$ (Desai, S. in Cytologia 25 : 28. 1960).

2. **A. excelsa** Roxb. Pl. Corom. 1 : 24. t. 23. 1795; Wight Ill. Ind. Bot. 1 : 170. t. 67. 1840; A. W. Bennett in Hook. f. Fl. Brit. Ind. 1 : 518. 1875; Cooke, Fl. Pres. Bomb. 1 : 193. 1902 (Repr. ed. 1 : 205. 1958); Prain, Beng. Pl. 1 : 308. 1903 (Repr. ed. 1 : 214. 1963); Duthie, Fl. Upper Gang. Pl. 1 : 144. 1903 (Repr. ed. 1 : 136. 1960); Gamble, Fl. Pres. Madr. 1 : 163. 1915 (Repr. ed. 1 : 116. 1957); Haines, Bot. Bih. Or. 2 : 169. 1921 (Repr. ed. 1 : 174. 1961); Nooteboom in Fl. Mal. I. 6 : 219. 1962; Nair in Rec. Bot. Surv. Ind. 21(1) : 54. 1978. *Pongelion wighti* van Tiegh. in Ann. Sc. Nat. IX. 4 : 277. 1906 (based on Wight l.c. t. 67).

Maharukh (Hindi); *Ardusi* (Guj.); *Doddamara* (Kan.); *Matti-Pongilyam* (Mal.); *Maharukh* (Mar.); *Madala* (Sans.); *Mahanim* (Or.); *Perumaram*, *Peru* (Tam.); *Peddamanu* (Tel.); *Mahanim* (Urdu).

Deciduous trees with large leaf-scars, 8-20 m high. Leaves usually 20-40 cm long, but at times 60-90 cm or more; petioles tomentose; leaflets 8-14 pairs, 8-16 × 4-7 cm, alternate or subopposite, variable in shape, unequal at base, acute or acuminate at apex, tomentose when young, lateral veins 12-20 pairs; petiolules with two hairy glands near the base. Flowers in much-branched, lax panicles. Calyx lobes 2 mm long, triangular. Petals 3-4 × 2 mm, ovate-lanceolate, reflexed. Filaments 0.5 mm long, glabrous; anthers about 1 mm long. Ovary sparsely hairy; styles free or connate; stigmas curling. Samaras 4.0-6.0 × 1.0-1.5 cm, linear oblong to lanceolate, reticulated above the seed, red in colour, once or twice twisted at base.

Type : India: Plate of Roxb. Pl. Corom. 1 : 24. t. 23. 1795.

Fls. : Dec.-May; *Frts.* : Feb.-July.

Distrib. : INDIA : Andaman Islands, Andhra Pradesh, Bihar, Gujarat, Haryana, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Orissa, Punjab, Rajasthan, Tamil Nadu, Uttar Pradesh; often planted in northern India and West Bengal; PAKISTAN, SRI LANKA

Uses : The timber used for packing cases, boats, toys and other articles. The tree yields an inferior type of *Bassora* or Hog-gum. Bark used as febrifuge and tonic.

Chr. No. : $n=31$ (Pathak, G. N. *et al.* in Curr. Sci. 18 : 347. 1949);

2n=62? (Narayana, L. L. 1. c. 26 : 223. 1957); 2n=86 (Ghosh, R. B. in Broteria 39(66) : 3. 1970).

3. **A. integrifolia** Lam. ssp. **calycina** (Pierre) Nooteboom in Fl. Mal. I. 6 : 218. 1962. *Pongelion calycinum* Pierre, Fl. For. Coch. 4 : t. 294A. (text). 1893. *Ailanthus calycina* Pierre, *Ibid.* (Plate). *A. grandis* Prain in Ind. Forester 28 : 131. t. 1 & 210. 1902; Kanjilal *et al.* Fl. Assam 1 : 216. 1936.

Actaluca, *Borpat*, *Sragphula*, *Brokesseru*, *Koranag* (Asm.); *Malditkung* (Lep.).

Figs.1-6

Lofty trees, 30-45 cm high. Leaves 3-7 jugate, 60-100 cm long, paripinnate; petioles 5-20 cm long; leaflets 6.0-20.0 × 3.0-9.5 cm, ovate to ovate lanceolate, base oblique cuneate, apex short acuminate, margin entire or rarely sinuate, glabrous; petiolules 0.8-1.5 cm long. Panicles about 40 cm long with loose branches. Pedicels up to 5 mm long. Calyx lobes less than 2 mm long, irregularly lobed, triangular, pubescent. Petals about 4 mm long, lanceolate, margin densely and outer surface laxly hairy. Anthers about 2 mm long in male flowers. Ovary hairy; styles 5, connate; stigmas spreading. Samaras 11-13 × 3-4 cm, apically twisted, outer margin rounded, inner margin straight, light brown; seeds 1.5 cm across.

Type : Cochinchina: Prov. Bien Hoa, *Pierre* 1629 (P).

Fls. : Jan.-Feb.; *Frts.* : Feb.-Apr.

Distrib. : INDIA : Eastern Himalaya—Arunachal Pradesh, Assam, Mizoram, Meghalaya, Nagaland, Sikkim, Tripura and West Bengal; THAILAND, CAMBODIA, LAOS, VIETNAM, INDONESIA (JAVA).

Uses : Wood light, soft and used for packing cases.

Notes : *A. integrifolia* ssp. *integrifolia* differs from *A. integrifolia* ssp. *calycina* in having larger flowers, pedicels up to 15 mm long, sepals 2-3 mm long, and petals 6-10 mm long and evenly hairy outside. They, however, cannot be distinguished in vegetative or fruiting condition.

4. **A. triphysa** (Dennst.) Alston, Handb. Fl. Ceylon VI (Suppl.): 41. 1931; Nooteboom in Fl. Mal. I. 6 : 219. 1962. *Adenanthra triphysa* Dennst. Schlüss. Hort. Malab. 32. 1818 (based on *Pongelion* Rheede, Hort. Malab. 6 : 27. t. 15. 1686). *Ailanthus integrifolia* var. β Lam. Encycl. 3 (2) : 417. 1792. *A. malabarica* DC. Prodr. 2 : 89. 1825 (also based on *Pongelion* Rheede), *nom. illeg.*; A. W. Bennett in Hook. f. Fl. Brit. Ind. 1 : 518. 1875; Cooke, Fl. Pres. Bomb. 1 : 194. 1902 (Repr. ed. 1 : 206. 1958); Gamble Fl. Pres. Madr. 1 : 163. 1915 (Repr. ed. 1 : 116. 1957). *A. kurzii* Prain in Ind. Forester 28 : 133. t. 3B. 1902.



