

(Fl. Sylv. p. 73) correctly states that the petals are sometimes furnished with 2 hairy glandular appendages. Disc concave, with a raised fleshy, hirsute edge. Stamens 8 inside the disc; filaments pilose; anthers oblong, apiculate. Ovary 3-lobed, covered with dense rusty tomentum. Drupes fleshy, 2 or 3, slightly united, each the size of a cherry.

2. *S. emarginatus*, Vahl; Roxb. Fl. Ind. ii. 279; W. & A. Prodr. 111; Bedd. Fl. Sylv. t. 154; Wight III. t. 51.

Leaflets ovate obovate or oblong, obtuse or emarginate, 2-3 pair, the terminal longest, 3-5 in. long, glabrous above, soft tomentose beneath; main lateral nerves 6-10, with a few shorter intermediate ones. Petals oblong or obovate, edge with long white hairs, with two thick tufts of white hair on either side at the top of the claw, attached to scales more or less coherent with the claw. On further examination, the petals and their scales will possibly be found the same in these two species, and then the only difference that will remain is in the shape of the leaf, which in this case would probably not be sufficient to keep them separate, and for all practical purposes, they may now be regarded as one species, which should be called *S. laurifolius*, Vahl.

The tree (*S. laurifolius* and *emarginatus*) is indigenous in South India. It is cultivated in Bengal and the North-West Provinces. Fl. from Oct. to Dec., and ripens its fruit from Feb. to April.

3. *S. detergens*, Roxb. Fl. Ind. ii. 280.—Syn. *S. acuminatus*, Wall. Vern. Dodan, dodani, ritha, Pb., N.W.P., Bandelkhand; Kanmar, N.W.P.

Leaflets 8-14, oblong or lanceolate, acuminate, generally alternate, the terminal leaflet smaller, coriaceous, glabrous on both sides, with numerous parallel lateral nerves close together, and shorter intermediate ones. Inflorescence consisting of numerous small, generally 3-flowered cymes, arranged in a terminal compound pyramidal thyrsus; ramifications pubescent or soft-tomentose; bracts small, linear. Numerous bisexual flowers mixed with male flowers. Calyx and petals purple, outside glabrous, with ciliate edges. Petals 5; lamina ovate, with 2 scales on either side at the top of the claw, covered with long white woolly hairs. Stamens 8; filaments covered with white woolly hairs; anthers ovate, not apiculate. Disc glabrous, flat, pentagonous, with 5 elevated radiating lines. Ovary 3-cornered, glabrous. Drupes fleshy, generally solitary, the size of a cherry.

Cultivated throughout North-West India, as far as the Chenab, but scarce near its north-western limit, ascending to 4000 ft. in the Himalaya. Also cultivated in Bengal. Royle speaks of it as wild in the valleys of the N.W. Himalaya, but its original home requires further inquiries. Fl. May, June, the fruit ripening from July onwards.

A handsome tree, 50-60 ft. high, with a straight trunk, attaining 8 ft. girth, numerous ascending branches, forming a close oval crown. Bark of trunk light or dark brown, with darker longitudinal furrows. The leaves are clustered near the ends of branches, and in autumn get partly yellow, which gives the tree a peculiar appearance. Wood whitish, with a red or yellow tinge con-

sidered valueless in the N.W. Himalaya. The leaves are given as fodder to cattle, the seeds are medicinal; but the valuable part is the saponaceous pulp of the fruit, which is an important article of trade in the Panjab and the North-West Provinces.

Another species of *Sapindus* (*S. Saponaria*, Linn., the West Indian *Soapberry*) is grown in the West Indies. The fruit (and the root) are used for the same purposes as *Ritha* in India; but Macfadyen, in his '*Flora of Jamaica*' (i. 159), states that it is apt to burn and injure the texture of the cloth washed with it. It differs from *S. detergens*, by having the common petiole winged, and very thin membranous petals, with an orbicular lamina, without any scale or appendix.

Erioglossum rubiginosum, Blume (*S. rubiginosus*, Roxb. Cor. Pl. t. 62; Fl. Ind. ii. 282), probably occurs in Oudh and the Central Provinces. I have seen a specimen in bud from the Oudh forests, collected by Mr R. Thompson in 1871, which scarcely leaves any doubt regarding the identification. It is a native of Eastern Bengal, Burma, the hills of the Circars, and Beddome has found it in the Godavery forests (Fl. Sylv. 73). In Burma the tree is one of those called *Thitni* (red wood). Roxburgh states that the wood is strong and durable, chocolate-coloured towards the centre. In Oudh it is a large tree with a straight trunk, and a fine full head of foliage. The branchlets, inflorescence, and young leaves are clothed with dense rusty or golden tomentum; leaflets 8-15, alternate or sub-opposite, oblong-lanceolate, acuminate, main lateral nerves on either side, 8-12, the common petiole ending in a downy bristle; inflorescence a pyramidal thyrus of long racemes, bearing small 3-5-flowered cymes with linear bracts, the bracts longer than buds, clothed with long rusty hairs; sepals 5, the 2 outer smaller, petals 4, longer than sepals, all on one side of the flower, bearing inside above the stalk a double scale half the length of the lamina; outer segment flat, inner segment thick, like a funnel-shaped tube slit open, the opening towards the inside of the petal; stamens 8; disc one-sided; ovary 3-lobed, hirsute. The Indian species is closely allied to, if not identical with, *Erioglossum edule*, Blume, a shrub or small tree in Java and the islands of the Indian Archipelago, the fruit of which is eatable.

4. **ACER**, Linn.

Trees, sometimes shrubs, with limpid, rarely milky sap, and scaly buds. Leaves opposite, usually exstipulate, deciduous. Flowers small, male and bisexual generally on different trees, in terminal panicles, racemes, or umbelliform fascicles. Bracts usually minute and caducous. Calyx 4-12-generally 5-parted, deciduous, the lobes imbricate in bud. Disc thick, annular, and hypogynous, or cup-shaped and more or less perigynous; margin free, lobed. Petals none, or as many as calyx-lobes, of the same colour, and alternate with them, equal, erect, short-clawed, deciduous. Stamens 4-12, generally 8, inserted on the disc; filaments commonly shorter in the bisexual, and longer in the male flowers; anthers introrse, 2-celled, the cells opening longitudinally. Pistil of two carpels, style deeply bifid, divisions linear or filiform, the inner face stigmatose; ovules 2 in each cell, attached to the inner angle. Fruit a double samara, consisting of 2 laterally-compressed nuts, at length separating from the small persistent axis, the back produced into a large, membranous, and reticulate wing, the lower edge of which is thickened. Seeds solitary, rarely 2 in each cell; albumen none. Embryo conduplicate, sometimes spirally convolute, the cotyledons irregularly folded; radicle generally long.

Of the genus Maple, upwards of 40 species are known, which are spread over Europe, Asia, and North America. Not less than 11 of these are found in the Himalayan region, 4 of which, *A. sikkimense*, Miquel, *Thomsoni*, Miq., *Hookeri*, Miq., and *Campbellii*, H. f. & T., belong to the Eastern Himalaya. Several of the N.W. Himalayan species have a wide range of distribution: *A. oblongum* is found in China; and *A. pictum*, Thunb., is known from India under the name of *cultratum*, Wall., from the Caucasus, Armenia, and North Persia, under the name of *lactum*, C. A. Meyer, and it is closely allied to *A. Lobelii*, Ten., from the mountains of South Italy. As regards their geographical distribution, the species of Maple may be divided into four large groups: first, those of Europe and Western Asia, of which *A. tataricum*, L., *pseudoplatanus*, L., *campestre*, L., *platanoides*, L., *opulifolium*, L., *monspessulanum*, L., are well-known species; secondly, those of the Himalayan region; thirdly, those of Japan, China, and North-East Asia; and fourthly, those of North America. Two species, *A. spicatum*, Lam., and *A. pennsylvanicum*, L. (*rufinerve*, Sieb. et Zucc.), are common to Japan and North America; the others, of which the Japanese and Chinese species, *A. palmatum*, and the North American, *A. saccharinum*, Wangerheim, may serve as instances, are at present only known as endemic. The following is a conspectus of the seven species, which are known from North-West India, but the present classification of this genus is imperfect. A revision will probably have the effect of basing it more upon the character of the inflorescence, the parts of the flowers, and possibly the structure of the seed. The inflorescence of *Acer* is mixed, cymes arranged in racemes or panicles.

- I. Leaves undivided, rarely 3-lobed, penniveined, the lower 2 or 4 lateral nerves often proceeding from the base.
 - Petioles half or one-third the length of leaf; flowers in hairy corymbs 1. *A. oblongum*.
 - Petioles one-fourth the length of leaf, or less; flowers in lax glabrous panicles 2. *A. laevigatum*.

Allied to these two are—of Himalayan species, *A. sikkimense*, Miq., Sikkim, Bhutan, 7000-9000 ft.; *Hookeri*, Miq., Sikkim, Bhutan, and Assam; *Thomsoni*, Miq., Sikkim; and of the other species mentioned above, *A. tataricum*, L., a small tree with white flowers and red wings, which is at home in Eastern Europe, Russia, Western Asia, as far as Northern Persia, and has been found in Manchouria and Japan.

- II. Leaves 3-lobed, with 3, rarely 5 basal nerves; flowers in terminal fascicles 3. *A. pentapomicum*.

Of the species mentioned, *A. monspessulanum*, L., a shrub or small tree, of Middle and South Europe, Algeria, Syria, and Armenia, with small, coriaceous, 3-lobed leaves on long petioles, belongs to this group.

- III. Leaves 5-lobed, with 5 basal nerves; flowers in racemes or panicles.
 - Flowers in long lateral racemes, appearing before the leaves; young leaves and inflorescence hairy 4. *A. villosum*.
 - Flowers appearing with or after the leaves in short racemes or corymbs.
 - Lobes of leaves short-acuminate, with obtuse serratures; leaves pale beneath 5. *A. caesium*.
 - Lobes long-acuminate, with sharp serratures 6. *A. caudatum*.

Near these are, of Indian species, *A. Campbellii*, H. f. & Th., from Sikkim; of the European Maples, the common Maple, *A. campestre*, L., with divaricate wings, small, obtuse-lobed leaves and erect corymbs; and the Sycamore, *A. pseudoplatanus*, with large leaves, pale beneath, and hanging racemes,—the first a moderate-sized, the second a large tree, common in Europe and Western Asia. Two other species of this group

A. spicatum, Lam., the Mountain Maple, and *A. pennsylvanicum*, L., the Striped Maple, are common to Japan and North America.

IV. Leaves 5- or 7-lobed, with 5 or 7 basal nerves; flowers in corymbs, umbels, or fascicles 7. *A. pictum*, Thunb.

Of European species, stand near to this *A. platanoides*, L., of North-Eastern and Middle Europe, the Caucasus, and Taurus region, the inner lobes of leaves with parallel sides, 3- or 5-cleft at the top; *A. opulifolium*, Vill., of South Europe, the Caucasus, and North Persia, the flowers in sessile fascicles, on long hairy pedicels; and of North American species, *A. saccharinum*, Wangenheim, the Sugar- or Rock-Maple.

There are other groups comprising North American and Japanese species, of which no representative forms are known from India.

1. *A. oblongum*, Wall.; Jacq. Voy. Bot. t. 34.—Vern. *Mark*, Pb.; *Patangalia*, *pharengala*, *kirmoli*, N.W.P.; *Mugila*, *buzimpāta*, Nepal.

Leaves oblong, acuminate, entire, green above, whitish-glaucous beneath; when young, with a few fine scattered hairs; when older, glabrous and coriaceous; main lateral nerves 4-8 pair, prominent, with finely-reticulated veins between. Petioles one-third or half the length of leaf. Flowers pentamerous, in terminal corymbs; ramifications, pedicels, and calyx hairy. Sepals and petals linear-oblong. Stamens 3, longer than calyx in the male flowers. Ovary hairy. Nuts unevenly gibbous; wings contracted at base, with a straight or somewhat curved back.

Siwalik tract and Outer Himalaya, ascending to 6000 ft. from the Jhelam to Bhutan, mostly in low valleys, in clumps of a few trees, not gregarious. Never leafless, the mature foliage of a fine dark-green colour. Fl. Feb.-Apr., the fruit ripens June-Nov. A moderate-sized tree 40-50 ft. high, attaining 5 ft. in girth. Bark dark blackish grey, smooth, with horizontal wrinkles. Wood light pink or reddish brown. Used for agricultural implements; some of the better drinking-cups in Tibet are said to be made of knobs of this wood. *A. laurinum*, Hasskarl, from Java, Sumatra, is similar, but apparently distinct.

2. *A. laevigatum*, Wall. Pl. As. rar. t. 104.—Vern. *Sasendi*, *cherauni*, Nepal.

Leaves oblong, acuminate, denticulate when young, entire when old, coriaceous, lucid on both sides, glabrous save a small brown tuft of hairs beneath in the axils of nerves; main lateral nerves 4-6 pair, joined by very prominent reticulate veins. Petioles short, less than $\frac{1}{2}$ the length of leaf. Flowers pentamerous, on long filiform pedicels, in lax terminal glabrous panicles; calyx glabrous; petals white, cuneate or obovate, distinctly unguiculate. Stamens 5-8, in the male flowers much longer than calyx, with a tuft of long hairs in place of ovary. Nuts smooth, oval; wings divergent, erect, or connivent, back curved.

Outer Himalaya 5000-9000 ft., from the Jumna to Sikkim, Kasia hills. Fl. Apr.; the fruit ripens July, Aug. A larger tree than *A. oblongum*, with a straight tall trunk 10-12 ft. in girth, branches spreading or hanging, forming a broad oval crown. Bark thick, smooth, yellowish or dark ash-coloured. In Nepal the wood is much used for building. *A. reticulatum*, Champ., Benth. Flora Hongkong. 47, from that island, is very similar to this species, but probably distinct.

3. *A. pentapomicum*, J. L. Stewart.—Vern. *Trekan(a)*, *kūkandra*, *kakrai*, *kakri*, *kitla*, *mandar(āi)* *kungli*, *tian*, *tilpatto*, *kūpattar*, *serān*, Kashmir and Panjab.

Leaves broader than long, sometimes 3-5-lobed, with truncate base, and 3 prominent penniveined basal nerves; lobes spreading, oval acute or acuminate, obtusely dentate, separated by right-angled or acute-angled sinus, length of middle lobe about twice its width; the lower leaves often 5-lobed, with cordate base, and 2 additional smaller basal nerves. Petioles generally as long as leaf, glabrous when full-grown. Under side and petioles of young leaves clothed with soft tomentum, old leaves pale beneath, glabrous on both sides, or with short soft hairs beneath; tufts of hairs in the axils of basal nerves. Flowers not known, fruit in short corymbs, wings erect or divergent, semi-ovate, with straight back.

Common locally, and at times almost gregarious, between 2300 and 7000 ft., in exposed hot dry places, not as a rule in thick forests, in the basins of almost all the great rivers in the Panjab, Himalaya from the Jhelam to the Sutlej, and east of the latter. Not found on the Bias. Fl. Feb., March; the fruit ripens April, June.

Grows not nearly to such a size as the other species; the largest trunk noted by Dr Stewart, much above the average, measured $5\frac{1}{2}$ ft. in girth. Twigs smooth, grey or reddish, bark of trunk brownish grey, not much marked by cracks or fissures. Wood used for ordinary domestic and agricultural purposes.

This species was discovered by Dr Stewart, and (doubtfully) identified by him, in Pb. Plants 30, with *A. creticum*, Linn., but subsequently recognised as a new species. It has no close affinity to any of the known species with 3-lobed leaves. The leaves are much larger than those of *A. monspessulanum*, L., or *creticum*, L., and are different in shape. Of the Japanese *A. trifidum*, Thunb., the leaves are much longer than broad. Without flowers, the affinity of the species cannot, however, be determined. It is not impossible that further inquiry may show this tree to be nearly allied to *A. Pseudoplatanus*, L.

4. *A. villosum*, Wall. Pl. As. rar. ii. 4.

Buds and young leaves covered with long silky hairs. Leaves cordate, 5-lobed, the 2 outer lobes small, irregularly and remotely dentate, on petioles exceeding half the length of leaf; basal nerves 5, the 3 inner penniveined. Flowers pentamerous, in lateral, more or less compound racemes, at the end of short lateral branchlets, appearing before the leaves. Peduncles and pedicels hairy; sepals oblong, with 3 nerves; petals linear, narrower than sepals; sepals and petals generally ciliate. Disc membranous. Stamens 8, in the male flowers much longer than calyx. Wings of fruit erect or divergent, back incurved; nuts large, the 2 nuts together forming a semicircle $\frac{1}{2}$ – $\frac{3}{4}$ in. across.

Himalaya, at high elevations (7000–9000 ft.), not uncommon from the Jhelam to Kamaon. Chūr, Royle. Deoban range, D.B. Fl. Feb., March; leaves appear in May; fruit ripens from June onward. A large, handsome tree, smaller branches brown, striate, bark of stem grey and fairly smooth.

5. *A. cæsiun*, Wall. (Herb. Kew).—Tab. XXI.—Vern. *Kūlu*, *trekhan*, *tarkhana*, *kūpattar*, *tilpattar*, *mandar*, *mandari*, *mandarang*, *kauri*, *kāl-īndra*, *salīma*, *kanzal*, Pb.; *Kaushin*, Tibet (N.W.P.)

Buds glabrous, young leaves with a few scattered hairs. Leaves pale beneath, cordate, 5-lobed, the 2 outer lobes small, with 5 basal nerves, all, or the 3 inner penniveined, margin with large obtuse serratures, petioles exceeding half the length of leaf. Flowers pentamerous, appearing after the leaves, in terminal corymbose panicles. Nuts unevenly gibbous, wings erect or divergent, back slightly curved. (*A. sterculiaceum*, Wall. Pl. As. rar. t. 105, from Nepal, is similar, but the male flowers are represented in lateral racemes below the insertion of the leaves.)

North-West Himalaya, from the Indus to Nepal, between 4000 and 10,000 ft., scattered in mixed forests, mostly in shady valleys. Fl. Apr.; fruit ripens Oct.

A large tree, 70-80 ft., with a tall straight trunk 12-13 ft. in girth, and a large oval, close crown. Twigs laterally compressed, red or bluish, smooth, with some callous dots, bark of trunk dark ash-coloured, or pale-brownish white, with thin long irregular scales. Wood of pale cream-colour, with brown bands, porous, soft, light, medullary rays indistinct. Some of the inferior kinds of the Tibetan drinking-cups are made of it.

6. *A. caudatum*, Wall. Pl. As. rar. t. 132.—Vern. *Khānsing*, Nepal.

Young shoots pubescent. Leaves 5-lobed, the 2 outer lobes small; lobes long-acuminate; base truncate or subcordate, margin divided into deep sharp cuspidate serratures; basal nerves 5, the 3 inner penniveined. Petioles reddish, pubescent, longer than half the leaf. Flowers appearing soon after the leaves in lateral and terminal short glabrous racemes, frequently tetramerous. Sepals ovate-oblong, with 6 nerves. Petals white, clawed. Disc fleshy, stamens 4-6, in male flowers much longer than calyx. Racemes elongated in fruit; wings pink, erect, or divergent, inner edge frequently denticulate.

Himalaya, at high elevations (8000-11,000 ft.), from the Chenab to Nepal. Fl. March, April. A large-sized tree with dark-brown bark.

A. pectinatum, Wall., with divaricate wings, is probably only a variety. *A. argutum*, Maximowicz, from Japan, is nearly allied.

7. *A. pictum*, Thunb. Fl. Japon. 161.—Syn. *A. latum*, C. A. Meyer; *A. cultratum*, Wall.; *A. Mono*, Maximowicz. Vern. *Kilpattar*, *trekhan*, *tarkhana*, *kakkeru*, *kanzal*, *kānjar*, *jārimu*, *laur*, Pb.; *Kanchli*, N.W.P.

Glabrous. Upper scales of buds oblong, clothed outside with adpressed hairs of a bright brownish yellow colour. Leaves broader than long, 5- or 7-lobed, from truncate or subcordate base; lobes long-acuminate, separated by rounded sinus, margin entire; basal nerves 5-7, the inner penniveined, with fine reticulation between. Petiole longer than leaf. Flowers appearing with or after the leaves on long filiform pedicels, in lateral and terminal stalked corymbs, pentamerous, glabrous; male and bisexual flowers on the same branch. Sepals oblong. Petals spatulate. Stamens 8, shorter than calyx. Disc fleshy, glabrous. Wings divaricate; back arcuate, somewhat recurved.

Outer and Middle Himalaya, from the Indus to Assam, between 4000 and 9000 ft. Outside India in Japan, North China, Mantchouria, the Caucasus,

Armenia, North Persia. There is no difference between the Himalayan specimens and those from Western Asia; those from Japan have the wings less divaricate: but the shape and direction of the wings is not always a steady character in this genus. *A. Lobelia*, Tenore, from the higher mountains of South Italy, is closely allied; but Boissier, Fl. Orient. i. 949, considers it to be different from *A. latum*.

The most common Maple in the N.W. Himalaya, usually found in mixed forests above 7000 ft. Leafless in winter. Leaves turn yellow and red in autumn before they are shed. Fl. about April, and the fruit ripens in summer. A large tree, 50 ft., with erect straight trunk 6-7 ft. girth, and wide-spreading branches. Bark dark brown, fairly smooth. Wood pinkish white, close-grained, fairly strong and elastic, not much valued for construction, but used for ploughs, bedsteads, and poles to carry loads. A large portion of the Tibetan drinking-cups are probably made of the knotty excrescences of this tree. The branches are lopped for fodder.

5. DODONÆA, Linn.

Shrubs, with alternate, simple, and entire leaves (pinnate in some of the Australian species), without stipules. Flowers unisexual and bisexual, often dioecious. Sepals 5 (sometimes fewer), valvate in the bud. Petals none. Disc small or inconspicuous. Stamens usually 8; filaments short; anthers basifixed, quadrangular, 2-celled, introrse, the cells opening longitudinally. Ovary 3- or 4-, rarely 5- or 6-celled, with 2 ovules in each cell. Capsule membranous or coriaceous, 2-5-celled, opening septicidally into as many valves as cells, each valve with a dorsal angle, often produced into a vertical wing. Seeds 1 or 2, with a thickened funicle, but not arillate; embryo spirally curled.

A large genus, of which about 45 species are known, with few exceptions endemic in Australia.

1. *D. viscosa*, Linn.; Boissier Fl. Orient. i. 953.—Syn. *D. Burmanica*, DC.; W. & A. Prodr. 114; Wight Ill. t. 52; *D. angustifolia*, D. dioica, Roxb. Fl. Ind. ii. 256. Vern. *Sanatta*, *mendru*, *ban-mendu*, Pb.; *Bandaru*, C.P.; *Bandurgi*, Can.

Leaves and young shoots more or less viscid with a bright yellow resin. Leaves varying from broadly oblong-lanceolate to linear-cuneate, gradually tapering into a marginate petiole, coriaceous, glabrous, shining, 1-4 in. long, acute obtuse or emarginate, entire or with shallow indentations, often revolute; one central nerve, with numerous parallel side-nerves, more or less distinct. Flowers in short terminal panicles or racemes. Sepals ovate, in the male flowers as long as stamens. Anthers oblong. Style generally longer than calyx, shortly 2-lobed at the top. Capsule membranous with 2, 3 or 4 membranous wings from base to style, including the wings $\frac{3}{4}$ in. across, and $\frac{1}{2}$ in. long. Seeds opaque, dark brown or black.

Common in the lower hills of North-East Afghanistan, the Trans-Indus territory, Sindh, Beluchistan, and the Panjab. Ascends to 4500 ft. in the Himalaya. Also in Central and South India, Burma, and Ceylon. Gregarious, covers extensive tracts of country, often to the exclusion of other shrubs, in the Dekkan, in Mysore; here and there in North-West India. Outside India in Arabia,

tropical Africa, tropical America, Florida, China, Java, Polynesia, and Australia. Fl. R. S. Fr. C. S.

A handsome evergreen shrub. In North-West India not more than 10 ft. high; on the mountains of Southern India a small tree 20 ft. high, with terete, compressed, or trigonous twigs. Wood light brown or bright yellow, hard, compact, and close-grained. Medullary rays indistinct. Annual rings fine, 26 on a specimen of $2\frac{1}{4}$ in. radius. The branches much used to support the earth of flat roofs, durable when thus employed. The shrub grows readily from seed without much water in arid places, and is planted in live hedges, for which it answers well.

6. STAPHYLEA, Linn.

Shrubs or small trees with opposite, stipulate, trifoliate, or pinnate leaves. Leaflets with setaceous, deciduous stipels. Inflorescence definite, flowers bisexual. Calyx 5-parted, coloured, the segments imbricate in bud, 2 outside, 2 inside, 1 intermediate. Disc 5-lobed. Petals 5, alternate with the sepals, erect, imbricate in bud. Stamens 5, inserted below the edge of the disc, alternate with the petals; anthers oblong, versatile, fixed near the middle, 2-celled, introrse, the cells parallel, opening longitudinally. Ovary of 2 or 3 distinct carpels, more or less united by their inner angles; styles filiform, distinct or more or less coherent. Ovules 6-8 in each carpel, attached to the inner angle in 2 series. Fruit a membranous, usually vesicular inflated capsule, 3-celled, 3-lobed, dehiscent at the summit. Seeds few or solitary in each cell, testa thick and bony. Embryo straight, in the axis of a fleshy albumen; cotyledons oval or orbicular, flat and thin; radicle short.

1. *S. Emodi*, Wall.—Vern. *Mārchob* (Serpent-stick), Afg.; *Nāgdawn*, *chitra* (spotted), *chūal*, *ban-bakhru*, *bān-shāgali*, *gūldar*, *kāghania*, Pb.

Glabrous, young leaves with slight farinose pubescence beneath. Leaves trifoliate; petioles round, glabrous, as long as, or longer than, the leaflets; leaflets nearly equal, ovate, acuminate, serrate, pale beneath, the terminal petiolulate, the lateral sessile. Stipules linear, membranous; stipels setaceous, both early deciduous. Flowers on short, compact, terminal, erect or drooping panicles, with numerous membranous, deciduous bracts. Petals as long as calyx-segments, both white. Stamens as long or a little longer; anther-cells attached to a linear, apiculate connective. Capsule 2-3 in. long, $1\frac{1}{2}$ in. diam., yellowish white, narrowed at base, broad, tricuspidate at the top, hanging on pedicels $\frac{1}{2}$ -1 in. long. Seeds compressed, shining grey.

Trans-Indus on the Safed Koh. North-West Himalaya from the Indus to the Sarda, generally at elevations between 6000 and 7000 ft., descends to 2500 and ascends to 9000 ft. Usually scattered singly in mixed and coniferous forests, where it attains the size of a moderate tree. Fl. April, May; the fruit ripens from June-Aug., hanging like grey bells among the dark green foliage.

Twigs smooth, dark, or greenish grey, rugose and longitudinally-striate, with large, oblong, white spots. Bark of stem spotted. Afghans and some tribes of the North-West Himalaya carry sticks of it, which are supposed to keep off snakes, probably because the spotted bark resembles a snake-skin.

There is but little difference between this species and the North American

S. trifolia, Linn., which is pubescent, and has anthers not overtopped by an apiculate connective. The Japanese species, *S. Bumalda*, DC., is also trifoliolate, but has lax, erect panicles, and small bifid capsules, of 2 carpels. *S. pinnata*, Linn., Central and South Europe, Western Asia, and *S. colchica*, Stevens, Caucasus, have imparipinnate leaves.

ORDER XXVIII. SABIACEÆ.

Shrubs or trees, with alternate leaves without stipules. Flowers small, unisexual or bisexual. Calyx 4-5-cleft, imbricate. Petals as many as sepals. Stamens hypogynous, as many as petals, and opposite to them. Anther-cells distinct, often adnate to a large and thick connective. Ovary 2-3-celled, styles distinct or connate. Ovules 1 or 2 in each cell. Fruit drupaceous, embryo without albumen or with very thin albumen.—Gen. Pl. i. 413; Royle III. 139; Wight III. i. 142 (*Millingtoniæ*).

