USEFUL PLANTS

OF THE

BOMBAY PRESIDENCY.

BY

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PREFACE.

In placing in the hands of the public the *Useful Trees of the Bombay Presidency*, the author does not claim for it the merit of originality, freely admitting that it is almost entirely a compilation from the various works on Indian Botany that have preceded it. Although nearly every botanical work has been availed of for his purpose, the author has in the following pages directed references in the main to Brandis' *Forest Flora of the North-West Provinces* and Dalzell's and Gibson's *Bombay Flora* as being the two that are most handy and portable.

The timber trees are arranged in a regular botanical series from descriptions which are found scattered in Balfour's *Timber Trees*, Brandis' *Forest Flora*, Beddome's *Flora Sylvatica*, Hooker's *Flora of British India*; and the author's knowledge of the plants of some of the districts of the Deccan and Konkan,—like Mátherán, Khandála, Mahábaleshvar, Goa,—together with the dried specimens which he has from time to time obtained from other places, have enabled him to verify and correct these descriptions where necessary.

In describing a tree the author has invariably given the colour and arrangement of its flowers. This, coupled with the character of the other parts and the native names, will, it is hoped, enable the reader of ordinary intelligence to identify the various trees mentioned in the work. The native names of many of the plants found at Mahábaleshvar and some parts of the Deccan are, it will be observed, Kánarese and Tamil, probably because the inhabitants of these forests are principally drawn from Southern India.

The altitude of a tree has been given, not in reference to the highest point at which it is seen growing in this presidency, but to the highest point at which it is met with in India. Thus the *Jambul tree*, which in Bombay is not met with higher than at Sindolla (Mahábaleshvar), has 5,000 feet recorded against it, the tree being found to grow at Kámaon, which has the above height.

The heights and girths given in this work are all average measurements. It is very well known that both vary, not only in different places and under different circumstances of climate, etc., but even in the same localities, according to differences of soil, exposure to winds, etc. Thus the Jambul, to which Brandis gives a

height of 70-80 and sometimes 90 feet, is in exposed high situations, such as Sindolla, towards and on the slopes of Lingmalla (Mahábaleshvar), but a stunted shrub, bearing fruit scarcely one-fourth the size of that found in the Konkan. *Hymenedyction excelsum* (Karwa, Dandru or Dandeli), which is a large tree in the plains, becomes smaller and smaller as we ascend the ghâts.

The flowering time (Fl.) and the seasons during which trees ripen their fruit (Fr.) are also subject to considerable variations: *e.g. Millingtonia hortensis*, the Indian cork-tree, is in full bloom in Poona at the end of August, whereas in Bombay it is in flower a month and half later. Dr. Brandis states that the *Jambul* tree flowers in March-April and fruits in June-July; in Bombay this tree flowers in February-March and is in fruit between April and June.

The description of fruits, vegetables, food, and oil-yielding plants, &c., mentioned in other sections is very short; for their cultivation, the uses and consumption of their products in each province are described in various volumes of the Gazetteer, for which last alone the present one is written. Besides, a considerable number consists of the common garden and field plants, which are or may be readily identified by their native names.

The idea of dividing the work into sections has been borrowed from Sir G. C. M. Birdwood's interesting work *Vegetable Productions of the Bombay Presidency*. The author has, however, not only made alterations and additions to Sir G. C. M. Birdwood's sections, but has introduced several entirely new ones, such as "Plants mentioned in the Religious Books of the Hindoos", "Plants or their Products used in intoxicating Fish", "Vegetable Poisons", "List of Herbs, Tubers", &c., used as food by the poorer classes of India during seasons of famine. The Indian medicinal plants are grouped together according to their properties and uses, the modes of preparation and administration being also briefly given. "Timber trees" occupy more than half the book, thus making the work, the author hopes, far more useful for reference.

It now only remains for the author to crave the indulgence of his readers for the irregularities and errors that must of necessity have crept into a work which has been written under failing health and in the short intervals of time snatched from the anxieties of his professional duties. If time and health are permitted him, the author hopes to correct these errors in a second edition of the work.

Bombay, 27th January 1883.

ABBREVIATIONS.

Alt. = altitude.

Fl. = flora; flowering time of a plant.

Fr. = time of ripening fruit.

T.T. = timber trees.

The other abbreviations will be easily understood.

USEFUL PLANTS

OF THE

BOMBAY PRESIDENCY.

TIMBER TREES.

DILLENIACEÆ.

This order is represented in this Presidency by two timber trees, both remarkable for the grandeur of their foliage and the showiness of their leaves.

Dillenia Indica, Linn.; Brand. For. Fl. 1.—*D. speciosa*, Dalz. & Gibs. Bby. Fl. 2. *Mota karmal, karambel.*

Young shoots silky. Leaves 8-10 by 2-4 in., approximated towards the ends of branches, acute, sharply serrate, with numerous parallel stout veins ending in points of serratures; almost coriaceous, glabrous above, pubescent beneath, especially on the nerves. Petiole 1-1½ in., channelled. Flowers solitary, about 5-6 in. diam., pure white on pubescent peduncles 2-3 in. Sepals orbicular, concave, thick and fleshy. Petals obovate. Inner stamens longer and recurved, outer erect. Carpels 20. Fruit round, size of a cocoanut. Seeds compressed.

Not uncommon in the Konkan, in Alíbág, Sávantvádi and Goa, and also in all tropical forests of South India, Bengal, Nepaul to Assam, Ceylon, Burma and the Malayan Archipelago. Alt. 1000 ft.

It attains the height of 30-50 ft. and a girth of 3-5 ft. An evergreen tree. Fl. June-July; Fr. ripens about February.

The wood is reddish-brown, hard, close-grained and strong; valuable on account of its durability under water; occasionally used for gunstocks, house- and ship-building, and as firewood. It makes a good charcoal. The fleshy sepals have an agreeable acid taste, and are eaten raw or cooked, or made into sherbet, which is said to be useful for cough. A palatable jelly is also made from them.

D. pentagyna, Roxb.; Dalz. & Gibs. Bby. Fl. 2; Brand. For. Fl. 2. *Karmal, kandgalu.*

A spreading tree. Leaves oblong-lanceolate, 1-2 ft. long (on shoots and young trees up to 5 ft. long) by ½-1 ft., tapering into a broad half amplexicaul petiole 1-3 in., denticulate, with numerous parallel veins, silky-downy when young, glabrous and shining when old. Flowers umbelled, 1 in. diam., sweet-scented, yellow, on

Timber Trees.

slender pedicels 1-2 in. long, arising from tuberosities on old branches. Petals obovate. Carpels and styles 5. Fruit globular, size of a cherry, smooth, orange-yellow.

Southern Marátha Country and on the west side of most of the hill forests of the Konkan, also along the base of the Himalayas from Oude and Behar to Assam, South India, Bengal and Burma. Alt. 2000 ft.

Attains 60-70 ft. in height and a girth of 6-8 ft. Sheds its leaves in March-April; comes in flower soon afterwárds. Fr. ripens in the beginning of the rainy season.

Wood very strong, hard, heavy, porous, coarse-grained, durable, of a light-pinkish colour turning to light-brown; used for house- and ship-building, buggy-shafts, rice-mills and charcoal. The berry has an agreeable acid flavour resembling somewhat that of *Grewia asiatica*, and are eaten raw or cooked. The leaves, which are sold in the bázárs of Poona and elsewhere, are used as substrata for thatched roofs and also as fodder. The old rough leaves of this and the preceding species are also employed to polish ivory and horn. Cordage is made of the bark.

MAGNOLIACEÆ.

We have only one species on this side, which is the well-known

Michelia champaca, Linn.; Brand. For. Fl. 3. *Champa.*

This evergreen tree is cultivated everywhere for the sake of its fragrant yellow flowers. Alt. 3-5000 ft.

It attains the height of 30-60 ft., and in favourable places up to 100 ft.; girth 7-9 ft. Fl. all the year round, but chiefly in May. Fr. in the cold season.

The wood is soft, mottled, light olive-brown, polishes well, and is adapted for handsome furniture. Used in some parts for carriages, palanquins and buildings.

ANONACEÆ.

This order yields the following timber trees:—

Unona pannosa, Dalz. in Hook. Kew Jour. Bot. iii. 207; Bedd. Ic. Pl. Ind. Or. t. 52.

Young parts pubernlous. Leaves 2¼-4 by ¾-1½ in., ovate-lanceolate, obtusely acuminate, rounded or acute at the base, glabrous above, pubescent beneath, thin, pellucid-dotted. Flowers brown-tomentose, axillary, of a dirty-white colour, on very short peduncles, surrounded with one or more scaly bracts. Sepals ovate-acute, 3 lines long, villous on the outside; petals 1½-2 in. long, lanceolate, villous, inner narrower and shorter. Ovaries 8-12, densely strigose; ovules 2-4. Carpels 5-6, oval-obtuse, subsessile, pubescent. Seeds 1-3, large, shining.

This tree is common in the forests of the Konkan, chiefly about Talwaddi-Sahyádri and in Travancore. Alt. 3500 feet. Fl. in October.

Wood is good, tough and strong, and a good fibre is extracted from the inner bark.

Polyalthia longifolia, Benth. & H. f.; Brand. For. Fl. 5.—*Guatteria longifolia*, Dalz. & Gibs. Bby. Fl. Suppl. 2. *Asók, asoka, aśipala, devadaru.*

Glabrous. Leaves 5-8 by 1-2 in., narrow-lanceolate, long-acuminate, waved, shining above, pellucid-dotted, membranous, glabrous, on a petiole ¼-⅜ in. Flowers numerous, yellow-green, on long slender pedicels; umbellate, on hoary peduncles, ½ in., arising from short, leafless, tuberculate branchlets; bracts minute-linear. Sepals broad-ovate; petals equal, narrow-linear from a broad base. Carpels ovoid, ¾ in., obtuse at both ends, on stalks ½ in., stout, glabrous.

This beautiful evergreen tree is indigenous in Ceylon, and is extensively planted in avenues along the roads in Bombay and other parts of India.

In some places it attains the height of about 50 ft. and a girth of 6 ft. Fl. February-May; Fr. July and August.

Wood whitish-yellow, light, tolerably close and even-grained; used for making drum cylinders.

P. cerasoides, Benth. & H. f.; Brand. For. Fl. 5.—*Gualteria cerasoides*, Dalz. & Gibs. Bby. Fl. 3. *Hūm.*

Young parts tomentose. Leaves 3-8 by 1-2 in., distichous, oblong-lanceolate, acuminate, membranous, acute or rounded at the base, dark-green, glabrous above, pubescent beneath; petiole short, tomentose. Flowers greenish-white, about 8-10 lines diam.; peduncles $\frac{1}{12}$ in., woody, arising from axillary tubercles; pedicels ½-1 in., slender, with a few basal imbricating scales and sometimes 2-3 oblong or ovate bracts. Petals hardly longer than sepals, ovate or linear-oblong, thickly coriaceous, puberulous. Carpels numerous, size of a small cherry, dark-red, on slender stalks ¾ in. long.

Found on Thall Ghát, Jawhár forest, Madras and Behár.

This evergreen tree sometimes attains a great height. Fl. February-May; Fr. end of rainy season.

Wood whitish, hard, close-grained, used by carpenters, and in making boat masts and small spars.

P. fragrans, Benth. & H. f.—*Gualteria fragrans*, Dalz. & Gibs. Bby. Fl. 4.

Young branches hoary. Leaves 4-9 by 2-5 in., membranous, oblong-lanceolate, acuminate, rounded at the base, generally oblique on petiole about ⅓-⅔ in. long, very prominently veined, especially beneath, glabrous above, slightly pubescent on the costa beneath. Flowers fragrant, white or yellowish-white on peduncles about 1 in. long, from the axils of fallen leaves or on woody tubercles, cymose, 5-12-flowered, puberulous; pedicels 1 in. long, slender, hoary; bracts cup-shaped about the middle. Sepals small, rotundate; petals 1-1½ in. long, narrow, attenuated at the apex. Carpels 10-20, 1-1½ in., broadly oblique-ovoid, hoary, on a stock 1-1½ in. long.

A large tree found in the jungles of Sivapore, Sávantvádi, Malabár and the South Kánara Ghâts. Fl. in the cold season.

The wood requires examination.

Goniothalamus cardiopetalus, Bedd. Ic. Pl. Ind. Or. t. 62.—*Polyalthia cardiopetala*, Dalz. in Hook. Kew. Jour. Bot ii. 39.

Branches slender, leafy. Leaves 6-9 by 2-3 in., aromatic, linear-oblong, abruptly-acuminate at the apex, acute at the base, thin,

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coriaceous, undulated at the margin; petiole ⅓ in. long. Flowers reddish, 1 in. diam., on supra-axillary, solitary or superposed peduncles ¼-½ in. long. Sepals small, pubescent, broadly-ovate, outer petals cucullate-clawed, ovate-lanceolate, 8 lines long, densely brown-tomentose, inner ones ⅓ shorter, tomentose. Styles slender, 2-fid, carpel 1-seeded.

It is a small tree or a large shrub found in the Southern Marátha Country, Coorg, Kánara Ghâts and Wynaad.

The timber is used for posts.

Saccopetalum tomentosum, Hook. f. & Th.; Dalz. & Gibs. Bby. Fl. 4; Brand. For. Fl. 7. *Kirna, karri,* and also called *hūm* by the natives.

Young shoots clothed with soft silky tomentum. Leaves 4-6 by 2½-3 in., elliptic or ovate-oblong, acute at the apex, rounded or cordate at the base, sometimes glabrous when old and somewhat rough above, pubescent and pale beneath, on petioles ¼ in. long. Flowers greenish-yellow with a broad streak of brown, in leaf-opposed or sub-terminal 2-4-flowered cymes, on short peduncles ¼-½ in.; pedicels slender, downy, 2-3 in. Sepals and outer petals ⅓ in., nearly equal, lanceolate, inner petals ⅔ in., oblong, obtuse, downy, saccate at the base. Carpels 1 in. diam., purple-tomentose, 3-4-seeded, on stalks ¼-½ in.

Forests of the Konkan, Travancore, and also at Behár, Orissa and Terai of Nepaul.

A large tree attaining in some places a height of 50 ft. with a girth of 5-6 ft. Fl. hot season; Fr. rainy season. Leaves are shed in March and renewed in April.

Wood greenish-yellow, strong, hard, close-grained and durable; valued for building purposes, as it does not warp. The leaves are used as cattle fodder.

Bocagea Dalzellii, H. f. & Th.—*Sageræa laurina*, Dalz. & Gibs. Bby. Fl. 2. *Sajiri.*

Branches glabrous. Leaves 5-9 by 2½-3 in., thick coriaceous, acute or obtuse at the apex, rounded or slightly attenuated at the base, glabrous and shining above, pale beneath. Flowers white, bisexual, crowded, in fascicles of 1-15 on woody tubercles; pedicels about ½-1 in.; bracteoles several, scaly, basal. Sepals orbicular, cohering at the base. Petals ½ in., broad-ovate, concave. Stamens 12-18. Ripe carpels 1 in. diam., globose, glabrous, smooth, subsessile.

Mátherán, Nágotna, Jawhár, and all along the forests of the Konkan and Travancore. Alt. 2500 ft.

It is a beautiful ornamental laurel-like tree. Fl. October-November.

The timber is of a reddish colour, close-grained, useful for fancy work.

CAPPARIDEÆ.

This order is represented by several plants, but most of the species are shrubs.

Capparis aphylla, Roth.; Dalz. & Gibs. Bby. Fl. 9.; Brand. For. Fl. 14. *Királ, sóduda.*

Straggling, much-branched glabrous shrub or small tree; thorns twin, nearly straight, brown. Leaves ⅓-¼ in. long only on young

shoots, caducous, sessile, linear-subulate, pungent. Flowers 1 in. diam., red-brown or scarlet, in many-flowered corymbs, on very short lateral shoots. Sepals unequal, the inner sepal larger and saccate, subvalvate. Petals ovate, longer than sepals. Stamens 8-20; filaments long-filiform. Ovary on a gynophore ½-¾ in. Style subulate. Fruit ovoid or globose, red, size of a cherry, long-beaked.

Common in Cutch, Gujarát and the Deccan as far south as Tinnevelly; also in dry places in the Punjáb, Rájputána, Central Provinces, etc.

It rarely attains the height of 20 ft. and a girth of 4-5 ft., rarely more. Fl. hot season; Fr. November-March.

Wood is whitish or light-yellow, becoming brown on exposure, close-grained, tough and shining. Used in some places for small beams and rafters, oil-mills. It is generally used for fuel, which burns with a strong flame. It is bitter, and therefore not liable to the attacks of white ants. The unripe fruit and flower-buds are used as pickle.

C. grandis, Linn.; Dalz. & Gibs. Bby. Fl. 10; Bedd. Fl. Sylv. An. Gen. 13. *Puchbwnda, ragota.*

A crooked tree; branches and all young parts grey or yellowish-tomentose, armed with short, slightly-curved thorns or none. Leaves 2-3 by ½-2 in., ovate or obovate, acute at both ends, or rarely obtuse, glabrous on both surfaces when old; petiole ½-¾ in. Flowers ¾-1 in. diam., white, in terminal corymbs or racemes; pedicels slender, 1 in. Sepals tawny, puberulous, unequal. Petals narrow-obovate, unequal. Stamens numerous. Gynophore slender, ½-1 in. Fruit size of a nutmeg, globose, purple, 2-6-seeded.

Found in the forts of Sholápur, Miraj, and sparingly on the ghâts and the Deccan, also in several parts of Madras and Ceylon.

It attains the height of about 15 ft., having a thick trunk. Fl. May. Sheds its leaves in the hot season.

Wood is hard and durable; much used for ploughshares and rafters.

Cratæva religiosa, Forst.; Dalz. & Gibs. Bby. Fl. 8; Brand. For. Fl. 16. *Waruna, warvanah, karwan, kmula.*

Glabrous. Leaves trifoliolate, long-petioled, clustered towards the ends of branches; leaflets 3-6 by 1¼-2½ in., ovate-lanceolate or obovate-lanceolate, abruptly or gradually acuminate, on articulate petioles, pale or glaucous beneath. Flowers 2-3 in. diam., white, becoming greenish-yellow, at length purplish, on long filiform pedicels, in many-flowered terminal corymbs. Sepals 4, ovate, deciduous, inserted with the petals on the broad-lobed hemispherical disc. Petals 4, ovate or oblong, obtuse or acute, long-clawed. Fruit 1-2 in. diam., ovate or globose, on a thick gynophore, many-seeded.

Found all over the Konkan, in Malabár, Kánara and Madras; Ceylon, Assam, Burma; cultivated everywhere in India, especially near temples. Alt. 2000 ft.

It attains the height of 30-40 ft., sometimes more, and a girth of 3-6 ft. Fl. in the hot season; young leaves appear in the same season and Fr. in the rainy season.

Wood is white or yellowish-white; when old changing to light-brown; close and smooth-grained, tough, durable and moderately hard. Used for drums, combs, writing-boards and in turnery. The viscid pulp of the fruit is said to be used as a mordant in dyeing; mixed with mortar as a cement.

BIXINEÆ.

Cochlospermum gossypium, D. C. Prod. i. 527.; Brand. For. Fl. 17. *Kumbi, ganeri, gunglay.*

Branchlets, young leaves and peduncles, grey-tomentose. Leaves 3-8 in. diam., palmately 3-5-lobed, old glabrous, lobes acute or acuminate, entire; petioles long, thick; stipules linear, caducous. Flowers 4-5 in. diam., bright yellow, on terminal panicles. Sepals oblong, concave, silky. Petals obliquely obcordate, obliquely emarginate or irregularly cleft. Capsule 2-3 in., 5-lobed, size of a goose-egg. Seeds numerous, covered with long cottony hairs.

Commonly planted near temples, and is found in the Deccan, Central Provinces, Bundelkund, Behár, Mysore, Travancore, Prome, etc. Alt. 3000 ft.

It attains the height of 20-30 ft. and a girth of 2-3 ft. Fl. February-April; Fr. June-July. Sheds its leaves in January, new leaves appearing in May.

Wood grey, soft, and light, but not much used. The cotton is used only for stuffing pillows. The white gum which exudes from the trunk is called *katira*, which is said to be used in the trade of shoe-making.

Scolopia crenata, Clos.; Bedd. Fl. Sylv. t. 78.—*Phoberus crenatus*, Dalz. & Gibs. Bby. Fl. 11. *Hitterlu.*

A middle-sized tree; branches of young trees armed, of old unarmed. Leaves 2-6 by 1-2 in., ovate or elliptic, oblong-lanceolate, obtusely or acutely acuminate, slightly attenuated at the base, glabrous and shining above, pale and reticulate beneath, obtusely crenated, teeth glandular; petiole ¼-½ in. Racemes 1-3 in., axillary, glabrous or puberulous; flowers nearly ½ in. diam., on longish peduncles, which are furnished with 2-3 small deciduous bracts at the base. Sepals and petals 5-6 each, ciliate. Fruit globose, size of a cherry, apiculate.

In the forests to the south of Rám Ghát; also at Goa, Malabár, Kánara, Mysore and Ceylon.

Wood is white, very hard and dense, but liable to warp: used for planks, etc.

Flacourtia ramontchi, L'Hérit; Dalz. & Gibs. Bby. Fl. 10; Brand. For. Fl. 18. *Swadú-kantaka, tambat, kaikun, pahar, bhekal, kakad.*

A glabrous tree, armed with acute-axillary spines 1-2 in. Leaves 2-3½ by 1¼-2¼ in., ovate-oblong, ovate or suborbicular, serrate or crenate, glabrous and shining above, on a petiole 3-5 lin. Flowers 1-2 lins. diam., greenish-yellow, in short racemes or panicles. Styles 5-11, very short, united at the base, radiate. Fruit dark-red or black, pulpy, roundish, about ½ in. long. Seeds 8-16, flat, compressed.

This plant is found in various parts of this Presidency, as well as in Madras and in Bengal and Eastern Archipelago.

Its height is about 20-25 ft., with a short trunk of 4-5 ft. in girth. Fl. November-March; Fr. May-June. Sheds its leaves January-February; new leaves February-March.

Wood red, close and even-grained, durable and not attacked by insects. Used by turners. Combs and agricultural implements are made

of it. The fruit is eaten, and the young twigs and leaves are used as cattle fodder.

F. montana, Grah. Cat. Bby. Pl. 10; Dalz. & Gibs. Bby. Fl. 10. *Attâk.*

A middle-sized, thorny tree; flowering branches unarmed, softly pubescent. Leaves 5-7 by 2-3½ in., ovate or oblong-lanceolate, obtusely-acuminate, rounded or acute at the base, crenate, coriaceous, glabrous, shining above and hairy beneath, on a petiole ½ in. Flowers, male and female, on separate trees, in fascicled densely-pubescent racemes. Disc of male, glandular. Fruit scarlet, size of a large cherry.

Common on the ghâts, Kánara and the Konkan. Fl. January-February. The wood is strong and close-grained, but too small to be of much use. The fruit, which is agreeable and slightly acid, is eaten.

F. cataphracta, Willd.; Dalz. & Gibs. Bby. Fl. 10; Bedd. Fl. Sylv. An. Gen. 16. *Juggom, panawa, talispatri.*

The trunk armed with numerous large compound thorns; branches numerous; the young ones slightly pubescent, generally unarmed, except close to the trunk. Leaves 3-4 by 1-1¾ in., ovate to oblong-lanceolate, acuminate at the apex, rounded or acute at the base, crenate-serrate, membranous, shining, green on both sides, glabrous. Racemes shortly tomentose or puberulous, 5-10-flowered, often arising from the lateral branchlets; a small cordate bract under each pedicel. Male calyx 4-5 partite. Stamens inserted into a glandular convex disc; female calyx of 4-6 spreading sepals, with annular-lobed disc surrounding the ovary. Styles 4-6, short, connate at the base; stigmas dilated, almost horse-shoe-shaped, or capitate. Berry oblong or ovoid, size of a plum, bluish-black, containing 10-14 compressed seeds.

Cultivated and wild in the Konkan, Malabár, South Kánara, Bengal, Assam to Chittagong, Malacca, Singapore and the Malay islands.

It attains 30-50 ft. in height and 3-5 ft. in girth. Fl. January-February; Fr. in May. Sheds its leaves in the hot season.

The wood is rather heavy, brown, hard and close-grained; takes a fine polish. The fruits are slightly acid, and are eaten. *Talishpatri* of the Indian Materia Medica is composed of tender shoots and leaves of this tree, and is much used in diarrhœa and general debility, etc., in ½ drachm doses.

F. inermis, Roxb.; Bedd. Fl. Sylv. An. Gen. 16.—*F. jagomas.* Dalz. & Gibs. Bby. Fl. Suppl. 5. This tree is also called *jagom.*

Trunk short, unarmed. Leaves 4-8 by 2-3½ in., ovate or oblong-lanceolate, acute or acuminate at the apex; acute or rounded at the base, obtusely-serrate, thin, coriaceous, shining, glabrous; petiole ¼ ½ in. Flowers hermaphrodite in fascicled racemes. Disc covered with fleshy, orange-red glands. Stigmas 4-8, 2-lobed. Ovary 5-celled. Cells 2-ovuled. Berry size of a cherry, red, containing 8-10 flattened seeds.

This tree is very ornamental and is found in various parts of this Presidency, generally cultivated; also in Silhet, Singapore, Penang, etc.

Timber Trees.

It attains the height of 40-50 ft. and 4-5 ft. in girth. Fl. in the hot season; ripens its fruit towards the end of the rainy season.

Wood red-brown, heavy, rather hard, but close-grained.

Hydnocarpus Wightiana, Blume; Dalz. & Gibs. Bby. Fl. 11; Bedd. Fl. Sylv. An. Gen. 16. *Kadu-kawut, kawa, kaiti* (*khasti* at Goa).

A tall tree; young shoots and racemes usually brown-pubescent. Leaves 4-9 by 1½-4 in., elliptic-oblong or oblong-lanceolate, acuminate at the apex, round, acute or subcordate at the base, acutely serrate or toothed, usually entire, coriaceous or membranous, on a petiole ¼-½ in. Flowers white, axilliary, solitary or racemed, few-flowered. Sepals green, pubescent, unequal, the inner ones longer. Petals broad, ovate, with soft white hairs and scales at the base, broad-ovate, about ½ the length of petals, hairy. Satmens villous at the base. Ovary pubescent. Fruit 2-4 in. diam., pubescent, obtusely-angled, woody, warted. Seeds obtusely angular.

Common in the Konkan, Malabár and all the ghát forests. Fl. in the hot season; Fr. towards the end of rainy season till January.

Wood is said to be good, and is employed for various purposes. The fruit is used in Ceylon to intoxicate fish. From the seeds an oil (*kawa-tel* or *kush-tel*) is extracted, which is used in lamps and in medicine. (*See* Oils.)

PITTOSPOREÆ.

Pittosporum floribundum, W. & A. Prod.; Dalz. & Gibs. Bby. Fl. 44; Brand. For. Fl. 19. *Yekdi* or *yekaddi.*

A small tree; branches often umbelled. Leaves 2-8 by 1-3 in., elliptic or oblong-lanceolate, acute or acuminate, margins waved, thinly-coriaceous, glabrous, shining above, pale below. Flowers numerous, dingy-yellow, small, pubescent, in terminal much-branched compact racemes or corymbs. Sepals obtuse or acute. Petals oblong, obtuse, patent, at last recurved. Capsule ¼ in. diam., glabrous, rugose, about 6-seeded, opening into 2, hard, broad-ovate valves.

Found at Mahábaleshvar and all along the Western Ghâts, mostly on dry, rocky sides; also on the Himalayas from the Jumna to Sikkim. Alt. 3500-8000 ft.

A handsome tree, with a short trunk. Fl. January-June; Fr. April-September.

Wood light-coloured, strong and tough, but of small size.

TAMARISCINEÆ.

Tamarix gallica, Linn.; Bedd. Fl. Sylv. An. Gen. 20; Brand. For. Fl. 20. *Jhavuka, jhau, lei.*

A tall glaucous shrub or small tree. Leaves minute, scale-like oblong or lanceolate, semi-amplexicaul, glaucous, white-margined. Flowers bisexual, penta-merous, generally white, rarely pink, ¼ in. diam., short-pedicelled, crowded in slender-panicled racemes at the ends of branches. Sepals much shorter than the petals. Disc 10-toothed, shallow. Ovary somewhat 3-gonous. Styles 3, rather long, slightly connate. Capsules about 3 lin. long.

It grows mostly on sand and gravel along the banks of rivers and near sea shores in Sind, Cutch, Bengal, the Punjáb, Afghanistan, Persia;

Ceylon and Burma. Graham says that it grows abundantly on the banks of the Indus and throughout Cutch and Sind, where it is commonly used as firewood. Alt. 11,000 ft.

This tree is very ornamental; it attains sometimes the height of 30 ft. and a girth of 3 ft. Fl. in the rainy season; Fr. in the cold season.

Wood whitish, occasionally with a reddish tinge, coarse-grained, rather hard and tough, used for turning and lacquered work; agricultural implements are made of it. It yields a kind of galls known in the bázár as *mai* or *barah mai* (Hind.) or *sumrat-ul-turfa* (Arab.); these contain large quantity of tannic and gallic acids, and are employed successfully by the natives of this country as an astringent in dysentery and diarrhœa; but it is chiefly used as a mordant in dyeing. A strong infusion of them is recommended as a local application to sloughing ulcers. This shrub is also said to yield a kind of manna called *gosan-jabin*.

T. articulata, Vahl.; Brand. For. Fl. 22. *Fras, asrelei.*

Found growing in Sind and the Punjáb and often cultivated. Alt. 1200 ft. It attains the height of 60 ft. in the Punjáb and a girth of 6-7 ft., sometimes 10-12 ft. Fl. May-July; Fr. later in the season. Leaves are shed partly in the cold season; new leaves appear in May.

This tree also yields galls similar to, but smaller in size than, the preceding one; they are known as *cholah mai* (Hind.), *sumrat-ul-asl* (Arab.), and are used also in the same diseases and for the same purposes. The bark is employed for tanning, and the galls as mordant. It also yields manna called *misri-lei*.

T. dioica, Roxb.; Bedd. Fl. Sylv. An. Gen. 20; Brand For. Fl. 21. *Serru, laljhau, pichula, gaz.*

A very graceful shrub or small tree; trunk short, branches with drooping extremities. Leaves small, scale-like, tubular, sheathing, obliquely-truncate and pointed, glabrous, and green. Flowers dioecious, ⅛ in. diam., numerous, sessile, rose-coloured, in terminal panicled spikes. Bracts acuminate. Male flowers: stamens 5, inserted in the notches of disc, anthers saggitate, purple. Female flowers: stamens abortive, capsule oblong, tapering, ½ in. long.

Cutch, Sind, Bengal, the Punjáb and Burma, and almost all over India near river-beds and the sea-coast. Graham (Cat. Bby. Pl.) states that it is common in the beds of the Konkan and Deccan rivers, and is cultivated in gardens. Alt. 2500 ft.

It attains the height of 6-7 ft., rarely 15 ft. Fl. May-July; Fr in. the cold season.

Wood is white with a pinkish tinge, and open-grained. Its chief use is to supply fuel for railways and steamers. It also yields galls and manna like the two preceding species.

T. ericoides, Rottl.; Bedd. Fl. Sylv. An. Gen. 20.—*Trichaurus ericoides*, Dalz. & Gibs. Bby. Fl. 14.

A shrub or small tree; stem slender. Leaves minute, scale-like, sheathing. Spikes terminal, 4-6 in. long. Flowers ¼ in. diam., rose-coloured, resembling those of the common heath, hence the specific name. Stamens 10, not exceeding the petals. Capsule ½ in., feathered with long spreading hairs.

This is one of the most beautiful trees of the tribe, often cultivated in gardens. Common in the rocky beds of the Panch Mahals, Deccan and Konkan rivers, and in Madras, Central India, Bengal, Ceylon, etc.

Only used as fuel.

GUTTIFERÆ.

Timber Trees.

The gamboge order is represented in this Presidency by several useful timber trees, some of which are very ornamental.

Garcinia Indica, Chois.—*G. purpurea*, Dalz. & Gibs. Bby. Fl. 31; Bedd. Fl. Sylv. An. Gen. 21. *Kokam, birand, brindão* of the Portuguese.

A tall tree with drooping branches. Leaves 2½-3½ in., obovate or lanceolate, obtuse, acute or acuminate, dark-green, red when young. Flowers yellowish; male flowers in axillary and terminal fascicles on pedicels 1-1½ in. Sepals orbicular. Petals rather larger. Stamens 12-20, forming a short capitate column; anthers opening longitudinally. Female flowers solitary and terminal on a thick peduncle. Staminodes arranged in 4 bundles. Ovary 4-8-celled. Stigma usually 8-lobed. Fruit deep-purple, globose, as large as a small orange, not furrowed, 4-8-seeded.

Grows at Mátherán, on the ghâts of the Konkan, and Kánara, and is cultivated in the Mauritius, etc. This evergreen tree flowers in the cold season; Fr. in the hot season.

Wood whitish-grey, and said to be strong, but easily attacked by insects. The fruit has an agreeable acid flavour, and is eaten. The juice is used as a mordant by people who work in iron; and a delicious syrup is made of it in Goa. The expressed oil of its seed is the *kokam oil* of the natives of this country (*see* Oils). The rind dried in the sun is used in curries to give them an acid flavour.

G. cambogia, Desrouss; Bedd. Fl. Sylv. t. 85; Grah. Cat. Bby. Pl. 26. *Vilaiti amli.*

A middle-sized tree. Leaves 2-6 by ½-1½ in., oblong, elliptic or lanceolate, acuminate, attenuated at the end, coriaceous, dark-green, shining above, on a petiole ¼-½ in. long. Flowers yellow, ¾ in. diam., hermaphrodite, larger, terminal or axillary, solitary or in fascicles, sessile or pedicelled. Male flowers: pedicels ¼-¾ in. long, thickened towards the tip. Sepals with narrow membranous margins, outer sepals smaller. Petals twice as long as sepals, concave. Anthers numerous (12-20 or more), adnate to a short androphore; cells dehiscing longitudinally, introrse. Female flowers: staminodia surrounding the base of the ovary in several phalanges, each consisting of 2-3 sterile stamens. Ovary 6-10-celled. Stigma 6-10, free nearly to the base. Hermaphrodite flowers: stamens 10-20; filaments unequal, all united at the base or in unequal phalanges. Fruit 2½-3 in. diam., ovate or oblong-ovoid, yellow or reddish, 6-10-furrowed; furrows with angular edges ending about the middle; the apex is flat, depressed, or nipple-shaped. Seeds 6-8, aril, succulent.

Found on the Western Ghâts, from Belgaum and the Konkan to Travancore, and also in Ceylon.

This evergreen tree sometimes grows to be of considerable size in favourable places. Fl. February-March; Fr. June-July.

Wood is close-grained, of a beautiful lemon or grey colour, and is easily worked. The pigment which exudes from the trunk is yellow, semi-transparent and insoluble, hence valueless as a paint. It is, however, said to be soluble in spirits of turpentine and to form a beautiful yellow varnish. The acid rind of the ripe fruit is eaten raw, and also in curries after being dried.

G. xanthochymus, Hook.—*Xanthochymus pictorius*, Dalz. & Gibs. Bby. Fl. 31; Bedd. Fl. Sylv. t. 88. *Dampel* (Hind.).

Glabrous tree, trunk straight, branches drooping, sharply angled and often enlarged immediately below the axils of leaves. Leaves 9-18 by 2-4 in., oblong-lanceolate, acute or shortly acuminate at the apex, more or less attenuated at the base, hardly coriaceous, shining green, glabrous; petiole ½-1 in. long, enlarged near the insertion on the stem. Flowers white, with a very slight tinge of yellow. Male and hermaphrodite flowers ⅔ in. diam., in 4-8-flowered fascicles, from the axils of fallen leaves; pedicels 1-1½ in., sepals small, usually 5, orbicular, concave, unequal. Petals usually 5, larger, spreading. Stamens united in 5 phalanges of 3-5, alternating with 5 glands; no ovary. Female flowers solitary in the axils of fallen leaves; ovary ovoid, 5-6-celled, crowned with a large 5-6-lobed stigma. Fruit the size of an apple, subglobose or oval, yellow. Seeds 1-4; oblong.

This beautiful evergreen tree is found on the Bombay and Madras ghâts, and all over the Eastern and Western Peninsula, Eastern Bengal and East Himalâyas, Burma, Penang and the Andaman Islands. Is also cultivated in gardens.

It attains the height of 40-50 ft. and a girth of 3-5 ft. Fl. in the hot season; Fr. in the rainy season up to January.

Wood yellowish-white, becoming in time yellowish-brown, rather heavy, hard and close-grained (*see* Dyes). This tree yields a sort of gum which has no value. The fruit is full of yellow juice which resembles the gamboge of commerce. The ripe fruit is eaten by the natives.

G. ovalifolia, Hook.; Dalz. & Gibs. Bby. Fl. 31; Grah. Cat. Bby. Pl. 26. *Tâvir.*

A middling-sized tree. Leaves 3½-8½ by 1¾-3½ in., rotundate, ovate, elliptic oblong or lanceolate, retuse, obtuse, or more or less acuminate, shining, on a petiole ⅛-½ in. Flowers white, ⅛-⅓ in. diam., male and female mixed; usually the female are fascicled, and the males are arranged in spikes. Male flowers: sepals usually 4, coriaceous, orbicular. Petals 4-5, concave, orbicular, twice the length of the sepals. Stamens in 5 fascicles; anthers 6-10 to each bundle. Female flowers: usually on much longer pedicles than males. Staminodes 5. Ovary round, 3-4-celled; stigma 5-lobed to the middle. Fruit broadly oval, size of a *kokam* fruit, with a smooth green rind, and full of yellow juice, 1-3-seeded.

This beautiful evergreen tree is found on the Western Ghâts, Khandâla, Parr Ghât, Mâtherân (rare), and also in Ceylon.

It flowers in the cold season, and ripens its fruit in March-April. Roxburgh states that the trees cultivated in the Botanic Garden at Calcutta begin to blossom during the whole of the hot season, but does not produce perfectly ripe fruit till the month of July.

The quality of the wood is unknown. The fruit is full of yellow viscid juice, which is an inferior kind of gamboge; a tenacious gummy juice exudes also from the trunk, but it is of no value.

Ochrocarpus longifolius, Benth. & Hook.—*Calysaccion longifolium*, Dalz. & Gibs. Bby. Fl. 32; Grah. Cat. Bby. Pl. 27. *Suringi.*

A middling-sized tree, glabrous; young shoots terete, youngest slightly 4-sided. Leaves 6-8 by 2-3½ in., opposite or ternately ver-

Timber Trees.

ticillate, oval-oblong, linear-oblong, or oblong-lanceolate, obtuse at the apex, slightly attenuated or rounded at the base, hard, thickly coriaceous, dark-green; midrib prominent, but the venation inconspicuous; petiole stout, ¼-½ in. Flowers polygamous, white streaked with orange-red, fragrant, ⅔ in. diam., numerous, on slender 1-in. pedicels, arising from tubercles in the axils of fallen leaves; buds globose. Calyx rupturing into 2 valves, reflexed during flowering. Petals 4, acute, deciduous. Stamens numerous. Ovary 2-celled; ovules 2 in each cell; style short, thick, subulate; stigma large, peltate. Fruit 1 in. long, obliquely-oblong, crowned by the hard style, 1-seeded.

Very common in the Ratnágiri Collectorate, Mátherán (rare), and Konkan and Kánara ghâts. It is also cultivated.

This tree sometimes grows to a large size. Fl. March-April; Fr. in the cold season.

Wood is said to be used in house-building. This tree is polygamous in a wild state, but often becomes hermaphrodite when in cultivation. Graham says that the male plant is called *wundi* and the female *poone*; both being also known under the name of *suringi* or *gardundi*. The globular buds are used for dyeing silks, and are exported to Calcutta and Europe.

Calophyllum inophyllum, Linn.; Dalz. & Gibs. Bby. Fl. 31; Grah. Cat. Bby. Pl. 26. *Wándi* (Mahr.), *sultan champa* (Hind.).

Leaves 4-8 by 3-4 in., elliptic or obovate-oblong, obtuse or retuse at the apex, usually acute at the base, firmly coriaceous, glabrous, shining; on a rather strong petiole ½-1¼ in. long. Flowers about 1 in. diam., pure white, fragrant on pedicles 1-2 in., arranged in axillary, glabrous, lax, few-flowered racemes, the length of the leaves are somewhat shorter, sepals 4, the two inner petaloid. Petals 4, rarely 6-8. Stamens numerous, in 4 bundles. Ovary round, stipitate; style much longer than the stamens; stigma peltate. Fruit 1 in. diam., globular, yellow when ripe, pulpy.

This beautiful evergreen tree, sometimes called the Alexandrian laurel, is very common in Málvan and the sandy shores of Southern Konkan, Goa, Orissa, Ceylon, Eastern Peninsula and the Andaman Islands; it is also cultivated.

It attains the height of 50-60 ft. and a girth of 6-14 ft. Fl. in the cold season; Fr. in the hot season.

Wood reddish-brown, striate, rather close-grained, heavy and moderately hard. It is valuable for masts, spars, railway sleepers, and for some purposes in ship-building.

The seeds afford good lamp-oil. (*See* Oils.)

C. Wightianum, Wall. Cat.—*C. spurium*, Dalz. & Gibs. Bby. Fl. 32; Grah. Cat. Bby. Pl. 27. Called *kalpun* in Kánara.

A middling-sized tree, branches terete, young shoots square, glabrous. Leaves 2-4 by 1¼-2 in., cuneate-obovate or oblong-cuneate, obtuse or retuse at the apex, very rigidly coriaceous, shining, on petiole ¼ in. Flowers white, ¼ in. diam., on slender pedicels, with a caducous bract at their insertion, arranged in axillary, many-flowered racemes, shorter than the leaves. Sepals 4, thin, strongly veined. Petals usually none. Ovary 1-celled, ovule one. Fruit ¾ in., oblong.

This evergreen tree is common from the Southern Konkan to Travancore.

Timber Trees.

Wood is red, very hard and heavy, and is much esteemed in Kánara, and there used for engineering purposes. (*See* Oils.)

C. tomentosum, Wight; Bedd. Fl. Sylv. An. Gen. 22.—*C. angustifolium* (?); Dalz. & Gibs. Bby. Fl. 32. *Pun, poon spar* tree.

A tall straight tree; branches 4-gonous; young shoots and panicles, rusty-tomentose. Leaves 3-5 by 1¼-2 in., elliptic or linear-lanceolate, with a bluntish accumination, rigidly coriaceous, shining, glabrous, on petiole ½-¾ in. Flowers white, about ½ in. diam., on slender pedicles, or racemes from the axils of upper leaves. Sometimes arranged into a large terminal, many-flowered panicle. Sepals 4, subrotund. Petals 4, ovate. Ovary 1-celled, 1-ovuled; stigma peltate. Drupe ovoid, pointed, about 1 in. long.

Found in moist forests of the Western Peninsula from the Konkan southwards, and in Ceylon. Both Dr. Birdwood and Colonel Beddome state that this tree is everywhere becoming scarce, and call for strict conservation. Alt. 5000 ft.

This evergreen tree grows to a large size. Fl. January-February; Fr. towards the end of the rainy season.

Wood is reddish, coarse-grained, hard, but ornamental; and is occasionally used for building purposes, chiefly for spars and masts. The seeds afford an abundant oil in Ceylon.

Mesua ferrea, Linn.; Dalz. & Gibs. Bby. Fl. 31; Grah. Cat. Bby. Pl. 26. *Nag-champa.*

Glabrous tree; trunk straight; young branches slender, obsoletely, 4-angled. Leaves very variable in size, usually 3-6 by 1½-1¾ in., linear-lanceolate or oblong-lanceolate, acute or acuminate at the apex, acute or rounded at the base, rigidly coriaceous, glabrous, dark-green and shining above, covered more or less with fine white tomentum or glaucous beneath; veins very fine, numerous, close-set, inconspicuous; petiole ¼-½ in. Flowers large, ¾-3 in. diam., pure white, fragrant (the fragrance partaking of rose and violet), usually terminal, and solitary or in pairs. Sepals 4, rotundate, fleshy, velvety with membranous margins, inner pair largest. Petals 4, spreading, broadly obovate. Stamens numerous, free or connate at the base. Anthers large, golden-yellow, 2-celled, dehiscing vertically. Ovary 2-celled, with 2 erect ovules in each cell. Style long, with a peltate stigma. Drupe of a variable size, often the size of a pigeon's egg, ovate, acuminate, striate, the base surrounded by the persistent sepals. Seeds 1, rarely 2-4, dark-brown, smooth.

In this Presidency it is to be found in Southern Konkan, Vádi, Goa, Belgaum, and all over India, Burma.

This beautiful evergreen tree is of a middling size, but sometimes attains the height of 50-60 ft. and a girth of 6-7 ft. It is also cultivated on account of its flowers, which appear February-March; Fr. May-June.

Wood reddish-brown; the sap-wood of a lighter colour, close-grained, very heavy, hard and difficult to work; but very durable under water; suitable for machinery, railway sleepers, gun-sticks, etc.

TERNSTRÖMIACEÆ.

This order is represented in this Presidency by two small trees:—

Eurya japonica, Thumb.; Brand. For. Fl. 24. *Baunra, gonta, doura.*

Timber Trees.

A tall glabrous shrub or small tree; branchlets angular. Leaves 2-5 by 1-1½ in., alternate, oblong-lanceolate to elliptic-lanceolate, acuminate at both ends, obtusely serrate, coriaceous, hairy when young, on a short, thick petiole. Flowers dioecious, small, white, on short glabrous-drooping pedicels, solitary or in fascicles, axillary or from the axils of fallen haves. Sepals and petals 5, much imbricate, the latter connate at the base. Stamens 12-15, inserted at the base of the corolla in a single series. Anthers adnate, opening longitudinally. Ovary ovoid, usually 3-celled; ovules several in each cell. Styles 3, rarely 4-5, slender, distinct or united at the base. Fruit globular, smooth, ⅛ in. diam., crowned by the persistent base of the style.

This tree resembles much the tea plant in leaf and general appearance. In this Presidency it is found in the forests of the Southern Konkan, and is widely spread over the mountainous parts of the Eastern and Western Peninsula, Ceylon and the Himalayas. Alt. 3500-9000 ft.

This evergreen tree attains the height of 15-25 ft. and a girth of 1-1½ ft. Fl. March-June; Fr. in the rainy season.

Wood is of a light pinkish-brown colour.

Gordonia obtusa, Wall.; Bedd. Fl. Sylv. t. 88. *Najetta* in the Nilghiries.

A middling-sized glabrous tree. Leaves 2-4 by 1-1½ in., narrow-elliptic or lanceolate, obtuse or with a blunt acumination, tapering at the base, crenate, glabrous, short-petioled. Flowers 1½ in. diam., white, solitary, on peduncles a little shorter than the petioles. Sepals generally 5, orbicular, silky-pubescent externally. Petals generally 5, obcordate, slightly united at the base, slightly silky-pubescent on the outside. Stamens numerous, somewhat pentadelphous. Anthers versatile. Ovary 3-, usually 5-celled. Style single; stigma large. Capsule 1 in. long, 5-angled. Seeds flattish, oblique.

This beautiful evergreen tree is found on the mountains of the Western Peninsula from the Konkan to the Pulney Hills. Alt. 2500-7500 ft.

Wood yellowish-white and even-grained, easy to work; generally used for planks, rafters and beams; but liable to warp.

DIPTEROCARPÆ.

Hopea Wightiana, Wall.; Bedd. Fl. Sylv. t. 96.; Wight's Illustr. t. 37. *Kalbolu, kong, hiralbogi* in Kánara.

A tall tree; branchlets pale, when young covered with a dense soft pubescence. Leaves 5-9 by 2-3½ in., ovate-oblong or lanceolate, obtuse or acute at the apex; acute, rounded or emarginate at the base, glabrous; nerves oblique, rather prominent above; petiole ¼-½ in., pubescent. Flowers pink, about ¾ in. diam., secund, with a bract at the base of pedicels, arranged in racemose, axillary panicles 1-6, usually 3 together, shorter than or about the length of the leaves. Calyx glabrous, segments lanceolate, obtuse.

Petals hairy externally. Stamens about 15; anthers terminated with a bristle, about 4 times their length. Ovary, 3-celled, each cell 2-ovuled. Style subulate. Fruit ½ in. long, ovoid. Calyx wings 1¾-2½ in. long, 7-9-nerved, crimson-coloured.

This tree is found in the forests of the Southern Konkan and Madras.

Timber Trees.

Wood is hard, heavy and durable, and is serviceable for railway sleepers and carriages. It is much used by the natives of South Kánara for temple-building.

The inflorescence is often diseased and converted into a globular achinate mass resembling Spanish chestnut.

Vateria Indica is said to grow in the Southern Konkan; but this statement requires confirmation. *See* Grah. Cat. Bby. Pl. 22.

MALVACEÆ.

This order, to which the cotton plant belongs, contains numerous fibrous plants, but a few unimportant timber trees.

Hibiscus tiliaceus, Linn.—*Paritium tiliaceum*, Dalz. & Gibs. Bby. Fl. 17; Grah. Cat. Bby. Pl. 14. *Belli-pata.*

A much-branched tree; young parts densely tomentose. Leaves 4-6 by 4-5 in., roundish, cordate-ovate or broadly cordate, shortly and abruptly acuminate, entire, crenulate, rarely lobed, long-petioled, leathery, glabrous above, hoary-tomentose and sometimes glandular beneath, 7-nerved. Stipules foliaceous, broadly-oblong, deciduous. Flowers large, yellow, with a dark crimson eye. Peduncles short, woody, terminal, with stipule-like deciduous bracts at the base. Bracteoles (epicalyx) 7-14, linear-lanceolate, connate above the middle, shorter or about the length of the calyx. Calyx 1 in., broadly-campanulate, 5-partite; divisions lanceolate, pubescent externally. Corolla 2-3 times the size of the calyx, campanulate. Staminal tube 1½ in. Ovary 5-celled. Styles 5, connate at the base; stigma capitate. Capsule shorter than the calyx, oblong, acuminate, pentagonal, densely hairy, 5-valved, spuriously 10-celled. Seeds slightly pilose.

Found along the coast of the Indian Peninsula. In this Presidency it grows at Ratnágiri, Vádi and on the banks of the Tiracol River; Ceylon, Chittagong and Tenasserim. It is also cultivated.

This evergreen tree becomes sometimes very crooked and stunted, but attains the height of 25-30 ft. and a girth of 2-3 ft. It flowers all the year round.

Wood is soft and valueless, except as fuel. The bark abounds in mucilage, and is said to be sucked in times of famine in the West Indies. The liber yields strong fibre. (*See* Fibres.)

Thespesia populnea, Correa; Dalz. & Gibs. Bby. Fl. 18; Grah. Cat. Bby. Pl. 15. *Bhendi, parsipū.*

All young parts covered with small rusty peltate scales. Leaves 3-5 by about 3 in., cordate, ovate, acute, acuminate or almost cuspidate, leathery, entire, glabrous, 5-7-nerved, with a glandular pore beneath between the nerves; petiole long, usually 2½ in. Stipules falcate. Flowers large, pale, sulphur-coloured, turning reddish, on axillary, slender peduncles. Bracteoles (epicalyx) 5, oblong-lanceolate, deciduous, as long as the bell-shaped, 5-toothed calyx. Corolla 2-3 in. diam. Staminal tube 5-toothed at the apex. Ovary 5-celled. Style club-shaped, 5-furrowed. Capsule 1½ in., coriaceous, globose, somewhat depressed, sprinkled with minute scales, ultimately glabrescent, 5-celled, indehiscent or opening slightly on the top. Seeds 2 in each cell, large, shortly tomentose or pilose.

Timber Trees.

Grows wild all over India, and is often planted as shade trees. Found also in Ceylon, Chittagong, and Tenasserim, etc.

This evergreen tree attains sometimes the height of 30-35 ft. and a girth of 3-4 ft. It flowers all the year round.

Wood pale reddish-brown, fading to pale-reddish, strong, durable, straight, even-grained and hard. Good for furniture, carpentry, etc.; used for panels of carriages, cart-framing, naves, etc. The bark yields fibre. The yellow viscid juice of the capsule is used by dyers, and also in scabies and other cutaneous diseases, the affected part being at the same time washed daily with a decoction of the bark of the tree.

Kydia calycina, Roxb.; Dalz. & Gibs. Bby. Fl. 24; Brand. For. Fl. 29. *Warang* or *warungud, bhôti, pola, puli, potari.*

All young parts and inflorescence more or less stellate-tomentose or velvety. Leaves 4-5 by 3-4 in., cordate, roundish or ovate-obtuse, acute or acuminate, palmately 5-7-nerved at the base, more or less deeply lobed, middle lobe longest, dark-coloured above, pale and velvety beneath. Petiole 1-2 in. Flowers polygamous, white, pink, or sometimes pale-yellow, in axillary and terminal panicles. Bracteoles 4-6, nearly as long as the calyx, ultimately enlarging. Calyx campanulate, 5-lobed and persistent. Petals 5, obcordate, oblique, longer than the calyx. Stamens monodelphous, the tube divided to about the middle into 5 bundles, each bearing 3-8 reniform anthers. Ovary 3-celled. Style 3-cleft; stigma peltate. Capsule globose, 3-valved, opening loculicidally. Seeds reniform, furrowed, stellately pubescent.

Common throughout our ghâts, Sâvantvâdi, Goa and the tropical regions of the Himalayas, Oude, Central Provinces, Bengal and Burma.

It attains the height of 25-40 ft. and a girth of 3-4 ft. Fl. July-October, sometimes further on; Fr. in the cold season, continuing to the hot season. It sheds its leaves in February; the new foliage appears in April-May.

Wood white, soft, straight-grained; used for house-building, ploughs and for carving. The liber yields fibre of which a strong coarse cordage is made in Garhwal. It is said that in Northern India the bark is used for the clarification of sugar.

Adansonia digitata, Linn.; Dalz. & Gibs. Bby. Fl. Suppl. 9; Brand. For. Fl. 30. *Gonik chintz, gorak amla, baobab, monkey bread tree.*

Trunk of an immense size, close to the ground, but soon tapering and resembling a cone. Leaves digitate, glabrous, pubescent beneath when young, deciduous; leaflets generally 5-7, 3-4 in. long, obovate or oblong-lanceolate, acuminate, attenuated at the base, entire or sinuous at the margins. Flowers white, solitary, axillary, pendulous, long-peduncled (often more than 12 in). Bracteoles 2. Calyx thick, coriaceous, fleshy, cup-shaped, 5-cleft, tomentose externally and clodded with silky hairs internally. Petals obovate, aduate below to the stamens. Staminal tube thick, dividing above into numerous filaments; anthers long, linear, reniform or contorted, 1-celled. Ovary ovoid. Style long, filiform, divided at the summit into as many radiating stigmas as there are cells to the ovary. Fruit pendulous, oblong, downy, woody, indehiscent, 8-12 in. long. Seeds kidney-shaped, brown, immersed in a mealy, slightly acid substance.

Native of Africa, and cultivated all over India, along the coast of Gujarât, Central Provinces, Bengal, etc., Ceylon.

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This quaint-looking tree, remarkable for its disproportionately large, short trunk, attains sometimes the height of 60-70 ft. Fl. May-June; it sheds its leaves in the dry season; the new ones appear April-June.

Wood is pale-coloured, soft and porous. It is often used as rafts to support fishermen in tanks, and the long dry fruit as floats for fishing nets. It appears that the reddish, mealy, acid pulp surrounding the seeds is refrigerent and diuretic, and is employed as a remedy in dysentery. The leaves, dried and powdered, are eaten mixed with food, and is said to restrain excessive perspiration. The bark has been proposed as a substitute for quinine; its liber affords excellent fibre. (See Fibres.)

Bombax malabaricum, D. C.; Brand. For. Fl. 31; *Salmalia malabarica*, Dalz. & Gibs. Bby. Fl. 22. *Saur, saer, somr, semul, shembal, silk-cotton tree.*

A glabrous tree covered with hard conical prickles, $\frac{1}{2}$ in., with black points; branches spreading. Leaves digitate, deciduous, 5-7 foliolate; leaflets generally 4-8 in. long, elliptic-oblong to oblong-lanceolate, acuminate or cuspidate at the apex, narrow at the base, glabrous, entire; common petiole as long as or longer than the leaflets; petiolules slender, about 1 in. Flowers numerous, large, scarlet or occasionally white, on short pedicels, fascicled near the ends of branches. Bracteoles 0. Calyx 1 in. long, cup-shaped, thick, coriaceous, irregularly cleft into short, obtuse 3-4 lobes, smooth externally, silk-hairy within. Petals 5, oblong, fleshy, recurved, tomentose externally, pubescent or nearly glabrous inside. Staminal tube shorter than the filaments; the latter thick and shorter than the petals, multi-seriate; 5 innermost divided at the top, each bearing an anther; 10 intermediate ones simple and shorter; the outer numerous and are united into 5 clusters. Anthers reniform, contorted, 1-celled. Ovary 5-celled, with several ovules in each cell. Style clavate; stigmas 5. Capsule 6-7 in., oblong, blunt, obsoletely 5-angled, woody, 5-valved. Seeds numerous, obovate, smooth, enveloped in silky fine wool.

It is common in the Bombay Presidency, in the Konkan, Southern Marátha Country and in Gujarát; and all over India, Burma and Ceylon. Alt. 3000 ft. and cultivated as high as 6000 ft.

This tree attains the height of 60-90 ft. and a girth of 12-15 ft., in favourable circumstances much more. The trunk is straight and its corky bark of a grey ash colour, often marked with cracks. Fl. February-March; Fr. April-May. Sheds its leaves in November and continues leafless till April.

Wood very light, white or yellowish-white when fresh cut, becoming darker on exposure, coarse-grained, brittle, perishable, durable only under water, takes no polish. Used for coffins, packing cases, toys, scabbard, planking, fishing floats, and is said to be often rafted with heavier timber to make it float. Canoes are also made of it in Burma. From the bark exudes a gummy juice, which has been thought erroneously to be *mochras* or *mucherus*, held in high esteem as a demulcent and astringent. It yields gallic and tannic acids, and occurs in more or less large, inodorous, opaque, dark-brown pieces, some of which present such a resemblance to galls, that they are called by some people *supari-ka-phal (areca nuts)*. The botanical sour[ce] of *mucherus* is unknown.

There are sold i[n] the bázár under the name of *safed musli*, small, shrivelled rootlets, [h]ighly esteemed as useful in general debility and wasting diseases. They are white or buff-coloured, destitute of taste or odour, 1 or 2 in. long, and of the thickness of a quill. The source of

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this drug was doubtful; it was supposed by some to be derived from the roots of *Saur* and by others from those of *Curculigo orchioides*. Mr. Mohideen Shereef, of Madras, has positively stated that the bulbous rootlets of *Asparagus adscendens* are the source of *safed musli*.

The wool covering the seeds is used in stuffing pillows. The calyx of the flower-bud is eaten as vegetable.

Eriodendron anfractuosum, D. C.; Dalz. & Gibs. Bby. Fl. 22; Grah. Cat. Bby. Pl. 17. *Shameula, safed simal.*

Trunk straight, armed when young with conical woody prickles, branches spreading horizontally, verticillate, usually ternary, all parts glabrous. Leaves 5-8 foliolate, on petioles as long as or longer than the leaflets; leaflets 3-4 by 1 in., lanceolate, acuminate or cuspidate with a mucro, entire or serrulate towards the point, glaucescent beneath, shortly petioluled or almost sessile. Stipules small, caducous. Flowers appearing before the leaves, of a dingy white colour on peduncles about 2 in., fascicled, axillary or terminal, 1-flowered, drooping. Calyx thick, coriaceous, 5-lobed; lobes roundish, glabrous externally, downy within. Petals 5, 1 in., oblong, connate at the base, thick, tomentose outside. Staminal bundles 5, united at the base, each bearing 2-3 variously convolute, linear, 1-celled anthers. Ovary ovoid, 5-celled, with several ovules in each cell; style thick; stigma entire or 5-lobed. Capsule oblong, thick, coriaceous, 5-valved. Seeds numerous, black, imbedded in a silky wool.