Ailanthus integrifolia Lam. ssp. *calycina* (Pierre) Nooteboom
 Figs. 1-6 : 1. Leaf 2. Inflorescence 3. Male flower 4. Male flower spread out
 5. Stamens 6. Samaras

Hal-maddi (Kan.); *Dhup, Pongilyam, Mattipal* (Mal.); *Peru, Perumaram* (Tam.); *Peddamanu* (Tel.).

Trees, 30-40 m high. Leaves 20-70 cm long, mostly paripinnate; leaflets 6-10 pairs, $9.0-12.0 \times 2.5-5.5$ cm, opposite, obliquely ovate-lanceolate to oblong-lanceolate, entire, wavy along the margin, unequal at base, acute or acuminate at apex, coriaceous, glabrous; petiolules about 5 mm long. Flowers white, in dense panicles 20-50 cm long; bracts small, caducous; pedicels 4 mm long. Calyx lobes 1 mm long, triangular. Petals $3.0-5.0 \times 1.0-1.5$ mm, oblong-lanceolate. Stamens 3.5 mm long in male flowers. Ovary $2.0-2.5 \times 1.0-1.5$ mm, glabrous; styles free or united at the base, connate above; stigmas 3-4-lobed, peltate. Samaras $5.0-8.0 \times 1.5-2.5$ cm, linear oblong, reddish brown, rounded at both ends, not twisted.

Type : India : Plate of Rheede, Hort. Malab. 6 : 27. t. 15. 1686.

Fls. : Jan.-Apr.; *Frts.* : Jan.-May.

Distrib. : INDIA : In evergreen forests up to 1500 m. Andaman Islands, Andhra Pradesh, Karnataka, Kerala, Maharashtra, Tamil Nadu, often cultivated; SRI LANKA, BURMA, MALAYSIA, THAILAND, CAMBODIA, VIETNAM, INDONESIA, CHINA, AUSTRALIA.

Uses : A viscous aromatic resin, obtained from incisions on the bark used locally for incense. Fruit edible. Wood used for packing boxes, boats and toys.

Notes : *A. kurzii* Prain differs from *A. triphysa* in having glossy, distinctly veined samaras with more twisted apex and male flowers having rudimentary ovaries and slender styles as long as filaments. However, these are variable characters and both are treated here as conspecific.

2. BRUCEA

J. F. Miller, Icon. Anim. Pl. t. 25. 1779, *nom. cons.*; Benth. & Hook. f. Gen. Pl. 1 : 311. 1862; A. W. Bennett in Hook. f. Fl. Brit. Ind. 1 : 520. 1875; Engl. in Engl. & Prantl, Nat. Pflanzenfam. ed. 2. 19a : 386. 1931; Nooteboom in Fl. Mal. I. 6 : 209. 1962.

Shrubs or low trees, young parts tomentose. Leaves imparipinnate; leaflets 3-15, opposite, ovate to lanceolate, slightly oblique, acuminate, entire or coarsely toothed with scattered, flat, spot-like glands along the margin on the undersurface. Flowers 4-merous, uni- or bisexual, in long, narrow axillary panicles. Sepals 4, connate at base, ovate-elongate or triangular. Petals 4, free, ovate-oblong or linear. Disk cupular, glabrous. Stamens 4,

inserted beneath the disk, rudimentary or absent in female flowers; filaments short; anthers cordate ovate. Carpels 4, free, ovoid; styles free or coherent at the base, recurved outwards over the ovary; stigmas thickened or club-shaped. Fruits 1-4, dried nuts, ellipsoidal, with two ribs. Seeds ovoid, exalbuminous.

Distrib. : 6 species in the old World tropics. AFRICA, INDIA, SRI LANKA, NEPAL, BHUTAN, BURMA, MALAYSIA, THAILAND, CAMBODIA, LAOS, VIETNAM, INDONESIA, SOUTH CHINA, PHILIPPINES, NORTH AUSTRALIA. 2 species in India.

- 1a. Dried nuts about 5 mm long with stalks 2-4 mm long. Leaflets always bluntly serrate; lateral veins nearly parallel, ending in marginal glands
...1. **B. javanica**
- 1b. Dried nuts 10-12 mm long with stalks 4-10 mm long. Leaflets usually entire; lateral veins mostly not parallel, anastomosing near the margin
...2. **B. mollis**

- 1. **Brucea javanica** (L.) Merr. in J. Arn. Arb. 9 : 3. 1928; Nooteboom in Fl. Mal. I. 6 : 211. 1962. *Rhus javanica* L. Sp. Pl. 265. 1753. *Brucea sumatrana* Roxb. Hort. Beng. 12. 1814, *nom. valid.*; A. W. Bennett in Hook. f. Fl. Brit. Ind. 1 : 521. 1875; Kanjilal *et al.* Fl. Assam 1 : 218. 1936.

Evergreen foetid shrubs, 1-6 m high. Leaves 25-50 cm long; petioles 6-15 cm long; leaflets 4.0-12.0 × 2.5-4.0 cm, oblong or ovate-lanceolate, base acute or obtuse, apex acuminate, dense yellowish pubescent beneath; petiolules about 5 mm long, slender. Flowers reddish to variously coloured, in axillary pubescent paniculate cymes 15-30 cm long; bracts minute. Male flowers: pedicels 1-2 mm long, slender; sepals less than 1 mm long; petals 1-2 mm long, linear spatulate, subpubescent to glabrous; filaments 0.5 mm long, subulate; anthers 0.4 mm long. Female flowers: pedicels up to 2.5 mm long; stigmas 1 mm long, free. Nuts 1-4, 4.0-5.0 × 2.5-3.5 mm, ovoid, glabrous, somewhat compressed and ridged, stone reticulated.

Type : Indonesia (Java): Herb. Linn. 378.4 (LINN, Photo!).

Fls. : Mar.-July; *Frts.* : May-Jan.

Distrib. : INDIA : Andaman Islands, Arunachal Pradesh, Assam, Kerala, Meghalaya, Nagaland; SRI LANKA, BURMA, MALAYSIA, THAILAND, CAMBODIA, LAOS, VIETNAM, INDONESIA, SOUTH CHINA, PHILIPPINES, NORTH AUSTRALIA.