Petals unequal; stamens 5, 2 fertile, 3 sterile . . . 1. MELIOSMA.

Petals equal; stamens 4-5, all fertile . . . 2. SABIA.

1. MELIOSMA, Blume.

Trees or shrubs, with simple or pinnate leaves. Flowers in large terminal panicles, bisexual or unisexual. Sepals generally 5, somewhat unequal, imbricate. Petals 5, unequal, the 3 outer concave, orbicular, the 2 inner small, bifid. Stamens 5, opposite to petals, the 2 fertile adnate to the smaller petals, 3 sterile, without anthers, opposite to the larger petals; anther-cells of the fertile stamens globose, distinct, attached to a large flat connective. Ovary sessile, 2-3-celled, surrounded at the base by the cup-shaped, membranous, toothed disc; ovules 2 in each cell, superposed; style 1, straight subulate. Fruit a drupe, with a hard, generally 1-celled and 1-seeded kernel; seeds with membranous testa; cotyledons conduplicate; radicle incurved.

Flowers pedicellate in the axils of deciduous bracts; bracteoles

none

Flowers sessile, 3-4 bracteoles under each flower . . . 1. *M. dillenifolia*.

2. *M. pungens*.

1. *M. dillenifolia*, Bl.—Syn. *Millingtonia dillenifolia*, Wall. Wight & Arnott in Edinb. New Philosoph. Journal, July 1833, p. 178. Vern. *Guep*, N.W.P.

Young branches, petioles, and inflorescence covered with ferruginous pubescence. Leaves 6-12 in. long, obovate or elliptic, acuminate, pale beneath, with short adpressed hairs on both sides, and rusty pubescence along nerves and veins; midrib prominent, with 15-20 parallel lateral nerves on either side, the nerves terminating in short sharp serratures, with intermediate serratures between. Petioles $\frac{1}{2}$ -1 in. long. Panicle lax, pyramidal, branches at right angles, longer than uppermost leaves, rachis angular. Flowers bisexual, on short pedicels, in the axils of short deciduous bracts. Calyx not supported by bracteoles, of 5 imbricate, ciliate sepals, the 2 outside sepals smaller. The 2 petals attached to the fertile stamens bifid, shorter than the stamens.

Himalaya, Sulej to Sikkim, between 4000-11,000 ft. Singly in shady mixed

forests, a small tree, 20 ft. high and 2½-3 ft. girth, conspicuous by its large penniveined leaves. Small branches reddish brown, furrowed. Bark of stem whitish and corky. Fl. white, with deep yellow pollen, from May-July; the small fruit ripens from Aug. and onward. Wood reddish white, coarse-grained.

Nearly allied is *M. myriantha*, S. & Z., from Japan, the only apparent difference being more persistent bracts, and minute linear bractlets on the pedicel.

2. *M. pungens*.—Syn. *Millingtonia pungens*, Wall. Cat. 8114. D. F. Vern. Gardar, kharas, Kamaon.

Young branches, petioles, and inflorescence clothed with short rusty pubescence. Leaves coriaceous, pale beneath, pubescent when young, when full grown with rusty pubescence beneath along midrib and nerves, otherwise glabrous, 6-8 in. long, oblong or cuneate-lanceolate; lateral nerves arcuate, with prominent reticulate veins; petioles short, less than ½ in. long, edge with large, distant, mucronate serratures. Panicles rigid, pyramidal, compact, longer than uppermost leaves; branches at acute angles, branchlets at right angles. Flowers sessile, calyx of 5 ciliate sepals, supported by 1 or 2 imbricate bracteoles, resembling sepals. The 3 outer petals membranous, 3-5-nerved, not conform to sepals.

Himalaya, between 2500 and 8000 ft., from near the Indus to Nepal; rare west of the Sutlej. A small tree; fl. in May and June; the fruit ripens from July onward.

M. Wightii, Planchon, Hb. Kew (*M. pungens*, Bedd. Fl. Sylv. Manual, p. 77; *Millingtonia pungens*, Wall., according to Wight & Arnott, Prodr. 115; and Wight l.c. 964. 3), is probably the same species. It is a large tree of the Sholas on the Nilgiris and other mountains near the western coast, above 5000 ft., and of Ceylon, with hard, coriaceous, entire or distantly-toothed lanceolate leaves; flowers hirsute, sepals and outer petals conform, thick, with fleshy base.

Another species nearly allied to these is *M. simplicifolia*, Blume (*Millingtonia simplicifolia*, Roxb. Fl. Ind. i. 103; W. & A. Prodr. 115; Griff. Pl. As. tab. 442). Eastern India, as far as Nepal, and perhaps further west; Southern India and Ceylon. A large tree, with obovate or oblanceolate leaves, entire or serrate in young plants, minute, nearly sessile yellow flowers, glabrous petals, hirsute sepals, and a bract conform with sepals. This again is similar to *M. angulata*, Bl., a tree from Java.

2. *SABIA*, Colebr.

Scandent or sarmentose shrubs with simple entire leaves. Flowers bisexual. Sepals 4-5, equal. Petals 4-5, equal, opposite to sepals, imbricate. Disc annular, 5-lobed. Stamens 4-5, all fertile, inserted on the disc; filaments thick. Ovary 2-lobed, the lobes cohering with the axis; styles 2, erect, terminal, more or less cohering; 2 ovules in each lobe. Fruit of 1 or 2 drupaceous or dry carpels; endocarp hard, rugose. Seeds 1 or 2 in each carpel, embryo curved.

- | | |
|---|----------------------------|
| Flowers axillary, solitary or in few-flowered fascicles . . . | 1. <i>S. campanulata</i> . |
| Flowers in large, terminal, and axillary panicles . . . | 2. <i>S. paniculata</i> . |

1. *S. campanulata*, Wall. in Roxb. Fl. Ind., ed. Carey, ii. 311.

A glabrous climbing shrub, branches woody. Leaves membranous, pale beneath, oblong-lanceolate, 3-4 in. long, decurrent into a ciliate

petiole. Peduncles axillary, 1-flowered, 1-2 in. long, mostly solitary. Flowers green, large. Calyx minute, with 5 spreading obtuse lobes. Petals membranous, $\frac{1}{3}$ - $\frac{1}{2}$ in. long, ovate, concave, obtuse, parallel-veined. Drupes twin, nearly distinct, obliquely obovate or reniform, flat, rugose, $\frac{1}{4}$ in. diam.

Himalaya, Kashmir, Sikkim, 5000-10,000 ft. elev. Fl. April, May, when the stem is nearly naked, and the buds begin to bring forth their young leaves.

2. *S. paniculata*, Edgew. MSS. in Herb. Kew.

A glabrous climbing shrub, leaves coriaceous, oblong-lanceolate, acuminate, 5-8 in. long. Flowers small, in terminal and axillary panicles; pedicels and calyx hairy. Petals lanceolate, $\frac{1}{2}$ in. long, or less. Drupes generally solitary, circular, compressed, $\frac{1}{2}$ in. diam.

Sub-Himalayan tract, Dehra Doon to Nepal, ascending to 3000 ft. Fl. spring.

ORDER XXIX. ANACARDIACEÆ.

Trees or shrubs, with alternate, rarely opposite, simple trifoliate or imparipinnate leaves, without stipules. Flowers mostly regular, unisexual or bisexual. Calyx 3-7, commonly 4-5-cleft. Petals as many as calyx-lobes. Disc generally annular. Stamens as many as petals or more, often twice as many, generally inserted outside at the base of the disc, all or a portion only perfect; anthers 2-celled, dehiscing lengthwise. Ovary various, either 1-celled with 1 ovule and 3-4 styles, or a trifid style (probably the result of an unequal development of 3 carpels), or 1-celled, with a simple oblique style (apocarpous, the other carpels abortive), or 5-6 distinct ovaries, but 1 only fertile; or lastly (tribe *Spondiææ*), 2-5-celled, 2-5-seeded. Fruit generally drupaceous, mostly 1-celled, 1-seeded, rarely 2-5-celled, 2-5-seeded. Albumen none.—Gen. Pl. i. 415; Royle III. 174; Wight III. i. 180 (*Terebinthaceæ*).

Fruit 1-celled, 1-seeded.

One 1-celled ovary, with a trifid style, or 3-4 distinct styles.

Ovule suspended from a funicle attached near the base of ovary.

Petals 4-6,

Petals none

Ovule suspended from near the top of ovary.

Stamens 8-10; leaves imparipinnate

Stamens 5; leaves simple

One 1-celled ovary, with a simple lateral style

Carpels 5-6, distinct, 1 only fertile

Fruit 2-5-celled, 2-5-seeded

1. RHUS.

2. PISTACIA.

3. ODINA.

4. SEMECARPUS.

5. MANGIFERA.

6. BUCHANANTIA.

7. SPONDIAS.

1. RHUS, Linn.

Trees or shrubs, with a resinous, sometimes viscous milky, often caustic juice. Leaves alternate, pinnate with a terminal leaflet, or trifoliate, rarely simple, without stipules. Flowers small, white or greenish, generally dicecious, in axillary or terminal panicles. Calyx of 5 sepals, united at the base, equal, imbricate, 2 outside, 2 inside, 1 intermediate. Petals 5, deciduous, alternate with the sepals, equal, inserted on the base of the

calyx outside the disc. Disc fleshy, coherent with base of calyx, annular or 5-lobed, the lobes opposite the petals. Stamens 5, alternate with the petals, inserted on or under the edge of the disc; anthers 2-celled, introrse, the cells opening longitudinally, in the fertile flowers smaller and more or less imperfect. Ovary in the fertile flowers ovoid or globular, sessile, 1-celled; styles 3, short; ovule solitary, anatropous, suspended from a long filiform funicle, which rises from the base of the cell. Fruit a small dry drupe; endocarp bony or crustaceous; albumen none, cotyledons flat, radicle incurved, generally superior.

Leaves simple	1. <i>R. Cotinus</i> .
Leaves trifoliate.	
Unarmed, terminal leaflet 2-3 in. long	2. <i>R. parviflora</i> .
Spinescent, terminal leaflet 1-1½ in. long	3. <i>R. mysorensis</i> .
Leaves imparipinnate; panicle terminal; fruit hairy.	
Leaflets dentate; petiole marginate	4. <i>R. semialata</i> .
Leaflets entire or subserrate, petiole not marginate	5. <i>R. punjabica</i> .
Leaves imparipinnate; panicles numerous, lateral, ripe fruit glabrous.	
Tomentose; pericarp splitting when ripe	6. <i>R. vernicifera</i> .
Glabrous; pericarp not splitting when ripe	7. <i>R. succedanea</i> .

1. *R. Cotinus*, L.*—Syn. *R. velutina*, Wall. Vern. *Pān, bhān, manu, banthra, tūng, tittri*, Pb.; *Tūnga, tungla, tung, chaniāt, āmī* (from *ām*, Mango), N.W.P.

Branchlets, petioles, and under side of leaves covered with short soft pubescence. Leaves elliptic or obovate, entire, obtuse, on long petioles, often longer than leaves, lateral nerves 10-15 pair, parallel, straight below, arcuate above. Flowers on slender pedicels, in a lax panicle, ramifications and pedicels pilose, bracts subulate. Fertile flowers few. Drupe compressed, semicordate or obliquely obovate, 1-seeded, about $\frac{1}{4}$ in. long, covered with short white hairs while young, glabrous and rugose with prominent veins when ripe. Pedicels of the sterile flowers elongated after flowering, and densely covered with long silky hairs, forming a spreading panicle of slender feathery branches.

Eastern slopes of Suliman range and N.W. Himalaya to the Sarda river, between 2300 and 6000 ft. Outside India in South Europe, West Asia, Caucasus. A shrub or small tree, to 20 ft. high, and 3 ft. girth, growing somewhat gregarious, mostly on arid, sunny slopes, often forming an underwood in forests of *Pinus longifolia* with *Berberis*, *Andromeda*, and other shrubs. Leafless for a short time, the young reddish leaves come out in April. Fl. Apr.-Sept.; fr. autumn. The South European shrub is hardy in England.

Bark of trunk and larger branches dark grey or brown, with white dots, and often with horizontal yellowish bands, smooth, hard, peeling off in flakes. The leaves and flowers when bruised emit a pleasant balsamic odour, supposed to resemble the smell of Mangoes, hence one of the vern. names. Wood yellowish, hard, strong, close- and even-grained, often beautifully mottled, used for inlaid and cabinet work in South Europe. In the Himalaya the twigs are used for basket-work, and the small branches as tooth-sticks. Bark and leaves used for tanning.

* I have seen a good deal of *R. Cotinus* in South Europe, and of *R. velutina* in the Himalaya, and do not hesitate to unite them, though the former is glabrous.

2. *R. parviflora*, Roxb. Fl. Ind. ii. 100.—Vern. *Tūnga*, *tūngla*, *dungla*, *rāi tūng*, *tumra*, *rannel*, N.W.P.

An unarmed shrub. Younger branches, petioles, and the under side of leaves clothed with dense brown tomentum. Leaves trifoliate, leaflets oblong-ovate, the lower part entire, the upper part irregularly crenate. Lateral leaflets sessile, smaller, the terminal larger, 2-3 in. long, narrowed into a short marginate petiole; lateral nerves 10-15 on either side of midrib, with shorter intermediate ones. Panicle large, compound, terminal, lower branches from the axils of leaves, with short, erect, corymbose branchlets; pedicels shorter than flowers, bracts linear. Ramifications of panicle and bracts with long white silky hairs. Sepals ovate, the outer hairy, 2 somewhat narrower than the rest. Petals oblong, more than twice the length of sepals; disc distinctly 5-lobed, lobes opposite to petals. Drupes ovoid, $\frac{1}{2}$ in. across, glabrous, brown, shining.

Common N.W. Himalaya, between 2000 and 5000 ft., from the Sutlej to Nepal, on the Pachmarhi hills, Central Provinces, and in Ceylon. Often gregarious on bare arid slopes. Fl. May-June; fr. July, Aug.

Bark grey, smoothish, longitudinally rugose. Wood yellowish, close-grained, and hard. Mixed with salt, the fruit is used like Tamarind (Benar valley, Bhawar). The *tantarik* of the Panjab bazaars, which is used in Hindu medicine (generally attributed to *Pistacia Terebinthus* and *Lentiscus*), is partly at least the fruit of this tree.

3. *R. mysorensis*, Heyne; W. & A. Prodr. 172.

A small shrub, branches stiff, often spinescent; branchlets with short grey or brown tomentum. Leaves trifoliate, leaflets obovate or cuneate, with scattered short hairs above, and with soft grey or brown pubescence beneath, deeply dentate or lobed, the 2 lateral leaflets sessile, smaller, the terminal 1-1 $\frac{1}{2}$ in. long, sessile or narrowed into a short marginate petiolule. Panicles terminal, compound, pubescent, the lower branches from the axils of leaves, with short racemose branchlets; bracts minute, linear, pedicels shorter than flowers. Sepals ovate, 2 smaller than the rest. Petals oblong, more than twice the length of sepals. Disc indistinctly 5-lobed. Drupes glabrous, brown, shining.

Eastern flank of Suliman range 2500-5000 ft., hills west of Sindh below 4000 ft. near Delhi, the Dekkan, and South India. Fl. Feb.; fr. April.

Gregarious in arid hot places; the leaves when bruised have a balsamic smell; the wood is used for fuel. Possibly not distinct from *R. parviflora*, Roxb.

4. *R. semialata*, Murray; D.C. Prodr. ii. 67.—Syn. *R. javanica*, Linn.; *R. Buckiamela*, Roxb. Fl. Ind. ii. 99; Wight Ic. t. 561. Vern. *Tatri*, *thissa*, *tetar*, *tītri*, *chechar*, *arkol*, *arkhar*, *kakkri*, *kakkeran*, *phus-kakrein*, *dūdra*, *brāsh*, *wānsh*, *hulāshing*, *kāshūn*, Pb.; *Dakhmīla*, *daswīla*, N.W.P.; *Bakhiamelā*, Nepal.

A moderate-sized tree. Young branches, petioles, and inflorescence covered with short, soft, dark-grey pubescence. Leaves imparipinnate, 12-18 in. long; upper part of petiole generally marginate; leaflets opposite, 4-6 pair, sessile (the terminal leaflet on a marginate petiolule),

oblong or elliptic from an oblique base, acuminate, with large triangular, often sharp teeth, 10-15 main lateral nerves on either side of midrib, glabrous or pubescent with scattered hairs above, and clothed with dense, grey or brown tomentum beneath. Panicle terminal, large, nearly as long as the upper leaves; branches spreading. Flowers small, pale yellowish green. Drupe globose or obovoid, nearly $\frac{1}{4}$ in. across, greenish yellow, or dark reddish brown, covered with short tomentum. Kernel compressed, smooth, brown, with a hard shell.

Common in the outer Himalaya between 2500 and 6000 ft., at times attaining 7000 ft., from the Indus to Assam. Kasia hills. Beyond India, in China and Japan. Deciduous; leaves get red before they fall; the flowers appear at various times between spring and autumn, chiefly April-June; the fruit ripens Aug.-Oct. In Japan fl. in Sept. (Thunberg, *Flora Japonica*, 121).

35-40 ft. high, with a short erect trunk 3-4 ft. girth, few ascending branches forming an oval head. Galls of various shapes, often stalked, frequent on the branches, in Japan and the N.W. Himalaya, an article of trade in Japan and China. Wood greyish white, soft, light, and not valued. Pulp of fruit acid, eaten in Sikkin and Nepal, and used medicinally.

5. *R. punjabensis*, J. L. Stewart.—Vern. *Titari*, *tetar*, *arkhar*, *palāi*, *choklu*, *kangar*, *kakkrein*, *dor*, Pb.

Young branches and petioles covered with short grey pubescence. Leaves imparipinnate, 12-15 in. long; leaflets opposite, 5 or 6 pair, nearly sessile, the terminal petiolulate, ovate-oblong, from a rounded oblique base, acuminate, entire, occasionally serrate near apex, pubescent beneath, particularly along nerves, short scattered hairs above; 10-15 main lateral arcuate nerves on either side of midrib, with a few intermediate shorter nerves. Panicle terminal, compact, pyramidal, less than half the length of leaf, ramifications with rusty pubescence. Drupes on short pedicels, subglobose, small, $\frac{1}{8}$ in. diam. Pericarp crustaceous, clothed with a dense purplish tomentum; kernel compressed, unequal-sided, broader than long, grey, shining.

Rajaori, Bussahir (Serahn), and elsewhere in the N.W. Himalaya, between 2500 and 8500 ft. Mostly in mixed forests, in places not too arid. Fr. Aug., Sept. A fair-sized tree, 35 ft. high and 4 ft. girth, with a broadish-oval crown, resembling *R. succedanea* in size, general appearance, and its corrosive juice. Nearly allied to *R. sylvestris*, Sieb. & Zucc., of Japan.

Another species, with terminal flower-panicles and imparipinnate leaves, is *R. Coriaria*, L., Boissier *Fl. Orient.* ii. 4, of South Europe, Algeria, and Western Asia; found in Persia, but not yet discovered in N.W. India. The leaves, dried and pounded, form an important article of trade under the name of *Sumach*, used for tanning the finer kinds of leather. Dye-stuff (for morocco leather) is made of the bark. The fruit is acid, and is eaten.

6. *R. vernicifera*, DC., Prodr. ii. 68.—Syn. *R. vernix*, Linn. (partly); *R. juglandifolia*, Wall. (not Willd.) Vern. *Kambal*, *gadūmbal*, *rūkhali*, *rūkhro*, *arkhar*, *arkol*, *harkū*, *lohāsa*, Pb.; *Akoria*, *kaunki*, (*gur*) *bhalūn*, N.W.P.; *Bhalāio*, *chosi*, Nepal.

A tree. Young branches, petioles, under side of leaves, and inflorescence clothed with dense, soft, rusty or greyish-brown tomentum; leaves approximate near ends of branches, 12-15 in. long, imparipinnate; leaflets opposite, 3-5 pair, nearly sessile, the terminal long-petiolulate, oblong or elliptic from unequal-sided base, acuminate, entire, with 20-25 arcuate main nerves on either side of midrib. Panicles much shorter than leaves, lateral from the axils of the lower or of fallen leaves. Flowers nearly sessile, petals with dark veins. Fruit ovoid or globose, $\frac{1}{4}$ in. long, in compact pyramidal panicles, rusty pilose when young, nearly glabrous when ripe. Outer pericarp dry, chartaceous, splitting irregularly. Kernel hard, smooth, in a mass of vegetable wax.

Common in places between 2000 and 4000 ft., ascending to 7000 ft., Himalaya from the Indus to Sikkim. Fl. May, June; fr. July-Sept. A large handsome tree, 50 ft., with a trunk attaining 5-6 ft. girth. Mostly in open places, not in forests. Bark of trunk grey, smooth, shining. Wood reddish brown, with indistinct medullary rays, soft, not valued. (On the Sutlej, yellow when dry; used for saw-frames and axe-handles.) The milky juice of the leaves is corrosive. It blisters the skin dreadfully. In Jaonsar Bawar it is rubbed on thread, to strengthen it.

I follow Decandolle and Royle (Ill. 175) in uniting the Indian tree with the Varnish-tree of Japan (*R. Vernix*, Linn.; Thunberg Fl. Japon, 121). I do so, however, with great reluctance, for I feel assured that they are not the same species. Wallich's name, *R. juglandifolia*, had unfortunately been anticipated by Willdenow for a species from New Granada. I have therefore no alternative, as it does not appear to me expedient to found a new name on the materials at present available to me. The leaves of the Japanese specimens are less tomentose, and the flowers are pedicellate, in lax panicles, longer than half the length of leaf. I have not seen specimens from Japan in fruit, but Gärtner's and Kämpfer's description seems to show that the pericarp does not split as it does in the Indian tree. Nor is the Himalayan tree known to yield any varnish. Gärtner (Fruct. i. p. 205, t. 44) describes the fruit of the Japanese tree as "drupa exsucca, turgide lenticularis, rotundo-rhomboides: vertice acuminato, obliquo, excentrico. Cortex (the pericarp) crassus, fibroso-fungosus, superficie lævigatissima, splendente, spadiceo-lutea." Kämpfer *Amoenitates exoticæ* (1712), p. 791, describes the tree under the Japanese name *Sits-dju* and *Urus-no-ki*, and says, "Fructus facie ac magnitudine ciceris, membranula tenui micante vestitus, per maturitatem durissimus et obsoleti coloris."

In Japan the Varnish-tree appears to be cultivated as coppice-wood. Kämpfer states that the varnish is obtained by incisions in stems three years old, these are cut down when exhausted, and the tree shoots up again. In Kämpfer's time the varnish obtained from this tree was considered superior to the varnish from China and Siam (*Melanorhiza usitatissima*?), and was often mixed with the inferior kinds. Candles are made in Japan of the wax round the fruit.

7. *R. succedanea*, L.; Roxb. Fl. Ind. ii. 98; Wight Ic. t. 560.—Syn. *R. acuminata*, DC. Prodr. ii. 268. Vern. *Tatri*, *arkol*, *arkhar*, *titar(i)*, *lakhar*, *rikhul*, Ph.; *Shash*, Kunawar; *Fási-no-ki*, Japan. (Kämpfer, *Amoen. exoticæ*, p. 794.)

Glabrous. Leaves approximate at the ends of branches, 6-12 in. long, imparipinnate; petiole round, naked; leaflets opposite, 3-6 pair, 2-4 in. long, petiolulate from unequal base, oblong-lanceolate, entire, long-acumin-

ate; lateral nerves 10-15 on either side of midrib. Panicles numerous, lateral, much shorter than leaves, in the axils of the lowest leaves or below them from the axils of the bud-scales. Flowers small, greenish yellow; pedicels nearly as long as flowers. Drupes on lax drooping panicles, oblique, compressed, outline rhomboid, about $\frac{1}{2}$ in. long, glabrous, rugose, yellow or light brown; kernel smooth, whitish, hard, enclosed by a fibrous pericarp; vegetable wax mixed with the fibres. Seeds large, oily.

In many parts of the Himalaya from 2000-8000 ft., from the Jhelam to Assam. Usually in mixed forests. (Nachar forest, Bassahir.) Kasia hills; also in China and Japan. Deciduous. Leaves fall in October, and turn red before they fall. Fr. Aug., Sept. A moderate-sized tree, 30 ft. high, with a short trunk 3 ft. girth. The milky juice of the tree causes blisters and makes black stains on paper. In Japan (Kämpfer, l. c.) the seed (and pericarp?) is crushed, boiled, mixed with the fruit of another tree (*Sindan*, *Melia Azedarach*?), and pressed, while hot. The result is a beautiful vegetable wax of snow-white colour, of which candles are made. Kämpfer calls this the wild Varnish-tree, and states that it yields a small supply of varnish.

2. *PISTACIA*, Linn.

Trees or shrubs, with alternate, pinnate, or trifoliate leaves without stipules, and small unisexual dioecious flowers without petals in axillary racemes or panicles. Male flowers with a 3-5-cleft calyx, and 3-6 stamens, on a small disc. Female flowers supported by bracts. Sepals 3-4. Ovary sessile, 1-celled, style short, 3-fid; stigmas 3 capitate, recurved; ovule 1, suspended from a basifixed funicle. Fruit a dry drupe, with a hard, bony kernel. Seed with a membranous testa, a curved embryo and thick plano-convex, often green cotyledons, filled with fat oil.

1. *P. integerrima*, J. L. S.—Tab. XXII.—Syn. *Rhus integerrima*, Wall.; *R. kakrasingee*, Royle. Often erroneously called *R. acuminata*. Vern. *Shuē, sarawān, masua*, Afg.; *Kakkar, kangar, kākra, kākda, kākāi, kakkrangche, kungu, gurgu*, Pb., N.W.P.

A tree, nearly glabrous. Leaves impari- or pari-pinnate, 6-9 in. long, with fine pubescence along petioles and nerves while young; leaflets opposite or nearly so, 4-5 pair; short-petiolate, lanceolate from oblique base, entire, long-acuminate, with 10-18 arcuate lateral nerves, joined by reticulate veins. Flowers on lateral panicles, the leaves below on the previous year's wood. Male panicles short, compact, pubescent. Stamens 5, 6, or 7; anthers large, oblong, obtuse, deep red. Sepals much shorter than stamens. Female flowers on short pedicels, in long lax panicles. Calyx of 4 linear sepals, generally supported by 2 ovate bracts, shorter than sepals. Sepals and bracts deciduous. Style 3-fid nearly to the base, with broad recurved stigmas. Drupe dry, somewhat broader than long, $\frac{1}{4}$ in. broad, rugose, glabrous, grey when ripe.

Eastern slopes of the Suliman range, hills of Trans-Indus territory, and round the Peshawar valley, between 1200 and 4000 ft. Salt range, and many parts of the Siwalik tract and the outer Himalaya, between 1500 and 6500 ft., ascending at times to 8000 ft. from the Indus to the Sarda. Often scattered on hot bare

rocky slopes. Cultivated in gardens of the Panjab plains. The dark-green leaves fall in February, the young foliage appears about March, together with the red flower-panicles, giving the tree a striking appearance for some time. At 4000-5000 ft. elevation the flowers open in May, and the fruit ripens from June-October.

A shady tree, 40 ft. high or more; trunk attaining a girth of 8-9, and at times 12-15 ft. Twigs ash-coloured or reddish brown, longitudinally rugose, with white specks; bark of trunk grey. The heartwood of mature trees is the best and most handsome wood of the North-West Himalaya for carving, furniture, and all kinds of ornamental work. It is hard, close and even-grained, brown, beautifully mottled with yellow and dark veins, and takes a fine polish. The sapwood is liable to be attacked by insects; but the heartwood is durable, highly prized, and consequently often cut recklessly. In Kangra, under native rule, it was one of the *Padshāhi* or Royal trees.

The tree is lopped severely, the twigs and leaves being a favourite food of buffaloes and camels. Gall-like excrescences, black, hard, rugose, hollow, irregularly crooked, often 6-7 in. long, are formed in October on leaves and petioles. They are sold under the name of *Kakra-singi*, and are used in native medicine. The fruit of this tree is probably the *Sumāk* of the Panjab bazaars, used to strengthen digestion.