Found throughout the hotter forests of India and Ceylon, and is planted near villages and temples: also found in Pegu and Tenasserim.

This tree grows to a large size in Khándesh, attaining sometimes the height of 60-80 ft. and a girth of 10-12 ft. Fl. February-March; Fr. April-May; sheds its leaves in the cold season, and continues leafless till the hot season.

Wood is light and soft, good for toys. The cotton of the seeds is said to be used for the same purposes as that of *bombax*.

STERCULIACEÆ.

The ovary of Sterculias consists of 4-5 free or nearly free, sessile or stalked carpels. No corolla. This order yields several timber trees.

Sterculia fœtida, Linn.; Dalz. & Gibs. Bby. Fl. Suppl. 10; Grah. Cat. Bby. Pl. 18. *Jungli-baddam, kuo-mhad* and *virhoi* (Goa), *bastard-poon tree.*

A straight stout tree, glabrous, except the very young leaves and shoots; branches horizontal, verticillate. Leaves crowded at the ends of the thick branchlets, on petioles 8 in.; digitately 5-9 (11)-foliolate; leaflets about 6 by 2 in., elliptic-oblong or lanceolate, acuminate or cuspidate, entire, shortly petioluled, coriaceous. Stipules ensiform, caducous. Flowers polygamous, of a dull crimson colour, rather large, emitting a strong disagreeable smell; in lax, simple or branched racemes, about as long as the petioles; pedicels shorter than the flower, jointed in the middle. Bracteoles minute. Calyx ½-1 in. diam., campanulate, deeply 5-cleft, glabrous externally and hairy internally; lobes lanceolate, spreading. Petals none. Staminal column bearing several (12-15) sessile, 2-celled anthers. Carpels 5,

with many ovules in each, villous. Style stalked, curved. Follicles about 2-4 by 2½ in., glabrous, woody, boat-shaped, shortly beaked. Seeds 10-15, large, oblong, black, smooth.

Common in Bombay, generally cultivated throughout India, found sparingly in a wild state throughout the Bombay, Madras and Bengal Presidencies: also in Ceylon and Burma.

This handsome stately tree attains the height of 80-90 ft. and a girth of 8-10 ft. Fl. March-May; Fr. beginning of the rainy season; sheds its leaves in the hot season.

Wood very light, tough, coarsely fibrous, loose-grained, white, turning yellowish, easily worked, takes an indifferent polish. Used for house-building, and the construction of masts and canoes; good for making packing cases, etc. The seeds are roasted and eaten like chestnuts. The liber yields fibre. (*See* Fibres.)

S. urens, Roxb.; Dalz. & Gibs. Bby. Fl. 23; Brand. For. Fl. 33. *Kavali, kandol, gwira, karai, gulu, kulu, gular.*

Trunk erect; branches spreading, marked with large scars; the softer parts tomentose. Leaves crowded at the ends of branches, 9-12 in. long and broad, cordate at the base, usually 5-lobed; lobes entire, acuminate, membranous or somewhat coriaceous, tomentose beneath, nearly glabrous above; petioles 6-9 in. Stipules caducous. Flowers small, numerous, greenish-yellow, covered with a glutinous yellow tomentum; male and female mixed, in much-branched panicles; pedicels furnished at their bases with linear bracts, deciduous after flowering. Calyx ¼ in. diam., 5-toothed. Corolla none. Filaments 10, alternately longer, united below into a thin sheath, which encloses the base of the gynophore. Anthers large, alternately larger. Ovary supported on a thick gynophore. Style short and thick; stigma 5-lobed. Fruit of 5-radiating carpels, 3 in. long, orange to bright red, covered with dense tomentum, intermixed with stiff hairs, stinging like those of *cowitch (mucuna)*. Seeds 3-6, oblong, black or chestnut coloured.

In our Presidency it is very common in the Konkan. Found all over India, Ceylon, Assam, Pegu and Tenasserim.

A large tree attaining the height of 60-70 ft. and a girth of 8-10 ft. The trunk short, often crooked and irregular. It has a greyish-white bark; the outer part papery, the inner fibrous. Fl. December-March; Fr. April-May. Leafless during the cold season; the young leaves appearing in the hot season.

Wood white, with a reddish-brown centre, emitting an unpleasant smell, soft, spongy and loose-grained; used for fuel, toys, etc. Native guitars are made of it. The trunk yields a gum resembling tragacanth, sold in the bázár under the name of *katila* or *katira*, with the gum of *S. villosa* and *Cochlospermum* and some other trees. The seeds are roasted and eaten, and said to be cathartic in their effects. A kind of coffee is made of them. (*See* Oils and Fibres.)

S. villosa, Roxb.; Dalz. & Gibs. Bby. Fl. 22; Brand. For. Fl. 32. *Gulkhándhar, anvi-nar, udal, údar.*

Branches few, spreading, with large scars; younger parts tomentose. Leaves 12-18 in. each way, crowded at the ends of branches, deeply palmately 5-7-lobed, cordate at the base, 5-7-nerved; lobes oblong, acute or acuminate, sometimes 3-fid, nearly glabrous or

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thinly stellate-pilose above, tomentose beneath; petioles puberulous, as long as the leaf, enlarged at the top; stipules oblong, acuminate. Flowers numerous, male and female mixed, yellow, sometimes with pink or orange eye, on slender pubescent pedicels, nearly as long as the calyx, arranged in lax, drooping panicles, about 12-14 in., tawny-pubescent, at the ends of the leafless branches. Bracts linear caducous. Calyx ½ in. diam., membranous, campanulate, deeply 5-cleft, lobes spreading, puberulous externally. Corolla none. Anthers 10, on the top of the staminal column. Ovary globose, puberulous on a gynophore as long as the calyx. Style curved. Fruit consisting of 5, coriaceous, oblong, rusty, densely tomentose follicles, about 1½-3 in., almost sessile. Seeds oblong, black, several in each carpel.

It is found all over India, and in this Presidency from Gujarát to Southern Konkan. In Bengal, North-West India, the Himalayas, Kumaon and Burma. Alt. 3500 ft.

In Southern India this tree sometimes attains the height of 60-70 ft. and a girth of about 4-6 ft; but towards the north it has a stunted growth, and is seen only as a shrub 8-10 ft. high. Fl. March-April; Fr. June-July. Leafless during the cold season; new leaves appear March-April.

Wood reddish, central part grey; soft, light, and fibrous, but valueless. A pellucid gum (also called *katira*) exudes from the trunk and is sold as a substitute for tragacanth, but not so valuable. The liber yields a coarse, strong fibre, which is made into ropes and coarse canvas for bags in Goa and Kánara. These ropes are used for dragging timber by elephants and buffaloes. A good kind of paper is said to have been made from the fibre.

S. guttata, Roxb.; Dalz. & Gibs. Bby. Fl. 23; Grah. Cat. Bby. Pl. 17. *Kukar, goldar.*

A large erect tree; young shoots pubescent. Leaves 7-8 by 4-5 in., smooth, shining or scabrid above, beneath very softly villous, oblong-ovate, acute or suddenly acuminate, rounded or slightly cordate at the base, entire; petiole round, downy, 2-4 in. Stipules very caducous. Bracts lanceolate. Flowers chiefly hermaphrodite, usually in threes on pedicels shorter than flowers in terminal and axillary, villous racemes. Calyx ⅛ in., 5-fid; segments broadly ovate-acute, reflexed, densely villous on both sides, of a pale-yellow colour externally, internally of the same colour spotted with purple. Corolla none. Anthers 12. Ovary long-stalked, 3-5 lobed, downy. Style curved; stigma 3-5 lobed. Follicles 1-5, usually 5, each about 8 by 2 in., obovoid, villous, of a brilliant red colour. Seeds large, oblong, black.

Common along the coast, Konkan, Malabár, Nilghiries, Madras, Ceylon, Andaman Islands and Malacca.

It is a large tree with an ash-coloured cracked bark, and looks very ornamental, especially when covered with red follicles. Fl. generally in February, when the tree is leafless; Fr. in the hot season.

The character of its wood is not known, nor is it much used. The inner bark yields fibres from which cordage is made. Cloth is also manufactured from them in Malabár. The seeds are roasted and eaten. (*See* Fibres and Oils.)

S. balanghas, Linn.; Grah. Cat. Bby. Fl. 17; Bedd. Fl. Sylv. An. Gen. 32. *Kavalum* in Malabár.

A middling-sized tree, young parts rusty tomentose. Leaves crowded about the extremities of the branchlets, 5-6 by 3 in., ovate-oblong, elliptic-oblong or lanceolate, obtuse or acuminate at the apex, rounded at the base, entire, glabrous above, pubescent beneath, or glabrous on both sides by age. Petioles 1½-2 in. Stipules subulate. Flowers numerous, small, drooping, hoary-tomentose outside, red within, fragrant, on about ½ in., villous pedicels, arranged in hairy, axillary, pendulous panicles. Calyx campanulate, about ½ in. diam., 5-cleft; segments long, slender, margins revolute, connivent at the points; in hermaphrodite flowers; anthers numerous, small, surrounding the base of the ovary. Carpels very hairy. Stigmas curved, as long as the style. Follicles 3 in., oblong acuminate, rusty tomentose. Seeds black.

This tree is found in the Thána District and in the Konkan forests and in various parts of India and in Ceylon; it is often cultivated in gardens. Fl. April-May; Fr. in the rainy season.

Wood is soft and open-grained. Its use is not known. The bark is of a brown colour and pretty smooth. The seeds are roasted and eaten, and the capsules burnt in Amboyna for the preparation of the colouring matter, called by the natives *kussumbha*.

S. colorata, Roxb.; Dalz. & Gibs. Bby. Fl. 23.; Brand. For. Fl. 34. *Khowsey, bhai-koi, bodúla, samdrri, vádena.*

Branches spreading; young parts pubescent. Leaves 6-9 by 5-12 in., alternate, crowded at the ends of branches, palmately 5-lobed, cordate at the base; lobes acuminate; common petiole, 4-9 in. Stipule erect, lanceolate. Flowers numerous, deep orange-red, showy, on short pedicels, arranged in terminal, numerous, erect, panicles. Calyx ¾-1 in., cylindrical-clavate, leathery, 5-lobed; lobes obtuse, covered with brilliant red, stellate-pubescence. Corolla none. Anthers about 30, sessile, round the border of the apex of the column. Carpels 5, oval. Styles 5, short, curved. Stigma acute. Follicles 1-5, 2-3 in. long, stalked, oblong-lanceolate, glabrous, membranous, opening long before the seeds are ripe, pink outside, and yellowish inside. Seeds ovoid, generally 2, about the size of a large pea, adhering one to each margin of the carpel near its base.

It is found in the forests throughout the Konkan and in the Deccan above the ghâts, as well as in Bengal, Oude, valleys of the Himalayas and various other parts of India, Ceylon and Burma. Alt. 4000 ft.

This tree, which has an ash-coloured and scabrous bark, attains the height of 50-60 ft. and a girth of 5-6 ft. Fl. March-April, when it is the most beautiful object to be seen, appearing as if ornamented with red coral; Fr. June-July. Sheds its leaves in the cold season; new leaves appearing with or soon after the flowers.

Wood of a dingy white colour, very soft, marked with conspicuous medullary rays. The bark yields fibre of an inferior kind, and not so strong as that of *S. villosa*. Twigs and leaves are used as cattle fodder. (See Fibres.)

Heritiera littoralis, Dryand.; Dalz. & Gibs. Bby. Fl. 22; Grah. Cat. Bby. Pl. 18. *Sundri.*

All young parts silvery-scaly. Leaves 5-8 by 2-4 in., alternate, oblong-lanceolate or ovate, rounded or subcordate at the base, entire, coriaceous, glabrous above, densely silvery lepidote beneath. Petiole ½-1 in. Stipules lanceolate, caducous. Flowers monoecious.

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red, small, numerous, in loose-tomentose panicles, in the upper axils or above the scars of the fallen leaves. Calyx about ¼ in., campanulate, urceolate, 5-toothed. Corolla 0. Staminal column in the male slender, bearing below the summit a ring of 5 anthers, with 2 parallel cells. Carpels 5 nearly distinct; 1 ovulate. Style short; stigmas 5. Fruit-carpel sessile, ovoid, woody, indehiscent, smooth or turbercled, brown, 1-4 in. long, with a slight projecting inner edge and a strong almost winged keel along the outer edge.

Along the sea-coast throughout India, Ceylon and Burma extending as far as the Khasia Hills in Cachar; also in Australia and Africa.

This evergreen tree attains the height of 20-30 ft., sometimes more, and a girth of 4-5 ft. It has a greyish bark. Fl. April-May; Fr. towards the end of the hot season.

Wood of a light-red colour turning to brown, rather light but strong, fibrous, somewhat loose-grained and not very durable nor easily worked. Used for poles and shafts of carriages, spokes of wheels, boxes, packing cases, etc.; also used as firewood.

Kleinhovia hospita, Linn.; Dalz. & Gibs. Bby. Fl. 23; Grah. Cat. Bby. Pl. 18.

A small tree; trunk straight with smooth bark. Leaves 6-12 by 2-3 in., alternate, broad-cordate or ovate, acuminate, entire, thin-membranous and smooth on both sides, 3-5 nerved. Petiole almost as long as the blade. Stipules ensiform. Flowers pink or rose-coloured, slightly fragrant, numerous, arranged in large, terminal, cymose panicles. Bracteoles ensiform. Pedicels downy, jointed. Calyx 5-partite, deciduous; segments lanceolate, villous, nearly equal, longer than corolla. Petals 5, unequal; the upper with longer claws; margins involute; lateral pair oblong, concave, and pressing on the staminal column; lower pair also oblong, but larger. Staminal column expanded above into a bell-shaped, 5-cleft cup; each division with 3 anthers, with cells diverging, and one short staminode between each division. Ovary ovate, villous, inserted on the cup of the column, 5-lobed, 5-celled. Styles slender; stigma 5-partite. Capsule inflated, membranous, pyriform, turbinate, 5-lobed, loculicidally 5-valved. Seeds 1-2 in each cell, small, round, tubercled.

Grows in Southern Konkan, Madras, Ceylon, Malacca, Singapore, Java and the Philippines. It is also cultivated at Poona and elsewhere. Believed to have been introduced into India in 1798 from the Moluccas.

This handsome tree sometimes grows to be of large size. Fl. towards the end of rainy season; Fr. October-November.

Quality of the wood is not known. It is stated that the old wood is highly valued in Java for various purposes.

Pterospermum suberifolium, Lam.; Dalz. & Gibs. Bby. Fl. 24; Grah. Cat. Bby. Pl. 19. *Muchunda.*

A middling-sized tree; trunk straight. Leaves 2-6 by 1-2 in., cuneate-oblong, shortly-acuminate, coarsely-toothed or somewhat lobed at the apex, obliquely cordate or subcordate, 5-9-nerved at the base, coriaceous, covered when young with a rusty tomentum, becoming soon glabrous above, and very white-pubescent beneath. Petioles about ¼ in. Bracteoles very caducous. Peduncles axillary, twice as long as the petiole, 1-3-flowered. Flowers about 1¼ in.

diam., light-yellow, fragrant. Sepals 5, slightly united at the base, oblong linear, revolute, covered with ferruginous tomentum on the outside. Petals 5, linear-oblong, obtuse, equalling the sepals. Staminal column short, divided at the top into 5 linear staminodes, with 3 stipitate anthers between each; anther-cell linear parallel. Ovary with 4 ovules in each cell. Capsule 1-2 in., obovoid, obsoletely angular, 4-5-valved, covered with furfuraceous pubescence. Seeds 2-4 in each cell, usually 2, obliquely oval, compressed, surmounted by small, thin-membranous wing.

Native of the forests of the Konkan and Madras; found also in Ceylon and Ava. Cultivated on account of its fragrant flowers.

Fl. in the hot season; Fr. in the rainy season.

Wood close-grained, tough, moderately hard, pinkish-brown; used for buildings, poles of bullock-carts, gun-stocks and various other purposes.

P. acerifolium, Willd.; Grah. Cat. Bby. Pl. 20; Brand. For., Fl. 35. *Karnikara, kanak-champa.*

All younger parts tawny-tomentose. Leaves 10-14 by 6-12 in., simple or lobed, ovate-oblong, or obovate-oblong, peltate or cordate at the base, 7-12 nerved, entire or coarsely toothed, covered on the upper side with stellate-pubescence when young, at length glabrous above, and grey tomentose beneath, coriaceous. Petiole round, striated. Stipules many-cleft, caducous. Flowers 5-6 in. diam., white, fragrant, with many-cleft bracteoles. Peduncles axillary, 1-3 flowered, very short. Sepals 5, linear-oblong, revolute, thick coriaceous, rusty tomentose outside, villous within. Petals 5, linear-oblong or obliquely cuneate. Staminodes club-shaped. Ovary oblong, rusty-tomentose, 5-angled, 5-celled; cells many-ovuled. Capsule 4-6 in., woody, 5-angled, 5-celled, 5-valved, covered with a dark-brown, scurfy tomentum. Seeds numerous, ovoid, compressed, smooth, with large, thin-membranous wings.

Cultivated throughout India, and is found wild at Máhim, in the Konkan and in some parts of Madras, Bengal, Kumaon, the Himalayas and Burma. Alt. 4000 ft.

This handsome evergreen tree sometimes attains the height of 40-50 ft. and a girth of 3-4 ft. Fl. in the hot season; Fr. in the cold season. Wood is of a light-red or brown colour, coarsely fibrous, moderately hard, heavy, and takes a fine polish; good for furniture. Leaves are used as plates and for packing tobacco; the down is used to stop bleeding.

P. heyneanum, Wall.; *P. Lawianum*, Dalz. and Gibs. Bby. Pl. 24; Grah. Cat. Bby. Pl. 246. *Muchunda?*

A middling-sized tree; with the trunk tolerably straight; young parts covered with stellate-rusty pubescence. Leaves 4-6 by 2-3½ in., alternate, oblong-acuminate; repand-toothed, or rarely lobed at the apex, subcordate, cuneate, rarely subpeltate, 5-nerved at the base, coriaceous, glabrous when adult on the upper side, white-tomentose beneath, with prominent nerves. Petiole ½ in. tawny-tomentose. Stipules deciduous, ensiform. Flowers large, white, fragrant. Bracteoles persistent, deeply divided. Peduncles shorter than the petioles, axillary. Sepals 5, linear, revolute, 2 in. Petals 5, obliquely-obovate, spreading. Staminodes linear. Ovary oblong, villous, 5-celled; ovules numerous. Capsule 2 in. long, acute,

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obscurely 5-angled, woody, covered with furfuraceous pubescence. Seeds 8 in each cell, produced into a membranous, acute wing.

The whole of this tree is of a pale-tawny colour, and is found in Dhárwár and the southern ghâts, extending to all the forests of India.

Fl. in the hot season; Fr. in the rainy season.

The wood is white, and too soft to be of any use.

P. glabrescens, W. & A. Prod.; Grah. Cat. Bby. Pl. 20; Bedd. Fl. Sylv. An. Gen. 34. *Solda* in Port.

A middling-sized tree. Leaves 6 by 3½ in., cordate, or cuneate-obovate, shortly and suddenly acuminate; equal and 5-nerved at the base, entire, coriaceous, glabrous above, ashy-pubescent beneath, with rusty-pilose, prominent nerves. Petioles about ½ in. Stipules linear, entire, ½ the length of the petiole, persistent. Flowers white changing to yellow, 4 in. diam., on axillary peduncles about ½ in. Sepals 5, linear-oblong, hairy within, 5 or 5¼ in. long. Petals 5, oblong, thick, nearly as long as the sepals, glabrous within, and villous externally. Staminal column long, about 1 in. Staminodes linear. Ovary ovoid, obscurely furrowed. Capsule woody, 5-6 in., stipitate, 5-angled, pointed, covered with yellow tomentum, glabrous by age. Cells 10-12-seeded.

This very handsome tree is found in the Southern Konkan and in the forests of Madras.

It is an evergreen tree; Fl. March; Fr. beginning of the rainy season.

Quality of the wood requires an examination.

Eriolæna Hookeriana, W. & A. Prod.; Grah. Cat. Bby. Pl. 20; Brand. For. Fl. 36. *Bute* or *bother*, *bolku*, *arâng*.

A middling-sized tree; young parts stellate-downy. Leaves 4 in. each way, roundish-cordate, shortly-acuminate, serrate, thinly stellate-hairy, at length glabrous above, rusty-stellate-pubescent beneath. Petiole nearly ½ the length of the leaf. Stipules linear, caducous. Flowers 2 in. diam., yellow on peduncle as long as or longer than the petiole, stellate-pubescent, at length glabrous, axillary, 3-flowered. Bracteoles deeply cut into numerous linear segments, pubescent, deciduous before the flower expands. Sepals 5, lanceolate, densely pubescent externally, silky within. Petals 5, shorter than sepals, with a broad tomentose claw. Staminal column short, bearing numerous, linear-oblong anthers in many series. Ovary sessile, 7-10-celled, ovoid. Style densely pubescent. Stigma 8-10-lobed. Capsule 1 in. long, ovoid, woody, 10-valved; valves hairy, tubercled or pitted. Seeds numerous with a tapering wing above.

Mahábaleshvar in ravines, in the forests of the Konkan, Nilghiries and Behár. Alt. 1-4000 ft.

Fl. March-May, when the tree is almost destitute of leaves; Fr. September-November.

Wood reddish, strong, hard, and polishes well. The liber yields excellent fibre.

E. Candollei, Wall.; Dálz. & Gibs. Bby. Fl. 24. *Buta*?

Young parts stellate-tomentose. Leaves 5-7 by 4 in., ovate-cordate, acuminate, irregularly crenate-toothed, palmately 5-7

nerved, nerves prominent on the under surface, stellate-tomentose or glabrescent above, grey or white pubescent beneath. Petiole 1½-3 in., tomentose or glabrescent. Stipules lanceolate, small, deciduous. Flowers 1½ in. diam., yellow, numerous, in terminal and axillary racemes, nearly as long or longer than the leaves. Peduncles 1 in. Bracteoles 3, linear, toothed or almost pinnatifid, tomentose. Sepals 5, lanceolate, glandular on the inner surface at the base. Petals oblong; apex notched; claw villous, incurved. Staminal column short, bearing numerous anthers. Ovary ovoid, sessile, 10-celled, with numerous ovules in each cell. Stigmas 8-10, spreading. Capsule 2 by 1 in., woody, ovoid, acuminate, 10-valved; valves thinly pubescent or glabrescent. Seeds numerous.

Rám Ghát, in the valleys of Mahábaleshvar, as well as in Burma and the mountains of Prome.

This tree attains sometimes the height of 30-60 ft., and a girth of about 4-7 ft. Fl. in the hot season; Fr. in the cold season; sheds its leaves in the hot season.

The wood is of a beautiful pink colour, mottled with orange and brown streaks, hard, tough, strong, close-grained, and takes a beautiful polish; used for gun-sticks, paddles, and rice-pounders—adapted for carpentry.

E. quinquelocularis, Wight; Bedd. Fl. Sylv. An. Gen. 35. *Budjaridha-mun.*

A small tree; young parts stellate-tomentose. Leaves 2½-3 in. each way, round, or ovate, shortly acuminate at the apex, cordate at the base, palmately 7-nerved, serrate, thinly pubescent or glabrescent above, silvery and soft pubescent or tomentose beneath. Petiole 2 in. Flowers 1 in. diam., on long peduncles, arranged into cymes at the ends of branches. Bracteoles minute, 3-5-lobed, very caducous. Sepals 5, ¾ in., oblong-linear, with 2 glands within at the base. Petals 5, about the length of the sepals; claw coriaceous, dilated, hairy. Staminal column as long as the petals, conical, covered with numerous anthers, confined more to the apex. Ovary ovoid, 5-celled, with numerous ovules in a double row, in each cell. Style 1, slender. Stigma 5-lobed, lobes hairy, revolute or spreading. Capsule 1¼ in. long, woody, 5-10-valved; valves not tubercled. Seeds numerous, winged.

The Konkan and Belgaum Ghâts, as well as in the western forests of the Madras Presidency, the Nilghiries and Behár.

Alt. 1-4000 ft.

The wood is said to be strong, and is used for various purposes.

I have very good specimens of *E. stocksii* brought from Mahábaleshvar.

Melochia velutina, Bedd.—*Riedleia filicifolia*, Dalz. & Gibs. Bby. Fl. 24; Grah. Cat. Bby. Pl. 19. *Methuri.*

A tall shrub or small tree; young parts stellate-pubescent. Leaves 4 by 3 in. or larger, suborbicular, subcordate, acuminate, 5-7 nerved, more or less deeply serrate, thinly stellate-pubescent or glabrescent above, softly velvety-tomentose beneath. Petiole about 3 in. long, tomentose. Stipules ½ in., leafy, broadly-cordate, more or less pubescent. Flowers ¼ in. diam., pale rose-coloured, on very short, tomentose pedicels, arranged in terminal and axillary, many-flowered, corymbose panicles. Calyx campanulate, 5-lobed; lobes connate to about the middle, greyish, tomentose. Petals 5, twice

Timber Trees.

the length of the sepals. Stamens 5, opposite to the petals, united at the base into a short tube, and inserted into a lobed disc; filaments flat; anthers introrse, 2-celled. Ovary sessile, 5-celled; each cell 2-ovuled. Styles 5, free, or connate at the base. Capsule oblong, ½ in., deeply 5-lobed, hirsute. Seeds solitary in each cell, brown, smooth, with a wing at the upper extremity.

This very ornamental flowering tree is common in gardens, and is found wild throughout the hotter parts of India, from the North-West Provinces to the Konkan, Ava, the Mauritius and Malaya. In this Presidency it is not uncommon in its wild state at Bassein, Khandála and Belgaum.

Though generally shrubby, it grows to be a small tree, attaining the height of 20-30 ft. Fl. in the cold season; Fr. in the hot season, when it sheds its leaves partially.

Wood very light, even-grained, soft and whitish, useful for toys.

Guazuma tomentosa, Kunth.; Dalz. & Gibs. Bby. Fl. Suppl. 11; Grah. Cat. Bby. Pl. 18. *Bastard-cedar* of the English.

Young parts shortly stellate-tomentose. Leaves 3-4½ by 2 in., obliquely-ovate or oblong-lanceolate, acuminate at the apex, unequally cordate at the base, irregularly serrate, scabrous or glabrescent above, pubescent or tomentose beneath. Petiole about ½ in. Flowers numerous, small, yellow, or dark-purple in terminal and axillary, cymose panicles. Sepals 5, connate below the middle. Petals 5, sub-unguiculate and concave at the base, produced at the apex into 2 linear, ligulate processes. Stamens 10, united in a column, tubular at the base, and terminated above by 5 fertile, 3-antheriferous filaments, and 5 lanceolate staminodes. Anthers 2-celled; cells diverging. Ovary sessile, 5-lobed, 5-celled, with numerous ovules in each cell. Styles 5, more or less connate; stigma simple. Capsule woody, indehiscent, oblong or sub-globose, 1 in. long, tubercled, black, many-seeded.

Native of tropical America, but cultivated in the warmer parts of India and Ceylon, and common about Bombay.

This evergreen tree attains the height of 30-60 ft. and a girth of 2-5 ft. Fl. at the beginning of the rainy season; Fr. towards the beginning of the cold season.

The wood is light, loose-grained, coarse, fibrous, and of a light-brown colour, takes a good polish; good for furniture, panels, packing cases, etc. The leaves are excellent fodder for cattle. The bark abounds in mucilage, which is used in the Mauritius for the clarification of sugar. It is said to be useful in elephantiasis and leprosy. (*See* Fibres.)

TILIACEÆ.

This family is represented in this Presidency by many herbs and shrubs and by the following trees:—

Grewia tiliæfolia, Vahl.; Dalz. & Gibs. Bby. Fl. 26; Brand. For. Fl. 4 1. *Dhaman, dhâmin, phârsa.*

Young shoots pubescent with minute stellate hairs. Leaves 4 by 2 in., ovate or roundish, acuminate, obliquely cordate, 3-5-nerved at the base, bluntly toothed or serrate, coriaceous, sparingly minutely stellate hairy or glabrescent above, hoary pubescent beneath. Petiole ½-1 in., pubescent or glabrescent. Stipules broad-lanceolate, leafy,

falcate, auricled, caducous. Peduncles axillary, 2-3 together (sometimes numerous), equal to or a little longer than the petioles, 3-5 flowered. Pedicels small, pubescent, furnished with bracts. Flowers yellow. Sepals ¼-½ in., tawny-velvety outside, glabrous inside. Petals emarginate, linear-oblong, half the length of the sepals, with a fringed foveolate scale at the base of each. Stamens numerous, all fertile, free from the base, and inserted upon a raised glabrous torus. Anthers small, 2-celled. Ovary 4-celled, hirsute. Style about twice as long as the stamens; stigma 4-lobed. Drupe globose, size of a pea, glabrescent, bluish-black, when ripe 2-, rarely 4-lobed.

Common in this Presidency as well as in Madras; found in Oude, Behár, Central Provinces, the Himalayas, and all over India and east tropical Africa.

Alt 4000 ft.

It attains the height of about 30-40 ft. with an erect, tolerably straight trunk 4-6 ft. in girth. Sheds its leaves in March; new leaves appear in April, when it flowers; Fr. June-October.

Wood of a light reddish-brown colour, turning to light-brown, compact, close-grained, light, moderately hard, elastic, durable and easily worked. Dr. Gibson says, however, that it is of no value: this must be an error, for it is valued where strength and elasticity are required, and is employed in carriage and cart building; buggy-shafts, walking-sticks, handles, masts, oars, etc., are also made of it. Young twigs and leaves make a good fodder for cattle. The liber yields a fibre from which cordage is made. The fruit, which has an agreeable acid flavour, is eaten by natives. (*See* Fibres.)

G. Asiatica, Linn.; Dalz. & Gibs. Bby. Fl. 26; Brand. For. Fl. 40. *Phalsa* or *phalsi*.

Shoots, underside of leaves, and inflorescence covered with soft, yellowish tomentum. Leaves 2-7 by 3-4 in., obliquely cordate or broad-ovate, rotundate, acuminate, 5-7 nerved, irregularly toothed, glabrescent above. Petiole ½ in., tomentose, enlarged at the top. Stipules linear-lanceolate, subulate, nearly as long as the petiole, often with a broad, oblique base. Peduncles axillary, 2-7 together, usually shorter, sometimes longer than the petioles, bearing from 3-5 flowers on bracteate, puberulous pedicels. Flowers yellow, ⅛ in. diam. Sepals oblong-lanceolate, generally ⅛ in. long, reddish-brown or yellow internally. Petals linear-oblong, obtuse, or emarginate, ½ the length of the sepals, with a small, foveolate, villous or fringed scale at the base. Stamens numerous, all fertile, free and inserted on a raised glandular torus; filaments red. Ovary densely villous. Drupe the size and shape of a pea, dark-brown, indistinctly lobed with 1 or 2, 1-seeded nuts.

Found all over India in a cultivated state; indigenous in Poona, Salt Range, Oude and Ceylon.

This shrub or small tree attains the height of about 20 ft., with a short trunk and a girth of 3-5 ft. Fl. March; Fr. April-May; sheds its leaves in the cold season, and is covered with new foliage about the end of March.

Wood is reddish-brown or light pink in colour, close-grained, strong and elastic, good for the same purposes as those of the above-mentioned tree. The pleasantly acid fruit is eaten, and a sherbet is made of it at Surat. The mucilage of the bark is used for clarifying sugar in Saharanpore. The liber yields fibre, which is made into ropes.

G. vestita, described by some authors as a distinct species, is a variety of the above-named tree.

Timber Trees.

It is found in Eastern Bengal, Behár, Central Provinces and the Himálayas, and grows to a height of about 25 ft., with 2 ft. in girth. Fl. January-May; Fr. August-November. New leaves appear in May.

Some other shrubby species of this genus grow under favourable circumstances to be trees attaining the height of 20-25 ft. These are:—*G. villosa*; *G. pillosa*, *phalsar*; *G. microcos*, *shiral*, *assalé* at Goa; *G. polygama*, *gowli*; *G. Ritchiei*. All these are found in the Deccan and Konkan.

Erinocarpus Nimmonii, Grah. Cat.; Dalz. & Gibs. Bby. Fl. 27; Grah. Cat. Bby. Pl. 21. *Chowra* or *jungli-bhendi*.

A small tree. Leaves 5-8 in. each way, roundish-cordate, irregularly-toothed, palmately 5-9-nerved, sometimes 3-5-lobed; lobes acute, glabrous above, pubescent or glabrescent beneath. Petiole 2-5 in. Stipules caducous. Flowers yellow, nearly 2 in. diam., on short pedicels in large, terminal, lax panicles. Bracts cordate-ovate, caducous. Sepals 5, distinct, stellate-pubescent externally. Petals 5, with pit-like glands inside at the base. Stamens numerous, inserted on an elevated torus, free or slightly connate at the base. Ovary pubescent, 3-celled, with 2 ovules in each cell. Style filiform; stigma minute. Fruit 2 by 1½ in., bristly, woody, indehiscent, triangular, 3-winged, 1-celled by abortion. Seeds solitary, pendulous, oblong.

This small handsome tree is common at Khandála, on the top of Karanja Hill, at Jambuti near Belgaum, and throughout the Konkan and the Deccan.

Fl. September-October; Fr. in the cold season.

The quality of the wood is not known; ropes are made from the fibres of the bark.

Elæocarpus ganitrus, Roxb.; Dalz. & Gibs. Bby. Fl. 27; Brand. For. Fl. 43. *Rudrák*, *rudraksh*.

A large tree; young parts silky-pubescent. Leaves 5-6 by 2 in., approximate towards the ends of the branches, oblong-lanceolate or elliptic, acute at the apex, obtuse, or narrowed at the base, serrulate, glabrescent, slightly silky when young. Petiole ½-¾ in., glabrous. Stipules minute, caducous. Flowers ½ in. diam., white, on slender, short, slightly silky-hairy pedicels; forming numerous, rather dense, drooping racemes. Sepals 5, lanceolate, acute, as long as the petals, slightly pubescent on both sides, with a rib in the middle internally. Petals 5, somewhat puberulous or glabrescent, oblong, deeply laciniate. Stamens 25-40, short, and inserted on the convex torus; anthers naked, or armed with short hairs. Ovary ovoid, silky-villous, 5-lobed, 5-celled, with about 4 ovules in each cell. Style longer than the stamens, 5-grooved; stigma simple, acute. Drupe globose, the size of a large cherry, smooth, purple. Nut spherical, elegantly tubercled, 5-grooved. Seeds generally solitary.

At Mahábaleshvar and the other higher ghâts of the Konkan as well as on those of Madras; Central Provinces, Nepaul, Assam, Malacca and the Malayan Archipelago.

Fl. in the cold season; Fr. in the hot and rainy season.

The hard tubercled nuts of this and several other species are polished, made into beads, and are worn around the neck by fakirs and Brahmins; they are also often set in gold and made into bracelets.

E. oblongus, Gœrtn.; Dalz. & Gibs. Bby. Fl. 27; Grah. Cat. Bby. Pl. 21. *Kassow, kas, azeitonas* (wild olives) *de Malabár* of the Portuguese.

A middling-sized tree. Leaves 3-4 by 1¼-2 in., alternate, elliptic, or elliptic-oblong, acute or acuminate at the apex, somewhat cuneate at the base, serrate, with blunt serratures, glabrous, thick, dark-green, shining. Petiole ¾-1 in., with a small gland on each side near the apex. Flowers white, ¾ in diam., glabrous, faintly fragrant, on slender pedicels, in simple racemes, from the axils of fallen leaves, and shorter than the latter. Sepals 5, lanceolate, brownish-red. Petals 5, deeply laciniate, longer than the sepals. Stamens 30-40; filaments very short. Anther-valves naked or bearded. Ovary sessile, 3-celled, with 2 ovules in each cell. Style longer than the stamens; stigma simple. Drupe 1 in. long, oblong, purple, indehiscent. Nut oblong, 1-celled, 1-seeded, hard, indehiscent, prominently tubercled.

Found in the forests of this Presidency from Mahábaleshvar and the Konkan to Travancore, and in those of Madras, Tenasserim, Borneo and the Moluccas. It is common at Mahábaleshvar, in the valley of the Yenna River, and at Lingmalla.

This handsome tree sometimes grows to a large size. Fl. May-June; Fr. in the rainy season. "When in full bloom this is certainly a most beautiful tree."

The wood is white, close-grained, strong, tough and dense-fibrous; useful for the lathe. The fruit has an agreeable acid taste, and is eaten in some places. The unripe ones are pickled.

E. tuberculatus, Roxb.; Bedd. Fl. Sylv. t. 113.—*Monocera tuberculata*, Dalz. & Gibs. Bby. Fl. 27. This tree is also called *rudrak, udrak*.

Leaves crowded at the ends of the branchlets, 6-12 by 3-4 in., oblong-obovate and ovate-cuneate, or retuse at the base, remotely serrulate, glabrous above, and more or less downy along the nerves beneath. Petiole 1½-2 in., round, villous or glabrescent. Stipules subulate, hairy, deciduous. Flowers 1 in. diam., white, on drooping pedicels, arranged in erect racemes below the leaves, more than twice the length of the petioles. Bracts lanceolate, caducous. Sepals 5, lanceolate, downy on both sides. Petals 5, cuneate, deeply laciniate, sometimes bifid, villous on the outside and glabrous inside. Stamens numerous (70-80); filaments short, very hairy or glabrous; anthers linear, longer than the filaments, terminated by a long awn. Ovary ovate, a little compressed, villous, 2-celled, with several ovules in each cell, in 2 rows. Style somewhat longer than the stamens; stigma simple. Drupe oval, smooth, 1½-2 in. long. Nut woody, ovate or oval, compressed, tubercled on the flattened sides, distinctly furrowed, 1-2-celled, with the margins thickened. Seeds generally solitary, ovate, thin.

Common at Rám Ghát, Malabár, Travancore, Coorg, Pegu, Martaban and Java.

This very large evergreen tree grows to the height of 50-80 ft. Fl. at the commencement of the hot season; Fr. at the end of May and in the rainy season.

Timber Trees.

Wood white, soft, but requires an examination. The nuts are worn by Hindus and fakirs as rosaries like those of *E. ganitrus*.

E. Munroii, Mast; Wight's Illustr. 84.

Leaves towards the ends of branchlets, 3 by 2 in., ovate-lanceolate, acuminate, slightly serrulate, without glands on the under surface, glabrous. Petioles 2 in. Flowers ½ in. diam., pure white, on slender, drooping, about ¾ in. pedicels, in many-flowered racemes, nearly as long as the leaves. Sepals 5, lanceolate, acute. Petals 5, deeply laciniate. Stamens numerous, glabrous. Anthers linear, longer than the filaments, terminated by a long awn. Ovary ovate, villous, 2-celled, on a raised torus, with 4 ovules in each cell. Style longer than the stamens; stigma simple. Drupe oblong, yellowish, shining, size of an olive. Nut 1-celled, coarsely and irregularly tubercled. Seeds solitary, oblong.

In the Southern Konkan in this Presidency, in Coorg, the Nilghiries and perhaps other parts of the Madras Presidency.

This large, truly magnificent tree attains sometimes the height of 60-80 ft., and when covered with flowers is a sight to look at—its white flowers forming a splendid contrast with the deep green foliage. Fl. in the cold season; Fr. February-March.

The quality of the wood is not known. The drupe is eaten by the natives; the unripe ones are pickled.

GERANIACEÆ.

Averrhoa carambola, Linn. *Kamaranga.*

Grows to the height of about 25-35 ft. and a girth of 3-4 ft. Fl. in the hot and rainy seasons; Fr. in the cold season.

Wood dark-brown, and said to be used in the Sunderbands for building purposes and furniture.

A. bilimbi, Linn. *Bilimbi, blimbu, amvalla.* Fl. in the hot season; Fr. in the rainy season.

Both the above plants are extensively cultivated throughout India for the sake of their acid fruits, which are used in curries and candied; their acid juice is employed in removing iron moulds.

RUTACEÆ.

A most important order containing the valuable orange plant and other species of the genus *Citrus*, as well as a few useful timber trees.

Evodia Roxburghiana, Benth.—*Zanthoxylum triphyllum*, Dalz. & Gibs. Bby. Fl. 45; Grah. Cat. Bby. Pl. 36.

An unarmed tree; branches opposite; young parts round and somewhat villous. Leaves opposite, trifoliolate; petiole 2-5 in., leaflets shortly petiolulel, 2-5 by 1-2 in., oblong-elliptic or oblong lanceolate, acute, or acuminate, entire, shining above, pale beneath, and glabrous on both sides. Flowers numerous, small, densely crowded, yellowish-green, inodorous, tetramerous, on very short pedicels, in axillary, puberulous, dichotomously brachiate cymose panicles. Bracts minute. Calyx minute, puberulous, 4-toothed. Petals oblong, spreading, about 4 times as long as the segments of

the calyx. Stamens inserted at the base of the disc; filaments glabrous, subulate; anthers oblong. Ovary roundish, hairy, deeply 4-lobed, 4-celled with 2 ovules in each cell. Style basilar; stigma large 4-lobed. Capsules 1-4, usually 2 when ripe, obovate, smooth, coriaceous, size of a field-bean. Seed smooth, shining, blue-black.

Khandála, Parr Ghát, Mahábaleshvar and throughout the forests of the Eastern and Western Peninsula, from Tenasserim to Malaya and Penang; Ceylon, Sumatra, Java, and the Khasia Hills.

Alt. 4000 ft.

This small evergreen tree attains the height of about 25-30 ft. and 2-3 ft. in girth. Fl. April-May; Fr. in the rainy season.

The wood is said to be strong.

Zanthoxylum Rhetsa, D. C. Prod.; Dalz. & Gibs. Bby. Fl. 45; Grah. Cat. Bby. Pl. 36. *Sessal, chirphal, tijabal, tephal* (at Goa).

A large tree; trunk straight; branches numerous, spreading; prickles straight or incurved, on every part of the tree. Leaves about the ends of branches, 1-1½ ft. long, equally or unequally pinnate. Petiole not winged. Leaflets opposite, from 8 to 20 pairs, 3-5 by 2 in.; oblong-lanceolate, acuminate, unequal-sided, entire, glabrous, short-petioluled. Flowers small, yellow, dicœcious, tetramerous, numerous on terminal and axillary 1½ ft. broad, dichotomously branched cymes; branches opposite, slightly compressed or angled. Bracts minute, caducous. Petals valvate, longer than the sepals. Disc small. Ovary rudimentary in the male flower, glabrous; in the female 1-celled, 1-ovuled. Style thick; stigma tapering. Capsule sessile, solitary, globose, size of a pea, tubercled. Seed 1, round, shining, black.

This tree grows at Khandála, Sávantvádi from the Konkan and Goa to Coromandel. Fl. in the cold season, when it is leafless; Fr. February. Wood yellowish white, but its quality is not known. Every part of this tree possesses a peculiar aromatic pungent smell; the unripe carpels taste of orange peel, and the seeds are hot, and taste like black pepper, and are used as condiment. (*See* Oils.)

Acronychia laurifolia, Blume.—*Cyminosma pedunculata*, Dalz. & Gibs. Bby. Fl. Suppl, 17.—*Clausena simplicifolia*, Dalz. & Gibs. Bby. Fl. 30.

A glabrous tree; young shoots and inflorescence puberulous. Leaves 1-foliolate, opposite 2-6 by 1½-2 in., elliptic, oblong-lanceolate, obtusely acuminate, entire, glabrous, with minute pellucid dots, petiole 1-1½ in. Flowers polygamous ½-⅔ in. diam., yellowish-green, fragrant, on longish, slender pedicels, on axillary, oppositely branched, corymbose cymes. Bracts and bracteoles small. Calyx 4-lobed, very small. Petals 4, ovate, linear-oblong, obtuse, revolute, valvate. Stamens 8; filaments alternately shorter, subulate, as long as the petals, villous below and inserted on a thick, 8-angled disc. Ovary tomentose, 4-celled, with 2 superposed ovules in each cell; style short; stigma capitate, 4-grooved. Drupe obsoletely 4-angled, 3-5-celled, apiculate, size of a large pea. Seeds black.

In this Presidency it grows at Talkat Ghát; and found all over India, Ceylon, Rangoon, Penang, Malacca, Sumatra, Java and Cochin-China. Alt. 3-4000 ft.

Timber Trees.

An evergreen tree; attains the height of 10-20 ft. and a girth of 2-3 ft. Colonel Beddome says: "It appears to be in flower and fruit in all seasons;" but it flowers chiefly in the rainy season.

Wood very light, close-grained; adapted for inlaying purposes and charcoal.

Murraya exotica, Linn.; Dalz. & Gibs. Bby. Fl. Suppl. 12; Brand. For. Fl. 46. *Kunti; marchula juti.*

A glabrous unarmed tree; young parts pubescent. Leaves imparipinnate, 4-5 in. long, glabrous, 3-9 foliolate. Leaflets 1-3 by 1 in., obliquely-ovate or obovate, obtuse, often notched at the end, smooth, shining, deep-green above, shortly-petioluled. Flowers campanulate, pure white, exquisitely fragrant, about ½ in. diam., in terminal and axillary corymbs. Sepals 5, glandular, erect, acute. Petals 5, lanceolate, imbricate. Stamens 10, free, alternately shorter. Filaments subulate, inserted around a fleshy disc. Ovary oblong, 2-celled, with 1 ovule or 2 superposed in each cell. Style thick as long as the stamens; stigma capitate, glandular. Berry red, ½-1 in. long, acuminate, globose or ovoid; 1-2-seeded. Seeds oblong, flat on one side, villous.

This elegant tree is cultivated in gardens on account of its fragrant flowers and handsome foliage: found wild in Southern India, Oude, Behár and throughout the hotter parts of India, Ceylon, Burma, China, Australia and the Pacific Islands.

Alt. 4500 ft.

It attains sometimes the height of 15-25 ft. and a girth of 1½-2 ft. This evergreen tree flowers throughout the year, but in greater profusion in May-September; Fr. October February.

M. Kœnigii, Spreng.; Brand. For. Fl. 48,—*Bergera Kœnigii*, Dalz. & Gibs. Bby. Fl. 29. *Kadhianim, kudhianim, karipak.*

An unarmed tree, pubescent or tomentose, rarely glabrous. Leaves about 1 ft. long, 11-21-foliolate, pubescent or glabrous. Petiole slender, round, pubescent, not winged. Leaflets 1-1½ in., shortly petioluled, alternate, ovate-lanceolate, obtusely acuminate, slightly emarginate, usually oblique at the base, crenulate. Flowers white, fragrant, ½ in. long, ebracteate, in dense terminal corymbiform panicles. Sepals 5, acute, persistent. Petals 5, oblong-lanceolate, acute or obtuse, about 2-4 lin. long, dotted. Stamens 10, alternately longer. Filaments dilated below, and inserted around the elongated disc. Anthers small. Ovary 2-celled, with 1 ovule in each cell or 2 superposed. Style short, thick; stigma capitate. Berry ovoid or subglobose, size of a small pea, 1-2-seeded, bluish-black, rugose. Seeds imbedded in mucilage.

In this Presidency it is common on the ghâts; found wild at Mahábaleshvar, Mátherán and other ghâts of the Konkan, Malabár, Travancore, Madras, Bengal, along the foot of the Himalayas from Garwhal to Sikkim, Pegu, and Ceylon. It is also cultivated.

Alt. 4-5000 ft.

Attains the height of 15-20 ft. and a girth of 1½-2 ft. It is an evergreen tree. Fl. in the cold season; Fr. June onwards.

Wood white, close-grained, hard, heavy and durable; used for agricultural implements, etc. All parts of this plant have a powerful, rather disagreeable, odour. The leaves are used in curries as a condiment, and those with the bark and root are used by hakims as a stomachic tonic. (*See* Oils.)

Clausena Indica, Oliv.; Bedd. Fl. Sylv. An. Gen. 45.—*Piptostylis Indica*, Dalz. & Gibs. Bby. Fl. 29.

An unarmed shrub or small tree, branchlets slender, puberulous. Leaves 7-11 foliolate, 4-10 in. long, glabrous; common petiole slender, round, glabrous or puberulous. Leaflets, 2-4 in., alternate, elliptic or ovate-lanceolate, obtuse, notched, acute or obtusely acuminate, very oblique, crenulate, subcoriaceous, shining, dark and marked with prominent glands on both surfaces when dry. Flowers ⅛ in. diam., pentamerous, glabrous, white, on very short pedicels, in terminal, corymbiform panicles as long as the leaves; peduncle hoary. Petals ovate-oblong, elliptical. Stamens 10, alternate shorter; filaments dilated below and inserted on an elongated disc. Anthers small. Ovary globose or oblong, glabrous, verrucose with pellucid glands, 2 sometimes 3-5-celled. Ovules 2 in each cell, collateral. Style deciduous; stigma 4-lobed. Fruit ½ in. diam., globose, yellow, pulpy, 1-2-celled; cells 1-2-seeded, usually 1-seeded. Seeds oblong.

This small tree is found at Panvar Ghát in this Presidency; Anamallay Hills and Ceylon.

Fl. March; Fr. in the rainy season.

Wood is close-grained, hard, and adapted for the lathe.

Limonia acidissima; Linn.; Dalz. & Gibs. Bby. Fl. 29; Brand. For. Fl. 47. *Naringi, limoens da folha crusada* in Portuguese.

A glabrous tree, armed with straight thorns ½-1 in. long, mostly solitary, axillary; branches rigid, woody. Leaves alternate, imparipinnate, 1-4 in. long; common petiole jointed, winged. Leaflets usually 5-9, 1-2 in., sessile, opposite, oblong or ovate-lanceolate, obtuse, notched or retuse at the apex, cuneate at the base, the terminal one larger, crenate and punctate with pellucid dots; joints of rachis crenulate. Flower ⅛ in. diam., white, fragrant, tetramerous, on slender pedicels, in axillary, 1 in. long, pubescent racemes; frequently bearing 1 or 2 leaves. Sepals small, ovate or triangular. Petals oblong-elliptic, twice the length of the calyx, pellucid, punctate. Stamens 10, free, nearly equal. Filaments subulate, inserted on an annular or columnar disc. Anthers cordate-oblong. Ovary oblong, 4-celled. Ovules 1 in each cell, pendulous. Style short, thick; stigma capitate. Berry globose, ½ in. diam., black, 1-4-seeded, very acid. Seeds imbedded in mucilage.

Very common on the Eastern and Western Ghâts, Padshapore, Falls of Gokák, Monghyr Hills, Behár, Simla, Kumaon and all over India.

Alt. 4000 ft.

Attains the height of 20-25 ft. and a girth of 1-2 ft. Fl. in the hot season; Fr. in the rainy season.

Wood yellow, hard and close-grained. Used for axils of oil-presses, rice-pounders, etc., and adapted for the lathe. The berry is much used as a stomachic tonic in Malabár, where it forms an article of commerce; its mucilage is of a red colour, very acid, and is considered to be an antidote against poisons of animals.

Atalantia monophylla, Correa; Dalz. & Gibs. Bby. Fl. 28; Bedd. Fl. Sylv. An. Gen. 46. *Rhan* or *makar-limbu*, *makar*.

A glabrous tree or large climbing shrub; branches rigid, woody; thorns small, strong, sharp, solitary, axillary. Leaves unifoliolate,

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2-3 by 1-1½ in., alternate, ovate, or ovate-oblong or elliptic, obtuse or 2-lobed at the apex, entire, persistent, coriaceous, bright-green. Petiole very short, often puberulous. Flowers white, ⅓-1 in. diam., fascicled in the axils of leaves, or arranged in short, sessile racemes. Pedicels ½-1 in., slender, usually pubescent, but soon glabrescent, minutely bracteolate. Calyx irregularly cleft to the base, lobes 2-5, entire and somewhat scarious. Petals 4-5, obovate-oblong, obtuse. Stamens 8, sometimes 5-7, united below into a long tube. Anthers cordate-ovate. Ovary glabrous, sessile, on a small disc, 4-, rarely 3-5-celled, usually with 1-2 ovules in each cell. Style deciduous; stigma capitate. Berry globose, size of a nutmeg, yellowish, glabrous, usually 4-celled; cells 1-seeded. Seeds oblong.

Common at Matherán, Mahábaleshvar, and the other ghâts from the Konkan to Coromandel; also in Silhet, foot of the Khasia Hills and in Ceylon.

It is generally a large evergreen shrub, which sometimes grows to be a small tree. Fl. October-November; Fr. February.

Wood pale yellow or white, close-grained, hard and heavy, resembling somewhat boxwood; and when of some size valuable for turning and cabinet purposes. (*See* Oils.)

Feronia elephantum, Correa; Dalz. & Gibs. Bby. Fl. 30; Brand. For Fl. 56. *Kavita, kait, kat-bel, kawit, kawat, elephant* or *wood-apple* tree.

A glabrous tree, armed with strong, straight, axillary thorns. Leaves 2-4 in., alternate, imparipinnate, quite glabrous, shining. Petiole slightly winged or not. Leaflets 5-7, about 1¼ in. long, opposite, lanceolate, cuneate or obovate, obtuse, entire or crenate towards the apex, membranous, almost sessile. Flowers polygamous by abortion, ½ in. diam., dull red, on slender pedicels, in terminal or axillary, lax panicles. Calyx small, 5-toothed, deciduous. Petals 5, sometimes 4-6, spreading, imbricate. Stamens 10-12, inserted around a short disc. Filaments dilated at the base. Anthers linear-oblong. Ovary in the male flower small, abortive; stigma 5-lobed. Ovary in the female flower, oblong, 5-6-celled, or at length 1-celled. Style none; stigma large, 5-lobed, deciduous. Ovules numerous in several series. Berry large, 2½ in. diam.; or larger, globose, woody, hard, grey-coloured, rough, 1-celled, many-seeded. Seeds numerous, imbedded in a fleshy edible pulp.

Common in the Konkan, Deccan, and throughout India; also cultivated for the sake of its edible fruit.

Alt. 1500 ft.

Usually grows to the height of 20-30 ft. and a girth of 2-4 ft., sometimes more. Fl. February-April; Fr. in the beginning of the rainy season—the fruits remaining long on the tree. It sheds its leaves during the hot season.

Wood yellowish-white or light-brown, rather heavy, hard, even-grained, strong, takes a fine polish; used for house-building, oil-crushers and agricultural implements; well suited for ornamental carving. A white, transparent gum, resembling gum arabic, exudes from the trunk; this, mixed with the gum of the *nim*, *mango*, *babal*, *khair*, *siris* and of several other trees, forms part of the East Indian gum arabic of commerce. The pulp of the fruit, which is slightly acid and sweet, is eaten, and makes a pleasant jelly and syrup. The leaves have a slight smell of aniseed, and

are used medicinally by the natives as a stomachic tonic. The unripe fruit is an astringent, and is administered in the form of decoction.

Ægle marmelos, Correa; Dalz. & Gibs. Bby. Fl. 31; Brand. For. Fl. 57. *Bael, bel, billi.*

A glabrous tree, armed with axillary, straight, strong thorns, 1 in. long; branches sometimes drooping. Leaves 3-foliolate, alternate. Leaflets 3 (very rarely 5), oblong or broadly ovate-lanceolate, acute or obtusely acuminate, crenulate, membranous, inconspicuously pellucid-punctate, the lateral ones smaller and almost sessile, the terminal one much larger, 2-2¼ by 1 in., long-petioluled. Flowers 1¼ in. diam., greenish-white, sweet-scented, on long slender, pubescent pedicels, forming axillary puberulous racemes. Calyx pubescent, deciduous. Petals oblong, coriaceous, thickly dotted, patent, imbricate. Stamens numerous (30-40). Filaments distinct, subulate, inserted round a small disc. Anthers linear-oblong. Ovary ovoid, 8-20-celled; cells near the circumference, with numerous, 2-seriate ovules. Style short; stigma capitate or oblong, deciduous. Fruit woody, globose, oblong or sometimes pyriform, 2-5 in. diam., smooth, grey or yellow. Seeds numerous, oblong, wooly, imbedded in a thick, sweet, aromatic, orange-coloured pulp.

Wild in Gujarát and the Deccan, and cultivated in Bombay, Elephanta and the Konkan; grows also in Madras, Bengal, Central India, Oude, Behár, Western Himalayas, Burma and all throughout the dry hilly parts of India.

Alt. 4000 ft.

This useful tree attains 30-40 ft. in height and 3-4 ft. or more in girth. Fl. towards the end of the hot season; Fr. in the rainy season. Sheds its leaves about March and April; the new foliage appears towards the end of the hot season.

Wood yellowish-white, mottled, close-grained, and takes a beautiful polish; said to emit a strong aromatic scent when fresh cut, but is eaten by insects. Used in the construction of carts, agricultural implements, pestles of oil and sugar mills, etc. The pulp of the fruit, which is officinal in the Indian Pharmacopœia, is valuable in diarrhœa and dysentery. It is often added to mortar to render the latter more tenacious. Snuff-boxes are said to be made of the rind. Twigs and leaves are used as cattle fodder. From the flower a sweet-scented water is distilled.

SIMARUBEÆ.

Ailanthus excelsa, Roxb.; Dalz. & Gibs. Bby. Fl. 46; Brand. For. Fl. 58. *Maharuk.*

Leaves abruptly pinnate, 1-2 ft. long; young ones more or less villous, old glabrous. Leaflets nearly opposite, 8-14 pair, 2-4 by 1½-2 in., ovate, often broad falcate-lanceolate, acuminate at the apex, very unequal at the base, long-petioled, coarsely and deeply toothed, often lobed. Flowers yellowish, polygamous, small, about 3 lin. diam., on slender longish pedicels, arranged in axillary, large, often very much-branched panicles. Petals glabrous within, ovate-lanceolate, usually reflexed. Stamens in male flowers 10 (in the hermaphrodite 2-3). Ovary rudimentary or none. Stamens in female flower abortive. Ovary 2-5-partite with 1 ovule in each cell. Samara 2 by ½ in., lanceolate, blunt or pointed at both ends, copper-red, always once or twice twisted at the base, and marked with numerous prominent veins.

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Common in this Presidency at Broach, Baroda, the Deccan, Madras, Central Provinces and Behár.

It is a handsome large tree, 60-80 ft. high. Fl. February-April; Fr. at the end of the hot season. Sheds its leaves during the cold season, and is covered with new leaves March-April.

Wood white, soft and spongy, not durable; it is only used in making sword handles, spear sheaths, and floats for fishing nets, etc. The bark is used as a febrifuge and tonic.

A. Malabarica, D. C. Prod.; Dalz. & Gibs. Bby. Fl. 46; Brand. For. Fl. 58. *Wild, muddhedup, matti-pal.*

Bark thick, rough, often studded with bright, reddish grains of resin. Leaves 15-20 in. long, unequally pinnate, quite glabrous. Leaflets 6-10, 3-7 by 1½ in., subopposite or opposite, distant, long acuminate, the base and two sides very unequal; margin often thickened and undulated, almost entire, coriaceous, shining above, pale beneath. Petioles long; petiolules 3-4 lin. Flowers small, white, on small, pubescent pedicels, forming large terminal panicles; nearly as long as the leaves. Calyx slightly pubescent and ciliate. Petals nearly 3 lin. long, slightly imbricate at the edges. Disc 10-lobed, with a minute, rudimentary, 3-lobed ovary in the male flower. Stamens much longer than corolla. Female flower with 10 sterile stamens, alternately shorter. Samara 2½ by ¾ in., oblong, reddish, obtuse at both ends, veined, not twisted.

Common in the forests of the Western Ghâts down to Cape Comorin; Indapore near Mahár, Khandála, and in the States belonging to Pant Sachu, Kánara, Ceylon and Cochin-China.

A lofty tree 60-80 ft. high. Fl. February-March; Fr. towards the end of the hot season. Sheds its leaves in the hot season.

Wood white, soft, light and useless. The trunk yields a reddish, aromatic, resinous substance known as *matti-pal*; this is esteemed as a very efficacious remedy in dysentery, generally administered in the form of powder and mixed with milk. Dr. Gibson thinks that it is a good stimulant in chronic bronchitic affections; this substance is also used as an incense. The bark, which has a pleasant and a slightly bitter taste, is used by natives in cases of fever.