Uses : Plant astringent; seeds used in amoebic dysentery.

2. **B. mollis** Wall. ex Kurz in J. Asiat. Soc. Beng. 42 : 64. 1873; A. W. Bennett in Hook. f. Fl. Brit. Ind. 1 : 521. 1875; Kanjilal *et al.* Fl. Assam 1 : 218. 1936; Nooteboom in Fl. Mal. I. 6 : 212. 1962.

Shrubs, 1-4 m high; branches with close set of lenticels, young parts tomentose. Leaves 18-40 cm long, alternate, rachis pubescent; leaflets 5-15×2-6 cm, opposite, ovate oblong to ovate lanceolate, base unequal and rounded or cuneate, apex acute or acuminate, margin entire or rarely undulate, membranous, pubescent on both surfaces, rarely glabrous; petiolules 2-10 mm long, pubescent. Flowers in axillary pubescent paniculate cymes 11-25 cm long, green, creamy white or red. Sepals 1 mm long, imbricate. Petals 1-2 mm long, imbricate, linear. Stamens about 1 mm long; anthers 0.4 mm long. Carpels 4, glabrous; styles linear, deflexed. Nuts 1-2, less often 3-4, 10-12×6-8 mm, ovoid, pointed at the apex, orange red when ripe. Seeds exalbuminous.

Type : Burma: Martaban, Kurz 2009 (CAL !).

Fls. : Nov.-Apr.; *Frts.* : Jan.-May.

Distrib. : INDIA: East Himalaya-Assam, Arunachal Pradesh, Manipur, Meghalaya, Nagaland, Sikkim, West Bengal; BANGLADESH, BHUTAN, BURMA, MALAYSIA, THAILAND, CAMBODIA, LAOS, VIETNAM, INDONESIA, CHINA, PHILIPPINES.

Notes : Kurz (l. c.) adopts only the manuscript name of Wallich and does not quote Wallich's specimens (Num. List Nos. 8483A & B) from India in the protologue.

3. HARRISONIA

R. Brown ex A. H. L. Juss. in Mém. Mus. Hist. Nat. Paris 12 : 517. 540. t. 28. no. 47. 1825, *nom. cons.*; Benth. & Hook. f. Gen. Pl. 1 : 314. 1862; A. W. Bennett in Hook. f. Fl. Brit. Ind. 1 : 519. 1875; Engl. in Engl. & Prantl, Nat. Pflanzenfam. ed. 2. 19a : 382. 1931; Nooteboom in Fl. Mal. I. 6 : 207. 1962.

Shrubs with straggling prickly branches; younger branches pubescent, older ones glabrous and lenticellate; prickles caducous. Leaves spirally arranged; leaflets rhomboid to ovate lanceolate, subentire to coarsely crenate or serrate, obtuse. Flowers bisexual, 4-5-merous, in bracteate, axillary or terminal cymes. Calyx 4-5-lobed, lobes acute-triangular, persistent. Petals 4-5, longer than calyx, slightly imbricate in bud, glabrous. Disk hemispherical. Stamens 8-10, attached to the base of the disk; filaments free with hairy, concave scales at base, glabrous; anthers latrorse.

Ovary 4-5-celled, connate, globose or lobed, seated on a thick disk; styles 4-5, connate or distinct at base; stigmas 4-5-lobed; ovule solitary, pendulous, amphitropous. Fruits globose, entire or lobed drupes. Seeds with a thin testa, endospermous; cotyledons hippocrepiform, radicle pointing upwards.

Distrib. : 4 species in the tropics. AFRICA, INDIA, BURMA, MALAYSIA, THAILAND, CAMBODIA, LAOS, VIETNAM, INDONESIA, PHILIPPINES, NORTH AUSTRALIA. 2 species in India.

- 1a. Leaves ternate. Flowers usually 4-merous, *ca.* 4 mm long, whitish; cymes 3-5-flowered. Fruits 4-5 × 5-6 mm ... **1. H. brownii**
- 1b. Leaves imparipinnate. Flowers usually 5-merous, 6-10 mm long, pinkish; cymes 8-30-flowered. Fruits 4-10 × 10-15 mm ... **2. H. perforata**

- 1. *Harrisonia brownii*** A. H. L. Juss. in Mém. Mus. Hist. Nat. Paris 12 : 540. t. 28. no. 47. 1825. Kurz, Rep. Veg. Andaman (app. A) 33. 1870; A. W. Bennett in Hook. f. Fl. Brit. Ind. 1 : 519. 1875; Parkinson, For. Fl. Andamans 112. 1923; Nooteboom in Fl. Mal. I. 6 : 207. 1962.