Two other trees of the same genus grow in Beluchistan and Afghanistan, and yield a resin similar to mastich, called in Sindh *Sahti kundra*. They also yield galls of various shape and colour. One of these, *P. Khinjak*, J. E. Stocks; Boissier Fl. Orient. ii. 6, called *Khinjak*, *Khanjak*, *Sharamna*, *Shearena*, *gewān*, in Afghanistan and Beluchistan, with unwinged petioles, is nearly allied to *Pistacia Terebinthus*, L., a shrub or small tree of South Europe and Western Asia, which yields the Chios or Cyprus turpentine. The other (*Kasūr*), with winged petioles, *P. cabulica*, J. E. Stocks, Boissier l. c., is allied to *P. atlantica*, Desf., a large tree 60 ft. high, of North Africa, Mount Atlas, and the Canary islands, which furnishes a resin similar to mastich. The true mastich of Chios, which is used all over the Levant for fumigation, and which is chewed to whiten the teeth, and to make the breath agreeable, is the product of *P. Lentiscus*, Linn., an evergreen shrub, with paripinnate leaves, of the Mediterranean region. The pistachio-nuts, which are imported into India from Afghanistan, are produced by *Pistacia vera*, Linn., a small tree with 3-5 broad-ovate leaflets, of Syria, Mesopotamia, Persia, which is cultivated in Sicily, and other parts of Southern Europe.

3. ODINA, Roxb.

Trees with deciduous, alternate, imparipinnate leaves; leaflets opposite, entire. Flowers small, unisexual, fasciculate, in racemose panicles. Calyx 4-5-cleft, persistent, lobes imbricate in bud. Petals as many as calyx-lobes, imbricate in bud. Male flowers: an annular crenate disc, bearing stamens double the number of petals, surrounding a 4-cleft rudiment of ovary; anthers versatile, attached above the base. Female flowers: short sterile stamens on disc, surrounding the ovary. Ovary ovoid, 1-celled, with 4 distinct, short thick styles, and a solitary pendulous ovule. Fruit a drupe, with a hard kernel; embryo with flat fleshy cotyledons.

1. *O. Wodier*, Roxb. Fl. Ind. ii. 293; W. & A. Prodr. 171; Wight Ic. t. 60; Bedd. Fl. Sylv. t. 123.—Vern. *Kiāmīl*, *kembal*, *kimlu*, *kamlāi*, *kāmla*, *batrin*, *āla*, *dhauntika*, *sulāmba*, *pīchka*, *lādhra*, Pb.; *Jhinghan*, *jiban*, *sindan*, *kanni*, *karālū*, N.W.P.; *Jhigua*, *Jhinghan*, Oudh; *Ganjak*,

moian, *moyen*, *mowi*, *barna*, *dampara*, C.P.; *Moina*, Guzerat; *Wodier* and *Wude* in Tamil (hence the specific name); *Gharri-marra*, Gonds, Satpura range. *Nubhay*, Burm.

Young branches, leaves, and inflorescence with deciduous stellate tomentum. Leaves few, near ends of branches, 12-18 in. long, more or less glabrous when old, leaflets 3 or 4 pair, short-petiolulate, ovate, the terminal long-petiolulate. Flowers tetramerous, on short pedicels in compact, few-flowered cymose fascicles, the female flowers in simple, the male flowers in compound racemes. Racemes numerous at the end of branches, or on short lateral branchlets, male and female on different branches (often on different trees). Bracts numerous, broad-ovate, ciliate. Calyx-lobes obtuse, ciliate. Petals oblong, more than twice the length of calyx, coriaceous, spreading, purplish and greenish-yellow. Stamens 8, in male flowers as long as petals. Drupe on short pedicel, obliquely oblong, compressed, $\frac{1}{2}$ - $\frac{3}{4}$ in. long; epicarp coriaceous, glabrous, red when ripe. (Sometimes black?)

Common in dry forests in most parts of India and Burma, extending north-west to the Indus, and ascending to 4000 ft. in the outer Himalaya. Leafless from January or February to June; the flowers appear before the leaves between February and April; the fruit ripens from June onward, and often remains long on the tree.

A large tree, 40-50 ft. high, with an erect trunk, attaining generally 5-6 ft. in girth (12 ft. Baraich and Gonda forests, Oudh). Branches not numerous, large, spreading. A handsome tree when in full foliage, an eyesore when leafless. Bark 1 in. thick, ash-coloured, brown, or blackish, smooth, with scaly plates exfoliating, inner substance reddish, mucilaginous. Sapwood whitish, large, often nearly half the radius. Heartwood dull red, or reddish brown. A cub. ft. weighs 50-60 lb., P. 821. Works and planes smooth, polishes well, and, save that it is heavy, might be valuable for cabinet-work. Used for spear-shafts, scabbards, spokes of wheels, and (in Burma) for oil-presses and rice-pounders.

A yellowish-white gum exudes in spring, which is largely collected, and used in cloth-printing by weavers, and in medicine. The tree is often lopped and pollarded, the leaves and branches being a favourite fodder of cattle. Elephants are very fond of the young shoots.

4. *SEMECARPUS*, Linn. fil.

Trees with alternate, petiolate, simple, coriaceous leaves, and small polygamous flowers in lateral or terminal panicles. Calyx 5-cleft, the segments deciduous. Petals 5, imbricate. A broad annular disc between stamens and ovary. Stamens 5, small and sterile in the female flowers. Ovary 1, 1-celled, with 3 styles; ovule solitary, pendulous. Fruit an oblong, more or less oblique drupe, with a thick pericarp, its cells filled with an acrid resinous juice, surrounded at the base by a fleshy cupular or turbinate hypocarp, formed of the thickened receptacle and base of calyx.

1. *S. Anacardium*, L.; Roxb. Cor. Pl. t. 12; Fl. Ind. ii. 83; W. & A. Prodr. 168; Wight Ic. t. 558; Bedd. Fl. Sylv. t. 166.—*The Marking Nut tree*.—Sans. *Arushkara*, *bhallātaka*. Vern. *Bhilāwa*, *bhaliau*, Pb.,

N.W.P.; *Bhāla*, Oudh; *Koka*, *bhallia*, C.P.; *Kohoka-marrah*, Gonds, Satpura Range.

Young branches, inflorescence, petioles, and under side of leaves clothed with a short, somewhat harsh, tomentum of simple hairs. Leaves approximate near extremities of branches, oblong-obovate, 9-18 in. long, rounded at the top, with rounded or cordate base, on a short, thick, half-round petiole. Flowers nearly sessile, fasciculate, the fascicles arranged in erect compound terminal panicles. Bracts lanceolate, the lower branches of panicle in the axils of leaves. Petals oblong, 3-4 times the length of calyx, spreading, glabrous, greenish yellow. Filaments subulate from a somewhat dilated base. Drupe obliquely oval or oblong, about 1 in. long, smooth, shining, purplish black when ripe, hypocarp orange.

Locally abundant in most parts of India, its north-western limit somewhat beyond the Sutlej river; ascends in the outer Himalaya to 3500 ft. Deciduous, old leaves shed in February, new foliage issues in May. The flowers appear at various times, generally soon after the leaves; the fruit ripens from November to February. A moderate-sized tree, attaining 30 ft. (but often smaller), with an erect trunk 4 ft. girth. Bark 1 in. thick, dusky grey, blackish, with irregularly quadrangular plates, separated by narrow longitudinal and shallow irregular cross furrows or wrinkles, in old trees rough with exfoliating scales. Inner surface of bark red, exuding a juice which blackens on exposure. Wood ash-coloured, reddish white, or brown, even- but open-grained, weight 42 lb. per cub. ft. Sap- and heart-wood not distinct. The wood is full of an acrid juice, which causes swelling and irritation; timber-cutters object to felling it unless it has been ringed for some time. Cracks in seasoning, is not durable, and is not much used. Bark adstringent, used in dyeing.

A brown, nearly insipid gum exudes from the stem. The leaves serve as plates. The ripe fruit is collected: the hypocarp is eaten; fresh, it is acrid and adstringent—roasted, it is said to taste somewhat like roasted apples, and when dry somewhat like dates. The pericarp is full of acrid juice, which is used in native medicine. A black varnish is prepared from it, and mixed with lime-water it is used for marking cotton. The oil of the seeds, mixed with the milk of *Euphorbia*, is made into birdlime by the wild tribes of the Satpura range in the Central Provinces.

5. MANGIFERA, Linn.

Trees with alternate, petiolate, simple, entire, coriaceous leaves. Flowers polygamous, in terminal panicles. Calyx 4-5-parted, imbricate, deciduous. Petals equal number, imbricate with prominent thick longitudinal nerves. Stamens 4-5, inserted on a more or less prominent disc; 1 stamen only perfect, much larger than the others. Ovary sessile, 1-celled, oblique, with a lateral simple style and 1 ovule, attached to the side of the cell above its base. Fruit a large fleshy drupe, with a fibrous kernel, 1-seeded. Testa thin, chartaceous, no albumen; cotyledons fleshy, plano-convex, often unequal and lobed; radicle inferior.

1. *M. indica*, L.; Roxb. Fl. Ind. i. 641; W. & A. Prodr. 169; Bedd. Fl. Sylv. t. 162. The *Mango-tree*. Sans. *Amra*; Malay, *Manga*.—Vern. *Am*, *ambi*, *āmri*. Local name, *Marka-marrah*, Gonds of Satpura range. *Thuyetben*, Burm.

A large evergreen tree, glabrous; leaves generally 6-12 in. long, dark

green, coriaceous, approximate near the extremities of branches, oblong-lanceolate, entire, the margins often waved; petioles swollen at base; numerous arcuate lateral nerves, with shorter intermediate nerves. Panicles large, erect, a little downy, with horizontal branches, and oval somewhat concave bracts. Flowers pale yellow, strongly scented, male and bisexual flowers on the same panicle. Sepals 5, oblong, concave. Petals ovate, twice the length of sepals, with dark yellow or orange lines near the base. Disc fleshy, 5-lobed, surrounding the ovary, and connate with its base; the stamens inserted between it and the ovary. Filament 1, subulate, bearing an oval purple anther; sterile stamens 2-4, minute. Ovary obliquely ovoid, with a lateral incurved style. The fruit varies in length from 2-6 in., is compressed, generally yellow when ripe, with a more or less flattened fibrous kernel, the radicle generally bent upwards.

The Mango-tree, or wild forms which are closely allied to the cultivated kinds, is indigenous in Burma, along the Ghats of the western coast (extending northwards to Khandeish), in the Kasia hills, Sikkim, and in ravines of the higher hills of the Satpura range. It is also believed to be wild in the sub-Himalayan tract, in deep gorges of the Baraith and Gonda hills in Oudh, and of the outer hills in Kamaon and Garhwal. Roxburgh, l. c. 644, describes the wild Mango of Silhet as *M. sylvatica*, with linear petals many times longer than calyx, and a short, turbinate, slightly grooved disc. The Mango is cultivated throughout India, but west of the Ravi it almost disappears, except at a few places in Mozaffargarh, and about Sealköt. At Peshawar there are only a few small trees with indifferent fruit, and it is very scarce further down in the Trans-Indus territory. In Upper Sindh (near Sukkhur), the Mango is grown in gardens and produces good fruit, but requires to be protected against frost while young. In the outer N.W. Himalaya it is cultivated as high as 3500 ft. In India, the Malayan Peninsula, and the Indian Archipelago, the Mango-tree has been cultivated from time immemorial. It is also cultivated in other tropical countries, particularly in Brazil and the West Indies, but its introduction into America is of comparatively recent date (1782 to Jamaica). The young foliage is purplish green, and comes out between Feb. and June. Fl. between Feb. and April, according to latitude, elevation, and locality; the fruit ripens between May and July.

Attains 60-70 ft. in North India; trunk straight, to 15 ft. girth, with a broad massive crown, giving dense shade. Bark $\frac{3}{4}$ -1 in. thick, dark grey, brown or blackish, rough with numerous small fissures and exfoliating scales. Wood dull grey or dirty white, with darker streaks or patches, soft, open-grained, readily eaten by insects. The cub. ft. weighs 38-44 lb., P. between 463 and 678. In old trees small distinct heartwood of dark brown colour (R. Thompson). Used for planking, doors, and window-frames. Canoes and Massula boats are made of it. Bark and leaves are used medicinally; a gum issues from wounds in the bark, and Lakh is produced on the tree (in Sindh, in dry years).

Mainly cultivated on account of its fruit. In North and Central India the fruit of ungrafted trees is generally stringy, with a strong turpentine flavour. It nevertheless forms an important article of food for large classes of the population. The fruit of good grafts is excellent, soft, juicy and with a delicious aromatic flavour. In Burma the Mango is not generally grafted; seeds of a good kind, as a rule, produce good fruit of a similar description. This is a remarkable fact, but it does not stand quite alone, for in other parts of India also it has been noticed that the seed of good kinds produces the same variety without grafting (Firminger Gardening, 2d ed. p. 235). It is an interesting question,

whether in certain districts, or under certain circumstances only, grafting is necessary to produce a good variety of the Mango.

In Jamaica, starch is made of unripe Mangoes; the kernels are eaten in India during times of scarcity. Roxburgh states that they are first boiled in the steam of water.

6. BUCHANANIA, Roxb.

Trees with alternate, petiolate, simple, entire, coriaceous leaves. Flowers small, bisexual, in terminal and axillary panicles. Calyx small, 3-5-cleft, persistent. Petals 5, oblong, imbricate in bud. An annular disc, between ovaries and stamens, more or less crenate or lobed. Stamens 10, inserted outside the disc at its base; anthers basifixed. Carpels 5, distinct, 1 fertile, 1-celled, ovule 1, attached to a funicle proceeding from the base of the ovary; the others rudimentary, subulate. Fruit a drupe with compressed crustaceous or bony putamen, splitting into 2 valves at the time of germination.

1. *B. latifolia*, Roxb. Fl. Ind. ii. 385; Cor. Pl. 282; W. et A. Prodr. 169; Bedd. Fl. Sylv. t. 165.—Sans. *Piyāla*, *chāra*, Vern. *Chirauli*, Pb.; *Piāl*, *muria*, *katbhūāwa*, Garhwal, Kamaon; *Piār*, *peirah*, Oudh; *Chār achār*, C.P.; *Sārāka-marrah*, Gonds, Satpura range. The kernel of the fruit is called *chironji*. *Lumboben*, Burm.

Young branches, inflorescence, under side of leaves, petioles, and midrib clothed with long silky hairs. Leaves generally 6-10 in. long, oblong, obtuse, with 15-20 prominent and branched lateral nerves on either side of midrib, and shorter intermediate ones. Stipules none. Panicles terminal and from the axils of the upper leaves, pyramidal. Bracts small, caducous. Flowers whitish green, sessile. Carpels hairy. Drupe black when ripe, $\frac{1}{2}$ in. long, putamen hard, bony.

A common tree of the dry forests throughout India and Burma, ascending nearly to 4000 ft. in South India, and to 3000 ft. in the outer Himalayan ranges. The Sutlej is its north-western limit in North India. Common in Sal forests, but extends far beyond the limits of Sal in the south. Nearly leafless for a short time during the hot season; the new leaves issue about May, and the full-grown foliage is dark green. Fl. Jan.-March; the fruit ripens in April and May, and is generally off the tree by the middle of June. A Loranthus is common on the tree.

A moderate-sized tree, 40-50 ft. high, with a straight trunk, not exceeding 4 ft. in girth in North and Central India; bark 1 in. thick, dark grey or blackish, rough, tubercled and tessellated, small quadrangular plates divided by deep narrow furrows. Sap- and heart-wood not distinct. Wood brown when fresh-cut, when seasoned greyish brown, red or pink, with white streaks, compact, even-grained, soft and light, weight 36-47 lb. per cub. ft., seasons well, is easily worked, liable to be eaten by white ants and beetles, otherwise fairly durable if kept dry. Used for boxes, bedsteads, bullock-yokes, doors, window-frames, tables, and the like. Is apt to stain clothes unless polished.

The bark is used for tanning; a pellucid gum exudes from wounds in the stem; the leaves are often used as a substitute for plates. The fruit has a pleasant, sweetish, subacid flavour, is an important article of food of the hill tribes in the Central Provinces (Gonds and Bygahs). They collect the seed and extract the kernel, which they barter for grain, salt, and cloth. The kernel

tastes somewhat like pistachio-nuts; it is an important article of trade, being used largely in native sweetmeats. Oil is extracted from it.

7. SPONDIAS, Linn.

Trees, with alternate, imparipinnate leaves, without stipules, and small flowers in terminal, spreading panicles. Calyx small, 4-5-lobed. Petals as many, valvate or imbricate in bud. Stamens twice the number of petals, inserted under the plicate or crenate disc; anthers versatile. Carpels 4-5, at first distinct, afterwards coalescing; styles as many as carpels; ovules solitary, pendulous. Fruit a fleshy drupe, with a bony, 2-5-celled, 2-5-seeded kernel. Embryo straight, with plano-convex cotyledons.

1. *S. Mangifera*, Pers.; Roxb. Fl. Ind. ii. 451; W. & A. Prodr. 173; Wight Ill. t. 76; Bedd. Fl. Sylv. t. 169.—*Hog-plum*. Sans. *Amrātaka*, *kapitana*. Vern. *Amra*, *amāra*, *ambārā*, *amūr*, *bahamb*, *ambodha*. (*Kwayben*, Burm.)

Glabrous. Leaves near extremities of branches, 12-20 in. long; leaflets opposite, about 5 pair, short-petiolulate, elliptic-oblong, acuminate, with 10-30 parallel, nearly straight, lateral nerves on either side of midrib, joined at the ends by a prominent nerve running parallel with the edge and close under it, and reticulate veins between. Flowers white, nearly sessile, bisexual, pentamerous, fasciculate, on large, erect, diffuse, and thin panicles. Petals 5, oblong, spreading. Disc fleshy, notched. Filaments subulate, shorter than petals. Drupe ovoid, smooth, fleshy, yellow when ripe, about $1\frac{1}{2}$ in. long; kernel woody, tough, fibrous outside, and rough with irregular furrows and cavities. Seeds 1-3. The flowers of this sp. seem always to be bisexual, but a few only set fruit.

Common, but not everywhere, in dry forests of many parts of India and Burma. Its north-western limit seems to be the Salt range in the Panjab. Scarce in the Central Provinces. One of the first trees to shed its leaves (Nov.), and the last to renew them, often not until the rains have set in. The mature foliage is bright green, with a peculiar smell when bruised. Fl. in April; the fruit ripens in the ensuing cold season.

In North India a small tree, 25 ft. high, 4 ft. girth; in South India and Burma a large tree. Bark thick, whitish or brownish-grey, undulated with short longitudinal, generally shallow wrinkles. Wood soft, coarse-grained, useless. A mild tasteless gum exudes from wounds made in the bark in spring. The ripe fruit has an astringent, acid, and turpentine taste, but is eaten, and is pickled. Deer eat it greedily, and heaps of the hard kernels are found everywhere in the forests where this tree grows.

Coriaria nepalensis, Wall. Pl. As. rar. t. 289. Vern. *Massūri* (at Mussoori, whence the name), *mākola* (Kamaon) is a shrub, belonging to the small order of *Coriariæ*, with quadrangular branchlets, opposite, ovate, 3-7-nerved leaves, racemose pentamerous flowers, 10 stamens, and 5 distinct, 1-seeded carpels, attached to a conical torus, the petals enlarged after flowering, with a sharp keel inside, which is inserted in the interstices between the carpels. It is found in the Himalaya, between 2500 and 7500 ft. elevation, from near the Indus to Bhutan. The branches are browsed by sheep. The fruit is eaten, but

is said to cause thirst or colic. Nearly allied to it is *C. myrtifolia*, Linn., a shrub of South Europe and North Africa, the leaves of which are used for tanning and dyeing leather, and the fruit of which is poisonous.

ORDER XXX. MORINGEÆ.

Soft-wooded trees, with alternate, impari- bi- or tri-pinnate leaves; the pinnæ and leaflets opposite; leaflets entire, caducous. In the place of stipules, glands at the base of petioles and pinnæ. Flowers large, bisexual, irregular, white or red, in axillary panicles. Calyx cup-shaped, with 5 deciduous, somewhat unequal, petaloid segments. Petals similar to calyx segments, unequal, the upper one ascending. Disc lining inside of calyx, with a short free margin. Stamens inserted on the edge of disc, 5 perfect stamens opposite to petals, and alternating with 5 (sometimes 7) filaments without anthers; anthers attached on the back, oblong, 1-celled. Ovary stipitate, lanceolate, 1-celled, with 3 parietal placenta, and a simple slender style; ovules numerous. Capsule pod-shaped, rostrate, 3-6-angled, torulose, 1-celled, 3-valved, with numerous seeds, embedded in the fungous substance of the valves. Seeds with a straight embryo without albumen. —Gen. Pl. i. 429; Royle III. 180; Wight III. i. 186.

1. MORINGA, Juss.

(Only genus, the characters those of the order.)

1. *M. pterygosperma*, Gärtn.; W. & A. Prodr. 178; Wight III. t. 77; Bedd. Fl. Sylv. t. 80. — Syn. *Hyperanthera Moringa*, Roxb. Fl. Ind. ii. 368. Horseradish-tree. Sans. *Sobhanjana*. Vern. *Soanjna*, *sajjna*, *senjna*, *sujna*, *shajna*, North India; *Swanjera*, Sindh; *Saihan*, *sejan*, *munga*, *mulaka*, C.P.

Young branches, inflorescence, petioles, and young leaves clothed with short, grey, velvety pubescence. Leaves near the extremities of branches, generally tripinnate, 1-2 ft. long, on long sheathing petioles; pinnæ opposite, 4-6 pair, the lower 3-4 pair bipinnate; pinnulae opposite, 6-9 pair, the four lower pairs generally with 3-7 leaflets, the rest consisting of single leaflets; leaflets on short slender petiolules, ovate or obovate, entire, pale beneath, lateral nerves indistinct. Petioles of pinnæ and pinnulae articulate, with a linear hairy gland between each pair of pinnæ, pinnulae, and leaflets. Flowers strongly honey-scented, in numerous lateral panicles at the ends of branches; bracts linear, shorter than pedicels. Petals linear-spathulate, white, with yellow dots at the base. Ovary and base of filaments hairy. Pods pendulous, 9-18 in. long, with 9 rounded longitudinal ribs; seed trigonous, winged at the angles.

Commonly cultivated throughout India and Burma, in the N.W. Himalaya to 500 ft., introduced in other tropical and subtropical countries (Jamaica 1784). Wild in the lower Himalaya and Siwalik tract from the Chenab to the Sarlah, also in the Oudh forests. Most of the old leaves shed in Dec. and Jan.; the fresh foliage appears in March and April; the flowers issue between Jan. and April, generally before the leaves are out; the pods ripen from April onward, and, unless pulled off, remain long on the tree.

A small tree, to 20 ft. high, with a straight trunk 4.5 ft. girth, and a few large divergent branches. Bark grey, soft, corky, and deeply cracked. Wood coarse-grained, spongy, soft and perishable. The tree is mainly cultivated on account of its fruit, which is eaten as a vegetable, and preserved as pickle. Leaves and flowers are likewise eaten. Twigs and leaves are lopped for fodder. Incisions are made in the trunk, from which exudes a reddish gum, used in native medicine. The root has a strong pungent flavour, much resembling horseradish; locally applied, it acts as a vesicant (Pharm. Ind. 61). From the seeds of another species with unwinged seeds, *M. aptera*, Gærtn., of Africa, a valuable oil (the Ben-oil of watchmakers and jewellers) is obtained; but, so far as known, no oil is extracted from the seeds of this species in India.

A second species, nearly allied to this, *M. concanensis*, Nimmo, grows wild on the dry hills of Rajputana (*Sainja*), near Kishengurh and Bednore; also on the hills of Sindh (*Mhūa*) and the Konkan. It has yellow flowers, and bipinnate leaves, pinnae 4-6 pair, simply pinnate, except sometimes the lowest, which are bipinnate, with broadly ovate leaflets, 1 in. long, on petioles $\frac{1}{2}$ in. long, with 4-6 pairs of rather prominent lateral nerves. In Rajputana I found it in leaf and flower in Dec. 1869; in the Konkan it is said to flower in Nov. The unripe fruit is eaten. Bark thick, soft, corky. Wood soft and light.

ORDER XXXI. LEGUMINOSÆ.

Herbs, shrubs, or trees, extremely variable in appearance. Leaves generally alternate, compound, and stipulate; inflorescence mostly indefinite. Flowers bracteate; calyx of 5 sepals, free or oftener connate; petals 5 or fewer, equal or unequal. Stamens 10 or numerous, rarely hypogynous, more commonly inserted with petals on the base or inside of the calyx-tube; anthers 2-celled, cells parallel, generally opening longitudinally. Pistil monocarpellary, rarely 2- or 5-carpellary; ovules numerous, rarely 1 or 2, attached in 1 or 2 series to the inner suture. Fruit a pod (legume), generally dry, indehiscent, or separating into 2 valves, along one or both sutures. Seeds exalbuminous, or (in some *Cæsalpinieæ*) albuminous; testa coriaceous, sometimes horny, rarely thinly membranous; embryo straight, or the radicle bent upon the cotyledons, which are generally large, fleshy, or foliaceous.—Gen. Pl. i. 434; Royle III. 180; Wight III. i. 187.

This large order comprises upwards of 6500 species, distributed nearly over the entire globe. It is divided into three well-defined sub-orders—*Papilionaceæ*, *Cæsalpinieæ*, and *Mimoseæ*.

Calyx gamosepalous; corolla papilionaceous; petals free, unequal, imbricate, the posterior petal outside; stamens generally diadelphous

1. PAPILIONACEÆ.

Calyx parted nearly to the base; petals free, mostly unequal, imbricate, the posterior petal inside; stamens free

2. CÆSALPINIÆ.

Calyx gamosepalous; petals more or less connate, equal, valvate; stamens free or monadelphous

3. MIMOSÆ.

FIRST SUB-ORDER, PAPILIONACEÆ.

Mostly herbs, rarely shrubs or trees. Leaves alternate, pinnate, or digitate, rarely simple; stipules usually present; leaflets often stipellate; flowers bisexual, irregular. Calyx gamosepalous, often 2-lipped, the upper

lip consisting of 2, the lower (anterior) of 3 sepals. Petals 5, clawed; unequal, imbricate in bud, the posterior and outside petal (standard) broad; often reflexed, the 2 anterior and inside petals (keel) often connate, the 2 lateral and intermediate petals (wings) enclosing the keel. (The standard is often called the upper petal, being commonly placed upwards with regard to the axis of the inflorescence, but as regards insertion it is the lowest of the 5 petals.) Stamens generally 10, inserted with the petals near the base or on the inside of the calyx-tube; filaments free, or connate into a tube or sheath, or the one opposite to the standard free, the claws of keel, or of keel and wings, sometimes adhering to the staminal tube; anthers versatile, rarely basifixed. Pistil monocarpellary, sessile or stipitate; style incurved; stigma oblique or terminal; ovules numerous, rarely 1 or few. Fruit a dry legume. Seeds with a coriaceous testa, without albumen; cotyledons thick, plano-convex; the radicle accumbent upon the cotyledons.

The 20 genera here described belong to the following tribes:—

- Podalyriæ*.—Stamens 10, free; leaves simple or digitate—*Piptanthus*.
Genistææ.—Stamens 10, monadelphous; leaves simple or digitate—*Crotalaria*.
Galegææ.—Stamens 10, diadelphous; pod 2-valved; leaves imparipinnate—*Caragana*, *Indigofera*, *Colutea*, *Sesbania*, *Millettia*.
Hedysarææ.—Stamens 9 or 10; pod articulate; leaves pinnate or trifoliate—*Alhagi*, *Desmodium*, *Ougeinia*.
Viciææ.—Stamens generally 10, diadelphous, pod 2-valved; leaves abruptly pinnate—*Abrus*.
Phaseolææ.—Stamens 10, monadelphous or diadelphous; pods 2-valved; leaves imparipinnate; leaflets mostly 3—*Erythrina*, *Pueraria*, *Butea*, *Spatholobus*.
Dalbergiææ.—Stamens 10, monadelphous, or in 2 bundles; pod indehiscent; leaves imparipinnate—*Dalbergia*, *Pterocarpus*, *Pongamia*, *Derris*.
Sophorææ.—Stamens 10, free; leaves imparipinnate—*Sophora*.