The late Mr. Náráyan Dájee read a paper on the virtues of the bark of this tree at one of the meetings of the Grant College Medical Society.

Samadera Indica, Gærtn.; Grah. Cat. Bby. Fl. 37; Bedd. Fl. Sylv. An. Gen. 49.

Leaves 6-10 by 3 in., oblong or elliptic-lanceolate, acute or obtuse at the apex, narrow at the base, coriaceous, fleshy, glabrous, shining, quite entire, generally furnished with 2 hollow glands at the base near the insertion of the petiole, and often with similar ones spread over the blade. Petiole thick ½-¾ in. Flowers yellowish-white or purplish, numerous, in dense umbels. Peduncle very long; pedicels small. Calyx segments 4-5 small, persistent in fruit. Petals linear-oblong. Stamens twice as many as the petals. Filaments with a scale at the base. Ovary generally 4-celled. Drupe 1½ by 1 in., with a very thick pericarp.

Not uncommon in the forests of Southern Konkan, Goa, Malabár Coast, Ceylon and Tenasserim.

This tree attains the height of 30-35 ft. Fl. in the cold season; Fr. March-April. It appears to be evergreen.

Wood light-yellow, soft and close-grained. The wood, fruit and seeds are very bitter, and used by the natives as a febrifuge and tonic.

Balanites Roxburghii, Planch.; Brand. For. Fl. 59.—*B. Egyptiaca*, Grah. Cat. Bby. Pl. 23. *Hingota, hingol.*

All young parts greyish pubescent, armed with very strong, sharp, ascending, solitary spines, frequently bearing leaves and flowers. Leaves bifoliolate, in short petiole. Leaflets 1-1½ in., elliptic or obovate, entire, puberulous, shortly petioluled, coriaceous. Flowers greenish-white, fragrant, in axillary, 4-10-flowered cymes. Sepals and petals 5, ovate, tomentose within, imbricate. Stamens 10, inserted at the base of a thick, conical disc. Ovary entire. Drupe woody, ovoid, about 2 in. long, 5-grooved, with a smooth, light-grey rind. Nut hard, 1-seeded, imbedded in an offensive smelling, greasy pulp.

Common in Gujarát, Panch Mahál, Kaira, Cutch, Khándesh, the Deccan, Behár, Central Provinces, Sikkim and other dry parts of India; also in Burma.

In favourable circumstances this tree grows to the height of 30 ft. with an erect short trunk, 2 ft. or more in girth. Fl. in the hot season; Fr. in the rainy season. Leafless in the cold season; covered with new leaves in March.

Wood yellowish-white and moderately hard, chiefly used for fuel; but walking-sticks and shoe-maker's boards are also made of it. From the seeds a fixed oil, called *zachun*, is extracted; and the pulp is used to clean silk in Rájputána. The hard nut is employed in native fireworks; the kernel being scooped out through a small hole, and filled with gunpowder, explodes with a loud report. The bitter bark, subacid leaves and seeds are much used by hakims.

OCHNACEÆ.

Ochna squarrosa, Lin.; Dalz. & Gibs. Bby. Fl. Suppl. 17; Grah. Cat. Bby. Pl. 37; Brand. For. Fl. 60. *Kanuk-champa.*

A glabrous shrub or small tree. Leaves 6-7 by 2 in., oblong-ovate or obovate or elliptic-oblong, obtuse or pointed at both ends, slightly serrated, shining. Petiole short. Flowers yellow, 1¼-1½ in. diam., numerous, on short axillary racemes or from the branches below the leaves. Sepals 5, persistent, oval-obtuse. Petals 5-12, clawed, deciduous. Disc large, lobed. Stamens numerous; filaments short, filiform; anthers very long, linear. Ovary deeply lobed, many-celled, with 1 ovule in each cell. Fruit of several carpels placed round the base of the style.

This handsome tree gows wild in the Konkan, Bengal and Burma; it is also cultivated on account of its flowers.

Fl. February-April; Fr. May-June. Leafless in the cold season; the new leaves appear February-March.

Wood reddish-brown, hard and close-grained.

Gomphia angustifolia, Vahl.; Grah. Cat. Bby. Pl. 38; Bedd. Fl. Sylv. An. Gen. 51. *Valermani.*

Glabrous tree. Leaves about 5 by 1½ in., ovate-oblong, or elliptic-oblong, acute or acuminate at both ends, slightly serrated, coriaceous,

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glabrous, shining and dark-green above, and of a lighter colour below, sessile; midrib prominent. Flowers yellow, inodorous, ½ in. diam., on slender pedicels, arranged in terminal racemose panicles. Sepals 5, broad-ovate, coriaceous, shorter than petals. Petals 5, deciduous. Anthers 10, long, erect nearly sessile. Carpels 5, obovate, or reniform, with one ovule in each. Styles connate, longer than the stamens. Stigma quite entire. Drupes size of a pea, red and shining, reticulated, surrounded by the red calyx.

Found in Southern Konkan and in the forests of the Madras Presidency, Ceylon, Singapore and the Philippines.

This evergreen tree in favourable places grows to the height of 30 ft.; it is almost throughout the greater part of the year in flower and fruit.

Wood is white, close-grained and hard, useful for building purposes. The root and leaves are bitter, and are used in Malabár in the form of decoction, mixed with milk as a tonic and stomachic. It is also used as an anti-emetic.

BURSERACEÆ.

Boswellia thurifera, Colebr. —*B. glabra*, Grah. Cat. Bby. Fl. 42; Brand. For. Fl. 61. *Salai, salga, dup-salai.*

Leaves alternate, 8-15 in., imparipinnate, near the ends of branches. Leaflets 17-31, 2-2¼ in. by 6-7 lin., opposite or nearly opposite, lanceolate oblong, or ovate-lanceolate, rounded or obtuse at the apex, oblique at the base, coarsely serrate, sometimes entire, sessile or subsessile, sparingly pubescent, specially when young. Flowers white, about ¼ in. diam., in axillary or terminal racemes, shorter than leaves. Calyx segments 5-7. Petals broad-ovate, narrowed at the base into a claw. Disc red crenate. Stamens about 10, inserted at the base of the disc. Anthers hairy. Ovary 3-celled; stigma 3-lobed. Drupe ½ in. long, trigonous, separating septicidally into 3 valves.

Abundant in Sátpura forests, common in the Deccan, Belgaum (chiefly on the hill of Shendur), the Konkan and southward to the Circars; also in Rájputána, Behár and the forests at the base of the Himalayas.

This tree is about 30 ft. high with a girth of about 5-6 ft. Fl. March-April; sheds its leaves February-April, covered with new foliage in the rainy season.

Wood is of a brown colour, soft, coarse-grained, and not durable; its charcoal is used for iron-smelting in Nhemar. The trunk yields an abundance of transparent gum-resin, which is very fragrant, and when burnt, diffuses an agreeable odour. It is sold in the bázár under the name of *luban, salai, kundur*, and is often used as an incense in Roman Catholic churches. It is employed by the natives externally in the cure of indolent ulcers, and internally as a diaphoretic.

B. glabra, *salphuli* or *salai.*

This is supposed to be a variety of the former, and chiefly differs from it in the leaflets being larger, nearly or quite glabrous and minutely crenate.

Garuga pinnata, Roxb.; Dalz. & Gibs. Bby. Fl. 313; Brand. For. Fl. 62. *Kurak* or *kuruk, kangkur, ghotar, kalkar.*

Trunk strong, erect; young parts pubescent. Leaves about 1 ft. long or more, alternate, imparipinnate, near ends of branches. Leaf-

lets 13-19, 2-4 by 1-1¼ in., nearly opposite, lanceolate or ovate-lanceolate, acuminate at the apex, unequal at the base, subsessile, crenate, glabrous or tomentose. Flowers yellowish-white, in large compound pubescent panicles; bracts deciduous. Calyx teeth 5, ovate, pubescent. Petals 5, linear, inserted at the throat of the calyx, between its teeth. Stamens 10. Filaments, ovary and style hairy; anthers versatile. Drupe fleshy, smooth, size of a gooseberry, containing 1-5, 1-seeded nuts.

Common in the ghâts and hilly parts of the Konkan and the Deccan and in every part of India; also in Burma, Malayan Archipelago and the Philippines.

Alt. 3500 ft.

Under favourable circumstances this tree attains the height of 50-60 ft. and a girth of 5-6 ft. Fl. early in the hot season; Fr. about the end of the hot season and beginning of the rainy season. It sheds its leaves in the cold season, covered with new foliage early in the hot season.

Wood is whitish with a reddish centre, soft, readily attacked by insects; used only for in-door work and for fuel. The fruit is eaten, both raw and pickled. The bark is employed by tanners.

Balsamodendron mukul, Hook.; Brand. For. Fl. 64.—*B. Roxburghii*, Dalz. & Gibs. Bby. Fl. Suppl. 19. *Gugal.*

Branches frequently ending in a spine. Leaves alternate, generally crowded towards the ends of short branchlets, 1-3-foliolate. Leaflets obovate, toothed towards the apex, almost sessile and shining, the terminal, the largest. Flowers small, unisexual, of a reddish colour, 2 or 3 in a fascicle; the male with a short abortive ovary, and the female with sterile imperfect anthers. Calyx tubular, 4 (5) cleft, glandular-hairy. Petals 4-5, strap-shaped, longer than the calyx. Stamens 8-10, inserted on the 8-10-toothed disc. Stigma 2-lobed. Drupe red when ripe, ovoid, apiculate, smooth, containing 2, 2-celled stones.

Found in Khándesh, Deesa, Káthiáwár, Sind, Rájputána, Bellary and Berár.

This small tree attains the height of 4-6 ft. or more. Fl. March-April; sheds its leaves in the cold season, and is covered with them in May.

Wood whitish, even-grained, soft and light; takes a fine polish. This tree exudes a fragrant gum-resin, which is sold in the bázárs under the name of *gugula* or *gugal*, which is believed to be the *bdellium* of old writers; it occurs in brittle tears of various sizes and of a red yellow or brownish colour, with a bitterish balsamic taste, and which probably furnishes part of the myrrh which is sold in Bombay. The *gugal* is said to be collected in the cold season by making incisions in the tree, and letting the resin fall on the ground. This accounts for the dirty condition in which it is imported into this city. The authors of the Bombay Flora, describing a plant from Khándesh under the name of *B. Roxburghii* believed to be *B. mukul*, write:—"The whole plant is aromatic, abounding in a viscid balsamic juice, which is exported in considerable quantities from Oomrawatty."

B. Berryi, Arnott.; Brand. For. Fl. 65.—*Protium Gileadense*, Grah. Cat. Bby. Pl. 43. *Hab-i-balessam, roghan-i-balessam, nod-i-balessam.*

A small-sized tree; lateral branches spinescent. Leaves alternate, trifoliolate, 1-1½ in., on short slender petioles arising from

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very short branchlets. Leaflets obovate-obtuse, obscurely crenulate, glabrous, sessile, the terminal one twice as large as the lateral ones. Flowers subsessile, solitary or fascicled ; peduncle shorter than the petioles. Calyx tubular, 3-4 cleft. Petals 3-4, reflexed, with inflexed tips. Disk small, 6-8 lobed, bearing 6-8 stamens. Stamens alternately shorter. Stigma 4-lobed. Ovary large. Drupe ovoid, pointed.

Native of the dry forests of the Nilghiries and Sivagheri Hills ; cultivated as a hedge plant all over India.

A small tree with a girth of 2-3 ft. Covered with flowers and fruit February-March.

The whole tree has a grateful fragrance, and a gum-resin exudes from its trunk.

B. pubescens, Stocks.; Brand. For. Fl. 65. *Bayi.*

A small tree or shrub with pubescent unarmed branches. Leaves 3-5-foliolate, on slender petioles, downy when young. Leaflets ovate, obovate or orbicular, entire pubescent. Flowers sessile, reddish or white. Stamens all equal. Drupe red, ovoid, with 2 stones.

Native of the rocky parts of Sind and Beluchistan.

Fl. March-April ; covered with leaves April-May.

This tree also yields a tasteless, inodorous gum.

Canarium strictum, Roxb. ; Dalz. & Gibs. Bby. Fl. 52 ; Bedd Fl. Sylv. t. 128. *Gugal-dhup, black-dammar tree.*

A tall straight tree ; young branches, petioles and panicles clothed with dense rusty-tomentum. Leaves 1-4 ft., equally or unequally pinnate. Leaflets 7-15 ; 3-12 by 2-5 in., opposite or subopposite, ovate-oblong, or ovate-lanceolate, acuminate, petioled, more or less crenulate, glabrescent and shining above, more or less tomentose beneath. Flowers white, numerous, in axillary panicles. Calyx campanulate, tomentose, 3-4-fid, valvate, persistent. Petals 3-4, much imbricate, thinly hairy at the apex. Male flowers : disc none. Filaments united below into a tube. Anthers oblong, dorsifixed, dehiscing longitudinally. Ovary small, 6-lobed, densely hairy-tomentose at the apex. Female flowers : ovary glabrous as long as the stout style. Drupe oval 1½-2 in., tapering at both ends, with a hard, bony, 3-celled nut.

This plant is found growing in the Konkan, Mira Hills, Pant Sachu's States, and in various parts of the Madras Presidency. Alt. 4500 ft.

The quality of its wood is not known. This tree is the source of a resinous substance, having a dark appearance and known as black dammar. This dammar is translucent, of a deep reddish-brown colour when held between the eye and the light. It is insoluble in cold, and partially so in boiling alcohol with the addition of camphor ; completely soluble in oil of turpentine, and in this state it is used for many purposes, as in the manufacture of bottling wax, varnishes, etc. It is recommended by Dr. Bidie as a substitute for Burgundy pitch.

Melia Azadirachta, Linn. Syn. Ed.

MELIACEÆ.

Azadirachta Indica, Adr. Juss. ; Dalz. & Gibs. Bby. Fl. 36.—**Melia Indica**, Brand. For. Fl. 67. *Nim, limbro, nimbay, margosa tree.*

Leaves imparipinnate, approximated near the ends of the branches 8-15 in. long. Leaflets 9-15, 1-3 by ½-1½ in., opposite, sub-opposite or alternate, ovate-lanceolate, unequal-sided, oblique or subfalcate, acuminate, serrate, glabrous, very shortly petioluled. Flowers small, white, honey-scented, on short puberulous pedicels arranged in large, solitary, axillary panicles shorter than the leaves. Calyx lobes 5, minute, rounded. Petals 5, shortly ciliate. Staminal tube as long as the petals. Anthers 10 opposite the teeth of staminal tube. Ovary 3-celled. Drupe oblong, size of an olive, yellowish-green. Stone almost always 1-celled; 1-seeded.

A common tree growing throughout the greater part of India and some parts of Burma; often planted near villages.

Alt. 5000 ft.

It is a large tree attaining the height of 40-50 ft., sometimes to 80 ft. with a girth of 6-9 ft. Fl. March-May; Fr. in the rainy season. Sheds its leaves in the hot season; new leaves appear March-April.

Wood yellowish-white or brownish-red, compact, resembling mahogany, durable, and not attacked by insects on account of its being bitter; takes a fine polish. Used for the construction of carts, agricultural implements, furniture, in house and ship-building, and for making idols. From incisions made in the trunk of young trees, issues a toddy-like fluid, which is used as a stomachic and a cooling drink. The bark is prescribed in the form of decoction in the cure of intermittent fevers; the leaves are applied in the form of a poultice to indolent ulcers. An acrid bitter oil (called *Margosa oil*) is extracted from the pulp of the drupe. The seeds are employed for killing insects and washing the hair. (*See* Oils.)

M. azedarach, Linn.; Brand. For. Fl. 68.—*M. sempervirens*, Dalz. & Gibs. Bby. Fl. Suppl. 15. *Hab-ul-ban* (Arab name used in Bombay), *maha-limbo, Persian lilac, common bead tree, drêk, bâkayan.*

Young parts and inflorescence minutely puberulous. Leaves 9-18 in. long, bipinnate, occasionally tripinnate, with or without an odd one, opposite, sub-opposite or alternate. Leaflets 1½-3 by ½-1½ in.; ovate or lanceolate, unequal, acuminate at the apex and more or less oblique at the base, serrate or entire at the upper end, very shortly petioluled. Flowers usually 5-merous, pale lilac, ½-¾ in. long, honey-scented, on short, slender pedicels, in solitary, more or less puberulous axillary panicles, shorter than the leaves. Calyx deeply cleft, lobes oblong-lanceolate. Petals puberulous. Staminal tube purple, glabrous outside, many-toothed at the tip. Ovary 5-celled. Stigma 5-furrowed. Drupe sub-globose ½-¾ in. diam., yellow when ripe, with 5 or fewer cells and seeds.

This beautiful tree is commonly cultivated near villages throughout India, but said to grow wild in the Sub-Himalayan tract, some parts of Burma and the Indian Archipelago.

Alt. 2000 to 3000 ft. up to even 5800 ft.

It attains the height of 40-50 ft. with a girth of 6-7 ft. Fl. February-March, sometimes throughout the year; Fr. March-April. Sheds its leaves February-April; new leaves at the end of the hot season.

Wood yellowish-white or reddish, loose-grained, soft, light, takes a fine polish; that of old trees is handsomely striate; used for furniture and many other purposes. The seeds are used as beads for rosaries. The bark, leaves and pulp of the fruit, which are bitter, are administered in

Timber Trees.

the form of decoction as an anthelmintic. In large doses they are reported to produce narcotic effects. A fixed oil is said to be extracted from the fruit. (*See* Oils.)

M. dubia, Cav.—*M. composita*, Dalz. & Gibs. Bby. Fl. 36; Brand. For. Fl. 69. *Eisur, limbarra, nimbarra.*

Young shoots, petioles and panicles mealy with stellate hairs. Leaves 9-24 in. long, bi-tripinnate; pinnæ 3-7 foliolate. Leaflets 1-3 by ¼-1½ in., ovate or oblong-lanceolate, acuminate at the apex and somewhat oblique at the base, entire or crenulate, glabrous. Flowers white, odorous, ¼-⅓ in. diam., arranged in panicles. Calyx divisions 5, ovate-oblong. Petals 5, linear-lanceolate. Staminal tube about ¼ in., white, villous. Ovary 5-celled. Drupe ovoid, size of a plum, with 5 or fewer cells and seeds by abortion.

A handsome tree planted and found wild in various parts of the Indian Peninsula, Ceylon, Burma, Indian Archipelago, Australia and Angola. In this Presidency it is found at Parr Ghát, Talwaddi and other hilly parts of the Konkan.

It attains the height of 40-60 ft. and a girth of 4-8 ft. Fl. February-April; Fr. in the cold season.

Wood light, cedar-like, not easily attacked by white ants, but not so strong and durable as that of *M. azadirachta*; used in Ceylon for ceilings and out-riggers of boats. The drupe sold in the bázárs as *kadu khajura* are bitter, and administered in colic and bowel complaints. The seeds are said to taste like almonds.

Dysoxylum binectariferum, Hook.—*Guarea binectarifera*, Grah. Cat. Bby. Fl. 31.—*Epicharis exarillata*, Dalz. & Gibs. Bby. Fl. 37. *Yerindi.*

Leaves 9-18 in. long; petioles flat. Leaflets 5-9, 2½-7 by 1-3 in., alternate, ovate-lanceolate to elliptic-lanceolate, acuminate, unequal at the base, entire, glabrous; petiolules ⅛-¾ in. long. Flowers 4-merous, pale-green or greenish-yellow, ¾ in. diam., shortly pedicelled, in minutely puberulous panicles. Calyx thick, coriaceous, hemispherical, obsoletely 4-toothed. Petals coriaceous. Staminal tube about 2 lin. long, hairy on both sides. Ovary and style hairy. Capsule 2½ in. diam., brownish-yellow, pear-shaped, size of an apple, 4-celled, 4-seeded, each cell containing a solitary, dark-purple, obovate-oblong, chestnut-sized seed.

Found at Lonávli, Khandála, Vengúrla, Goa and other parts of the Konkan; also on the ghâts of the Madras Presidency, Ceylon, Khasia Mountains, Assam and Chittagong.

Alt. 2000 ft.

This evergreen tree attains the height of 30-50 ft., sometimes to 60 ft. Fl. in the rainy season; Fr. in the cold season.

Wood reddish, soft, coarse-grained. Use not known. Monkeys are said to be very fond of the fruit.

Sandoricum Indicum, Cav.; Grah. Cat. Bby. Fl. 31; Hook. Fl. Brit. Ind. i. 553.

This beautiful evergreen tree with ternate leaves, and with fruit of the size of an apple, was introduced into Bombay many years ago, but, I believe, it has disappeared. It is closely allied to the preceding.

Aglaia Roxburghiana, W. & A. Prod.; Bedd. Fl. Sylv. t. 130; An. Gen. 55.

A large tree; all young parts more or less covered with ferruginous tomentum. Leaves pinnate, 3-8 in. long or more; petiole 3 in. long. Leaflets 5, rarely 7 or 3, 2-5 by 1-1½ in., opposite or alternate, obovate-lanceolate or elliptic-oblong, acute, obtuse at the tip, acuminate or slightly cuneate at the base, entire, glabrescent, pale beneath, on small petiolules. Flowers yellow, shortly pedicellate, in rather supra-axillary panicles longer than the leaves. Calyx 5-cleft. Petals 5, imbricate, elliptic-oblong. Fruit globose or pyriform, ¾ in. diam., buff-coloured. 1-seeded.

Found throughout the Southern Konkan and the Madras Presidency, Ceylon, Burma, Singapore, Malacca and the Malaya Islands.

Alt. 6000 ft.

Fl. March-April, sometimes at other seasons; Fr. in the rainy season.

Wood is strong and useful for building purposes.

A. odorata, Lour.; Dalz. & Gibs. Bby. Fl. Suppl. 13.

This shrub or small tree with yellow fragrant flowers arranged in axillary racemes is found in gardens in Bombay.

Amoora rohituka, W. & A. Prod.; Brand. For. Fl. 69.—*Andersonia macrophylla*, Grah. Cat. Bby. Pl. 31. *Rohituka, harim khana.*

Young parts tawny, closely tomentose. Leaves 1-3 ft., coriaceous, glabrous. Leaflets 9-15, 3-9 by 1½-4 in., opposite, oblong or ovate-lanceolate, acuminate at the apex, somewhat unequal at the base, entire, shortly-petioluled. Flowers white or greenish-white, bracteate, sub-sessile, about 4 lin. diam.; male spikes panicled; female simple. Calyx 5-partite. Petals 3, oval. Staminal tube entire, globular. Ovary 3-celled, with 2 superposed ovules in each cell. Capsule smooth, globose, pale-yellow or reddish, 1-1½ in. diam. Seeds oblong, enclosed in a fleshy arillus.

Found at Khandála and all along the Western Ghâts, Travancore, and all over India, Ceylon, Tenasserim, Indian Archipelago and the Philippine Islands.

Alt. 3000 ft.

It is a large evergreen tree growing to the height of 50-60 ft., with a straight trunk more than 4 ft. in girth. Fl. in the rainy season; Fr. in the cold season up to March.

Wood is pale or reddish-brown in colour, streaked, close grained, hard, rather heavy, takes a fine polish; valuable for house-building and canoes. In Bengal an oil is extracted from the seeds.

A. cucullata, Roxb.; Dalz. & Gibs. Bby. Fl. 37; Bedd. Fl. Sylv. An. Gen. 55.

Glabrous. Leaves 6-18 in. long, unequally pinnate, alternate. Leaflets 3-13, 3-7 by 1½-2½ in., opposite or sub-opposite, obliquely ovate-oblong, obtuse at both ends, unequally divided by the midrib, entire, glabrous, the terminal leaflet often hooded at the apex. Male and female flowers on separate trees; male flowers: ¼ in. diam., yellow, 3-merous, in drooping panicles, about as long as the leaves. Bracts caducous, two at the base of the calyx. Stamens 6-8, sessile. Rudiment of the ovary small. Female in few-flowered racemes. Stamens 6-8. Ovary minutely lepidote, 3-celled, with 2 superposed ovules in each cell. Stigma large. Capsule sub-globose, 2½ in. diam., 3-lobed, 3-celled, 3-valved. Seeds 3-4 covered with a bright orange-coloured aril.

Timber Trees.

Found sparingly on Parvar Ghát of this Presidency; also in Lower Bengal, in the Sunderbands, Nepaul, Pegu and Tenasserim.

This evergreen tree is of considerable size, and flowers in September.

Wood reddish-brown, strong, close-grained and hard; adapted for house-building, posts, and as firewood.

A. Lawii, Benth. & Hook. Gen. Pl.—*Epicharis exarillata*, Grah. Cat. Bby. Pl. 31.—*Nemedra Nimmonii*, Dalz. & Gibs. Bby. Fl. 37. *Burumb.*

A middling-sized tree; all the young parts and inflorescence covered with yellowish-brown scales. Leaves unequally pinnate, 6-9 in. Leaflets 3-5 by 1½-2 in., alternate or opposite, lanceolate or elliptic-lanceolate, acuminate, narrow at the base, glabrous; petioles ¼-½ in. Flowers very small, white, forming much-branched axillary panicles. Calyx 4-toothed, scaly. Petals 4. Anthers 8, rarely 7; staminal tube orbicular, sub-entire or crenated. Ovary lepidote, 3-celled, with 1 ovule in each cell. Fruit 1 in. long, pyriform, 3-valved, abounding in white resinous juice.

Found in this Presidency at Khandála, hills near Nágotna, Parr Ghát, forests near Rohe, etc.; also in the Madras forests.

Fl. December-January.

The quality of the wood is not known.

Walsura piscidia, Roxb.; Dalz. & Gibs. Bby. Fl. 37; Bedd. Fl. Slyv. An. Gen. 56. *Walsúra, wallursi.*

Leaves 2-7 in. long, alternate. Leaflets 1-4 by ⅜-1⅜ in., elliptic, obtuse, often emarginate, glabrous, shining green above, pale beneath, on short petiolules. Flowers numerous, small, yellowish-white, in small terminal panicles. Bracts minute, caducous. Calyx 5-cleft. Petals 5, imbricate. Staminal tube 10-divided; divisions all bifid. Ovary 2-, rarely 3-celled. Berry oblong, shortly tomentose, size of an olive, dark-brown, 1-celled, 1-seeded, indehiscent.

Common at Rám Ghát, Malabár, Travancore, and also in various parts of the Madras Presidency and Ceylon.

A small tree. Fl. in the cold season.

Wood is said to be good. Used by the natives for various purposes, and the bark to intoxicate fish; and the fish thus caught is not unwholesome. This tree is often found stripped of its bark in Southern India.

Heynea trijuga, Roxb.; Dalz. & Gibs. Bby. Fl. 38; Brand. For. Fl. 70. *Limbúrah.*

Leaves 4-15 in. Leaflets 5-11, 2-6½ by ¾-3 in., opposite, ovate-oblong, acuminate, glabrous above, and whitish, glabrescent or pubescent beneath, on short petiolules, the terminal ones longer. Flowers white, small, numerous, in panicles nearly equalling the leaves. Bracts small, caducous. Calyx 5-cleft, pubescent or subglabrous. Petals 5, linear-oblong, glabrous, puberulent. Staminal tube covered with pubescence both internally and externally. Anthers 10, on very short filaments, between two subulate teeth, nearly as long as the anthers. Ovary 2-celled. Capsule ½-⅔ in. long, reddish, round, opening into 2 broad valves. Seed solitary, round, covered with a thin white aril.

Common in Khandála, Parr Ghát and the other ghâts of this Presidency; also in the forests of the Konkan southwards, Madras, Bengal, Oude, the Himalayas, Nepaul, Pegu and Penang.

This is a very ornamental tree attaining sometimes a great height, generally 30 ft. high, with an erect trunk 5 ft. in girth. Fl. February-April; Fr. in the rainy season up to cold season. Sheds its leaves in March.

The quality of the wood is not known. Bark and leaves are bitter.

Swietenia mahogani, Linn.; Brand. For. Fl. 70. *Mahogany.*

A large, evergreen tree, with abruptly pinnate leaves.

It is a native of Central America and West Indies, and has been introduced at Dapuri, Hewra, Calcutta, Sikkim to Saháranpur. Mr. Woodrow, Superintendent, Botanical Gardens, Ganesh Khind, in a letter addressed to me says: "I have measured many mahogany trees; I find the average of eight years' growth is 20 ft. high and 15 inches circumference at 3 feet from the ground. Much larger trees, forty years old, are at Hewra." The excellent quality of its wood is well known.

Soymida febrifuga, Adr. Juss.; Dalz. & Gibs. Bby. Fl. 38; Brand. For. Fl. 71. *Rohin.*

Leaves abruptly pinnate, 9-18 in. long. Leaflets 6-12, 1½-5 by ½-2¾ in., opposite, elliptic or oblong, obtuse at the apex, oblique at the base, on very short petiolules. Flowers greenish-white on short pedicels forming large panicles often equalling the leaves. Calyx deeply 5-cleft. Petals 5, obovate, contorted in bud. Bracts ovate-deltoid, small. Capsule oblong, obovoid, smooth, black when ripe, size of an apple.

Not uncommon in Gujarát, Ajunta, Khándesh and Jawhár forest; also in Madras, Central India, Ceylon and forests of Pegu.

A tree of considerable size 70-80 ft. in height with a trunk 7-8 ft. in girth. Fl. April-May; Fr. in the rainy season. It is almost an evergreen tree; the new leaves appear in the hot season while part of the old ones are still on the tree.

Wood dull-red, close-grained, strong, hard, and durable underground; not being easily attacked by white ants. Much prized for building purposes; ploughshares, pestles and pounders for oil-seeds are made of it. It is well adapted for ornamental furniture and sleepers. The bark is bitter, and used as tonic and febrifuge in cases of intermittent fevers, as well as in diarrhœa and dysentery (*see* Medicines). It is said that this tree is held sacred in some parts of Southern India.

Chickrassia tabularis, Adr. Juss.; Grah. Cat. Bby. Pl. 32.—*C. Nimmonii,* Dalz. & Gibs. Bby. Fl. 38. *Pábba, dalmara, chickrassi* in Beng.

Leaves 12-18 in. long, alternate. Leaflets 10-16, 2-5 by 1¼-2¾ in., sub-opposite or alternate, obliquely ovate, unequal-sided, acuminate-cuspidate, nearly glabrous or more or less tomentose. Flowers numerous, about ½-¾ in. long, of a dirty-white or yellowish-white colour (sometimes red) on terminal axillary panicles which are shorter than the leaves. Calyx 5 dentate. Petals 5, ½ in. long, sparsely pilose. Staminal tube glabrous, and shortly 10 denticulate. Ovary 3-5-celled, hirsute. Capsule nearly 2 in. long, ovoid.

Timber Trees.

Found sparingly on Tungár Hill and Rohe forests in the Konkan; also in the Madras forests, Bengal, Ceylon, Burma and Malacca.

A large tree 60-80 ft. in height and a girth of 8-10 ft. Fl. January-February; Fr. in the hot season.

Wood, known as *Chittagong wood*, is of a light reddish-brown or yellowish-brown colour, close-grained, hard, rather elegantly veined, shining, polishes well; much used for furniture of various kinds and for carving. It has a cedar-like smell, and is called bastard-cedar by Europeans. The flowers yield a yellow dye.

C. velutina, Rœm.

This tree, found in dry situations of the Konkan, appears to be a distinct species; but is united with the last by Mr. Hiern in Hook. Fl. Brit. India. The timber is said to be exported from Malabár.

Cedrela toona, Roxb.; Dalz. & Gibs. Bby. Fl. 38; Brand. For. Fl. 72. *Deodari, kuruk, túndu, tun, tunna, maha-nim.*

Glabrous. Leaves 1-3 ft. long, abruptly pinnate, deciduous. Leaflets 8-30, 2-7 by ¾-3 in., generally opposite or sub-opposite, obliquely ovate or lanceolate, acuminate or cuspidate, entire or slightly undulated or serrate, shining above and sometimes glaucescent beneath, on a rather long petiole. Flowers white, fragrant, ⅓-¼ in. long, on slender, short pedicels, arranged in large drooping, terminal panicles, about the length of the leaves or longer. Calyx segments 5, short, round. Petals 5, oblong, ciliate. Stamens 5, occasionally 6, alternating with staminodes, inserted on orange-coloured, hairy lobes of the disc. Ovary 5-celled, with 8-10 ovules in 2 series in each cell. Capsule oblong, about ¾-1 in. long. Seeds compressed, winged below or at both ends.

Found in ravines at Khandála, in the forests of the Southern Konkan and in those of Madras; also in the hilly districts of Central India, tropical Himalaya, Burma, Java and Australia.

Alt. 7000 ft.

A tall tree attaining the height of 60-80 ft. or more under favourable circumstances, and 6-12 ft. in girth. Fl. March-May; Fr. September-November. Sheds its leaves in the hot season.

Wood reddish-brown or of a light-rose colour, with a silvery lustre; soft, even-grained, durable, not attacked by white ants, easily worked, polishes well, and somewhat fragrant when sawn. Much used in making chairs, bedsteads and other articles of furniture; also for door panels and carving work. The bark is a powerful astringent, and is used in diarrhœa and dysentery; its powder mixed with the powdered seeds of *Cæsalpinia bonducella* is administered in the cure of intermittent and remittent fevers. The flowers are used in Mysore in dyeing cotton a beautiful rose colour.

Chloroxylon Swietenia, D. C. Prod.; Dalz. & Gibs Bby. Fl. 39; Brand. For. Fl. 74. *Bheria, halda, billu, satin-wood tree.*

Young parts, petioles and inflorescence covered with minute grey pubescence. Leaves abruptly pinnate, 5-9 in. long. Leaflets 20-40, ⅓-1½ by ¼-⅝ in., opposite, sub-opposite or alternate, unequal-sided, obliquely oblong, obtuse at the apex, glabrous on both sides, pale and dotted on the under surface, shortly petiolulate. Flowers white, ¼ in. diam., on long villous pedicels, forming large, branched

terminal and axillary panicles. Calyx lobes 5, ovate, acute. Petals 5, free from the base, membranous. Stamens 10; filaments free, inserted in the sinuses of the disc. Ovary 3-celled, with 8 ovules in each cell, superposed in 2 series. Capsule 1 by ½ in., oblong, dark-brown, glabrous.

Common in the Konkan and the Deccan, hilly parts of Madras and Ceylon.

A middling-sized tree. Fl. March-April; Fr. in the rainy season. New leaves appear at the end of the hot season, about the time that the old ones fall.

Wood yellowish-brown, close-grained, hard, heavy, durable, polishes well, fragrant, and has a beautiful satin lustre. Much used for furniture and picture frames, ploughs, axle-trees, oil-presses, etc.; well adapted for turning. The tree is said to yield a wood oil.

CHAILLETIACEÆ.

Chailletia gelonioides, Hook.; Bedd. Fl. Sylv. An. Gen. 59. —*Moacurra gelonioides*, Dalz. & Gibs. Bby. Fl. 52. *Moacurra* in Beng.

Leaves 2-4 by ¾-2 in., while young silky pubescence beneath, alternate, elliptic or elliptic-lanceolate or obovate, abruptly acuminate, short-petioled. Flowers numerous, small, on axillary cymes; male flowers about ⅛ in diam. Sepals 5, obtuse, whitish. Petals as long, narrow, obovate. Hypogynous glands 5, sub-quadrate, opposite to the petals. Anthers with broad connective. Female flowers as in the male, but the anthers sterile. Ovary broad, compressed, downy, 2-celled, with 2 pendulous ovules in each. Styles 2, very short, recurved. Stigma capitate. Capsule transversely oval, 2-lobed, compressed, ¾-1 in. diam., covered with a grey down, dehiscing along the edges, showing inside yellowish-red arillus. Seeds oblong.

Common at Rám Ghát, Southern Konkan, forests of Madras, Eastern Bengal, Silhet, Ceylon and Chittagong.

It is a small, evergreen tree. Fl. April-May; Fr. December.

OLACINEÆ.

Gomphandra axillaris, Wallich; Bedd. Fl. Sylv. An. Gen. 61.—*Platea axillaris*, Dalz. & Gibs. Bby. Fl. 28.

Dioecious or polygamous, glabrous, or the young branches slightly puberulous. Leaves 2½-5½ by 1-2½ in., alternate, membranous, conspicuously veined, variable in shape, from narrow-lanceolate to almost orbicular, terminating in a long acumination, on a petiole ½-½ in. Cymes puberulous, axillary, short, solitary or twin, many-flowered in the male; 2-5 flowered in the female. Calyx minute, 4-5-toothed. Petals 4-5, united at the base into a tubular, campanulate corolla. Filaments flat, 4-5, hairy at the apex. Ovary oblong, smooth. Fruit ½ in. long, oblong, obtuse, smooth. Seeds large.

Common in the forests of Southern Konkan, Chorla and Parvar Ghats, etc., and those of Madras; also in Silhet and Ceylon.

This is a small tree. Fl. April-May; Fr. December.

Strombosia Ceylanica, Gardn.—*Sphærocarya leprosa*, Dalz., & Gibs. Bby. Fl. 223.

Timber Trees.

A tall shrub or middling-sized tree. Leaves 6 by 2¼ in., ovate, oblong-lanceolate, acute or acuminate at the apex, rounded at the base, entire, glabrous, pale beneath, coriaceous, on a petiole ¼ in. Flowers small, green, sub-sessile, in axillary glomerules or on a prominent tubercle. Calyx 5-fid; segments semi-orbicular. Petals 5, three times longer than calyx-lobes, linear-acute. Stamens 5; filaments opposite and adnate to petals. Ovary 4-5-celled with 1 ovule in each cell. Fruit pyriform, nearly 1 in. long, rugose or tuberculated, purple, covered with scurfy scales.

Konkan, Vádi, Goa, Kánara and Ceylon.
Alt. 3000 ft.
Fl. in the cold season; Fr. in the hot season.
Wood white and durable.

Mappia oblonga, Miers; Dalz. & Gibs. Bby. Fl. 28. *Ganerah, gura* (at Mahábaleshvar), *narik*.

Leaves 4-7 by 2¼-3 in., elliptic-oblong, acuminate at the apex, acute at the base, distinctly veined, glabrous on a petiole 1-1½ in. Flowers yellowish-white, small, very fœtid, pilose, on short pedicels, arranged in terminal, lax, pubescent cymes. Calyx segments 5. Petals 5. Stamens equal in number, alternate with petals. Ovary 1-celled, with 2 pendulous ovules. Fruit ¾ in. ovoid, succulent, purple when ripe.

Common on the ghâts opposite Goa; at Mahábaleshvar, Travancore and Ceylon.
Alt. 7000 ft.
It is a middling-sized tree. Fl. in the cold season; Fr. in the hot season.

ILICINEÆ.

Ilex Malabarica, Bedd. Fl. Sylv. t. 143.—*I. Wightiana*.

Glabrous. Leaves variable in length and breadth, usually 4-5 by 1-1½ in., ovate-elliptic or elliptic-acuminate, entire, coriaceous, shining green above, pale beneath on a small petiole, which is channelled above. Flowers $\frac{1}{10}$ in diam., white, usually 6-merous. Peduncles and pedicels puberulous. Male flowers in small umbellules. Female flowers solitary or fascicled; fascicles very shortly peduncled; pedicels ¼-½ in., 3-4 together, rarely solitary. Calyx lobes broad, sub-acute, shortly ciliate. Petals connate at the base. Stamens often only 4, inserted at the base of the corolla; filaments short. Ovary of the male flower imperfect, with 4 minute stigmas. Ovary of the female 6-celled, with 1 ovule in each. Fruit size of a pea, depresso-globose, red when ripe.

Common on the ghâts from the Konkan southwards.
Alt. 3000 ft.
A large tree, with a trunk attaining sometimes more than 10 ft. in circumference. Fl. February-April, and probably more or less all the year round; Fr. in the rainy season.
Wood yellowish-white; much used for planks, platters, building purposes, etc.

CELASTRINEÆ.

Euonymus Indicus, Heyne.—*E. Goughii*, Dalz. & Gibs. Bby. Fl. 47; Bedd. Fl. Sylv. An. Gen. 43.

A shrub or small tree, glabrous. Leaves 3-4 by 1-2¼ in., ovate or oblong, acute at both ends, or shortly acuminate at the apex.

3-nerved, entire or obscurely serrate towards the apex, shortly-petioled. Peduncles axillary, ¼-2 in. long, 1-3 flowered. Flowers pentamerous, reddish-coloured. Petals orbicular, fringed, about ¼ in. broad, imbricated at the margin. Ovary imbedded in the disc, 5-celled, with 2 ovules in each cell. Fruit ¾ in. long, obovoid, clavate, 5-angled.

This very beautiful tree is not uncommon in the forests of the Konkan and of the Madras Presidency.

Lophopetalum Wightianum, Arn.; Dalz. & Gibs. Bby. Fl. 48; Bedd. Fl. Sylv. t. 145. *Bolpale* in Kan.

Leaves 5-9 by 2-4 in., elliptic-oblong, obtuse or slightly acute at the apex, obtuse or sub-cordate at the base, coriaceous, quite entire, glabrous on both sides on a petiole about ½ in. Flowers pentamerous, of a dull-red colour, 7-9 lin. diam., in axillary and terminal cymes. Calyx lobes very short and broad. Petals with a membranous corrugated crest. Ovary 3-celled. Fruit sharply triangular, 3-celled, 3-4 in. long. Seeds numerous, imbricate, oblong, compressed, with a long wing.

This handsome, large, evergreen tree grows sometimes to a great height; and is not uncommon in the forests of the Konkan and Malabár. Wood reddish-coloured, hard, close-grained; said to be much used by the natives for house-building.

Elæodendron glaucum, Pers.—*E. Roxburghii*, Dalz. & Gibs. Bby. Fl. 48; Brand. For. Fl. 82. *Tamruj, aran.*

Leaves 2-6 by ¾-2½ in., opposite, elliptic-ovate or oblong, acute or acuminate, crenate or nearly entire, membranous or coriaceous, glaucous when young, on petiole ¼-1 in. Flowers small, pentamerous, yellowish or greenish-white on axillary, diffuse, dichotomous cymes, about half the length of the leaves; peduncles longer than the petioles. Drupe hard, woody, ovoid or obovoid, ½ in. long, 1-celled, 1-seeded.

In this Presidency it is common at Sátára, Camatki, Bhímáshankar forests, etc., and also throughout the hotter parts of India, Ceylon and the Malayan Archipelago.

A small tree, grows sometimes to a great height; in favourable circumstances it attains a height of 30-50 ft., with a girth of 3-8 ft. Fl. February-June; Fr. in the rainy season, and continues to remain on the tree till February and March of the following year. The old leaves are shed February-March, and new ones appear in May.

Wood light reddish-brown, close and even-grained, tough, but not very strong, durable, works easily and polishes well: the surface is often beautifully curled; used for cabinet-work and manufacture of combs; adapted for picture frames. The root and bark are used in native medicine: the latter is said to be a virulent poison, while the former as a specific for snake-bites.

RHAMNACEÆ.

Zizyphus jujuba, Lamk.; Dalz. & Gibs. Bby. Fl. 49; Brand. For. Fl. 86.

This is the well-known *Bhor* or *Baor* tree; wild and cultivated throughout India, as far as the base of the Himalayas; also in Ceylon,

Timber Trees.

Burma, Malacca, Malayan Archipelago, China, Australia and tropical Africa.

This is a middling-sized tree, attaining sometimes the height of 25-40 ft. or more, with 4-8 ft. in girth. Fl. in the rainy season, Fr. December-March.

Wood yellowish when freshly cut, becoming dark-brown in time, hard, strong, durable, close and fine-grained; used for building purposes, agricultural implements, Persian wheels, tent-pegs, oil-mills and for many other purposes; yields a good charcoal. Lac is found on it in various parts of India; a kind of gum exudes from its bark which is used in native medicine; while the bark is used by tanners. It is said that wild silkworms live on this tree at Kangra and in Southern India. Oil is abstracted from its kernel. Leaves are used as cattle fodder. The fruit is eaten by all classes of people; that of the cultivated tree is larger, ovoid or oblong; of the wild, globose. The pulp is mealy and sweet.

Z. xylocarpus, Willd.; Dalz. & Gibs. Bby. Fl. 49; Brand. For. Fl. 90. *Guti, goti, bhore-goti.*

Branches, underside of leaves, inflorescence and fruit covered with short greyish tomentum; stipulary thorns generally twin, one straight and the other recurved, always present in a poor soil, but often absent in a good one, and especially on younger branches. Leaves 1½-3½ in. long by nearly as broad, elliptic, orbicular or obovate, obtuse at the apex, slightly oblique, rounded or sub-cordate at the base, serrulate, glabrous and dark above, pale and softly pubescent below, shortly petioled. Flowers greenish-yellow, sometimes tetramerous, on short pedunculate compact cymes 1-1½ in. long. Calyx glabrous within; lobes keeled near the apex. Petals very concave, reflexed, on long claws. Disc thin, 5-angled. Ovary 3-, rarely 2 or 4-celled. Styles usually 3, divided to near the base. Drupe usually round, hard, 3-, rarely 2 or 4-celled, ½-1 in. long, covered with a dense grey or whitish tomentum.

Common in almost every forest of this Presidency and in that of Madras, North-West India, Rájputána, Oude, Nepaul and Ceylon.

Alt. 2000 ft.

Attains the height of 15-20 ft. and a girth of 2-3 ft. Fl. April-May; Fr. September-February. Old leaves are shed February-March, new ones appear April-May.

Wood yellowish-white or orange-coloured, hard, tough and durable; employed for building purposes, for carts, ploughs, etc.; excellent torches are made of it. Bark is employed for tanning and for making blacking; the fruit is also used for making blacking for leather, and the kernel is edible. The young shoots, leaves and fruits are used as fodder for cattle and goats.

SAPINDACEÆ.

Hemigyrosa canescens, Thwaites; *Cupania canescens,* Grah. Cat. Bby. Pl. 29; Dalz. & Gibs. Bby. Fl. 35. *Kurpah, karpa, kalu, yelti* in Kán.

Young parts shortly greyish tomentose. Leaves 5-20 in. long. Leaflets 2-8, 2½-10 by ¾-5 in., mostly opposite, elliptic-oblong, ovate, obovate or lanceolate, generally obtuse or emarginate or acute at the apex, entire, coriaceous, glabrous, shining, on a short, thick, puberulous petiolule. Flowers white, ¼-¼ in. diam., in

racemes simple or panicled, axillary or from the leafless branches. Sepals 4, silvery-canescent. Petals 4, furnished with bifid scales at the base. Bracteoles mostly subulate. Ovary 3-celled, with a solitary ovule in each cell. Fruit fleshy, sub-globose or 3-gonous, tomentose, ½-1 in. diam., often 1-seeded by abortion.

Common in the Konkan, Rám Ghát, Kussar Ghát, Khandála, Bhímáshankar; also on the western side of the Madras Presidency, Ceylon, Burma, etc.

An evergreen, middling-sized tree with a trunk of considerable thickness, but not straight. Fl. February-April; Fr. end of the hot season or the beginning of the rainy season

Wood whitish, soft, even-grained, not strong, but used by the natives for building purposes.

Schleichera trijuga, Willd.; Dalz. & Gibs, Bby. Fl. 35; Brand. For. Fl. 105. *Kassumár, kussúmb, kussumb, peduman.*

Young parts puberulous. Leaves abruptly pinnate, 8-16 in., at the ends of branches. Leaflets 4-8, 1-10 by ¾-4½ in., opposite or sub-opposite, oblong, elliptic-oblong or nearly lanceolate, the lowest pairs the smallest, obtuse or shortly acuminate, entire, coriaceous, sessile. Flowers small, yellowish-white or greenish on short pedicels, arranged in axillary, branched racemes. Fruit ¾-1 in. long, smooth, ovoid, unarmed or sometimes echinate.

Common in this and the Madras Presidencies, Bengal, Central India, Ceylon and Burma.

Alt. 3000 ft.

A large beautiful tree attaining sometimes the height of 60-70 ft. and a girth of 8-12 ft. Fl. February March, when it is covered with young leaves; leafless in the cold season.

Wood red or reddish-brown, very heavy, strong, hard, tough, close-grained, durable, and takes a fine polish. Used in making rice and sugar-pounders, pestles and mortars; for building and many other purposes. Lac is produced on the tree; that found at Mirzapore is said to be the best. The pulpy sub-acid aril is eaten. Oil is extracted from the fruit. Bark is rubbed with oil to cure itch.

Sapindus laurifolius, Vahl.; Dalz. & Gibs. Bby. Fl. 34 Brand. For. Fl. 106. *Rhitáh.*

Leaves 8-14 in. long, pari-pinnate, alternate. Leaflets 4-6, 3½-7½ by 1½-3 in., ovate or oblong-lanceolate, acuminate at the apex, sometimes obliquely-sided at the base, entire, glabrous, shining above, soft pubescent beneath, on petiole 2-3 lin. Flowers numerous, small, dull-whitish, in large, terminal, much-branched panicles, which are clothed with rusty pubescence. Calyx rusty pubescent on the outside. Petals covered externally with adpressed hairs, sometimes furnished on inner surface with a membranous scale, fringed with long white hairs. Fruit fleshy, 3-lobed, soft when ripe, of a brownish colour. Seed round, obovate.

Common in Bombay and Madras, both wild and cultivated.

This handsome tree has a straight trunk with 3-4 ft. in circumference. Fl. November-December; Fr. February-April.

Wood light-yellowish, close-grained, hard, but not durable; used for door frames, posts, etc. The fruit is used medicinally and also as soap

for washing clothes, silk, etc. It is said to be efficacious in epilepsy; an oil is also said to be extracted from the nuts.

In Hooker's Flora of British India *S. emarginatus* is describde as a variety of *S. laurifolius*; the former is common in Gujarát, and is also found, though scarce, in the Deccan; both trees are known by the same name *Rhitah*, and the uses are the same.

Nephelium longana, Camb.; Grah. Cat. Bby. Pl. 29; Dalz. & Gibs. Bby. Fl. 35. *Wumb.*

Glabrous. Leaves 4-18 in. long. Leaflets 4-10, 2-12 by ½-2½ in., opposite or alternate, elliptic-oblong or ovate-lanceolate, obtuse or acute at the apex, and sometimes oblique at the base, entire, coriaceous, glabrous above, more or less glaucous beneath on small petiolules; veins prominent. Flowers pale, yellowish-white, ⅛-¼ in. diam., on short pedicels arranged in terminal and axillary, puberulent panicles. Calyx deeply 5-, rarely 6-partite, softly downy on both sides. Petals 5, rarely 6 pubescent, spathulate. Stamens 6-10; filaments tomentose. Ovary 2-3-lobed, tomentose. Style with 2-3 stigmatic lobes. Fruit lobes usually solitary, rarely 2-3, reddish or purple, globose, ½-¾ in. diam., tubercled.

Common at Parr and Rám Ghát, and from the Konkan southwards; also in Eastern Bengal, Ceylon and Pegu.

A beautiful evergreen tree 30-50 ft. high and 4-5 ft. in girth. Fl. February-March; Fr. in the rainy season.

Wood light or reddish-brown, rather heavy, hard, close-grained, takes a fine polish; adapted for furniture. The succulent aril of the seed is an agreeable acid substance, which is eaten by the natives.

N. litchi, Camb.; Grah. Cat. Bby. Pl. 29; Dalz. & Gibs. Bby. Fl. Suppl. 13. *Litchi.*

Leaves 3-9 in. long, usually abruptly pinnate; leaflets 2-8, 1½-6 by ½-1¾ in., opposite or alternate, oblong-lanceolate or ovate, acuminate, entire, coriaceous, glabrous, glossy above, glaucous, glabrous or glabrescent beneath on short petiolules. Flowers greenish-white, shortly pedicelled, ⅛-⅛ in. diam., arranged in tawny tomentose, terminal panicles, as long as or longer than the leaves. Calyx 4-, rarely 5-lobed, puberulous on both sides. Petals none. Stamens 6-8; filaments hairy. Disc glabrous, crenulate, fleshy. Ovary 2-3-celled, covered with ferruginous tomentum. Style generally with 2 stigmatic lobes, sometimes with 3. Fruit 1-2-lobed, globose, size of a pigeon's egg, red, tubercled. Aril whitish, fleshy, sub-acid.

Very common in gardens in Bombay; cultivated throughout India.

This ornamental, evergreen tree attains the height of 30-40 ft. and a girth of 3-4 ft. Fl. February-March; Fr. in the rainy season.

Wood red-brown, heavy, hard, close grained, and takes a fine polish; adapted for furniture. The sweet fruit is eaten.

I have seen only one plant of *Blighia sapida*, the *akí* tree, in Bombay.

Sapindus rubiginosus, which was introduced into Bombay from Calcutta, has, I believe, disappeared.

Harpullia cupanioides, Roxb.

Said to exist in Southern Konkan, but this requires confirmation.

SABIACEÆ.

Timber Trees.

Meliosma Wightii, Planch., *Hill mango.—M. pungens,* Brand. For. Fl. 116.

This plant is said to exist in the Konkan.

ANACARDIACEÆ.

Mangifera Indica, Linn. *Am, ámb,* or *amba;* the well-known *mango tree.*

Common every where.

Alt. 3500 ft.

In some places it attains the height of 60-70 ft. with a straight trunk, measuring 15 ft. in circumference. Almost an evergreen tree; Fl. February-March; Fr. May-June.

Wood dirty white or dull-grey, soft, coarsely fibrous, open-grained, readily attacked by insects, or soon decays if exposed to wet; heart wood of old trees is dark-brown, close-grained and more durable; used for house and coach-building, packing cases, door and window frames. Canoes are occasionally made of it. Bark exudes a yellowish gum. The tree is mainly cultivated for the sake of its delicious fruit. The unripe fruit is pickled and sometimes cut into pieces, salted, and dried in the sun to be used in curries. (*See* Oils.)

Anacardium occidentale, Linn.

This is also the well-known *caju* or *cashew-nut* tree, found all along the coast of India and Ceylon.

An evergreen tree, growing to the height of 25-30 ft. and a girth of 2-3 ft. Fl. December-February; Fr. March-April.

Wood dark-brown or red in colour, hard, close-grained; occasionally used for making packing cases and boats; also makes an excellent charcoal. The enlarged pedicel of the fruit is eaten, and from its juice large quantity of spirit is distilled in Southern Konkan. From the trunk there exudes a transparent gum, resembling gum-arabic, which makes a good varnish; a solution of this is used in book-binding to keep off insects. (*See* Oils.)

Buchanania latifolia, Roxb.; Dalz. & Gibs. Bby. Fl. 52; Brand. For. Fl. 127. *Pyál, chár, charuli;* the kernel of the fruit is called *chironji.*

Leaves 6-10 by 3-4½ in., rounded or obtuse at the tip, coriaceous, firm, entire, 15-20 pairs of prominent nerves, villous or pubescent, glabrate beneath, on a flattened, stout, pubescent petiole ¼-½ in. Flowers numerous, greenish-white, ¼ in. diam., sessile or on very short pedicels, forming terminal and axillary, wooly or velvety, much-branched panicles; bracts small, caducous. Calyx small, 5-toothed. Petals oblong. Disc fleshy, 10-lobed. Stamens 10. Ovary 1 fertile, conical, hairy; the remaining 4 reduced to filaments. Drupe compressed, smooth, sub-globose, black when ripe, ½ in. long. Nut hard, bony, 2-valved.

Common all over the Konkan as far as Baroda; also in Central India, Oude, Burma, etc.

Alt. 1500-4000 ft.

This tree grows to the height of 40-50 ft. with a straight trunk attaining a circumference of 4 ft. Fl. January-March; Fr. April-May. Sheds its leaves in the hot season.

Timber Trees.

Wood greyish-brown or red, soft, even-grained, tough, easily worked, but liable to be attacked by white ants; but durable if kept dry. Used for making bullock yokes, doors and window frames, boxes, etc.; also for making charcoal. The bark is used for tanning, and from its wounds exudes a transparent gum. Both the fruit, which has a sweetish taste, and the kernel are eaten; the latter is employed in native confectionery. (*See* Oils.)

Odina Wodier, Roxb.; Dalz. & Gibs. Bby. Fl. 51; Brand. For. Fl. 123. *Shimti, ginyan, kimul, moina, moi, moja.*

Young parts and inflorescence covered with stellate tomentum. Leaves 12-18 in., unequally pinnated near the ends of branches. Leaflets 7-9, 2-6 by ½ in., oblong-ovate, caudate-acuminate, entire, membranous, glabrous, sub-sessile, the terminal one long petiolulate. Racemes slender; male: compound, long; female: simple and short. Flowers tetramerous, purplish or greenish-yellow, on short pedicels. Bracts ciliate. Sepals obtuse, ciliate. Petals twice as long, oblong, coriaceous, spreading. Stamens 8, in male flowers as long as the petals. Drupe kidney-shaped, red or purple when ripe, size of a pea.

Very common in this Presidency, in Madras, Bengal, along the foot of the Himalayas, Ceylon, Assam, Tenasserim and the Andaman Islands. Alt. 4000 ft.

This tree grows 40-50 ft. in height and 5-8 ft. in girth. Fl. February-March; Fr. in the hot season; remains leafless almost from February to end of hot season.

Sap-wood white, rather light and coarse; heart-wood heavier, close-grained, of a dull-red colour, or reddish-brown on exposure. Used for scabbards, spear shafts, oil-presses and for many other purposes. It works and polishes well, and is, therefore, well adapted for furniture and cabinet purposes. A yellowish white gum exudes from the trunk, which is used in cloth-printing by weavers, and in medicine, being given in asthma, and applied externally as a plaster in rheumatism, etc. The bark is said to be good for tanning. Leaves and young shoots afford good fodder for cattle.

Semecarpus anacardium, Dalz. & Gibs. Bby. Fl. 52; Brand. For. Fl. 124. *Bibu, biba, bhilama, bhilawa, marking-nut tree.*

Dioecious; young branches, inflorescence, petioles and the under-side of leaves covered with a short, pale pubescence. Leaves 9-18 by 5-12 in., approximated near the ends of branches, oblong or obovate-oblong, rarely linear-oblong, usually contracted below the middle, rounded at the top; rounded, cordate or cuneate at the base, thick-coriaceous, on rounded, thick petiole 1-2 in.; nerves 16-25 pairs, conspicuous. Flowers greenish-white or yellow, ¼-½ in. diam., sub-sessile, fascicled, arranged in erect, large, terminal panicles as long as the leaves or shorter; bracts lanceolate. Petals 3-4 times the length of the calyx, spreading, glabrous. Stamens 5; filaments slender. Ovary densely tomentose. Styles 3. Drupe obliquely oval or oblong, smooth, shining, purplish black; cup-shaped hypocarp, orange-red, fleshy.

Common in Gujarát, the Deccan and the Konkan, Madras, tropical Himalayas from Sirmore to Sikkim, Assam, Eastern Archipelago and South Australia.

Alt. 3500 ft.

This tree attains 30-40 ft. in height, trunk erect, 4 ft. in circumference. Fl. generally in the hot season; Fr. in the cold season. Leaves shed in February; new ones appear in May.

Wood grey, reddish-white or brown, open-grained, soft, not durable, useless. It is full of an acrid juice which causes inflammation of the skin. The fleshy orange-red receptacle is roasted and eaten, and said to taste somewhat like roasted apples, and when dried somewhat like dates; the kernels are also eaten. The pericarp contains much corrosive juice, which is used for marking cotton, and applied externally as a counter-irritant in internal inflammation and rheumatism. The juice is generally mixed with lime water before it is used for marking linen. The oil of the seeds mixed with the milk of an Euphorbiaceous plant and the young fruit well pounded, is made into bird-lime. The bark is employed in dyeing; it exudes a sort of white gum.

Holigarna Arnottiana, Hook.—*H. longifolia*, Grah. Cat. Bby. Pl. 41; Dalz. & Gibs. Bby. Fl. 51. *Hulgeri*, also called *bibu*.

Young shoots pubescent. Leaves 6-9 by 2-3 in., about the ends of branches, more or less spathulate or cuneate-ovate or oblong, obtuse or acute, gradually narrowed down to the petiole, entire, coriaceous, shining above, glaucous or not beneath; nerves 16-20 pairs, strong, slightly arcuate, conspicuous on both surfaces; petiole glabrous or rufo-pubescent, ¼-1 in., with 2 tubercles on the top, furnished about the middle with two subulate, spur-like, deciduous processes. Panicles of compound racemes axillary and terminal, densely rufo-tomentose; male and female on different trees. Flowers numerous, dull-white, minute; male flowers smaller than the fertile. Calyx 5-toothed. Petals 5, villous, cohering at their sides with margin of the disc. Stamens 5, inserted round the margin of the disc. Drupe obliquely oblong, rounded at the top, about 1 in. long.