Figs. 1-5

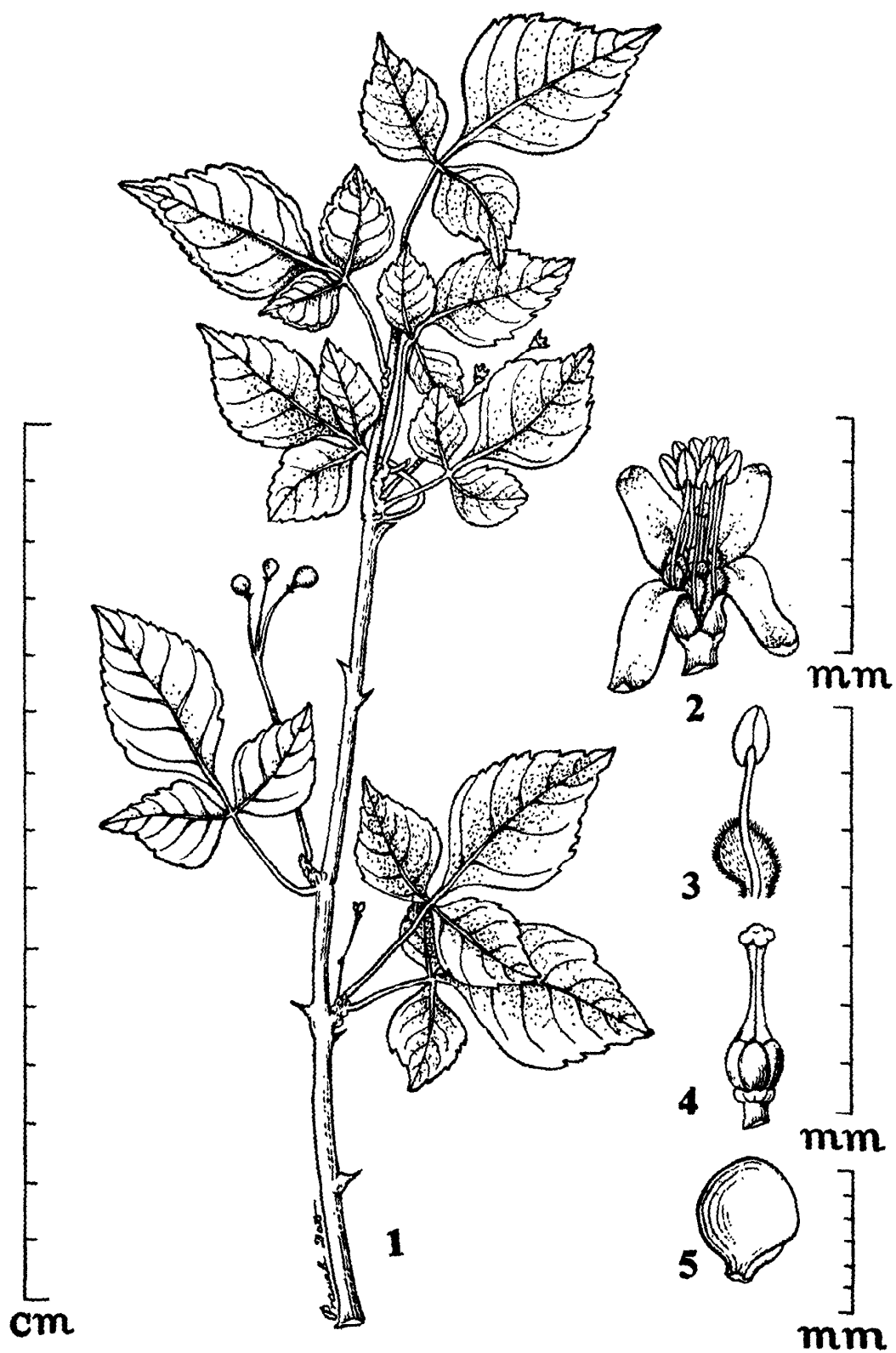
Deciduous spreading shrubs, about 3 m high; branches dark brown; prickles up to 5 mm long, recurved. Leaves 5-10 cm long, petioles 0.5-2.8 cm long; leaflets 2.0-8.0 × 0.5-4.0 cm, the terminal one largest and narrowed to the petiolule 0.5-10 mm long, ovate rhomboid, acuminate; lateral ones 1.0-5.0 × 0.5-2.0 cm, oblique, cuneate towards base, petiolules slender, channelled. Flowers few; bracts about 1.5 mm long, persistent. Calyx lobes *ca.* 1 mm long, glabrous. Petals 3.0-3.5 × 1.0 mm, lanceolate to oblong, acute and inflexed at apex. Disk short, cylindrical, slightly 8-lobed. Stamens 8; filaments 2.5 mm long; anthers *ca.* 1 mm long. Ovary 1 mm long; styles 4, connate, *ca.* 1.5 mm long, twisted, glabrous. Drupes globose, entire (Andaman Islands).

Type : Indonesia (Timor) : Plate of A. H. L. Juss. in Mem. Mus. Hist. Nat. Paris 12 : 517. 540. t. 28. no. 47. 1825.

Fls. : June-Oct.; *Frts.* : July-Nov.

Distrib. : INDIA : South Andaman Islands; MALAYSIA, INDONESIA, PHILIPPINES, NEW GUINEA, NORTH AUSTRALIA.

Notes : Nooteboom (l. c.) considers the distribution of this species in Andaman Islands as a 'marked and unexpected extension of the range towards the west'. However, King (in J. Asiat. Soc. Beng. 42 : 227. 1893) and Parkinson (l. c.) record its occurrence in Andamans as fairly common.



Harrisonia brownii A. H. L. Juss.

Fig. 1-5 : 1. Branch with flowers and fruits 2. Flower 3. Stamen
4. Gynoecium 5. Drupe

In Calcutta herbarium (CAL), there are several specimens from Andamans collected by King, Heinig and others. These, however, possess globose, entire fruits, a few flowers and/or young flower-buds.

2. **H. perforata** (Blanco) Merr. in Philip. J. Sc. Bot. 7 : 236. 1912; Nooteboom in Fl. Mal. I. 6: 208. 1962. *Paliurus perforatus* Blanco, Fl. Filip. 174. 1837. *Lasiolepis bennettii* Planchon in Hook. Lond. J. Bot. 5 : 570. 1846. *nom. illeg.* *Harrisonia bennettii* (Planchon) A. W. Bennett in Hook. f. Fl. Brit. Ind. 1 : 519. 1875; Parkinson, For. Fl. Andamans 113. 1923. *Limonia pubescens* Wall. ex Hook. f. 1. c. 507. 1875.

Scandent shrubs, about 8 m high. Leaves 8-16 cm long, petiole 0.5-3.0 cm long; leaflets 5-13, 1.0-4.0 × 0.5-2.0 cm, odd one 2.0-5.5 × 1.0-2.5 cm, ovate, glabrous, crenate. Flowers with pubescent pedicels. Calyx lobes about 1.5 mm long, persistent. Petals 6-8 × 1.5-2.5 mm, lanceolate, rarely oblong, pubescent on both sides, inserted below the disk. Stamens 10; filaments 7-10 mm long. Disk 1-2 mm high, cup-shaped, fleshy. Ovary 0.5-1.5 mm long, glabrous, slightly lobed; styles 6-7 mm long, connate, pubescent. Drupes slightly lobed.

Type : Philippines: Mandalayon, Rizal Prov., Luzon, April 20, 1914, *Merrill Species Blancoanae* 433 (L, CAL !).

Fls. : Dec.-May; *Frts.* : Feb.-Aug.

Distrib. : INDIA : Andaman Islands; BURMA, MALAYSIA, THAILAND, LAOS, CAMBODIA, VIETNAM, INDONESIA, PHILIPPINES.

Notes : In absence of any original material of Blanco, it is better to accept the illustrative specimen, *Merrill Spec. Blanc.* 433 in herb. L as neotype.