Stamens free.

- | | |
|---|----------------|
| Pod flat, 2-valved; stipules connate, opposite to petiole | 1. PIPTANTHUS. |
| Pod moniliform, generally indehiscent; stipules distinct | 2. SOPHORA. |
| Stamens monadelphous, or equally diadelphous, or unequally diadelphous (the tenth stamen free). | |
| Pod 2-valved; leaves pinnate, rarely trifoliate or simple. | |
| Spinescent shrubs; flowers solitary or in few-flowered umbels | 3. CARAGANA. |
| Unarmed shrubs; flowers racemose. | |
| Flowers pink, purple, or white; pods not inflated | 4. INDIGOFERA. |
| Flowers yellow; pods inflated | 5. COLUTEA. |
| Soft-wooded trees, with large flowers; leaflets numerous | 6. SESBANIA. |
| Climbers with flat pods. | |
| Leaves imparipinnate; seeds compressed | 7. MILLETTIA. |
| Leaves abruptly pinnate; seeds subglobose | 8. ABRUS. |
| Pod 2-valved; leaves trifoliate. | |
| Pod 1-10-seeded. | |
| Trees with bright red flowers | 9. ERYTHRINA. |

- Twining with blue or purple flowers 10. PUERARIA.
 Pod 1-seeded.
 Flowers large, orange; standard oblong; wings adhering to keel 11. BUTEA.
 Flowers small, white, purple, or pink; standard broadly ovate or orbicular; wings free 12. SPATULOLOBUS.
 Pod 2-valved; leaves simple 13. CROTALARIA.
 Pod articulate, generally indehiscent; leaves simple or trifoliate.
 Shrubs armed with axillary spines; leaves simple 14. AETHAGI.
 Unarmed shrubs; leaves trifoliate; flowers panicled 15. DESMODIUM.
 An unarmed tree; leaves trifoliate; flowers fasciculate in short racemes 16. OUGEINIA.
 Pod indehiscent, not articulate; leaves imparipinnate.
 Leaflets alternate.
 Flowers white, lilac, or purple; pod oblong, 1-4-seeded 17. DALBERGIA.
 Flowers yellow; pod suborbicular, 1-seeded 18. PTEROCARPUS.
 Leaflets opposite.
 Pod short, thick, edges not winged 19. PONGAMIA.
 Pod flat, edges marginate or winged 20. DERRIS.

1. PIPTANTHUS, D. Don.

1. *P. nepalensis*, D. Don.—Syn. *Baptisia nepalensis*, Hook. Exotic Flora, t. 131.

A shrub, with alternate, digitate, trifoliate leaves, and large bright yellow flowers. Leaflets lanceolate, entire, 2-5 in. long, sessile; common petiole less than half the length of leaflets. Stipules deciduous, connate at the outer edges, so as to appear opposite to the petiole. Flowers subverticillate, in short hairy racemes, with broad-ovate, tomentose bracts. Calyx hairy, somewhat 2-lipped. Standard erect, large, broadly obovate, the margins reflexed. Stamens 10, free. Pod stipitate, broad-linear, 2-5 in. long, 3-10-seeded, dehiscent.

Himalaya, Sutlej to Bhutan, in shady woods 7000-9000 ft. Hardy against walls in England. Fl. May, June.

2. SOPHORA, Linn.

Trees or shrubs with imparipinnate leaves. Flowers yellow, white, or blue-violet, racemose or panicled, terminal or axillary. Calyx-teeth short. Standard erect or spreading, obovate or orbicular; wings obliquely oblong; keel-petals nearly straight, oblong, imbricate, or connate. Stamens free, or nearly so; anthers versatile. Ovary shortly stipitate, multiovulate; stigma terminal, minute. Pod usually indehiscent, or but tardily dehiscent, moniliform in our species. Seeds exalbuminous; radicle short and nearly straight, or longer and curved.

1. *S. mollis*, Wall.—Syn. *Edwardsia mollis*, Royle III. t. 32; *E. Hydaspica*, Edgew. Sometimes called *Himalayan Laburnum*. Vern. Arghawān, Afg.; *Gojār, ghwareja*, Trans-Indus; *Kūn, kohen, mālan*, Salt range; *Tūlūn, tarni, kathi*, Chenab; *Brisari*, Ravi; *Pahur gūngri*, Kamaon.

A shrub with showy yellow flowers. Young leaves with adpressed silky pubescence; leaflets 30-40, subcoriaceous, elliptic, $\frac{1}{2}$ -1 in. long.

Flowers in lax axillary racemes. Pods 4-6-seeded, moniliform, the seed parts with 4 membranous wings, the seedless stalks between often $\frac{1}{2}$ in. long. Seeds brown, hard, shining.

Trans-Indus. Salt range. N.W. Himalaya as far as Kamaon, ascending to 6000 ft. Fl. March, Apr.

2. *S. Griffithii*, Stocks in Hook. Journal of Botany, iv. (1852) p. 147.—Syn. *Keyserlingia Griffithii*, Boissier Fl. Orient. ii. 630—is a grey-silky undershrub, with winged pods; common in Beluchistan (3000-6000 ft.), also found in Afghanistan. 3. *S. Moorecroftiana*, Benth., of North-West Tibet (10,000-12,000 ft.), is armed with spinescent stipules and branchlets, and has unwinged pods. 4. *S. alopecuroides*, Linn.—syn. *Gabelia alopecuroides*, Boissier Fl. Orient. ii. 628—is a large perennial herb with unwinged pods, of West Tibet (10,000-12,000 ft.) and Western Asia.

3. CARAGANA, Lam.

Low spinescent shrubs, with abruptly pinnate leaves. Calyx campanulate, placed obliquely on its pedicel. Petals long-unguiculate, claws as long, or nearly as long, as calyx; standard broad, with reflexed edges; keel obtuse, as long as wings and standard. Stamens diadelphous; anthers uniform. Ovary linear, sessile. Style filiform, incurved, glabrous; stigma terminal, minute. Pod linear, valves convex, continuous, not torulose.

Leaflets 3-7 pair, distant; pods hairy inside.

Flowers in umbels of 2-3, on long peduncles . . . 1. *C. brevispina*.

Flowers solitary.

Leaf-bearing branchlets, short, tubercular, in the axils of scariosc bracts and stipules . . . 2. *C. Gerardiana*.

Leaf-bearing branchlets, short, tubercular, in the axils of trifid spines, the middle spine longer . . . 3. *C. ulicina*.

Leaflets 2 pair, approximate; pods glabrous inside . . . 4. *C. pygmaea*.

1. *C. brevispina*, Royle Ill. 198.—Vern. *Sat-bargi*, Jhelam; *Drob, burkundu*, Kashmir.

An erect shrub, with flexuose branches. Leaves generally fasciculate, on short tuberculate branchlets, rarely (on vigorous shoots) distant, with the internodes elongated. Leaf-bearing branchlets in the axils of stout spinescent petioles, 1-2 in. long, with or without leaflets. Stipules scariosc, the outer frequently spinescent. Leaflets 5-7 pair, elliptic, $\frac{1}{2}$ in. long, pubescent, with soft adpressed hairs. Flowers yellow, in umbels of 3-5; peduncles 2-3 in. long. Calyx, bracts, peduncles, and petioles clothed with soft tawny pubescence. Calyx-teeth shorter than tube. Pods 2-2 $\frac{1}{2}$ in. long, pubescent or glabrate outside, villous inside.

Outer and inner ranges of the N.W. Himalaya, 5000-9000 ft.; from the Indus to the Ganges, also in Waziristan. Fl. June-Aug.

2. *C. Gerardiana*, Royle Ill. t. 34, fig. 1.—Syn. *C. spinosissima*, Benth.; Jacq. Voy. Bot. t. 43.

A diffuse spinescent tomentose shrub. Leaf-bearing branchlets short, closely approximate at the ends of branches. Stipules scariosc, villous, not spinescent. All petioles spinescent, the lower part of the leaf-bearing

ing branchlets closely set with leafless spinescent petioles. Leaflets 3-5 pair, elliptic, mucronate, villous, $\frac{1}{2}$ in. long. Flowers yellow, solitary, peduncles shorter than calyx. Calyx-teeth shorter than tube. Pods 1 in. long, tomentose inside and outside.

Inner N.W. Himalaya (7000-12,000 ft.) Kunawar, Garhwal, Kamaon. Fl. May-Aug.

3. *C. ulicina*, Stocks; Hook. Journ. Bot. iv. (1852) 145; Boissier Fl. Orient. ii. 199.

A low thorny shrub. Leaves fasciculate in the axils of stout trifid spines; the middle spine (petiole) often with a few leaflets, 1-1 $\frac{1}{2}$ in. long, the 2 lateral much shorter. Leaflets 2-3 pair, grey with adpressed hairs, obovate or elliptic, mucronate, less than $\frac{1}{2}$ in. long; lateral nerves prominent. Flowers yellow, solitary; peduncles as long as, or longer than, calyx. Pod pubescent outside and inside, 1 in. long.

Common in the hills of Beluchistan, ascending to 6000 ft. (Shah-Bilawal, near Karāchi); Waziristan, 2000-8000 ft. *C. ambigua*, Stocks l. c. (vern. *Shinalak*), the flowers eaten by the Brahuīs in Beluchistan, seems to be only a variety. It is said to differ by larger flowers, and the pods slightly curved at the top.

4. *C. pygmæa*, DC.—Syn. *C. versicolor*, Benth. in Royle III. 198. *Gemista versicolor*, Wall. ibid. t. 34, f. 2; *Tartaric furze*.—Vern. *Dāma*, *tāma*, *trāma*, Ladak.

A small thorny glabrous shrub, branches striate. Leaves fasciculate, or on short tuberculate branchlets, in the axils of sharp trifid shining brown spines, the middle spine (petiole) longer, about $\frac{1}{2}$ in. long. Leaflets 2 pair, $\frac{1}{2}$ in. long, closely approximate, linear or oblanceolate; common petiole very short, terminated by a spine. Flowers bright reddish-yellow, solitary, peduncles jointed, as long as calyx. Calyx-teeth shorter than tube.

Common in the inner arid valleys of the N.W. Himalaya, and on the plains of Western Tibet, from 12,000-16,000 ft. On the Safedkoh at 8000-9000 ft. Siberia, from the Altai to Dauria. Fl. Sept. Gregarious, somewhat resembling furze. Browsed by goats, and extensively used as fuel.

C. crassicaulis, Benth., is a small alpine undershrub, in the inner arid ranges of Kamaon and Sikkim. 13,000-16,000 ft., with reddish-yellow flowers, and stiff, but not spinescent petioles.

4. INDIGOFERA, Linn.

Herbs or shrubs, generally clothed with adpressed silky hairs often fixed by the middle. Leaves imparipinnate simple or trifoliate. Calyx small, oblique, campanulate, or tubular; teeth equal, or the lowest longer than the rest. Standard ovate or orbicular; wings oblong, adhering a little to the keel, which is straight, not rostrate, spurred on each side near the base. Upper stamen free from the base, the others connate; anthers uniform, the connective forming an apiculus. Ovary sessile or nearly so, usually with numerous ovules; style glabrous; stigma capitate. Pod linear or oblong, rarely globose, straight or curved, terete tetragonous or

compressed, generally filled with a dry spongy mass which separates the seeds.

Calyx-teeth lanceolate, as long as the cup-shaped calyx-tube.

Leaflets 6-15 pair; pods spreading 1. *I. heterantha*.

Leaflets 4-6 pair; pods deflexed 2. *I. tinctoria*.

Calyx-teeth triangular, shorter than the campanulate calyx-tube; leaflets 4-6 pair; pods spreading 3. *I. atropurpurea*.

1. *I. heterantha*, Wall.—Syn. *I. polyphylla*, Edgeworth. Vern. *Khenti, kathi, kathi, kati, kathewat, mattu, kaskei, kütz, kuts, katsu, shagali*, Pb.

A shrub, strigose with grey adpressed hairs. Leaves imparipinnate, common petiole $1\frac{1}{2}$ - $2\frac{1}{2}$ in. long. Leaflets opposite, 6-15 pair, oblong, or elliptic-oblong, mucronate, less than $\frac{1}{2}$ in. long. Stipules subulate, deciduous. Racemes short-pedunculate, as long as leaves; bracts subulate, deciduous. Calyx cup-shaped, the teeth longer than, or as long as, tube. Pod spreading; straight cylindric, $1\frac{1}{4}$ in. long, shining, with a few scattered hairs.

Common in the outer North-West Himalaya, and on the eastern skirts of the Suliman range, ascending to 8000 ft. Fl. May, June. In Kashmir and elsewhere the twigs are largely used for basket-work, and in some cases they form part of the twig-bridges. *I. Gerardiana*, Wall., with larger flowers and a less number of leaflets, is probably only a variety of this species.

2. *I. tinctoria*, Linn.; Elox. Fl. Ind. iii. 379; W. & A. Prodr. 202; Wight Ic. t. 365. *The Indigo plant*.—Sans. *Nili*. Vern. *Nil*.

Branches, inflorescence, and leaves thinly silky. Leaves imparipinnate; common petioles 3-4 in. long, firm, erect; stipules small, setaceous; leaflets 4-6 pair, opposite, on short petiolules, oblong or obovate, $\frac{1}{2}$ - $\frac{3}{4}$ in. long, turning black when dried. Racemes axillary, lax, with about 20 greenish rose-coloured flowers, at first shorter than, and ultimately equaling, the leaves. Pedicel shorter than the silvery calyx; calyx-teeth lanceolate, reaching half-way down. Pods deflexed, $1\frac{1}{2}$ in. long, thick, nearly cylindrical, straight or nearly so, glabrous when mature, 8-12-seeded.

Cultivated in the southern and eastern Panjab, ascending on the Chenab to 2000 ft. Rare in the Peshawar valley. Grown extensively in Bengal, Sindh, and South India. Cultivated in tropical Africa and America. Wild in Senegambia.

A perennial undershrub, but generally grown in India from seed as an annual or biennial plant. The stems are cut when in blossom or before they come into flower, steeped in water, and under the influence of fermentation and free access of air Indigo is formed. The juice of the fresh plant does not contain Indigo ready formed, but a colourless substance, the nature of which is not yet accurately known, and which is converted into Indigo during the process of manufacture in the Indigo vats. Dioscorides and Plinius mention Indigo as a dye used in Egypt and India; its general use in Europe dates from the sixteenth century. Indigo may be obtained in small quantities from other plants—*Isatis* (Cruciferae), Europe, *Wrightia tinctoria* and *Marsdenia tinctoria*, both included in this Flora, *Polygonum tinctorium* (Polygonaceæ), China, and others.

Nearly allied are two other species, which likewise yield Indigo: 1. *I. Anil*, Linn., with racemes shorter than leaves, and sickle-shaped pods. Cultivated

largely in tropical Africa, and which, according to Macfadyen's Flora of Jamaica, i. 245, supported by Grisebach, Flora of the Brit. West Indies, 181, is indigenous in Jamaica. To this species some cultivated forms from Burma and other parts of India may be referred. There are intermediate forms between *I. Anil* and *tinctoria*, and possibly they may have to be considered as one species, indigenous in America and Western Africa. 2. *I. argentea*, Linn., probably identical with *I. cœrulea*, Roxb. Fl. Ind. iii. 377, Wight Ic. t. 366, with 4 pairs of obovate leaflets, on both sides permanently silvery, and short, thick, curved, 3-4-seeded pods, wild in the Beluchistan hills, Sindh, and (*I. cœrulea*) in South India; wild and cultivated in the Barbary States, Egypt, and Arabia. The cultivated forms of Indigo in India demand further examination.

3. *I. atropurpurea*, Hamilton; Roxb. Fl. Ind. iii. 381; Wight Ic. t. 369.—Vern. *Khenti, jand*, Kaghan; *Kathi, gorkatri*, Kashmir; *Kala saleena, sakna*, Kamaon.

A large shrub, nearly glabrous, young parts with scattered adpressed hairs. Leaves imparipinnate; common petioles 6-10 in. long, spreading; leaflets opposite, on short petiolules, 5-6 pair, ovate-oblong, mucronate, $1\frac{1}{2}$ in. long. Stipules early caducous, stipels setaceous at the base of leaflets. Flowers dark purple. Racemes as long as, or longer than, the leaves; bracts lanceolate, longer than buds. Calyx with scattered white hairs; teeth short, triangular. Pods spreading, reticulate, glabrous, marginate, straight, linear, compressed, $1\frac{1}{2}$ in. long, with 10 seeds.

Salt range, 2500-5000 ft. Abundant in the outer Himalaya from Hazara to Nepal, generally between 2000 and 9000 ft., descending occasionally to 1200 ft. in the Siwalik hills. In Pangi on the upper Chenab between 8000 and 9000 ft. Kasia hills. The twigs are used for basket-work and for twig-bridges.

Of the numerous other shrubs and undershrubs of this genus which are found in North and Central India, I will only mention: 1. *I. pulchella*, Roxb. Fl. Ind. iii. 382.—Syn. *I. arborea*, Roxb. ib. 381; Wight Ic. t. 368; *I. violacea*, Roxb. ib. 380.—Vern. *Sakena*, Kamaon. A large shrub, with rose-coloured or violet flowers, hairy; leaflets 6-10 pair, obovate-oblong, obtuse, or emarginate; bracts longer than flower-buds, and calyx-lobes triangular. South India, Bengal, N.W. India, ascending to 5000 ft. in the outer Himalaya. Fl. Jan.-June. 2. *I. linifolia*, Linn.; Roxb. Cor. Pl. t. 196; Fl. Ind. iii. 370; Wight Ic. t. 313; W. & A. Prodr. 198.—Vern. *Torki*, Pb.; *Bhangra*, Bengal. A small caespitose undershrub, common throughout the plains of India, with simple, linear leaves and small globose 1-seeded pods.

5. COLUTEA, Linn.

Shrubs with imparipinnate leaves. Stipules small. Flowers yellow or reddish, rather large, in few-flowered axillary racemes. Calyx-teeth subequal, or 2 upper shorter. Standard rotundate, bi-plicate or bi-callose at the base, shortly clawed; wings falcate-oblong; keel-petals incurved, obtuse, with long connate claws. Vexillary stamen free; anthers uniform. Ovary stipitate multiovulate; style longitudinally bearded above; stigma subapical. Pod membranous, inflated, indehiscent or opening at the top. Seeds reniform, funiculate.

1. *C. nepalensis*, Sims. Bot. Mag. t. 2622; Bot. Reg. t. 1727. *Nepal Bladder Senna*.—Vern. *Brān*, Ladak.

A shrub, with smooth, reddish-brown bark, and fascicled branchlets. Leaves glabrous; common petiole 2-4 in. long; leaflets 7-9, oval or obovate, $\frac{1}{2}$ -1 in. long; lateral nerves indistinct. Flowers large, greenish yellow, in slender, drooping racemes. Pod membranous, inflated, about 2 in. long, hairy.

Arid valleys of the inner Himalaya. Ladak, Piti, Kunawar, Kamaon (8000-11,500 ft.) Fl. July, Aug. Hardy in England. The pods open before they ripen; and in general appearance, also, the plant is different from the common *Bladder Senna* (*C. arborescens*, Linn.) It is a subject for further inquiry whether it is near *C. orientalis*, Miller (*C. cruenta*, Aiton; Boissier Fl. Orient. ii. 195).

6. SESBANIA, Pers.

Herbs or small soft-wooded trees, of brief duration, with abruptly pinnate leaves, numerous deciduous leaflets, and middle or large sized flowers in axillary racemes. Calyx broad-campanulate, with short, nearly equal teeth. Petals distinctly unguiculate; standard large, emarginate, oblong or orbicular; wings oblong. Stamens diadelphous; anthers uniform or nearly so. Ovary multiovulate; style glabrous, incurved; stigma capitate. Pod long, narrow, linear, dehiscent.

Flowers $\frac{1}{2}$ in. long; leaflets linear-oblong 1. *S. ægyptiaca*.
Flowers 3 in. long; leaflets oblong 2. *S. grandiflora*.

1. *S. ægyptiaca*, Pers.; Wight Ic. t. 32; W. & A. Prodr. 214; Boissier Fl. Orient. ii. 193.—Syn. *Æschynomene Sesban*, Linn.; Roxb. Fl. Ind. iii. 332. Sans. *Jayanti*, *jaya*. Vern. *Jail*, *jhijan*, *janjhan*, Pb.; *Dhandiāin*, Rohilk.; *Jayanti*, Beng.; *Shewarie*, *sheveri*, Dekkan.

A soft-wooded tree, 8-12 ft. high, of a few years' duration. Nearly glabrous, extremities and young leaves slightly pubescent. Common petiole unarmed, 4-6 in. long; leaflets opposite, 10-20 pair, on short petioles, oblong-linear, $\frac{3}{4}$ -1 in. long, blunt, with a faint mucro, the lowest pair near the base. Racemes lax, 6-12 flowered, nearly as long as leaves; pedicels spreading, longer than calyx. Calyx-teeth short triangular. Petals $\frac{1}{2}$ in. long, yellow, or orange and purple. Pod 6-8 in. long, narrow-linear, valves convex, torulose; seeds 20-30.

Commonly cultivated and naturalised in many parts of India; in the Panjab as far as Peshawar. Ascends to 4000 ft. in the North-West Himalaya. Cultivated throughout the tropics; wild in tropical Africa. Fl. autumn and C.S. Grown in the drier parts of the Dekkan to furnish poles as a substitute for the bamboo; rope is made of the bark, the wood is used to boil Jaggery, and the leaves and branches as cattle-fodder. On the rich alluvial banks of the Kistna and Warna rivers in the Dekkan, which are submerged during the annual floods, it is grown from seed as an annual, attaining 15-20 ft. in one season. In the Sattara district it is grown with *Melia Azedarach* and *Moringa pterygosperma* to shade and support the Betel vine, in thickets 20 ft. high.

2. *S. grandiflora*, Pers.—Syn. *Agati grandiflora*, Desv.; W. & A. Prodr. 215; *Æschynomene grandiflora*, Roxb. Fl. Ind. iii. 330. Sans. *Vaka*. Vern. *Busna*, Hind.; *Buka*, Beng.; *Agati*, Tamil.

A short-lived, soft-wooded tree, attaining 20-30 ft. Nearly glabrous, extremities and young leaves slightly pubescent. Common petiole un-

armed, 6-9 in. long; leaflets opposite, on short petiohules, 10-30 pairs, oblong, obtuse, and often mucronate, glaucous, $1-1\frac{1}{2}$ in. long. Racemes short, with 2-4 very large flowers, 3 in. long, red or white. Calyx campanulate, from a turbinate base, with short, unequal teeth. Standard ovate, rather shorter than the keel. Pod upwards of a foot long, $\frac{1}{3}$ in. broad, compressed, tetraginous.

Cultivated in Southern and Eastern India, and in the Ganges Doab. Indigenous in the Indian Archipelago and in North Australia. Wood white, only fit for fuel. The tender leaves, pods, and flowers are eaten as a vegetable, and in Bengal the tree is grown as a support for the Betel plant.

7. *MILLETTIA*, W. & A.

Climbing shrubs, with imparipinnate leaves; leaflets prominently pinniveined. Flowers white, rose, or purple, racemose or paniced. Calyx truncate or shortly toothed, 2 upper teeth sometimes connate. Standard large-spreading or reflexed, shortly clawed, with or without basal calli or auricles; wings oblong, falcate; keel-petals incurved, obtuse. Vexillary stamen free at base, connate with the rest at the middle or wholly free; anthers uniform. Ovary multiovulate; stigma small, terminal. Pod from linear to oblong, flat or thick, coriaceous or woody, indehiscent or tardily dehiscent.

1. *M. auriculata*, Baker MSS.—Syn. *Robinia macrophylla*, Roxb. Fl. Ind. iii. 329; *Pongamia macrophylla*, Graham; *Otosema macrophylla*, Benth. Vern. *Maudh*, Oudh; *Gonjha*, Kamaon.

A large pubescent climber, young leaves with soft silky hairs. Leaflets 7-9, 2-6 in. long, oblong, obovate-oblong or obovate, shortly and abruptly acuminate; naked part of common petiole below the lowest pair of leaflets equal to half its entire length. Stipules falcate, silky-tomentose, $\frac{1}{3}$ in. long. Flowers white, in slender axillary racemes, about half the length of leaves. Standard auriculate above the claw. Pods rusty-tomentose, flat, linear, hard-coriaceous, 4-6 in. long, $\frac{1}{2}$ in. broad.

Sub-Himalayan tract, Sutlej to Bhutan, ascending to 3500 ft. Oudh forests. Behar. Satpura range. Fl. April-June.

To the tribe of *Galegeæ* belongs also *Tephrosia candida*, DC.; W. & A. Prodr. 210.—Syn. *Robinia candida*, Roxb. Fl. Ind. iii. 327. Vern. *Lektia*, Kamaon. A large shrub; leaflets 10 pair, lanceolate, $1\frac{1}{2}$ -2 $\frac{1}{2}$ in. long, clothed with soft pubescence. Flowers white, 1 in. long, in terminal racemes. Pods linear, 3-4 in. long, $\frac{1}{4}$ in. broad, clothed with soft, tawny tomentum. Burma, Bengal, sub-Himalayan tract to Sutlej. Fl. C.S. The leaves are employed to poison fish.

8. *ABRUS*, Linn.

Climbing shrubs, with abruptly pinnate leaves. Calyx truncate, or with short teeth. Standard ovate, narrowed into a broad short claw, more or less adherent to the staminal tube; wings narrowly falcate, oblong; keel longer and broader than wings, arcuate. Stamens 9, connate in a sheath slit above, the tenth absent; anthers uniform. Ovary sessile, multiovulate; style short, incurved, beardless; stigma capitate. Pod flat, 2-valved, divided by transverse membranes between the seeds.

1. *A. precatorius*, Linn.; Roxb. Fl. Ind. iii. 257; W. & A. Prodr. 236.—Sans. *Gunja, kunchi*. Vern. *Gunchi, kunch*, (the seed *rakti, rattika*).

Nearly glabrous, young parts with scattered adpressed hairs. Common petiole 2-4 in. long, terminating in a bristle. Leaflets deciduous, opposite, nearly sessile, 10-15 pairs, the lowest pair near the base, oblong, blunt, often mucronate, $\frac{1}{2}$ - $\frac{3}{4}$ in. long; stipules linear-subulate. Flowers rose-coloured or white, fasciculate on short pedicels, in dense axillary pedunculate racemes; peduncles 2-4 in. long, often leaf-bearing. Pod 1-1 $\frac{1}{4}$ in. long, $\frac{1}{2}$ in. broad, oblong, rostrate, coriaceous, hairy when young. Seeds 4-5, subglobose or ellipsoid, generally red, with a black eye on the hilum, or more rarely white, or black with a white eye.

A climber, with a woody stem and slender herbaceous branches, common in most forest-tracts of the moister regions of India, ascending in the Sub-Himalayan tract to 3500 ft. Fl. at the close of the rains. The seeds are used as weights (1 $\frac{1}{2}$ -2 grains) by jewellers; the root is a bad substitute for liquorice (the root of *Glycyrrhiza glabra*, Pharm. Ind. 75).

9. ERYTHRINA, L.

Trees, shrubs, or herbaceous undershrubs; young branches often prickly. Leaves trifoliate, the lateral leaflets opposite; stipules small; stipels glanduliform. Flowers large, generally red, in fascicles of 2 or 3, forming axillary or terminal racemes. Calyx spathaceous, truncate, 5-dentate or bilabiate. Standard sessile or unguiculate, much larger than wings and keel. Stamens connate to the middle, the upper one free or connate at the base with the rest; anthers equal. Ovary stipitate, with numerous ovules; style incurved; stigma small, terminal. Legume stipitate, narrowed at both ends, opening more or less completely into 2 valves. Seeds ovoid; hilum lateral, oblong.