Common on the ghâts of the Konkan and of the Madras Presidency.

This tree grows to the height of 30-50 ft., with a trunk of 3-5 ft. in circumference. It is an evergreen tree; Fl. February-March; Fr. April-May.

Wood grey or yellowish-brown, close-grained, but soft. It is stated that in some parts it is used for house and boat-building. A very acrid black substance is prepared from the trunk and fruit, which is used as varnish. The fruit and bark are used medicinally. (*See* Oils.)

H. Grahamii, Hook.—*Semecarpus Grahamii*, Dalz. & Gibs. Bby. Fl. 52; Bedd. Fl. Sylv. An. Gen. 79.

Young parts pubescent. Leaves 1-2 ft. by 4-6 in. broad a little below the apex, gradually tapering down to the base from a little above the middle, spathulate or oblanceolate-cuneate, acuminate, rigidly coriaceous, shining and sometimes glabrous above, pale and hairy beneath; nerves 20-30 pairs, very prominent beneath, on petiole ½ in.; spur-like, deciduous processes 2 or 4. Panicles racemose, terminal; male: 1 ft. long, much-branched, rufo-tomentose; female: short. Flowers numerous, dull-white, minute; male about 1 in. diam. Calyx cup-shaped, truncated. Styles 3, reflexed. Ovary covered with rust-coloured hairs. Drupe ovoid, glabrous, ⅛ in. long.

Common in the jungles of the Konkan.

A deciduous tree with a height of 20-30 ft., and 2-3 ft. in girth. Fl. December-February; Fr. April-May.

Timber Trees.

The wood is not known to be used for any purpose; but a black, acrid, oily substance is extracted from the pericarp of the fruit and used for the same purpose as that of the last species.

Nothopegia Colebrookiana, Blume.—*Glycycarpus racemosus,* Dalz. & Gibs. Bby. Fl. 51. *Amberi.*

A tree with milky acrid juice.; branches glabrous. Leaves 2-8 by 1-2½ in., alternate, elliptic-oblong, or oblong-lanceolate, acuminate, usually waved, entire, coriaceous, glabrous, shining above and glaucous beneath; nerves 15-20 pairs, arched, not prominent; petiole ½-¾ in., naked. Racemes axillary or from the axils of fallen leaves, much shorter than the leaves, solitary and fascicled; male branched, much longer and more branched than the female. Flowers small, numerous, white. Sepals almost orbicular. Petals linear-oblong, with recurved tips, hairy on the back. Stamens 4. Ovary ovoid, 1-celled, with one pendulous ovule. Style undivided; stigma simple. Drupe transversely oblong, ½ in. diam., depressed, red when ripe. Seed 1, covered with sweet pulp.

Common on the ghát forests of this Presidency and those of Madras; also in Ceylon.

Alt. 3000 ft.

It is a small tree about 15 ft. high.

The sweet oil is eaten.

Spondias mangifera, Pers.; Dalz. & Gibs. Bby. Fl. Suppl. 19; Brand. For. Fl. 128. *Ambarah, amarak, amrah, rhan-amb, hog-plum.*

Glabrous. Leaves alternate, 1-1½ ft. long, imparipinnate, on slender terete petioles. Leaflets 9-13, 2-9 by 1-4 in., opposite, elliptic-oblong, acuminate, more or less oblique at the base, quite entire, glabrous, membranous, shining, shortly petiolulate; nerves 10-30 pairs, horizontal, prominent, joined by a conspicuous intramarginal one. Flowers ¼ in. diam., scattered, greenish-white, uni- or bisexual, sub-sessile, arranged on large, terminal, much-branched panicles. Calyx 5-toothed. Petals 5, oblong. Disc large, fleshy, 10-crenate. Stamens 10; filaments subulate. Drupe ½-2 in. long, ovoid, smooth, yellow. Stone woody, tough and rough, with small cavities, usually with 1-3 perfect seeds.

Common all over India, Ceylon, Malacca and tropical Africa.

Alt. 5000 ft.

A small tree about 20 ft. high and 4 ft. in circumference; in favourable circumstances it grows to the height of 50-60 ft., or even more. Fl. April; Fr. in the cold season. Sheds its leaves in the cold season.

Wood white, soft, coarse and useless. From wounds made in the bark, large quantities of an insipid yellowish gum exude resembling somewhat gum-arabic. The raw fruit is pickled, and the ripe one has an austere, acid, somewhat sweet taste, but is nevertheless eaten. Leaves when bruised emit a peculiar smell.

S. acuminata, Roxb.; Grah. Cat. Bby. Pl. 42. *Ambat, ambadah.*

Leaves smaller than those of the last. Leaflets 11-17, 1½-3 in. long, sub-opposite, long-acuminate, quite entire or obscurely and remotely crenulate, shining. Flowers greenish-white on panicles

6-8 in. long. Calyx-lobes imbricate, small. Petals spreading. Disc crenate. Stamens 10. Ovary sessile, free, with a solitary, pendulous ovule in each cell. Drupe ovoid-globose, size of a small hen's egg. Stone smooth, fibrous.

Grows in the Konkan and Malabár.

This is a beautiful tree of middling size and with an erect trunk. Fr. January.

MORINGEÆ.

Moringa pterygosperma, Gærtn.; Dalz. & Gibs. Bby. Fl. 311; Brand. For. Fl. 129. *Shekiah, soanjna, sainjan, moshing, horse-radish* tree of India.

Young parts tomentose. Leaves 1-2 ft. long, alternate, twice or usually thrice pinnate; petiole sheathing at the base; pinnæ 4-6 pairs. Pinnulæ 6-9 pairs, opposite, elliptic, ovate, or obovate; on slender petiolules; glands between each pair of pinnæ. Flowers 1 in. diam., white, honey-scented, arranged in panicles spreading at the ends of branches. Bracts linear. Sepals linear-lanceolate. Petals linear-spathulate. Fertile filaments hairy at the base. Ovary villous. Pod 9-18 in., pendulous, with 9 longitudinal ribs. Seeds 3-gonous, winged at the angles.

This tree is cultivated everywhere.

Alt. 1500 ft.

It attains the height of 15-25 ft. and a girth of 4-5 ft. Fl. in the cold season; Fr. in the hot season. Leaves are shed December-January; new leaves appear March-April.

Wood white, soft, spongy and useless. From incisions made in the trunk a yellow gum exudes, which is applied in rheumatism. Tender leaves, fruit and flowers are eaten as vegetable. Seeds yield a pure oil, which is said to be used as salad oil in the West Indies, and also employed by watchmakers. Twigs and leaves form a good fodder. The root bark has a strong flavour of horse-radish, and is used as counter-irritant in rheumatism.

M. Concanensis, Nimmo; Dalz. & Gibs. Bby. Fl. 311; Brand. For. Fl. 130. *Sainjna.*

A tree very similar to the last-named species, but distinguished from it by having very much larger leaves and rounded leaflets, which are often retuse and have much more powerful odour of horse-radish. Flowers yellowish, streaked with pink. Perfect anthers 5; abortive anthers 5, much smaller. Seeds ½ in. long, very broadly trigonous, with membranous wings.

This plant is found growing in Southern Konkan, Sind and Rájputána.

Fl. November-December.

Wood soft, light and useless. The unripe fruit is eaten.

LEGUMINOSÆ.

Mundulea suberosa, Benth.; Bedd. Fl. Sylv., An. Gen. 85.—*Tephrosia suberosa*, Dalz. & Gibs. Bby. Fl. 60. *Sapti.*

Young parts, pedicels, and underside of leaves white tomentose. Leaves unequally pinnate, 6-9 in. Leaflets 13-21, 1½-2 by ½ in., opposite, sub-opposite or alternate, elliptic-oblong or oblong-lanceolate, obtuse and sometimes mucronulate, coriaceous. Flowers large

Timber Trees.

rose-coloured, on short pedicels, arranged in terminal racemes. Calyx campanulate, 5-toothed. Corolla ¾-1 in. Stamens monadelphous. Ovary sessile, many-ovuled; stigma capitate. Legume 3-4 in., densely silky, irregularly contracted between the seeds, 6-8-seeded.

Found growing on the ghâts of the Southern Konkan, Madras, Ceylon and in tropical Africa.

This small tree is very ornamental when in flower. Trunk erect, but very short.

The leaves are used to intoxicate fish.

Sesbania Ægyptiaca, Pers.; Dalz. & Gibs. Bby. Fl. Suppl. 21; Brand. For. Fl. 137. *Shewari, shevari, sewri, jait, janjan.*

Nearly glabrous. Leaves 3-6 in., abruptly pinnate. Leaflets 20-40, ¾-1 in. long, linear-oblong, obtuse, with or without a mucro-entire, membranous, pale-green. Flowers yellow, spotted with purple, 6-10, on spreading, slender pedicels ⅛-¼ in., forming lax, axillary drooping racemes. Calyx ⅛ in. long, membranous. Corolla ½-¾ in. Pod 6-9 in. by 2-2½ lin., torulose, pointed. Seeds 20-30, pale-brown.

Cultivated in many parts of India.

Alt. 4000 ft.

A small tree with a height of about 15-20 ft. and 1-3 ft. in girth. Fl. at the end of rainy season and during the cold season. It is evergreen.

Wood white, soft, light, but close-grained; said to make the best charcoal for gunpowder, and is used to boil *jaggri*. The timber is cultivated to furnish poles in place of bambus, and also in some places to shade and support the betel plant. Rope is made of its bark. Leaves and young branches are a good fodder for cattle.

S. grandiflora, Pers.; Brand. For. Fl. 137.—*Agati grandiflora,* Dalz. & Gibs. Bby. Fl. Suppl. 22. *Augusia, basna.*

Leaves ½-1 ft. long, abruptly pinnate. Leaflets 40-60, 1-1½ in. long, opposite, linear-oblong, obtuse, and often mucronate, entire, membranous, glabrous, pale-green, on short petiolules. Flowers white or red, in short axillary racemes. Calyx 1 in. long, glabrous. Corolla 3-4 in. long. Pod 1 ft. or more, about 3 lin. broad, not torulose.

Cultivated all over India, on account of its tender leaves, pods and flowers. It is said to be indigenous in the Indian Archipelago and North Australia.

This tree attains the height of 20-30 ft. and a girth of 1-2 ft. It is in flower and fruit at all seasons of the year.

Wood white and soft; used only for fuel. The tree is cultivated in some parts as a support for the betel vine. Tender leaves, pods and flowers are eaten as vegetable.

Ougeinia Dalbergioides, Benth.; Brand. For. Fl. 146.—*Dalbergia oojeinensis,* Dalz. & Gibs. Bby. Fl. 78. *Tiwas, tinus, tinnia, telas, sandan, timsa.*

Branches terete, slender. Leaves about 12 in. long, ternate, alternate, stipulate, petioled. Leaflets coriaceous, glabrous or pubescent below, wavy; terminal leaflet, 3-6 by 2-5 in., roundish or obovate; lateral, 4 by 3 in., opposite, oblique-oval, obtuse, entire or crenate. Flowers numerous, white or pale-rose, fragrant, on slender,

villous or glabrous, ½-¾ in. long pedicels forming short, fascicled racemes, from the nodes of old branches. Calyx ⅛-⅓ in. long, sub-bilabiate. Pod 2-3 in., linear-oblong, obtuse, contracted between the seeds. Seeds 2-5.

Common in the forests of the Konkan and Northern India.

Alt. 4-5000 ft.

A tree 20-40 ft. in height, with an erect short trunk 3-7 ft. in circumference. Fl. March-May; Fr. September-October. Sheds its leaves January-February; new leaves appear April-May.

Wood light-brown with yellow tinge, or dark reddish-brown, hard, strong, very tough, close-grained, and takes a beautiful polish. Used for building purposes, and for making agricultural implements, wheels, carriage poles, etc. The bark when incised affords a fine kino, which is used as an astringent in cases of diarrhœa and dysentery. The bark is used to intoxicate fish, and for this purpose many trees are found stripped of their bark.

Erythrina Indica, Lam.; Dalz. & Gibs. Bby. Fl. 70; Brand. For. Fl. 139. *Pangarah, Indian coral tree.*

A tree, armed with black prickles; petioles and leaves unarmed. Leaves pinnately-trifoliolate on petioles 4-6 in. long. Leaflets broad-ovate, entire, short-acuminate, somewhat cordate base, membranous, glabrous; terminal leaflet 4-6 in. long and broad, largest, round cuspidate, truncate, or broad rhomboidal at the base. Flowers bright scarlet, large, on pubescent pedicels ½-⅔ in., arranged in axillary or terminal racemes, ½ ft. long. Calyx 1-1¼ in. long, spathaceous, with a very oblique mouth, 5-toothed at the top. Standard 2-2½ in. long; the blade 1 in. broad; wings and keel nearly equal and conform. Legume ½-1 ft., cuspidate, distinctly torulose, blackish, 1-8 oblong, red or purple seeds.

Wild and cultivated throughout India, Burma and Malacca; also in Java and Polynasia.

A tall tree 50-60 ft. high and 5-9 ft. in girth; trunk straight, but rather short. Fl. February-March; Fr. May-July. Leaves shed in the cold season; new ones appear March-April.

Wood white, light, soft and open-grained, known as *mochi-wood* in Madras; employed in making light boxes, scabbards, trays, packing cases, toys, etc.; varnishes well, and the lacquered ware of different parts of India is made of it. The tree is generally planted as a prop for the vines of the betel and black-pepper plants, and also for hedges. The tender leaves are eaten in curries.

Butea frondosa, Roxb.; Dalz. & Gibs. Bby. Fl. 71; Brand. For. Fl. 142. *Palás, parás, pullus, kakria, dhak, chickra.*

Young parts covered with grey or brown silky pubescence. Leaves pinnately-trifoliolate, in petiole ½-½ ft. long. Leaflets 4-6 in. by 3-4½ in., coriaceous, hard, glabrescent above, hoary beneath; two lateral ones oblique-ovate; the terminal one roundish, obtuse, often emarginate at the apex, rhomboid at the base, larger, as long as broad in the middle. Flowers large, bright orange-red, on thickly brown pubescent pedicels ½-1 in., arranged in tomentose, terminal and axillary racemes ½ ft. long. Calyx ½ in., silky inside. Petals equal, densely clothed on external side with silky pubescence; standard 1

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in. broad; keel acute, incurved. Legume pendulous, tomentose, 6-8 by 1¼-2 in. Seed oval, flat, brown.

Common in the Konkan, Khándesh and Gujarát; also throughout India from the Himalayas to Ceylon and Burma.

Alt. 3-4000 ft.

An erect tree 40-50 ft. in height, with a trunk 6-10 ft. in girth. Fl. February-March; Fr. June-July. Leafless in the cold season, and is covered with new foliage April-May.

Wood coarse, open-grained, soft, light and spongy, not durable except under water; but it is used in making toys, trunks, packing cases, etc., which are afterwards varnished; otherwise the wood is readily attacked by insects. From fissures and incisions made in the bark there issues a red juice, which is soon converted into a ruby-coloured, astringent gum, similar to *kino*, and known in commerce as *Bengal kino*. In Central India lac is collected on the branches of this tree. Seeds are used as a vermifuge; leaves as plates by Hindus and as fodder for buffaloes. The flowers yield a yellow dye, and from the bark of the root is extracted a good fibre, which is made into coarse cordage for caulking boats and into slow matches.

Dalbergia latifolia, Roxb.; Dalz. & Gibs. Bby. Fl. 77; Brand. For. Fl. 148. *Shissam, sissu, kalarik, blackwood* tree.

Glabrous. Leaves 4-7 in. on straight petiole. Leaflets usually 5 (3-7), 1½-2½ in. long and broad, often emarginate at the apex, cuneate at the base, entire, somewhat undulate, coriaceous, green or whitish beneath, on petiolules 3-4 lin. Flowers small, greenish or white, on short pedicels, forming lax, branched and divaricating panicles, shorter than the leaves. Calyx ⅛-⅛ in.; segments oblong, obtuse, shorter than the tube. Stamens 9, monadelphous; sheath open on the upper side. Legume oblong-linear or oblong-lanceolate, firm, brown, 1½-3 by ½-¾ in.; 1-4 seeded.

Common in Southern Konkan, Southern Marátha Country, Madras, Central India, Sikkim, Burma, etc.

A tall tree 60-80 ft. in height with an erect trunk 3-6 ft. in girth, sometimes even 20 ft. Fl. in the hot season (a small variety—*D. sissoides*—in the rainy season); Fr. October-February. Leaves shed February-March; new ones appear April-May.

Wood varies from dark-brown to purple black, in white or purplish veins of lighter colour, close-grained, heavy, strong and durable, takes a fine polish. Extensively used for furniture, gun-carriage purposes, ploughs and other agricultural implements, and for house-building.

D. sissoo, Roxb.; Dalz. & Gibs. Bby. Fl. Suppl. 24; Brand. For. Fl. 149. *Sissu, shissam.*

Young parts and branches grey downy. Leaves alternate, imparipinnate, on a zig-zag petiole. Leaflets 3-5, 1-3 in. each way, orbicular, with a sudden long acumination, entire, firm, glabrescent. Flowers yellowish-white, nearly sessile, in densely pubescent, axillary panicles, much shorter than the leaves. Calyx ⅛ in. long, campanulate, pubescent; teeth very short; 2 upper ones obtuse, 3 lower acute; the central one the largest. Corolla twice the length of the calyx; standard with a long claw. Stamens 9, monadelphous; sheath open on the upper side. Legume thin, linear-lanceolate, pale-brown, glabrous, 1½-4 by ¼-1 in., with a stalk twice as long as the calyx, generally 2-3-seeded. Seeds compressed, reniform.

Cultivated and planted as an avenue tree everywhere. Indigenous in the Sub-Himalayan tract and in the plains of Central India, Afghanistan and Beluchistan. Said to be indigenous also in Gujarát.

Alt. 3-5000 ft.

A handsome tree attaining the height of 60 ft., with an erect trunk 6-12 ft. in circumference. Fl. March-July; Fr. November-February. Sheds its leaves December-January; new leaves appear February-March; old trees do not generally shed its leaves.

Wood light greyish-brown, mottled with darker veins; in old trees sometimes nearly black, close-grained, remarkably strong; used extensively in boat-building, gun-carriages, carts, agricultural implements, door and window frames, furniture, and for various other purposes.

D. paniculata, Roxb.; Dalz. & Gibs. Bby. Fl. 78; Brand. For. Fl. 150. *Passi, padri, sondarra, dhobein, satpuria, topia, sheodar.*

Young branches, petioles and inflorescence clothed with short, grey, silky pubescence. Leaves 5-6 in., imparipinnate, turning black on drying. Leaflets 9-15, 1-2 by 1 in., oval or obovate-oblong, emarginate or retuse, entire, sub-coriaceous, green above, glaucous beneath, on a petiolule 1-1½ lin. Flowers white, tinged with blue, numerous, small, sub-sessile, crowded on short racemes forming terminal and axillary panicles. Calyx densely silky, ⅛ in. Corolla twice the length of the calyx. The limb of the standard broader than the base, without any callosity at the latter part; keel shorter than the petals. Stamens 10, diadelphous. Legume 1½-4 by ½-¾ in., brown, narrowed at both ends, 1-2-seeded.

Common on the Máwal districts above the ghâts in this Presidency, and all over the plains of Central and Southern India.

Alt. 2500 ft.

A tree which grows to the height of 30-60 ft. and more in favourable circumstances, with a trunk 8-9 ft. in circumference. Fl. March-May; Fr. May-July. Sheds its leaves February-March, and covered with new leaves April-May.

Wood greyish-white or yellowish, firm, often mixed with narrow, soft layers of a fibrous substance, liable to be attacked by insects. Not of much value, though used by the natives for building and many other purposes.

D. lanceolaria, Linn.; Dalz. & Gibs. Bby. Fl. 78; Brand. For. Fl. 151. *Dandous, kaurchi, takoli, harrani, gengri.*

Glabrous. Leaves 3-6 in., imparipinnate. Leaflets 11-15, 1-2 by 1 in., oval or broadly oblong, emarginate, obtuse or retuse, coriaceous, green above, and rather glaucous below. Flowers pale-blue, on short, slender pedicels, arranged in large, lax, terminal and axillary panicles; branches of panicles sub-glabrous, or clothed with rufous pubescence. Calyx ⅛ in. long, hoary; the teeth obtuse, the lowest rather longer and narrower. Corolla 2-3 times as long as the calyx; standard ¼ inch broad, obovate, with a large callosity at the base of the limb; keel much shorter than the wings. Stamens 10, diadelphous. Legume 1½-4 by ¾-¾ in., brown, flexible, narrowed at both ends, with a long stalk. Seeds 1-4 (usually 2).

Common in the forests from the Western Himalayas to Ceylon. In this Presidency it is common in some parts of Khándesh, but rare in the Konkan.

Alt. 2500 ft.

A beautiful tree attaining the height of 30-40 ft. (in some places 60-80 ft.), with a straight trunk 4-5 ft. in girth. Fl. in the hot season;

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Fr. in the rainy season. Sheds its leaves in the cold season, and covered with new ones in March.

Wood white, strong, without the peculiar concentric layer of the fibrous tissue of the last species. Said to be used for house-building and many other purposes. An oil is extracted from the seeds; this and the bark are employed medicinally by the natives.

Pterocarpus marsupium, Roxb.; Dalz. & Gibs. Bby. Fl. 76; Brand. For. Fl. 152. *Bibla, bija, piasal, dorbeula, asan, honay.*

A large deciduous tree, trunk cinereous. Leaflets alternate, coriaceous, 5-7, obtuse, acute or emarginate. Flowers numerous, yellowish-white, ½ in. in diam., arranged in paniculate racemes. Petals twice the length of the calyx, waved or curled. Sheath of monadelphous stamens is sometimes deeply divided into 2. Pod 1-2 in. broad, articular.

Common in the Konkan, Parnera Hill, Dang jungles and Central India, though now rare and nearly extinguished.

Alt. 3000 ft.

Attains 50-60 ft. height and 6-8 ft. girth. Fl. May-June; Fr. December-March.

Wood reddish-brown, close-grained, tough and strong. It takes a fine polish and is durable; valuable in house-building, and beautiful cabinet-work is made from it.

Pongamia glabra, Vent.; Dalz. & Gibs. Bby. Fl. 77; Brand. For. Fl. 153. *Karanj.*

A tall tree, with short, white or dark cinereous trunk. Leaflets 5-7, opposite, oblong or ovate, acute, 2-5 in. long. Flowers mixed white, blue or purple, in peduncled axillary racemes; pedicels with a pair of bracteoles in the middle. Calyx nearly truncate. Corolla much exserted, ½ in. in diam. Standard broad, keel obtuse, petals united. Legume thick, woody, 2 in. long, 1-2-seeded.

Planted and wild. Common in the Konkan. In the Deccan, along the banks of rivers. Attains 50-60 ft. height, and 5-8 ft. girth. Fl. May-June; Fr. April of the following year. It is almost evergreen, being bared of leaves only a short time in April.

Wood yellowish, hard and tough, and used for building and cart-wheels. From the seeds an oil is extracted, used for burning and in the cure of itch and various cutaneous eruptions. (*See* Pharm. Ind. 79.)

Poinciana elata, Linn.; Roxb. Fl. Ind. ii. 355; Bedd. Fl. Sylv. t. 178; Brand. For. Fl. 157.

An unarmed tree. Leaves ½-¾ ft. long; pinnæ 10-16; leaflets 30-40, caducous, sessile, obtuse. Flowers yellowish, in corymbs, terminal or from the upper axils. Calyx ¾-1 in. long. Petals 1 inch broad, shortly-clawed, curled on the margin. Filaments bright-red, much exceeding petals, 2-3 in. long, pubescent at the base. Legume flat, 6-8 in. by 1-2 in., 4-8-seeded.

Indigenous in forests of the western and eastern coasts of the Peninsula as far north as Gujarát. It is cultivated for the beauty of its numerous light-yellow flowers in Poona, Gujarát, Khándesh, near villages.

Wood yellow, close-grained, and polishes well; useful for furniture.

Poinciana regia, Dalz. & Gibs. Bby. Fl. Suppl. 27; Bedd. Fl. Sylv. 91. *Gulmohr.*

Leaves bipinnate ½-2 ft. long; pinnæ 8-20 pair, leaflets in 15-20 pairs, nearly sessile, oblique base, ⅛-½ in. long. Flowers large, bright scarlet or crimson in axillary or terminal racemes. Petals waved, 2 or 3 times larger than the calyx, tapering into claws, 1 in. long, the upper petal more cuneate, variegated red and yellow. Stamens nearly as long as the petals, pubescent at the base. Pod 1-2½ ft. by 2 in., flat, sessile, glabrous, many-seeded. Seeds ¾ in., oblong, variegated brown and white.

This splendid ornamental tree introduced from Mauritius and Madagascar some sixty years ago, is now naturalized all over India.

Attains 30-40 ft. height and 3-4 ft. girth. Fl. April-June; Fr. in the cold season. Is leafless for a short period in the hot season.

Wood white, soft, and loose-grained. Takes fine polish, but no use is made of it in this Presidency.

Cassia Siamea, Lam.; D. C. Prod, ii. 499.—*C. Sumatrana*, Dalz. & Gibs. Bby. Fl. Suppl. 29.—*C. florida*, Bedd. For. Sylv. t. 179. *Kassod.*

A robust tree, with virgate grey-downy branchlets. Stipules small, caducous. Leaves abruptly pinnate, 6-12 in.; leaflets 12-28, 1-3 in., oblong, more or less emarginate with a mucro, sub-coriaceous, glabrous or finely downy, on a small petiolule. Flowers yellow, ½-1 in. on puberulous pedicels, disposed in corymbose racemes, forming both axillary and terminal panicle ½-1 ft. long. Pod 3-7 in., nearly straight, flat, stalked, brown, many-seeded. Seeds dark-brown, glossy.

Cultivated in various parts of this Presidency, and is said to grow wild in the forests of the Peninsula, Ceylon, Tenasserim, Ava and the Malay Isles.

Attains 30-60 ft. height and 3-6 ft. girth. Is an almost evergreen tree. Fl. nearly all the year round, chiefly in the cold season; Fr. March-April.

Wood dark-brown, often streaked, close-grained, strong and durable. Takes fine polish, and is well adapted for furniture and cabinet-work.

Cassia glauca, Lam.; D. C. Prod, ii. 495; Dalz. & Gibs. Bby. Fl. Suppl. 30.

A tree with glabrous branchlets. Leaves distinctly petioled, abruptly pinnate, 6-12 in., leaflets 8-20, 2-4 in., ovate acute or blunt, sub-coriaceous, very glaucous; common petiole more or less silky-downy, with glands between the lower only, or between all the leaflets. Stipules small, caducous. Flowers rather large, yellow, on filiform about 1 in. long pedicels, arranged in axillary or terminal corymbose racemes. Pod 6-8 in. by ½-¾ in., flat, strap-shaped, 20-30-seeded. Seeds brown, compressed.

Common in gardens in Bombay, Poona and other parts of this Presidency. Said to grow wild from the Himalayas to Ceylon and Malacca. Fourteen to sixteen feet high. Fl. and Fr. all the year round, chiefly in the rainy season.

Cassia fistula, Linn.; Dalz. & Gibs. Bby. Fl. 80; Brand. For. Fl. 164. *Bawa, garmala, amaltas.*

A moderate-sized tree with grey trunk. Leaves pinnate, 12-18 in. long; leaflets 4-8 pairs, ovate or ovate-oblong, 2-5 in. long, on

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petioles 2-3 lin. long, acuminate, thin. Stipules minute. Flowers large, showy, yellow, on slender pedicels, 1½-2 in. long, arranged in drooping racemes, 1-2 ft. long, from the axils of the new leaves or from above the scars of fallen ones. Calyx of 5, nearly equal, velvety, deciduous lobes. Petals obovate-oblong, nearly equal, about 1 in. long. Stamens unequal, the 3 lowest longest, incurved, 1-3 very short. Pod cylindrical, pendulous, 2-3 ft. long, dark-brown, smooth, indehiscent, divided into numerous one-seeded chambers by thin transverse partitions. Seeds ovoid, somewhat compressed, brownish, enveloped in a soft black pulp.

Very common in the Konkan and throughout the ghâts and hilly parts of India.

Alt. about 4000 ft. at Mahábaleshvar and in the outer Himalayas.

Attains 30-50 ft. height, and 3-6 ft. girth. Fl. April-June; Fr. next cold season.

Wood red or reddish-brown, often beautifully mottled; very durable; makes good posts, ploughs, and spars of boats.

Hardwickia binata, Roxb.; Dalz. & Gibs. Bby. Fl. 82; Brand. For. Fl. 162. *Anjan* (by which name *Memecylon edule* is also known), *tam, parsed.*

Trunk straight, black and rough. Leaflets 2, like those of the *Aptá* tree, sessile, oblique, ovate-trapezoid, entire, obtuse, 1-3 in. long with 4-5 veins radiating from the base. Stipules small, caducous. Flowers greenish-yellow, on long terminal and axillary panicled racemes. Pedicels as long as the calyx. Sepals oblong, obtuse, about ⅛ in. long. Ovary oblong, sessile, stigma capitate. Pod thin, lanceolate, 2-3 in. long, dry, with 1 seed at the top.

In Khándesh, Nimár and also in the Lulling Pass between Málegaon and Dhulia. The tree grows also in the Madras Presidency, in Berár, Chanda, etc.

Attains 50-60 ft. height, occasionally 120 ft. Fl. in the cold season; Fr. April-May.

Wood dark, reddish-brown, hard and durable; takes fine polish, and is used for ornamental works and house posts. From the inner part of the bark, strong fibres are extracted, and used for cordage. The leaves afford good fodder for cattle.

Saraca Indica, Linn.; Brand. For. Fl. 166; Bedd. Fl. Sylv. t. 57.—*Jonesia asoca,* Dalz. & Gibs. Bby. Fl. 82. *Asók, jassundi.*

Leaves abruptly pinnate, sessile or nearly so, 12 in. long, drooping, reddish when young; leaflets opposite, 4-6 pairs, oblong-lanceolate, acute or obtuse, rigidly sub-coriaceous, shining, 2-9 in. long. Corymbs terminal and axillary, large, 3-4 in. broad, crowded with flowers of beautiful orange colour; pedicels coloured ½-¾ long, with coloured ovate bracts. Filaments 3 times as long as the sepals. Pods 6-10 in. by 2; hard, woody, dehiscent. Seeds 4-8, smooth, compressed, 1½ in. long.

Common about the ghâts of Southern India and Eastern Bengal; cultivated in Hindu temples and in gardens. (*See* Religious Plants.)

Handsome evergreen tree, attains 12-25 ft. height or more and 2-3 ft. girth. Fl. March-April; Fr. August-September.

Wood hard, tough, and dark-brown.

Tamarindus Indica, Linn.; Dalz. & Gibs. Bby. Fl. 82; Brand. For. Fl. 163. *Ambli, chintz.*

This is the well-known tamarind tree, common in this and the other Presidencies and in Burma.

Attains 50-80 ft. in height and 6-12 ft. girth, often 25 ft. Evergreen, but changes leaves in April. Fl. May-June; Fr. next cold season.

Wood hard, durable, but difficult to work upon.

Bauhinia racemosa, Lam.; Dalz. & Gibs. Bby. Fl. 82; Brand. For. Fl. 159. *Seyára, aptá, kachnal, ashta, maula, dorara.*

A tree having a dark-grey or brown trunk with exfoliating scales and drooping branches. Leaves cordate at the base, deeply cleft, broader than long, with rusty or grey tomentum on the under surface. Flowers whitish-yellow, in short-peduncled lax racemes, terminal or leaf-opposed, ¼-½ ft. long; pedicels shorter than calyx. Bracts deciduous. Calyx tube turbinate. Petals oblanceolate. Stamens 10, all fertile. Pod 5-12 in. by 1 in., thick, falcate, 12-20-seeded.

Very common in this Presidency and all over India, ascending to 5000 ft.

Attains 20-30 ft. height and 3-4 ft. girth. Fl. March-June; Fr. November-March of the following year. Sheds leaves December-January, and renews them March-June.

Wood reddish-brown, hard, used for agricultural implements. The bark furnishes a fibre of which strong durable ropes and slow matches for match-lock men are made.

Xylia dolabriformis, Benth.; Dalz. & Gibs. Bby. Fl. 85; Brand. For. Fl. 171. *Jamba, yerrul, suria.*

Leaves bipinnate; pinnæ 2; leaflets 4-10, opposite, oblong, acute, sub-coriaceous, 3-6 in. long, the terminal leaflets much larger. Flowers yellowish, sessile, in dense peduncled heads, crowded on 1-2 in. long peduncles arising from above the scars of the fallen leaves. Corolla ¼ in. Stamens 10. Pod woody, falcate, flat, greyish-brown, 4-6 in. by 1-2½ in., 6-10-seeded.

From Kolába Collectorate to Sávantvádi and Eastern and Western Godávari forests and in Burma, Singapore and the Philippines.

Alt. 3000 ft.

Attains 50-60, sometimes 100 ft. height, and 9-12 ft. girth. Fl. March-April; Fr. October-November. Sheds leaves during hot season.

Wood, called the iron-wood of Burma, is dark-red, hard, strong and durable, not attacked by white ants, and difficult to be worked upon. Used for ploughs, building posts and for other purposes.

Adenanthera pavonina, Linn.; Dalz. & Gibs. Bby. Fl. Suppl. 26; Brand. For. Fl. 168. *Thorlá-gunj* or *motlá-gunj.*

An unarmed tree; leaves abruptly bipinnate, 1-2 ft. long; pinnæ 4-6 pair, opposite, short-peduncled, 4-8 in. long; leaflets 4-12 pair, oblong, alternate, ¾-1½ in. long, on very short petiolules. Flowers small, yellow, faintly fragrant, in short-peduncled racemes, 2-6 in. long, simple from the axils of the leaves and panicled at the end of the branches. Pod 6-9 in. by ½ in., twisted, 10-12-seeded. Seeds scarlet red, shining, convex on both sides.

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Wild and planted in Southern India, Bombay, Gujarát, Khándesh, Bengal, Burma, Sikkim, ascends to 2500 ft. Height 50-70 ft. and girth 4-6 ft. Fl. March-May; Fr. August-October.

Wood heavy, fibrous, hard and durable. When fresh cut, of yellowish-red colour, turning brown or purplish on exposure. Useful for cabinet-work. Seeds used as weight (each about 4 grains) by jewellers, and worn as ornament. Oil is said to be extracted from them, and from the wood a red dye is prepared.

Prosopis spicigera, Linn.; Dalz. & Gibs. Bby. Fl. 84; Brand. For. Fl. 169. *Shemi, shemri.*

Branches unarmed or covered with scattered, nearly straight prickles. Pinnæ mostly 4, 1-2 in. long; leaflets 16-24, sessile, obliquely oblong, cuspidate, ¼-½ in. grey, coriaceous. Flowers small, yellow, in short-peduncled axillary spikes, 2-3 in. long, and terminal panicles. Calyx minute, cup-shaped; corolla $\frac{1}{12}$ in. long; pod straight, pendulous, glabrous, contracted between seeds, 4-8 in. by ½ in., filled with farinaceous edible substance. Seeds 5-15, brownish, oblong.

In Gujarát, Deccan, Bundelkund, Sind, Punjáb, Rájputána, etc. Fl. February-May; Fr. May-August. Sheds leaves in March, and renews them soon after.

Wood light yellowish-brown, coarse-grained, tough but readily attacked by insects. Used for carts and agricultural implements. Its heating power is equal to that of *babul*; hence it is used as fuel for steamers and locomotives. The pod is useful as fodder for camels, goats, etc. The mealy substance (pulp) in which the seeds are imbedded is eaten in Gujarát and in the Deccan; for this purpose the pods are collected before they are quite ripe; the sweetish pulp is eaten raw or boiled with vegetables, butter and salt. This tree is worshipped in the Deccan at the Dusserá festival.

Acacia Farnesiana, Willd.; Brand. For. Fl. 180; Bedd. Fl. Sylv. t. 52. *Gu-kikar, vilayti-babul.*

This small evergreen tree is armed with straight sharp spines and cultivated all over India on account of its yellow sweet-scented flowers arranged in globose heads. Fl. January-March, sometimes in the rainy season. Attains 20-25 ft. height, and 1-2 ft. girth.

Wood very hard and tough, much used in some parts for ship keels, tent-pegs, etc. Exudes considerable quantity of a white gum, which is collected in Sind.

Acacia Arabica, Willd.; Dalz. & Gibs. Bby. Fl. 86; Brand. For. Fl. 180. *Babúl, babur.*

A tree with grey-downy, thorny branches. Spines ¼-2 in. long, large, white, often with brown points, straight, somewhat ascending. Leaf-rachis downy with several cup-shaped glands; pinnæ generally 6-12, ½-1½ in. long; leaflets 20-40, linear, membranous, ¼ in. glabrous or downy. Flowers yellow, in globose heads. Peduncles slender, grey-downy, with bracts in the middle, 3-6 fasciculate. Corolla campanulate, twice the length of the calyx. Pod coriaceous, densely grey-downy, stalked, ½-¾ ft. by ½ in.; moniliform, 8-12-seeded.

Common in the Deccan, Gujarát, Sind, and many parts of India; and is cultivated.

Attains 50-60 ft. height and 5-12 ft. girth. Ascends 4000 ft. Fl. in the rainy season.

It is stated in the Bombay Flora that "there is a singular variety with erect branches, like a cypress in growth and very handsome, called *ram-kanta*. This is *A. cupressiformis* variety known also as *ran-babul kabuli-kikar*, common in some parts of the Deccan, Sind, and Rájputána, &c. The other variety, *eri-babul*, is what is called *Spina albida*, a young luxuriant plant with long, strong, white spines."

Wood pale-red or dark reddish-brown, strong, close-grained, and durable; employed for agricultural implements, tent-pegs, sugar-rollers, oil-presses, etc.; it is excellent for carts and gun-wheels. It is also a good fuel, as it has great heating powers. Indian gum-arabic is the concreted exudation from wounds made in the bark. It is used in native medicine and also by dyers and cloth-printers. The bark of the trunk is used for tanning and dyeing, and that of the root is said to be employed in the preparation of some sort of native spirit. The shoots, leaves and green pods are greedily eaten by cattle. In times of famine the bark is ground and mixed with bájri flour and eaten. The tender pods are used at all times as vegetable.

Acacia eburnea, Willd.; Dalz. & Gibs Bby. Fl. 85; Bedd. Fl. Sylv. 95. *Marmat.*

A small tree with slender downy or glabrous branchlets. Spines ¼-2 in.; the long ones ivory-white. Pinnæ 4-10, ¼-½ in. long, with a gland between the lowest pair, and occasionally one between the uppermost; leaflets 12-16 very small, linear, obtuse, coriaceous, grey-green, downy. Heads of flowers yellow, about ½ in. diam.; peduncles axillary, solitary or several, densely grey-downy with bracts about the middle. Corolla about twice the length of the calyx, tubulose. Legume stalked, 2-6 in. by ¼ in., thin, flat, glossy, 6-12-seeded.

Common in Southern India, Deccan and Sind in dry barren places; also in some parts of the Himalayas, Afghanistan and Aden.

Alt. 3-5000 ft.

Attains generally 14-20 ft. height. Fl. November-January; Fr. May-June.

This is used for fuel.

Acacia tomentosa, Willd.; Dalz. & Gibs. Bby. Fl. 86; Bedd. Fl. Sylv., 95. *Hewar.*

A small armed tree or shrub with branchlets and petioles velvety with dense grey tomentum, the latter with several glands. Spines 1-2 in. long, dark-coloured. Pinnæ 12-24, 1-2 in. long; leaflets 40-60, very small, linear, obtuse, grey, more or less pubescent, membranous. Flowers white, purplish, ½ in. diam.; peduncles axillary, densely pubescent, with a bract about the middle. Pod thin, flat, dry, dehiscent, falcately contorted, 4-6 in. by ½ in., 6-10-seeded.

In the Deccan and Khándesh jungles; also in Sholápur and Ceylon.

Used for fuel and fences.

Acacia leucophlea, Willd.; Dalz. & Gibs. Bby. Fl. 86; Brand. For. Fl. 184. *Hewar*, name also given to the preceding species; *nimbar, rohâni, safed kikar.*

Branchlets, leaves, petioles and branches of inflorescence grey-downy. Spines ¼-1 in., stipulary, straight. Petiole with several

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cup-shaped glands. Pinnæ 12-24, 1-1½ in. long; leaflets 30-60, rigid, coriaceous, ⅛-⅙ in., obliquely oblong obtuse. Flowers small, pale-yellow, nearly white, in globose heads, not more than ¼ in. diam., disposed in terminal leaflets about 1 ft. long panicles; peduncles short with 2 bracts. Pod 4-8 by ¼-⅓ in., sessile, slightly twisted, clothed with pale-brown or grey tomentum. Seeds 8-12.

Common in Southern Marátha Country and in Sholápur, North-West Provinces to Ceylon, Burma, Malay Isles and Timor.

Attains 25-50 ft. height and 4-6 ft. girth. In dry places is reduced to a small bushy tree. Fl. August-November, sometimes as early as May; Fr. November-April.

Wood hard and strong, of a brownish-red colour, loose-grained, seasons well and takes a fine polish, but is somewhat brittle; it is also used for fuel and other various purposes. From the tough and strong fibre of the bark, fishing-nets and cordage are made. The bark being ground and mixed with bájri flour is eaten in times of scarcity. It is added to sugar and palm juice in the distillation of spirits on account of the tannin it contains, which serves to precipitate the albuminous substances of the juice. Tender pods are eaten as vegetable, and the seeds boiled or ground and mixed with bájri flour. Large excrescences, like those found on *Prosopis spicigera*, but more spongy, are often seen on the branches.

Acacia suma, Kurz.; Brand. For. Fl. 187.—*A. catechu*, Dalz. & Gibs. Bby. Fl. 86. *Daula* (white), *kair*, *ker*.

A tree with white bark and downy branchlets. Spines twin, short-hooked, infra-petiolary. Leaf rachis ¼ ft. long, with a large cup-shaped, oval gland at the base, and several smaller ones between several of the upper pinnæ; pinnæ 20-40, 1½-2 in. long; leaflets 60-100, approximate, rigid, pale-green, ¼ in., pubescent. Flowers pale-yellow, almost white in axillary, 1-4-nate, 3-4 in. long, spikes. Legume 3-4 in. by ½-⅝ in., stipitate, and beaked, 6-8-seeded.

Common in the Konkan and also in Gujarát and Deccan, but stunted. In Madras, Bengal and Ceylon.

Attains 15-30 ft. in height and the trunk 3-4 in. girth. Fl. May-August.

Wood dark-coloured, extremely hard, durable, and stands a good polish. It is used for ploughs, cotton-rollers, and rice pestles. But the most valuable product of this and the allied species, *A. sundra*, is *catechu*, *cutch* or *katha*. In Goa and Malabár it is made by men called *kathacadis* from the heart-wood, and is extensively used with betel leaves and largely exported to Europe for dyeing and tanning. In medicine it is used in the same complaints as kino. The bark is also used for tanning.

Acacia sundra, D. C.; Dalz. & Gibs. Bby. Fl. 86.—*A. catechu*, Brand. For. Fl. 186. *Lal-keir*.

Resembles closely *A. suma*, from which it chiefly differs by its dark-brown or purplish bark. Spines short, hooked, twin, brown, infra-petiolary. Leaf rachis glabrous or pubescent, about ½ ft. long, often with scattered prickles, and a gland below the insertion of the pinnæ, and smaller ones between several of the upper pinnæ. Pinnæ 30-40; leaflets 40-80, ¼ in. long, very close, ligulate. Flowers pale-yellow, in solitary, or fascicled, axillary, 3-4 in. long spikes. Petals linear, three times longer than the glabrous calyx. Legume stipitate, strap-shaped, brown, 2-3 in. by ½-¾ in., 3-10-seeded.

Common in the Deccan, most parts of India, Burma, Ceylon.

Alt. 3000 ft.

Attains 30-40 ft. in height, and the short trunk 4-10 in girth. Fl. May-July; Fr. September-November. Old leaves shed in February-March; the new foliage March-April.

The wood is of a dark-red colour, heavy and durable, and used for building purposes, ploughs, etc. This species (like the above) yields *katha*.

Acacia ferruginea, D. C.; Brand. For. Fl. 185; Bed. Resembles *A. suma*, from which it differs by its dark-brown bark.

Spines short, hooked, twin, infra-petiolary; sometimes absent. Leaf rachis with one small circular or linear gland on the common petiole, and one between the uppermost pinnæ. Pinnæ 6-12, 2-3 in. long; leaflets 20-60, ¼-½ in., glaucous, rigid-subcoriaceous. Flowers yellowish, in dense axillary spikes, 4-5 in. long. Corolla very small. Pod 3-4 by ¾ in., dark-brown, glabrous, veined, 4-6-seeded, the upper suture narrowly winged.

It is a large tree found in the forests of Panch Mahâls and the Konkan. Attains 25-40 ft. height, and Fl. October-November; Fr. January-February.

The wood is of a reddish-brown colour, heavy and durable, used in building and in the construction of agricultural implements. The bark is strongly astringent, and said to be employed in the distillation of arrack.

Acacia latronum, Willd.; Dalz. & Gibs. Bby. Fl. 87; Brand. For. Fl. 180. *Bhés.*

A glabrous shrub or small tree, forming an umbrella-like crown when old, armed with twin, straight, white, stipulary spines, connate at the base, ¼-2½ in. long. Leaves often very close with a gland on the glabrous or (sometimes) pubescent petiole. Pinnæ 6-10, 1 in.; leaflets 20-30, ⅛-¼ in., ligulate, glabrous or pubescent, rigid. Flowers fragrant, white, becoming yellow in time, in spikes 1-1½ in., arising from the leafless branchlets. Corolla very small. Pod ½-2 by ½-¾ in., dehiscent, falcate, dark-brown, 2-4 seeded.

Common in the Eastern Deccan and in the Madras Presidency. Fl. January-March.

There are four more species of the genus growing in the Bombay Presidency, but they are climbers.

Albizzia odoratissima, Benth.; Dalz. & Gibs. Bby. Fl. 88; Brand. For. Fl. 175. *Borhi chichanda, bhandir, bansa, bas, ranśiris, sirsa* or *kala sirsa* (black), *harreri.*

An unarmed tall tree. Branchlets, petioles, inflorescence and under side of the leaves finely downy. Common petiole 6-12 in. long, with a gland at the base, and of the 1-2 upper pinnæ. Pinnæ 6-16, 4-6 in.; leaflets 16-50, ¾ in., oblong, unequal-sided, rigid, glaucous beneath, with the midrib parallel with the upper edge at a short distance from it. Flowers pale-yellow, fragrant. Heads few-flowered, very numerous, on peduncles ½-¾ in.; peduncles disposed in corymbose panicles, terminal or from the upper leaf-axils. Calyx very small, about five times shorter than grey-silky corolla. Legume 6-8 by 1-1½ in., firm, opaque or glossy, 8-12-seeded.

Konkan, Southern India, Panch Mahâls in Gujarát, Madras, Bengal and Burma. It is also planted in many places.

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Alt. 5000 ft., 30-40 ft. high, in favourable situations higher, girth of the trunk 5-6 ft. Fl. April-June; Fr. in the rainy season. It is an almost evergreen tree.

This large tree yields wood of a rich dark-brown colour, hard and strong. It takes a fine polish, and is used for naves, oil-mills and furniture.

A. Lebbek, Benth.; Dalz. & Gibs. Bby. Fl. 88; Brand. For. Fl. 176. *Siris, harreri, kalsis, garso.*

A tall unarmed tree. Common petiole 3-12 in., glabrous or downy, with a large gland near the base. Pinnæ 4-8 with or without one or more glands between the lowest; leaflets 8-18, unequal-sided, rigid, glabrous or pubescent, obtuse, 1-1½ in. Flowers white, fragrant, glabrous or downy, larger than in the last species, on pedicels ½ in. long. Heads many-flowered, on peduncles 3-4 in., 3-4 together, arising from the uppermost axils. Legume 8-12 by ¾-1½ in., firm, yellow-brown, thin, 6-12-seeded.

Common in the Konkan, Madras and Bengal, extending to the sub-Himalayan tract. It is planted in Bombay and elsewhere.

Alt. 5000 ft., 30-60 ft. high, with a girth of 6-10 ft. Fl. April-June; Fr. August-September. Like the last it is nearly evergreen, new leaves appearing March-April. The wood is similar to that of the last species.

A. procera, Benth.; Brand. For. Fl. 175.—*Acacia procera*, Dalz. & Gibs. Bby. Fl. 87. *Kinye, kilai, kili, karallu, tihiri, gurar, karo, gurkur.*

A large unarmed tree with white bark. Tender leaves downy. Common petiole 6-12 in., with a large, brown, oblong gland near the base. Pinnæ 4-12; leaflets 12-24, short-petioled, sub-coriaceous, rigid, obtuse, 1-1½ in., obliquely truncate at the base. Flowers yellowish-white, borne on peduncles 1 in., in fascicles of 2-5, arranged into more or less ample terminal panicles. Legume 6-9 by ¾-1 in., thin, reddish-brown, dehiscent, 8-12-seeded.

Common near the ghâts in the Deccan and still more so in the Konkan, Madras, along the Western forests, Himalayas, Burma, Malay and Philippines. Attains 60-80, and in favourable places 100 feet in height and the trunk 6-9 ft. in girth, or more. Fl. May-June; Fr. January-February. Almost an evergreen; the foliage is renewed in April-May.

The wood is dark-brown with patches of a darker colour; largely used for rice-pounders or pestles, wheels, etc.; it takes fine polish, and is recommended for furniture. The bark is used for tanning, and mixed with flour has been consumed as food in times of famine.

A. stipulata, Boiv.; Dalz. & Gibs. Bby. Fl. 88; Brand. Fr. Fl. 178. *Kasir, shemhar, udul, oi, sumsundra, siran.*

A large unarmed tree. Branchlets, petioles and inflorescence tomentose or downy. Common petiole 6-12 in., with a large gland near the base, and several smaller ones between the pinnæ. Pinnæ 12-40, 4-5 in.; leaflets 40-80, ½ in., membranous, sensitive, sessile, glaucous beneath, broader at the base, acute at the apex. Stipules large, cordate, acute, membranous, velvety, pubescent. Flowers yellowish, inodorous, almost sessile; stamens pink. Heads on ½-1 in. downy peduncles clustered, or racemose disposed in terminal panicles. Calyx very small, funnel-shaped. Corolla three times longer. Legume 5-6 by ¾-1 in., flat, indehiscent, pale-brown, 8-10-seeded.

Common on the ghâts, Mátherán, Mahábaleshvar in ravines, Madras, Kumaon, Sikkim to Ceylon and Burma.

Alt. 4000 ft.

Attains 60-80 ft. height, and 8-12 girth. Fl. April-June ; Fr. September-October. An evergreen tree, never altogether leafless, renews leaves February-March.

The wood is strong, coarse-grained, of a reddish-brown colour, and used for building purposes. It takes fine polish, and is good for cabinet-work and furniture. The leaves serve as cattle fodder.

A. amara, Boiv. ; Dalz. & Gibs. Bby. Fl. 88 ; Brand. For. Fl. 178. *Lalai.*

A middling-sized, unarmed tree ; branchlets, petioles and inflorescence densely pubescent. Common rachis 2-4 in. with one small circular gland below the pinnæ, and one above, at the insertion of one pair of the pinnæ. Pinnæ 8-20, 1-3 in. ; leaflets 30-60, ¼-⅓ in., membranous, sessile, caducous, glaucous beneath, the midrib nearly in the middle. Flowers yellow, fragrant in heads, on numerous peduncles, crowded in the axils of the uppermost much reduced leaves. Calyx minute. Corolla three times the length of the calyx. Legume 4-6 by 1 in., pale-brown, 6-10-seeded.

Common at Mahábaleshvar in ravines, on the banks of the Krishna, about Nalativad, at Mátherán, and in the Deccan ; in the dry forests of Madras and Ceylon. Fl. April-June ; Fr. September-October.

The wood is like that of the other species, and used for ploughs, carts and building purposes.

Pithecolobium dulce, Benth. ; Brand. For. Fl. 173.—*Inga dulcis*, Dalz. & Gibs. Bby. Fl. Suppl. 25. *Vilayti ambi, chinch, Deccani babul.*

A middle-sized, glabrous tree, armed with short stipulary spines, pointing upwards. Pinnæ and leaflets 2. Leaflets unequal-sided, 1-2 in., oblique, obovate-oblong, rigidly sub-coriaceous, obtuse, glaucescent. Flowers white, sessile, in small heads, ½ in. broad, on long terminal, racemose panicles. Calyx a line long. Pod 4-5 by ½ in., fleshy coriaceous, twisted. Seeds 6-8, dark-brown, imbedded in a pulpy, white, firm, sweet, edible pulp.

A large tree of Mexico, naturalized in Southern India, and common about Bombay in hedges. Attains 20-30 ft. height and 4-5 ft. girth. Is evergreen. Fl. January-March ; Fr. ripens April-June.

The wood is of a reddish-brown colour used for various purposes and for fuel. Smells unpleasantly when fresh sawn. The fruit is eaten at Manilla, and an oil is extracted from the seeds in Madura and Tinnevelly.

Pithecolobium bigeminum, Benth. ; Dalz. & Gibs. Bby. Fl. 89 ; Brand. For. Fl. 173. *Kachlora.*

A large, unarmed tree ; branchlets, inflorescence, and legume with thin, brown, ferruginous pubescence. Common petiole 1-3 in., with an oval gland on it, and at the base of each pinna and leaflet. Pinnæ 2-4 ; leaflets 4-6, sub-coriaceous, elliptic-oblong, or obovate-oblong, acute, the upper 4-6 in., the lower shorter, all like the pinnæ distinctly petioled. Flowers white, silky. Heads with 6-12 sub-sessile flowers in copious, large, axillary and terminal panicles. Pod 3-6 by ½-1 in., generally spirally twisted, slightly pubescent, valves coriaceous.

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Southern Konkan and Western forests of Madras, Eastern Himalaya, Nepaul, Ceylon and Indian Archipelago.

Alt. 3000 ft.

Fl. March-May; Fr. August-October. Is an evergreen tree.

Wood dark-coloured, called by some *iron-wood*.

ROSACEÆ.

Pygeum Gardneri, Hook.; Hook. Fl. Ind. ii. 321; *P. Zeylanicum*, Dalz. & Gibs. Bby. Fl. 82. *Daca, kaula (?)*

A large, glabrous tree; inflorescence with tomentose pubescence. Leaves 4-6 in., alternate, coriaceous, entire, glabrous, ovate-oblong or ovate-lanceolate, acuminate, base acute, or rounded, equal or unequal; basal glands none; petioles glabrous; of young leaves silky. Flowers ¼ in. diam., yellowish-white, on ¼-½ in. stout pedicels disposed in racemes 3-4 in. long. Calyx tube urceolate; limb 10-12 obtuse lobes. Petals none. Stamens 12. Ovary hirsute; style exserted, 1-1½, smooth, obtusely and transversely 2-lobed.

Mahábaleshvar and other ghâts of Bombay, rare; and on Nilghiri Hills. Attains 25-40 ft. in height and 4-8 girth. Ascending 4500 ft. at Mahábaleshvar. Fl. in the rainy and cold season; Fr. March-May.

Sapwood dark-red. Heartwood whitish, coarse-grained—used, I am informed, for making boxes, planks, rafters and beams.

RHIZOPHOREÆ.

Rhizophora mucronata, Lam.; Dalz. & Gibs. Bby. Fl. 95; Brand. For. Fl. 217. *Kamo, bhora*—Sind and Bengal names.

A small glabrous tree. Leaves 3-7 by 1½-4 in., oval, or elliptic-oblong, mucronate, narrowed at the base, rather long-petioled, coriaceous. Flowers pedicellate, greenish-white, rather large, sweet-scented, on peduncles arising from the axils of leaves, longer than the petioles, about 3-6-flowered. Calyx segments triangular. Petals villous at their involute margins. Stamens 8. Fruit about 1 in. diam., ovoid or obconic, furrowed, supported at the base by the reflexed limb of the calyx. Radicle of the fruit germinating on the tree about 2½ ft. long.

Common in the salt marshes along the coast of this Presidency, of Madras, Bengal and Burma. Is also found in Africa and Australia. An evergreen tree, attaining 15-25 ft. in height and 1-2 ft. in girth. Wood greyish, or pale-red, hard, rather heavy, close-grained and durable. Bark employed in tanning, and the fruit said to be edible.

Bruguiera gymnorhiza, Lamk.; Brand. For. Fl. 219.—*B. Rheedii*, Dalz. & Gibs. Bby. Fl. 95. *Kakra, kamkra*—Bengal names.

Glabrous tree. Leaves shortly, oblong-elliptic, or oblong-lanceolate, 3-6 by 1½-2½, coriaceous, on a thick petiole, 1 in. long. Stipules oblong, very deciduous. Flowers red, about 1 in. diam., on short, thick drooping peduncles, shorter than the petioles, solitary in the axils of the leaves. Calyx tube almost campanulate; limb 10-14-cleft; the segments 6-8 lin., stiff. Petals 10-14, densely hairy at the base, 2-lobed, with 2-4 bristles on each lobe and one in the sinus between the lobes. Fruit oblong, drooping, crowned at first with the stiff calyx lobes; germinating radicle cylindric, smoothish.

Common along the coast, estuary of the Indus, Sunderband, and Indian Archipelago. An evergreen tree, 30-40 ft. high, with a girth of 5-8 ft. Fl. January-May.

Wood yellowish or reddish-brown, close-grained, coarse-fibrous, hard, heavy, strong and durable. Bark contains large quantity of tannin, and constitutes an article of commerce.

Bruguiera parviflora, described in the Bombay Flora under the name *Kanilia parviflora*, is a small shrub also found on salt marshes along the coast.

Carallia integerrima, D. C.; Dalz. & Gibs. Bby. Fl. 95; Brand. For. Fl. 219. *Panschi.*

Leaves dark-green, lucid, quite entire, or rarely serrulate towards the apex, elliptic-ovate, obovate, narrow, oblong, obtuse, acute or short acuminate, narrow or acute at the base, glabrous, coriaceous. Flowers white, very small, usually 8-merous, in dense, almost capitate, short-peduncled, axillary cymes. Calyx broad-campanulate. Petals deeply laciniate, obovate, concave, not embracing the stamens. Berry size of a pea, globose, 1-seeded.

Khandála, Párr Ghát, Mátherán and other ghâts of this Presidency; also in those of Southern India, Bengal, Assam, Silhet, Burma, Ceylon, Malay Archipelago, China and Australia. This evergreen tree attains 25-50 ft. in height and 4-10 ft. in girth. Fl. February-March; Fr. April-June.

Wood very ornamental, red-brown, variegated with undulating lighter-coloured bands, heavy and close-grained. Used for rice-pounders, planks, etc. Polishes well, and is well adapted for cabinet-work and furniture.

COMBRETACEÆ.

Terminalia belerica, Roxb.; Dalz. & Gibs. Bby. Fl. 91; Brand. For. Fl. 222. *Bhêrdha, behedo, bahra, bhaira, goting.*

Glabrous tree; young branchlets and calyx clothed with rusty pubescence. Leaves 3-6 in., crowded at the end of the branches, alternate, coriaceous, broadly-elliptic or obovate-elliptic, obtuse, retuse, or short-acuminate at the base, often unequal at the base, deciduous; petioles 1-2½ in. Bracteoles minute. Flowers small, grey or greenish-yellow with an offensive smell, arranged in simple solitary, axillary or infra-axillary spikes, 3-6 in., upper flowers of the spike male, lower hermaphrodite. Calyx pubescent with long rusty hairs inside. Fruit ½-¾ in. diam., ovoid, grey, when dry obscurely 5-angled.

Common in the plains and at the foot of the ghâts throughout India and Malay Isles.