4. PICRASMA

Blume, Bijdr. 5 : 247. 1825; Benth. & Hook. f. Gen. Pl. 1 : 311. 1862; A. W. Bennett in Hook. f. Fl. Brit. Ind. 1 : 520. 1875; Engl. in Engl. & Prantl, Nat. Pflanzenfam. ed. 2. 19a : 387. 1931; Nooteboom in Fl. Mal. I. 6 : 212. 1962.

Trees or large shrubs, branches glabrous. Leaves imparipinnate; leaflets opposite or subopposite. Flowers 4-5-merous, unisexual, or both unisexual and bisexual (functionally female ?), in axillary, long peduncled, corymbose compound cymes. Sepals 4-5, free or connate. Petals 4-5, valvate, accrescent in fruits. Stamens 4-5, alternate with petals, inserted at the narrow base of the disk; anthers emarginate, latrorse. Disk entire or

lobed, pubescent, sometimes accrescent in fruits. Carpels 4-5, free, pubescent; styles distinct at base but connate above; stigmas free, filiform; ovule solitary, erect, basal. Fruits 1-5, drupaceous, subglobose. Seeds with broad hilum; testa thick and hard; endosperm absent.

Distrib. : 8 species in the tropics. WEST INDIES, VENEZUELA, BRAZIL, ARGENTINA, MEXICO, KOREA, JAPAN, SOUTH CHINA, NEPAL, INDIA, BANGLADESH, BHUTAN, BURMA, MALAYSIA, THAILAND, CAMBODIA, LAOS, VIETNAM, INDONESIA, PHILIPPINES. 2 species in India.

- 1a. Leaflets 3-7, entire. Flowers 4-merous. Fruits 7.5 mm or more long
...1. *P. javanica*
- 1b. Leaflets 9-15, crenate to serrate. Flowers 5-merous. Fruits about 5 mm long
...2. *P. quassioides*

1. *Picrasma javanica* Blume, Bijdr. 5 : 248. 1825; A. W. Bennett in Hook. f. Fl. Brit. Ind. 1 : 520. 1875; Parkinson, For. Fl. Andamans 113. 1923; Kanjilal *et al.* Fl. Assam 1 : 217. 1936; Nooteboom in Fl. Mal. I. 6 : 214. 1862. *P. nepalensis* J. J. Bennett, Pl. Jav. Rar. 201. 1844; A. W. Bennett 1. c. 520. 1875; Kanjilal *et al.* 1. c. 218. 1936. *P. andamanica* Kurz ex A. W. Bennett 1. c. 520. 1875. *P. javanica* var. ? *mishmiensis* A. W. Bennett 1. c. 520. 1875. *P. javanica* var. *nepalensis* (J. J. Bennett) Badhwar in Chopra *et al.* Pois. Pl. Ind. 1 : 231. 1949.

Bonposhla, *Nimtitta*, *Tita-sasi* (Asm.); *Aeo* (Nag.); *Teju* (Nep.).

Trees, 6-20 m high. Leaves 1-3-jugate, 8-25 cm long; petioles 2-7 cm long; leaflets 5-15 × 1-6 cm, oblong-ovate, or elliptic, margins sometimes wavy or wrinkled, cuneate at base, abruptly acuminate at apex, glabrous; petiolules 1-5 mm long; stipules 1.0-1.5 cm long, broadly ovate-orbicular. Flowers dull-white, in axillary, paniculate cymes 6-20 cm long; pedicels 8-13 mm long, villous, elongating in fruits. Sepals about 1 mm long, triangular to ovate. Petals 4, in male flowers 2.0-3.0 × 1.0-1.5 mm, in female flowers 3-6 × 3-4 mm, ovate-oblong or oblong. Disk 4-lobed, hairy. Stamens 4, 2-5 mm long. Carpels 4; styles 2 mm long. Drupes 1-4, on cushion-like disk, subglobose, black when ripe.

Type : Indonesia : Java, *Blume s. n.* (L).

Fls. : Jan.-May; *Frts.* : Mar.-Oct.

Distrib. : Tropical south-east Asia. INDIA : Andaman Islands, Arunachal Pradesh, Assam, Manipur, Meghalaya, Orissa, Sikkim, Tripura, West Bengal; NEPAL, BANGLADESH, BURMA, MALAYSIA, CAMBODIA, THAILAND, LAOS, VIETNAM, INDONESIA, PHILIPPINES.

Uses : The bark contains bitter principles allied to quassin and is used as febrifuge.

Notes : *P. nepalensis* J. J. Benn. differs from *P. javanica* Bl. in being smaller trees with slender panicles, usually narrower leaflets having more elongated apices. But these are not constant characters and following King (in J. Asiat. Soc. Beng. 62 : 228. 1893), the former is reduced to the synonym of *P. javanica*. *P. andamanica* Kurz ex A. W. Bennett can hardly be distinguished from *P. javanica* (King l. c.).

The specimens from Sikkim Himalaya [Teesta valley and Ryang valley, *J. L. Lister s. n.* (CAL)] have 5-merous male flowers.

2. ***P. quassioides*** (D. Don) J. J. Bennett, Pl. Java Rar. 198. 1844; A. W. Bennett in Hook. f. Fl. Brit. Ind. 1 : 520. 1875; Kanjilal *et al.* Fl. Assam 1 : 217. 1936; Nooteboom in Fl. Mal. I. 6 : 214. 1962; Nair, Fl. Bashahr Him. 54. 1977. *Simaba quassioides* D, Don, Prodr. Fl. Nepal. 248. 1825.

Bharangi, *Charangi*, *Kashshing* (Hindi); *Bhurungi* (Beng.); *Shama-baringi* (Nep.); *Hala*, *Puthorin*, *Tithu* (Punj.).

Trees or scrambling shrubs, up to 12 m high. Leaves about 30 cm long, petioles 1.5-5.0 cm long, puberulous; leaflets 4-12×1.5-4(-6) cm, opposite or subopposite, ovate to lanceolate, lowest pair much smaller and stipuliform, glabrous with age, base often oblique, apex acuminate; lateral nerves 7-10 pairs, pellucid, prominent beneath, nervules finely reticulate; petiolules 1.5-3.5 mm long. Flowers in axillary paniculate cymes *ca.* 15 cm long; pedicels 5-10 mm long, jointed below the middle. Sepals minute, about 1 mm long, imbricate. Petals about 3.0-2.5×2 mm, ovate or oblong-ovate. Stamens equalling petals, thick hairy at base; filaments strap-shaped. Drupes 1-5 together, obovoid or globose, black when ripe.

Type : Nepal, *Hamilton s. n.* (BM, Photo!).