Calyx spathaceous, splitting longitudinally on the upper side,	
apex contracted, 5-toothed; petals of keel free	1. <i>E. indica</i> .
Calyx campanulate, bilabiate; petals of keel connate	2. <i>E. suberosa</i> .
Calyx campanulate, truncate, indistinctly toothed; petals of	
keel connate in the middle	3. <i>E. arboreus</i> .

1. *E. indica*, Lam.; Roxb. Fl. Ind. iii. 249; W. & A. Prodr. 260; Wight Ic. t. 58. The Indian Coral-tree.—Sans. *Mandāra*. Vern. *Pangra, panjira, pangara*.

Glabrous, inflorescence and young leaves clothed with stellate pubescence. Branches armed with numerous black prickles, petioles and leaves unarmed. Leaflets broad-ovate, short-acuminate, entire, from a truncate or somewhat cordate base, the terminal leaflet largest, often 7 in. broad and 6 in. long; lateral nerves 4-6 on either side of midrib. Racemes one or several near the ends of branchlets, 8-12 in. long, projecting horizontally at a right angle from the branchlet; flowers numerous, large, of a bright dazzling scarlet, in fascicles of 3, almost verticillate, on pedicels $\frac{1}{2}$ in. long. Calyx spathaceous, half or one-third the length of standard, contracted and 5-toothed at the top. Standard oblong, erect, narrowed into a claw, wings and keel equal and conform, about 4 times

shorter than standard, petals of keel distinct. Stamens monadelphous at base, higher up the tenth stamen distinct. Legume 6-12 in. long, cuspidate, protuberant at the seeds, black and wrinkled when ripe, with 1-8 oblong, smooth, red or purple seeds.

Cultivated throughout India and Burma. Wild in Bengal, Burma, South India, and in the Gonda forests of Oudh. Old leaves shed early in autumn, the young foliage issues in March and April. Fl. in February, March, before the leaves appear; pods ripen from May-July. Grows readily from cuttings.

A moderate-sized tree of rapid growth, with straight trunk and numerous branches, the branchlets armed with prickles to the third or fourth year. Bark thin, yellowish or greenish-cinereous, smooth, shining, with longitudinal whitish cracks. Wood white, light and soft (called *Mochi* wood in Madras), much used for light boxes, toys, scabbards, trays, and planking. Does not warp or split, varnishes well; much of the lacquered ware of different parts of India is made of it. Planted largely in Bengal and South India to support the Betel and black-pepper vine; also in hedges.

2. *E. suberosa*, Roxb. l. c. 253; W. & A. Prodr. 260.—Vern. *Gūlnash-tar*, *pariāra*, *thab*, Pb.; *Dauldhāk*, *rūngra*, *rovāra*, *madāra*, N.W.P.; *Nusūt*, Oudh; *Pāngra*, C.P.

Young branches, leaves, and inflorescence covered with a soft tomentum of long bi- or tri-furcate hairs. Branchlets armed with scattered, white, shining, conical prickles; petioles and leaves generally unarmed, sometimes with a few scattered prickles. Leaflets rhomboid, entire, underneath pale and tomentose, or covered with adpressed hairs. Racemes 1-4, near ends of branchlets, 4-5 in. long; flowers scarlet, in fascicles of 2-3, on pedicels $\frac{1}{4}$ in. long, smaller than those of *E. indica*. Calyx 2-lipped. Standard oblong, narrowed into a short claw, 5-6 times longer than calyx, more than twice the length of the keel; petals of keel connate, broad, many times larger than the minute falcate wings. Stamens monadelphous. Legume about 5 in. long, cylindrical, contracted between seeds, acuminate, with 2-4 glabrous black seeds.

Common wild in the Siwalik tract and lower Himalaya, from the Ravi to the Sarda, ascending to 3000 ft., occasionally found at 4000 ft. Oudh, the Central Provinces, and not uncommon in South India. Frequently cultivated. Old leaves shed in January, young foliage issues in March and April, shortly before the flowers appear. Pods ripen in June. Cuttings, even of large branches, take root readily, and grow well. A moderate-sized tree, 40-50 ft. high, with an erect trunk, 3-4, at times 6 ft. girth. Branchlets shining grey, armed with prickles to the third year. Bark corky, deeply cracked, and with longitudinal furrows, the old scales pale brown, the younger bark green-coloured. Wood white, soft, light, but fibrous and tough. Used extensively for scabbards, sieve-frames, and occasionally for planking.

3. *E. arborescens*, Roxb. Cor. Pl. t. 219; Fl. Ind. iii. 256.—Vern. *Rūngara*, Kamaon.

Young parts clothed with short, soft, ferruginous pubescence. Leaflets glabrous when full grown, broadly ovate on a cordate base, entire, long acuminate, with 5-7 lateral nerves on either side of midrib. Petiole twice the length of leaflets, with a few scattered prickles. Racemes erect, axil-

lary, on long peduncles; flowers large, of a vivid scarlet, in fascicles of 3, each fascicle supported by a deciduous, ovate bract; pedicels $\frac{1}{4}$ in. long. Calyx campanulate, truncate, indistinctly 5-toothed. Standard obovate, boat-shaped, claw $\frac{1}{4}$ in. long; wings a little shorter than keel, obovate; petals of keel free at the base and apex, semiovate. Legumes stalked, brown-tomentose, pendulous, incurved, cuspidate, with 2-10 seeds.

Outer Himalaya from the Ganges to Sikkim, at elevations between 4000 and 6500 ft. Kasia hills. Occasionally planted in Sindh and elsewhere. A small tree, fl. Aug.-Oct.

This is probably the tree which Madden calls *E. stricta*; but *E. stricta*, Roxb., Bedd. Fl. Sylv. t. 175, with spathaceous calyx and minute wings, is a different species of the western coast.

A herbaceous species, *E. resupinata*, Roxb. Fl. Ind. 257, Pl. Cor. t. 220, is found on grass-lands of the Himalayan Terai. From a perennial underground root-stock, spring in March short racemes with large bright scarlet flowers, calyx 2-lipped, and standard resupinate—that is, bent downwards. After the flowers, appears a short herbaceous, leaf-bearing stem, which withers after the rains.

10. PUERARIA, DC.

Twining shrubs, with large pinnately trifoliolate, stipellate leaves. Flowers blue or purplish, racemose. Two upper calyx-lobes connate into an entire or bidentate lip. Standard rotundate, with basal auricles; wings oblong- or obovate-falcate, usually connate with the nearly straight or incurved keel-petals. Vexillary stamen wholly free, or cohering with the rest at the middle; anthers uniform. Ovary sessile, multiovulate; stigma small, capitellate. Pod flat or subterete, continuous, or septate between the seeds, membranous or coriaceous. Seeds rotundate or transversely oblong.

1. *P. tuberosa*, DC.; Wight Ic. t. 412; W. & A. Prodr. 205.—Syn. *Hedysarum tuberosum*, Roxb. Fl. Ind. iii. 363. Vern. *Siāli*, *saloha*, *badār*, Pb.; *Bilai kand*, *billi*, *birali*, *pona*, Kamaon.

A twining shrub, with woody tubercled stems, running over high trees. Leaves large, trifoliolate, pubescent; common petiole 5-8 in. long; leaflets 4-6 in. long, 3-5 in. broad, ovate, acuminate, the two lateral unequal-sided. Flowers bright blue, in long panicle racemes. Legumes flat, covered with long rusty hairs, 2-3 in. long, 2-6-seeded, much contracted between the seeds.

Sub-Himalayan tract, from the Indus to Sikkim, ascending to 4000 ft. Oudh forests. Bengal, the Konkan, Canara. Leafless during the cold and hot season. Fl. March, April. The large tuberous roots are eaten; they are also used for poultices and as a cooling medicine; from Kamaon they are exported to the plains.

11. BUTEA, Roxb.

Trees or large climbers, with trifoliolate leaves. Leaflets stipellate, the 2 lateral opposite. Flowers large, orange-coloured, in fascicles of 2-5, arranged in racemes or panicles, with linear, deciduous bracts. Calyx silky inside; the 2 upper teeth connate into a broad, entire, or emarginate

lip. Standard oblong, acute, without appendages, recurved; wings falcate, adhering to the keel; keel acute, incurved, as long as the standard or longer. Upper stamen free, the others connate beyond the middle; anthers uniform. Ovary sessile, or short-stipitate; style long, curved, not bearded. Legume short-stalked, oblong or broad-linear, coriaceous, 1-seeded and 2-valved at the top, flat, indehiscent below.

A tree; pedicels twice the length of calyx 1. *B. frondosa*.
A climber; pedicels three times the length of calyx 2. *B. superba*.

1. *B. frondosa*, Roxb. Cor. Pl. t. 21; Fl. Ind. iii. 244; W. & A. Prodr. 261; Bedd. Fl. Sylv. t. 176.—Sans. *Palāsa*. Vern. *Dhāk*, *palās*, *chichra*, North India; *Chulcha*, Bandelkhand; *Chiula*, *palās*, *pursha*, C.P.; *Kakria*, *khakra*, *khakro*, Banswara and Panch Mehals; *Mur-marra*, Gonds, Satpura.

Young parts downy or tomentose with soft simple hairs. Stipules linear-lanceolate, stipels subulate, both tomentose and deciduous. Leaflets coriaceous, hard, clothed with adpressed hairs beneath, and a few scattered hairs above, emarginate, or rounded at the top, the terminal leaflet broadly obovate from a cuneate base, generally as long as broad, 4-6 in. long, the lateral leaflets oblique-ovate, smaller; lateral nerves 4-8 on either side of midrib, joined by numerous prominent reticulate veins. Flowers fasciculate, in rigid racemes, pedicels twice the length of calyx. Branches of inflorescence, bracts, and calyx densely clothed with soft ferruginous hairs. Legumes pendulous, tomentose, 4-6 in. long, 1½-2 in. broad; seed oval, flat, smooth, brown 1½ in. long, 1 in. broad.

A common tree throughout India and Burma, the Jhelam river its north-western limit. Ascends to 3000, occasionally to 4000 ft. in the N.W. Himalaya. Often gregarious. Thrives on the stiff black soil of Central India and the Dekkan, and on saline soils of the Panjab. The old leaves shed in Feb., the young foliage issues in April, May, usually preceded by the scarlet flowers. The tree in full bloom presents a striking spectacle, like fire on the horizon. The fruit ripens in June, July. Inhabits the open country, not found in thick forests.

A moderate-sized tree, 40-50 ft. high, with a crooked, often irregular trunk, 6-8, at times 10-12 ft. girth, and few crooked branches. In N.W. India often kept down as a shrub by constant lopping. Bark ½ in. to 1 in. thick, spongy, inner substance fibrous, outside grey or light-brown, rough, undulated. Wood coarse and open-grained, with prominent medullary rays; weight 31-36 lb. per cub. ft. Its transverse strength P.=335 (Kyd). Not durable except under water, readily eaten by insects. (Said to be durable in Guzerat.) In North-West India used for well-curbs and piles. The bark of the root yields a fibre, used for caulking boats on the Ganges and other rivers, also for slow-matches and coarse cordage.

From natural fissures and incisions made in the bark, issues during the hot season a red juice, which soon hardens into a ruby-coloured, brittle, astringent gum, similar to kino, and sold as Bengal Kino (Pharm. Ind. 74). In Oudh and throughout Central India, lac is collected on the branchlets of this tree; the insect is often propagated by cutting a branch with the coccus on it, and fixing it on a fresh tree.

The leaves are used as plates, instead of paper to wrap up parcels, and they are given as fodder to buffaloes. The flowers (*Kāsu*, North India; *Kisu*, Guzerat) are collected, and made (with alum) into the fleeting yellow dye

used in the Holi festival; they are also used medicinally. The seeds are given as purgative and anthelmintic, mostly in veterinary practice.

2. *B. superba*, Roxb. Cor. Pl. t. 22; Fl. Ind. iii. 247.

A gigantic climber, stems as thick as a man's leg. Leaflets membranous, acuminate, the terminal 6-15 in. long, lateral oblique, smaller. Flowers larger than those of *B. frondosa*, of a gorgeous orange-colour, on pedicels 3 times the length of calyx, in lax panicle racemes.

Forests of Burma, Bengal, Oudh, the Circars, the northern Konkan, and the Dehra Doon. Fl. March. Yields kino like the preceding species.

12. *SPATHOLOBUS*, Hasskarl.

Large climbers, with trifoliolate leaves; leaflets stipellate, the 2 lateral opposite. Flowers small, white, purple, or pink, numerous, fasciculate on the branches of large compound panicles, with small, narrow bracts and bractlets. Calyx 4-dentate, the 2 upper teeth connate in 1. Standard broad-ovate or orbicular, obtuse, without appendages, longer than keel; wings obliquely oblong, free; keel obtuse, nearly straight, shorter than wings. Stamens, ovary, and legume like *Butea*.

1. *S. Roxburghii*, Benth.—Syn. *Butea parviflora*, Roxb. Fl. Ind. iii. 248; W. & A. Prodr. 261; Wight Ic. t. 210.—Vern. *Mula*, *maula*, N.W.P.

Inflorescence, calyx, petioles, and under side of leaflets pubescent. Leaflets obovate, acuminate, longer than broad, 6-8 in. long; lateral nerves 6-8, arcuate, anastomosing by intramarginal veins. Flowers whitish, in fascicles of 3, in large terminal and lateral panicles, pedicels as long as calyx. Teeth of calyx nearly as long as tube. Standard twice the length of calyx, emarginate. Legumes 4-5 in. long, 1 in. broad, on a distinct pedicel, 1 in. long, seed part tomentose.

A powerful climber, common in the forests of Burma, Bengal, Oudh, and the Sub-Himalayan forests as far as the Jumna river. Also in the Circars and the southern part of the Konkan. One of the principal climbers in the Oudh Sal forests. Fl. Dec., Jan.; fr. April.

Several large and remarkable forest-weeds belong to the genus *Flemingia*, which is generally classed under *Phaseoleæ*: 1. *F. Chaparr*, Ham., and 2. *F. strobilifera*, Brown (*Hedysarum strobiliferum*, Roxb. Fl. Ind. iii. 350), with simple leaves, those of the former long-petiolate, cordate, those of the latter ovate, on short petioles. Both species have spikes with large membranous inflated bracts, enclosing the flowers. *F. strobilifera* is common throughout India, and often attains 8 ft. The leaves are used for thatching. *F. fruticulosa*, Wall., is a suffrutescent variety of *strobilifera* in the North-West Himalaya. *F. Chaparr* is found in Burma, Bengal, Gorakhpur, and the sub-Himalayan tract to the Jumna. Three other species have trifoliolate leaves,—viz., 3. *F. lineata*, Roxb. Fl. Ind. iii. 341, common nearly throughout India, flowers in paniculate racemes, with small bracts; 4. *F. congesta*, Roxb. Fl. Ind. 341, Wight Ic. t. 390, which is closely allied to, if not synonymous with, *F. semialata*, Roxb., Wight Ic. t. 326, common nearly throughout India, flowers in dense axillary bracteate spikes; and 5. *F. involucreata*, Benth. in Pl. Junghuhn. 246, sub-

Himalayan tract from Assam to Kamaon; flowers in subcassile heads with large tomentose, ovate-lanceolate bracts.

13. *CROTALARIA*, Linn.

Herbs or shrubs, with simple or digitately 3-foliolate (rarely 5-7-foliolate) leaves. Stipules free or decurrent, sometimes small or none. Flowers yellow blue or purplish, usually in terminal or leaf-opposed racemes. Calyx-lobes distinct, or calyx more or less bilabiate. Standard orbicular or ovate, usually callous at base, shortly clawed; wings-obovate or oblong; keel-petals beaked. Stamens monadelphous in an open sheath; anthers unequal, alternately basifixed and versatile. Ovary 2- ∞ -ovulate; style bearded. Pod globose or oblong, turgid, 2-valved.

1. *C. Burhia*, Hamilton; Benth. in London Journal of Botany, ii. (1843) 474; Boissier Fl. Orient. ii. 26.—Vern. *Sis, sissāi, metni, pola*, Trans-Indus; *Khep, khip, khippi, būta, bhata, būi*, Pb.; *Lāthia, kharsan, kauriāla*, Harriāna, Delhi.

An erect or procumbent shrub, with slender, close-set entangled branches, flexible and rush-like when young, stiff and rigid when old. Leaves small and scanty, oblong or linear, generally less than $\frac{1}{2}$ in. long, more or less pubescent. Flowers yellow with red veins, on short pedicels, far apart in long racemes, forming terminal rigid divaricate panicles. Legume short, villous, 1-3-seeded, twice the length of calyx.

Common in the plains of Sindh and the Panjab, Peshawar valley, in dry sandy places. Fl. Nov.-March. Ropes are made of it in the Panjab, and it is browsed by cattle.

Crotalaria juncea, Linn.; Roxb. Cor. Pl. t. 193; Fl. Ind. iii. 259.—Sans. *Sana*. Vern. *Sann, sanni (Taag, Bombay)*. The well-known Indian hemp; is cultivated throughout North-West India for its fibre. Several other large herbaceous species of *Crotalaria* are common weeds in the forests.

14. *ALHAGI*, Desv.

Calyx campanulate, with 5 small acute teeth. Petals unguiculate, claws nearly as long as calyx; standard broad; keel blunt. Stamens diadelphous, anthers uniform. Ovary linear, sessile; style filiform, incurved. Pod linear, generally moniliform, contracted between seeds, rarely continuous.

1. *A. Maurorum*, Desv.; W. & A. Prodr. 232.—Syn. *Hedysarum Alhagi*, Willd.; Roxb. Fl. Ind. iii. 344. *The Camel-thorn*. Vern. *Jawāsa, jēwassi, jawā, jawān, jawāni*. (*Kas, Sindh*.)

A small, nearly glabrous shrub, extremities pubescent; armed with numerous axillary, spreading spines, $\frac{1}{2}$ -1 in. long. Leaves simple, short-petiolate, oblong, coriaceous. Flowers red, on short slender pedicels, 1-6 from the axillary spines. Pod about 1 in. long, straight or falcate.

Widely spread, from Greece and Egypt through Western Asia and Afghanistan to the plains of North-Western India; extending east as far as Monghir on the Ganges, and south to the Southern Mahratta country. Also in Guzerat and the Konkan. Generally found in dry barren places. Fl. March, April.; fr. ripens August.

Camels delight in it as fodder. In Guzerat, Sindh, and the Southern Panjab, screens (tatties) employed during the hot winds are made of it. Near Kandahar and Herat manna is found and collected on the bushes at flowering time, after the spring rains.

15. DESMODIUM, Desv.

Shrubs or herbs, with trifoliolate or unifoliolate stipellate leaves. Calyx campanulate or turbinate. Corolla exserted; standard broad; wings more or less adhering to the keel; upper stamen entirely or partially free; style incurved; stigma minute, capitate. Pod usually articulate, the articulations flat, 1-seeded, rarely splitting open at the upper suture.

Leaves 3-foliolate; bracts subulate	<i>D. tiliaefolium</i> .
Leaves 3-foliolate; bracts orbicular, foliaceous	<i>D. pulchellum</i> .
Leaves 1-foliolate, ovate, softly tomentose	<i>D. latifolium</i> .

1. *D. tiliaefolium*, Don.—Syn. *D. nutans*, Bot. Mag. t. 2867; *D. argenteum*, Wall. Vern. Sambar, sammār, shamru, shambar, chamra, chamyār, chamkāt, chamkūl, martan, matta, marāra, gūr kats, gurshugal, pri, müss, chiti must, kali must, murt, laber.

A large, somewhat diffuse shrub, with trifoliolate leaves. Branchlets, inflorescence, pods, and leaves greyish tomentose or canescent. Leaflets broad-ovate or obovate from cuneate or rounded base, often mucronate, with 4-6 pair of prominent lateral nerves, green and glabrescent above, clothed beneath with a matted tomentum of whitish silky hairs, terminal leaflet largest, 2-5 in. long. Flowers red, on slender pedicels, longer than calyx, fasciculate, in spreading terminal panicles, with long drooping branches; bracts subulate, bractlets setaceous, at the base of calyx. Pods 2-3 in. long, $\frac{1}{4}$ in. broad; joints 6-10, somewhat longer than broad.

Common outer Himalaya from the Indus to Nepal, 3000-9000 ft. Fl. June-Sept. Bark fibrous, ropes are made of it which are strong but not durable. In Kulu and Kunawar, paper and pasteboard for the Buddhist monasteries in Tibet is made of the bark (H. Cleghorn). The branches are browsed by cattle.

2. *D. pulchellum*, Benth.—Syn. *Hedysarum pulchellum*, Linn.; Roxb. Fl. Ind. iii. 361; *Dicerma pulchellum*, DC.; W. & A. Prodr. 230; Wight Ic. t. 418.

An erect pubescent shrub. Leaves trifoliolate, leaflets ovate, obtuse, the terminal 4-5 in. long, more than twice the size of the lateral ones. Stipules subulate, with long bristly points. Flowers in terminal and axillary spiciform racemes, the flowers in the axils of 2-foliolate bracts, the common petiole terminating in a long bristle, the two lateral leaflets orbicular, enclosing the flower. Pod generally with 2 joints.

South India, Bengal, Burma, Oudh, and Gorakhpur, particularly in the Sāl forests. Fl. R.S.

3. *D. latifolium*, DC.; W. & A. Prodr. 223; Wight Ic. 270.—Syn. *Hedysarum latifolium*, Roxb. Fl. Ind. iii. 350.

A shrub with a short woody stem and spreading branches. Leaves uni-

foliolate, broad-ovate, 4-5 in. long, with an obtuse or cordate base, rough above, soft-tomentose beneath. Stipules semicordate, cuspidate. Flowers bright purple, in axillary and terminal racemes. Pods 4-5 jointed, hairy with stiff hooked hairs.

Bengal, Ceylon, Burma. Oudh forests. Kamaon. Fl. C.S.

This genus comprises numerous other shrubs and undershrubs within the range of this Flora, of which the following are the more common kinds:—Simple leaves have: 1. *D. triquetrum*, DC.; W. & A. Prodr. 224 (*Hedys. triq.*, Roxb. iii. 347); with broadly winged petioles. 2. *D. gangeticum*, DC.; Wight Ic. 271 (*Hedys. ganget.*, Roxb. iii. 349); with ovate, acute leaves. Trifoliate leaves have: 3. *D. floribundum*, G. Don.—Syn. *D. multiflorum*, DC. *D. dubium*, Bot. Reg. t. 967; Bot. Mag. t. 2960. 4. *D. oxyphyllum*, DC., leaves and pods nearly glabrous; pods reticulate. 5. *D. concinnum*, DC. (*D. pendulum*, Wall. Pl. As. rar. t. 94), leaflets oblong, with marked lateral nerves, ascends to 7000 ft. in the North-West Himalaya. 6. *D. gyrans*, DC.; Wight Ic. t. 294 (*Hed. gyrans*, Roxb. iii. 351); lateral leaflets small, very sensitive, showing a rotatory motion during the day.

16. OUGEINIA, Benth.

Tree with trifoliate leaves, and large stipellate leaflets, the 2 lateral opposite. Stipules free, deciduous. Flowers white or pale rose-coloured, on slender pedicels, 2 or 3 from one point, in short fasciculate racemes on the old wood. Bracts small, scaly; small persistent bractlets under the calyx. Calyx indistinctly 2-lipped, upper lip emarginate or bidentate. Standard nearly orbicular, short-clawed. Wings conform to and equal to the keel, slightly adhering to it. Stamens connate to beyond the middle, one quite free; anthers equal. Ovary sessile, with numerous ovules; style incurved, subulate; stigma capitate, terminal. Pod linear-oblong, flat, veined, contracted between the seeds, scarcely dehiscent. Seeds 2-5, flat.

1. *O. dalbergioides*, Benth.—TAB. XXIII.—Bedd. Fl. Sylv. t. 36.—Syn. *Dalbergia Oujeimensis*, Roxb. Fl. Ind. iii. 220; Wight Ic. t. 391. Sans. *Tinsa*. Vern. *Sannan*, *sāndan*, *chāndan*, Pb., N.W.P.; *Shānjan*, *pānan*, Oudh; *Tinsa*, *tinnas*, *tiwas*, *tewas*, *dhewas*, C.P.; *Ser-marra*, Gondi; *Tunnia*, Banswara; *Telus*, Khandeish Dangs.

Pubescent, terminal leaflet broad-oval, 2-6 in. long, lateral oblique-oval, 1½-3 in. long; edge undulate, shallow-crenate, 4-8 prominent main nerves on either side of midrib.

A common tree in Central and Northern India, as far as the Godavery on the east side and Canara on the west side of the Peninsula. In the outer Himalayan forests from the Great Gandak river to the Sutlej, ascending in the valleys to 4000, and in places to 5000 ft. The Jhelam appears to be its north-western limit, but it is scarce between that river and the Sutlej. Its southern and eastern limits require further inquiry. It is found in the Oudh, Gorakhpur, Godavery, and Canara forests. The old leaves are shed in Jan. and Feb., the new foliage comes out in April, May. The flowers appear before the leaves are fully out, from March-May.

A middle-sized tree, 20-40 ft. high, with a short, crooked, and often gnarled trunk, 3-5 ft., occasionally 7-8 ft. girth. Bark cinereous or dark brown, with long perpendicular and short cross-fissures, brittle corky scales peeling off.

Sapwood small, heartwood varies from light-greenish brown, with yellow tinge, to dark-red brown. It is close-grained, hard, the cub. ft. weighs 57-60 lb., Strong, tough, and durable; takes a beautiful polish. Much valued for agricultural implements, wheels, naves, furniture, also for building. Combs are carved of it.

An astringent red gum exudes from incisions in the bark. The bark is pounded and largely used to intoxicate fish. Twigs much lopped as cattle-fodder. In places difficult of access, tall and well-grown specimens are occasionally met with, but most older trees have been mutilated by lopping and stripping off the bark.

To the tribe of *Hedysaræ* belongs *Æschynomene aspera*, Linn.; Wight Ic. t. 299.—Syn. *Hedysarum lagenarium*, Roxb. Fl. Ind. iii. 365. Vern. *Sola*, *Phul-Sola*. A large perennial water-plant, with thick stems mainly composed of light white pith, which is made into toys, floats, and Solah hats, invaluable as a protection against the sun. Abundant in tanks and marshes in Bengal.

Brya Ebenus, DC., Bot. Mag. t. 4670, the green or West Indian Ebony, a small tree with orange-coloured flowers, and dark green, nearly black heartwood, of Jamaica and Cuba, also belongs to this tribe.

17. DALBERGIA, Linn. fil.

Trees or climbers, with alternate, imparipinnate leaves, without stipels; leaflets alternate. Flowers small, white, lilac or purple, in dichotomous or irregularly branched panicles; bracts and bractlets small. Calyx 5-dentate, the lowest anterior tooth generally longer. Standard ovate or orbicular; wings oblong, as long as standard; keel obtuse, shorter than standard, its petals connate at the top. Stamens either diadelphous, the 10th stamen free, or monadelphous, with 9 or 10 stamens, or equally diadelphous, with 2 bundles of 5 stamens each, and the vagina slit below as well as above; anthers small, erect, didymous, the cells back to back, attached to the end of the filament, opening by diverging or divaricate slits, or with a short slit at the top. Ovary stipitate, with few ovules; style short, incurved, with a small terminal stigma. Legume like a samara, oblong or linear, flat, thin, indehiscent, with 1 or a few seeds. Seeds reniform, flat.