Alt. 2000 ft.

Attains 60-100 ft. in height and 8-20 ft. in girth. Sheds old leaves February-March, is covered with new in April. Fl. February-May; Fr. during the next rainy and cold seasons.

Wood light-grey and durable, used for planking, packing cases, etc. The fruit is the *beleric myrabolans* of commerce, and is used for dyeing cloth and leather and in making ink. The kernels are generally eaten by the natives, but when taken in large quantities they produce symptoms of narcotic poisoning. Oil is also expressed from them. A quantity of insipid gum, like gum-arabic, issues from wounds in the bark of this tree.

T. chebula, Retz.; Dalz. & Gibs. Bby. Fl. 91; Brand. For. Fl. 91. *Harda, hirda, har, hararâ, harla.*

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Young parts more or less rust-coloured or silvery-hairy. Leaves not clustered, mostly sub-opposite, ovate, or elliptic-ovate, acute and rounded at the base, 3-5 in., deciduous. Petiole 1½-2 in., often with 2 glands near the summit. Flowers all hermaphrodite, dull-white or yellowish, subtended with a downy bracteole, arranged in terminal, often panicled spikes, 2-4 in. long. Fruit ¾-1¼ in., ellipsoidal or obovoid from a cuneate base, more or less distinctly 5-angled.

Common all over India, up to nearly 5000 ft. at Mahábaleshvar, Ceylon, Burma, etc.

Alt. 2-5000 ft.

Attains 25-35 ft. in height, in favourable circumstances 80-100 ft. and 5-12 ft. in girth. Sheds its leves February-March, and is covered with new ones in April. Fl. May-June; Fr. in the next cold season.

The wood is yellowish-brown, hard, heavy and durable; used for building purposes, etc. It takes fine polish and is employed for furniture, carts. The dried ripe fruits are the black or *chebulic mirabolans* of commerce. They are ovoid, more or less furrowed longitudinally, and of a yellowish-brown colour. There are two chief varieties to be met with in the bázárs:—*Herda*, of a dark yellowish-brown colour, 1-1½ in. long; and *rangari herda* smaller, about ¾ in. long, of lighter colour. These fruits are extensively exported to Europe, and are valuable in the arts, as they contain a considerable amount of astringent principles. Bruised and immersed in water containing iron filings or salts of iron, they yield ink, and mixed with alum in solution, a good yellow dye. They are held in high repute as medicinal agents, and are a good substitute for galls in lotion. Six fruits are administered internally in dysentery, bleeding piles and in other diseases requiring tonic astringents. The unripe dried fruits are called *bala-harda*. They are ovoid, black, shrivelled bodies about ½ in. long, possessing the same properties as the ripe fruits, and are generally administered in the same cases—having been previously powdered in ghee or castor oil. Curious hollow round galls, about 1 in. in diameter, are found on the leaves of this tree, supposed to be caused by some unknown insect having deposited its ova there. They are very astringent, and are given in cases of infantile diarrhœa, and used in making ink, in dyeing and in tanning. They are known as *harda-phal* in the Deccan or *kadu kay* in Tam. The bark is also used in tanning.

T. citrina; **T. Gangetica**, Roxb.; and **T. tomentella**, Kurz., are believed to be mere varieties.

T. arjuna, Bedd.; Dalz. & Gibs. Bby. Fl. 91; Brand. For. Fl. 224.—*T. berryi*, Dalz. & Gibs. Bby. Fl. 91. *Anjan, jamla, kowa, arjun, arjuna-sadra.*

A large glabrous tree. Leaves 5-8 in., sub-opposite, coriaceous, glabrous when old, oblong or elliptic, often suddenly narrowed or cordate at the base, obtuse or acute at the apex; petiole about ½ in. or less, with 2 glands near its apex, or at the base of the leaf. Flowers dull-yellow disposed in pedunculate, terminal and axillary spikes, usually panicled. Bracteoles very small. Fruit 1-2 in. with 5-7, coriaceous, thick wings, truncate or narrowed at the summit, marked with ascending cross lines.

Found in the Deccan and the Sub-Himalayan tracts of North-West Provinces; also in Bengal, Oude and Southern India.

Attains the height of 60-80 ft.

Wood brown, variegated with darker-coloured streaks, very hard. It is not easy to work, and sometimes splits on seasoning. Used for carts, agricultural implements, etc.

In this Presidency it is found in the North Konkan and Deccan, but is very common in the Southern Konkan in the vicinity of the banks of rivers. Also in the Sub-Himalayan tracts of the North-West Provinces and in Ceylon. Of great size in the Belgaum and Sunda forests. Attains 80-102 ft., generally 40-50 ft. in height and 10-20 ft. in girth. Is almost an evergreen tree. Fl. April-May; Fr. at the end of the rainy and in the cold seasons.

Wood dark-brown, very hard, used for carts, agricultural implements and building. The bark is in great repute as a tonic, and is administered internally in the form of decoction in atonic diarrhœa, and used as a local application to indolent ulcers. (*Terminalia Arjuna*, Bedd.)

Syn. **Pentaptera angustifolia**, Roxb., with narrow oblong leaves, is a variety of the last species.

T. tomentosa, Bedd.; Brand. For. Fl. 225.—*T. glabra, var. tomentosa*, Dalz. & Gibs. Bby. Fl. 91. *Ain, asna, saj, sadri, marthi.*

Branchlets, young leaves, and inflorescence rusty-tomentose. Leaves 3-9 in., sub-opposite or alternate, elliptic, ovate or obovate-oblong, glabrous or hairy when old, coriaceous, cordate or suddenly narrowed at the base into short petioles, ½ in. with 2 glands near the base of the midrib. Flowers of a dull-yellow colour in panicled spikes. Bracteoles very small. Fruit 1-2 in., obovoid-oblong, wings broad, marked with prominent horizontal lines; edges of wings thin, irregularly crenulate.

Forests from Gujarát down to Konkan, Madras and Ceylon, Sátára and various parts of the Deccan. Also in Burma and Sub-Himalayan tract of the North-West Provinces.

Alt. 4000 ft.

Attains 80-100 ft. in height and 8-10 ft. in girth. Fl. April-May; Fr. January-April of the next year. Sheds its leaves January-March and renews them at the end of the hot season.

Wood hard and strong, much used in house-building, for making cart wheels and boats. It is an excellent fuel, and furnishes good charcoal. The bark is used for tanning, and the ashes (of the burnt bark) are said to be chewed with betel leaves. Potash is in some places prepared from them. Tassar silk-worm feeds on the leaves, and lac is sometimes formed in them. The flowers are often attacked by a species of cynips giving rise to numerous galls simulating fruits.

T. paniculata, Roth.; Dalz. & Gibs. Bby. Fl. 92; Brand. For. Fl. 226. *Kinjal, kindal.*

Young parts, inflorescence and bracts rusty-pubescent. Leaves 4-7 in., lower sub-opposite, upper alternate, coriaceous, nearly glabrous when old, oblong, elliptic, acuminate, cordate, generally with 2 sessile glands near the base of the midrib; petiole ½-¾ in. Spikes of reddish flowers very dense, terminal, forming compound panicles. Bracts ovate, acuminate, recurved. Calyx reddish, with long hairs within. Fruit ½-¾ in., brown-red, villous, with one broad wing about ½ in. and 2 smaller.

Common along the foot of the ghâts in the Southern Konkan to Cochin. Said to grow at Nilghiri and Coorg. Fl. August-October; Fr. ripens February-April, sometimes earlier.

Timber Trees.

Wood is said to be good and fairly durable, and is used for planks and posts, is inferior to that of *ain* and *marthi*.

T. catappa, Linn.; Dalz. & Gibs. Bby. Fl. Suppl. 33; Roxb. Fl. Ind. ii. 430. *Bengali badhám.*

A handsome tree, branches whorled, horizontal, forming table-like tiers. Leaves 6-9 in., generally softly hairy when young, or glabrous, chartaceous, alternate, crowded at the end of branches, obovate, oblong, apiculate, base cordate or narrow-rounded with a depressed gland on each side of the midrib; petiole ¼-¾ in. Flowers small, greenish-white, forming solitary axillary spikes, shorter than the leaves. Bracteoles minute, lanceolate; the upper flowers male, the lower hermaphrodite. Fruit oval, or ellipsoid, compressed, with 2 elevated margins, 1-1½ in., rather convex on both sides.

Wild in Malaya, Moluccas (?) and extensively planted all over the tropics on hedges and gardens. Ascends 1000 ft., and attains 30-30 and in favourable situations 60-80 ft., with a girth of 6-8 ft. In Bombay almost evergreen—leaves which commence falling at the end of cold season are soon renewed.

Wood of a greyish-white colour, light, durable and much esteemed in Malabár, where the tree attains large size and is used for posts and various other purposes.

Anogeissus latifolia, Wall.; Brand. For. Fl. 227.—*Conocarpus latifolia*, Dalz. & Gibs. Bby. Fl. 91. *Dándua, dhávada, dhaura, bákli.*

A large tree with white smooth bark; branchlets and young leaves with soft, silky or rusty pubescence. Leaves 2-5 in., on petiole ½ in., coriaceous, ovate, or broad-elliptic, obtuse, retuse or emarginate. Flower heads in axillary racemes; peduncles one or more from the same axil, often branched. Bracteoles minute. Fruit very small, 2-winged, prickly, glabrous.

Mira Hills, Kennery and forests of the Konkan, and Madras to Ceylon. In the Sub-Himalayan forests to the Rávi.

Alt. 3000 ft.

Attains 30-50 ft., sometimes 80 ft. in height and 6-9 ft. in girth. Leafless during the whole of the cold season. And the new foliage appears in April-May. Fl. May-June (January-February, Roxb.); Fr. ripens November-February.

Wood close-grained, hard and tough, and used for cart axles, etc. It is useful as fuel, and yields good charcoal. From incisions made in the bark flows a white gum, similar to gum-arabic, which is employed in cloth-printing. The leaves are said to be used in tanning.

A. pendula, Brand. For. Fl. 229. *Kala-dhankra.*

Is a small tree or shrub with small glabrous leaves described from Deesa in this Presidency. Common in Rájputána.

Lumnitzera racemosa, Willd.; Dalz. & Gibs. Bby. Fl. 90; Brand. For. Fl. 221.

A glabrous tree or shrub. Leaves 1-3 in., sessile, coriaceous, veinless, entire or crenate, attenuated at the base, cuneate, obovate, retuse. Flowers small, white, in solitary, simple, axillary spikes, about as long as the leaves or shorter. Bracteoles minute. Stamens 10, alternately shorter, occasionally 5 (?). Fruit ½ in., ovoid.

Banks of salt-water creeks, Southern Konkan, Malabár and Sunderband, Ceylon and Australia.

An evergreen tree 15-40 ft. high and 2-4 ft. in girth. Fl. in the hot season; Fr. October-November.

Wood said to be strong and durable, and used for posts and other building purposes.

Gyrocarpus Jacquini, Roxb. Fl. Ind. 1·445; Cor. Pl. t. 1; Bedd. Fl. Sylv. t. 196.

Branchlets and young leaves downy. Leaves 4-5 in. and almost as broad, broadly-ovate, entire, or slightly lobed, acuminate at the apex, truncate or cordate at the apex, rarely pubescent; clustered at the end of the branches; those of the young plants are larger, often 8-10 in., distinctly 3-lobed; petiole 1-4 in. Flowers small, greenish-yellow, unisexual, arranged in dense axillary cymes; peduncles 1-4, chiefly in the upper axils. Drupe ½-¾ in., ovoid, crowned with the elongate wing-like spathulate, calyx lobes 2-2½ in., coriaceous.

Common in the Deccan, ascending 1000 ft. on the banks of the Krishna River, near Nalativad. Bengal, Malay and the tropics. Attains 40-60 ft. in height and 4-8 ft. in girth. Fl. July-September; Fr. November-February.

Wood said to be white, coarse-grained, very light and soft; fit only for boxes, toys, etc.

MYRTACEÆ.

Eugenia jambolana, Lam.; Brand. For. Fl. 233.—*Syzygium jambolanum*, Dalz. & Gibs. Bby. Fl. 93. *Jambul, jám.*

Glabrous. Leaves 3-6 in., coriaceous, smooth, shining, entire, ovate, or oblong-lanceolate, more or less acuminate, penninerved, the numerous nerves uniting within the margin; petiole ½-1 in. Flowers numerous, greenish-white, odorous, in short and compact panicled cymes, usually lateral on the previous year's branches, occasionally axillary, or terminal. Calyx tube funnel-shaped, truncate or obscurely lobed. Petals cohering and falling off in a calyptra. Berry oblong or sub-globose, ½-1 in., crowned with the base of the calyx, purple, succulent when ripe.

Common throughout India, Ceylon, Malay Archipelago to Australia ascending to 5000 ft. Attains 30-80 ft. in height and 5-12 ft. in girth. An evergreen tree, renewing its leaves in the hot season, whilst the old ones are falling off. Fl. February-March; Fr. April-June.

Wood reddish-brown, tough, hard, and excellent for building and agricultural implements. The bark is astringent, and in the form of decoction is administered in chronic dysentery. It also yields an extract, like gum kino, which is used for dyeing and tanning. The fruit has a sweetish taste, and is much eaten by the natives, and also by birds and bats. From its juice a pleasant syrup is prepared, which acts as a good aperient in chronic diarrhœa. Vinegar for domestic use is also prepared from it by some people at Mahábaleshvar.

Jambul tree is very variable in the shape of its leaves, the size of its fruit and the height. The following are its chief varieties.

E. caryophyllifolia, with ovate-lanceolate, long, acuminate leaves and globose fruit size of a pea. This form prevails chiefly at Mahábaleshvar. *E. obtusifolia* with obtuse leaves and large oblong fruit. This variety is more frequently seen in the Konkan.

Timber Trees.

Other species belonging to this genus are chiefly seen growing over the higher ghâts. Some are very handsome, such as *E. rubicunda*, *E. Zeylanica* with cymes of white flowers, *E. læta* with cymes of large crimson or purple flowers, *E. caryophyllæa*, yielding an edible fruit, etc.

E. jambos and *E. malaccenses* are cultivated for the beauty of the foliage and flowers. The fruit is not of good flavour.

The wood of some of these is brown-red, but all of them are small trees, used in the construction of huts or for fuel.

E. Stocksii is a lofty tree with large, oblong, or elliptic-obovate leaves and dense axillary and lateral cymes of small flowers.

Barringtonia racemosa, Blume; Dalz. & Gibs. Bby. Fl. 94. *Kárpa.*

Glabrous. Leaves 10 by 3 in., cuneate, oblong, or cuneate-lanceolate, coriaceous, crenulate, shortly acuminate, rounded at the base, petiole ⅛-¼ in. Flowers showy, pink or pale-rose-coloured, on slender pedicels ¼-⅜ in., forming lax pendulous racemes, 12-18 in., arising laterally from the ends of the branchlets. Calyx tube, turbinate, lobes ovate. Fruit ovoid-oblong, 1¾ by 1-½ in., obscurely quadrangular when ripe, smooth.

Konkan, in the Severndurg Táluka, in Madras about the coast, and from Sunderband to Malacca and the Andamans.

Attains 40-50 ft. height and 4-5 ft. girth. An evergreen tree. Fl. March-April; Fr. May-July.

The wood is like that of the following species:—

B. acutangula, Gærtn.; Dalz. & Gibs. Bby. Fl. 95; Brand. For. Fl. 225. *Indar, ijál, samándar-phal, tuwar, kanapa chethi.*

Glabrous. Leaves 3-5 by 2 in., short-petioled, cuneate-elliptic or obovate-oblong, entire or serrulate, coriaceous, occasionally pubescent. Flowers pink, smaller than in the preceding species, arranged in long, often about 1 foot pendulous racemes at the ends of the branches, sometimes downy. Calyx 4-cornered, the limb 4-lobed. Petals 4, pink, ¼ in. Filaments long, red. Fruit 1-1½ by ½ in., oblong, 4 angled; angles rounded.

Common on the banks of streams in the Konkan, Malabár, Burma, Bengal, Ceylon, and all over India, Singapore, Australia and the Malay Isles.

Attains 40-50 ft. height and 4-6 ft. girth. An evergreen tree. Fl. April-May; Fr. rainy season.

Wood reddish-brown, close-grained, hard, tough and strong. Used for boat-building, carts, etc. Pounded bark is employed for catching fish. The fruit rubbed in water is administered as an emetic.

Careya arborea, Roxb.; Dalz. & Gibs. Bby. Fl. 95; Brand. For. Fl. 236. *Kumbia, kumbi, wátkumba.*

Wholly glabrous. Leaves 6-12 by 4-6 in., oblong, obovate or orbicular, membranous, sessile or very short-petioled, crenate-denticulate, obtuse or shortly acute. Flowers 2-2½ in. diam., white with purple filaments, subtended by 3 unequal bracts arranged in short spikes, with an unpleasant smell. Calyx campanulate. Fruit 2½ by 2 in., globose, and crowned with the persistent calyx-tube.

Very common in the Southern Konkan and Indápur. Also in Madras, Bengal and Burma. From Himalaya to Travancore and Tenasserim. Alt. 4000 ft.

Attains 30-60 ft. height and 5-8 ft. girth. Sheds leaves during the early part of the hot season, and is soon covered with new leaves (March-April). Fl. March-April; Fr. May-July.

Wood red or reddish-brown, beautifully mottled, close and even-grained, strong, and used for cart-building. Takes fine polish, and is good for cabinet-work and furniture. Strong cordage is made from the fibres of the bark and also matches for matchlock men. The bark is said to be used for tanning in some parts of India.

Psidium Guyava, Linn.; Brand. For. Fl. 232.—*P. pyriferum*, Dalz. & Gibs. Bby. Fl. Suppl. 34.

This is the *guava* tree, *Amrud*; indigenous in Mexico and West Indies and naturalized throughout India.

Grows to be a tree 20-30 ft. high and 2-3 in. in girth. Evergreen. Fl. April-May; Fr. rainy season. In some places it flowers all the year round.

Wood very hard, close-grained, takes a fine polish, and is excellent for carpentry, and the bark for tanning the leather.

LYTHRACEÆ.

Lagerstrœmia parviflora, Linn.; Dalz. & Gibs. Bby. Fl. 98; Brand. For. Fl. 239. *Nakeh, dáura, sida, lendi, bandárah, kákrio.*

Glabrous; branchlets and young leaves are pubescent, at least on midrib. Leaves 2-3½ in., oblong, opposite, coriaceous, sessile, or shortly-petiolate, rounded at the base, acute or acuminate-obtuse, glaucous beneath. Flowers white, fragrant, ¼-½ diam., on slender pedicels, forming lax axillary or terminal panicles. Calyx glabrous or minutely-downy, not ribbed; lobes 6-7, ultimately erect, adpressed to the fruit. Petals clawed, crumpled. The 6 outer stamens much longer than the inner ones. Capsule oblong or obovate-oblong, ½-1 in. long; 3-4 celled. Seeds with a terminal wing.

Common; from Gujarát to the Konkan, ascending up to the valleys of Mahábaleshvar.

Alt. more than 4000 ft.

Common in Central and Southern India, Bundelkund, Behár and at the base of the Western Himalaya.

Attains 50-70 ft. in height and 6-8 ft. in girth. Bark white. Fl. April-June; Fr. rainy season. Sheds leaves March-April, and renews them in May.

The wood, called *bentek*, is light-brown or reddish, strong, tough and durable, takes a fine polish, and is used for ploughs, buggy-shafts, etc. The bark and leaves are used for tanning, and the gum which exudes from the bark is said to be sweet and edible.

L. lanceolata, Wall.; Dalz. & Gibs. Bby. Fl. 98; Brand. For. Fl. 240. *Bandara, bandaya, nándi, náni, sokutia, boda.*

Leaves 3 in., ovate, or elliptic-lanceolate, acuminate, narrowed at the base into a petiole ¼-½ in., glabrous, white beneath. Flowers white, larger than in the last species, in lax compound panicles. Pedicels slender and downy. Calyx sometimes white-tomentose, not ribbed; lobes finally patent or reflexed. Capsule smaller than that of *L. parviflora*, usually about ¼-½ in., very hard.

Common in the forests of our ghâts from Khándesh, Deccan to Sávantvádi, Malabár Coast to Travancore.

Timber Trees.

Attains 30-50 ft. and a girth of 4-5 ft. Fl. April-May; Fr. in the rainy season. Wood red, moderately hard.

L. flos-reginæ, Retz.; *(L. reginæ),* Dalz. & Gibs. Bby. Fl. 98; Brand. For. Fl. 240. *Motta-tandara, taman.*

Glabrous, sometimes with a few scattered straight spines 1-3 in. on old trunk and branches. Leaves 4-9 in., broad-elliptic or oblong-lanceolate, obtuse, entire, coriaceous, on a petiole ¼-½ in. Flowers 2-2½ diam., showy, lilac, on thick arhitish pedicels, forming large, not dense, panicles. Calyx clothed with white or tawny tomentum, 12-14-ribbed. Petals waved. Stamens all equal in length. Capsule oblong ½-¾ in., 6-celled. Seeds brown with a lateral wing.

Common in the Deccan, Nagotna, Ratnágiri, Vengúrla and the Western forests of Southern India, Assam, Ceylon, Malacca and China.

Attains 50-60 ft. and a girth of 6-12 ft., ascending to 2000 ft. Fl. May-July; Fr. cold season. Leafless during the hot season.

Wood of a red or whitish colour, rather heavy, close-grained and strong; takes a good polish. It is extensively used for ship-building in Chittagong and Burma, and for carts, boats, planks, etc.

Punica granatum, Linn.; Dalz. & Gibs. Bby. Fl. Suppl. ?; Brand. For. Fl. 241. Pomegranate, *dalim, anár.*

The wood is of a whitish colour, hard, heavy, and takes a fine polish. The bark of the root is an effective remedy for tape-worm, and with it Morocco leather is tanned and dyed. The rind of the fruit is administered in diarrhœa and chronic dysentery, and also used as dye and tan stuff. From the flowers a red dye is prepared.

Sonneratia apetala, Ham.; Roxb. Fl. Ind. ii. 506; W. & A. Prod. 327.

A glabrous tree with drooping branches. Leaves 3-4 by 1-1½ in., oblong-lanceolate, or linear-lanceolate, obtuse, attenuated at the base on a petiole ¼ in., coriaceous, pale-green. Flowers whitish, about 1 in. diam. Pedicel 1 in., terete or angular, arising from the end of branchlets. Calyx ¾ in., lobes 4, oblong, acute. Petals none. Filaments as long as the calyx-lobes. Style included or scarcely exert; stigma large, capitate. Capsule broader than high, 4-6-celled, with the calyx at the base.

Found at Sewri and in the Konkan in salt marshes. Common at Sunderband, back-waters of Travancore, Transgangetic Peninsula to Moulmein.

Is an evergreen tree; attains 40-50 ft. with a girth of 3-5 ft. In some places it is a stunted shrub. Fl. June-July; Fr. August-October.

Wood reddish-brown, coarse-grained, strong and hard.

S. acida, Linn.; Dalz. & Gibs. Bby. Fl. 98; Brand. For. Fl. 242.

A small glabrous tree or shrub with drooping branches. Leaves 3-4 by 1-1½ in., obovate, or broadly-ovate, attenuated into a broad but very short petiole, obtuse or retuse, entire, coriaceous. Flowers about 2 in. diam., reddish or purplish, on very short pedunclos, solitary at the ends of branchlets. Calyx about 1 in., not ribbed, 6-8 lobed. Petals linear, acute. Style long-exerted. Capsule 2-2½ in. broad, concave at the top, many-celled.

In salt marshes in Sálsette, Ratnágiri, Vengúrla and all along the Western Coast, Sunderband, Travancore, Ceylon, Burma, Java, Pegu and Siam.

Attains 10-15 ft. in height. Fl. in the beginning of the rains, probably nearly all the year round; Fr. cold season. Wood soft and light, used as fuel.

SAMYDACEÆ.

Casearia graveolens, Dalz. & Gibs. Bby. Fl. 11; Brand. For. Fl. 243. *Naro, nahŕaw, chilla, pimpri.*

A shrub or tree, glabrous. Leaves 3-8 by 1-2 in., broad-elliptic, short-acuminate, or obtuse, crenate-dentate, narrow and rounded at the base, on a petiole ¼ in. Flowers numerous, green, with a disagreeable odour, clustered in the axils of the leaves; pedicels short, about ¼ in., articulated above the base, pubescent below the articulation. Calyx lobes 5, sometimes pubescent. Petal none. Stamens 8, alternating with scalelike staminodes. Fruit ¾ in., oblong-ellipsoid, 3-valved.

In the Konkan, Karanja, Rájápur, valleys of Mahábaleshvar, Mátherán (?) and Western Ghâts of Madras, Garwhal, Kumaon, Burma and Sikkim.

Attains 20 ft. in height and 12-15 in. in circumference, ascending up to 5000 ft. Fl. March-April; Fr. in the rainy season. Sheds leaves March-April, and these are renewed in May.

Wood light-yellow, close-grained. The fruit is used for poisoning fish.

Casearia tomentosa, Roxb.; Brand. For. Fl. 243.—*C. anavinga*, Dalz. & Gibs. Bby. Fl. 11; Brand. For. Fl. 243. *Lainja, massoi, karei, chilla, bhari* (Punj. name).

Branchlets tomentose or nearly glabrous. Leaves 4 by 1½ in., tomentose, pubescent, or scantily hairy at the base of the midrib, ovate, elliptic-oblong or lanceolate, serrulate, or nearly entire, somewhat unequal and rounded at the base. Flowers small, numerous, greenish-yellow, on pedicels ¼ in., in dense axillary fascicles. Stamens 7-10. Staminodes hairy, alternating with the calyx lobes. Fruit ovoid, ⅜ in., 3-valved. Seeds imbedded in a red soft arillus.

Karanja, Rájápur, Mátherán (?), valleys of Mahábaleshvar. Throughout India, Ceylon, Malaya and North Australia.

Attains 25-35 ft. in height, in some places higher, with a girth of 4-7 ft. Fl. February-May. Sheds leaves January-March, and new foliage appears March-April.

Wood whitish, soft, and used for making combs and small wood-work. The milky juice of the fruit is employed for poisoning fish, and the pounded bark for adulterating the *kamilla* powder of *Mallotus Philippinensis*.

Homalium Zeylanicum, Benth.; Dalz. & Gibs. Bby. Fl. 53; Bedd. Fl. Sylv. t. 210.

Leaves 3-4 by 2 in., ovate-elliptic, or ovate, obtusely-acuminate, narrowed at both ends, crenate, shining, glabrous. On a small petiole, about ⅛ in. Flowers numerous, small, white, on small slender pedicels, about ¼ in., arranged in dense axillary racemes, usually clustered at the ends of branchlets. Calyx tube oblong, 4-5-divided. Styles 3-4. Capsule coriaceous, dehiscing partially, 3-4-valved.

From Rám Ghât to the forests of Malabár and Ceylon, ascending 4000 ft. alt.

Attains 40-50 ft. in height.

Timber Trees.

DATISCACEÆ.

Tetrameles nudiflora, R. Br.; Brand. For. Fl. 245; D. C. Prod. xv. pt. I. 411; Bedd. Fl. Sylv. t. 212. *Jungly-bendi* (name given to *Thespesia populnea*).

Leaves 5-6 by 4-5 in., rotundate, or ovate, acute, or shortly-acuminate, rounded at the base, serrate, or almost entire, sometimes obsoletely 3-lobed, membranous, pubescent when young, glabrescent when old. Flowers small, apetalous, dicœcious, greenish-yellow, calyx usually 4-fid; styles 4. Male flowers in erect panicles, clustered at the end of branches. Female in elongate, pendulous racemes. Capsule ovoid, very small, glandular-viscid, dehiscent at the top.

At Pârr Ghât and the forests from Bombay to Ceylon, Burma, Tenasserim, Andamans, and Sikkim—ascending 2000 ft.

Attains 100-150 ft. in height and 10-15 in circumference. Fl. February-March; Fr. May-June. It sheds its leaves at the beginning of the hot season, and begins to renew the foliage in May.

Wood brownish-light, soft, coarse, and loose-grained—not durable.

CORNACEÆ.

Alangium Lamarckii, Thwaites; Dalz. & Gibs. Bby. Fl. 109; Brand. For. Fl. 250. *Ankŭl, ankŏla* or *akŏla, alangi.*

A shrub or small tree with branches often spinescent. Leaves 3-6 by 1-2 in., membranous, oblong or elliptic, obtuse, acute, or acuminate, somewhat rounded and unequal at the base, pubescent or tomentose when young, glabrous when old, or more or less pubescent below, often with scattered hair, hollow glands in the axils of the veins; petiole hairy or villous. Flowers white, hermaphrodite on short bracteate pedicels, solitary or fasciculate in the axils or above the scars of the fallen leaves. Calyx 5-10-toothed. Petals 5-10, ½-1½ in. Pedicels, calyx and petals wooly. Stamens about 20-30. Stigma large. Fruit oblong, ½-½ in., black, crowned by the calyx limb.

Grows in the island of Elephanta, Virdi jungles, Deccan and Konkan; not uncommon all over India.

Attains 20-40 ft. in height and 2-3 ft. in girth.

Fl. usually February-April, sometimes in January; Fr. May-August. It is an almost evergreen tree; renews foliage April-May.

Wood is ornamental, yellowish-brown, and often dark-coloured in the centre; also close-grained, tough and strong, with a glossy surface, easily worked. It yields excellent fuel. The fruit is sweet, somewhat astringent and acid, and is eaten. Leaves are used as poultices in rheumatic pains, and boiled in oil are applied to indolent ulcers. The juice of the aromatic root is reckoned anthelmintic, purgative and an antidote to snake-bites

Mastixia arborea, C. B. Clarke; Bedd. Fl. Sylv. t. 216.—*Bursinopetalum arboreum*, Dalz. & Gibs. Bby. Fl. 28.

Leaves 2-3 by 1½-2 in., alternate, elliptic-oblong, acute or suddenly acuminated, narrow at the base, glabrous, coriaceous, entire, dark-green, becoming dark on drying, on petiole ½-1 in. Flowers small, white, in terminal pubescent panicles. Calyx campanulate; segments 5, triangular-lanceolate. Petals 5, ovate-acute, leathery. Stamens 5, alternate with the petals. Ovary adhering to tube of calyx, 1-celled, with 1 pendulous ovule. Fruit drupaceous, ovoid, size of a plum.

Parvar Ghát, Nilghiries, Sisparah and Ceylon.

Alt. 4-7000 ft.

Fl. April-June; Fr. in the cold season. Leafless December-January; new leaves appear February-March.

Wood is said to be good, but its uses are not known.

RUBIACEÆ.

Anthocephalus cadamba, Miq; Brand. For. Fl. 261.—*Nauclea cadamba*, Dalz. & Gibs. Bby. Fl. Suppl. 43. *Nhew, nepa, kadam.*

Branches horizontal. Leaves 5-9 in., ovate-oblong, or elliptic-oblong, coriaceous, glabrous, and shining above, pubescent beneath, acuminate, cordate or rounded at the base, on a short petiole; stipules lanceolate-deciduous. Flowers orange-coloured, scented, sessile, with large, white, exserted stigmas, arranged in terminal, globose, peduncled heads, 1-1½ in. diam.; peduncle 1-1½ in. Bracteoles none. Fruit yellow, size of a small orange.

Common about villages in the Southern Konkan, Poladpore; Bombay, rare, and one or two trees at Mahábaleshvar, probably planted. Wild and cultivated from Himalaya to Ceylon, Malacca and Pegu.

A glabrous tree 40-70 ft. high, with 6-15 ft. in girth. Fl. May-June; Fr. August-October.

Wood light-yellow, used for furniture and building, but suffers from the attacks of insects. The flowers are offered in Hindu shrines. The fruit is eaten, but is not palatable.

Adina cordifolia, Hook.; Brand. For. Fl. 263, t.33.—*Nauclea cordifolia* Dalz. & Gibs. Bby. Fl. 118. *Hedu, háldu, heddi.*

Young parts pubescent. Leaves 4-12 by 3-9 in., coriaceous, pubescent beneath, cordate, abruptly acuminate, petiole 2-3 in., thick; stipules orbicular or oblong, deciduous. Flowers yellowish, in heads ¾-1 in. diam.; peduncles 1-2 in., axillary, solitary, or 2-3, each bearing one head; bracts small; corolla downy, style long-exserted; stigma clavate. Fruit-head consists of numerous capsules, ⅛ in., dehiscing from the base.

Common throughout the Konkan; and from Kumaon to Sikkim, Pegu, Tenasserim, Madras and Ceylon.

Alt. 3000 ft.

A large tree 40-80 ft. high with 4-15 in girth. Fl. June-July; fruit ripens December-March. Sheds leaves in the hot season, and is covered with new foliage very soon.

It furnishes a yellow wood, which works easily and takes a fine polish and is good for turning. It is used for furniture, opium boxes, combs, etc., but is said to decay soon when exposed to wet.

Stephegyne parvifolia, Korth; Brand. For. Fl. 262.—*Nauclea parviflora*, Dalz. & Gibs. Bby. Fl. 118. *Kaddam, kanjei, kalam, kadamb.*

Glabrous or pubescent. Leaves usually 2-6 in., extremely variable in size, rotundate, oblong, ovate, or obovate, cordate at the base, on short petioles, obtuse, acute, or acuminate, deciduous; stipules obovate. Flowers small, yellow, sessile, in dense heads, about 1 in. diam., on peduncles ½-3 in., supported by 2 linear-oblong leaf-like bracts, arranged in terminal and axillary panicles. Bracteoles spatulate. Capsules ⅛ in., ovoid.

In the Konkan and the Mával District. Common throughout India, Ceylon and Burma.

Alt. 4000 ft.

Timber Trees.

Attains 40-80 ft. in height and 6-12 in circumference. Fl. May-July; Fr. November-December. Leafless for a short time, February-March.

Wood light-red in colour and close-grained, and is used for building, making gun-stocks, combs, etc., but is said to rot if exposed to wet. The leaves are used as fodder.

Nauclea purpurea, Roxb. Fl. Ind. i. 515; Cor. Pl. 41 t. 54; Hook. Fl. Ind. iii. 26; Brand. For. Fl. 262. *Bagada-toling, dáv panas.*

A glabrous small tree with ash-coloured trunk. Leaves 4-9 by 1½-5 in., membranous-elliptic or elliptic-lanceolate, sub-acute, narrowed at the base, entire, smooth, and shining on both sides, on a petiole ½-1¼ in. Flowers purple in globose heads, 1½ in. diam., on terminal peduncles, about 2-3 in. long. Stigma capitate. Ovary 2-celled; capsule of two dehiscent cocci opening from the base. Seeds minute, numerous.

In the forests of the Konkan, Malabár, Cranganor, Circars, etc. Rare.

Fl. in April. The fruit remains long on the tree for months. Wood pale-yellow, or brownish; close-grained.

Nauclea missionis, Wall.; W. & Arn. Prod. 392; Hook. Fl. Ind. ii. 27—*N. elliptica*, Dalz. & Gibs. Bby. Fl. 118. *Phúga.*

Leaves 4-7 by 1½-2½ in., almost sessile, glabrous, oblong, or elliptic-lanceolate, acute or obtuse, membranous or coriaceous, glabrous, shining above, on a petiole ¼-½ in., usually winged; stipules arranged in an oppressed cylindric sheath, more or less connate below, persistent. Flowers small, yellowish-white, on axillary and terminal, stout, short peduncles, each bearing a globose head, 1 in. diam., four unequal bracteoles, united into a cup above the base. Calyx and corolla tomentose. Stigma long exserted, cylindric.

Konkan, near Sura and the village of Hulan, not far from Chorla Ghát; Malabár and Travancore.

The wood is of a light chestnut colour, and valuable for furniture.

Hymenodictyon excelsum, Wall.; Dalz. & Gibs. Bby. Fl. 117; Brand. For. Fl. 267. *Kadwah, kudyi, bhdulan, phaldu, bhoursal.*

A large pubescent tree. Leaves 4-10 by 3-5 in., ovate-elliptic, or elliptic-oblong, or almost orbicular, suddenly acuminate, pubescent on both surfaces, membranous; nerves 7-10 pair; petiole 1-3 in.; stipules broad, cordate, recurved. Floral leaves long-petioled, 3-5 in. Flowers greenish-white, fragrant, numerous, arranged in large spreading compound panicles. Calyx 1½ in.; corolla ⅛ in., infundibuliform. Capsules ¾-¾ in. on recurved pedicels.

Along the ghâts in this Presidency; base of the Himalayas from Garwhal to Nepaul ascending to 2500 ft.; throughout the Deccan and Central India to the Annamallays, and in Tenasserim and Chittagong; also in Java.

Alt. 5500 ft.

Attains 30-50 ft. in height and 6-8 ft. in girth, but in higher altitudes becomes bushy. Fl. June-July ripens; fruit October-January. Leafless November-June.

The wood is light-coloured, soft, close-grained, and is used for agricultural implements, palanquins, toys and similar articles. The inner

bark possesses the bitterness of Cinchona, and is used as a febrifuge; it is also employed in tanning. The leaves are useful as fodder.

H. obovatum, Wall.; Dalz. & Gibs. Bby. Fl. 117; Brand. For. Fl. 268. *Kadwai* (bitterness), *sirid.*

A large tree. Leaves 4 by 2-2½ in., crowded at the apex of the branches, elliptic or broadly-obovate, abruptly-acuminate, glabrous on both sides, or sometimes pubescent beneath, finely reticulate, 6-8 pair of nerves, narrowed into a petiole 1½-2 in.; stipules ovate-oblong, glandular-serrate. Flowers small, greenish, in spiciform terminal racemes, several together, each generally furnished with a coloured floral leaf. Calyx hairy. Capsule erect.

Island of Karanja, Rám and other ghâts down to Travancore.
Alt. 4000 ft.

Is evergreen. Fl. during the rainy season, and the fruit remains on the tree for a long time.

The wood is said to be equal to that of the last species.

Randia uliginosa, D. C. Prodr.; Dalz. & Gibs. Bby. Fl. 119; Brand. For. Fl. 273. *Kaurio, telphetru, pindra, panar, katul.*

A glabrous armed tree with rigid, straight, 4-sided branches. Spines short, straight, or none. Leaves 2-8 by 1-4 in., obovate or oblong, obtuse, shining, cuneate at the base; petiole short and slender; stipules triangular. Flowers solitary, white or cream-coloured, fragrant, either large and sessile, or small and peduncled; corolla of the large form 1-2 in. diam.; lobes rounded; mouth of the tube closed with a ring of white hairs; of the small form the tube is glabrous within. Berry 2 in. long, yellow, crowned with the persistent calyx, 2-celled, ellipsoid. Seeds compressed, smooth.

In the Southern Marátha Country and Konkan; also in Eastern and Central India, Sikkim and Assam.
Alt. 2500 ft.

Attains a height of 15-20 ft. and a girth of 2 ft. Fl. in May-June; Fr. December-February. Leaves shed February; renewed April.

Wood whitish, close-grained, and hard. The fruit which is sold in the bázárs is eaten either cooked or roasted. The leaves serve as fodder for cattle.

Randia dumetorum, Lamk.; Dalz. & Gibs. Bby. Fl. 119; Brand. For. Fl. 273. *Ghéla, yalay, mâinphul, karhar, arar.*

A tall shrub or small tree, spines horizontal, often long and rigid, 1-1½ in. Leaves 1-2 by 1, obovate, glabrous or pubescent, obtuse or sub-acute, from cuneate base, narrowed into a short petiole; stipules ovate-acuminate. Flower white, soon becoming yellow, fragrant, solitary, rarely 2-3, on short peduncles at the end of short lateral branchlets. Calyx strigose, with stiff adpressed hairs. Corolla ½-¾ in. diam.; divisions oval or oblong. Berry globose or ovoid, ¾-1½ in. long, glabrous or pubescent, yellowish when ripe. Seed imbedded in pulp, compressed.

R. dumetorum, Lamk

R. longispina (Dalz. & Gibs. Bby. Fl. 119) is probably the same species with rather sub-acute leaves.

Very common on our ghâts and throughout India.
Alt. 4-5000 ft.

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Attains 15-20 ft. height with 2-4 ft. girth. Fl. March-May; Fr. during the rains. Leaves shed February-April; new foliage, April-May. Is rarely, if at all, leafless at Mahábaleshvar and Mátherán.

The wood is of a light-brown colour, even-grained, heavy and strong, but liable to warp. It is used for agricultural implements, combs, as also for fuel. The ripe fresh fruit is roasted and eaten (Brandis). It is soapy, but destroys the cloth, and is, therefore, useless for washing purposes. The dried ripe fruit is held in esteem by the hakims for its emetic properties; the dose is one ripe fruit in powder. The unripe fruit, bruised and pounded, is used to poison fish. The leaves are used as fodder for cattle.

Gardenia lucida, Roxb.; Dalz. & Gibs. Bby. Fl. 120; Brand. For. Fl. 271. *Dikamáli, karánji.*

A glabrous, unarmed, large shrub or small tree with resinous buds. Leaves 3-10 by 2-5 in., elliptic, oblong, obtuse or sub-acute, narrowed into short marginate petiole, shining, many-nerved,—nerves 20-30 pair; stipules large, connate. Flowers white, becoming yellow, solitary, fragrant, on pedicels 1½ in. from the axils of the uppermost leaves. Calyx variable. Corolla tube 1½-2 in., limb 1½-3 in. diam.; divisions 5, oblong, stigma entire. Fruit oblong or ovoid, smooth, crowned with the persistent calyx.

Common in the Southern Marátha Country and the Konkan, Chittagong, Burma, Southern India, and Central Provinces. Cultivated in gardens in Bombay.

Height 20 ft. with a girth of 3 ft. Fl. March-June; Fr. in the cold season.

The wood is close-grained, hard; used for combs and turning. This as well as *G. gummifera* furnish the *Dikamala* resin which exudes from the wounded bark. As sold in the bázárs it is hard, opaque, greenish-yellow, of a repulsive odour, and is used in the treatment of sores and in cutaneous diseases. It is much employed by farriers to kill maggots in the sloughing sores of cattle.

G. gummifera, Linn.; Dalz. & Gibs. Bby. Fl. 120; Brand. For. Fl. 270. *Dikamáli, kamari.*

A tall, glabrous, unarmed shrub or small tree; buds resinous. Leaves 1½-3 in., with 15-20 pair of nerves, sessile, or sub-sessile, obovate-oblong, acute or obtuse, with cordate base, coriaceous, shining, occasionally puberulous beneath. Stipules sheathing, truncate or mucronate. Flowers sub-sessile, white, fragrant, terminal, 1-3 together. Corolla tube 1½-2 in., glabrous or pubescent; limb 1-3 in. diam.; divisions 5, narrow, oblong, obtuse. Fruit oblong, 1-1½ in., small, crowned with the persistent calyx. Pericarp, thin, crustaceous; endocarp 4-5-valved.

In Dhárwár (dry plains), Dadi on the Ghatparba; also in Ceylon, Madras, and Sátpura range.

Fl. March-April; Fr. during the rains. Leafless during the hot season.

Wood white and hard, with uses similar to those of the preceding. Fruit edible.

G. latifolia, Ait.; Dalz. & Gibs. Bby. Fl. 120; Brand. For. Fl. 271. *Pandru papura, kariga, phiphar, ghogar, gogarli.*

A tree with resinous branchlets. Leaves 4-8 in. and sometimes almost as broad, opposite or in threes, large, broadly-elliptic, ovate

or orbicular, obtuse, narrowed into short petiole, glabrous or pubescent beneath; nerves about 12 pair with hairy glands in the axils of the nerves beneath; stipules large, connate, often toothed. Flowers terminal, generally solitary, sometimes binate, nearly sessile, white, soon changing to yellow, fragrant. Calyx divisions 5-9, unequal, recurved. Corolla tube 2-3 in., pubescent or hirsute on the outside, limb 2-4½ in. diam., lobes 5-9, obliquely-obovate. Stigma thick. Fruit nearly globose, 1-2 in. diam., greenish or greenish-yellow, crowned by the calyx limb.

In Khándesh jungles, Nagotna, Thull Ghát, and throughout India. Alt. 3000 ft.

Attains 20-30 ft. height and 3-4 ft. girth. Fl. April-May; Fr. in the cold season. Leafless during the cold season; leaves renewed in May.

The timber is white, durable, close-grained, and easily worked. It is valuable for engraving, and tanners' work.

G. montana, Roxb.; Dalz. & Gibs. Bby. Fl. 120.

This is a small plant, said to be a variety of *G. turgida*, very rare in this Presidency, being only met with in the Atavesi.

The wood is close-grained, but is apt to warp.

Canthium umbellatum, Wight; Dalz. & Gibs. Bby. Fl. 113. —*Plectronia didyma*, Brand. For. Fl. 276. *Arsúl.*

A beautiful evergreen tree, unarmed, glabrous; branchlets 4-sided. Leaves 2-6 by 2-4 in., oval, elliptic-obtuse or obtusely acuminate, dark-green, coriaceous; nerve-axils glandular; stipules triangular. Flowers white, fragrant, in axillary umbels on short, very stout, compressed peduncle. Corolla segments 5; tube hairy inside. Fruit ½-¾ in., broad, oblong, compressed, almost didymous, on slender pedicels. Putamen rugose.

Pretty common in stony places above the ghâts.

Alt. 4000 ft.

Attains a height of 30-50 ft.

The timber is of a light chocolate colour, but black in the centre, close-grained and hard.

Vanguería spinosa, Roxb. Fl. Ind. i. 536. *Alú* (name given also to *Colocasia*).

A small tree or tall shrub armed with straight, opposite, simple or 3-nate sharp spines. Leaves 3-4 in., opposite or 3-nately whorled, entire or membranous, ovate, elliptic or ovate-oblong, acute or acuminate, glabrous or tomentose on a petiole ½-1 in. Flowers small, greenish, very short-pedicelled, arranged in shortly peduncled cymes. Calyx 5-toothed. Stigma 4-5-lobed. Drupe ¾-1 in. diam., globular or terminate, yellowish, fleshy. Pyrenes 4-5, smooth.

Common on the ghâts and throughout the Konkan, Khándesh, Bengal, Tenasserim and Burma.

Fl. in January-February. The fruit is eaten cooked or roasted, but is not palatable.

Another allied species, *V. edulis*, a native of Madagascar, is sometimes cultivated in gardens for the sake of its fruit.

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Ixora parviflora, Vahl.; Dalz. & Gibs. Bby. Fl. 113; Brand. For. Fl. 275. *Kurat, lokandi, rar-kurat, rai-kura, guavi-lakdi, kota-gandal.*

A small evergreen tree, glabrous, or the inflorescence pubescent. Leaves 3-6 by 1½-2½ in., coriaceous, short-petioled, oblong or elliptic-obtuse, with rounded or corded base; nerves slender, about 10 pairs; venules prominently reticulate. Stipules triangular. Flowers white or pink, ⅛-½ in., odorous, sessile or pedicelled, arranged in branched cymes. Fruit small, didymous. Seed plano-convex.

Common on our ghâts and all over Southern India, extending northwards to the Sátpura range. Attains 25-30 ft. height and 2-3 ft. girth. Fl. February-March.

The wood is of a reddish-brown colour, hard, close-grained, easily worked, and stands a good polish; employed for furniture, building purposes and fuel. The green make excellent torches, which are frequently used by dâk-runners.

Morinda citrifolia, Linn.; Dalz. & Gibs. Bby. Fl. 114. *Aal, bartundi.*

A small glabrous tree with 4-angled branchlets. Leaves usually 6-10 in., short-petioled, shining, oval-oblong or broadly elliptic, acuminate, acute or obtuse, one of the pair next the peduncle often absent. Stipules large, broader than long, or semilunar, entire or 2-3 fid. Flowers white, small, fragrant, in globose heads; peduncles 1 in. long or more, solitary, leaf-opposed, bracteate, bracts few, foliaceous. Fruit yellowish.

Hooker describes three varieties under this head—*M. citrifolia*, *M. bracteata* and *M. elliptica*.

Cultivated and wild in many parts of India. Attains a height of 12-15 ft. and a girth of 1-2 ft. Fl. April-May.

The wood is of a yellowish-brown or yellow colour, and is used for gun-stocks. The root of this and other species of the genus yields a valuable red dye which is fixed with alum, and for the sake of which the plant is cultivated in Berár, Khándesh, Surat and various other places.

M. tomentosa, Heyne; Dalz. & Gibs. Bby. Fl. 114. *Aal.*

A tall shrub or small tree; branchlets 4-angled, tomentose. Leaves 4-7 in. long, broadly-ovate, or ovate-oblong, acuminate, tapering into a short, thick, tomentose petiole, entire, membranous, pubescent on both sides, stipules bi-fid. Flowers white, sessile, on a globular head; peduncle ½-1 in., leaf-opposed, tomentose, solitary, axillary, larger than the petiole, or sometimes several together at the end of the branchlet. Calyx truncate; corolla campanulate, tomentose. Fruit, globose or ovoid, about 1 in. diam.

Common in the Konkan, some parts of the Deccan, and throughout India. Attains a height of 15-20 ft. and a girth of 1-2 ft.

This species is described by Hooker as a variety of *M. tinctoria*.

The wood is like that of the preceding, and is used for the same purpose.

SAPOTACEÆ.

Chrysophyllum Roxburghii, G. Don.; Dalz. & Gibs. Bby. Fl. 139. *Tarsi or tarsiphala.*

A very large tree; young shoots and leaves rusty-pubescent. Leaves 3-7 by 1-2 in., elliptic or ovate-lanceolate, produced into a longer or shorter obtuse point, glabrous, entire, short-petioled. Flowers minute, pale-yellow, 5-merous, pedicels axillary, fascicled, recurved, about 4 lin. long. Calyx segment unequal, imbricate. Corolla tube as long as the calyx, lobes obtuse. Fruit spherical or obscurely 5-angled, 1-1¼ in. diam., when ripe deeply 5-angled, smooth, and yellow. Seeds brown, imbedded in glutinous pulp.

Found in Chorla Ghát and in Sunda jungles in this Presidency, and is common also in Madras, Bengal, Ceylon and Pegu.

Alt. 3000 ft.

It is an evergreen 60-70 ft. high with a girth of 4-7 ft. Fl. during the rains; Fr. December-March. Fruit eaten, but not palatable.

The wood is used for building purposes.

Sideroxylon tomentosum, Roxb. Fl. Ind. i. 602.—*Sapota tomentosa*, Dalz. & Gibs. Bby. Fl. 139. *Kanta, kuhla, kumba.*

An evergreen, middle-sized tree, frequently armed with blunt axillary spines. Young parts tawny-tomentose. Leaves 3-5 by 2 in., oval, oblong, or obovate-oblong, short-petioled, glabrous above, more or less tawny-villous and often glabrescent beneath, a little waved. Flowers rather small, dull-white, 5-merous, fascicled, axillary, nodding. Calyx rusty-pubescent, about 3 lin. Corolla twice as long as the calyx; petaloid staminodes as long as the stamens, hairy, yellow. Fruit ovate, size of an olive, yellow, 1 or 2-seeded by abortion.

Common on the higher ghâts in this Presidency as well as in Madras.

Fl. February-March; ripens fruit about the beginning of the rains. The sambur devours this fruit voraciously.

The wood is brown, fibrous, loose-grained and heavy.

Achras sapota, Linn.; Dalz. & Gibs. Bby. Fl. Suppl. 50; Brand. For. Fl. 288. *Chicú.*

Young shoots covered with tawny-tomentum. Leaves 2-3 in., lanceolate-acuminate, obtuse or almost retuse, entire, glabrous, approximated near the ends of the branches; petiole ½-1 in. Flowers 6-merous, whitish, scentless, on solitary axillary pedicels, ½-1 in. Calyx tawny-tomentose, 2-4 lin. long. Corolla slightly longer than the calyx. Berry globose or oblong, when ripe covered with a brown, scabrous rind. Seeds 10-12, covered with yellowish tawny sweet pulp.

A native of South America; cultivated in gardens in Bombay, the Deccan, and various parts of India.

Attains 40-60 ft. in height and 3-4 ft. in girth. Fl. in the cold season; ripens fruit in the rains.

Wood hard, reddish-brown, heavy, and very durable. The pulp of the fruit is eaten.

Bassia latifolia, Roxb.; Dalz. & Gibs. Bby. Fl. 139; Brand. For. Fl. 289. *Mahwa, môho.*

Young parts, petiole and pedicels pubescent or tawny-tomentose. Leaves 4-8 in. by 2-4 in., elliptic or oblong-elliptic, short-acuminate, coriaceous, congested near the ends of branches; petiole round, ½-¾ in.; stipules subulate, downy. Flowers white, or yellowish-white, ½-1¼

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numerous, fleshy, crowded from the extremity of the branches, drooping on pedicels 1-1½ in. Calyx 4-5-sepalled, coriaceous, densely rusty-tomentose. Corolla tube ovoid; limb 7-14-parted, stamens 20-30 in three series. Fruit fleshy, ovoid, 1-2 in., 1-4-seeded, very rarely more.

Cultivated and wild in the Konkan, Gujarát, and Rájwara, and throughout India.

Attains 40-60 ft. in height and 6-7 ft. in girth. Fl. March-April; Fr. June-July. Leafless February-April, and the new leaves appear soon after.

The wood is of a reddish-brown colour, hard, and very strong, even-grained, tough, and proper for naves of wheels and railway sleepers. The tree produces an abundance of flowers from which a strong spirit, called *Maurah*, is distilled in large quantities for exportation in Uran, Surat and Poona. Being sweetish to the taste these flowers are voraciously consumed by the poorer classes to whom they are a nourishing food. During the famine of 1873 and 1874 in Behár they kept thousands of people from starvation. A single tree is said to yield from 200 to 400 lbs. of flowers. From the seeds a greenish-yellow oil is expressed; the oil-cake is stated to be used to poison fish, and the smoke produced from burning it to kill insects and rats. The residuum left after the expression of the oil is used as an emetic. (*See* Section Fruits, Vegetables and Plants used during seasons of scarcity.)

B. longifolia, Linn.; Dalz. & Gibs. Bby. Fl. 139; Brand. For. Fl. 290. *Mahwa, mohi.*

Young shoots villous. Leaves 4-7 in. by 1-1½ clustered near the ends of the branches, lanceolate, narrow at both ends, entire, smooth on villous petioles 1-2 in.; stipules villous, caducous, ensiform. Flowers crowded near the ends of branches, larger and more fleshy than in the last species. Pedicels 2-3 in., sub-erect, one-flowered. Calyx segments 4, acute. Corolla tube, length of calyx; limb 8-10-cleft. Anthers 16-20 in two series. Berry oblong, size of a plum, yellowish when ripe.

In Southern Konkan and north of Goa, confined to the southern limits in the latitude of Dhárwár, Kánara; also in Madras, Bengal, Mysore and Ceylon; not found at great elevations. Also cultivated.

Attains a height of 40-50 ft. and a girth of 4-6 ft. Fl. April-May; Fr. August-September.

The timber is of a yellowish-brown colour, heavy, close-grained and durable, scarcely inferior to teak in strength. Used for the construction of carts, for keels of ships, and in building. The flowers are eaten raw, cooked, or roasted. The seeds contain about 30 per cent. of a yellow oil. It is extracted by expression, and is used in lamps, in the manufacture of country soap, and that of candles in England. It is also a substitute for ghee among the poorer classes. It concretes at ordinary temperature, and becomes rancid within a month, unless kept well-corked. Externally it is used in the cure of itch. Leaves and bark in decoction and the milky juice of the green fruits are employed in rheumatism.

B. elliptica, Dalz. & Gibs. Bby. Fl. 139. *Pancholi, palla.*

A very large tree with rusty bark. Leaves 2½-4 in. by 2 in., crowded at the end of branchlets, coriaceous, entire, abruptly acuminate, narrowed at the base, dark-green above, pale beneath; minute ½-1 in., nerves prominent beneath; peduncles axillary 1-3, petiole

3-4 times longer than the petioles, erect. Calyx 6-divided, divisions in two series. Corolla 5-6-cleft, contorted in aestivation, deciduous. Stamens 12-18. Fruit oblong, smooth, size of a large almond, 1-seeded by abortion.

Common in the Bombay Ghâts, Travancore, Wynaad and Madras. Alt. 4000 ft.

Attains a height of 100 ft. and a girth of 12 ft. Fl. in February.

The wood is hard, takes a good polish, and is used in Malabár for building purposes. The tree yields a kind of gum which is known as the *Indian gutta-percha*, but is of no value compared to the true article. It might, however, be used as bird-lime and for encasing telegraph wires.

B. Wightiana, Bed. For. Man. Bot. 141.—*Isonandra Candolliana*, Dalz. & Gibs. Bby. Fl. 139.

A small glabrous tree; young parts occasionally densely tomentose. Leaves variable in shape and size, 1½-14 in., orbicular or obovate-oblong, lanceolate, bluntly-acuminate, or obtuse at the apex, tapering at the base, glabrous on both sides, or sometimes tomentose beneath, nerves prominent beneath; petiole 2-6 lin. long. Flowers white or greenish-white, small, 3-4 lin. long, axillary, fascicled, 2-12 together, sessile or sub-sessile. Calyx 4-lobed. Corolla deeply 4-cleft. Fruit oblong, ½ in., red when ripe. Seed 1-2 by abortion, brown, shining.

Along the Western Ghâts as far as Ceylon.

Alt. from 2-6000 ft.

Fl. March-April.

The uses of the wood are unknown.

Mimusops Indica, Brand. For. Fl. 291.—*M. hexandra*, Dalz. & Gibs. Bby. Fl. 140. *Kirni, rayâni.*

A glabrous tree. Leaves 2-4 by 1½-2 in., obovate-oblong, notched at the end, narrowed at the base, sometimes crowded at the end of the branches, glabrous, shining above. Petiole ½-1 in. Flowers white and yellow, not fragrant, ¼ in. diam., on ½-¾ in. solitary, axillary pedicels. Calyx segments 6. Corolla lobes two series, the outer consisting of 12 white and the inner of 6 yellow lobes. Stamens 12. Fruit about 1 in. in diam., yellow when ripe, smooth, usually 1-seeded by abortion. Seed compressed, oblong, about ½ in.

Common on our ghâts, Konkan, Gujarát, Daman, Ahmedabad, Panch Mahâls, Ahmednagar; also at Multán, Lahore, Ceylon, and cultivated in villages along with *M. elengi*.

This ornamental, evergreen tree attains a height of 50-60 ft. and a girth of 12-15 ft. Fl. November-December.

The wood is reddish-brown, very strong, close-grained and durable. It is used for making sugar and oil mills, cart-wheels, etc. The fruit is said to be the chief article of food of the poorer classes in Gujarát during the hot-weather months.

M. elengi, Linn.; Dalz. & Gibs. Bby. Fl. 293. *Wowli, bakul, mulsari.*

A glabrous tree; young shoots and pedicels shortly rusty-pubescent. Leaves 3-4 by 1-1½ in., entire, smooth, coriaceous, shining, glabrous, elliptic-oblong, acuminate, on a petiole ½-¾ in. Flowers white, very

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fragrant, about 1 in. diam., in axillary fascicles of 2-8 drooping on tawny pedicels 4-6 lin. Calyx segments 8. Corolla lobes three times as many as sepals; the outer series consists of 16 (occasionally 12), the inner of 8 (occasionally 6) lobes. Stamens 8. Berry about ½-1 in., yellow when ripe, smooth, edible, 1-seeded by abortion.

Cultivated in our gardens. Common allover the Presidency and in Madras. Cultivated also in various parts, as in Delhi, Lahore, Multán, on account of its much-esteemed fragrant flowers.

This evergreen, ornamental tree attains a height of 40-50 ft. and a girth of 4-7 ft. Fl. March-April, and Fr. about the end of the rains.

The timber is reddish-brown, close-grained, strong and durable, lasting fifty years. It takes a good polish, and is used for furniture and building purposes. The bark possesses tonic properties, and is employed in Java as a tonic in fevers. Its decoction forms a good gargle in salivation. Water distilled from the flowers is employed in Kánara as a stimulant and a perfume. The tree is also said to yield a good gum. Oil is expressed from the seeds.