Fls. : Feb.-June; **Frts. :** Apr.-Sept.

Distrib. : INDIA : Subtropical Himalaya between 900 and 2500 m-Arunachal Pradesh, Assam, Himachal Pradesh, Jammu & Kashmir, Meghalaya, Nagaland, Punjab, Uttar Pradesh; NEPAL, BHUTAN, SOUTH CHINA, JAPAN, KOREA.

Uses : The bitter wood and bark used as substitute for commercial Quassia bark. The dried wood containing 0.31 % of Quassin, is official in Indian Pharmacopoeia (Ind. Pharm. 513. 1955). The bark and leaves used as febrifuge and insecticides.

Chr. No. : 2n=50 (Nakajima, G. in Cytologia 12 : 262. 1942).

5. SAMADERA

J. Gaertn. Fruct. 2 : 352. t. 156. f. 3. 1791, *nom. cons.*; Benth. & Hook. f. Gen. Pl. 1 : 310. 1862; A. W. Bennett in Hook. f. Fl. Brit. Ind. 1 : 518. 1875; Engl. in Engl. & Prantl, Nat. Pflanzenfam. ed. 2. 19a : 371. 1931. *Quassia* sect. *Samadera* (Gaertn.) Nooteboom in Fl. Mal. I. 6 : 199. 1962.

Small glabrous trees. Leaves alternate, entire. Flowers bisexual, in axillary or terminal pseudo-umbels. Calyx 3-5-lobed, lobes imbricate, obtuse with a concave gland outside. Petals 3-5, free. Disk obconic, glabrous. Stamens with basal scales, twice the number of petals, epipetalous ones smaller than episepalous ones; filaments slender, twisted; anthers medifixed, lanceolate. Carpels 4-5, distinct, on columnar disk; styles free at base, connate above; stigmas acute; ovule solitary, pendulous. Fruits semiorbicular, woody, laterally compressed drupes with a narrow wing at the apex, surface reticulate. Seed solitary.

Distrib. : 2 species in the tropics. MALAGASY, SRI LANKA, INDIA, BURMA, MALAYSIA, CAMBODIA, THAILAND, LAOS, VIETNAM, PHILIPPINES, INDONESIA, BISMARCKS, SOLOMON ISLANDS. 1 species in India.

Notes : Nooteboom (l. c.) reduces the genus to a section under *Quassia*. However, *Samadera* with simple leaves, small prolate spheroidal pollen grains and total absence of foliar sclereids, is treated here as distinct from *Quassia* which is characterised by compound leaves, medium-sized suboblate grains and diffuse sclereids of 4 categories.

Samadera indica J. Gaertn. Fruct. 2 : 352. t. 156. f. 3. 1791; Wight, Ill. Ind. Bot. 1 : 171. t. 68. 1840; A. W. Bennett in Hook. f. Fl. Brit. Ind. 1 : 519. 1875; Cooke, Fl. Pres. Bomb. 1 : 194. 1902 (Repr. ed. 1 : 206. 1958); Gamble, Fl. Pres. Madr. 1 : 163. 1915 (Repr. ed. 1 : 117. 1957); Blatter in Kirtikar & Basu, Ind. Med. Pl. 1 : 508. 1935. *Niota lucida* Wall. Pl. As. Rar. 2 : 54. t. 168. 1831. *Samadera lucida* (Wall.) Planchon in Hook. Lond. J. Bot. 5 : 562. 1846; A. W. Bennett l. c. 519. 1875; Parkinson, For. Fl. Andamans 112. 1923. *S. indica* var. *lucida* (Wall.) Blatter in Kirtikar & Basu, Ind. Med. Pl. 1 : 509. 1935. *Quassia indica* (Gaertn.) Nooteboom in Fl. Mal. I. 6 : 199. 1962.

Nipa, *Samadera* (Kan.); *Karinjotta* (Mal.); *Lokhandi* (Mar.); *Nibam*, *Niepa*, *Karinjottei* (Tam.).

Evergreen shrubs or low trees, 6-10 m high. Leaves 16.0-28.0 × 4.0-11.5 cm, acute at base, coriaceous and glossy; petioles 1-2 cm long. Flowers 4-merous, many on 7-20 cm long peduncles; pedicels 10-15 mm long, bracts minute. Calyx lobes 2.0-2.5 mm across, semiorbicular, pubescent on the

back, thick, persistent in fruit. Petals 4, 15-20×4 mm, oblanceolate, hairy on the back, white or pale yellow. Stamens 8, 10-12 mm long, pubescent; anthers 2-3 mm long. Ovary 2×2 mm, free, puberulous; styles up to 2 cm long. Drupes 1-4, 4-6×3-4 cm, flattened, keeled, with glands on pericarp, surface reticulate.

Type : Indonesia (Java) : Plate of Gaertn. Fruct. 2 : 352. t. 156. f. 3. 1791.

Fls. : Jan.-June; *Frts.* : Feb.-July.

Distrib. : In evergreen forests, and along backwaters and sandy places.
INDIA : Andaman Islands, Goa, Karnataka, Kerala, Maharashtra;
MALAGASY, SRI LANKA, BURMA, MALAYSIA, CAMBODIA, THAILAND, LAOS,
VIETNAM, INDONESIA, PHILIPPINES, SOLOMON ISLANDS

Uses : It is the source of the *niepa* bark of commerce. Wood used for turnery articles, packing cases and suitable for light and cheap furniture, and match wood. Bark, leaves, oil from kernel and plant used medicinally.

Notes : *S. lucida* (Wall.) Planchon with umbels on erect peduncles (shorter than leaves), smaller leaves and smaller fruits with strong reticulations on the surface, is sometimes considered distinct from *S. indica* (Bennett l. c.; Parkinson l. c.).

6. SURIANA

L. Sp. Pl. 1 : 284. 1753 & Gen. Pl. (5th ed.) 137. 1754; Benth. & Hook. f. Gen. Pl. 1 : 313. 1862; A. W. Bennett in Hook. f. Fl. Brit. Ind. 1 : 522. 1875; Engl. in Engl. & Prantl, Nat. Pflanzenfam. ed. 2. 19a. : 367. 1931; Nooteboom in Fl. Mal. I. 6 : 196. 1962.