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| Trees or erect shrubs; stamens 9 or 10, monadelphous. | |
| Shrubs or small trees; panicles regularly dichotomous . . . | 1. <i>D. rimosa</i> . |
| Large trees; panicles not dichotomous. | |
| Leaflets obtuse or emarginate; flowers pedicellate . . . | 2. <i>D. latifolia</i> . |
| Leaflets acuminate; flowers sessile . . . | 3. <i>D. Sisoo</i> . |
| Trees; stamens 10, equally diadelphous. | |
| Leaves with reticulate venation, without prominent lateral nerves; petals and stamens inserted in the middle of the calyx-tube . . . | 4. <i>D. paniculata</i> . |
| Leaves with prominent parallel lateral nerves; petals and stamens inserted at the base of calyx-tube. | |
| Leaflets 11-15; panicles lax; the 3 anterior calyx-teeth acute, the 2 posterior obtuse . . . | 5. <i>D. lanceolaria</i> . |
| Leaflets 13-19; panicles compact; 4 calyx-teeth obtuse, the 5th longer and subacute . . . | 6. <i>D. hircina</i> . |
| Limbing shrubs; stamens 10, equally diadelphous . . . | 7. <i>D. volubilis</i> . |

Several valuable South American timber-trees belong to this genus. Of the principal varieties of *Rosewood* exported from Rio Janeiro, the two finest are sup-

plied by species of *Dalbergia*, chiefly by *D. nigra*, classed in the same section as the Indian *Sissoo* and *Blackwood* (Bentham, Synopsis of *Dalbergiæ*, Linn. Soc. Jour. iv., Suppl. 5).

1. *D. rimosa*, Roxb. Fl. Ind. iii. 233; Wight Ic. t. 262.

A large shrub or small tree, glabrous. Leaflets 5-9, oval, 2-3 in. long, acute at both ends, with numerous, prominent, parallel nerves. Panicles terminal and axillary, lax, regularly dichotomous; flowers on short pedicels, small, less than $\frac{1}{8}$ in. long. Calyx supported by 2 obtuse bractlets, campanulate, all teeth obtuse, shorter than the tube. Claws of petals very short. Stamens 10, monadelphous. Ovary short-stipitate, ovules 1-2. Legume 2-3 in. long, 1 in. broad or less, 1-seeded.

Sikkim Terai, Assam, Kasia hills, and Silhet. Also in the Siwalik tract and outer Himalaya west to the Jumna, ascending to 4000 ft., J. L. S. Fl. March, April; seed ripens Nov., Dec.

2. *D. latifolia*, Roxb. Cor. Pl. t. 113; Fl. Ind. iii. 221; W. & A. Prodr. 264; Wight Ic. t. 1156; Bedd. Fl. Sylv. t. 24. The *Blackwood* or *Rosewood tree* of Southern India.—Vern. *Sitsāl*, Oudh; *Sāksāl*, *Sitsāl*, Mirzapore distr.; *Shisham*, Banswara; *sirras*, *sirsa*, *sisso*, *sisso*, Mandla and Chindwara distr. of C.P.; *Bili*, Can.

A large glabrous tree, with dark-purple heartwood. Leaflets 3-7, generally 5, alternate, broad-obovate or orbicular, obtuse or emarginate. Flowers greenish or yellowish white, on slender pedicels as long or nearly as long as the calyx-tube, in axillary, branched, and divaricating panicles. Calyx-segments oblong or ovate, obtuse. Stamens 9, all united in a sheath, open on the upper side. Ovary glabrous, with 5 ovules; style slender, nearly as long as ovary; legume oblong-linear or oblong-lanceolate, 1-4-seeded.

Dry forests of South and Central India, frequently associated with Teak and Bamboo in South India, also in the evergreen forests (Bedd.), extending north to the Satpura range, Bandelkhand, and the Malwa plateau (Bassi in Meywar). Also in the Andamans, in lower Bengal, Behar, in Sikkim at the foot of the Himalaya, and (scarce and small) in the Baraith and Gonda forests of Oudh, along the base of the hills. Old leaves are shed Feb., March, new leaves appear in April. The flowers appear with the young foliage, or before the old leaves fall; the pods ripen from Oct.-Feb.

In South India and the Godavery forests (Ahiri), a large tree 60-80 ft. high, with an erect, but not generally straight or regular trunk to 20 ft. girth. In North India a moderate-sized or small tree. Numerous thick branches, spreading into a large shady crown. Branchlets grey, bark of trunk $\frac{1}{2}$ -1 in. thick, cinereous, less rough than the bark of *Sissoo*. Foliage fine glossy dark green. Coppices well, and propagates itself readily by self-sown seed. Easily raised from seed, but of slow growth, especially while young; 5-9 rings per in. of radius.

Sapwood large, whitish; heartwood with an irregular outline, from deep nut-brown to blackish purple, with white or purplish veins and streaks of lighter colour, and small whitish specks; fine-grained, strong, and heavy. The average weight of seasoned *Blackwood* fluctuates between 50 and 54.68 lb.; the lower figure is that given by Skinner, and the higher is the result of Baker's experiments made with Malabar wood. In the Central Provinces list, however, the weight is given at 66 lb. The average value of P. ranges between 722 and

1104, and may be taken at 950. Old trees are often hollow, and have ring-shakes. When fresh-sawn, the wood has an agreeable smell. Much valued for furniture. Combs and a great variety of ornaments are carved of it. Largely used for yokes, cart-wheels, ploughs and other agricultural implements, knee-timbers of boats, and for construction, also for spokes and felines of gun-carriage wheels. In Oudh the tree is pollarded for cattle-fodder.

3. *D. Sissoo*, Roxb.—**Tab. XXIV.**—Fl. Ind. iii. 223; W. & A. Prodr. 264; Bedd. Fl. Sylv. t. 25. The *Sissoo tree*.—Sans. *Siusapa*. Vern. *Shisham*, *sisu*, throughout North India; *Sheva*, Pushtu; *Tali*, *sufedar*, *shin*, *shia*, *nelkar*, Pb.; *Sissai*, Oudh.

A large tree with brown heartwood. Young parts pubescent or tomentose. Leaflets 3-5, alternate, broad-ovate, acuminate, glabrous when old. Flowers yellowish white, nearly sessile, in unilateral spikes, which are arranged in short axillary panicles; ramifications of inflorescence and calyx pilose. Stamens 9, all united into a sheath, open on the upper side. Ovary on a long stalk, pubescent; style very short, much shorter than the ovary; stigma large; legume linear-lanceolate, generally 2-3-seeded.

The *Sissoo tree* is indigenous in the sub-Himalayan tract, and in the outer Himalayan valleys, from the Indus to Assam, ascending to 3000, and at times to 5000 ft. Generally gregarious, mostly on sand or gravel along the banks of rivers or on islands, extending 50-100 miles into the plains. Believed to be indigenous also in Guzerat, Beluchistan, and Central India. I have never seen it really wild outside the sub-Himalayan belt. Cultivated and often self-sown throughout India; thrives best on light soil, and requires a considerable amount of moisture. The old leaves turn reddish brown, and begin to fall in December, but continue to be shed up to February, when the young foliage comes out, continuing until April. The full-grown foliage is of a fine clear green colour. Young trees are occasionally leafless for a few weeks; old trees are hardly ever without leaves. Fl. from March-June, at times with a second flush between July and October; the seed ripens from November-February, and generally remains long on the tree.

Under favourable circumstances a large tree, attaining 60 ft. and more, with an erect but not straight or regular trunk 6-12 ft. in girth; large branches supporting a spreading crown. Young shoots downy, bifarious, drooping; branchlets cinereous or light brown; bark of trunk $\frac{3}{4}$ -1 in. thick, grey or pale brown; narrow strips exfoliating between more recent obliquely longitudinal shallow fissures, and distant, older deep cracks, which tail off into each other.

Sapwood small, light-coloured; heartwood close-grained, brown, mottled with darker veins, in old trees sometimes very dark, nearly black. Medullary rays very fine. Pores large, scanty, uniformly distributed, often joined by narrow concentric bands of whitish tissue. A cub. ft. of seasoned heartwood weighs between 45 and 50 lb. Skinner gives it at 50, but this is too high as an average. The results of Baker's numerous experiments range between 42.68 and 46.25; the average of my experiments of 1864 was 47.83, and of 1865, 45.83. Instances are, however, recorded of a greater weight (55.5 lb., average of 3 experiments by Major Russell, Calcutta, 1862). Unseasoned wood weighs 64-70 lb. The transverse strength of *Sissoo* is probably somewhat less than of Blackwood, but considerably greater than of Teak, and even greater than of Säl. Skinner gives the value of P. at 870; the average of 33 experiments made by me in 1864 was 739, and 51 experiments made in 1865 gave 865. Considering these, and the results

of the numerous recorded experiments by Baker, Cunningham, and others, and excluding extremes, the mean value of P. will be found to range between 700 and 900. Sissoo is very elastic, it seasons well, does not warp or split, and takes a fine polish. It is durable in the Panjab and North-West India, less so in Bengal. Boats made of Sissoo on the Chenab will last 20 years.

Sissoo wood is esteemed highly for all purposes where strength and elasticity are required. It is used extensively in boat-building, for carts and carriages, agricultural implements, camel-saddle-frames, doors and window-frames, and in construction generally. It is an excellent and beautiful furniture-wood. At present the use of Sissoo wood is only limited by the insufficient supply. Until about 1820, considerable supplies of large Sissoo logs were regularly imported into Calcutta from the forests of the sub-Himalayan tracts of Nepal and adjoining districts. In those days Sissoo was the principal wood used for the construction of gun-carriages in Bengal; and it was only between 1820 and 1830 that Sissoo of large dimensions became scarce, and that Sāl timber began to be used extensively for this purpose, being more plentiful than Sissoo, though heavier, and not easily seasoned. The twigs and leaves are often lopped for cattle-fodder; camels prefer Sissoo to Kikar. The raspings of the wood are used in native medicine.

The Sissoo is easily raised from seed, grows rapidly with a long tap-root. The night frosts in the Panjab turn the leaves black, but do not kill the plants. The roots are bitter, and are not touched by white ants or rats. The Sissoo tree continues to grow rapidly until it attains maturity. In the Panjab it attains, under fair conditions, on an average 2½ ft. girth in 12, and 4½ ft. in 30 years. It copices well, and in the Southern Panjab and Sindh it has always been raised from slips, often cuttings of thick branches. The slips are cut 1 ft. long, and are put in about the end of Feb., sometimes in March.

In the large plantations made since 1865 in the Panjab plains, the Sissoo is at present the most important tree. Its requirements and treatment are beginning to be well understood, and several thousand acres are now stocked with it. Here, as well as in its natural habitat, the Sissoo shows a decided preference for a light sandy soil. The tree is healthiest in the low Sailaba lands, which stretch along the main rivers, and are kept moist by percolation. On the bar or high ground between the rivers it thrives with the aid of canal irrigation when the soil is a sandy loam. On stiff binding soils the roots are small and the trees often unhealthy. On saline soils, and when there is a substratum of kankar, the Sissoo will not thrive. Regarding the eventual yield of these Sissoo plantations, and the production per acre, no definite estimate can yet be based upon the fragmentary data available. But so much is certain, that these plantations will yield large supplies of fuel and a proportion of timber, though it may appear doubtful whether so near its north-western limit the tree will attain dimensions at all approaching to those of the Sissoo in the more moist and forcing climate of the Nepal and Sikkin Terai, or in Bengal.

4. *D. paniculata*, Roxb. Cor. Pl. t. 114; Fl. Ind. iii. 227; W. & A. Prodr. 265.—Vern. *Katsirsa*, Oudh; *Dobein*, *dobin*, *pāssi*, C.P.; *Padri*, Dharwar.

A large or moderate-sized tree, the wood in broad concentric masses, alternating with narrow layers of fibrous tissue. Young branchlets, petioles, and inflorescence hairy. Leaves turn black in drying; leaflets 9-13, generally 1 in. long, obovate, oblong or oval, glabrous, hairy beneath along midrib; venation reticulate; no prominent lateral nerves. Panicles ter-

minial and axillary; flowers bluish white, nearly sessile, crowded on short unilateral racemes; bracts oblong, villose, early deciduous. Calyx campanulate, densely hairy outside, glabrous inside, all teeth acute. Claws of petals as long as calyx-tube. Standard from cordate base oblong, broader above, with straight sides, not thickened above the claw. Stamens 10, equally diadelphous; inserted with petals in the middle of calyx-tube. Ovary glabrous, ovules 2-3. Legume $1\frac{1}{2}$ - $2\frac{1}{2}$ in. long, $\frac{1}{2}$ - $\frac{3}{4}$ in. broad, 1-2-seeded, narrowed at base and at top.

South and Central India. Gonda forests in Oudh. Siwalik tract west to the Jumna, ascending to 2500 ft. Leaves are shed Feb., March; the new foliage comes out in April and May, with the flowers.

A moderate-sized or large tree (60 ft. high in the Satpuras). Trunk erect, irregularly scooped out, fluted and compressed, attaining 5-6 ft. girth. Bark smooth, greenish white or cinereous. Wood greyish white, no heartwood. Structure most remarkable, entirely different from that of other Dalbergias. Broad concentric masses of wood alternate with narrow soft layers of a fibrous substance, so that planks cut of old trees often fall to pieces. The seasoned wood weighs 48, and the unseasoned wood 54 lb. per cub. ft. (R. Th.) Eventually this remarkable species may have to be placed in a distinct genus.

5. *D. lanceolaria*, L.—Syn. *D. frondosa*, Roxb. Fl. Ind. iii. 226; Wight Ic. t. 266; W. & A. Prodr. 266.—Vern. *Takoli*, *bithua*, N.W.P.; *Barbat*, *parbati*, Banswarra; *Gengri*, Panch Mehals; *Harrōni*, Dharwar.

A tree, glabrous, inflorescence covered with ferruginous pubescence. Leaflets 11-15, oval or oblong, obtuse, 1-2 in. long; lateral nerves numerous, parallel, joined by reticulate veins. Panicles large, lax, terminal and axillary; flowers $\frac{1}{2}$ - $\frac{3}{4}$ in. long, on short slender pedicels, in short unilateral racemes. Calyx broad-campanulate or turbinate, hairy outside, glabrous inside, the 2 upper teeth obtuse, the 3 lower teeth acute. Standard obovate, thickened above the claw. Stamens 10, equally diadelphous. Ovary long stipitate, generally hairy at the base, with 3 ovules. Legume $1\frac{1}{2}$ -2 in. long, $\frac{2}{3}$ - $\frac{3}{4}$ in. broad, 1-3-seeded.

South India on the west side, as far as Banswara on the Mhye river, on the east side to Behar. Also in the Siwalik and outer Himalayan tract, extending west to the Jumna river, ascending to 2500 ft. Leafless for a short time, young foliage in March; fl. H.S.; seed Sept., Oct.

A middle-sized tree, attaining 30-40 ft., with a straight trunk 4-5 ft. girth. Bark thin, light or brownish grey. Wood white, without the peculiar concentric layers of *D. paniculata*. Small patches of black heartwood in the centre.

6. *D. hircina*, Ham.; Benth. Journ. Linn. Soc. iv. Suppl. 46.—Vern. *Sarao*, *bandar*, *tantia*, *gogera*, N.W.P.

A small tree. Branchlets, petioles, and inflorescence clothed with dense ferruginous tomentum. Leaves 6-10 in. long. Leaflets 13-19, oval or oblong, obtuse, with adpressed hairs on both sides; lateral nerves numerous, parallel, joined by reticulate veins. Panicles short, axillary, compact. Flowers small, $\frac{1}{2}$ in. long, on slender pedicels, as long as calyx. Calyx campanulate, densely hairy outside, glabrous inside, 4 teeth obtuse, the 5th longer and subacute. Standard ovate, gradually narrowed

into a claw, and thickened above it. Stamens 10, equally diadelphous, inserted with petals at the base of calyx-tube. Ovary stipitate, hairy. Legume straight, linear, 1½-2 in. long, ¼ in. broad, 1-4-seeded.

Siwalik tract and outer Himalaya, at 2500-5500 ft., from the Jumna to Nepal. Fl. Apr., May; the seed ripens in July.

7. *D. volubilis*, Roxb. Cor. Pl. t. 191; Fl. Ind. iii. 231; W. & A. Prodr. 265. Vern. *Bhatia*, Kamaon; *Bankharra*, Oudh.

A large climber, glabrous, only petioles and ramifications of inflorescence pubescent. Leaves 4-6 in. long; leaflets 11-13, nearly opposite, oblong, generally broader at the top, obtuse, retuse, often mucronate, glabrous, with reticulate veins, no prominent lateral nerves. Inflorescence large, terminal, and axillary, drooping, composed of numerous compact, pedunculate, dichotomous panicles, which consist of short unilateral racemes, bracts oblong, deciduous after flowering. Flowers pale blue, ½ in. long; calyx short-pedicellate, tubular-campanulate, villous, the 2 upper teeth acute, the 3 lower obtuse. Claws of petals shorter than calyx-tube. Standard broad. Stamens 10, equally diadelphous. Ovary long-stipitate, with 2 ovules.

Sub-Himalayan tract. Kamaon to Sikkim, Oudh forests, Behar, the Central Provinces, Bandelkhand, and the Coromandel coast. Common in the Sāl forests of Oudh. Fl. Febr., March; seed May. A large climber with very tough wood.

18. PTEROCARPUS, L.

Trees with alternate, imparipinnate leaves; leaflets alternate, without stipels. Flowers large, yellow, in simple racemes or lax panicles. Calyx campanulate, with an acute base, generally curved, 5-dentate. Petals on long claws, those of the keel free, or slightly connate at the top. Stamens 10, monadelphous, the tube slit above, more or less divided into 2 bundles of 5 each, the 10th stamen frequently free; anthers versatile, cells parallel, opening longitudinally. Ovary with 2-6 ovules. Pod flat, orbicular or ovate, generally somewhat oblique, the seed-part in the middle. Seeds 1-3, separated by hard dissepiments.

1. *P. Marsupium*, Roxb. Cor. Pl. t. 116; Fl. Ind. iii. 234; W. & A. Prodr. 266; Bedd. Fl. Sylv. t. 21. Often called Bastard Teak.—Vern. *Bija*, *bija sāl*, *bijasār*, *bījhua*, *bia*, *bibla* (*Honay*, Canar.)

A large deciduous tree, with full foliage and dark-green shining leaves. Leaflets 5-7, coriaceous, elliptic, obtuse, emarginate or acuminate, with scattered adpressed hairs on both sides when young; glabrous, shining when full-grown; lateral nerves numerous, arcuate, joined by prominent reticulate veins. Flowers ½ in. long, on short pedicels, in short lateral and terminal paniculate racemes. Calyx, peduncles, and pedicels with scattered adpressed hairs. Stamens and petals inserted above the base of calyx. Claws shorter than petals, lamina of all petals broad, waved or curled. Stamens monadelphous, the tube divided deeply into 2 bundles. Ovary hairy. Pod angular, nearly orbicular, 1½-2 in. diam.; style lateral.

Common formerly in South and Central India, though now in many places

rare or nearly extirpated. On the west side found in the Santolah forests of Meywar, S.W. of Neemuch; on the east side as far as the Rajmahal and Mirzapur hills, near the Ganges; also in the extreme S.E. corner of Kamaon, ascending to 3000 ft.; not reported from the Oudh forests. Fl. May, June; the seed ripens Dec.-March.

Attains a considerable size, with an erect, but not very straight trunk 6-8 ft. girth. Yields beams 20 ft. long, and 20 in. square. In Central India large trees are now rare, save in the less accessible parts of the forests. (Maikal range and Delakhari Sâl forests.) Bark $\frac{1}{2}$ - $\frac{3}{4}$ in. thick, cinereous or dusky grey, rugose, with the outer softer corky layers flaking off. Inner bark reddish brown, fibrous. Sapwood large, whitish. Heartwood reddish brown or nut brown, close-grained, tough, and strong. In the green state the cub. ft. weighs 65-70 lb., seasoned between 51 and 56 lb. Skinner gives the value of P. at 868. The results of Puckle's experiments in Mysore range between 693 and 950. Seasons well, takes a fine polish, and is durable. The heartwood is full of gum-resin, and stains yellow when damp. Makes beautiful furniture, and is much used for doors and window-frames, posts and beams. Highly valued for cart and boat-building, for cotton gins and agricultural implements. In the peninsula it is considered, next to Teak and Blackwood, the most valuable tree, and the timber often fetches the same price as Teak. From wounds in the bark flows copiously a red gum-resin, true *Kino*, coll. in S. I., and exported. It is sold in little angular pieces, brittle, black and shining; melts in the mouth with a strong, simply astringent taste, like the kino of *Butea frondosa*, which it much resembles.

To the same genus belong: 2. *P. santalinus*, L. fil., the red *Sanders* wood of the North Arcot, Cuddapah, and Kurnool forests. Also found by Beddome in the Godavery forests, but not known further north, with 3 leaflets and smaller flowers; claws as long as the lamina of petals. 3. *P. indicus*, Willd., with 7-9 acuminate leaflets, the *Padouk* of Burma. The rosewood or lancewood of western tropical Africa is the produce of *P. erinaceus*, Poir.; Guill. et Perr. Fl. Seneg. t. 54.

19. PONGAMIA, Vent.

Trees with imparipinnate leaves, the leaflets opposite, without stipels. Calyx cup-shaped, truncate, or with 5 indistinct teeth. Standard broad-ovate, thickened at the base, with callous inflexed auricles at the top of the claw; keel obtuse, its petals cohering at the back near the top. Stamens 10, monadelphous, the tenth stamen free at the base, in the middle connate with the rest into a closed tube; anthers versatile. Ovary nearly sessile, with 2 ovules; style filiform, incurved, with a small terminal stigma. Legume oblong, indehiscent, 1-seeded, shell thick, coriaceous, the sutures obtuse, without wings. Seed reniform, thick, hilum small.

1. *P. glabra*, Vent.; W. & A. Prodr. 262; Wight Ic. t. 59; Bedd. Fl. Sylv. t. 177.—Syn. *Galedupa indica*, Lam.; Roxb. Fl. Ind. iii. 239.—Sans. *Karanjaka*. Vern. *Pāpar*, *pāpri*, *karanj*, *karanjh*, *kanji*, *kunj*. Local n. *Sūkchein*, Pb.; *Charr*, Mairwara.

A moderate-sized tree, glabrous, almost evergreen, with bright-green shining leaves. Leaflets 2-3 pair, ovate or elliptic, short-acuminate, 3-5 in. long, with 4-6 lateral arcuate nerves on either side of midrib. Flowers mixed blue, white, and purple; petals dark-veined. Pod thick, hard, semi-ovate, about 2 in. long, 1 in. broad, acute at both ends.

Common near banks of streams and watercourses, and elsewhere in moist localities; often associated with *Terminalia Arjuna*, in South and Central India, Burma, and Bengal. Also at the foot of the Himalaya, and in the outer valleys extending west to the Ravi (not common), and ascending to 2000 ft. Outside India in Ceylon, Malacca, the Indian Archipelago, extending northward to South China, and eastward to the Fiji Islands, Timor, and tropical Australia. The leaves are shed in April, and are renewed soon afterwards. Fl. May, June; the pods ripen in April of the ensuing year.

Attains 50-60 ft; trunk short, not very regular, 5-8 ft. girth; crown spreading, shady. Bark smooth, striated, of a whitish or dusky cinereous colour, 1 in. thick. Inner bark yellowish, fibrous, with an unpleasant smell. Wood yellowish, with darker veins, hard, and tough; sap and heartwood not distinct. Used for building, but not durable, readily eaten by insects. In South India solid cart-wheels are made of it. The pods (*bara karanj*) and the leaves are used in native medicine, and oil is expressed from the seeds, used for burning, and medicinally (Pharm. Ind. 79).

20. DERRIS, Loureiro.

Climbing shrubs or trees, with alternate imparipinnate leaves; leaflets opposite, exstipellate. Flowers violet, purplish, or white, in simple or paniculate racemes. Calyx truncate. Standard unappendaged; wings obliquely oblong, slightly cohering to the keel-petals. Vexillary stamen united to the rest near the middle, rarely free; anthers versatile. Ovary 2- ∞ -ovulate; stigma terminal. Legume indehiscent, oblong or orbicular, flat, membranous, or coriaceous, narrowly winged on the upper or both sutures. Seeds solitary or several, compressed.

1. *D. scandens*, Benth. in Linn. Journ. iv. Suppl. 103.—Syn. *Dalbergia scandens*, Roxb. Cor. Pl. t. 192; Fl. Ind. iii. 232; W. & A. Prodr. 264.

A large climbing shrub, with imparipinnate leaves. Leaflets 3-4 pair, elliptic-lanceolate, 2-3 in. long, glabrous, dark green, subcoriaceous, common petiole pubescent. Flowers on filiform pedicels, light rose-coloured, in long slender racemes. Pods flat, oblong, marginate, 2-3 in. long, 2-4-seeded.

Baraich and Gonda forests in Oudh, Bengal, South India, Ceylon, Burma, Indian Archipelago, North Australia, and South China. Fl. R.S.; fr. C.S., H.S. Attains 1 ft. in girth.

D. robusta, Benth. l. c. 104.—Syn. *Dalbergia robusta*, Roxb.; Wight Ic. t. 244. *D. Krowei*, Roxb. Fl. Ind. iii. 229,—a tree, with narrow-linear pods 2-3 in. long, and $\frac{1}{2}$ in. wide, of South India, Ceylon, Bengal, is found in Kamaon (Madden), ascending to 5000 ft. (vern. *Buro*).

SECOND SUB-ORDER, CÆSALPINIÆ.

Trees, shrubs, rarely herbs, with pinnate, abruptly bipinnate, bifoliolate, rarely unifoliolate leaves; leaflets generally not stipellate. Flowers bisexual, generally irregular. Calyx of 5 more or less connate sepals. Petals 5, or fewer, imbricate in bud, the upper petal inside. Stamens 10, or fewer, rarely numerous, free, or more or less connate. Seeds with or without albumen; the embryo with a straight radicle.

Leaves bipinnate, common petiole long.

Pod flat, thin, membranous, indehiscent, with a broad wing on the seminiferous suture

Pod thick or more or less turgid, not winged.

Calyx imbricate, of 5 unequal sepals

Calyx valvate, of 5 equal sepals

Calyx valvate, of 4 sepals, the 2 upper connate

Leaves bipinnate, common petiole short, spinescent, leaflets minute

Leaves simple or bifoliolate.

Calyx gamosepalous; seeds numerous

Calyx of 5 nearly distinct sepals; pod 1-seeded

Leaves abruptly pinnate.

Calyx-tube turbinate, segments 4; petals 3

Calyx-tube very short, segments 5; petals 5

Calyx-tube long, funnel-shaped; petals none

1. *MEZONEURUM*.

2. *CÆSALPINIA*.

POINCIANA (p. 157).

COLVILLEA (p. 157).

3. *PARKINSONIA*.

4. *BAUHINIA*.

5. *HARDWICKIA*.

6. *TAMARINDUS*.

7. *CASSIA*.

8. *SARACA*.

1. *MEZONEURUM*, Desfontaines.

Climbing shrubs with bipinnate leaves. Flowers in terminal or axillary, solitary or paniced racemes. Calyx oblique, with 5 broadly-imbricate segments, anterior segment larger, concave, outside in bud. Petals 5, rather unequal. Stamens 10, free; anthers uniform. Ovary with 2 or more ovules, stigma terminal, truncate, or dilated. Legume indehiscent, or nearly so, compressed, central suture longitudinally winged. Seeds compressed, exalbuminous.

1. *M. cucullatum*, W. & A. Prodr. 283.—Syn. *Cæsalpinia cucullata*, Roxb. Fl. Ind. ii. 358. Vern. *Biskoprah*, Oudh; *Ragi*, Bombay.

A powerful climber, branches and petioles armed with strong hooked prickles. Pinnæ 3-7 pair; leaflets 4-5 pair, coriaceous, shining, ovate, acuminate, 2-4 in. long. Flowers yellow in axillary and terminal panicles, composed of a few rigid racemes. Pods flat, shining, unarmed, foliaceous, 3-4 in. long, 1 in. broad, with a broad membranous wing on the seminiferous suture. Seeds 1-2.

Bengal, Oudh forests, Konkan, Western Ghats. Indian Archipelago. Fl. Nov.-Feb. Fr. ripe March.

2. *CÆSALPINIA*, Linn.

Trees or shrubs, often climbing, and armed with prickles. Leaves bipinnate. Flowers white, yellow, or red, in simple or paniced racemes. Calyx-lobes 5, imbricate, the lower outside and often larger. Petals 5, orbicular or obovate, nearly equal. Stamens 10, free; anthers uniform, dehiscing longitudinally. Ovary free, inserted at the base of the short calyx-tube; ovules few. Pod compressed, coriaceous, indehiscent, or 2-valved. Seeds in some species separated by cellular partitions, generally exalbuminous, with a short straight radicle.