M. Kauki, Linn.; Dalz. & Gibs. Bby. Fl. Suppl. 50; Brand. For. Fl. 293. *Pomo* or *fructa de Adão* at Goa.

A glabrous tree; branches numerous, round, spreading horizontally. Leaves 2½-4 in., clustered at the ends of the branches, elliptic-ovate or obovate, obtuse or retuse, entire, coriaceous, dark-green, shining above, white or ash-white beneath, nerves parallel, prominent beneath; petiole ¼-1 in. Flowers white with a purple tinge, about ¼-½ in. diam., on solitary, axillary, recurved pedicels about as long as the petiole. Calyx divisions 6 in two series, slightly downy. Corolla lobes in two series—12 outer, 6 inner. Berry oval or obovate, purple when ripe, crowned with persistent style, 1-seeded by abortion, 1-1½ in. long. Seed triangular, compressed, of a light purplish colour.

Is a native of the Eastern Archipelago and Australia, and cultivated at Goa, Malabár, Cochin and Calcutta on account of the fruit, which contains a sweet, somewhat acid, pulp which is edible. Very rare in Bombay.

Is a beautiful, evergreen tree 30-40 ft. high, with a girth of 3-6 ft. Fl. in the hot season, and Fr. August-September, the fruit remaining on the tree a long time. The inner bark is red, and the wood light-brown. From incisions in the bark a viscid juice exudes, which may probably be converted into an inferior sort of *gutta-percha*.

EBENACEÆ.

Diospyros melanoxylon, Roxb. Cor. Pl. t. 46; Brand. For. Fl. 294.—*D. exsculpta*, Dalz. & Gibs. Bby. Fl. 142. *Timburni, tumri kendu, kenduka* (Sans.)

All the young parts and inflorescence covered with grey or tawny tomentum. Leaves alternate or sub-opposite, 3-6 in. by 1½-2 in., sometimes longer, coriaceous, oval, or elliptic, narrowed at both ends, when full grown glabrous above, tomentose or pubescent beneath. Petiole ¼-½ in. Flowers white; male peduncles very short, 3-12-flowered, axillary or extra-axillary; bracts, calyx and corolla densely tomentose. Stamens 12-16, inserted on the torus; female solitary axillary or extra-axillary, usually twice larger than the male, on short pedicels. Calyx-lobes 4-5. Corolla-lobes 4-5. Staminodes

8-10 or less. Styles 2 or 3, bi-fid; ovary round, hairy, 4-8-celled, with one ovule in each cell. Fruit globose, yellowish when ripe, 1-1½ in. across, 4-8 seeded.

Is not uncommon in Bombay, North Kánara and the Madras forests, extending northwards as far as the Rávi.

Attains a height of 30-50 ft. and a girth of 6 ft. Sheds foliage in the cold season; renews and puts forth flowers in the beginning of the hot weather; Fr. during the rains.

This is a valuable timber tree, the wood being whitish or with a yellowish or brown tinge outside, and the core jet-black. It is heavy, close and even-grained, and takes a fine polish. The pulp is yellow, sweet, soft and highly astringent, and is much appreciated during the hot months. Douglas mentions a variety without stone which is cultivated in the Central Asian highlands.

D. montana, Roxb. Cor. Pl. t. 48.—*D. cordifolia*, Roxb. Cor. Pl. t. 50; Brand. For. Fl. 296.—*D. goindu*, Dalz. & Gibs. Bby. Fl. 141. *Goindu, temru, lokari, bistend.*

A pubescent or tomentose tree, sometimes glabrate, armed with spinescent branchlets. Leaves variable in size and shape; 1-6 in. long, always alternate, ovate-oblong, linear-oblong, elliptic or obovate-oblong, obtuse or more or less acute or acuminate at the apex, rounded or cordate at the base, on a slender petiole about ¼ in. Flowers greenish-white, fragrant (?), small, 4-merous; male flowers 2-6, sometimes more, in short, pedunculate, recurved axillary cymes; stamens 16; female flowers solitary, axillary, larger than the male on recurved pedicels 3-5 lin. long. Staminodes 4-12. Ovary 8-celled with one ovule in each cell. Fruit globular, ½-1½ in. diam., 2-8-seeded, yellowish when ripe, smooth.

Common on our ghâts and throughout India.

Height 20-30 ft., sometimes more in higher situations; girth 3-5 ft. Fl. March-May; Fr. in the cold season.

The wood is dark-brown mottled with white, hard, close-grained, takes a fine polish, and is used for furniture. Fruit bitter, not eaten. Leaves used as fodder in Oude.

D. chloroxylon, Roxb. Cor. Pl. t. 49; Brand. For. Fl. 297; Dalz. & Gibs. Bby. Fl. 140. *Ninai.*

A small tree occasionally armed. Leaves 1-2 in. by ¾-1¼ in., alternate, elliptic-oblong, or obovate-oblong, pubescent above, rusty-tomentose beneath on petioles 3-4 lin. Flowers white, tetramerous; male in axillary fascicles of 6-10 minute flowers; stamens 16 in 2 series, the inner smaller; female flowers solitary, sessile, small, with about 8 stamens; styles 4, bi-fid. Ovary 8-celled. Fruit globose, size of a cherry, purplish when ripe, 2-8-seeded by abortion.

Common about Surat and in the Násik Districts, Orissa and Circars.

Wood hard, yellowish and durable; useful for various purposes. The ripe fruit is eaten, and is very palatable.

D. embryopteris, Persoon.; Brand. For. Fl. 298.—*Embryopteris glutinifera*, Roxb. Cor. Pl. t. 70. *Gab, timburi, makur-kendi* (Bomb.)

A glabrous tree. Leaf bud silky with adpressed hairs. Leaves 5-8 in. by 2 in., alternate, short-petioled, coriaceous, smooth, shining,

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linear-oblong on thick wrinkled petioles less than ½ in. long. Flowers white, fragrant, tetramerous, male peduncles axillary, length of petiole, drooping, 3-6-flowered, furnished with a small deciduous bract; anthers 40 on 20 filaments; female axillary, solitary, larger than the male, on short recurved pedicel. Staminodes 1-4. Ovary globular, hairy, 8-12-celled. Styles 4-6. Stigma branched, usually 2-3-fid. Fruit 1½-2 in. diam., globular, rusty-yellow when ripe, covered with a rusty, meal-like tomentum. Seeds usually 5-8, immersed in viscid glutinous pulp, reniform.

Common in Sálsette, the Konkan and the forests of Southern India, Ceylon, Burma and Banda.

Alt. 2500 ft.

This evergreen tree is usually 30-35 ft. high (more in higher parts), with a girth of 4 ft. Fl. March-May; Fr. in the cold season.

Wood pinkish grey or light-brown mottled with dark streaks. It is of indifferent quality, and is sometimes used for building purposes, and in Ceylon for masts and yards. The fruit has a strongly astringent taste, due to the presence of tannin, and an infusion of it is used for steeping in fishing nets and lines to strengthen and preserve them. The pulp serves also to pave the seams of boats, and Mr. Rheede states that bookbinders in Malabár use it instead of gum both on account of its adhesiveness and from its being obnoxious to worms. It is stated in the Indian Pharmacopœia that an extract of this fruit is a good astringent. The expressed oil from the seeds is employed in native medicine.

D. Candolleana, Wight. Icon. Pl. 1221; Dalz. & Gibs. Bby. Fl. 142.

A large glabrous shrub or small tree. Leaves 4-6 by 1-2 in., elliptic-oblong, obtusely acuminate, very coriaceous, veinless, rather shining. Flowers axillary, aggregate, sessile; calyx and corolla 4-5-cleft; calyx densely rusty-pubescent; male flowers very numerous, stamens 10, filaments united by pairs at the base; anthers apiculate; female calyx segments revolute at the margins. Staminodes 4-5, single; ovary 4-celled, style simple; stigma 2-lobed. Fruit ovoid, hard, size of a nutmeg.

On the Bombay Ghâts, the northern slopes of the Nilghiries, and Wynaad.

Fl. in the hot season, and Fr. during the rains.

D. paniculata, Dalz. & Gibs. Bby. Fl. 141.

A glabrous, middle-sized tree. Leaves 5-9 by 1¼-2¾ in., lanceolate oblong, obtusely acuminate, very coriaceous, veins closely reticulated on a petiole ¼-½ in. Male flowers numerous on velvety axillary cymes about ½ the length of the leaves; bracts large, ovate, obtuse, deciduous. Calyx 5-divided, ventricose; segments foliaceous, broadly oval, obtuse; corolla velvety outside, twice as large as the calyx; segments oblong, obtuse, as long as the tube. Stamens 20 in pairs sub-equal; female flowers solitary, extra-axillary; peduncles 2-3 times the length of the petiole, with 2 large ovate bracts about the middle. Calyx accrescent with the fruit, glabrescent. Fruit ovoid, densely tomentose, 3-4-celled, supported by the enlarged calyx.

Chorla Ghát and Raighad.

Alt. 2-3000 ft.

Fl. in the cold season.

D. pruriens, Dalz. & Gibs. Bby. Fl. 141.

A small or middling-sized tree, branchlets softly hairy, hairs yellow. Leaves 3-5½ by 1-2½ in., narrow, oblong, obtusely acuminate, more or less cordate at the base, glabrous above, except the costa, hirsute beneath on a petiole 1-2 lin. long. Fowers, male usually solitary, sometimes twin on axillary or extra-axillary peduncles 2-3 times the length of the petiole. Calyx 4-parted ; segments oblong, obtuse, reticulated, glabrous within, very hairy on the outside. Corolla hirsute on the outside, limb 4-divided, stamens about 14, connate at the base, unequal in length arising from the torus surrounding a hairy rudiment of an ovary. Female inflorescence as in the male ; staminodes 4 ; styles 2. Ovary 4-celled, hairy. Fruit ovoid, conical, 1¼ in. long, clothed with fibrous stinging hairs.

Common on the Bombay Ghâts, Kánara, Tinnevelly and Wynaad ; found also in Ceylon.

Alt. 3000 ft.

D. nigricans, Wall.; Dalz. & Gibs. Bby. Fl. 141.

A small glabrous tree turning very black in drying. Leaves 4-5 by 1½-2 in. oblong or lanceolate, suddenly acuminated, slightly attenuated at the base, glabrous on petiole ¼-½ in. long. Male flowers in small 3-flowered axillary cymes. Calyx villous, terminate, 4-parted to the middle, lobes ovate or sub-acute, ciliated. Corolla 4-cleft, glabrous ; lobes rounded or emarginate ; stamens about 26, unequal in length, in twos, threes or fours, inserted in the base of the corolla, surrounding a rudiment of a 10-lobed ovary ; female solitary, increasing in fruit with the lobes much reflexed. Fruit glabrous, globose, depressed, 8-celled.

Chorla Ghât.

Maba buxifolia, Pers.; Roxb.—*M. nigrescens*, Dalz. & Gibs. Bby. Fl. 142. *Rakhrura* (name given to some other plants also).

A small tree, young parts more or less rusty or tawny-pubescent. Leaves ¼-5 in., oval, ovate, obovate or orbicular to linear-lanceolate, coriaceous or membranaceous, glabrous and shining above, or sometimes clothed with tawny adpressed hairs ; becomes black in drying. Flowers small, yellow, shortly pedicelled, 3-merous ; male usually 3, smaller than female ; stamens 6 ; ovary rudimentary ; female solitary, axillary, almost sessile. Calyx minutely pubescent outside. Ovary 3-celled. Style very short. Stigma 3-toothed. Fruit 3-5 lin. diam., round, smooth, yellow when ripe, 1-3-seeded.

Not uncommon in the Bombay forests, Madras and Ceylon. Is a tree in sheltered situations, and a shrub in the plains.

Alt 6000 ft.

Fl. in the hot season.

The wood is black-coloured, hard and durable, and is used for various purposes where durability is principally required. The berries are said to be palatable, and are eaten by the poor people.

Holochilus micranthus, Dalz. & Gibs. Bby. Fl. 142.

A middling-sized tree. Leaves 4-5 by 2, elliptic, oblong, obtusely acuminate, narrowed at the base, glabrous, coriaceous, petiole about ½ in. Flowers minute, white, dicecious, male unknown ; female about

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3 in. long, axillary, solitary, sessile. Calyx tube entire, truncate, sitting on a few bifarious imbricated scales, accrescent in fruit. Corolla tubular, 3-cleft almost to the middle, 3 times the length of the calyx, lobes ovate, obtuse, spreading; staminodes 6, inserted at the base of the corolla, filaments free. Ovary hemispherical, smooth, glabrous, 6-celled; ovules solitary in the cells, pendulous. Styles 3, thickish. Stigma obtuse. Fruit cylindric, oblong, supported at the base by the enlarged calyx, dry, hard, 6-celled.

The female plant only was discovered by Dalzell on the Konkan Ghát. It Fl. February-March.

This is believed to be probably a species of *Maba*.

STYRACEÆ.

Symplocos spicata, Roxb.; Brand. For. Fl. 300.—*Hopea spicata*, Dalz. & Gibs. Bby. Fl. 140. *Lodh* (Kumaon).

A glabrous tree. Leaves 3-6 by 1-1½, elliptic-oblong, obovate or lanceolate, obtuse or shortly acuminate, entire or irregularly toothed, tapering into a petiole 4-6 lin., coriaceous, shining, and in a dry state yellow. Flowers numerous, small, almost sessile, yellowish, white, forming more or less branched axillary spikes 2-3½ in; bracts and bracteoles round, ciliate, deciduous. Calyx 5-parted; lobes exceedingly short, broad; petals about 1½ lin. long, cohering in a ring with the stamens, which are about 40, long exserted. Ovary 3-celled, with 3-4 ovules in each cell. Stigma large. Drupe size of a pea, turbinate, olive-coloured, 12-ribbed, containing a one-seeded nut.

Common on the ghâts and in the Nilghiries; also in Burma and Assam. Alt. 7000 ft.

Is an evergreen, middling-sized tree. Fl. August-December.

Wood close-grained, light, not durable; used for fuel. The fluted seeds are strung and worn round the neck as a charm against evil spirits.

S. racemosa, Roxb.; Brand. For. Fl. 301.—*Hopea racemosa*, Dalz. & Gibs. Bby. Fl. 140. *Lodhra, lodh, kaulá (?)*.

A glabrous tree; young shoots and inflorescence more or less pubescent. Leaves 3-6 by 1½-2 in., coriaceous, shining above, elliptic, oblong or lanceolate, obtusely acuminate, more or less serrulate, turning yellowish in drying, on a short petiole. Flowers small, yellowish, fragrant, sub-sessile, on short, axillary, simple or branched villous racemes; bracts and bracteoles pubescent. Calyx-lobes 5 ciliate, about 1 lin.; petals nearly 3 lin. long. Stamens numerous, unequal, as long as the petals, and inserted at their base. Ovary 3-celled. Fruit narrow, oblong, more or less distinctly ribbed, purple when ripe, ½ in. long, enclosing a hard, 1-3-celled nut, with 1 or 2 seeds by abortion.

Common in our forests, Bengal, Kassia, Sikkim, Nepaul. Alt. 5000 ft.

This evergreen tree attains a height of 20-25 ft., with a girth of 1-1½ ft. Fl. October-January; Fr. April-May.

The wood is yellowish, strong and compact, and is used for furniture. From the bark a red dye is obtained, which is useful for dyeing.

OLEINEÆ.

Nyctanthes arbor-tristis, Linn.; Dalz. & Gibs. Bby. Fl. Suppl. 51; Brand. For Fl. 314. *Parbati*, a corruption of *prajatak*, *harsinghar*, *shali*, *nibari*, *khurasli*.

A large shrub or small tree rough all over with stiff hairs, branches 4-cornered. Leaves 3-4 in., ovate, oblong-ovate, acuminate, entire, on a petiole 1-3 lin. Flowers white with a deep orange tube, fragrant, sessile; open in the evening and fall early in the morning, each supported by 2 bracts. Capsule obovate, truncate or notched, about 1½ in. long, glabrous.

Indigenous in various parts of India; on this side only cultivated.

Attains a height of 15-20 ft. and a girth of 3 ft. Fl. chiefly during the rains, and more or less throughout the year. Lafless in February; foliage renewed April-May.

The timber is brown, close-grained, and only used as fuel. The rough leaves are used to polish wood, and from the orange tube of the flowers a fine buff orange-coloured dye is prepared.

Schrebera Swietenioides, Roxb.; Dalz. & Gibs. Bby. Fl. 138; Brand. For Fl. 305. *Moka*, *gantha*.

A glabrous tree. Leaves about a foot long, opposite or sub-opposite in pari-pinnate leaflets 3-4 pair with the old one, 3-4 in., ovate-lanceolate, obtusely acuminate, unequal-sided at the base, opposite, or sub-opposite, shining. Flowers yellowish-white, turning brown, fragrant at night, arranged in terminal, trichotomous, corymbose panicles 3-6 in. long. Calyx glabrous or rarely pubescent. Corolla ½ in. long. Capsule 1½-2 in., woody, pyriform, rough, with white specks, bivalved.

Common below the Thull Ghát; found rarely in South and Central India, Madras, Burma.

Attains a height of 40-60 ft. and 4-5 ft. girth. Fl. February-April; Fr. in the cold season. Leafless January-March; new leaves appear April-May.

Wood yellowish-grey or white, close-grained, hard and durable; useful for turning, making combs, etc.

Olea Roxburghiana, Rœm. & Schult; Dalz. & Gibs. Bby. Fl. 159.

A small or middling-sized, glabrous tree. Leaves 4-5 by 2 in., oblong or ovate-elliptic, acuminate, attenuated at the base, entire, waved at the margin on a petiole 1-1½ in. Flowers white, panicles axillary arising from beneath the leaves, many-flowered, bracts small. Corolla-tube short, lobes deep. Stigma 2-cleft. Fruit small, oblong, purple.

Common in the forests of this Presidency, Madras and elsewhere.

Alt. 6000 ft.

Fl. in the hot and at times in the rainy season; Fr. November-February.

Wood pale-brown, hard, close-grained, durable, used for agricultural implements and turning.

O. dioica, Roxb.; Dalz. & Gibs. Bby. Fl. 159. *Parjamb*, *kárambu*.

A glabrous, dicœceous tree. Leaves 3-5 by 2-2½ in., oblong-elliptic, lanceolate-acuminate, remotely and rather acutely serrate, coriaceous,

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narrowed at the base; petiole 3-4 lin. long. Flowers small, greenish-white (female somewhat larger) arranged in short panicled racemes arising from the axils of the leaves opposite to them or below; no rudiment of an ovary in the male flower. Drupe size of a pea, purplish, globose, with a one-seeded nut.

Common at Mátherán, Lonávli, Mahábaleshvar and other ghâts; also at Khandála, Wag Dongar near Vengúrla, South Kánara, forests of Chittagong.

Fl. February-March; Fr. May- June.

The wood is white, strong and close-grained, and is used for various purposes.

Ligustrum Neilgherrense, Wight.; Dalz. & Gibs. Bby. Fl. 159.

A large shrub or small tree, glabrous. Leaves 1½-2 by 1-1½ in., ovate-elliptic, acute or acuminate, coriaceous, entire, short-petioled. Flowers numerous, white, fragrant, on thyrses at the end of branches. Fruit black, size of a pea.

This species resembles *L. Perrotteiii* of the authors, and is very common at Mahábaleshvar, Rám Ghát, Khandála and other ghâts.

Fl. in the cold season; Fr. May-June.

Wood light-brown, rather close-grained and durable. Generally used at Mahábaleshvar in the construction of huts and for fuel.

Chionanthus Malabarica, Bedd.—*Linociera Malabarica*, Wall.; Dalz. & Gibs. Bby. Fl. 159.

A small tree; young parts covered with adpressed hairs. Leaves 3-6 by 1-2½ in., elliptic or obovate-obtuse, acute or acuminated, cuneately attenuated at the base, glabrous on both sides, short-petioled. Flowers white, fragrant, 1-3 sessile on the top of a peduncle ½ in., or several on cymose panicles about 2 in.; bracts of the ramifications small, deciduous. Calyx usually densely hairy, sometimes glabrous. Petals linear in duplicate-valvate channel united in pairs by the stamens. Fruit ovate or obovate, oblong-angled, about ½ in. long.

Very common on our ghâts at Khandála, Rám Ghát, etc.; also in Madras and Ceylon.

Fl. November-December.

SALVADORACEÆ.

Salvadora Persica, Linn.; Dalz & Gibs. Bby. Fl. 312; Brand. For. Fl. 315. *Pilu, khárjal, kabbar, arák* (Arab); *tooth-brush tree.*

A large shrub or middling-sized tree, scabrous, branchlets pendulous. Leaves 1-2 by 1 in., oval or ovate to narrow-lanceolate, entire, coriaceous, very smooth and shining and glaucous on both sides; petiole ¼-1 in. Flowers greenish-white on slender pedicels usually about ¼ in. or shorter, arranged in axillary and terminal lax panicles longer than the leaves. Calyx-lobes 4-parted, ciliated. Corolla cleft almost to the base into 4 generally reflexed lobes. Berry globose, smooth, fleshy, red when ripe, 2-2½ lin., embraced at the base by the persistent calyx.

Common near the sea in Gujarát, Konkan, Madras, and in the Circárs and northern parts of Ceylon. Planted in many places. Found also in Sind and elsewhere, as in Egypt, Syria, etc.

This evergreen tree attains in some places 30-40 ft. in height and 4-5 ft. in girth, sometimes 6-8 ft. Fl. November-May and more or less all the year round; Fr. in the rainy, and in some places in the cold season. Old leaves shed in April, the new ones re-appearing almost simultaneously.

Wood whitish-yellow, soft, easy to work, and takes a fine polish, but is little used, as it is small. White ants do not attack it. The root bark is very acrid, and is sometimes used by the natives as a vesicant. The berries have a strong aromatic odour and pungent taste like that of garden-cress, and are used medicinally. The leaves are also pungent, and are used in some places as salad. The twigs serve in lieu of tooth-brushes.

This tree has been identified by some botanists as the mustard tree of the Scripture.

APOCYNEÆ.

Thevetia neriifolia, Juss.—*Cerbera thevetia*, Dalz. & Gibs. Bby. Fl. Suppl. 53. *Zard, kuhel.*

A small glabrous tree. Leaves 2-3 in., linear-acuminate like those of oleander. Flowers large, yellow, on ½-1 in. pedicels in axillary or terminal corymbs. Drupe size of a crab-apple, fleshy, smooth.

Is a native of South America and West Indies, and naturalized in Bombay, Poona and elsewhere.

Fl. and Fr. throughout the year.

Cerbera odollam, Gærtn.; Dalz. & Gibs. Bby. Fl. Suppl. 53; Brand. For. Fl. 322.

A large, glabrous tree. Leaves 4-6 in., sometimes 12 in., oblong-lanceolate or obovate-lanceolate, acuminate, tapering into a slender 1-1½ in. petiole entire and shining. Flowers white, sometimes with a yellowish throat, sweet-scented, in a corymbose terminal pedunculate cyme. Calyx-lobes reflexed, about ½ in., deciduous along with the bract; bracts coloured, large, very deciduous. Corolla-tube ¾ in. long, sometimes longer, nearly as long or longer than the lobes. Drupe ovoid, brown, or blackish when ripe. Size of an apple.

Common on salt ground along the whole of the coast line, in the Konkan; also in China, Eastern Archipelago and elsewhere.

Attains 40-50 ft in height and 3-4 ft. in girth. Is evergreen. Fl. and Fr. all the year round.

Wood white, soft and spongy. The seeds yield an oil which is used in lamps. The drupe is said to be poisonous.

Plumeria acutifolia, Poir.; Dalz. & Gibs. Bby. Fl. Suppl. 52; Brand. For. Fl. 323. *Khair-champa, gutáchin, chameli.*

A glabrous tree with thick, blunt, crooked branches. Leaves 5-15, obovate-lanceolate, shortly acuminate, entire, tapering on a 1-2-in. petiole. Flowers large, white, slightly pinkish outside, with pale-yellow throat, forming a large pedunculate cymose corymb. Follicles linear, rigid, cylindrical, divaricate, about 6 in. long.

Is cultivated throughout India, China, Cochin-China, etc., but its home is not known.

Attains a height of 15-25 ft. and a girth of 2-4 ft. Fl. in the hot and rainy seasons; has never been in fruit on this side.

Attempts have been made, though unsuccessfully, to manufacture caoutchouc from the abundant, tenacious, milky juice which flows on wounding the bark or any other part of the tree.

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Wrightia tomentosa, Rœm. & Schul.; Dalz. & Gibs. Bby. Fl. 145; Brand. For Fl. 323. *Kadu-inderjao, dhudi, dáira.*

A small tree; branchlets and leaves softly pubescent and tomentose. Leaves 3-4 in. by 1½-2 in., elliptic-acuminate, attenuated into a petiole 1-3 lin. entire, membranous. Flowers 1 in. diam., yellowish, on short pubescent pedicels forming a short, peduncled, terminal, corymbose cyme; bracts oval, deciduous. Corolla-tube twice the length of the calyx. Corona orange-coloured, and cleft into about ten scales. Follicles 8-12 in. by ½ or more across, scabrous, with numerous elevated specks with a shallow furrow on each side. Hairs white.

Common on the hills of Northern Konkan and northern ghâts, Madras, Oude, Bengal, Ceylon, Burma. Attains 20-40 ft. with a circumference of 3-5 ft. Fl. April-June; Fr. November-January. Sheds foliage February-March; renews April-May.

The wood is of a yellowish-white colour, even-grained, easy to work, and used in turning and making combs, etc. The bark of the stem and root is said to be useful in snake-bites and in scorpion-stings. From incisions in the bark a yellow milky juice flows, which, when mixed with water, forms a good dye.

W. tinctoria, Br.; Dalz. & Gibs. Bby. Fl. 145; Brand. For. Fl. 324. *Kala-kuda, khirni.* The seeds are called *inderjao.*

A glabrous tree. Leaves 3-4 by 1-1½ in., elliptic-oblong, acuminate, rounded at the base, entire, membranous, glabrous or occasionally pubescent, or with the margins slightly erosed; petiole 2-3 lin. long. Flowers white, fragrant, ½-⅔ in. diam., in lax terminal cymes; bracts lanceolate, caducous. Corolla-tube twice the length of calyx. Corona consisting of numerous white linear scales. Follicles 10-20 in. long by 5 lin. diam.

Common in the forests of this Presidency, Madras and other places; Meywár, Bánda.

Alt. 4000 ft.

Attains a height of 20-25 ft. and a girth of 3-4 ft.

Fl. in the hot season; ripens fruit next cold season. Sheds leaves February; renews foliage March-April.

The wood is beautifully white like ivory, close-grained, and valued for turning and carving. Indigo is made from the leaves and tender branches. The seeds, which are not bitter, are sold in the bázár as sweet inderjao, and confounded with those of *Hollarrhena.* (*See* Medicines.)

Alstonia scholaris, Br.; Dalz. & Gibs. Bby. Fl. 145; Brand. For. Fl. 325. *Satwin, sátni, chatiun.*

Glabrous except the inflorescence. Leaves 4-8 by 1½-2½ in., in whorls of 5-7, oblong or ovate-oblong, obtuse or acute, narrowed into a short petiole, coriaceous, shining above and pale underneath, entire. Flowers greenish-white, sessile, or sub-sessile in pedunculate cymes. Peduncles 1-2 in. long; cymes 8-12, arranged in an umbel. Calyx-segments ovate. Corolla-lobes pubescent outside; the throat closed by a ring of hairs. Follicles slender, 1-1½ ft. long. Seeds about ¼ in. long, covered with hairs all round.

Common in our forests and those of Burma, Madras, Ceylon and elsewhere.

Alt. 3000 ft.

This evergreen tree attains a height of 40-60 ft. (sometimes even 90) and a girth of 4-6 ft. Fl. December-March; Fr. in June.

The wood is whitish, even-grained, soft, somewhat porous, and used for furniture, school-boards, scabbards, etc. The bark is a powerful astringent tonic, and is used in chronic diarrhœa and dysentery in the form of infusion and tincture. (*See* Medicines.)

Holarrhena antidysenterica, Wall.; Dalz. & Gibs. Bby. Fl. 145; Brand. For. Fl. 326. *Daula, kudla, ankdia*; the seeds are called *kadva* (bitter) *inderjao, karri, karchi*.

A small glabrous tree. Leaves 4-8 by 2½-3½ in., elliptic, oblong, short-acuminate, obtuse at the base, entire, on a petiole 2-3 lin. Flowers white, 1-1¼ in. diam., inodorous, arranged in terminal corymbose cymes. Corolla-tube puberulous. Follicles smooth, 8-15 in. long, ⅛ in. diam. Seeds pendulous with a tuft of hair at the hylum.

Very common in the Konkan, Madras, Bengal, Oude, etc.

Alt. 3500 ft.

Attains a height of 25-30 ft. and a girth of 3-4 ft.

Fl. April-June; Fr. in the cold season. Leafless in February; foliage renewed April-May.

The timber is pinkish or yellowish-white, even-grained, soft and light. It is used in making combs, spoons, toys, etc. The bark in powder or decoction is used with benefit in cases of chronic diarrhœa. The seeds (*inderjao*) are also used for the same purpose; they resemble oak-seeds, are narrow, oblong, about ½ in. long, convex on one side. As stated above, they are often confounded with the seeds of *W. tinctoria*. The leaves serve as fodder. (*See* Medicines.)

LOGANIACEÆ.

Strychnos potatorum, Linn.; Dalz. & Gibs. Bby. Fl. 156; Brand. For. Fl. 317. The *clearing-nut tree, nirmali, nelmal, chilbinj*.

Glabrous. Leaves 2-3 by 1½-2 in., ovate or rotundate, acute or obtuse, coriaceous, sub-sessile. Flowers yellowish-white, odorous, small, in short pedunculate cymes rising solitary or in pair from the scars of the fallen leaves. Corolla-tube campanulate; segments rotate with tufts of white hairs at the base. Berry ¾-1 in. diam., globose, black when ripe, 1-seeded. Seeds compressed, orbicular, imbedded in purplish pulp.

Pretty general throughout the ghâts, Konkan, and Southern Marátha Country; also in Madras and Bengal.

This evergreen tree attains a height of 25-30 ft. and a circumference of 3-4 ft. Fl. in the hot season, and Fr. after the rains.

The wood is hard, greenish, pale-brown, close-grained and durable, and takes a fine polish. It is used for ploughshares, etc. The seeds are employed to clean muddy water; they are devoid of poisonous properties, and are given in gonorrhœa and diabetes. The pulp of the fruit is eaten.

S. nux-vomica, Linn.; Dalz. & Gibs. Bby. Fl. 155; Brand. For. Fl. 317. *Kajra, kára, jhar katchura*.

Glabrous. Leaves 3-4 by 2-3½ in., ovate or nearly orbicular, acute at the apex or quite rounded, coriaceous, shining above and glaucous beneath, prominently 3-5-nerved, on petioles 3-6 lin. Flowers greenish-white on terminal, pubescent, trichotomous corymbose

Timber Trees.

cymes. Corolla-tube cylindric, about 5 lin. long. Ovary with numerous ovules. Stigma peltate. Berry globular, size and colour of an orange. Seeds numerous, about ½ in. long, flat, shining, circular or reniform.

Very common throughout this Presidency, in the Konkan, Vádi country, Madras, Ceylon and other parts of India.

Alt. 4000 ft..

This evergreen attains 30-40 ft. in height with a circumference of 3-4 ft. It Fl. in April-May; Fr. in the cold season; sheds foliage for a short while in the hot season, the new leaves appearing almost simultaneously.

The wood is white or grey, hard, close-grained, durable, and of a bitter taste. It is used for cart-wheels, agricultural implements, fancy work, etc. The seeds, which are flat and grey, contain an extremely poisonous alkaloid, *strychnia*, which is also found in the bark.

BORAGINEÆ.

Cordia myxa, Linn.—*C. latifolia*, Dalz. & Gibs. Bby. Fl. 173; Brand. For. Fl. 336. *Bargund, vargund, gedūri, sepistar, pistan, bhokar, lesuri, semdr, goden, gondan.*

Young shoot and leaves soft-pubescent. Leaves 3-6 by 2½-4 in., broad-ovate or orbicular, rounded or slightly cordate at the base, entire, smooth above, paler beneath; petiole 1-2 in. Flowers small, white, sessile or sub-sessile in loose, terminal, axillary, pedunculate cymes. Calyx-lobes silky-pubescent inside. Corolla-tube the length of the calyx, glabrous. Drupe ¾-1 in. long, ovate or globular, pale-yellow, supported by the enlarged calyx; pulp very viscid.

Common in Bombay on the ghâts, and about valleys throughout the Konkan, Madras, Punjáb, Bengal, Assam, etc.

Alt. 5000 ft.

Attains a height of 25-40 ft. and a girth of 3-5ft., sometimes more. Fl. March-May; Fr. May-July. Leafless in April; leaves renewed in May.

The wood is olive-coloured, greyish, or light-brown, close-grained, soft, light and fibrous, and employed in boat-building and for gun-stocks, agricultural implements and fuel. The ripe fruit is eaten, as also the young tender one as vegetable; it is also pickled. The adhesive viscid pulp is used as bird-lime, the juice being sometimes employed instead of the marking nut, though the colour is apt to fade. The ripe dried fruit is the *sebastan* of native Materia Medica, and is employed as a pectoral medicine. The kernel, especially that of the cultivated species, is also eaten. The bark is made into ropes and fuses, and the fibre is employed in caulking boats. In Otaheti the juice of the leaves is used in dyeing.

C. Wallichii, G. Don.; Dalz. & Gibs. Bby. Fl. 174; Brand. For. Fl. 337. *Dhaiwan.*

This is, botanically speaking, closely allied to the preceding, except that the leaves are densely wooly or grey-tomentose below and more distinctly cordate.

Between Malsej and Ahmednagar and the Brahaminváda range of hills; also in the western forests of Madras and Mysore.

The wood is tough, and used for various purposes.

C. Rothii, Roem. & Schul.; Dalz. & Gibs. Bby. Fl. 174; Brand. For. Fl. 338. *Gondni, gūndi, lidi.*

Leaves 3-4 by 1-1½ in., oblanceolate, obtuse, sub-opposite, entire, mucronate, rough, tapering to a petiole ½ in. Flowers small, white, numerous, 4-5-cleft, on terminal and axillary pedunculate cymes. Corolla-lobes 4-5 reflexed. Stamens 4-5. Drupe size of a pea, orange-yellow, longitudinally striated.

Not uncommon in this Presidency, especially in the villages about the Deccan and Gujarát; also in Madras, Mysore, Ajmir, Sind and Rájputána.

Height 30-40 ft.; girth 3-5 ft. Fl. April-June; Fr. in the ensuing cold season. Leafless December-January; foliage renewed February.

The wood is of a light-yellow or light-brown colour, tough, and valuable for making carriage poles, and for building in Sind. Agricultural implements are also made of it in Cutch. Gum issues from the wounded bark; hence the name *gondni* of the tree. The bark is much used for making astringent gargles, as also for ropes. The fruit, though insipid, is eaten.

C. Macleodii, H. & Th.; Brand. For. Fl. 337. *Dhāwan, dhāman, dhāim, bhóti, daiwas.*

Young shoots, inflorescence and calyx wooly or tawny-tomentose. Leaves 5-7 in. and nearly as broad, alternate or sub-opposite, almost orbicular, cordate at the base, pubescent and rough above, on a petiole 2-3 in. Flowers white, small, on axillary and terminal cymes. Calyx 5-unequally toothed, sometimes 3-cleft, ribbed externally. Corolla-lobes undulate, spreading, or reflexed. Male flowers with a rudimentary ovary. Drupe ½ in., oval, crowned with the persistent base of style and supported by the calyx.

In Western Deccan, Sátára, Belgaum, Central India, Ajmir and other places.

Height 30-40 ft.; girth 3-4 ft. Fl. in the hot and Fr. in the cold season.

The wood is pale-brownish, mottled with white veins, hard, even-grained, tough and easily worked. Used in carpentry and building; fishing rods are also made from it.

Ehretia lævis, Roxb.; Dalz. & Gibs. Bby. Fl. 170; Brand. For. Fl. 340. *Tamboli, chambal, datranga, koda, darar.*

Glabrous tree. Leaves 3-5 by 2 in., ovate or elliptic, acutely acuminate or obtuse, rounded or acute at the base, coriaceous, entire; petiole ½ in. Flowers small, white, sessile, in terminal, and axillary compound cymes. Calyx segments 1 lin. long. Corolla-lobe spreading. Anthers exserted. Drupe red, afterwards black, size of a pepper kernel, rugose, with 4-seeded pyrenes.

Common at Málvan, south-east of Surat, Bhimáshankar, Konkan, Goa; also in Madras, Ceylon, Bengal, and various other parts of India.

Alt. 2500 ft.

Attains a height of 30-50 ft. and a girth of 3-4 ft. Fl. January-March, sometimes later; Fr. April-June. Sheds foliage in the cold season; renews February-March.

The wood is whitish or yellowish-brown, even-grained, tough, and used for agricultural implements and in building. The inner bark is said to be eaten mixed with flour in times of famine. The fruit is also eaten though insipid, and the leaves are used as fodder.

Timber Trees.

BIGNONIACEÆ.

Oroxylum Indicum, Bth.—*Calosanthes Indica*, Dalz. & Gibs. Bby. Fl. 161; Brand. For. Fl. 347. *Tantun* (Sálsette), *tetu*, *ullu*, *karkath*, *sauna*, *assar*.

Glabrous. Leaves 4-6 ft. long; pinnæ 3-4 pair, the lowest pair bi-pinnate; leaflets 3-8 in. long, broad-ovate, acuminate, petioled, sub-cordate, entire. Flowers large, fetid, dark-red, fleshy, on short pedicels in erect terminal racemes. Calyx about 1 in. long. Corolla 2-3 in. diam. Capsule 2-4 ft. by 3-4 in., flat. Seeds 1½ in. wide, with a large pellucid wing all round. The pod resembles a scabbard.

Common in the Konkan, Sálsette, Khándesh, etc.; also in Madras, Bengal, Central India, and Burma.

Alt. 3500 ft.

Height 20-40 ft.; girth 2-5 ft. Fl. in the rainy season and Fr. in the cold season. Leafless February-March; foliage renewed April-May.

The wood is yellowish-white, coarse-grained and soft. The bark and fruit are used in tanning and dyeing. The seeds are employed in lining hats, and placed between two layers of wicker-work to make umbrellas.

Millingtonia hortensis, L.; Dalz. & Gibs. Bby. Fl. Suppl. 55; Brand. For. Fl. 347. *Indian cork-tree*, *nimi-chambeli*, *akas-nim*.

Glabrous. Leaves 1-2½ ft. long, opposite de-compound; leaflets 1-3 in., ovate-acuminate, rounded or obtuse at the base, entire, membranous, dark-green; petioles of the lower pinnæ and pinnules long, the upper pinnules sessile or sub-sessile. Flowers numerous, 3-3½ in., long, pure, white, fragrant, in ample terminal panicles, bracts minute, ciliate. Capsule 12 by ¾ in., smooth. Seeds (which are rarely met with on this side) about an in. diam., flat, surrounded by a pellucid wing.

Said to be a native of Ajmir, Burma and the Indian Archipelago, but is planted in avenues and gardens in Bombay, Poona, etc.

This evergreen attains a height of 50-60 ft. (sometimes more), and a circumference of 6-12 ft. It flowers September-December; Fr. in March.

The wood is whitish or of a pale-yellow colour, firm, close-grained, takes a fine polish, and is adapted for furniture and ornamental work. From the bark an inferior kind of cork is made.

Tecoma undulata, G. Don.; Dalz. & Gibs. Bby. Fl. 161; Brand. For. Fl. 352. *Roirá*, *lohuri* or *lohero rakhi-reora*.

Glabrous, with branches drooping like the weeping willow. Leaves 3-4 in., opposite or sub-opposite, linear-lanceolate, or obovate-oblong, entire, much undulated, clothed with minute white scales; petioles slender 1 in. Flowers large, about 2-3 in. long, bright, orange-coloured, inodorous, 5-10 in corymbose racemes. Calyx campanulate, 5-toothed. Corolla campanulate. Ovary 2-celled on a cup-shaped disc. Capsule slender, linear, compressed, 6-8 in. long.

Found in Western Khándesh, Gujarát, Punjáb, and Beluchistan, and cultivated in several places.

Alt 4600 ft.

This is an evergreen which attains 30-40 ft. in height with a girth of 5-8 ft. Fl. January-April, when the tree is a most beautiful sight; Fr. May-July. The foliage is renewed January-February.

The wood is hard, dark-greyish-brown, fine-grained, and takes a fine polish. It is used for cabinet-work and agricultural implements. The leaves afford fodder for cattle.

Dolichandrone falcata, Seem.—*Spathodea falcata*, Wall.; Dalz. & Gibs. Bby. Fl. 160; Brand. For. Fl. 350. *Mersingi, kanseri, mendal, manchingi.*

A small or middle-sized tree, glabrous or pubescent. Leaves 3-6 in., usually opposite, unequally pinnate, 2-3 pair; leaflets 2-3 pair, ½-1½ in., and nearly as much across, orbicular, obtuse or short-acuminate, short-petioled. Flower 1½ in. long, white, fragrant, in few-flowered terminal racemes. Corolla deeply-cleft into 5 unequal lobes. Capsule linear, flat, variously curved, 10-14 by 3-4 in. Seeds with oblong wings.

Found at Bombay, Nagotna, Khandála, Southern Marátha Country, Madras, Meywár and Bánswárá.

Fl. in the hot and Fr. in the cold season.

The wood is light-coloured, strong, durable, and used for agricultural implements and building.

D. crispa, Seem.—*Spathodea crispa*, Wall.; Dalz. & Gibs. Bby. Fl. 160; Brand. For. Fl. 350.

A small or middle-sized, glabrous tree; young shoots pubescent. Leaves 6-12 in., opposite-pinnate; leaflets 5-7, rarely 3, 2-4 in. long, oblong, acute, entire on petioles 1-2 in. long. Flowers large, white, long-pedicelled, fragrant, in terminal, few-flowered racemes. Calyx 1 in. long, spathaceous, opening on the upper side. Corolla 2½ in. long, lobes with curled edges. Capsules 12-15 in. by ½ in., pendulous, variously curved, hard, and brown.

In Dudhi in Ghatparbha, Southern Marátha Country, Madras and elsewhere.

Fl. May-June; Fr. December.

The wood is of a light-yellow colour, close-grained, heavy and durable, and used for building and other purposes.

Heterophragma Roxburghii, D. C.; Dalz. & Gibs. Bby. Fl. 160.—*Spathodea Roxburghiana*, Sprengel; Brand. For. Fl. 350. *Warras, pullung.*

A large tree. Leaves 1-2 ft. long, impari-pinnate, opposite, glabrous when old; leaflets 2-2½ by 1½ in., 3-5 pair, ovate, acute, serrate, short-petioled. Flowers whitish with a pink margin, fragrant in large, terminal, many-flowered, erect panicles. Calyx bi-labiate. Corolla campanulate. Capsule 12 by 2 in., ½ in. thick, 4-celled.

Very common in our ghâts, Khándesh, Southern Marátha Country, Konkan, Kánara, Mátherán, Koina River and Godávari.

Fl. March-April; Fr. in May and the rainy season.

The wood is strong, and is used for planks and building purposes.

Stereospermum xylocarpum, Benth. & Hook.; Dalz. & Gibs. Bby. Fl. 159.—*Spathodea xylocarpa*, Brand. For. Fl. 349. *Karsing* or *karsingi, bhersingi.*

Leaves 1-4 ft., glabrous, bi-tri-pinnate, pinnæ 4-6 pair; leaflets 2-5 by 1-1½ in., 3-5 pair, short-petioled, ovate or ovate-lanceolate, oblong-acuminated, entire, membranaceous, reticulately veined.

Timber Trees.

Flowers large, white, slightly yellow, fragrant, in large, terminal, corymbose cymes. Calyx campanulate, coloured, unequally 5-toothed. Corolla 2 in. long, curved, hard, woody, and very rough, with hard tubercles, inside smooth. Seeds numerous, winged.

Common in Thull and Parr Ghâts, Juar forest, Khándesh Dangs; also in Madras and Bengal.

Attains a height of 30-35 ft., sometimes more. Fl. March-April; Fr. at the end of the cold season. Leafless during the cold months; renews foliage in hot weather.

The wood is reddish-brown or light-brown in colour, close-grained, tough; stands a good polish, and is used by cabinet-workers.

S. suaveolens, D. C.; Brand. For. Fl. 351.—*Heterophragma suaveolens*, Dalz. & Gibs. Bby. Fl. 161. *Paral, paddal, kalagori.*

Leaves 12-24, opposite, impari-pinnate; leaflets 2-4 pair, 3-6 by 2½-3½ in., petioled, ovate or elliptic-ovate, acuminate, almost entire or slightly serrate, downy when young, glabrous when old; petiole enlarged at the base 4-6 lin. Flowers 1½ in. long, of a dark, dull, crimson colour, fragrant, glandular, puberulous, on slender pedicels, forming a large trichotomous viscid panicle. Calyx 4-cleft. Corolla campanulate, bi-labiate. Calyx-lobes curled. Capsule 18-24 by 3-4 in. diam., dark-grey, rough with elevated white tubercles. Seeds with membranous pellucid wings.

Common in Dandeli jungles, Mátherán, island of Karanja, Deccan, Madras, Bengal, Central India, Burma, etc.

Alt. 4000 ft.

Attains a height of 30-40 ft. (sometimes twice as much), with a circumference of 3-6 ft. Fl. March-April; Fr. November-December, the fruit remaining long on the tree. Is leafless in April, the new foliage appearing by the end of that month or the beginning of May.

The wood is of a reddish-brown colour mottled with white, durable, and much esteemed for building purposes. It makes very good charcoal. The root bark is used as a tonic in Ceylon.

S. chelonoides, D. C.; Brand. For. Fl. 352.—*Heterophragma chelonoides*, Dalz. & Gibs. Bby. Fl. 160. *Padal, pádri, paral, kirsel, tuátuka.*

A glabrous tree. Leaves 12-18 in., opposite, impari-pinnate, leaflets 3-5 pair, 4-6 by 2 in., oval-elliptic, long-acuminate, entire or sometimes slightly serrate, short-petioled. Flowers ½-1 in., yellow, fragrant, on glabrous 2-4 lin. pedicels, forming an ample, lax, glabrous panicles. Calyx 5-toothed. Corolla bi-labiate, lobes curled, rugose. Capsule 12-24 by ½ in., compressed, curved. Seeds with membranous pellucid wings.

Common in the Bombay forests, Lonávli, Parr Ghát, etc., and throughout the peninsula, Ceylon and Burma.

Alt. 3000 ft.

Attains a height of 40-60 feet and a girth of 4-5 ft. Fl. May-July; Fr. August-January, the fruit remaining long on the tree. The leaves are shed February-March and renewed in April.

The wood is of a reddish-brown or orange colour, close-grained, soft, and useful for fancy work and in house-building. The bark, leaves, flowers and fruit are used in native medicine.

VERBENACEÆ.

Tectona grandis, Linn.; Dalz. & Gibs. Bby. Fl. 199; Brand. For. Fl. 354. *Saag, saguan, tegu, tekku, teak.*

Branches quadrangular; young parts roughish with stellate tomentum. Leaves 6-18 by 6-12 in., oval or elliptic-obovate, acute or short-acuminate, short-petioled, more or less rough, pubescent above, densely grey or tawny-tomentose beneath. Flowers small, numerous, white, on short pedicels, in large, erect, bracheate, cymose panicles 12-36 in. long. Corolla rotate, 5-6-lobed. Fruit globose, hard, more or less distinctly 4-lobed, nearly 1 in. diam., enclosed in the inflated bladdery calyx.

Common from the forests in the vicinity of the Tápti to the Konkan; Madras, Malabár, Bengal, Burma, Java, Sumatra, and islands of the Indian Archipelago. Is also cultivated in various parts. Does not appear to thrive above 2500 ft., though found of poor growth as high as 4,000 ft.

Height 70-100 ft. with a girth of 12-15 ft., though occasionally exceeding 20 ft. Flowers during the rains, and ripens fruit between November and January. Sheds its foliage early in the cold season and renews in May.

The wood is yellowish or yellowish-brown, hard, strong, very durable, easily worked, and takes a good polish. When young it is oily, and takes about two years to season. It is used for innumerable purposes, the foremost of which are ship and house-building, cabinet-work, etc. The tree yields a good oil, which is considered a substitute for linseed oil in the preparation of paints. It also yields a good varnish. The leaves are used instead of plates, and for wrapping parcels and thatching. A yellow dye is made from them.

Gmelina arborea, Roxb.; Dalz. & Gibs. Bby. Fl. 201; Brand. For. Fl. 364. *Sewan* or *shewan, kumar, gumbar.*

Young parts pubescent. Leaves 4-8 by 3-6 in., ovate-acuminate or acute at the apex, rounded or cordate at the base, tawny-tomentose beneath while young, entire almost coriaceous on a petiole 2-3 in. long. Flowers yellow tinged with brown, 1 in. long, on short yellowish pedicels in small cymes forming raceme-like tomentose, terminal and axillary panicle. Inflorescence, calyx and corolla densely tawny-tomentose. Corolla 5-lobed, bilabiate. Drupe 1 in., ovoid or obovate, fleshy, smooth, yellow when ripe.

Common at Bombay and in the Konkan; also in the Deccan, though not attaining any great size. Found also throughout India, Burma and Ceylon.

Alt. 3000 feet.

Height 50-60 ft. with a girth of 6-12 ft. Fl. February-May, and Fr. in May-June. Sheds leaves February-April, the new foliage appearing April-May.

The wood is pale-yellow, strong, light, and lasts well under water. It is used in cabinet-work and for general carpentry and toys. The fruit is eaten by the poor natives of Sátpura.

Premna latifolia, Roxb.; Dalz. & Gibs. Bby. Fl. 203. *Chámbadi.*

Is a tall shrub growing into a small tree with rounded cordate or oval leaves, 2-3 in., entire or slightly dentate, petioled and greenish flowers in terminal and axillary corymbose panicles.

Timber Trees.

Common in Bombay, in the Konkan, Ceylon and other parts of India. Wood white, moderately close-grained; usually burnt for fuel.

Vitex alata, Roxb.; Dalz. & Gibs. Bby. Fl. 201.

Young shoots tomentose or mealy. Leaves tri-foliolate; petiole (especially in young plants) with a broad wing, or quite wingless, about 2-3 in. long. Leaflets 3-4 in. by 1½-2 in., sessile or sub-sessile, lanceolate, obtusely acuminate, entire, sub-coriaceous, shining above, pubescent or hoary and glandular, dotted beneath. Flowers pale-yellow, 1-3 lin., slender pedicels, in small, dichotomous, lax cymes arranged in long axillary and terminal panicles.

Found in the Southern Marátha Country, Warri jungles and the Konkan; also in Burma, Chittagong, Pegu, Tenasserim, etc.

Alt. 2000 ft.

Attains a height of 30-40 ft. and a girth of 8 ft. Fl. March-May, and sheds its foliage in the hot season.

The wood is yellowish or light-brown, soft, close-grained, heavy and strong. Used for making handles, etc.

V. altissima, Linn.; Dalz. & Gibs. Bby. Fl. 201. *Banalgay.*

A large tree; branchlets quadrangular, compressed and channelled. Leaves 3, rarely digitately 5-foliate; petiole sometimes winged; leaflets 3-6 by 1-2½ in., sessile, oblong-elliptic, acute or acuminate, sub-coriaceous, entire, slightly pubescent or glabrescent above, clothed with white tomentum beneath. Flowers white, tinged with blue, in panicles composed of numerous interrupted cymes or spikes. Corolla small, lower lip hairy. Drupe size of a pea, fleshy, black.

Found in the ravines near Nagotna; plentiful in Kánara and South Konkan; also in Madras, Bengal and Ceylon.

Alt. 4000 ft.

Fl. in May and during the rains.

The wood is light-brown, coarse-grained, hard and durable, and is used for cabinet-work, building, and many other purposes.

V. leucoxylon, Linn.; Dalz. & Gibs. Bby. Fl. 201. *Sheras, longarbis thiras.*

Glabrous, except the young shoots, which are minutely downy. Leaves 3-5-foliolate on a petiole 2-5 in. long; leaflets 2-5 by 1-3 in., oblong or lanceolate-acuminate, usually entire, acute at the base, sub-coriaceous, shining above, pale, glabrous or finely downy beneath, on petioles ½-1 in. Flowers white with the centre of the lower lip clothed with lilac hairs, numerous, fragrant, sessile on short pedicels in dichotomous, long, peduncled, axillary cymes. Calyx 5-toothed; corolla twice the length of the calyx. Drupe oval, size of a cherry, black, supported by the circular patelliform calyx.

Common at Khandála, in the Southern Maráitha Country, Sávantvádi, and Konkan; rare in the Deccan. Found also in Eastern Bengal, Ceylon and Burma.

Alt. 3000 ft.

Grows to a height of 30-60 ft., attaining a girth of 3-12 ft. Fl. February-April, and Fr. during the rains. Sheds leaves in the hot season.

The wood is greyish-brown, hard, close-grained, and durable. It is used for cart-wheels, and has been recommended for furniture.

V. negundo, Linn.; Brand. For. Fl. 369.—*V. bicolor*, Dalz. & Gibs. Bby. Fl. 201. *Nargunda, nirgur, shiwari, nisinda.*

A tall shrub or small tree; young shoots, lower surface of leaves and inflorescence clothed with white tomentum. Leaves 3-5-foliolate on a 1-in. petiole; leaflets 1-4 in, short, petiolulate, lanceolate, entire or coarsely-toothed. Flowers small, bluish-white, in terminal thyrsus. Berry size of a pea, black when ripe.

Common everywhere in the plains and the ghâts, ascending up to Mahábaleshvar, where it is rare.

Is an evergreen tree 15-20 ft. high, with a trunk 2-3 ft. in circumference.

The timber is used for fuel; the leaves are much employed in native medicine (*see* Phar. of India), and the branches for wattle-work.

Avicennia officinalis, Linn.; Brand. For. Fl. 371. *White mangrove.*

Leaves 1½-3 in., elliptic-lanceolate, obovate-acuminate, tapering into a petiole 3-5 lin; coriaceous, entire, glabrous above, clothed with a white minute tomentum beneath. Flowers yellow, fragrant, sessile, small, in terminal heads. Calyx lobes 5. Corolla segments 4; capsule ovate, compound, acuminate, 2-valved, 1-seeded.

This small tree grows abundantly in the salt marshes in Bombay, Konkan and elsewhere.

Fl. April-May.

The bark is used for tanning, and a preparation of the ashes for washing clothing by dhobies. Painters mix them with their colours to make them adhere.

NYCTAGINEÆ.

Pisonia morindifolia, Wall.; D. C. Prod. ii. 447; Dalz. & Gibs. Bby. Fl. Suppl. 72.

A tall shrub or small glabrous tree. Leaves 6-12 by 5 in., ovate-oblong or elliptic-oblong, acute or shortly acuminate, usually oblique, and unequal at the base, membranous, glabrous, entire, or denticulate, pale-green, petiole ½-1½ in., veins prominent below. Flowers yellowish-green in terminal, rather large cymes; appear in the hot season.

The young leaves of this tree look blanched; hence its name of "Chinese lettuce". It is said to be indigenous in the Eastern Islands, and is now very commonly cultivated in our gardens on account of its foliage, which the Bombay Flora is responsible for saying becomes darker in the shade.

This tree attains a height of 15-30 ft., sometimes even more, and a circumference of 2-4 ft.

Seldom cut down for its wood.

MYRISTICACEÆ.

Myristica attenuata, Wall.; Dalz. & Gibs. Bby. Fl. 4. *Ramjaiphala* or *manpatri.*

A very tall, handsome tree. Leaves 5-8 by 1¾-2¾ in., oblong-lanceolate, long, attenuated, acute or rounded at the base, membranaceous, glabrescent when old, sub-furfuraceous in the midrib and veins, glaucous beneath; lateral veins 12-20 on each side; petioles

Timber Trees.

½-1 in. Flowers sub-globose, peduncles axillary, woody, fascicled, short, few-flowered; pedicels longer than the peduncles or nearly equal; bracteolate about the middle. Calyx sub-globose, scurfy. Anthers 12, round a flat disc. Fruit oval or oblong, tawny-tomentose, 1-2 in. long. Aril very thin-lobed at the apex.

At Khandála. Common on the ghâts and the hills of the Konkan. Fl. October-November.

M. Malabarica, Lamk.; Dalz. & Gibs. Bby. Fl. 4. *Ranjaiphal* or *mânpatri*.

A tall, elegant tree; branchlets glabrous or minutely puberulous with a reddish bark. Leaves 4-8 by 1½-2½ in., narrow, oblong or elliptic, lanceolate, acute or obtuse at the apex, acute or rounded at the base, glabrous on both sides, dull-coloured above, dull-brown or whitish beneath, petiole ½-1 in., channelled above. Male flowers more numerous and smaller than female ones on axillary cymes 1-3 in.; pedicels 2-6 lin.; perianth sub-globose, 3-4 cleft at the apex. Anthers 10-15, covering more than three-fourths of the column. Female peduncles axillary, 4-8 lin., usually simple, bearing 3-6 flowers; pedicels 3-4 lin. Fruit 2½-3 in. by ½-1 in., oblong. Aril orange-red, lobes twisted and folded into a cone at the top.

Common in the dense forests of the Konkan and Malabár. Fl. November-February; Fr. June, the nutmeg remaining a long time on the tree.

The wood of both this and the preceding is said to be white, close-grained and hard, but not much used, as it is said to be liable to attacks from insects. *M. Malabarica* yields a variety of nutmeg which when bruised and subjected to boiling furnishes a considerable quantity of a yellow concrete oil said to be an efficacious application to indolent ulcers, allaying pain, and inducing healthy action. It is used as an embrocation in rheumatism, for which purpose it is melted down with a small quantity of cocoanut oil. The oil is also employed to adulterate true nutmeg oil with; as is the aril, which is not very aromatic, to mix with that of the true nutmeg.

M. moschata, the true nutmeg, a native of the Eastern Islands, is also cultivated in Bombay, Goa, Konkan and various parts of India near the sea-coast.

The wood is said to be hard and close-grained, but is not much used, the tree being chiefly valued on account of its aromatic nut.

LAURINEÆ.

Cinnamomum Zeylanicum, Breyn.; D. C. Prod. xv. i. 13; Brand. For. Fl. 375. *Dalchini, tikhi* (at Goa), *tâj, canélla* (Portug.).

A middle-sized tree, small branches quadrangular. Leaves 3-5 by 1½-3 in., rigid, more or less coriaceous, elliptic-lanceolate, obtusely pointed at the apex, more or less acuminated and sometimes unequal at the base, glabrous and shining above, glaucous beneath, 3-5-nerved, petiole 4-8 lin., long-channelled. Flowers tomentose, 3-lin., usually hermaphrodite, on long terminal, corymbose panicles equalling the leaves, the ultimate ramifications 3-flowered.

Cultivated and wild (?) in Bombay, Konkan, Cochin, Ceylon and other parts.

Alt. 8000 ft.

Timber Trees.

This evergreen attains a height of 30-40 ft. and 4-5 ft. of girth. Fl. throughout the year, but abundantly in January-February; Fr. June-August. Sheds and renews foliage in May.

The wood is whitish, becoming brown on exposure, and close-grained. Every part of the plant when bruised gives a powerful odour of cinnamon. The bark is used as a condiment and also for medicinal purposes, and from it, as also from the leaves, an oil is extracted. From the root-bark camphor is prepared.

C. iners, Rwdt.; D. C. Prod. xv. i. 19. *Tikhi.*

Leaves 4-8 by 1-3 in., oval or oblong-lanceolate, attenuated at both ends, usually strongly 3-nerved a little from above the base, glabrous above, glaucous beneath; petiole about ½ in. Flowers small, white, on slender pedicels of about the length of the calyx, forming long-peduncled, axillary or terminal cymose panicles equalling or exceeding the leaves. Calyx usually silvery-silky; lobes falling off at the middle. Fruit oblong, smooth, brown, embraced at the base by the thickened 6-lobed calyx.

Common in the forests of the Konkan, Malabár, etc.

Height 30-50 ft., with a girth of 3-4 ft. Fl. in the cold season.