Littoral shrubs or small trees without any bitter substances; branches and leaves with dense, simple and glandular hairs. Leaves simple, sessile, crowded at the ends of branchlets. Flowers bisexual, 5-merous, perfect, hidden by leaves, 2-4 in axillary or terminal cymes or solitary; pedicels articulated at the base; bracts foliaceous, persistent. Sepals lanceolate, imbricate, connate at base, persistent. Petals clawed, obovate or elliptical, imbricate. Stamens 10, distinct, obdiplostemonous, 5 antipetalous stamens barren; filaments subulate, hairy below; anthers 2 locular, latrorse, versatile. Disk inconspicuous. Carpels 5, free; styles filiform, basal; stigmas capitellate; ovules 2 in each locule, amphitropous. Fruits 5 or fewer, 1-seeded achene-like drupelets enclosed by the calyx, subspherical, pubescent. Embryo curved and albumen absent.

Distrib. : A monotypic pantropical genus; widely but sporadically distributed on the sea-shores of the new and old world. In Pacific Indian ocean, usually found on small, isolate islands or coral islets and atolls.

Notes : Arnott (in Wight & Arnott, Prodr. 360. 1834), Jadin (in Ann. Sc. Nat. Bot. VIII. 13 : 224-226 & 303. 1901), Record & Hess (Timb. New World 521-522. 1949) and Gutzwiller (in Bot. Jahrb. 8 : 1-49. 1961) consider the genus as representative of a distinct monotypic family Surianaceae. However, Bentham & Hooker f. (l. c. 307. 1862), Solereder (Syst. Anat. Dict. 207-213. 1899 & in Loesener & Solereder in Verh. Bot. Ver. Brandenb. 47 : 35-62. 1905), Engler (l. c.), Cronquist (in Brittonia 5 : 129. 1944), Brizicky (in J. Arn. Arb. 43 : 176. 1962), Nooteboom (l. c.) and Hutchinson (Fam. Fl. Pl. 440. 1973) maintain it under the family Simaroubaceae. Pollen morphologically, *Suriana* and *Quassia* are closely related and are similar in size, shape class, colpi and ora structures (Basak in Bull. Bot. Surv. Ind. 5 : 385-387. 1963) and perhaps, it is better regarded as belonging to the family Simaroubaceae.

Suriana maritima L. Sp. Pl. 284. 1753; Wight Ill. Ind. Bot. 2 : 45. 1850; A. W. Bennett in Hook. f. Fl. Brit. Ind. 1 : 522. 1875; Parkinson, For. Fl. Andamans 112. 1923; Nooteboom in Fl. Mal. I. 6 : 196. 1962.

Shrubs or small trees, 3-7 m high. Leaves 15-30×2-3 mm, entire; scars tuberculate; midrib and veins inconspicuous. Bracts 4-8×1 mm, lanceolate; pedicels about 1 cm long. Sepals 5-10×2-3 mm. Petals bright yellow, as long as sepals. Stamens unequal in length; anthers emarginate. Ovary 1 mm long, hairy; styles up to 5 mm long, glabrous except at the base. Fruits 2-3 mm long.

Type : Bermuda Islands : Plate of Plukenet, Phytogr. t. 241. f. 5. 1692.

Fls. : Sept.-Feb.; **Frts. :** Nov.-May.

Distrib. : INDIA : A littoral species, found along sea coast in islands or small islets, forming thickets. The species has not been known from Indian mainland proper, but is reported from small islands along the coast such as Rameshwaram, Krusadi and Shingle Islands (Tamil Nadu), Andaman and Nicobar Islands, and Kavarthi, Agathi, Betra Par, Maldiv in Minicoy and Lakshadweep group of Islands; SRI LANKA, PAKISTAN (Murray).

Uses : The wood is suitable for turnery.

INTRODUCED SPECIES

Quassia amara L. Sp. Pl. (2nd ed.) 553. 1762, app. 1679. 1763; Nootboom in Fl. Mal. I. 6 : 199. 1962.

Fls. : July-Mar.; *Frts.* : Aug.-Apr.

Distrib. : Native to tropical America from Brazil to Mexico and West Indies. Introduced and often naturalised in tropical countries of the old world for medicinal and ornamental purposes; grown in Indian gardens for foliage and red showy flowers.

EXCLUDED SPECIES

Eurycoma longifolia Jack in Mal. Misc. 2 : 45. 1822; A. W. Bennett in Hook. f. Fl. Brit. Ind. 1 : 521. 1875; Nootboom in Fl. Mal. I. 6 : 205. 1962.

A. W. Bennett (l. c.), Kurz (For. Fl. Burma 1 : 202. 1877) and Nootboom (l. c.) report its occurrence in the Andaman Islands (India), probably based on the specimen collected by Helfer. It may be noted here that most of Helfer's collections from Tenasserim (Burma) got mixed up with his Andaman collections as is evident from the label 'Tenasserim and Andamans'. It is most likely that Helfer's specimen of the above species might be from Tenasserim. This is evident from the fact that King (in J. Asiat. Soc. Beng. 62 : 230. 1893) holds similar view. Further, inspite of the intensive and extensive explorations, the species has not been reported so far from the Andaman and Nicobar Islands.

BALANITACEAE †

Endlicher, Ench. Bot. 547. 1841, "Balaniteae".

R. K. BASAK*

Shrubs or trees; branches with axillary, simple or forked spines; bark bitter. Leaves alternate, exstipulate, bifoliolate; leaflets entire. Flowers bisexual, in axillary cymes. Sepals 5, free, imbricate. Petals 5, oblong, glabrous to villous, spreading, imbricate. Stamens 10, inserted in the grooves below the disk; filaments filiform, free; anthers dorsifixed. Disk thick, 10-grooved. Ovary 5-celled, or 1-celled by suppression, globose, semi-immersed in the disk; ovule one in each locule; style short; stigma minute. Fruit a fleshy, oily, 5-angled, 1-seeded drupe. Seeds pendulous, exalbuminous.

Pollen : Tricolporate, circular in polar view, elliptical in equatorial view, subprolate (85%) to prolate in shape ($28-32 \times 21-26 \mu\text{m}$), sexine as thick as nexine; colpi long, narrow and tapering gradually, ora usually lolongate, rarely circular; surface tectate, pattern faintly striate, oriented parallel to the polar axis [Basak in Bull. Bot. Surv. Ind. 5 : 381-397. 1963 (1964)].

Distrib. : Only genus *Balanites*, and ca. 25 species in Africa and Asia. 1 species in India.