Pods covered with closely-set prickles; a prickly climber

Pods smooth, without prickles.

A prickly climber; pubescent; flowers in lateral racemes

An erect, almost unarmed shrub; glabrous; flowers in terminal corymbs

1. *C. Bonducella*.

2. *C. sepiaria*.

3. *C. pulcherrima*.

1. **C. Bonducella**, Roxb. Fl. Ind. ii. 357.—Syn. *Guilandina Bonducella*, Linn. *The fever-nut*. Vern. *Katkaranj*, *kat karinga*, *karanjo*, *karanja*, *karonj*. (*Karbat*, *kachla*, Sindh.)

A scandent shrub; pubescent; branches, petioles, inflorescence armed, sparsely or densely, with short, unequal, slightly recurved prickles. Leaves ample, 1-1½ ft. long, pinnae 6-8 pair; leaflets opposite, 6-10 pair, elliptical with a rounded, somewhat unequal-sided base, apex mucronate. Stipules large, cut into large segments. Racemes axillary, many-flowered, simple or branched below, bracts linear-lanceolate, with a spreading or recurved apex, projecting beyond the unopened flowers. Calyx rusty-tomentose, with recurved lobes, the inferior lobe largest, hood-shaped. Petals yellow, spreading, the upper sometimes spotted with red. Pods 2-valved, 2-3 in. long, 1½-1¾ in. broad, coriaceous, covered with sharp, straight, spreading prickles. Seeds 1-2, globose or ovoid, smooth, shining, bluish grey or lead-coloured, ¾ in. long.

Widely spread throughout the tropics, indigenous or naturalised in Southern, Eastern, and a great part of North-Western India, ascends to 2500 ft. in Kamaon. In the Panjab only cultivated, and occasionally run wild in hedges and waste places. Common in the Salt line fence in Harriāna. The large yellow flowers appear in the rains. Is an excellent hedge-plant. The seeds contain a fixed oil, resin, and a bitter substance: they are tonic and antiperiodic (Pharm. Ind. 68).

C. Bonduc, Roxb. (*Guilandina B.*, Linn.), a nearly allied species in South India and Burma, has nearly glabrous leaves, no stipules, and erect bracts. In W. & A. Prodr. 280, the two are united, under the name of *G. Bonduc*.

2. **C. sepiaria**, Roxb. Fl. Ind. ii. 360; W. & A. Prodr. 282; Wight Ic. t. 37. *Mysore thorn*.—Vern. *Urn*, *uri*, *uran*, *arlu*, *kando*, *relu*, *relmi*, *Pb.*; *Kingri*, *aira*, *karaunj*, *agla*, *karkari*, *kannena*, Garhwal, Kamaon; *Aila*, Oudh; *Sensen*, Chittor in Meywar; *Chillar*, Bombay.

A large, prickly climber. Pubescent; branches, petioles, and peduncles armed with short, strong, recurved prickles. Leaves ample, 10-18 in. long, pinnae 6-10 pair; leaflets opposite, 8-12 pair, oblong, obtuse, on short petioles; stipules semisagittate, deciduous. Flowers yellow, in simple axillary racemes, pedicels longer than flowers, jointed at the top, bracts lanceolate, clothed, as well as pedicels and calyx, with ferruginous tomentum. Lobes of calyx oblong, broader above, a little shorter than the petals, the inferior lobe hood-shaped, larger than the others. Stamens somewhat longer than petals, villous below. Pod glabrous, oblong, obliquely cuspidate, 2-3 in. long, 1 in. broad. Seeds 4-8, ovoid, mottled, brown and black, less than ¼ in. long.

Indigenous and naturalised throughout India and Burma. Outer hills of the Himalaya, extending to the Indus, ascending in places to 6000 ft. Said by Roxburgh to have been introduced into Bengal from Mysore by General Martin. Fl. Feb.-May; Aug. (Hazara.) Makes an almost impenetrable fence: Hyder Ali planted it round fortified places.

Nearly allied is the *Sappan-wood*, *C. Sappan*, Linn.; Roxb. Cor. Pl. t. 16; Fl. Ind. ii. 357. Vern. *Patang*, *Bakam*, a large prickly tree in South India,

Burma, and Bengal, with yellow flowers in large terminal panicles, unequal-sided leaflets, and thick, woody, smooth, shining, dark-brown pods, broader at top, obliquely truncate and mucronate. The wood, which yields a valuable dye, is largely exported from Calcutta, Madras, Ceylon, and Siam.

C. Nuga, Ait.—Syn. *C. paniculata*, Roxb. l. c. 364; Wight l. c. t. 36, Bengal, Indian Archipelago,—is a prickly climber, with short rhomboid, cuspidate, 1-seeded pods.

3. *C. pulcherrima*, Sw.—Syn. *Poinciana pulcherrima*, Linn.; Roxb. Fl. Ind. ii. 355; W. & A. Prodr. 282. Vern. *Krishna-chūra*, Beng.

A large shrub. Glabrous, armed with a few scattered prickles. Pinnae 3-9 pair, leaflets 5-10 pair, obovate-oblong, obtuse or emarginate. Flowers large, orange or bright yellow, on long pedicels, more than twice the length of flowers, supported by early caducous, subulate bracts, in terminal pyramidal racemes. Calyx-tube turbinate, segments oblong, the inferior segment larger, hood-shaped. Petals $\frac{1}{2}$ -1 in. long, narrowed into a claw, edge often lacerate. Style and stamens much longer than corolla; filaments slightly hairy below, stigma minute. Legume linear-oblong, flat, obliquely rounded at the top.

Cultivated in gardens in most parts of India. Said originally to have been brought from the Moluccas. In the West Indies it is either indigenous, or naturalised at a very early date (Macf. Fl. Jam. 331).

C. coriaria, Willd., the *Divi-divi* or *Libi-dibi*, is a spreading tree 20-30 ft. high, indigenous in the West Indies and Central America, unarmed, glabrous, with bipinnate leaves, pinnae unpaired, leaflets linear; flowers white, scented, in short compound racemes, and broad, oblong, glabrous, twisted pods. The pods are rich in tannin. The tree has been introduced into Western and South India, and its cultivation deserves to be extended, as it yields valuable material for tanning.

Three splendid ornamental, soft-wooded trees, nearly related to *Cesalpinia*, are largely cultivated in India. 1. *Poinciana regia*, Bojer, Bot. Mag. t. 2884, a native of Madagascar, introduced into India within the last 60 years, and commonly grown in gardens north-west as far as the Jumna, with 8-20 pair of pinnae, large bright-scarlet flowers, in terminal and axillary racemes; petals 2-3 times longer than calyx-lobes, 2 in. long, almost orbicular, tapering into claws 1 in. long, the upper petal more cuneate, variegated and striated with red and yellow; stamens nearly as long as petals. Pods 2 in. broad, 20-24 in. long. 2. *P. elata*, Linn., Bedd. Fl. Sylv. t. 178, indigenous in forests of the western and eastern coasts of the Peninsula, as far north as Guzerat, common near towns and villages in Marwar (Madden), and cultivated largely in South India, with yellowish flowers in lax corymbis, terminal or from the upper axils, petals somewhat longer than calyx, 1 in. long, on short claws, with a rounded lamina, much curled on the margin, stamens much exceeding petals, 2-4 in. long. 3. *Colvillea racemosa*, Bojer, Bot. Mag. t. 3325, 3326, with large leaves, pinnae 20-30 pairs, bright-scarlet flowers in erect, compact, cylindrical racemes, 18 in. long, terminal and from the upper axils, petals as long as calyx, unequal, the upper and inside petal orbicular, convolute, the 2 lateral petals longer, cuneate, the 2 upper longest, falcate. This tree was discovered on the western coast of Madagascar by Professor Bojer in 1824, brought by him to the Mauritius, and introduced into India about 1840. Generically, these 2 genera differ from *Cesalpinia* by a valvate calyx, consisting in *Poinciana* of 5 equal segments, while *Colvillea* has 4, of which the 2 uppermost are connate nearly to the top.

3. PARKINSONIA, Linn.

Spiny shrubs, or small trees, with bipinnate leaves; primary petioles short, secondary elongated, abruptly pinnate, with minute leaflets. Flowers yellow, in lax axillary racemes. Calyx divided nearly to base into 5 equal, membranous, slightly imbricate segments. Petals 5, equal, spreading. Stamens 10, free; filaments pilose at base; anthers uniform, elliptical. Ovary 8-15-ovulate, style filiform, recurved in bud. Pod linear, contracted between the seeds, seeds albuminous.

1. *P. aculeata*, Linn.; W. & A. Prodr. 283.—Vern. *Vilayati kihar*, Pb.

Common (primary) petiole $\frac{1}{2}$ in. long, ending in a stout sharp spine, often with lateral stipulary spines. Pinnæ 6-10 in. long, 2-4 on either side, clustered, flat, coriaceous, with or without minute leaflets. Racemes shorter than leaves, pods 3-6 in. long.

Indigenous in the West Indies and tropical America, cultivated in most tropical countries, almost naturalised in India, where it is grown as a hedge-plant. Has spread largely throughout the Panjab since annexation, and thrives well in the more arid districts. Common in the Salt line fence in Harriāna. Fl. throughout the year. Branches lopped as fodder for goats. Wood whitish, light and soft, but close-grained, polishes fairly.

To the same tribe as the preceding genera (*Eucasalpiniceæ*) belongs *Hæmatoxylon campechianum*, Linn., the logwood, a most valuable dyewood of Central America and the West Indies; also *Acrocarpus fraxinifolius*, Arnott, Bedd. Fl. Sylv. t. 44, one of the largest timber-trees of the evergreen forests along the Western Ghats.

4. BAUHINIA, Linn.

Trees, shrubs, or climbers, with simple or bifoliolate leaves, the leaflets distinct, or more or less connate. Flowers white, pink, or purple, in simple or paniculate racemes. Calyx gamosepalous, turbinate or tubular, cleft into 5 segments, or split on the upper side, and spathaceous. Petals 5, spreading, slightly unequal. Stamens 10, all or only a portion perfect, free or more or less connate; anthers versatile, the cells dehiscing longitudinally. Ovary stipitate, stalk free or adnate to the tube, with 2 or numerous ovules. Pod indehiscent or 2-valved, long, linear, or oblong. Seeds numerous.

Stamens 10, all perfect; ovary-stalk free; pod indehiscent (sub-genus *Pileostigma*).

A tree; calyx 5-cleft; legume marked with regular parallel reticulate veins

1. *B. malabarica*.

A tree; calyx spathaceous; legume irregularly reticulate

2. *B. racemosa*.

Perfect stamens 3, 4, or 5; ovary-stalk adnate to calyx; pod 2-valved (sub-genus *Phanera*).

Trees; flowers large, in short racemes.

Perfect stamens 3; calyx 2-cleft to the base; leaflets connate to the middle

3. *B. purpurea*.

Perfect stamens 5; calyx spathaceous; leaflets connate beyond the middle

4. *B. variegata*.

A tree; flowers small, in large panicles; perfect stamens 3; calyx 2-3 cleft to the base; leaflets connate to the apex

5. *B. retusa*.

A climber; flowers middle-sized in large corymbs

6. *B. Vahlia*.

Of the sub-genus *Pauletia*, with large flowers, a spathaceous calyx, the ovary-stalk free, 10 perfect stamens, and a narrow linear pod, there are two species, which will probably be found in the range of this Flora. 1. *B. acuminata*, Linn.; Roxb. Fl. Ind. ii. 324; W. & A. Prodr. 295. Vern. *Kachnār*. A large erect shrub, with greyish-brown bark. Leaves 2-lobed nearly to the middle, each lobe (leaflet) with 4 pinniveined nerves; lobes ovate, pointed. Flowers white, 2 in. across; calyx tapering into a long fine apex, divided into 5 hairy, filiform teeth. Pod flat, 3-4 in. long, $\frac{1}{2}$ in. broad, upper suture thickened and 3-keeled. Bengal, South India, Burma. 2. *B. tomentosa*, Linn.; Roxb. Fl. Ind. ii. 322; W. & A. Prodr. 295. A shrub, with ash-coloured bark. Branchlets, petioles, and under side of leaves with rust-coloured pubescence. Leaves 2-lobed to the middle, lobes obtuse, 3-nerved. Stipules subulate, $\frac{1}{2}$ in. long. Flowers white or pale yellow, 4 in. across. Pods flat, tomentose, 4-5 in. long, $\frac{1}{2}$ in. broad. South India, Indian Archipelago.

1. *B. malabarica*, Roxb. Fl. Ind. ii. 321; W. & A. Prodr. 294.—Vern. *Amlōsa*, Oudh; *Amlī*, N.W.P.; *Boaygyin*, Burm.

A tree, nearly glabrous; inflorescence, calyx, petioles, and nerves on the underside of leaves with rusty pubescence. Leaves cordate at base, broader than long, leaflets united beyond the middle, each with 4-5 nerves. Racemes axillary, often 2 or 3 together, short, nearly sessile; bracts triangular, ciliate, deciduous. Flowers $\frac{1}{2}$ in. long, pedicels slender, longer than calyx, calyx funnel-shaped, teeth 5, equal, triangular. Petals spathulate, equal. Stamens 10, all fertile, slightly monadelphous at the base. Legume linear, 12 in. long, $\frac{3}{8}$ in. broad, long-acuminate, on a stalk 1 in. long or longer, marked with regular parallel, waved, and reticulate veins, generally descending from the edges to the middle of the valves.

Sub-Himalayan forests from the Ganges to Assam, frequently associated with Sāl. Oudh Sāl forests, but not plentiful. Also in Behar, the Godavery forests, Mysore, along the western coast, and in Burma. Fl. Oct., Nov.; fruit April, May. In Oudh attains 30 ft., and a girth of 4-5 ft. In Burma and Malabar it is a large tree. Foliage dark green. Heartwood small, dark brown, weight 42 lb. per cub. ft. in Burma. The leaves are acid, and are eaten.

2. *B. racemosa*, Lam.; W. & A. Prodr. 295; Bedd. Fl. Sylv. t. 182.—Syn. *B. parviflora*, Vahl.; Roxb. Fl. Ind. ii. 323. Vern. *Kosūndra*, taur, Ph.; *Kachnāl*, *gūriāl*, *thaur*, N.W.P.; *Ashta*, *makkēna*, Oudh; *Mahauli*, Banda; *Maula*, *ashto*, *dhorāra*, C.P.; *Dhondri mara*, Gondi; *Hpalanben*, Burm.

A small tree, pubescent, or rusty-tomentose. Leaves cordate at base, broader than long; leaflets united beyond the middle, with 4 nerves each. Racemes terminal or opposite to leaves, lax, 3-6 in. long; flowers distant, whitish yellow, $\frac{1}{2}$ in. long; pedicels shorter than calyx. Bud curved, unequal-sided. Bracts subulate, tomentose, deciduous. Calyx spathaceous, at length reflexed, 5-toothed. Petals linear-lanceolate, stamens 10, all fertile and united at the base. Legume linear, thick, generally curved, 4-12 in. long, 1 in. broad; valves marked with irregularly reticulate lines.

Dry forests of South and Central India, Burma, Bengal, Oudh. Sub-Himalayan tract to the Ravi, ascending to 5000 ft. in Kamaon. Old leaves are shed in Dec., or later; the new foliage appears between March and June. Fl. March-June; the pods ripen Nov.-March.

A small, crooked, bushy tree, 15-20 ft. high, branchlets drooping. Bark 1 in. thick, rough, with exfoliating quadrangular scales, dark grey or brown. Inner bark bright red, fibrous. Wood reddish brown, heart small, irregularly shaped, of a darker colour. R. Thompson makes the weight of the seasoned wood (C. Prov.) 56 lb. per cub. ft. Rope, strong and durable, is made from the inner fibrous bark; also slow-matches for matchlock-men.

3. *B. purpurea*, Linn.; Roxb. Fl. Ind. ii. 320; W. & A. Prodr. 296. —Sans. *Kharvallika*. Vern.* *Kolār, karār, karālli, Pb.; Koliār, kaniār, kandan, khairvāl*, N.W.P.; *Kwillar*, Oudh; *Kodwari*, Gonds, C.P.

A tree. Nearly glabrous; young branches, inflorescence, and calyx covered with brown pubescence. Leaves coriaceous, cordate at base, as long as broad; leaflets united to the middle, or a little beyond, 4-5-nerved, the inner edges often overlapping. Racemes paniculate. Flowers of a deep rose-colour, pedicels in the axils of triangular bracts, with a pair of subulate bracteoles in the middle. Calyx cleft to the base of the limb into 2 reflexed segments, the one emarginate, the other 3-toothed, sometimes cohering at the apex. Petals oblong-lanceolate, narrowed at the base, 1-2 in. long. Fertile stamens 3, occasionally 4, long, ascending. Ovary hairy, stalk cohering on one side with calyx-tube. Legume 6-12 in. long, linear, flat, pointed. *B. triandra*, Roxb., with white flowers, is probably a variety of *B. purpurea*.

Wild in dry forests of most parts of India, as far west as the Indus, ascending to 4000, and at times to 5000 ft., also in Burma. Often associated with *Sāl* and *Bamboo* (*Dendrocalamus strictus*). Cultivated throughout India. Particularly fine in the Kotree Doon and the Patlee Doon, and their side valleys; also in the *Sāl* forests of the Meikla range, C. Prov. In North-West India fl. from Sept.-Nov. Pods ripen Jan.-April.

A moderate-sized tree, to 40 ft. high, with a short trunk attaining a girth of 6-9 ft. Bark $\frac{1}{2}$ in. thick, smooth, or rough, with rounded exfoliating scales, whitish, ash-coloured, or dark brown. Heartwood of a handsome yellowish or reddish brown colour, hard, close-grained, durable. Sapwood liable to be attacked by insects. Employed for agricultural implements, and in construction when found sufficiently large. The cub. ft. of seasoned wood weighs 39 lb., of green wood, 45-48 lb.; value of P. 567 (Skinner).

The bark is used for tanning, the leaves are lopped for cattle-fodder, the flower-buds are pickled and eaten as a vegetable.

4. *B. variegata*, Linn.; Roxb. Fl. Ind. ii. 319; W. & A. Prodr. 296. —Sans. *Kovidāra, kanchanāra*. Vern. *Kachnār*, North and Central India; *Koliār, kurāl, karal, padriān*, Pb.; *Khairāl, gūriāl, gwār, bariāl*, N.W.P.

A tree, young branches, under side of leaves, inflorescence, and calyx with short pubescence. Leaves with cordate or rounded base, as broad as long; leaflets connate beyond the middle, with 5-7 nerves. Racemes

* The vernacular names of *B. purpurea* and *variegata* demand further inquiry.

short, axillary or terminal, with few flowers. Bracts small, broad, triangular. Flowers large, 2 in. long, fragrant. Calyx spathaceous, ovate, 5-toothed at the apex. Petals oblong, the fifth broader, ovate or obovate. Perfect stamens 5. Ovary-stalk cohering with the calyx-tube. Legume 6-18 in. long, linear, flat. Two varieties: one with red flowers, 4 petals light purple, the 5th deep purple, tinged with cream and red; the other with white flowers, *B. candida*, Roxb. l. c. 318, 4 petals white, the 5th variegated inside with yellowish green.

Wild in most wooded parts of India, as far west as the Indus, also in Burma. Abundant in the warm glens between the Kosilla and Sarda (Madden). Cultivated throughout India. Fl. Feb.-April; old leaves are generally shed before flowers appear; young foliage in April and May.

A moderate-sized tree, with a short erect trunk, attaining 4-5 ft. girth. Bark light or dark grey, with vertical cracks. Wood light or reddish brown, weight 54 lb. per cub. ft. (seasoned), 67½ lb. (green), R. Th., considered less durable than that of *B. purpurea*, much used for agricultural implements. Bark astringent, used for tanning and dyeing. Leaves and flower-buds eaten as vegetables; flower-buds are often pickled.

5. *B. retusa*, Roxb. Fl. Ind. ii. 322.—Syn. *B. emarginata*, Royle. Vern. *Kurāl*, Pb.; *Kandla*, *kanalla*, Kamaon.

A small tree, glabrous, only extremities of inflorescence and calyx with short whitish pubescence. Leaves entire, or emarginate, broad-ovate with a cordate or straight base, broader than long, with 9-11 nerves, branching above the middle. Flowers numerous, pale yellow, ½ in. across, on long slender pedicels in corymbose, pedunculate racemes, forming large terminal panicles. Calyx ovate, split into 2 or 3 segments. Petals clawed, hairy outside, lamina orbicular, beautifully marked with dark purple veins. Perfect stamens 3, ovary hairy below, curved, the stalk adnate to the calyx-tube. Legume oblong, 4-6 in. long, 1 in. broad, often broader at the top.

Siwalik tract and outer N.W. Himalaya, ascending to 4500 ft., west to the Bias. Oudh, and occasionally in the Central Provinces. Chiefly in damp places. Fl. Sept. A small tree with a short trunk 3 ft. girth, spreading branches, and long, slender, waving, pendulous branchlets. Bark smooth, cinereous. Wood reddish. A brown insipid gum exudes from the bark, and is collected in the Dehra Doon.

6. *B. VahlII*, W. & A. Prodr. 297.—Syn. *B. racemosa*, Vahl; Roxb. Fl. Ind. ii. 325. Vern. *Marwār*, *taur*, Pb.; *Malghan*, *māḷjan*, *mūlu*, N.W.P.; *Maurain*, *jallaur*, Oudh; *Sihār*, *maul*, C.P.

A gigantic climber, clothed with dense grey or ferruginous tomentum, branchlets frequently terminating in a pair of opposite, revolute tendrils. Leaves very large, often 12 in. across, deep-cordate, as broad as long; leaflets connate to the middle, each with 5-7 prominent arcuate, pinniveined nerves. Stipules obtuse, falcate. Flowers ¾ in. broad, on long slender pedicels, in terminal corymbose racemes. Bracts subulate, bractlets 2, above the middle of pedicel. Calyx-limb ovate, splitting to the top of the tube in two reflexed segments. Petals clawed, obovate, hairy outside. Perfect stamens 3. Ovary oblong, hairy, stalk adnate to calyx-

tube. Legume pendulous, flat, thick, 6-18 in. long, 2-3 in. broad, woody, clothed with thick dark-brown tomentum. Seeds orbicular, flat, smooth, brown, 1 in. diam.

Common in the forests of Northern and Central India, in the sub-Himalayan tract from the Chenab to Assam, Behar, and on the western coast. Fl. April; the pods of the previous year ripen about the same time.

Stem irregularly ridged and furrowed, often more than 100 ft. long, with a fibrous bark and porous wood, in broad, irregularly concentric layers. Foliage dense, with an almost impenetrable network of branchlets, covering the largest trees, smothering them, or causing their stems to grow crooked and irregular. One of the greatest enemies of the Sāl tree, but nearly extirpated by the labours of the forest officers in the Khyregarh forests of Oudh. Rope is made from the bark; the leaves are used for packing, as plates, and umbrellas are made of them. The pod (*chihār*) is roasted, and the seeds are eaten.

5. *HARDWICKIA*, Roxb.

Trees, with abruptly pinnate leaves and small flowers in racemose panicles. Calyx of 5 distinct, ovate or orbicular, petaloid, imbricate sepals. Petals none. Stamens 10, alternately shorter, generally all fertile. Anthers versatile, dehiscing longitudinally. Ovary sessile, free, with 2 ovules.

1. *H. binata*, Roxb. Cor. Pl. t. 209; Fl. Ind. ii. 423; W. & A. Prodr. 284; Bedd. Fl. Sylv. t. 26.—Vern. *Parsid*, Singrowlie hills; *Anjan*, C.P.; *Acha*, Tam.

Glabrous. Leaves bifoliate; leaflets sessile, entire, obtuse, obliquely ovate, or semicordate, with 4-5 arcuate nerves; common petioles $\frac{1}{4}$ or $\frac{1}{3}$ the length of leaflets. Stipules small, cordate, caducous. Flowers greenish yellow, on long slender racemes, arranged in axillary or terminal panicles; pedicels shorter than flowers; bracts minute, caducous. Ovary oblong; style ascending, with a large, peltate stigma. Legume lanceolate, 2-3 in. long, with parallel longitudinal veins, a solitary seed near the top.

In dry forests of South and Central India, but not everywhere; generally gregarious in belts or patches of greater or less extent. It is wanting in the moister forests below and above Ghat on the west side of the Peninsula. In Central India, the tree is known in Chanda, Berar, Khandeish, and Nimar, on the eastern slopes of the Pachmarhis, near the Dhūdi river, and on the Singrowlie hills, south of the Soane river. Seed ripe April, May.

An elegant tree, attaining 50-60, occasionally 120 ft., with a tall, straight, and regularly shaped stem, and a narrow oval crown. Bark black, rough, with exfoliating scales. Young leaves tinged with red; mature foliage dark green; branchlets slender, drooping. Easily raised from seed, and throws up strong shoots from stumps.

Sapwood small, whitish; heartwood dark reddish brown, sometimes nearly black, close- and fine-grained, strong, very hard and very heavy, weight 67-85 lb. per cub. ft., 100-120 lb. when green; value of P. 942 (Skinner). Liable to split, but does not warp, takes a fine polish, and is exceedingly durable. Used for bridge- and house-posts, and for ornamental work.

The bark yields a valuable fibre, which requires no preparation, is strong, and is in places much used for cordage. Cattle are exceedingly fond of the leaves. In the Canvery forests, Northern Mysore, and Berar, the trees were formerly, and are still to a great extent, pollarded for cattle-fodder.

6. TAMARINDUS, Linn.

An unarmed tree, with abruptly pinnate leaves, small caducous stipules and racemose flowers. Calyx with a turbinate tube, and 4 imbricate, membranous segments. Petals 3, the lateral ones ovate, the upper inner one narrower, concave. Stamens 3, perfect, incurved, united in a sheath to the middle, with oblong versatile anthers, dehiscing longitudinally, a few short filiform staminodes at the edge of the sheath. Ovary stipitate, the stalk adnate to the calyx-tube, with numerous ovules; a thick style and clavate stigma. Pod oblong, curved or nearly straight, thick, outer pericarp a thin crustaceous shell, inner layer an acid pulp, traversed by fibres. Seeds obovate or roundish, often angular, compressed, with a brown, very hard, thick, shining testa and no albumen.

1. *T. indica*, Linn.; Roxb. Fl. Ind. iii. 215; W. & A. Prodr. 285; Bedd. Fl. Sylv. t. 184. *The Tamarind*.—Sans. *Chukra*, *chinha*. Vern. *Amli*, *ambli*, *imli*, Hind.; *Chintz*, Konkan; *Magyiben*, Burm.

Leaves 3-6 in. long, leaflets 10-15 pair, linear-oblong, glabrous, obtuse, with fine reticulate venation, and more or less distinct intramarginal nerves. Racemes loose, with 10-15 flowers, at the end of short lateral branchlets. Petals unilateral, beautifully variegated with red and yellow. Pod pendulous, 3-8 in. long, 1 in. broad.

Cultivated throughout India and Burma, save in the North-Western Panjab; trees are found as far as the Jhelam, but the fruit does not ripen west of Amballa. In the Central Provinces, the Bassi forests Meywar, and in many parts of South India, the tree is found self-sown in waste and forest lands, but there seems no sufficient evidence of its being originally indigenous in India. Wherever I have seen it, it has been in the vicinity of existing or abandoned cultivation. The tree is cultivated in the tropics of both the New and Old World, and is believed to be truly indigenous in tropical Africa (Oliver Fl. Trop. Afr. ii. 308). Never leafless, the foliage changes in March and April; fl. May, June; fruit ripens 7-9 months after flowering.