The wood is brown or pale-brown, heavy and close-grained. The bark and the leaves are used for curries, and their aroma varies in different parts.

Machilus macrantha, Nees.; Dalz. & Gibs. Bby. Fl. 221. *Kurma* (Kán).

A middle-sized or large tree; branches spreading. Leaves 3-8 by 2-3 in., ovate or elliptic-oblong, acute or obtuse, glabrous above, glaucous beneath; petiole 1-1¾ in., channelled. Flowers yellowish, 4-6 lin., on a large, terminal, white, pubescent panicle about as long or longer than the leaves. Berry globose, ¼-¾ in., black.

Common at Parvar and other ghâts; also in the western forests of the Madras Presidency and in Ceylon.

Alt. 1-6000 ft.

Fl. March-April; Fr. in the rainy season.

The wood is light and even-grained, and is used for building purposes.

M. glaucescens, described by Dalz. & Gibs., appears to be a variety of this, but the leaves are smaller, and the panicles usually corymbose equalling the leaves.

Beilschmiedia Roxburghiana, Nees.; Dalz. & Gibs. Bby. Fl. 222; Brand. For. Fl. 378. *Maida-lakdi.*

Leaves 4-6 by 1½-2 in., sub-opposite or alternately elliptic-oblong, acuminate, obtuse, coriaceous, glabrous, shining above, and marked with prominently reticulate veins below; petiole ½-1 in. Flowers whitish or yellowish-white on axillary racemes the length of the petiole or longer. Peduncles, pedicels and calyx pubescent, glands and staminodes yellow. Fruit 1½-2 in., oblong, dark-purple when ripe, grey-tomentose.

Common on the ghâts, Eastern Bengal, Nepaul, Oude forests and Burma.

Attains 20-30 ft. in height (sometimes more) and 4-8 ft. in girth. Fl. April-May.

Timber Trees.

The wood is dark-grey and is used for building purposes, etc.

B. fagifolia is closely allied to the above species, if not the same.

Tetranthera laurifolia, Jacq.; Brand. For. Fl. 379.—*T. apetala*, Dalz. & Gibs. Bby. Fl. 222; also called *maida-lakdi, garbijaur, menda.*

Branchlets, inflorescence and leaves more or less pubescent, the last named becoming often glabrate when old. Leaves 5-10 by 2½-3½ in., alternate, oblong-lanceolate or elliptic-lanceolate or obovate, shortly acuminate or obtusely acute; acute or cuneate at the base, pale beneath, coriaceous. Flowers minute, yellowish, 8-12 in a head forming pedunculate umbels or corymbs of about the length of the petiole or a little longer; involucre of 4 concave bracts; perianth truncate. Stamens about 14, alternating with as many or more staminodes. Berry globular, size of a pea, smooth, black and almost dry when ripe, resting on the club-shaped perianth.

Found at Vengúrla and on the ghâts; Southern India, Madras, Ceylon, Bengal, Burma and other parts of India.

Alt. 4500 ft.

This evergreen attains a height of 40-50 ft. with a circumference of 4-5 ft. Fl. May-July; Fr. in October.

The wood is greyish-brown, close-grained and durable. The bruised leaves have the smell of cinnamon.

T. Wightiana, Wall.—*Cylicodaphne Wightiana*, Dalz. & Gibs. Bby. Fl. 222. *Keyngi.*

Branchlets and under surface of the leaves clothed with rusty brown pubescence. Leaves 3-8 by 1-3 in., elliptic or oval or obovate-oblong, obtuse or acute, rounded or attenuated at the base, green and glabrous above, usually tomentose or sub-glabrous below; veins prominent; petioles 3-8 lin. Flowers in axillary, solitary racemes shorter than the leaves, clothed with rusty pubescence; involucre 4-6-flowered. Berry nearly ½ in. long, nearly half-immersed in the cup-shaped truncated tube of the calyx.

This handsome large tree is common in our ghâts; also in Kánara down to Cape Comorin, and Assam.

Alt. 2000 to 8000 ft.

The wood is yellowish, with a dark heart, and is used for rafters and other economical purposes.

Actinodaphne Hookeri, Meissn.; Brand. For. Fl. 381.—*A. lanceolata*, Dalz. & Gibs. Bby. Fl. 312. *Pisa.*

A small or middling-sized tree; young shoots and petioles rusty-tomentose. Leaves 3-9 by 1¼-2 in, in whorls of 5-8, more or less 3-nerved at the ends of branches, elliptic-lanceolate, or ovate-lanceolate, acute or acuminate, narrow, rounded at the base, glabrous in age, dark-green and shining above, glaucous beneath; petiole 3-8 lin., tomentose. Flowers axillary, fascicled, few-flowered, covered with sub-orbicular golden scales. Fruit somewhat like an acorn, oblong, resting on a concave cup.

Very common at Mahábaleshvar, Mátherán, along the Western Ghâts, Kánara, Sátára, in some parts of the Madras forests, and in Sikkim.

Alt. 5000 ft.

This evergreen shrub becomes a small tree in protected situations. It Fl. from September-November, and Fr. March-May.

Litsæa Zeylanica, Nees.; Dalz. & Gibs. Bby. Fl. 223; Brand. For. Fl. 382. *Belori* at the Nilghiries, *kanwal, sara, chirchira.*

A large tree, glabrous; leaf-buds and pedicels pubescent with minute hoary tomentum. Leaves 3-6 by 1-2 in., elliptic-oblong, lanceolate, acuminate, narrow at the base, thinly coriaceous, glaucous beneath; petiole ½-1 in. Flowers yellowish-white, short-pedicellate, in dense, axillary, 6-12-flowered clusters; perianth segments ovate-oblong. Glands of the two inner anthers stipitate. Berry ¼ in. diam., globular.

At Parvar Ghát, Nilghiries, mountains of Southern India from 2-6000 ft., Ceylon, Hongkong and Queensland.

This evergreen attains a height of 20-30 ft. and a girth of 3-4 ft. Fl. March-May, and Fr. at the end of the rainy season.

Alseodaphne semecarpifolia, Nees.; Dalz. & Gibs. Bby. Fl. 222. *Wiwarana, raani.*

A glabrous tree, except the young shoots, which are tawny-pubescent. Leaves 3-9 by 2-4 in., ovate or obovate-oblong, obtuse at the apex, narrowed at the base, rigidly coriaceous, green, shining above, glaucous beneath; veins reticulated; petiole ½-¾ in.; panicles axillary, or from the scars of the fallen leaves. Berry ½ in. long, oblong.

Found along the whole of the Western Ghâts as far as Cape Comorin and in Ceylon.

Alt. 5000 ft.

This is also an evergreen tree; it attains a height of 25-30 ft. Fl. in the cold season, and Fr. in the hot season.

The wood is of a yellowish or pale-brown colour, strong, and is used for building purposes. Boats are also built from it, as it is not attacked by teredo.

Cryptocarya Wightiana, Thw.—*C. floribunda*, Dalz. & Gibs. Bby. Fl. 222. *Golu-mora* (Ceylon).

A glabrous tree; young shoots and leaves minutely tawny-pubescent. Leaves 2-6 by 1-2½ in., on petioles 3-9 lin., elliptic or ovate-oblong, acute or acuminate at the apex, obtuse or acute at the base, rigidly coriaceous, glabrous and shining above, pubescent on the veins beneath. Flowers yellow, small, numerous, shortly pedicelled on terminal or terminal and axillary panicles, yellowish-tomentose. Fruit oblong, ½ in. long, black when ripe.

Common at Talwaddi, and all along the Western Ghâts down to Ceylon.

Alt. 2-5000 ft.

This evergreen grows to a height of 20-35 ft.

It yields a large wood considered valuable for building purposes.

THYMELACEÆ.

Lasiosiphon eriocephalus, Decne; Dalz. & Gibs. Bby. Fl. 251.

A tall shrub or small tree with willow-like alternate, lanceolate, acute leaves 2-3 by ½-1 in., and pretty yellow flowers in capitules.

Timber Trees.

Very common at Mahábaleshvar, Mátherán and other ghâts in this and the Madras Presidency; found also in Bengal and Ceylon.

Alt. 5000 ft.

This tree attains a height of 25 ft. in good situations. It Fl. November-February, and continues in flower up to April.

The bark is used to intoxicate fish.

EUPHORBIACEÆ.

Euphorbia neriifolia, Linn.; Dalz. & Gibs. Bby. Fl. 226; Brand. For. Fl. 439. *Thôr, nivalkanti* at Goa.

Branches obsoletely 5-angled, spirally twisted, stipulary spines twin, black. Leaves 6-12 near the ends of branches, oblanceolate, obtuse, narrowed into a short petiole with dichotomous cymes of 3-15 red flower heads.

Wild and cultivated in the Konkan, Deccan and most parts of India.

Alt. 5,000 ft.

Height 20 ft.; girth 3 ft. Fl. February-April; Fr. in the rainy season. Sheds foliage October-December; the new re-appearing towards the beginning of the rainy reason.

The slightly acrid milk is used as a mild vesicant in painful affections, and the root mixed with pepper is employed as an antidote in snake-bites. The plant is used for hedges.

E. nivulia, Ham.; Dalz. & Gibs. Bby. Fl. 225; Brand. For. Fl. 439. *Sij, newrang.*

A shrub or a small tree; branches round, armed with stipulary twin spines. Leaves 6-12 in., glabrous, fleshy, entire, obovate, veinless. Flowers yellowish in short, peduncled, 3-flowered cymes arising from the scars of the fallen leaves. Capsule 3-lobed.

Found in Gujarát and Sind; also in Madras and the dry hills of Garwhal.

Height 15-20 ft.; girth 1½-2½ ft. Fl. in March, and Fr. towards the end of the hot season. Is leafless in the cold season, the foliage being renewed about the beginning of the rains.

Wood yellowish and loose-grained; useless as timber.

E. antiquorum, Linn.; Dalz. & Gibs. Bby. Fl. 226; Brand. For Fl. 438. *Sihunda* (Sansk.), *tidhâra sehnd* (Hind.)

A glabrous shrub or small tree; branches obsoletely 3-5-angled. Leaves minute, fleshy, or wanting. Flowers yellowish; peduncles solitary or in pairs arising from a little above the fallen leaves, usually with 3-flower heads, the centre head fertile. Capsule deeply 3-lobed.

Common in the dry hills of Sevundrug, Ghorgam, Madras, Bengal and Burma.

Height 15-20 ft., sometimes more, with a girth of 1½-3 ft. Fl. February-March and Fr. at the beginning of the rainy season. Leafless in the cold season.

The wood is white, light, soft, but even-grained.

E. tirucalli, Linn.; Dalz. & Gibs. Bby. Fl. Suppl. 75; Brand. For. Fl. 439. *Smooth milk-bush, sehnd* (Hind.), *nival* (Goa).

A glabrous tree or shrub; branches unarmed, terete, not angled. Leaves ½-¾ in., fleshy, linear. Flower-heads yellowish-white, crowded at the ends or forks of the branchlets. Capsule deeply 3-lobed, dark-brown.

Indigenous in Africa, and naturalized all over India.

Height 20 ft.; girth 1-2 ft. Fl. April to June, and Fr. at the end of the rainy season.

The wood of the old plant is white, tolerably close-grained, strong and not attacked by insects. It is used for rafters, etc. The milky juice of the branches is extremely acrid and vesicant, and is employed in the Southern Marátha Country and Goa to poison fish. The tree is often planted as a hedge, and though unarmed, cattle avoid it from fear of the acrid juice. The fresh milky juice is employed for the removal of warts, and mixed with any bland oil is used as a rubefacient embrocation in rheumatism; it is also considered as a specific in syphilis.

Actephila excelsa, D. C. Prod. xv. ii. 222.—*Anomospermum excelsum*, Dalz. & Gibs. Bby. Fl. 233.

A tall shrub or small tree, monœcious or occasionally diœcious. Leaves 3½-8 by 1-2½ in., alternate, coriaceous, entire, shining, glabrous above, paler beneath, elliptic-lanceolate, acuminate at the apex, and narrow acute at the base on petioles 3-8 lin. Stipules scale-like, glabrous or hairy. Flowers axillary, male crowded, sub-pedicelled; female larger and on longish pedicels usually solitary, mixed with the male, or in separate axils. Calyx-lobes glabrous, or hairy, larger than petals. Capsule about 1 in. diam., depressed, globose, smooth; pedicels drooping.

Found at Phonda Ghát, Konkan, Malabár, Madras to Cape Comorin, Silhet, Kassia, Ceylon, etc.

Alt. 5500 ft.

Fl. April-May.

Phyllanthus emblica, Linn.; Brand. For. Fl. 454.—*Emblica officinalis*, Dalz. & Gibs. Bby. Fl. 235. *Aolá, amla, aonli.*

A glabrous tree. Leaves ½ in. by 1½-2 lin.; distichous, alternate, linear-oblong, sessile, imbricate, on 4-8 in. long branchlets having the appearance of pinnate leaves. Flowers numerous, small, yellowish, on small slender pedicels, on axillary fascicles, or on the naked portion of the branch below the leaves. Calyx 6-parted, usually glabrous, glands 6, one between each of the segments. Staminal column slender, short, bearing 3-5 oblong anthers. Ovary 3-celled, glabrous. Styles 3, twice 2-cleft. Berry globose, ⅔ in. diam., fleshy, smooth, 6-striated, pale-yellow.

Common in Bombay in the plains and forests; found also in Madras, Burma, Ceylon, etc.

Height 30-40 ft.; girth 3-6 ft., sometimes more. Fl. March-May; Fr. October-February. Is leafless in the hot season.

The wood is mottled, of a red-brown and yellow colour, hard, close-grained, takes a fine polish, and is durable under water. It is used for building purposes, well-rings, etc. The fruit (emblic myrobalan) is eaten raw and pickled; it is also used for dyeing and tanning, and is highly valued in the treatment of diarrhœa and dysentery. The bark, which is also astringent, is employed for the same purpose. It is stated that chips of the wood or small branches thrown into muddy water have the property of clearing it; hence the wood is often employed, as stated above, for making well-rings.

P. polyphyllus, Willd.; Dalz. & Gibs. Bby. Fl. 234.

This species much resembles the preceding, but is principally distinguished from it by its small dry fruit and triangular lanceolate stipules.

Timber Trees.

Fringes the banks of the Krishna and other rivers towards the ghâts. Common in the ravines at Mahábaleshvar, Nilghiries, Mysore and Ceylon.

P. distichus, Müll.—*Cicca disticha*, Dalz. & Gibs. Bby. Fl. Suppl. 78. *Country gooseberry, harpharuri* (Hind.)

A glabrous tree. Leaves 1-3 by 1½ in., numerous, alternate, short-petioled, obliquely ovate-lanceolate (lowermost sometimes orbicular). Flowers minute, red, numerous, in globular heads at the axils of the fallen leaves, male, female and hermaphrodite mixed. Calyx segments 4; disc of 4 glands. Stamens 4, three shorter than the calyx. Ovary ovate; styles short; stigmas 3, 2-cleft. Drupe 6-8-grooved, globular, size of a gooseberry, pale-yellow.

Cultivated in gardens; not found wild.

Height 25-30 ft., with a girth of 2-3 ft. Fl. April-May, when the tree is leafless.

The fruit is eaten raw and pickled, and is made into preserves and used for tarts.

P. Indicus, Müll.—*Prosorus Indicus*, Dalz. & Gibs. Bby. Fl. 236.

A small dicœceous tree. Leaves 2-4½ by 1-2 in., oblong, elliptic-lanceolate, membranous, entire, on petioles 2-5 lin. Male flowers small, numerous-fascicled, on pedicels 3-4 lin.; disc convex; female solitary or in threes on pedicels 4-5 lin. Styles 3, bi-fid at the apex. Capsule globose, depressed, small, bluish. Seed purplish-blue.

Found in the ghâts, Konkan, Madras Presidency and Ceylon.

Alt. 3000 ft.

Fl. and renews foliage in March.

The wood is white and tough, and is used for building purposes in Ceylon.

P. cynospermum and **P. Stocksii** described by De Candolle have a close affinity to the preceding.

P. lanceolarius, Müll.; Brand. For. Fl. 453.—*Golchidion lanceolarius*, Dalz. & Gibs. Bby. Fl. 235. *Bhoma.*

A glabrous tree; branchlets obsoletely triangular. Leaves 3-6 by 1-2 in., elliptic or elliptic-oblong, acute at both ends, short-petioled, coriaceous, shining. Flowers pale-green in axillary fascicles; male, numerous, fasciculate, on long filiform peduncles; female, few, sessile. Male calyx segments 6, unequal. Stigma 6-8-toothed. Capsule ½ in. diam., depressed, sulcate. Seed red.

Common in Mátherán and the ghâts, Malabár, Kánara, Nepaul, Eastern Bengal, Burma, Oude forests.

This is an evergreen attaining a height of 25-30 ft. and a girth of 2-3 ft. It Fl. from December-April and Fr. during the rains.

The wood is hard and durable, and is used for building purposes.

Müller in De Candolle, and Beddome in "Flora Sylvatica" describe, besides the above, the following shrubs or small trees of this genus as existing in the Konkan:—

P. nitidum.
P. tomentosum.
P. Ohenackii.
P. asperum.
P. diversifolium.
P. Malabaricum.
P. juniperioides.
P. Lawii.

Melanthesopsis patens, Müll.; Brand. For. Fl. 455.—*Melanthesa turbinatha*, Dalz. & Gibs. Bby. Fl. 234.

A glabrous shrub or tree; branchlets 4-angular. Leaves ½-1 in., oval-obtuse or almost orbicular, entire, short-petioled, sometimes unequal-sided. Flowers, small, greenish, short-pedicelled, axillary, solitary or by pairs. Male calyx turbinate, 6-lobed; female calyx 6-lobed enlarging with the fruit; styles 3, 2-lobed; capsule size of a pea, rather dry and red when ripe, supported by the enlarged red calyx.

Common in Bombay island and the Konkan forests; also in Madras and Bengal.

This tree is generally 3-6 ft. high, and sometimes more. It Fl. March-May.

Putranjiva Roxburghii, Wall.; Dalz. & Gibs. Bby. Fl. 236; Brand. For. Fl. 451. *Puta-jan, putra-jiva, jiv-putrak, jewan-putr.*

Young shoots and petioles pubescent. Leaves 3-5 by 1-1½ in., elliptic-oblong, acute at both ends, on petioles 3-4 lin., sub-coriaceous, often unequal at the base, serrulate, glabrous and shining above; stipules deciduous. Flowers small, yellow; male numerous, sub-sessile in globose axillary heads; calyx 3-5-cleft; stamens 3; filaments more or less connate; female flowers solitary or 2 together, axillary, pedunculate; calyx segments 5-6; ovary pubescent, 3-celled; styles 3, dilated into large usually triangular stigmas. Fruit oval, 7-10 by 5-8 lin., smooth, white; nut pointed, very hard, rugose, 1-seeded.

Found at Khándála, Nagotna, Kenery and Alibág forests and in Belgaum; also in Bengal, Burma, Southern India and Ceylon.

Alt. 2500 ft.

This evergreen shady tree attains a height of 40-50 ft. with a girth of 4-5, sometimes 9 ft. It Fl. March-May and Fr. next cold season Foliage renewed in April.

The wood is white or light-grey, even-grained and durable;—used in tanning. The nuts are made into necklaces for children to keep them in health; hence the name *putra-jiva*. The leaves are lopped for fodder.

Securinega obovata, Müll.; Brand. For. Fl. 455,—*Flueggea virosa*, Dalz. & Gibs. Bby. Fl. 236. *Kodarsi, dalme, ghari, darim.*

A glabrous shrub or tree; branchlets angular. Leaves 1-2½ by ½-1 in., oval, or obovate, sub-sessile. Flowers minute, yellowish, dioecious, in axillary fascicles. Styles 3, 2-cleft. Capsule size of a pea, white, globose.

Found in Bombay, Nepaul, Bengal, Southern and Central India, Ceylon, Burma, &c.

Alt. 5000 ft.

Height 15-25 ft.; girth 3-4 ft. Fl. May-July and Fr. July-October.

The timber is white or yellowish, close-grained, strong, durable, and not attacked by insects. It is used for agricultural implements. The bark is astringent, and is used to intoxicate fish. The fruit is eaten.

S. leucopyrus, Müll.; Brand. For. Fl. 456—*F. leucopyrus*, Dalz. & Gibs. Bby. Fl. 236.

Timber Trees.

A large spinescent shrub or small tree; glabrous. Leaves 1-2 by ½-1 in., on petioles 1-2 lin., ovate, usually retuse, thin coriaceous. Flowers dicœcious, yellowish or greenish-yellow, on slender pedicels in axillary fascicles; male flowers numerous, 5-androus; styles 3, 2-cleft. Fruit size of a grain of pepper, white, globose, 3-coccous.

Common in the Konkan, Madras, Bengal, Ceylon, Sind, Garwhal and Sikkim.

Alt. 5000 ft.

Attains a height of 12-15 ft. with a girth of ⅜-1 ft. Fl. throughout the year, but chiefly April-June; Fr. July-September.

The wood is pink, hard, close-grained; of no economical value. The fruit is eaten.

Bischoffia Javanica, Bl.; Brand. For. Fl. 446.—*Stylodiscus trifoliatus*, Dalz. & Gibs. Bby. Fl. 235. *Boke, korsa, iram.*

A glabrous tree. Leaves 3, rarely 5-foliolulate, 8-12 in., of which the common peduncle measures 3-5 in.; leaflets 3-6 by 1¼-2, short-petiolulate, elliptic-lanceolate, long-acuminate, crenate. Stipules minute, caducous. Flowers greenish; male small on short pedicels in axillary panicles; female on stronger pedicels in branched panicles or simple racemes. Drupe size of a small cherry, round, bluish-black, globose.

Common on Chorla Ghát, Konkan, Madras forests, Bengal, Burma, Indian Archipelago, Southern China, etc.

Alt. 5000 ft.

Height 30-40 ft., sometimes 70; girth 3-4 ft. and sometimes 7 ft.;—in dry places a stunted tree 12-15 ft. high. Fl. February-March; fruit ripens May-June.

The wood is red, fine, hard, durable, and fine-grained. Used for furniture, buildings, bridges, and other works of construction.

Hemicyclia sepiaria, W. & A.; Dalz. & Gibs. Bby. Fl. 229; Bedd. Fl. Sylv. 298.

A large or middle-sized glabrous tree. Leaves 1½-2 by ¾-1¾ in., elliptic-ovate or obovate-obtuse or retuse, coriaceous, entire or repand-denticulate. Flowers numerous, whitish, minute; male 7-11-androus around a flat disc; no rudiment of an ovary; sepals 4, concave, pubescent outside; female sub-sessile. Ovary crowned with 2 sessile stigmas. Drupe red, globose.

Found in the forests of the Konkan, Malabár and Ceylon.

Alt. 3000 ft.

The wood is very hard, close-grained, and resembling boxwood.

H. venusta, Wight.; Dalz. & Gibs. Bby. Fl. 229; Bedd. Fl. Sylv., 298.

A small tree with drooping branches; young shoots pubescent. Leaves 3-4 (sometimes more) by 1-1½ in. on petioles 3-4 lin., oblong-elliptic, lanceolate, long-acuminated, coriaceous, entire, glabrous, with a few hairs below. Flowers tomentose; male flower in axillary fascicles; calyx 4-parted; rudiment of ovary minute or obsolete. Stamens 5-9, female in pairs, rarely more. Stigma large, sessile.

Found in Dhárwár, South Kánára as far as Tinnevelly.

Alt. 2-4000 ft.

Fl. May-June.

The wood is very hard.

Cyclostemon Indicum, Müll.; D. C. Prod. xv. ii. 481; Bedd. Fl. Sylv. 199.

A large glabrous tree. Leaves 3-5 by 1-2 in., ovate or elliptic-lanceolate, long-cuspidate, acuminate, narrow or acute at the base, on petioles 2-3 lin., entire, thin, membranaceous, reticulately veined.

Flowers,—pedicels slender about as long as the petioles; male calyx ciliate at the margin; anthers 4-6; disc central, thick, undulated, sub-lobed; female calyx and pedicels silky pubescent. Ovary silky, styles slender, peltiform at the apex.

Found in the Konkan, Malabár and Kánara.

Aporosa Lindleyana, Wight.; Bedd. Fl. Sylv. 286.—*Scepa Lindleyana*, Dalz. & Gibs. Bby. Fl. 236. *Sala* (Kán).

A small or middling-sized glabrous tree; dicœcious; young shoots puberulous. Leaves 4-6 by 1½-2¼ in., alternate, entire, ovate-lanceolate, or oblong-acute at the apex, attenuated and obtuse at the base on petioles 3-4 lin.; stipules caducous. Flowers yellowish, male in sessile, often forked catkins about 1½ in., solitary or 2-3 together, axillary or below the leaves, bracts broad, fimbriate. Calyx segments 4-6, ciliate; anthers 2; female in solitary or twin cymose spikes. Calyx segments 5. Ovary ovoid, pilose, 2-3-celled. Stigma bi-fid. Fruit sub-globose, ½ in. long, generally 2-celled, of which one is abortive.

Common in Southern Konkan, Madras, Bengal, Ceylon, etc.
Alt. 4000 ft.
This evergreen flowers in the cold and sometimes in the rainy season; Fr. April-September.
The wood is yellowish and soft, and is used for building purposes.

Antidesma Ghæsembilla, Gœrtn.; Brand. For. Fl. 446.—*A. paniculata*; *A. pubescens*, Dalz. & Gibs. Bby. Fl. 237. *Jondri.*

Branchlets, young leaves and inflorescence tawny or greyish-pubescent. Leaves 1½-3½ in., oval or obovate, elliptic or nearly orbicular, rounded or slightly cordate at the base, on petioles 3-6 lin. Flowers greenish-yellow in dense paniculate spikes; male spikes 1-2 in., female somewhat shorter, tomentose. Calyx deeply 5-7-parted. Drupe ovoid, dark-purple when ripe.

Found in the Konkan, chiefly at Vengúrla, the forests of Madras, Ceylon, Bengal, Burma, Oude and Nepaul.
Attains a height of 20-25 ft. and a girth of 1-2 ft. Fl. April-June; Fr. in the rainy season.
The wood is hard, close and even-grained, whitish or reddish, and adapted for cabinet-work. The fruit is eaten on account of its pulp, which is agreeably acid; the leaves are said to be also eaten in Bengal. The bark is used for making ropes.

A. diandrum, Tul.; Dalz. & Gibs. Bby. Fl. 237; Brand. For. Fl. 447. *Amti, dákki.*

A small glabrous tree; young shoots and petioles pubescent with rust-coloured hairs. Leaves 2-4 by 1-2 in., oblong or ovate, lanceolate, on a petiole 1-2 lin., membranous. Flowers greenish-yellow, minute, on short pedicels in axillary and terminal spikes, solitary or 2-3 together; male spikes 2-3 in., female shorter. Calyx

Timber Trees.

4-5-toothed. Stamens usually 2 or 3. Styles 3. Drupe obovate, purple, small, succulent, 1-celled.

Found at Vengúrla in the Konkan, Southern India, Bengal, Behár, Oude, Kumaon, Java, etc.

Attains a height of 12-20 ft. and a girth of 1-2 ft. Fl. May-June; Fr. December-January. Leafless in the hot season.

The wood is pinkish, hard, smooth, close-grained, and takes a fine polish, but is apt to split and warp. The fruit, which is acid, is eaten; the leaves are made into chutnies.

Briedelia retusa, Sprang.; Brand. For. Fl. 449.—*B. montana*, Dalz. & Gibs. Bby. Fl. 233. *Asáána, gunjan, kati-ain, phathur-phod, khája, gauli.*

Branches occasionally spinescent when young; young shoots and underside of leaves usually pubescent or tomentose. Leaves 3-6 by 3½ in., elliptic-oblong or elliptic-obovate, obtusely pointed, retuse or emarginate at the apex, rounded or slightly cordate at the base, entire or slightly crenulated, coriaceous, glabrous above, glaucous or more or less hairy beneath; petioles 3-4 lin. Flowers greenish-yellow, monœcious on very short pubescent pedicels, numerous, in solitary axillary clusters, or forming spikes in the axils of the leaves, and often panicled at the end of the branchlets. Petals of male flowers on long claws; disc 5-lobed; fruit-globular, size of a pea, succulent, black when ripe.

Found on the ghâts, where it is common, in Mátherán, in the ravines of Mahábaleshvar, throughout the Konkan, Oude forests, Satpura range, Bengal, Burma, Ceylon, etc.

Attains a height of 30-50 ft. and a girth 5-6 ft. Fl. April-July; Fr. October-January. Sheds leaves March-April; renews May-June.

The wood is yellowish or dark-olive brown, durable, takes a fine polish, is even-grained and hard. Used for house-building and in the construction of carts. The bark is astringent, and is used for tanning, and the leaves for fodder. The fruit is eaten.

De Candolle Prod. ii. 500 describes another species,

B. Hamiltoniana, as existing on the Konkan Ghâts. It is a small tree with membranaceous leaves 2-3½ by 1-1½ in., and flowers in heads subtended by leaves of bracts.

Cleistanthes Malabaricus, Müll.; D. C. Prod. xv. ii. 508.

A small tree; branchlets rufo-villous, at length glabrous. Leaves 3-5 by 1-1½ in.; obovate-lanceolate, shortly cuspidate, acuminate, glabrous above by age, rufescent-pubescent beneath, narrowed at the base, on a very short, densely, rufo-villous petiole. Stipules longer than the petiole, acuminate. Flowers glomurate, sessile or sub-sessile in the axil of the leaves. Calyx segments glabrous. Petals obovate-spathulate, slightly 3-lobed. Ovary with tawny hairs. Fruit globose, 3-celled.

Found in the Konkan and Malabár.

Croton oblongifolium, Roxb.; Dalz. & Gibs. Bby. Fl. 231; Brand. For. Fl. 440. *Gunsur, gansurang* (Goa).

Young parts and inflorescence clothed with silvery scales. Leaves 5-10 by 3½-4 in., oblong-lanceolate or elliptic-obovate, acute or

acuminate, pale-green, glabrous, dentate, crowded towards the apex of branches, petioles 1-2 in.; stipules small, caducous. Flowers small, yellowish-green, male and female together on short pedicels in the axils of minute bracts in long terminal racemes. Calyx segments 5; petals woolly; stamens 10-12; styles 3, 2-cleft. Capsule subglobose, 3-lobed, 3 lin. diam.

Found in Southern Konkan (not very common), Madras, Behár, Bengal, Burma, Ceylon, etc.

Height 20-30 ft., sometimes 40; girth 2-3 ft. Fl. February-April; seed ripens April-May. Is leafless in the hot season.

The wood is white, close-grained, and hard. The bark and fruit are extensively used, externally in rheumatic swellings of the joints, and internally in cases of pneumonia.

C. aromaticus, Linn.; D. C. Prod. xv. ii. 588.

A very scabrous shrub or small tree, with ovate, long-petioled leaves, with glands at the base. Stamens 10-30, and capsules globose or ellipsoid.

Common in the Konkan, Malabár and the Nilghiries.

C. tiglium, Linn.; D. C. Prod. xv. ii. 600; Roxb. Fl. Ind. iii. 682. *The purging croton, jepál, jamal gota.*

A small tree or shrub. Leaves ovate, acuminate, or acute, serrate, sometimes entire with 2 glands at the base. Flowers greenish-yellow. Stamens 15-18. Capsule 3-cornered, rather large, ellipsoid.

C. Malabaricum, Bedd. Fl. Sylv. 204.

A tree 20-30 ft. high, closely resembles *C. reticulatum* of Müller and *C. hypoleucas*.

Symphyllia mallottiformis, Müll.; D. C. Prod. xv. ii. 764.

A small tree or shrub. Leaves 3-4½ by 1-2 in., not approximated at the apex of the branches, alternate, oblong-elliptic, entire, acute at the apex, obtuse at the base; short-petioled, puberulous when young, glabrous by age. Flowers in dense heads, arranged in spikes, a little shorter than the leaves; male flowers numerous, shortly pubescent, longer than the pedicels. It is said to resemble *Mallotus Lawii* to be hereafter described, but has alternate instead of opposite leaves, and destitute of glands beneath.

Aleurites Moluccana, Willd.; Dalz. & Gibs. Bby. Fl. Suppl. 76.; Bedd. Fl. Sylv. t. 276. *Akrut, hijli buddam*, Belgaum walnut.

Young shoots covered with a brownish stellate tomentum. Leaves 4-8 by 3-6, collected at the ends of branches, ovate-lanceolate, acute or acuminate, often 3-5-lobed and covered with a brownish whitish tomentum when young and glabrous when old, cordate or obtuse at the base with 2 glands at the insertion of the petiole; petiole 2-3 in. Flowers numerous, rather small, white, on large terminal panicles; male flowers usually at the ends of the branches of the panicles; female flowers sessile in the divisions of the panicles. Calyx both of male and female pubescent or tomentose. Styles 2, 2-cleft. Drupes 1-2 in. diam., fleshy, a little compressed, olive-coloured, containing 2 or by abortion a single hard 1-seeded nut.

Timber Trees.

A handsome tree indigenous in the Malayan Archipelago, and now cultivated and run wild in many parts of Bombay, Madras and various other parts.

It attains 40-60 ft. in height and 5-6 ft. in girth. Fl. in hot season and Fr. in rainy season. It is an evergreen tree.

Wood said to be white, soft, and of no value. The kernel is eaten, but is inferior in taste to that of the walnut. They yield about 50 per cent. of a fine, clear oil called Kecuna, which is used for food and burning. "In the Sandwich Islands a large trade is carried on in this oil, and the kernels strung on sticks are employed as candles; they burn well and slowly and give a clear light." The oil-cake is said to be good food for cattle.

Trewia nudiflora, Linn.; Dalz. & Gibs. Bly. Fl. 231.; Brand. For. Fl. 443. *Pettari*, a name also given to *Mallotus ripandus*; *tumri bhillaura*.

The young parts more or less pubescent. Leaves 4-9 by 3-5½ in., cordate or broad-ovate, sub-glabrous in age; on petiole 1½-3 in. Flowers greenish-yellow; male in pendulous, many-flowered racemes, 4-9 in. long; pedicels about 1 lin.; female on longer pedicels, solitary or in few-flowered racemes. Calyx segments caducous. Drupe globose, hoary, mucronate, about 1 in. diam.

Very common throughout the plains of the Konkan, Madras, Ceylon' Oude, Kumaon, Burma, Java and Sumatra.

Alt. 3000 ft.

Attains a height of 60-70 ft. and 6-7 ft. in girth. Female trees are usually smaller. Fl. November-April; Fr. rainy season. Leaves resemble those of *Gmelina arborea* and *Thespesia populnea*, and are shed January-February, and renewed March-April.

Wood white, turning yellow, moderately tough, soft, not durable. Used for native drums and agricultural implements. The fruit is eaten.

Mallotus albus, Müll.; Brand. For. Fl. 444.—*Rottlera mappoides*, Dalz. & Gibs. Bby. Fl. 230.

Young parts and inflorescence tawny or white, with dense stellate tomentum. Leaves 4-8 in. long and nearly as broad, cordate, subpeltate, acuminate, entire or obsoletely sinuate-toothed, sometimes lobed, furnished with 2 or sometimes 3-4 glands at the base on the upper side; alternate, glabrous above by age, rusty or white tomentose below; petiole 1-4 in. Flowers very shortly pedicelled; the males in small, almost sessile heads; females solitary and larger, arranged in terminal, more or less elongated panicle. Male calyx 3-4 or rarely 5-parted; stamens about 80; female calyx 4-5-cleft. Ovary densely puberulous, warty. Capsule globular, tubercled, usually tetra-coccous, about 4 lin. broad.

In the Konkan, Southern Marátha Country, forests of Madras, Ceylon, Bengal, Indian Archipelago,

Alt. 4000 ft.

This evergreen ree is dœcious and attains 30-40 ft. in height and 3-4 ft. in girth. F. April and May; Fr. July and August.

Wood is white and soft—uses not known.

M. Philippinensis, Müll.; Brand. For. Fl. 443.—*Rottlera tinctoria*, Dalz. & Gibs. Bby. Fl. 230. *Shendri, kamela*.

Branchlets, inflorescence and under surface of leaves hoary. Leaves 3-9 by 2-2½, alternate, ovate or ovate-lanceolate, acuminate or obtuse, glabrous, with minute red glands beneath and 2 depressed glands at the base above, entire, coriaceous, or sometimes slightly toothed; petioles 2-3 in. Flowers white and yellow, small, sessile or sub-sessile, in axillary and terminal paniculate spikes; calyx furnished with red glands; stamens about 26. Ovary tomentose, 3-celled; styles 3, thickly plumose. Capsule ⅓ in. diam., 3-lobed, 3-celled, 3-valved, covered with a red powder.

Common in the plains and the ghâts of the Konkan, Madras, Bengal, Ceylon, Central India, Burma, Indian Archipelago and North Australia. Alt. 4500 ft.

This is an evergreen, dicœcious tree attaining the height of 25-30 ft. with a girth of 3-4 ft. Fl. September and December; Fr. February and May.

Wood light-brown, hard and close-grained. Too small to be used for any economical purpose. "The berries of this tree at a certain stage of their ripeness are really brown, but are covered with a thick coating of red dust. This dust is the *kamala* of commerce, and can be collected easily by plucking the bunch of berries gently, and rubbing them between the palms of the hands over a cloth spread out to catch the dust. If the berries are plucked too early, this dust is mixed with another sort, of a greenish tint, which destroys the value of the article, and if not plucked at the right time, the dust will all disappear, being blown away by the wind, leaving the berries of a greenish-brown colour, and of no value. This article, *kamala*, finds a ready market, and is now worth one shilling and sixpence per pound."

M. aureopunctatus, Mull.—*Rottlera areopuncta*, Dalz. & Gibs. Bby. Fl. 230.

A small dicœcious tree or shrub found in the forests of the Konkan and Mira Hills.

M. Lawii, Müll.; D. C. Prod. xv. ii. 974.

A tall shrub or small tree found in the Konkan and Malabár. It has a close affinity to *M. mnricatus and stenanthus*, but the female calyx is spathaceous.

M. stenanthus, Müll.; D. C. Prod. xv. ii. 972.

Also a small tree or shrub found in the forests of the Konkan.

M. repandus, Mull.—*R. decocca* of Dalz. & Gibs. Bby. Fl. 230. *Pettâri.*

This is a weak, scandent shrub common in the Southern Konkan, Madras, Bengal and the Indian Archipelago.

Cleidon Javanicum, Bl.; *Rottlera uranda*, Dalz. & Gibs. Bby. Fl. 230.

Young shoots puberulous. Leaves 4-7 by 1½-3 in., lanceolate or elliptic-lanceolate, acute or acuminate, glabrous, distantly serrated, sometimes furnished with 2 glands at the base on the upper side. Petiole slender, 1-2 in., channelled; stipules acuminate, deciduous; male flowers small, on slender pedicels, in small clusters, 2-5, arranged in axillary slender racemes; female flowers longer on a long pedicel, solitary in the axil of the leaves. Ovary 2-3-celled; styles 2-3

Timber Trees.

united at the base, 2-cleft. Capsules 2-3-coccous, about 1 in. diam. Seeds variegated, size of a large pea.

Common in the forests of the Konkan, Madras, Travancore, Ceylon, Bengal, Burma, &c.

Alt. 2000-3000 ft.

This evergreen tree attains the height of 15-20 ft., sometimes 30-40 ft., and 3-4 ft. in girth. Fl. February and March; Fr. May and July.

Wood yellowish-white, rather heavy, close-grained, takes good polish, but said not to be durable. In Madras it is used for building purposes.

Macaranga Indica, Wight.—*M. Roxburghii*, Dalz. & Gibs. Bby. Fl. 228. *Chanda.*

Young parts covered with rusty-coloured tomentum; branchlets glabrescent, glaucescent. Leaves 5-9 in. long, orbicular-ovate or ovate, acute or acuminate, broadly peltate at the rounded base, sub-entire or serrated at the margin, glabrous above and softly pubescent and gland-dotted beneath and on the upper side near the base with several large impressed glands. Male and female flowers minute, in panicles; males in dense clusters, supported by a linear bract, bearing a large, elliptic, shining, disc-shaped gland; the female flowers on rather long pedicels supported by elliptic bracts, but without glands. Stamens 6-8. Ovary usually 1-celled. Capsule globular covered with resinous points.

Common at Mátherán, Khandála, Pal Ghat, the forests of the Konkan, Nilghiries, Travancore. Not found as yet at Mahábaleshvar.

Alt. 3000 ft.

This evergreen tree attains 20-40 ft. and sometimes 50 ft. in height, with a girth of 3-4 ft., sometimes more. Fl. in December and January; Fr. April and May.

Wood greyish-red, somewhat hard.

Trigonostemum Lawianum, Nimmo.; Bedd. Fl. Sylv. 273. —*Croton Lawianum*, Dalz. & Gibs. Bby. Fl. 232.

A tall shrub or small glabrous tree. Leaves 1-6 in. by 1½-2 in., elliptic-ovate or lanceolate, short-petioled, coriaceous, entire or slightly crenulated, glanduloso-punctate at the margins. Stipules triangular. Flowers white, on pedicels 1-8 lin., forming terminal and axillary sessile or shortly pedunculate cymes. Male calyx 5-toothed; petals 5. Disc consists of 5 rufo-pubescent glands, alternate with petals; stamens 10-14 in., 2 or 3 series; filaments more or less connate below; female calyx larger, deeply 5-fid, enlarging with the fruit; petals as in male. Disc annular. Ovary silky puberulous; styles 3, erect. Capsule 5-12 lin. diam., smooth, supported by the enlarged foliaceous calyx. Seeds smooth.

Common at Bhímáshankar, Mira Hills, and throughout the Konkan, from Kánara down to Travancore and Ceylon.

Alt. 3500 ft.

Givotia Rottleriformis, Griff.; Bedd. Fl. Sylv. 285; Brand. For. Fl. 442.

A small or middling-sized, dioecious tree; young shoots, inflorescence and under side of leaves densely grey-tomentose with stellate hairs. Leaves 4-6 by 3½-6 in., alternate, broadly ovate or rotundate, acute at the apex and a cordate base, sometimes slightly lobed and

distantly crenate, glabrous by age, but grey tomentose beneath; petiole 3-5 in., sometimes with 2-3 glands above the middle. Flowers in axilliary slender panicles, 5-10 in. Calyx 5-cleft. Petals alternating with the sepals. Disc somewhat lobed, pubescent. Styles 2-cleft to the middle. Fruit oblong, ellipsoid, fleshy, size of a pigeon's egg; seeds globose, pale-coloured.

North Deccan (rare), Southern Marátha Country, Mysore and Ceylon. Fl. in hot season; Fr. September-October.

Wood white, light and soft, but even-grained; is used to make toys, imitation fruit, boxes and other fancy articles which are lacquered and painted, as the wood takes paint very well. The seed yields an oil which is well adapted for lubricating fine machinery.

Ricinus communis, Linn.; Dalz. & Gibs. Bby. Fl. Suppl. 78. *Castor-oil plant, rund, ind, erund.*

The *Castor-oil plant, hirund,* is cultivated throughout India, and often found run wild. It is a large shrub or small tree.

Wood very soft and light, too small to be adapted for any economical purpose. Usually cultivated for the sake of the oil which is extracted from its seed, and which is employed in medicine as a purgative, in lamps, and in lubricating machines. It is also grown in Assam and other parts for the sake of its leaves on which silkworms *(Attacus Ricini)* are fed.

Excæcaria insignis, Müll.; Brand. For. Fl. 442—*Falconera Malabarica*, Dalz. & Gibs. Bby. Fl. 227. *Dudla, ucla, kirad, lendwa, khinna.*

Glabrous tree. Leaves 4-8 in. by 1½-3½ in., oblong-lanceolate, acuminate, dentate, membranaceous; petiole 1-2 in. with 2 circular glands at the apex. Flowers small, sessile, in long, naked, terminal spikes; male and female flowers in distinct branches; bracts minute; male many-flowered; female 1-flowered. Ovary 2-3-celled on the same or different plants. Capsule ¼ in, ovoid, 2-3-celled.

Grows sparingly in the forests of Mátherán, Násik, Khandála to Vengurla; common at the latter place. Also in Kumaon, Burma, Chittagong, &c.

Alt. 5500 ft.

Attains 20-30 ft. in height and in favourable places 50-60 ft., with a girth of 4-6 ft. and sometimes 11-12 ft., though usually cut down for posts and other minor purposes. Fl. January-March; Fr. May-June. Destitute of leaves during the cold season; leaves renewed about the beginning of the rains.

Wood greyish-white, very soft and spongy, used for cylinders of native drums and sandals. The whole plant is full of acrid juice, which when applied to the skin produces vesication.

E. Indica, Mull.; Brand. For. Fl. 441. *Hurna.*

A small evergreen tree, said to exist in the Konkan.

Wood soft, white, chiefly used for fuel. The seeds are used to poison fish.

E. agallocha, Willd.; Dalz. & Gibs. Bby. Fl. 227; Brand. For. Fl. 442.

Evergreen, small, glabrous, with coriaceous, elliptic-lanceolate, cordate, serrulate leaves. Flowers small, yellowish-green, in axillary catkins; male several together; female solitary. Capsule 3-lobed, size of a cherry.

Timber Trees.

Found along the coast; in the Konkan, Madras, Bengal, Indian Archipelago and North Australia.

It attains a height of 15-25 ft., with a girth of 2-3 ft. Fl. January-March; Fr. May-June.

Wood—character and uses much the same as the preceding. Juice acrid and poisonous.

E. oppositifolia, Jack.; D. C. Prod. xv. ii. 1219.

Small, evergreen, glabrous tree, 20-25 ft. in height. Leaves opposite, elliptic-lanceolate, acuminate, crenate-dentate. Flowers small, yellowish; male several to each bract; female solitary axillary. Capsule 3-coccous, size of a cherry.

Grows in the Konkan, Malabár, Mysore and Tenasserim.

URTICACEÆ.

Debregeasia longifolia, Wedd.; Brand. For. Fl. 405.—*Cenocephalus niveus*, Dalz. & Gibs. Bby. Fl. 239. *Kapsi.*

A tall shrub or small tree; branchlets pubescent. Leaves 3-6 by 1-2 in., lanceolate, oblong-lanceolate, acute or acuminate, sinuate, membranous, rough above, prominently reticulated and covered with a white or grey tomentum beneath, 3-nerved; petiole ½-1 in. Flowers monœcious in heads or clusters, on dichotomous, axillary, puberulous cymes, solitary or twin.

Common in jungles of Sávantvádi, the Konkans up to Mahábaleshvar; Madras, Ceylon, Kumaon, Nepaul, Burma and Java.

Alt. 5000 ft.

Evergreen tree 15-25 ft. in height and 1-1½ ft. in girth. Fl. in the rainy season; Fr. October-January.

Wood reddish-brown, hard, but too small to be used for any economical purpose. The fibre of the bark is sometimes used in making ropes and fishing nets.

Morus alba, Linn.; Dalz. & Gibs. Bby. Fl. Suppl. 80; Brand. For. Fl. 407. *Mulberry tree, tut, chinni, satúr* or *shah-tut.*

Glabrous tree; branchlets, petioles and under side of leaves slightly pubescent. Leaves 2-3 in., ovate, acute or acuminate, cordate at the base, dentate or variously lobed, 3-nerved, petiole ½-1 in. Flowers monœcious; the male and female often on distinct branches.

Is cultivated in many parts of India, and found sparingly in the Bombay gardens.

Ascends in Ladak to 11,000 ft.

Attains 30-40 ft. in height and 6-8 ft. in girth, sometimes more. Fl. March and April; Fr. during the rainy season. Sheds its leaves during the cold season, renews February-April.

Wood yellow or reddish-brown, hard, even-grained, seasons and polishes well. Used for building and agricultural purposes. The leaves serve as fodder, and in some places to feed silkworms. The fruit is eaten.

M. atropurpurea, Roxb. This is specially known as *shah-tut.*

Grows well in gardens, attaining sometimes a large size, having cordate, coriaceous and often lobed leaves, and dark-purple, cylindric fruit. This is said to be a variety of *M. alba.*

M. Indica, Linn.; Dalz. & Gibs. Bby. Fl. Suppl. 80; Brand. For. Fl. 408. *Tut, tutri, shah-tut, ambor.*

Glabrous shrub or small tree, young parts sparingly pubescent. Leaves 2-5 in. on petiole ½-2 in., ovate, long-acuminate, coarsely and unequally serrate, sometimes lobed, 3-nerved. Male spikes ½ in. long, axillary, on slender peduncles 2-3 lin. Female spikes shorter, on slender peduncles. Fruit globose or ovoid, small, purplish-black.

Wild in the Sub-Himalayan tract, hills of the Punjáb and Kumaon. Alt. 5000-7000 ft.

This is the mulberry which is cultivated in Bengal, Burma. It was formerly cultivated in Ahmednagar, Poona and Bombay for the sake of its leaves, which are used for feeding silkworms. It is now sparingly found in native gardens.

Attains 20-25 ft. in height, sometimes more, with a girth of 16-18 in. Fl. February-March ; Fr. May-July. Leafless in the cold season.

Wood, yellow, mottled, hard and close-grained.

Streblus asper, Lour. ; Brand. For. Fl. 410.—*Epicarpurus orientalis*, Dalz. & Gibs. Bby. Fl. 240. *Karera, kharaoli, karchanna, rusa.*

All parts harshly hoary. Leaves 2-4 by 1-2 in., elliptic, rhomboid, oblong or obovate, obtuse or shortly acuminate, irregularly dentate, rough on both sides with minute raised dots ; petiole 1-3 lin. Male flowers in short, pedunculate, globose, axillary heads. Female axillary 1-2 together on slender longer peduncles. Drupe size of a pea, 1-seeded, yellow, partly enclosed in the enlarged perianth which is also yellow.

Common in Bombay, Madras, Ceylon, and throughout India, Burma, Siam, etc.

Attains the height of 25-35 ft. and a girth of 3-4 ft., sometimes more ; generally a small scraggy-looking tree. Fl. January-March ; Fr. May and July. An evergreen tree, but renews its leaves in March.

Wood white, moderately hard, tough and elastic, and is used for cart-wheels and building purposes. The twigs are used as tooth brushes, and the rough leaves in polishing wood and ivory.

Artocarpus integrifolia, Linn. ; Dalz. & Gibs. Bby. Fl. 244 ; Brand. For. Fl. 425. *Jack-tree, phanas, kanthal.*

This is a large tree, wild, and cultivated throughout India.

Alt. 4000 ft.

Attains 40-60 ft. in height and 6-10 ft. in girth, sometimes larger. Fl. December-February ; Fr. April and July.

The wood is of a yellow colour when fresh cut, and reddish-brown when seasoned ; even-grained, hard, seasons well, and takes a beautiful polish, and is used for carpentry, boxes, furniture, etc. A yellow dye is made of its wood to dye clothes. The fruit of young trees is borne on branches, while on older trees the fruit is borne on the trunk and near the root. The ripe fruit is eaten ; and the white milky juice is used as bird lime.

A. lakoocha, Roxb. ; Brand. For. Fl. 426 ; Dalz. & Gibs. Bby. Fl. 244. *Lakuch, dheu, wulma, dephul.*

Branchlets and under side of leaves downy. Leaves 6-10 by 2-6 in., oval or ovate or oblong-ovate, obtuse or short-acuminate, coriaceous, glabrous and shining above and soft tomentose below ; petiole ½-1 in. Stipules small, caducous. Aments of both sexes on very short peduncles, axillary and solitary, the male generally on the lower axils, irregularly roundish or oblong, yellow, size of a nutmeg ;

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female on the upper axils. Fruit size of a man's fist, sometimes larger, soft-pubescent, yellow when ripe.

Karanja and Bassein sparingly, Goa, Madras, Bengal, Kumaon, Ceylon and Burma.

Alt. 4000 ft.

Attains 40-60 ft. in height; girth 6-10 ft. or more. Fl. February-April; Fr. rainy season.

Wood pale-brown or yellow, rather coarse, with a dark heart wood, takes a fine polish, and is used for furniture and canoes. The male flower heads are pickled. The fruits are acid and are eaten; they are collected before being ripe; and after being cut into slices, freed from seeds are dried in the sun, to be subsequently used in curries on account of their acid flavour.

A. hirsuta, Lamk.; Dalz. & Gibs. Bby. Fl. 224; Brand. For. Fl. 226. *Pat-phanas, ran-phanas, hebalsu.*

Young parts hirsute. Leaves 6-12 by 4-6 in., ovate or elliptic, acute or obtuse, entire or occasionally serrate, glabrous above, hairy especially in the nerves beneath; petiole 6-12 lin., female oval, size of an egg, on long peduncles about 3 in.

Found in Pant Sachu's Country, jungles of the Konkan and Madras up to about 4000 ft.

It is a very lofty, evergreen tree attaining sometimes the height of 200 ft. (Beddome) with a trunk of great girth. Fl. January-March; Fr. beginning of the rains.

Wood hard, yellowish-brown, strong, close-grained, durable, and much used for house and ship-building, furniture, etc.

A. incisa, Linn.; Dalz. & Gibs. Bby. Fl. Suppl. 79; Brand. For. Fl. 426. *Bread-fruit tree.*

A middle-size tree. Leaves large, roundish, pinnatifid; lobes oblong-acute. Male calyx bifid. Fruit round, size of a pumaloe, muricated, somewhat like jack-fruit.

Native of South Sea Islands and cultivated throughout India, Ceylon and Burma. The ripe fruit is not palatable. The green fruit cut in slices is eaten as vegetable. Seed size of a large pea, is eaten roasted; tastes like that of chestnut.

Antiaris toxicaria, Lesch.—*A. innoxia*, Brand. For. Fl. 427. —*A. saccidora*, Dalz. & Gibs. Bby. Fl. 244. *Jasund.*

Glabrous tree; branchlets sometimes pubescent. Leaves 4-8 by 2-2½ in., on a petiole 3 lin., elliptic-oblong, acuminate, rounded or cordate at the base, entire, scabrous. Male flowers axillary, crowded on a thick, flat receptacle; calyx lobes 4; stamens 3-8. Female flowers solitary, enclosed in an involucre of imbricate bracts. Styles 2. Fruit size of a filbert, 1-seeded, purple when ripe.

Khándála and the forests of the Konkan, Sávantvádi, Madras, Ceylon and Burma.

A gigantic evergreen tree attaining a height of 100-250 ft., and of enormous girth, reaching sometimes to 30 ft. Fl. August-October; Fr. cold season.

Wood white or pale-brown, soft, even-grained, and of no commercial value. It exudes a white resinous substance, used in poisoning arrows. The nuts are intensely bitter, and contain an azotized principle. The inner bark yields a strong, tenacious fibre of which rope is made. Sacks are also made of this bark to carry rice, the process being described in

Graham's Catalogue of Bombay Plants, p. 193, thus:—"A branch is cut, corresponding to the length and diameter of the sack wanted. It is soaked a little, and then beaten with clubs until the *liber* separates from the wood. This done, the sack formed of the bark is turned inside out, and pulled down until the wood is sawed off, with the exception of a small piece left to form the bottom of the sack, and which is carefully left untouched. These sacks are in general use among the villagers for carrying rice."

The genus **Ficus** is represented by numerous species—trees and shrubs—some of enormous size; but their wood is soft, and not of any commercial value.

Ficus Bengalensis, Linn.; Brand. For. Fl. 412.—*Urostigma Bengalense*, Dalz. & Gibs. Bby. Fl. 240. *Vad (war), bár, bargat.* This is the *banyan tree* of Europeans.

A large, evergreen tree attaining 50-70 ft. in height, sometimes a 100 ft. and a girth of 20-25 ft.

Common throughout India.

Alt. 4000 ft.

Fr. March-May, and remains long on the tree.

This tree sends down many aerial roots which dipping into the earth take root and grow into trunk, and thus serve as supports to the horizontal branches, and for increasing the diameter of the crown. Sykes mentions one in the Poona Collectorate with 68 stems descending from the branches and capable of affording shade to 20,000 men.

Wood grey, soft, and of little value; durable under water, and hence used for well work and in some places for boxes and window panels. The wood of the aerial roots is stronger, tough, and is used for tent poles, cart yokes, and poles for carrying loads. From the coarse fibre of the bark and small roots ropes are made, and these are used for slow matches. Bird-lime is made of the milky juice. Leaves are used in lieu of plates by Brahmins. Lac is sometimes collected in Ceylon and other parts.

F. mysorensis, Roth.; Brand. For. Fl. 414.—*Urostigma dasycarpum*, Dalz. & Gibs. Bby. Fl. 242. *Goni* (Kán.)

Young parts and fruit covered with dense tomentum. Leaves 5-9 in., on petiole 1-1½ in., ovate or ovate-elliptic, acuminate, coriaceous, glabrous by age; primary veins 8-12 on each side, confluent at the margins, much reticulated and prominent beneath. Figs twins, axillary, sessile, globular or ellipsoid, size of a small cherry, red. Bracts 3, small, pubescent.

Found in the Konkan, Malabár, Mysore, Ceylon and Burma.

A large evergreen tree 50-60 ft. in height and a girth of 4-5 ft. Fr. March-May.

F. infectoria, Willd.; Brand. For. Fl. 414.—*U. infectorium*, Dalz. & Gibs. Bby. Fl. 241. *Pipli, bassari, pakri, kaim.*

A large tree. Leaves 4-8 in., oblong, acutely acuminated, obtuse or rounded or sub-cordate, entire or waved, membranous; petiole 2-3 in. Fig. ¼ in. diam., twin, globose, white when ripe.

Common in the Konkan up to Mahábaleshvar, Bengal, Ceylon, Central Provinces, Punjáb and Burma.

Alt. 5000 ft.

Attains a height of 40-50 ft., sometimes more, with 5-9 ft. in girth. Seldom throws down one or two aerial roots. Fruit ripens May-June. Leaves renewed in February-April.

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Wood grey or brownish-white, moderately hard, but not durable. Young shoots eaten in curries, and leaves are used as fodder for elephants.

F. tsiela, Linn.; Brand. For. Fl. 415.—*U. pseudo-tsiela.*, Dalz. & Gibs. Bby. Fl. 241. *Pipri.*

An immense tree. Leaves 4-6 by 2-3 in.; on petioles 1-1½, alternate, ovate-oblong, pointed, entire, firm, smooth on both sides, shining particularly above. Fruit twin, axillary, sessile, turbinate, size of a cherry, purple when ripe.

At Mahábaleshvar and other ghâts of the Konkan, Madras, Bengal and Ceylon.

Ficus religiosa, Linn.; Brand. For. Fl. 415.—*U. religiosum*, Dalz. & Gibs. Bby. Fl. 241. *Pipal, pipul, pipro.*

This is a beautiful evergreen tree, wild and planted throughout India, Ceylon and Burma.

Alt. 5000 ft.

Attains 80-90 ft. in height, and girth 25-30 ft. Fr. during the hot season, and sometimes towards the end of the rainy season. Leaves renewed February-April. Young leaves reddish.

Wood whitish, moderately hard, and used for packing cases, fuel and charcoal. Silkworms (the gori silkworms) feed on the leaves of this tree in Assam. Lac is also said to be produced on the leaves. Tender leaf-buds are eaten as vegetable in Central India by the hill-tribes during times of scarcity.

F. cordifolia, Roxb.; Brand. For. Fl. 416.—*U. cordifolium*, Dalz. & Gibs. Bby. Fl. 242. *Pair.*

A large deciduous tree very much resembling *Pipal*; attaining 40-50 ft. in height and a girth of 7-8 ft.

Found at Mátherán, Mahábaleshvár, Bengal, Central India, etc., ascending to 5000 ft. Fr. in May-June; renews leaves in March.

Wood pinkish-white and very soft, used for charcoal. The fruit is eaten, and the leaves and young branches are cut for cattle fodder. In Assam the tree is cultivated for rearing on it the lac-insect.

F. retusa, Linn.; Brand. For. Fl. 417.—*U. retusum, U. nitidum*, and *U. bengamonium*, Dalz. & Gibs. Bby. Fl. 241 and 242. *Mandrul.*

A handsome evergreen tree, wholly glabrous. Leaves 2-3 in., on a short petiole, oval or obovate, acute or short-acuminate, entire, coriaceous, lateral nerves numerous, not prominent. Fruit globose, solitary, or in pairs, sessile, size of a pea, yellowish.