BALANITES

Delile, Fl. Egypte 77. t. 28. f. 1. 1813, *nom. cons.*; Benth. & Hook. f. Gen. Pl. 1 : 314. 1862; A. W. Bennett in Hook. f. Fl. Brit. Ind. 1 : 522. 1875; Engl. in Engl. & Prantl, Nat. Pflanzenfam. ed. 2. 19a : 179. 1931; Hutchinson, Gen. Fl. Pl. 2 : 621. 1967. *Agialid* Adans. Fam. Pl. 2 : 508. 514. 1763.

Characters of the family.

Distrib. : Ca. 25 species in the tropics. IVORY COAST, ETHIOPIA, SOMALIA, TANZANIA, UGANDA, KENYA, SUDAN, LIBYA, EGYPT, SAUDI ARABIA, SYRIA, PALESTINE, PAKISTAN, INDIA, BURMA. 1 species in India.

† Editor for Fam. Balanitaceae : Dr. K. THOTHATHRI, Botanical Survey of India, Howrah-711103.

* Botanical Survey of India, Howrah-711 103.

Notes : Benth. & Hook. f. (l. c.) and Paris & Mue Aubrat (in Bull. Soc. Bot. Fr. 93 : 202. 1946) place the genus *Balanites* in the family Simaroubaceae, while Engler (l. c.) treats it as a member of Zygophyllaceae. Hutchinson (Fam. Fl. Pl. 3rd ed. 327. 1973) treats it under a separate family Balanitaceae (cf. Endlicher l. c.). Most of the Indian Floras have followed Benth. & Hook. f. (l.c.) in treating *Balanites* as a member of Simaroubaceae. Pollen morphologically, it is allied to Simaroubaceae (Basak l.c. 387. 1963). Parvati and Narayana (in Curr. Sci. 47 : 968. 1978) suggest that the genus *Balanites* may be retained in Zygophyllaceae under a sub-family Balanitoideae, although there are similarities with Simaroubaceae. The author agrees with Hutchinson in treating *Balanites* under Balanitaceae.

***Balanites aegyptiaca* (L.) Delile, Fl. Egypte 77 & 221. t. 28. f. 1. 1813; Wight Ic. 1: t. 274. 1840; Nair in Rec. Bot. Surv. Ind. 21(1): 54. 1978. *Ximenia aegyptiaca* L. Sp. Pl. 1194. 1753; Roxb. Fl. Ind. 2 : 253. 1832. *Balanites roxburghii* Planchon in Ann. Sc. Nat. (Ser. 4) 2 : 258. 1854; A. W. Bennett in Hook. f. Fl. Brit. Ind. 1 : 522. 1875; Cooke, Fl. Pres. Bomb. 1 : 195. 1902 (Repr. ed. 1 : 207. 1958); Prain, Beng. Pl. 1 : 308. 1903 (Repr. ed. 1 : 214. 1963); Gamble, Fl. Pres. Madr. 1 : 164. 1915 (Repr. ed. 1 : 117. 1957); Haines, Bot. Bih. Or. 2 : 154. 1921 (Repr. ed. 1 : 160. 1961). *B. aegyptiaca* var. *roxburghii* (Planchon) Duthie, Fl. Upper Gang. Pl. 1 : 145. 1903 (Repr. ed. 1 : 136. 1960).**

Hingan, Hingot, Hingua (Hindi); *Hingan* (Beng.); *Regorea* (Guj.); *Hinganabet* (Mar.); *Ingudi* (Sans.); *Nanjunda* (Tam.); *Gari* (Tel.)

Shrubs or small trees, up to 6 m high, younger parts pubescent; spines 1.0-4.5 cm long, often with leaves and flowers. Leaflets 1.5-5.0 × 1.0-2.5 cm, on petiole 3-5 mm long, elliptic, obovate or oblanceolate, rounded or cuneate at base, obtuse or acute, or rarely mucronulate at apex, puberulous, coriaceous; petiolules up to 4 mm long. Flowers 4-12, in cymes up to 5.5 cm long; pedicels 0.5-1.5 cm long. Sepals 3 mm long, ovate, pubescent outside, silky villous within. Petals 4-5 mm long, obovate oblong, glabrous outside, silky villous within. Stamens 2.5-3.0 mm long, antipetalous ones shorter; filaments 1.5-2.0 mm long, glabrous. Ovary globose, ca. 2 mm across; styles ca. 1 mm long. Drupes ovoid, 5-angular at both ends, 3-6 × 2-4 cm, yellow when ripe with foetid smelling pulp. Seed solitary, stony.

Type : Egypt : Plate of Alpinus, Pl. Aegypt. Liber 38. t. 39 (on p. 39), 'Agihalid'. 1640.

Fls. : Oct.-June; *Frts. :* Oct.-Aug.

Distrib. INDIA : Andhra Pradesh, Bihar, Delhi, Gujarat, Haryana, Karnataka, Kashmir, Madhya Pradesh, Maharashtra, Orissa, Punjab, Rajasthan, Sikkim Terai, Tamil Nadu, Uttar Pradesh, West Bengal; AFRICA, SAUDI ARABIA, SYRIA, PALESTINE, PAKISTAN, BURMA.

Uses : Pulp of the fruit edible and used for cleansing silk and cotton. Bark used as anthelmintic for cattle and its juice used as fish-poison. Wood used for walking sticks and as fuel.

Chr. No. : $n=9$ (Pathak, G. N. *et al.* in Curr. Sci. 18 : 347. 1949; $2n=16$ (Mangenot, S. & G. Mangenot in Bull. Jard. Bot. (Bruxelles) 27 : 639-654. 1957).

Notes : Planchon (l. c.) bases his name *B. roxburghii* on *Ximenia aegyptiaca* sensu Roxb. (1832) and considers it distinct from *X. aegyptiaca* L. (1753). He points out that *B. roxburghii* differs from African *B. aegyptiaca* (L.) Delile in the petals being villous on the inner surface (also see Sprague in Kew Bull. 135. 1913). The former also differs from the latter in having shorter petiole and its ovary does not lengthen out after flowering. However, these differences are insignificant for a specific delimitation. As such, they are treated here as conspecific. A W. Bennett (l. c.) regards *B. roxburghii* as "Very nearly allied to, and perhaps only a variety of, the *B. aegyptiaca* of northern and tropical Africa".

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PAEONIACEAE	1	Oct. 1978
DILLENiaceae	2	May 1979
POACEAE (Tribe GARNOTIEAE)	3	Nov. 1979