A large tree, attaining 80 ft. or more, with a short thick trunk (25 ft. girth not rare), often ridged, with a magnificent broad and high, shady crown. Bark $\frac{1}{2}$ in. thick, dark grey, brownish to blackish, tessellated by longitudinal fissures and cross-cracks. Wood yellowish white, hard and close-grained, the outer and younger wood a little softer, but the sapwood not defined by a concentric line, such as we find it in the wood of Teak, Sissoo, Säl, Bija sal, Oak, and other trees. Heartwood small near the centre, outline very irregular, dark purplish brown, projecting into the yellowish outer wood with radiating ramifications, so that planks frequently show alternate layers of light- and dark-coloured wood. Annual rings indistinct, medullary rays very numerous, very fine, pores moderate, equal, uniformly distributed, each pore or group of pores surrounded by lighter-coloured tissue. Weight of outer wood (sap) 60 lb. (Cunningham); of the dark-coloured heartwood from 79-83 lb. Value of P. 605-623 (sap-wood), 850 (heartwood). Polishes well, and though extremely hard and difficult to work, is prized highly for many purposes when a tree past fruit-bearing is felled. Naves and other parts of wheels, mallets, planes, tent-pegs, furniture, rice-pestles, oil-presses, and sugar-crushers are made of it; it is an excellent wood for turning. The heartwood is very durable, the outer wood is apt to be eaten by insects.

Mainly cultivated on account of the acid pulp of the pod; there are several kinds, with sour, sweetish, and red pulp. The pulp contains Citric, Malic, and Tartaric acids; large quantities are imported into England from the West Indies. It is officinal as a laxative and refrigerant (Pharm. Ind. 64). The seeds (*chinha*) are used in native medicine; pounded, they are eaten in times of scarcity, and the powder mixed with gum makes cement.

7. CASSIA, Linn.

Trees, shrubs, or herbs, with abruptly pinnate leaves and yellow or red flowers. Calyx-tube very short, segments 5, imbricate in bud. Petals 5, nearly equal, imbricate. Stamens 10, all perfect, or a portion (3 or 5) more or less abortive. Legumes indehiscent or 2-valved. Seeds albuminous.

A tree, leaves without interpetiolar glands; pods long, cylindrical

1. *C. Fistula*.

A shrub, leaves with interpetiolar glands; pods flat
Shrubby or herbaceous; leaves without glands; pods flat, broad, oblong, obtuse.

2. *C. auriculata*.

Leaflets obovate, obtuse; valves of pod crested

3. *C. obovata*.

Leaflets lanceolate, acute; valves of pod without appendages

4. *C. angustifolia*.

Leaflets oblong, obtuse; valves of pod without appendages

5. *C. holosericea*.

1. *C. Fistula*, Linn.; Roxb. Fl. Ind. ii. 333; W. & A. Prodr. 285.—Syn. *Cathartocarpus Fistula*, Pers. *The Indian Laburnum*. Sans. *Suvarna*. Vern. *Amaltās* (fruit and tree), North India. Local names: *Karangal*, *kiār*, *kaniār*, *ali*, Pb., Himal.; *Chimkani* (rattler), Sindh; *Girmala*, *gurmala*, *garmalu*, Dekkan, Guzerat; *Kitcālī*, *kitola*, *itola*, *shimarra*, *sun*, N.W.P.; *Warga*, Oudh; *Jaggareeah*, *raila*, *hirojah*, C.P.; *Jaggra-marra*, Gonds, C.P.; *Gnūshwoay*, Burm.

A moderate-sized tree, nearly glabrous, extremities pubescent. Leaves 12-18 in. long, leaflets 4-8 pair, ovate or ovate-oblong, 2-5 in. long, on petioles $\frac{1}{4}$ in. long, lateral nerves numerous, approximate, branching, stipules minute, conical or setaceous. Flowers racemose, large, bright yellow, fragrant, on long slender pedicels in the axils of minute bracts which are caducous long before expansion; racemes lax, pendulous, 1-2 ft. long. Calyx of 5 nearly equal, ovate obtuse lobes; petals oval, narrowed into short claws, nearly equal. Stamens unequal, the 3 lower longest, on incurved filaments, with oblong anthers, dehiscing longitudinally, 4-6 intermediate, with the anther-cells diverging at the base, and opening at that end by pores, the remaining 1-3 very short, with indehiscent anthers. Pod cylindrical, pendulous, 1-2 ft. long, 1 in. diam., dark brown, smooth, hard, indehiscent, divided into numerous flat 1-seeded cells by thin transverse partitions, filled with a soft black sweetish pulp. Seeds flat, smooth, shining, the flat cotyledons with curved edges, so as to be S-shaped in the transverse section.

Common throughout the forest-tracts of India. Trans-Indus on the hills near Peshawar; ascends to 4000 ft. in the outer Himalaya. Leafless for a short time in the dry season; the fresh leaves of a lively green colour, appear April-May. Fl. in spring, and occasionally a second time in autumn. Pods ripen in the cold season.

In Northern and Central India a small tree, rarely exceeding 30 ft., with a short trunk 3-5 ft. girth. Bark thick ($\frac{1}{2}$ in.), yellowish or greenish grey, darker in old stems, with cross-wrinkles and shallow longitudinal cracks, and brown, irregularly shaped, exfoliating scales. Sapwood large, heartwood brick-red when fresh-cut, red or reddish brown when seasoned, often beautifully mottled and streaked, hard, tough, works easily, takes a fine polish, but is somewhat brittle, and apt to crack. The cub. ft. of green wood weighs 72-78 lb.; for seasoned wood, Skinner gives the average at 61, the extremes of the experiments available are 52 and 66. The coefficient of transverse strength (P.) is 846 (Skinner). The annual rings are fairly distinct, the pores large, uniformly distributed, save occasionally in a narrow line of autumn wood without pores. Each pore in a patch of white tissue, and these patches joined by wavy lines of similar tissue. Very durable, but large pieces are rare. Used for posts, ploughs, bows, and spars of native boats. Axles of carts are made of it in Burma.

The bark is used for tanning and dyeing; red juice exudes from wounds in the bark, which hardens into a gum, called *Kamarkas*, used like the gum of *Butea frondosa*. The pulp which fills the pod is a strong purgative, used largely in native medicine, as well as in Europe (Pharm. Ind. 65). Twigs and leaves are lopped for cattle-fodder in Oudh and Kamaon.

2. *C. auriculata*, Linn.; W. & A. Prodr. 290.—Syn. *Senna auriculata*, Roxb. Fl. Ind. ii. 349. Vern. *Tarwar*, *Awal*.

Pubescent. Leaves 3-5 in. long; leaflets 8-12 pair, oval, obtuse, mucronate, with short filiform glands at the base of each pair. Stipules large, foliaceous, semicordate. Flowers yellow, in terminal, corymbose, leaf-bearing panicles. Calyx-lobes unequal, petals equal, ovate, unguiculate, twice the length of calyx. Perfect stamens 6 or 7, with long cylindrical anthers; antherless staminodes 3 or 4. Pod flat, 3-4 in. long, $\frac{1}{2}$ in. broad, with 4-6 seeds.

A shrub, common in South and Central India, also in Rajputana. The bark is used for tanning and dyeing leather, and the root in the manufacture of steel. Fl. Oct.-March.

To this genus belong the plants which yield the Senna leaves (Pharm. Ind. 65). They are shrubs, undershrubs, or herbs, leaves without glands, flowers in axillary racemes; pods flat, broad, arcuate, dehiscent; natives of tropical Africa; the following 3 species extending to North-West India, and 2 of them to the dry belt of South India.

3. *C. obovata*, Colladon; Boiss. Fl. Orient. ii. 631.—Syn. *Senna obtusa*, Roxb. Fl. Ind. ii. 344. *Cassia obtusa*, W. & A. Prodr. 288; Wight Ic. t. 757.

A diffuse procumbent perennial herb, with glabrous, obovate, obtuse leaflets in 3-7 pairs; stipules obliquely lanceolate, acuminate, spreading or decurved. Racemes erect, at length exceeding the subtending leaf. Pod oblong-reniform, broadly rounded at the extremity, the valves thinly coriaceous, and marked longitudinally over the seeds with a single series of rounded crest-like plaits.

Salt range to 2500 ft. (*sanna*), and Trans-Indus (*jīvan*), Sindh, Guzerat, South India, tropical Africa.

4. *C. angustifolia*, Vahl.—Syn. *C. lanceolata*, Forsk. ; Royle Ill. t. 37. *Senna officinalis*, Gärtn. ; Roxb. Fl. Ind. ii. 346. Vern. *Sanna makki*, Pb.

A bushy herbaceous plant. Leaflets 5-8 pair, narrow ovate-lanceolate, stipules subulate, spreading or reflexed. Racemes exceeding the subtending leaf. Pod broadly oblong, slightly curved, rounded at the extremity, the valves chartaceous, glabrous, smooth, without appendages.

Sindh, Guzerat, South India, cultivated in the N.W. Provinces.

5. *C. holosericea*, Fresenius ; Oliver Fl. Trop. Afr. ii. 278.

A small shrub. Leaflets oblong, 5-8 pair, closely velvety pubescent above and beneath ; stipules subulate, spreading, somewhat rigid. Racemes erect, shorter than leaves. Pod flat, broadly falcate-oblong, rounded at the extremity ; valves thinly chartaceous, pubescent, without appendages.

Abyssinia, Nubia, Arabia, Aden, Sindh.

Ceratonia Siliqua, Linn., the *Carob tree* (*Algaroba*), is indigenous in Spain and Algeria, the eastern part of the Mediterranean region, and in Syria ; its flat pods, full of sweet, nutritious pulp, are a common article of food in the Mediterranean for man, horses, pigs, and cattle, and are imported into the Panjab under the name of *Kharnūb nūbtī*. A slow-growing evergreen tree, with heavy wood, excellent as fuel, and valued for cabinet-work, has great powers of reproduction, and is satisfied with a scanty supply of moisture. It has been grown in the Panjab, and may prove a valuable introduction. Its characters are somewhat anomalous. Abruptly pinnate leaves, small polygamous or dioecious flowers, without petals, with 5 stamens, versatile anthers, and a broad disc surrounding the ovary. The structure of the seed, with thick, flat cotyledons, enclosed in a fleshy albumen, brings it near the genus *Cassia*.

8. *SARACA*, Linn.

Unarmed trees, with abruptly pinnate leaves, and small, caducous stipules. Flowers yellow or red, in short panicles. Calyx-tube long, funnel-shaped, lined with the disc, limb cleft into 4 petaloid, ovate, nearly equal segments, imbricate in bud. Petals wanting. Stamens 3-9, free ; anthers oblong, dehiscing longitudinally, on long filaments. Ovary stipitate, the stalk adnate to the calyx-tube ; style filiform ; stigma terminal, obtuse. Pod oblong, coriaceous or woody, 2-valved. Seeds without albumen.

1. *S. indica*, Linn. ; Bedd. Fl. Sylv. t. 57.—Syn. *Jonesia Asoka*, Roxb. Fl. Ind. ii. 218 ; W. & A. Prodr. 284 ; Wight Ic. t. 206. Sans. *Asoka*, *vanjula*. Vern. *Asok*, *Asoka* (*Jassundi*, Bombay).

Glabrous, leaves 12 in. long, drooping and coloured when young. Leaflets opposite, 4-6 pair, lanceolate, coriaceous, smooth, shining, 3-9 in. long. Stipules intrapetiole, oblong, striate. Flowers in corymbose panicles, terminal, or at the end of short lateral branches, with numerous ovate, ciliate, coloured bracts, 2 at the base of the calyx persistent, the others at the ramifications of the panicle deciduous. Peduncles and pedicels coloured, flowers orange on expanding, gradually changing to

red. Edge of the disc a crenulated ring at the mouth of the calyx-tube. Pod 6-10 in. long, 2 in. broad, valves hard, woody, reticulate outside. Seeds 4-8, smooth.

Indigenous in the forests of South India and Eastern Bengal, cultivated near Hindu temples and in gardens in most parts of India. Fl. March, April; fr. ripens Aug., Sept. Heartwood hard, dark-coloured.

THIRD SUB-ORDER, MIMOSÆ.

Trees, shrubs, rarely herbs, with abruptly bipinnate, rarely pinnate leaves, and small flowers in heads or spikes. Flowers regular, occasionally polygamous. Sepals generally connate into a 5-lobed calyx, rarely free, valvate. Petals hypogynous, as many as sepals, usually connate, valvate. Stamens hypogynous, as many as sepals, double their number, or numerous, free or monadelphous, with small, 2-celled anthers, the cells dehiscing longitudinally. Pollen (in species of *Acacia*, *Albizia*, and *Pithecolobium*) cohering in 3-4 masses in each cell. Seeds without albumen, the embryo with a straight radicle.

Stamens 10; anthers with deciduous apical glands.

Flowers in spikes or racemes (Indian species).

Unarmed climbers; pods 2-3 ft. long, flat, constricted between seeds 1. ENTADA.

Shrubs or trees, often spinescent.

All flowers bisexual, or sterile flowers mixed with the fertile.

Flowers pedicelled, in long slender racemes; pods 2-valved 2. ADENANTHERA.

Flowers sessile, in slender cylindrical spikes; pods 2-valved 3. PIPTADENIA.

Flowers sessile, in cylindrical spikes; pods indehiscent 4. PROSOPIS.

Upper flowers of the dense cylindrical spikes bisexual, the lower neuter 5. DICHROSTACHYS.

Flowers in globose heads; pod thick, woody, falcate 6. XYLIA.

Stamens 8-10 or more, but definite, anthers without glands. Pods flat, linear, 2-valved 7. LEUCENA.

Pods 2-valved, the valves separating in joints or entire from the persistent frame 8. MIMOSA.

Stamens indefinite, more or less connate. Armed or unarmed trees; pinne 1-2 pair; pods coriaceous, twisted 9. PITHECOLOBIUM.

Unarmed trees; pinne generally numerous; pods thin, flat, straight, 2-valved 10. ALBIZZIA.

Stamens indefinite, free; armed trees, shrubs or climbers; pods dehiscent or indehiscent, flat or turgid 11. ACACIA.

1. ENTADA, Linn.

1. *E. scandens*, Benth. in Hook. Journ. of Botany, iv. (1842) 332.—Syn. *E. Pursathia*, DC.; W. & A. Prodr. 267. *Mimosa scandens*, Roxb. Fl. Ind. ii. 554. Vern. *Gilla*, Beng.; *Gardal*, Bombay.

A large climber, stems angled, often curiously twisted and curled. Glabrous, but inflorescence pubescent. Common petiole ending in a long, woody, bilid tendrill. Pinne 2 pair; leaflets 3-4 pair, 1-3 in. long, shining. Flowers pale yellow, sessile, in long slender spikes, generally 4-8 on a

common peduncle, from the axils of the former leaves, on 2-3 year-old branchlets. Pods ligneous, of an immense size, 2-4 ft. long, 3-4 in. broad, constricted between the seeds, consisting of 10-30 1-seeded, flat, rounded joints, the valves separating from the more durable thick rim. Seeds flat, ovate or nearly orbicular, brown, shining, testa very hard.

South India, Eastern Bengal, Nepal, Burma, Ceylon, Indian Archipelago, Fiji Islands, Queensland. West Indies (probably the same species, the seeds carried by the Gulf Stream to the western shores of Europe). Fl. March-May; fr. Dec., Jan. The seeds are eaten, cooked or roasted; children play with them, and they are made into snuff-boxes and other articles.

2. *ADENANTHERA*, Linn.

Flowers bisexual, pentamerous, pedicelled, in slender axillary or paniculate racemes. Calyx campanulate, with short teeth. Petals free or connate at the base. Stamens 10, free; the anther-cells adnate to a broad connective, bearing a deciduous gland at the top. Ovary sessile or short stipitate, with numerous ovules in 2 rows, a filiform style, and a small terminal stigma. Legume linear, 2-valved, the valves often contorted after opening. Seeds thick, with a hard red or bi-coloured testa.

1. *A. pavonina*, Linn.; Roxb. Fl. Ind. ii. 370; W. & A. Prodr. 271; Wight Ill. t. 84; Bedd. Fl. Sylv. t. 46.—Sans. *Kuchandana*. Vern. *Thorlagunj*, Mar.

A large tree, glabrous or pubescent, unarmed. Leaves 1-3 ft. long, abruptly bipinnate, pinnae opposite, 4-6 pair; leaflets alternate, elliptic-oblong, obtuse, 4-12 pair. Racemes paniculate, cylindrical, pedunculate, about 4 in. long. Flowers small yellow, fragrant, on slender pedicels. Legumes linear, twisted, about 9 in. long. Seeds shining, hard, bright scarlet, compressed, but convex on both sides, oval or orbicular.

South India, Burma, Bengal. Known to extend as far as Khandeish and Guzerat on the west side of India, and as far as Sikkim on the east side, but will probably be found in the forests of Gorakhpur, Oudh, and Central India south of the Satpuras. Fl. March-May; seeds ripen Aug.-Oct.

Trunk erect, bark rough, dark-coloured. The wood is described by Skinner as follows: "Heartwood hard and durable, when fresh-cut of a beautiful coral-red colour, and sometimes marked with stripes of a darker shade; after exposure it turns purple, resembling Rosewood; weight 56 lb. P. = 863." The seeds are worn as ornaments, and used as weights (about 4 gra.) by goldsmiths and jewellers. Oil is expressed from them.

3. *PIPTADENIA*, Benth.

Characters of *Adenanthera*, but pods linear, flat, not contorted; seeds flat. Flowers sessile.

1. *P. Oudhensis*.—Syn. *Adenanthera Oudhensis*, J. L. Stewart, MSS. Vern. *Genti*, *gainti*, Oudh.

A moderate-sized tree, armed with large conical prickles. Glabrous, inflorescence only pubescent. Leaves abruptly bipinnate, pinnae 2 pair, common petiole about 3 in. long, with a large, flat, circular gland at the base of the lowest pair; secondary petiole 1 in. long, bearing 1 pair of sessile,

subcoriaceous, reniform leaflets, 2-3 in. long and $1\frac{1}{2}$ -2 in. broad. Flowers greenish yellow, sessile or nearly sessile, in dense cylindrical spikes 1-3 in. long, arranged in short axillary panicles. Calyx cup-shaped, nearly truncate, with 5 short teeth. Petals 5, lanceolate, 3 times longer than calyx. Stamens longer than petals, terminal glands globose. Pod stalked, linear, flat, 9-12 in. long, $\frac{1}{2}$ in. broad. Seeds 15-20, compressed, brown, broad-oval.

Discovered in March 1871, by Mr Richard Thompson, in the Oudh forests under the base of the hills in the Gonda division, where it is common, clothing the sides of the hills, and entering into them along the valleys. The leaves are renewed in March, and the tree flowers in April.

Attains 40 ft., with a short trunk, which divides into numerous upright branches, with drooping branchlets, resembling *Hardwickia binata* in general appearance. Bark of younger branches smooth or wrinkled, with large, conical, compressed, sharp-pointed prickles. Bark of stem and older branches $\frac{1}{2}$ in. thick, grey, brown, to dusky red, rough with flattish, exfoliating, woody scales. Inner bark red, fibrous. Wood light red, close-grained, durable, very hard; seasons well without cracking. Heartwood not distinct. The trees are pollarded for cattle-fodder.

4. PROSOPIS, Linn.

Flowers bisexual, pentamerous, generally sessile, in spikes or heads. Calyx campanulate, with 5 short teeth. Petals valvate, free or connate below. Stamens 10, free, exserted; anthers tipped with a sessile or stipitate gland. Ovary sessile, with numerous ovules, a slender style, and a small terminal stigma. Legume coriaceous, indehiscent; the seeds embedded in a spongy, hard, or scanty pulp.

Pod linear, contracted between seeds, pinnae 2 pair . . . 1. *P. spicigera*.

Pod short and thick, pinnae 2-5 pair . . . 2. *P. Stephaniana*.

Several trees of this genus form a marked feature in the vegetation of the dry regions of Chili, Peru, Texas, and Mexico, with sweetish succulent pods called *Algarobo*, eaten by the Indians, and given to horses.

1. *P. spicigera*, Linn.—Tab. XXV.—Roxb. Cor. Pl. t. 63; W. & A. Prodr. 271; Bedd. Fl. Sylv. t. 56; Boissier Fl. Orient. ii. 634.—Syn. *Adenanthra aculeata*, Roxb. Fl. Ind. ii. 371. Vern. *Jand*, *jhand*, *jant*, *khār* (pod *Sangri*, *Sankar*), Ph.; *Kandi*, *kundi*, Sindh; *Chaunkra*, Agra, Bhurtpur; *Khejra*, *khejri*, Rajputana; *Sangri*, *shangri*, Pertabgarh; *Sēmru*, *sēmri*, *sumri*, *hamra*, Panch Mehals, Guzerat; *Shemi*, *shema*, *saunder*, Dekkan.

A moderate-sized thorny tree. Glabrous, branches and branchlets armed with scattered, broad-conical, somewhat compressed prickles. Leaves bipinnate, pinnae opposite, usually 2 pair, leaflets 7-10 pair, obliquely oblong, cuspidate, more or less distinctly 3-nerved. Spikes slender, in short axillary panicles. Flowers small, yellow, in the axils of ovate, obtuse, membranous bracts. Calyx cup-shaped, membranous. Pod pendulous, linear, contracted between seeds, 5-10 in. long, filled with a brown mealy substance.

Common and gregarious in the Panjab, Rajputana, north and middle Sindh,

where the tree forms extensive forests, pure, or mixed with *Capparis aphylla*, *Salvadora*, and a few species of *Acacia*. In the Panjab, these forests are on the high land (Bār) between the main rivers. In Rajputana, they are likewise on high ground, (Bhartpur, Kishengurh, Meywar). But in Sindh, with less moisture, and a normal annual rainfall of less than 10 inches, they generally are found at no great distance from the river. *Prosopis*, however, in Sindh, thrives on ground more dry than the *Tamarisk*, the *Poplar*, and *Acacia arabica*, the pure *Prosopis* forests being generally beyond the range of actual inundation. Ascends to 1500 ft. on the hills Trans-Indus, and in the Salt range. Also in Guzerat, Bandelkhand, the Dekkan, and in the dry region of the Peninsula as far south as Tuticorin. Outside India in Beluchistan, Persia, Mascat. I have never found it where the annual rainfall exceeds 40 inches, and it seems to thrive best where the rainfall is less than 30 inches. In Meywar, *Prosopis* is common north of the Bunass river, and is there universally called *Khejri*. It is often associated with *Acacia leucophlœa* (Arins). South of the Bunass, *Prosopis* is scarce, but retains its name as far as Pertabgarh, where it is called *Sangri*. *A. leucophlœa* continues to be common south of the Bunass, and is there called *Khejra*.

The tree is leafless for a short time; the young foliage comes out early in March; fl. in Feb. (Guzerat), in March, April (Sindh), in April, May (Panjab). The fruit ripens from May-Aug. Easily raised from seed; young trees do not suffer from frost; throws out vigorous coppice-shoots. Growth probably slow, 3 ft. girth in 30 years (Saharanpur gardens), 4-5 indistinct annual rings per in.

Attains 30-40 ft., with a short erect trunk, generally under 6 ft. girth, attaining 10-12 ft. girth and 60 ft. height in Sindh. For dimensions of exceptionally large trees, see Panjab Plants, p. 74. Branchlets drooping, foliage light. The base of the stem is often surrounded by a mass of stiff, thorny, entangled branches and suckers. There is a cupressiform variety, with ascending branches and a narrow crown. Bark $\frac{3}{4}$ in. thick, dark grey, or light brownish grey, rough, with deep longitudinal furrows and horizontal cracks. Adult foliage grey, round galls common on leaflets, and woody excrescences on branches and branchlets.

Wood light, yellowish brown, with irregular masses of dark-brown or black heartwood in the centre of old trees. Marked wavy concentric lines. Coarse-but even-grained. Weight in the Panjab and Sindh between 49 and 58.5 lb. per cub. ft. when seasoned, 82 when green (Dalzell, Fenner, and Stewart). Skinner gives 72 lb. for seasoned and 95-100 lb. for green wood, with 981 for the value of P.; but the identification of the wood experimented upon seems open to doubt. Easy to work, tough, but not durable, liable to dry-rot, and readily eaten by insects. Used for building, for carts, and agricultural implements; is a favourite wood for well-curbs in parts of the Panjab; ordinary furniture is made from it in Sindh. A good fuel for steamers and locomotives, its heating power being near that of Babool, and much higher than that of the *Tamarisk*. Experiments made at Karāchi in May 1869 gave the following results:—

Of the wood of	<i>Prosopis spicigera</i> , 1374 lb.	{ were consumed in evaporating 11.8 cub. ft. of water per hour during 7 hours, the pressure of steam being kept at 27 lb. on the square inch.
	<i>Acacia arabica</i> , 1388 "	
	<i>Tamarix gallica</i> , 1627 "	

Nevertheless, *Tamarisk*-wood is often preferred in the Indus steamers, probably because the pieces have a more convenient shape, and are easier handled.

A mild gum, not used, exudes from wounds in the bark. The pod (*Sangri*, *sankar*, Pb.), is much used as fodder for camels, cattle, and goats; the mealy, sweetish substance which surrounds the seeds is an article of food in parts of

the Panjab, Guzerat, and the Dekkan. The pods are collected before they are quite ripe, and the mealy pulp is eaten raw, or boiled with vegetables, salt, and butter. Is considered indigestible if consumed in large quantities. The tree is worshipped by Hindus at the Dussera festival.

2. *P. Stephaniana*, Kunth; Boissier Fl. Orient. ii. 633.—*Jembūt*, Arab.

A small thorny shrub, 2-2½ ft. high, with smooth white bark, extremities and leaves hairy. Pinnæ 2-5 pair; leaflets 8-12 pair, linear. Pods short, thick, 1-1½ in. long, black, rugose, with 6-7 seeds.

Peshawar valley, and further east, sparingly as far as Amballa. Beluchistan, Afghanistan, Persia, Syria, Asia Minor, Egypt, Turkestan. Never leafless; small roundish excrescences common on branchlets and leaves.

5. *DICHROSTACHYS*, DC.

Flowers sessile, pentamerous, in dense cylindrical spikes, the upper flowers of each spike bisexual, the lower neuter, with long, much-exserted, filiform stamnodes. Teeth of calyx short. Petals valvate, more or less connate. Stamens 10, free, exserted; anthers tipped with a globose, often stipitate gland. Ovary subsessile, multiovulate; style slender, stigma terminal. Legume linear, compressed, coriaceous, twisted, indehiscent, or irregularly opening. Seeds compressed, shining.

1. *D. cinerea*, W. & A. Prodr. 271; Bedd. Fl. Sylv. t. 185.—Syn. *Mimosa cinerea*, Roxb. Cor. Pl. 174; Fl. Ind. ii. 561. Vern. *Vurtuli*, Hind.; *Kinlai*, *kunrat*, Mairwara.

A rigid thorny shrub, or small tree, with white or grey bark. Pubescent, armed with axillary spines, straight, strong, and sharp, often prolonged into leaf-bearing branches. Leaves bipinnate, generally 1-2 in. long; pinnæ 8-10 pair, with stipitate glands at the base of each pair; leaflets small, ciliate, 12-15 pair. Stipules subulate, ½ in. long. Spikes axillary, pedunculate, solitary, or 2-3 together, as long as, or shorter than leaves; bracts lanceolate, membranous. Upper fertile flowers yellow, the lower sterile flowers white, purple, or rose-coloured. Pods 2-3 in. long, ¼ in. broad, irregularly twisted, generally 3-8 on one peduncle; seeds 10-15.

Common on dry stony hills in South and Central India; has been found as far north as Futtegharh on the Ganges, near Jeypur, and on the hills of Mairwara, near Todgarh. Fl. hot season. Bark of trunk soft, with deep longitudinal furrows. Heartwood hard, dark reddish brown.

6. *XYLIA*, Benth.

1. *X. dolabriformis*, Benth. l. c. 417; Bedd. Fl. Sylv. t. 186.—Syn. *Inga xylocarpa*, DC.; W. & A. Prodr. 269. *Mimosa xylocarpa*, Roxb. Cor. Pl. t. 100; Fl. Ind. ii. 543. *The Ironwood of Burma*. Vern. *Jamba*, Konkan; *Baja*, Godavery forests; *Pynkado*, Burm.

A large tree, unarmed. Common petiole short, 1-2 in. long, bearing 1 pair of pinnæ, with 2-6 pairs of oblong or ovate-oblong acuminate leaflets, 3-9 in. long, the terminal leaflets largest. Flowers pale yellow, in