Wild and cultivated throughout India, Ceylon, Burma, Indian Archipelago.

Attains a height of 30-40 ft., sometimes more, and a girth of 6-12 ft.

Wood reddish-grey, close-grained, light and somewhat hard, used as fuel.

F. elastica, Bl.; Dalz. & Gibs. Bby. Fl. Suppl. 79. *Indian rubber tree, Assam caoutchoue tree.*

It is indigenous in Assam and Sikkim, and is cultivated here in Bombay, but does not afford a good supply of caoutchouc.

F. carica, Linn.; Dalz. & Gibs. Bby. Fl. Suppl. 80. *Fig-tree, anjir.*

Cultivated successfully in Bombay and extensively above the ghâts.

F. glomerata, Roxb.; Brand. For. Fl. 422; *Covellia glomerata,* Dalz. & Gibs. Bby. Fl. 243. *Umar, umari, umbar, gular.*

Glabrous tree. Leaves 4-6 by 1-2½ in., alternate, entire, acute, smooth on both sides, pale beneath and covered with minute green dots. Fruit large, size and shape of a common pear, purplish when ripe, on peduncles 1½-2 in., arising in short paniculate clusters from the trunk and larger branches.

Common in Mahábaleshvar, Mátherán and other ghâts and plains throughout India.

Attains 40-60 ft. in height and girth of 5-8 ft., sometimes more in favourable circumstances. Fr. usually March-July. An evergreen tree, renewing its leaves January-April.

Wood brownish-grey, soft, and not durable, except under water, and hence used for well frames and curbs. The milky juice is frequently used by natives of India in painful affections of the liver and joints; birdlime is made of it. The ripe fruit is eaten, and also the unripe in times of scarcity pounded with rice and made into cakes. The leaves are good fodder for cattle and elephants.

F. hispida, Linn.; Brand. For. Fl. 423.—*Covellia opositifolia; C. dæmonum,* Dalz. & Gibs. Bby. Fl. 243 and 244. *Rumbal dumbar, mira, dhedu.*

Young shoots hispid. Leaves 4-8 in. long, opposite, ovate or obovate-oblong, shortly acuminate, crenate, serrate, more or less rough on both sides, with short stiff hairs; petiole 1-2 in. Fruit ovate or globose, size of a cherry, yellowish, hairy, on peduncles 2-5 lin., arising from the axils of the leaves or from the trunk and branches.

Common in Panch Mahâls, in the Konkan, especially near the seaside and throughout India, Ceylon, Burma, the Indian Archipelago and Australia.

Alt. 3500 ft.

Attains usually the height of 20-30 ft., in favourable circumstances more; 3-4 ft. in girth. Fr. April-June. It is an evergreen tree, but the leaves are renewed February-March.

Wood grey, coarse-grained, soft. The leaves are used as cattle fodder.

Celtis Roxburghii, Bedd.; Dalz. & Gibs. Bby. Fl. 237; Brand. For. Fl. 429. *Brumaj.*

A glabrous tree; young parts pubescent. Leaves 3-6 by 2-3½ in., alternate, obliquely ovate-cordate, long-acuminate, 3-nerved at the base, entire or serrate in the upper half, sub-coriaceous. Petiole 2-4 lin. Flowers greenish-yellow, on slender, pubescent, axillary racemes, or below the leaves; perianth 4-5-divided. Ovary 1-celled, 1 ovule, pendulous from the apex of the cell. Drupe ovate, size of a pea crowned by short styles.

Common in the forests of the Konkan, Madras, Bengal, Punjáb, Burma, etc.

Alt. 3000 ft.

An evergreen tree which attains the height of 25-35 ft., with a girth of 2½-3 ft. Fl. in the cold season, and Fr. April-May.

Wood grey, hard, and close-grained.

Trema orientalis, Bl.—*Sponia orientalis,* Pl.; Brand. For.

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Fl. 430.—*Sponia Wightii*, Dalz. & Gibs. Bby. Fl. 238. *Indian nettle tree, gol, khargul.*

Branchlets more or less pubescent. Leaves 3-5 by 2-2½, ovate-oblong, acuminate, 3-nerved, cordate, and unequal-sided at the base, serrate, more or less rough on the upper side, with white pubescence beneath; petiole 2-3 lin. Flowers greenish, deciduous or polygamous, sessile or sub-sessile, in axillary cymes, usually longer than the petiole. Drupe very small, globose, black when ripe, 1-seeded.

Common in the forests of the Konkan, Madras, Bengal and Ceylon.

This evergreen tree attains the height of 25-30 ft., with a girth of 1½-3 ft. Fl. January-April; Fr. during the rainy season.

Wood reddish-grey, soft; used for charcoal in gunpowder manufacture, and hence it is also called *Charcoal tree*. The inner bark yields tough and strong fibre which is used for various economical purposes.

Ulmus integrifolia, Roxb.; Brand. For. Fl. 431.—*Holoptelea integrifolia*, Dalz. & Gibs. Bby. Fl. 238. *Wawali, woula, keul, papura, dhamna, kumba.*

A glabrous tree; young shoots pubescent. Leaves 3-5 by 1½-2 in., ovate, cordate-ovate, elliptic, acuminate, coriaceous, entire, sometimes unequal base, on a petiole ⅓ in. Flowers, male and female mixed in short pubescent cymes; perianth hairy, deeply 4-8-parted; segments caducous. Stamens 5-9. Ovary stipitate, compressed, usually 1-celled; styles 2. Samara sub-orbicular, flat, 1 in. long, winged all round, emarginate or 2-cleft at the apex.

Common in Khandála, Nagotna and in many other places of this Presidency; in Madras, Bengal, Ceylon and Burma.

Alt. 2000 ft.

Attains 50-60 ft. in height and 5-12 ft. in girth. Fl. February-March; Fr. during the rainy season. Sheds its leaves October-January; renews March-April.

Wood light yellowish-grey or light-brown, moderately hard, strong; open-grained and light. Used for buildings, carts and carving; also for fuel and charcoal. Leaves are good cattle fodder. An oil is said to be expressed from the seeds in some parts.

CASUARINEÆ.

Casuarina equisetifolia, Forst.; Dalz. & Gibs. Bby. Fl. Suppl. 82; Brand. For. Fl. 435. *Sáróka jhar.*

Glabrous, with leafless, drooping branches terminated by whorled, articulate, thin, slender branchlets which are deciduous. Male flowers monandrous, in terminal cylindric catkin, about ½ in.; female flowers in small, pedicillate, globose heads, with conspicuous subulate teeth. Fruit a globular oblong cone, size of a cherry, formed of the enlarged woody bracts and bracteoles, containing samaroid careopsys with a membranous wing.

Indigenous in Chittagong and Burma, Indian Archipelago and Australia. Now cultivated in Bombay, Poona and throughout India.

Evergreen tree 50-80 ft. in height; girth 4-8 ft. Fl. January-March; Fr. in cold season.

Wood white and reddish-brown at the centre, heavy, very hard, cracks and splits, adapted for poles, but is chiefly used as fuel. The bark is

astringent, and is administered in powder or decoction in the cure of chronic diarrhœa and in dressing wounds; it is also useful as a mordant.

SALICINEÆ.

Salix tetrasperma, Roxb.; Dalz. & Gibs. Bby. Fl. 220; Brand. For. Fl. 462. *Wallung, bucha, bed, baishi.*

Young shoots silky-pubescent. Leaves 4-6 by 1½-2 in., ovate-lanceolate, long-acuminated, entire or serrulated, glaucous beneath, sub-coriacious, lateral nerves prominent. Catkins peduncled or sub-sessile; peduncles with or without leaves. Male aments sweet-scented, yellowish, lax, drooping, 2-5 in. Stamens 5-12, free; female aments greenish, shorter than the male. Ovary stipitate; stigmas 2. Capsule ovate, very small, usually rugose when ripe, 4-6 seeded.

Common on river-banks and in moist places at Mahábaleshvar and throughout the ghâts of the Konkan and Madras, and throughout India.

Alt. 6000-7000 ft.

Attains a height of 30-40 ft. and a girth of 5-6 ft., and in favourable places 10 ft. Fl. in the cold season; Fr. in the hot. It is an evergreen tree, but renews its foliage February-March.

Wood reddish-brown, soft, porous, not much used; but its charcoal is used in the gunpowder manufacture. Leaves are lopped for cattle fodder, and baskets are made of the twigs. Dalzell says that the bark is used as a febrifuge. Kurz says that it is used for tanning.

CONIFERÆ.

Cupressus torulosa, Don.; Dalz. & Gibs. Bby. Fl. Suppl. 83; Brand. For. Fl. 533. *Himalayan cypress, deodar.*

Branches whorled, with drooping extremities, sometimes erect, forming a pyramidal crown of dark-green foliage; branchlets round or absolutely tetragonous. Leaves very small, ovate-triangular. Cones numerous, ½ in. diam., consisting of rugose scales enclosing several compressed seeds with an orbicular wing.

Native of the Himalayas and Nepaul, and cultivated in Bombay, Poona, Calcutta, etc.

Alt. 3000-5000 ft.

Attains usually 70-80 ft. in height, and a girth of 6-8 ft., and in favourable circumstances much more. An evergreen tree. Fl. January-February. Cones are formed October-November; when this tree has attained a certain height, it dies.

Wood light-brown or yellowish-white, hard, and fragrant. Used for building purposes, etc. In Kullu images are carved of it, and the poles are also made of it to carry the sacred ark. It is often burnt as incense in temples.

C. glauca, Lam.; Dalz. & Gibs. Bby. Fl. Suppl. 83; Brand. For. Fl. 534. *Lusitanian cypress.*

Commonly cultivated in gardens in Bombay, Poona and other towns; but it does not appear to grow well below the ghâts. Said to be introduced by the Portuguese into Goa, and thence to other parts of India.

SANTALACEÆ.

Santalum album, Linn.; Dalz. & Gibs. Bby. Fl. 224; Brand. For. Fl. 398. *Chandan, sandal (gandha).*

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Glabrous. Leaves 1½-3 by 1-1½ in., opposite, ovate-lanceolate, acute, entire, glaucous beneath. Flowers small, yellowish, soon becoming deep purple or blood-red, inodorous, in axillary cymose panicles; perianth segments 4. Disc-lobes large and alternating with the 4 stamens. Stigma 3-4-lobed. Drupe globular, about ½ in. diam., black when ripe.

Indigenous in Southern Marátha Country, in Mysore, hills of the Coromandel Coast, etc. It is planted in Bombay, the Deccan and in Gujarát; it thrives well.

Alt. 2000-3000 ft.

Attains 25-40 ft. in height, with a girth of 3-4 ft. Fl. and Fr. all the year round, but chiefly in March-July.

Sapwood white, inodorous; heartwood yellowish, fragrant, hard and close-grained. The latter is an article of commerce in India, and is exported to China and Arabia, and is also imported into Bombay: used as incense. It is found to be adapted for engraving. Fragrant oil is distilled from the wood, and is used as a perfume and in diseases of the chest and urinary organs.

PALMÆ.

Borassus flabelliformis, Linn.; Dalz. & Gibs. Bby. Fl. 278; Brand. For. Fl. 544. *Palmyra-palm* or *brab tree, tad, tad-mar, targollah* (fruit of *tar*).

Dicœcious tree with cylindric stem, surmounted with a terminal crown of fan-shaped leaves 6-10 ft. across, consisting of about 60-80 pinnæ, 2-4 ft. long, shining, folding along the midrib and united to half their length, and bifid at the apex; petiole 2-4 ft. long with spinose borders. Spathes several, incomplete. Flowers pink and yellow; male in drooping, stout, cylindrical catkins, arising in pairs or threes from the branches of the spadix. Calyx and corolla 3-cleft. Stamens 6, inserted in the corolla tube, no rudiment of ovary. Female flowers larger, greenish in paniculate spikes; calyx and corolla 8 or 12 segments, closely imbricate, all similar in colour. Sterile stamens 6. Fruit globose or obovoid, dark-brown, with a tinge of yellow, shining, size of a child's head.

Common in the Konkan, Sind, Madras, Bengal, Ceylon, Burma and the Indian Archipelago.

Attains the height of 40-60 ft., sometimes 100 ft.; girth 5-6 ft. Fl. February-March; Fr. in the cold season. It is said to live over a 150 years.

The outer wood is close-grained, hard and durable, consisting of numerous, dark-brown, vascular bundles of fibres, and is used for posts, rafters and buildings. The stems are hollowed out and used as water-pipes; cut half through lengthwise, serve as open channels. The sweet sap which runs from the pedunculs, cut before the flowers are expanded, is collected in earthen pots; sugar and toddy are derived from it; from toddy arrack is distilled. Oil extracted from the nuts forms an important article of commerce. From the thick fibrous rind (coir) ropes and mats are made. The leaves are employed for thatching, and for writing upon with iron styles, and preserved for years.

Phœnix sylvestris, Roxb.; Dalz. & Gibs. Bby. Fl. 278; Brand. For. Fl. 554. *Wild date palm, cajúri, salma, thakil.*

Leaves 7-15 ft., greyish-green, pinnate; petiole short and dilated at the base; pinnæ 6-18 in., alternate, opposite, rigid. Flowers

small, sessile. Calyx and corolla 3-toothed or parted in both sexes. Stamens in male flowers 6, ovary rudimentary; female flowers, carpels 3. Male flowers in compact panicles, 6-12 in. Fruit oblong, reddish-yellow when ripe, about 1 in. long, smooth, supported by the perianth.

Common in Bombay and many parts of India.
Alt. 5000 ft.
Attains 25-30 ft. in height; girth 3-5 ft. Fl. cold season; Fr. May and rainy season.
Wood is light-brown, hard and durable; occasionally used for rafters and water pipes, etc., but it is chiefly cultivated on account of the sweet sap which is extracted during the cold season, by a deep notch being cut into the trunk immediately below the lower leaves. Baskets, mats, etc., are made of the leaves. (*See* Fruits and Vegetables.)

Caryota urens, Linn.; Dalz. & Gibs. Bby. Fl. 278; Brand. For. Fl. 550. *Birli-mhad.*

A beautiful tree, with a smooth annulate stem. Leaves 18-20 by 10-12 ft., bipinnate, on stout, sheathing petiole; pinnæ numerous; leaflets cuneate, triangular, præmorse. Spathes several. Flowers monœcious in long, pendulous, branched spadices. Calyx and corolla 3-parted, valvate; male flowers yellow; stamens numerous, rudiment of ovary none; female flowers greenish or purplish, smaller than male. Staminodes 3. Ovary 1-celled. Fruit roundish or nearly so, size of a nutmeg, brownish, stinging (hence the name *urens*).

Forests of Mahábaleshvar, Khandála and of the Konkan, Madras, Sikkim, Bengal and Ceylon.
Alt. 5000 ft.
Attains the height of 30-40 ft. and a girth of 2-3 ft. Fl. May-July.
Wood hard, strong and durable, used for the same purposes as the above. The leaves yield a strong fibre *kittul*, which is made into ropes, brushes, brooms, baskets, etc. Excellent and durable fishing lines and ropes are made from the fibres of the sheathing petioles and from the rachis of the long spadices. "This tree is highly valuable to the natives of the countries where it grows in plenty. It yields them, during the hot season, an immense quantity of toddy or palm wine. I have been informed that the best trees will yield at the rate of one hundred pints in the twenty-four hours. The pith or farinaceous part of the trunk of old trees is said to be equal to the best sago; the natives make it into bread, and boil it into thick gruel; these form a great part of the diet of those people; and during the late famine they suffered little while those trees lasted. I have reason to believe this substance to be highly nutritious. I have eaten the gruel, and think it fully as palatable as that made of sago we get from the Malay countries."

Areca catechu, Linn.; Dalz. & Gibs. Bby. Fl. Suppl. 95; Brand. For. Fl. 551. *Supari, mári, phopholi, betelnut* or *areca palm.*

Slender, annulate, cylindrical stem. Leaves pinnatifid, 4-5 ft. long, on a sheathing petiole. Pinnæ 1-1½ ft. long, numerous, linear-oblong, slightly falcate; spathe parallel-veined. Flowers monœcious, male and female on the same inflorescence, sessile. Male, calyx and corolla 3-partite; stamens 6, rudiment of ovary sometimes present. Female flowers, ovary 1-celled, surrounded by 6 sterile stamens; stigmas 3. Spikes branched, panicled; the branches bearing numer-

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ous male sessile flowers and solitary female flowers in the forks. Fruit 1½-2 in., ellipsoid, orange-coloured and supported by a persistent perianth.

Cultivated throughout India, below and above the ghâts, in Ceylon, Burma, Siam, Cochin-China and the Indian Archipelago.

Alt. 3000 ft.

Attains usually the height of 40-50 ft., sometimes 100 ft., and 1½-3 ft. in girth. Fl. nearly all the year round.

Wood is hard, and is used for spear handles, bows. The trunk is occasionally used for rafters, and hollowed out for water-channels. The seeds *(supari)* are chewed with lime and the leaves of betel. From the fruit an extract is prepared in some parts of India, which possesses the same properties as the officinal *catechu*, the produce of *Acacia catechu*. The leaves are used to write upon and to wrap up articles; they are also used in lieu of plates. Necklaces and knobs of walking-sticks are made from the seeds, the albumen of which has a beautiful reticulated appearance.

Cocos nucifera, Linn.; Dalz. & Gibs. Bby. Fl. 279; Brand. For. Fl. 556. *Cocoa palm, nárel, mkad.*

This useful palm tree is too well-known to require description.

It is almost certain that the Portuguese introduced this tree into West Africa, Cape Verde Islands, Brazil and perhaps into other parts of America.

Calamus rotang, Roxb.; Dalz. & Gibs. Bby. Fl. 279; Brand. For. Fl. 559. *Bét, rattan.*

Stem long, slender, ¼-½ in. diam., articulated, and climbing, to a great extent enveloped in the thorny sheaths of the leaves. Leaves pinnate, 18-36 in., leaflets 4-9 in. long, opposite or alternate, sessile, linear-lanceolate, the margins armed with minute bristles. Sheaths of leaves also armed with long, prickly, whip-like processes. Flowers in long, drooping, decompound panicles; common peduncle of inflorescence armed with recurved prickles. Male flowers greenish; calyx 3-partite. Petals 3, valvate. Stamens 6, surrounding a rudimentary ovary. Female flowers, calyx and corolla as in the male; ovary 3-celled, surrounded by 6 sterile stamens. Styles short, 3-cleft. Fruit ½ in. long, ovoid, straw-coloured.

Rather common in Southern Konkan, Rám Ghat, Madras, Bengal, Oude, Kumaon, Nepaul and Ceylon.

Fl. in the rainy season; Fr. during the cold season.

Used in making door-blinds, baskets, chairs, mats and various other curious things.

GRAMINEÆ.

Arundinaria Wightiana, Nees.; Brand. For. Fl. 563.—*Bambusa arundo*, Dalz. & Gibs. Bby. Fl. 299. *Chiwari.*

A small annual bamboo. Culm much-branched at the nodes. Sheaths striated, hispid or glabrous. Leaves 2-7 in. by 3-12 lin. ovate-lanceolate, acuminate at the apex, rounded and cuneate at the base, on a short petiole, glaucous beneath, with scabrous margins. Sheaths of the leaves sometimes fimbriate; ligula short. Flowers in ample, terminal, leafy spikes 4-8 in. long; branches slender, sometimes with glands in the axils; spikelets ¼-1 in. long, 2-8-flowered

purplish, on long filiform pedicels; the lower paleæ or flowering glume 5-7 nerved, the upper one nerveless, cuspidate at the apex. Lodicules 3.

Found on the ghâts. Attains 6-12 ft. in height. It flowers and dies annually, and springs rapidly again from the root.

Walking-sticks are made of this at Mahábaleshvar; wottle work is also made of it.

Bambusa arundinacea, Retz.; Dalz. & Gibs. Bby. Fl. 299; Brand. For. Fl. 564. *Mandgay* (Dalzell), *wansa*, *bans*.

A tall-tufted bamboo; culm green, shining, thorny. Thorns (spinescent branches) double and triple, alternate on the joints. Joints 3-4 in. diam. Sheaths of branches deciduous, 12-15 in., white, shining, silvery inside, acuminated at the apex. Leaves 2-8 in. by ½-¾, thin, lanceolate, pointed at the apex, broad at the base, short-petioled, hispid above and on the margins. Sheaths of the leaves 1-2 in. long, persistent, coriaceous, somewhat downy or glabrous, and somewhat fimbriate at the mouth. Flowers, when the tree is leafless, in large spikes, compound and decompound. Spikelets generally sessile, in dense, half-whorled clusters at the nodes; each spikelet 8-12 in. long, 6-12-flowered. Empty glumes 2-4; flowering glumes 4-10, acuminate or mucronate and sometimes fimbriate. Lodicules 3; stamens 6; anthers with an obtuse point at the apex. Style 2-3-divided; stigmas plumose. Caryopsys ½ in. long, enclosed in flowering glume and paleæ.

Khándesh, Belgaum, forests and hilly parts of the Konkan, Madras, Bengal, Jubulpore and Burma.

Usually 30-70 ft. high, reaching sometimes to 100 ft. Fl. in the hot season once every thirty years, after which it usually dies; Fr. soon after.

It is used for building purposes, scaffolding, ladders, mats, baskets, etc. Used now for paper materials (*see* Fibres). The caryopsis affords food for poor people, especially during famine. (*See* Fruits and Vegetables.)

Bambusa vulgaris, Wendl.; Dalz. & Gibs. Bby. Fl. 299; Brand. For. Fl. 568. *Bamboo*, *kulna*, or *kullak*.

Culm green or yellow, or mottled green and yellow, unarmed, widely hollow. Leaves 6-10 by ¾-2 in., linear-lanceolate, acute, scabrous on the longitudinal nerves. Sheaths hirsute above, with dark-coloured hairs. Flowers appear when the branches are in leaf. Spikelets ½-1 in., 4-12-flowered, sessile, oblong-lanceolate, compressed so as to appear bifid, on long interrupted paniculate spikes. Empty glumes 2; flowering glume or lower palea attenuated at the base, mucronate and ciliate at the apex; the upper palea fimbriated at the margin. Lodicules transparent. Anthers tipped with short hairs. Style filiform, 2-3-divided at the apex.

Said to be indigenous in Ceylon up to 2000 ft.; cultivated in the Konkan, Deccan, and various other parts of India.

Attains 20-30 ft. in height; joints 4 in. diam., sometimes more.

Uses same as the above.

Dendrocalamus strictus, Nees.; Brand. For Fl. 569.—*Bambusa stricta*, Dalz. & Gibs. Bby. Fl. 299. *Male-bamboo*, *bans*, *bas*, *udha*, *kabar*.

Timber Trees.

Culm straight, unarmed, nearly solid or with a very small cavity. Sheaths striated, yellowish, 8-10 in. long. Leaves usually 3-9 by ½-1 in., lanceolate, long-acuminate, rough and hairy above and hairy below, rounded or attenuated at the base, on a short petiole. Sheaths hirsute. Spikelets spinescent, in dense, globular, verticelled heads, 1-2 in. diam., in long interrupted spikes. Empty glumes 2-6; flowering glumes usually 2, hairy or spinescent. Stamens 6, connective not apiculate. Ovary stipitate. Style long, hirsute. Stigma plumose. Caryopsis 3-4 lin. long, ovoid, brown, shining; pericarp coriaceous, separable from the seeds.

Common in Bombay, Madras, Punjáb (rare).

Alt. 3500 ft.

Attains the height of 30-50 ft. with ¼-½ ft. in girth, sometimes more. Grows rapidly, and Fl. every year between November and April, and Fr. May-June. It does not die after flowering. Leafless during the cold season, and renews its leaves April-May.

Used for boar-spear handles, baskets, wottle works, and for building purposes.*

Oxytenanthera Stocksii, Munro; Bedd. Fl. Sylv. An. Gen. 233.

This tree is said to exist in the Konkan ghâts, and that its leaves resemble those of *Dendrocalamus strictus*, but is distinguished from it by the short points to the anthers, and its striated, membranous lower paleæ.

* For a description of the uses of this, see Sections "Fruits and Vegetables" and Herbs, Tubers, &c., used as food during seasons of scarcity.

FOOD PLANTS.

FRUITS, VEGETABLES, PULSES, GRAINS AND CONDIMENTS *

Food Plants.

THE plan of grouping together into one single chapter the various articles that are taken as food has been adopted on grounds of expediency. It would evidently be inconvenient and cumbersome to treat of, say, the mango as a fruit in one place, of mango as a pickle in another, of mango jelly or jam in a third, or of the dried strips of green mangoes that enter into the composition of various Indian curries in a fourth. Such a system would cause not only endless reference, but would in no way improve the value of the subject that is being treated. Hence the adoption of the above heading.

Almost all the species of plants belonging to the orders Cucurbitaceæ, Solanaceæ, Dioscorideæ, and Aroideæ contain more or less acrid and poisonous principles. In some these principles are minimised or destroyed by cultivation, although apt to re-appear at times. In others the simple process of steeping in water is enough to effect the desired object; whereas in others, again, boiling once or oftener becomes necessary before the plants can be considered edible and harmless. Some creepers in themselves harmless, when allowed to climb trees that contain poisonous principles, become poisonous by absorption; as is the case with the vanilla creeper which, being sometimes made to climb the euphorbiaceous shrub *Jatropha curcas*, has been stated to become possessed of some of the injurious properties of the latter. This is not at all surprising when we remember that the parasitic plants belonging to the order Loranthaceæ found growing on the nux-vomica tree have been found to contain the deadly alkaloids of the latter.

With the exception of the products belonging to the orders just referred to, the plants treated in this chapter are all more or less wholesome, though, it is perhaps needless to add, not equally nutritious. It is also necessary to exclude the pulse of *Lathyrus sativus* and the grain of *Paspalum scrobiculatum*.

Lathyrus sativus, Roxb. Fl. Ind. iii. 322; Dalz. & Gibs. Bby. Fl. Suppl. 22. *Chuckling vetch;* known in Bombay by the name of *lang*, and in Bengal and the North-West Provinces by that of *kesári* or *teori*.

It is a small, annual, herbaceous, leguminous plant found growing in Europe, Asia and Africa, and is also cultivated in Gujarát, the North-West Provinces and Bengal.

* For the description of the trees mentioned in this and in the following sections, see the section *Timber Trees*. The description of small plants is rather short.

Food Plants.

This is a species of wild vetch, the dhall of which is well known to the people of Central and Northern India as producing very injurious consequences when eaten for any length of time. Nevertheless in seasons of great scarcity, when other food-grains are not cheaply procurable, it is freely consumed by the poorer classes. If taken mixed with other sorts of food the use of this grain may be continued for a very long period without producing any dangerous consequences, or perhaps no consequences whatever may follow; but if it forms the sole or principal article of diet, the direst results supervene. At first there is "weakness and irregular motion of the muscles moving the knees, which are bent and moved with a tremulous irregular motion" somewhat like that of chorea. As the disease advances, the lower extremities suffer emaciation, and eventually the patient is completely paraplegic. No case of recovery from this last stage appears to have been recorded.

The disease is one to which attention was first directed in this country by General Sleeman. He was then stationed near Saugor, and says that in the villages about that place the wheat crops were successively destroyed or very deficient in the years 1829, 1830 and 1831. During these three years, however, the kesari had remained uninjured, and large crops of it had been collected upon which the people mainly fed. The result of this food soon made itself manifest. The younger part of the population below the age of thirty began to be deprived of the use of their lower limbs by paralytic strokes more or less severe, and always coming on suddenly, generally when the person was asleep. The subject was taken up by Dr. Kinloch W. Kirk in Upper Sind. A villager had brought him his wife about thirty years old who was suffering from paralysis of the lower extremities. When questioned as to what he thought the cause to be, the man replied: "It is from kesari; we are very poor, and she was obliged to eat it for five months on end." Dr. Kirk hereupon instituted enquiries into the subject, which confirmed the statement; and he adds that "the natives know that this dhall is poison, but they eat it, *because it is cheap*, thinking that they can stop in time to save themselves from its consequences."

Dr. Irving, who went into the subject of palsy caused by the use of *Lathyrus sativus* more extensively, has published long tables showing that, in all the districts of the North-West Provinces where this grain is used as an article of food, injurious effects are believed to follow. He says that, if used occasionally and in small quantity, the results may be constipation, colic, or some form of indigestion; but if freely used, and especially without admixture of any other sort of grain, palsy of the lower limbs is very apt to occur. Dr. Irving's tables further show that these ill-effects are most apt to be produced in the rainy season, and that the great majority of the sufferers are males, the proportion being 6·11 males to only 0·59 females paralysed. He also suggests that the disease known in Bengal as *kumree*, which attacks the loins of horses, may perhaps be due to feeding upon grain largely adulterated with kesari dhall.

There is a form of palsy to be met within the Malabár Coast and Ceylon, formerly named barbiers, which somewhat resembles the disease we have just been speaking about. Its principal characters are, according to Dr. Copland, "tremor with pricking, formicating pain, numbness of the extremities, chiefly of the lower, followed by contractions and paralysis of the limbs, inarticulation and hoarseness of voice, emaciation and sinking of all the vital powers." It is said to be violent on the Malabár Coast during the months of January, February and March, and to attack such as unwarily sleep exposed to the land winds of the morning. Severe cases of this disease are scarcely, if ever, amenable to treatment so long as the season continues and the winds have not shifted, but it readily yields with a change to the eastward.

Now this barbiers has many points of resemblance to the paralysis of *Lathyrus sativus*; but there are well-marked differences which serve to distinguish one disease from the other. The latter generally comes on suddenly at night without any warning, and always in the rainy season, is incurable, always attacks the lower extremities, prefers males to females, the sense of feeling is unaffected, and life itself is not shortened. Barbiers, on the other hand, prefers the cold season, is curable by change and treatment, attacks any portion of the body, shows no preference for either sex, and most decidedly impairs the vital powers. Then the symptoms of barbiers are never attributed to eating any grain.

While on this subject it may be as well to mention that there are two varieties of *Lathyrus sativus*, only one of which is supposed by some to be noxious. This theory is, however, one that does not meet much favour, for *Lathyrus sativus* not only produces ill-effects in India, but similar effects have also been observed in Europe, as may be seen from the following extract taken from Don's General System of Gardening and Botany:—

"*Lathyrus sativus*; native of Spain, France and Italy. The seeds of *Lathyrus sativus* are commonly sown in Switzerland, for soiling horses, under the name of *gosse*. In several parts of the Continent a white, light, pleasant bread is made from the flour of the pulse, but it produced such dreadful effects in the seventeenth century that the use of it was forbidden by an edict of George, Duke of Wurtenberg, in 1671, and was enforced by two other edicts under his successor, Leopold, in 1705 and 1714. Mixed with wheat flour in half the quantity, it makes a very good bread, and appears to be harmless. But bread made with this flour exclusively has brought on a most surprising rigidity of the limbs in those who use it for a continuance, in so much that the exterior (extensor?) muscles could not by any means be reduced or have their natural action restored. These symptoms usually appear on a sudden without any previous pain. The disease was regarded as incurable, and being neither very painful nor fatal, those who were seized with it usually submitted to it with patience. Swine fattened with this meal, lost the use of their limbs, but grew very fat lying on the ground. A horse fed some months on the dried herb was said to have his legs perfectly rigid. Kine are reported to grow lean on it, but sheep not to be affected. Pigeons, especially young, lose the power of walking by feeding on the seeds. Poultry will not readily touch it, but geese eat it without any apparent damage. In some parts of Switzerland cattle feed on the herb without any apparent harm."

Duvernoy Fubbroni of Florence says that—

"The Government there had cautioned the peasants against the use of *Lathyrus sativus* in 1786; swine having lost the use of their limbs and became pitiable monsters by being fed on the pulse exclusively. The peasants, however, eat it boiled or mixed with wheat flour in the quantity of one-fourth without any harm."

Nor are the ravages that arise from the use of this dhall confined to man. Horses are believed to be equally subject to its ill-effects; but it is not yet established how far cattle, poultry, &c., are susceptible to its baneful influences. I may, therefore, perhaps avail myself of the present opportunity to call the attention of the members, principally of such as have frequent occasions to travel in the interior, to this subject, in the hope that they may, when occasions arise, investigate the subject, and thus help to throw light upon an as yet unsettled question.

Paspalum scrobiculatum, Roxb. Fl. Ind. i. 278 and 279; Dalz. & Gibs. Bby. Fl. Suppl. 97. *Kodrá, kodri, pakodri.*

It is a graminaceous plant, about 1-2 in. high. Grows in hilly parts about the commencement of the rainy season; the grain becomes ripe for harvest in November and December.

Several varieties of this grain are mentioned by the natives, the differences in them being probably due to differences in the soil, method of cultivation, &c. Two sorts are, however, well known: the wholesome and the unwholesome. The former is smaller and paler than the next, and goes by the name of *peshadi* or *harkin* in the Konkan. In Goa it is called *pokod*. The unwholesome variety is called *dhora* or *majari*

Food Plants.

harik in the Konkan and *mana kodra* in Gujarát. In Sanskrit it is named *kodrava* (injurious). The grain is the only poisonous part of the plant.

Although the two principal varieties have been styled respectively wholesome and unwholesome, the arrangement is only one of convenience, for all the varieties are, as a matter of fact, more or less poisonous, and the highly poisonous seed of one locality when sown in a different soil from that which produced it, may yield a grain whose properties have become either modified or intensified according to the peculiarities of the two localities.

The black kodra, decidedly the most poisonous, shows, according to Surgeon-Major Pirie, the following characters under the microscope :— "The outer coat or husk has a dark outline of a fungus-like character and on the internal surface appears to consist of minute roundish cells containing dark sporules." Several authorities have failed to recognize this fungus-like character in which is supposed to reside the poisonous principle ;—the fact, however, that kodra grain freshly reaped if left unstacked in the fields for some days when it was rainy and wet had become possessed of decidedly more poisonous properties than grain from the same field harvested and stacked when the weather was dry,—together with the generally acknowledged truth that a very poisonous seed has under peculiarities of soil and cultivation yielded a comparatively harmless grain seems to bear out the fungus theory. Nevertheless the subject is one that can hardly be supposed to be sufficiently studied, and demands a great deal of close investigation. Though every part of the grain is poisonous, the husk and testa are more so ; hence the natives take good care to separate the light grain, by means of water in which it floats, from the heavy and less injurious one.

Kodra grain is a common article of food with all the poor people in India. They prepare it by macerating it for 3 or 4 hours or more in a watery solution of cowdung, when the scum and hollow grain which rise to the surface are separated, and the good grain removed and spread out in the sun to dry. This process is repeated so long as any poison is suspected to remain in the grain. Boiling does not entirely destroy the poison, but if the grain is kept for a number of years its poisonous properties are found to diminish. When required for use it is ground in earthen mills, which remove the pericarp and then pounded and winnowed, which separates the different layers of the testa, and leaves the grain fit for use. Kodra is cooked sooner than common rice, and is very commonly used in the Konkan, where it is generally eaten both by men and cattle with whey, which latter is supposed to have the property of neutralizing its poison. Notwithstanding all precautions, however, cases of poisoning do occasionally occur, though they seem rarely attended with fatal consequences. Surgeon-Major Pirie, who has described a case of kodra poisoning (*vide* Transactions of the Medical and Physical Society of Bombay, 1869, No. 9, New Series) thus enumerates the symptoms :—

"Unconsciousness, delirium with violent tremors of the voluntary muscles, pupils dilated, pulse small and weak, skin cold and covered with profuse perspiration, and difficulty in swallowing."

Fourteen persons belonging to four indigent families were taken to him suffering from the above symptoms. They had come on about 6 hours after the kodra had been eaten, and in extreme cases had lasted 18 hours. All had recovered under emetics, stimulants, warm clothing, and heat applied to the surface.

It will have been remarked by such members as belong to the medical profession that the symptoms given above are much like those of poisoning from datura, except the tremors, which are not met with in the last.

The regular use of kodra seems to establish a sort of tolerance of the

grain; but it is believed by people that if partaken with black pepper, even by habitual consumers, deleterious effects soon show themselves.

The evil effects of unwholesome kodra are far more severe in beasts than in man, due, no doubt, to their eating the grain, husk and all, and also to the absence of vomiting, an effect that almost always takes place in man. It proves fatal in quantities of about two and a half ounces to such large quadrupeds as horses, cows, &c., (more so to the former), and has also been known to kill buffaloes, goats, and asses. The active principle that produces these fearful effects has not, as far as I am aware, been yet isolated.

Natives have various antidotes for kodra poisoning. The most usual ones are gruel made of the flour of *urid (Phaseolus radiatus)*, the expressed juice of the stem of the plantain which is rich in tannin and the alkaline salts; the astringent juice of the leaves of *Psidium guayara*, or the leaves of *Nyctanthes arbor tristis*. Whey has already been mentioned before. It is used in Daman and the neighbouring villages.

DILLENIACEÆ.

Dillenia Indica, Brand. For. Fl. 1.—*D. speciosa*, Dalz. & Gibs. Bby. Fl. 2. *Motha-karmal, karmal.*

The large thickened sepals are used for the table. They taste when raw like a sour apple, and are used after being sweetened with sugar. A palatable jelly is made from them.

D. pentagyna, Dalz. & Gibs. Bby. Fl. 2. *Karmal.*

The fruit, size of a gooseberry, is eaten. The flower-buds and young fruits have a pleasant acid flavour and are eaten raw or cooked in the Central Provinces.

ANONACEÆ.

Anona reticulata, Dalz. & Gibs. Bby. Fl. Suppl. 2. *Anona*, Goa; *ram-phal* or *ram-phala*, Dec.—called *bullock's heart* from its resemblance to it.

The fruit is not so good as the custard-apple, but is accepted in the absence of the latter.

A. squamosa, Dalz. & Gibs. Bby. Fl. Suppl. 2. *Custard-apple; atta*, Goa; *sita-phal*, Dec. and Bby.

The fruit is of the size of a large apple; when well ripe, it bursts on being raised, and is decidedly of a most delicate flavour, on which account it must be protected from the ravages of birds and squirrels. The seeds, well pounded, are made into a kind of ointment in the Southern Marátha Country and Goa to destroy lice in the hair.

NYMPHACEÆ.

Nymphœa lotus, *Uplea-kamal;*
Nymphœa stellata, *Uplea-kamal;* and
Nelubium speciosum, *Paisar-kamal.*
} Dalz. & Gibs. Bby. Fl. 6 and 7.

These water-lilies are found in tanks throughout the Konkan. Their flowers are of various hues. The tuberous roots and the scapes—the latter known as *bishi* in the bázárs—are much esteemed as an article of food.

The immature berries, torus and seeds are eaten raw or in curries, pickled, or ground and mixed with flour are baked into bread. The

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ripe berries are roasted and eaten : they are very palatable, and not a bad substitute for almonds. A syrup or confection is made from the petals, and used as a cooling drink or medicine.

PAPAVERACEÆ.

Papaver somniferum. *Afim* or *amal, afú ; kadavi* (Maráthi name of capsule).

The plant has been cultivated in India, Turkey, Asia Minor, Egypt, China, &c., from the earliest times for the sake of the juice of its capsules, named *post* or *poss*—the inspissated juice being known as opium.

The seeds called *kas-kas*, very small, size of a millet grain, white, are eaten roasted, in curries, and made into various kinds of sweets. The oil of the seeds is sweet, and is used for culinary purposes and lamps. The seeds partially roasted and mixed with sugar and cardamoms act as a gentle purgative, useful in mild cases of dysentery in infants.

The use of opium has been known from the earliest times. In the writings of the younger Mesue, who died A.D. 1015, the syrup of poppies is recommended as a sedative in coughs and catarrhs, and in the first edition of the *Ricettario Fiorentino* published in 1498, which is the earliest pharmacopœia known, a formula for the syrup is given under the name *Sroppo di Papaveri semplici di Mesue.* In the pharmacopœia of the London College (1618) it is prescribed as *Syrupus de Meconio Mesuæ.* Long before this, however, Scribonius Largus had noticed the method of procuring opium in his Compositiones Medicamentorum (circa A.D. 40), and the drug was likewise known to Dioscorides, Pliny and Theophrastus. Coming nearer our own times, we find Pyres speaking of Egyptian and Cambay opium in his letters to D. Manuel, King of Portugal, and a little later Garcia d'Orta tells us that the opium of Cambay was collected in Málwa and was soft and yellowish. The advent of opium into India is connected with the spread of Mahomedanism, and was very probably favoured by the prohibition of wine inculcated by that religion. Barbosa is the earliest European who described opium as a product of India.

The cultivation of the poppy-plant is carried on to a large extent in India, the principal regions distinguished for the production of opium being the districts of Behár and Benares, the broad table-lands of Málwa and the slopes of the Vindhya Hills. The plant requires a rich moist soil, and is injuriously affected by heavy rains. In Behár the sowing takes place at the beginning of November, and the capsules are scarified in February, March and April. The scarification has to be repeated on different sides of the capsule at intervals of a few days, and the milky juice which flows is scraped off early on the following morning with an iron scoop, and being treated for the removal of *pascwa*, which is a dark coffee-coloured fluid which collects at the bottom of the vessel, is exposed to the action of air (never to the sun) until it acquires the proper degree of dryness. This drying operation, which still leaves behind about 30 per cent. of moisture, occupies between three and four weeks, and the opium is now ready for sale at the Government factory.

It is difficult to ascertain the quantity of opium produced in India, but in the official year ending 31st March 1872, 93,364 chests valued at £13,365,228 were exported from Bengal and Bombay, the net revenue from which to the Government of India was £7,657,213.

CRUCIFERÆ.

Brassica oleracea, Dalz. & Gibs. Bby. Fl. Suppl. 4. *Common cabbage, cauliflower, knol-khol* and other varieties of cabbages, all cultivated.

B. campestris, Hook. Fl. Brit. Ind. i. 156. *Salgam* (Pers.), *Swedish turnip.*

The roots and tops eaten as vegetable.

B. rapa, Hook. Fl. Brit. Ind. i. 156. *Salgam* (Pers.)

Used the same way as the preceding variety.

B. nigra, Hook. Fl. Brit. Ind. i. 156. *Mustárd, rye, sarsun.*

The seed and the oil are used for culinary purposes.

B. napus. } Hook. Fl. Brit. Ind. i. 157. The leaves are eaten
B. juncea. } as salad.

Lepidium sativum, Dalz. & Gibs. Bby. Fl. Suppl. 4. *Common cress; hallim*, Beng. & Dec.

Young leaves eaten as salad.

Raphanus sativus, Dalz. & Gibs. Bby. Fl. Suppl. 4. *Mula* or *mulli*, the red radish of Europe, much cultivated in the rainy season. The white native radish grows at all seasons. It is much larger and less delicate than the European plant.

CAPPARIDEÆ.

Capparis aphylla, Dalz. & Gibs. Bby. Fl. 9 and 10. *Kiram* and *kirár*, Sind.; *sodada*, Arab.; *kari.*

In dry places of Gujarát, the Deccan, Southern Carnatic, &c. The unripe fruit is cooked and eaten.

C. Zeylanica, Hook. Fl. Brit. Ind. i. 174.—*C. brevispina*, Dalz. & Gibs. Bby. Fl. 9. *Wagátti* or *waganti.*

A rigid, wiry shrub with white flowers and fruit 2 in. long, globose, bright scarlet. Two lower petals of the flower become yellow changing into red brown.

Along the banks of the nálas of the Konkan and Malabár: scarce in the Western Deccan. The fruit of this plant—rather unpleasant to the taste—and that of *Melothria heterophylla gametta* are eaten on *duadashis* which occur in the month of *Ashad.* These two kinds of fruits are invariably associated in the *bhaji* or dish made for those days.

C. spinosa, Hook. Fl. Brit. Ind. i. 173.—*C. Murrayana*, Dalz. & Gibs. Bby. Fl. 9. *Kabar*, Arab.; *kalvári*, Sind.

At Mahábaleshvar and in most nálas and rivers along the ghats, and other parts of India. The fruit is pickled in Sind. The flower-buds are the capers of Europe.

Cleome viscosa, Roxb. Fl. Ind. ii. 128.—*Polanisia icosandra*, Dalz. & Gibs. Bby. Fl. 8. *Harhuria*, Mah.; *khanphutia*, Hind.

It is a very common viscous herb 1-3 ft. high, with 3-5 foliolate leaves and small yellow flowers. It has an acrid taste somewhat resembling that of mustard, but is eaten boiled with chillies and salt as salad.

Gynandropsis pentaphylla, Dalz. & Gibs. Bby. Fl. 7. *Hul-hul.*

An annual, glandular, pubescent herb with 5-foliolate leaves and small flowers of a white or purplish colour in glutinous racemes. It has an acrid taste and a very disagreeable smell, but is used in chutnies and curries.

Food Plants.

BIXINEÆ.

Flacourtia Ramontchi. *Tambat. Panávla,* Beng.; *swaadoo kantaka,* Sans.; *tambat.*

The fruit dark-red or black, about ½ in. long, is eaten.

F. cataphracta. *Jaggam.*

This tree bears a fruit size of a small plum, of a purplish colour, and tastes somewhat like that of *Adam's fruit (Mimusops kanki).* A curious plan by which the fruit is rendered more palatable, is to slightly squeeze it between the thumb and the forefinger for a minute or two, and then roll it gently between the palms of the hands, by which the fruit becomes softer and loses its original asperity.

F. montana. *Attak-ke-jar.*

The fruit, size of a cherry, slightly acid, eaten.

F. inermis. *Tambat,* and also called *jaggam.*

Cultivated. The fruit, about the size of a cherry, red and acid, is eaten. It resembles the fruit of *F. cataphracta,* but is inferior.

F. sepiaria. *Atrun.*

High ranges. The fruit, size of a large pea, is eaten. This plant differs from the last in being smaller and thorny.

F. sapida. *Bauchi* (this name is also given to *Psoralea*), Konkan. The fruit is eaten.

PORTULACEÆ.

Portulaca oleracea. *Gól* (this name is also given to *Sponia Wightii*).

A very common weed. It is slightly acid, but much esteemed as a pot-herb.

P. quadrifida. *Kota; chaval-ke-bhaji.*

Also a common weed. Eaten as a pot-herb.

GUTTIFERÆ.

Garcinia Indica, Hook. Fl. Brit. Ind. i. 261.—*G. purpurea,* Dalz. & Gibs. Bby. Fl. 31. *Kokám,* Mah.; *brindão,* Goa.

The ripe fruit eaten, and the dried rind used as a garnish to give an acid flavour to curries. From the fresh rind of the ripe fruit a syrup is prepared for use during the hot months.

G. xanthochymus, Hook. Fl. Brit. Ind. i. 269.—*Xanthochymus pictorius,* Dalz. & Gibs. Bby. Fl. 31. *Dampel, tumal.*

The fruit temptingly beautiful, as big as an orange, smooth and bright yellow; strongly acid, more so in the fleshy rind. The pulp, which is less acid, if eaten puts the teeth out of order for a couple of days. It is only eaten by poor natives and flying-foxes.

G. mangostana, Dalz. & Gibs. Bby. Fl. Suppl. 14. *Mangustin.*

It was introduced many years ago, but has disappeared. At the desire of Mr. Robertson, Revenue Commissioner, Central Division, experiments are being tried in Poona and elsewhere to re-introduce it. The fruit is occasionally seen in the Bombay market, but is not so palatable as that collected in its native place.

G. cambogia, Hook. Fl. of Brit. Ind. i. 261. The acid rind of ripe fruit is eaten, and in Ceylon it is dried like the *kokam*, and eaten as a condiment in curries.

MALVACEÆ.

Hibiscus esculentus, De Cand. Prod. i. 450.—*Abelmoschus esculentus*, Dalz. & Gibs. Bby. Fl. Suppl. 7. *Bhenda* or *bhendi*.

One of the vegetables the most widely cultivated in India for the sake of its excellent capsule.

H. cannabinus, Dalz. & Gibs. Bby. Fl. 20. *Ambari*.

Much cultivated on account of the flax which its bark yields. Tender shoots and leaves eaten as pot-herb.

H. subdariffa, Dalz. & Gibs. Bby. Fl. Suppl. 7. *Mesta*, Beng.; *rozelle*.

The succulent sepals yield a delicious jelly, a good substitute for the red currant jelly; puddings and tarts are also made of them. There are two kinds, the red and the white, the latter a little less acid.

Bombax Malabaricum, D. C. Prod. i. 479.—*Salmalia Malabarica*, Dalz. & Gibs. Bby. Fl. 22. *Saur* or *siwur*, Mah.; *mochras*, Hind.

The calyx and flower-buds eaten as a vegetable.

Adansonia digitata, Dalz. & Gibs. Bby. Fl. Suppl. 9. *Baobab*, *gorak-chinch*, *gorachi ambli*, *chauri*.

The fruit is about the size of an ostrich's egg. From the pulp of the fruit an agreeable acid sherbet is made, and the leaves dried and powdered are mixed with food as condiment.

TILIACEÆ.

Grewia Asiatica, Dalz. & Gibs. Bby. Fl. 26. *Phalsi*, *phalsa*, *dhamin*.

Wild and cultivated throughout India for the sake of its dark-brown, small, pleasantly acid fruit, which is eaten. A sherbet made from it is liked by some.

G. microcos, Dalz. & Gibs. Bby. Fl. 26. *Shiral*, *ansalé*.

Common in the hilly parts of the Konkan and elsewhere in India. The drupe, size of a pea, purplish when ripe, sweet, is eaten.

G. polygama, Dalz. & Gibs. Bby. Fl. 26. *Gowli* or *gowali*.

Common in the Konkan. The drupe, ½ in. diam., hairy, brownish, and sweet, is eaten.

G. tiliæfolia, Dalz. & Gibs. Bby. Fl. 26. *Daman*.

The drupe blackish, size of a small pea, eaten.

G. villosa, Dalz. & Gibs. Bby. Fl. 25.

Western and Southern India. The fruit globose, size of a cherry, eaten.

G. pilosa, Dalz. & Gibs. Bby. Fl. 26.

In the Deccan. The drupe reddish brown, size of a large pea, eaten.

Food Plants.

GERANIACEÆ.

Oxalis corniculata, Roxb. Fl. Ind. ii. 457; Dalz. & Gibs. Bby. Fl. 42. *Amrul*, Hind. & Beng.; *ambuti*, Dec.

The leaves eaten as salad. Several other acid herbs and shrubs are named *ambuti*.

Averhoa bilimbi, Dalz. & Gibs. Bby. Fl. Suppl. 16. *Bilimb*, Bomb.; *kamaranga*, Hind.

Cultivated. The fruit has a small translucent rind. It is as soft as butter when ripe; unfit to be eaten (except when cooked in curries or pickled) on account of its acidity. It is made into a good compote. The fruit hangs in a singular way from the branches, being suspended in clusters of 8 or 10 by slight thread-like stalks.

A. carambola, Dalz. & Gibs. Bby. Fl. Suppl. 16. *Carambol*, Bomb.; *karmar*.

Cultivated. Fine, semi-transparent, amber-coloured fruit, as big as a lemon. It possesses an agreeable scent and flavour when ripe, though hardly eatable, because of its acidity. A good jelly is made of the pulp. The fruit pickled, or used in curries.

RUTACEÆ.

Toddalia aculeata, Dalz. & Gibs. Bby. Fl. 46.

A thorny shrub with trifoliate leaves and small white flowers in axillary cymes. Fruit, size of a small cherry, has a strong pungent taste like black-pepper; is used in curries as a substitute for spices. Leaves boiled and used as green in famine times. The root-bark, bitter, pungent and aromatic, is officinal in the Indian Pharmacopœia and is employed in the form of tincture as an aromatic tonic and stimulant. The natives use it also in jungle fevers. Formerly it was much used in diarrhœa, and was known in Europe as Lopes' root.

Ægle marmelos, Dalz. & Gibs. Bby. Fl 31. *Bel, bel-phal.*

The fruit varies much in size, the smallest being about the best. It is covered by a hard shell, and contains a yellow consistent substance agreeable to the taste and smell.

Feronia elephantum, Dalz. & Gibs. Bby. Fl. 30. *The elephant or wood-apple; kaota*, Mah. *kavit.*

Round, pale-green or scurfy fruit, as big as an orange, containing a rather acrid and not much palatable substance. The pulp makes a pretty good jelly.

Citrus aurantium, Dalz. & Gibs. Bby. Fl. Suppl 12. *Sweet orange, naranghi cantra.*

Grows everywhere in India. There are several varieties; that from Nágpur *(cantra)* being well known.

C. decumana, Dalz. & Gibs. Bby. Fl. Suppl 12. *Pomelo, shaddock, papanass.*

Commonly cultivated in India. The pomelo has been raised to perfection in Bombay. It is more scarce in the north of India. The fruit is pulpy and full of juice; gathering it too soon tells, as a rule, on its flavour.

C. limetta, Dalz. & Gibs. Bby. Fl. Suppl 13. *Sweet lime, miṭṭá limbu.*

Cultivated. The fruit is as large as an ordinary orange, with smooth rind, inferior in taste to the latter.

C. medica, Dalz. & Gibs. Bby. Fl. Suppl 13. *Citron, limu.*

Cultivated. Well known for its thick rind, which makes good preserve. The pulp is also preserved in sugar. Both fruit and preserve are somewhat bitter to the taste.

Glycosmis pentaphylla, Dalz. & Gibs. Bby. Fl. 29. *Kirmîra*, Bomb.; *mânki*, Goa.

Common in the jungly parts of the Konkan. The fruit is eaten.

Murraya Kœnigii, Hook. Fl. Ind. i. 503.—*Bergera Kœnigii*, Dalz. & Gibs. Bby. Fl. 29. *Bursunga*, Hind.; *karri-nim, karria pat.*

Common on the Konkan ghâts and other parts of India. The leaves used as garnish in curries and chutnies.

Triphasia trifoliata, Dalz. & Gibs. Bby. Fl. Suppl 12. *Chini naranghi.*

Found in the Konkan, but said to be an escape from cultivation. Common in gardens throughout India, indigenous in China. The fruit used in conserve, and pickled.

BURSERACEÆ.

Garuga pinnata, Dalz. & Gibs. Bby. Fl. 313. *Kurak, kakur*, Bomb. The drupe size of a gooseberry, eaten raw or pickled.

OLACINEÆ.

Ximenia Americana, Roxb. Fl. Ind. ii. 252; W. & Arn. Prod. i. 89.

A shrub or small tree with a red astringent bark. Grows in tropical Africa, America, and almost all over India, Ceylon, Malacca, Andaman Islands and Malayan Archipelago. In this Presidency it is described from Belgaum. Drupe ovoid with one solid stone, edible when ripe. The wood is used as a substitute for sandal-wood. This plant is not mentioned in Dalz. & Gibs. Bby. Flora.

RHAMNEÆ.

Zyzyphus jujuba, Dalz. & Gibs. Bby. Fl. 49. *Bhor.*

The fruit is small, round, and of a yellowish colour. There are several kinds of it, varying in size and flavour; those from Ahmedabad being much prized on this side of India. The unripe fruit is pickled. The bony stone is cracked, and the kernel, which is palatable, eaten. It is much procured in times of scarcity.

Z. rugosa, Dalz. & Gibs. Bby. Fl. 49. *Turan.*

Common. The edible fruit is a great support to the people of the ghâts from March to the middle of May.

Food Plants.

AMPELIDEÆ.

Vitis vinifera, Dalz. & Gibs. Bby. Fl. Suppl. 15. *Common grape; dakh* or *drakh*, Hind.; *angur*, Pers.

Cultivated in several parts of India. There are numerous varieties of the grape; that of Aurungabad ranks among the best. The fruit from Cabul, also of superior quality, appears in the bázárs in small, flat, circular, wooden boxes.

Leea macrophylla, Dalz. & Gibs. Bby. Fl. 41. *Dinda.*

On the hills of the Konkan pretty common. Tender leaves eaten as vegetable.

SAPINDACEÆ.

Nephelium litchi, Dalz. & Gibs. Bby. Fl. Suppl. 13. *Lichi.*

Cultivated; indigenous in China. The fruit, the size of a plum, contains a fleshy, whitish aril or pulp, as delicious as that of any other fruit and a single stone in the centre. The quality of the fruit varies according to the size of the stone, the smallest being found in the best.

N. longanum, Dalz. & Gibs. Bby. Fl. 35. *Wumb-ashphal.*

Konkan and elsewhere. The fruit, reddish or purple, is not so palatable as that of the preceding, though resembling it. It is of the size of a small marble, and borne in bunches.

Schleichera trijuga, Dalz. & Gibs. Bby Fl. 35. *Kossimb* or *koshim.*

Rám Ghát and elsewhere. The fruit about 1 in. long, smooth or spinous. The subacid pulp eaten.

Allophylus Cobbe, Hook. Bby. Fl. i. 673. *Tipin, mendri.*

A straggling shrub with ternate leaves, small, yellow or white flowers and red, shining, globose fruits. Common all over India and from the Konkan southwards. The ripe fruit is eaten.

ANACARDIACEÆ.

Anacardium occidentale, Dalz. & Gibs. Bby. Fl. Suppl. 18. *Cashew nut, caju.*

Common in the Konkan. The kidney-shaped kernel eaten both raw and roasted; also the fleshy peduncle.

Mangifera Indica, Dalz. & Gibs. Bby. Fl. 51. *Mango, amba.*

This well-known fruit varies in size from a betel-nut to a pomelo. The various kinds found in Bombay and Goa are known under different names,—the *Alphonso*, *Fernandina* and *Pairi* ranking among the foremost, and yielding in flavour to no other known fruit. The unripe fruit is pickled in salt and water or in vinegar, with or without chillies, mustard, etc. It is also cut into slices, dried in the sun, and used like kokam to flavour curries. The slices are called *solam.*

Buchanania latifolia, Dalz. & Gibs. Bby. Fl. 52. *Payal, charoli.*

The kernel is generally substituted for almonds, and is eaten roasted with milk. It is also largely used in native confectionery.

Nothopegia Colebrookiana, Hook. Fl. Ind. ii. 40.—*Glycarpus racemosus*, Dalz. & Gibs. Bby. Fl. 51. *Amberee.*

Grows on the ghâts. The drupe ¼ in. diam. with the top depressed, red when ripe. The sweet pulp eaten.

Semecarpus anacardium, Dalz. & Gibs. Bby. Fl. 52. *Marking-nut; bhiba*, Bomb.

Kernel of the drupe eaten as nut.

Spondias mangifera, Dalz. & Gibs. Bby. Fl. Suppl. 19. *Hog's plum; ambara, amra.*

The largest fruit is as big as a goose's egg. The part near the stone sweet; that nearest the rind being acid, not nearly so good in taste or smell as the mango. The acid leaves used as vegetable or in curries.

MORINGACEÆ.

Moringa pterygosperma, Dalz. & Gibs. Bby. Fl. 311. *Segata sanga; moosing*, Goa.

Wild and cultivated throughout India. Leaf, flower, and pod prepared with various condiments used as vegetable, and the pungent root as garnish instead of mustard.

M. Concanensis, Dalz. & Gibs. Bby. Fl. 311.

Southern Konkan. The unripe fruit eaten as vegetable.

LEGUMINOSÆ.

Trigonella fœnum-græcum, Dalz. & Gibs. Bby. Fl. Suppl. 21. *Methi.*

Herb eaten as vegetable and as a garnish in curries.

Cyamopsis psoraloides, Dalz. & Gibs. Fl. Suppl. 21. *Gauri, mathi.*

Cultivated for the sake of its pods, which are delicate and are eaten as vegetable like French beans and put in curries, *shak-bhaji*, etc. Cattle are also fond of the plant.

Sesbania grandiflora, Bedd. Fl. Sylv. 86.—*Agati grandiflora*; Dalz. & Gibs. Bby. Fl. Suppl. 22. *Augûsta*, Beng.

Leaves, flowers and young pods eaten as vegetable in all seasons. When freely taken they cause diarrhœa.

Smithia sensitiva, Dalz. & Gibs. Bby. Fl. 63. *Kaola.*

This herb is specially used, made into *bhâji* with various condiments on every Monday of the month of *Shrâvan.*

Arachis hypogœa, Dalz. & Gibs. Bby. Fl. Suppl. 27. *Bhuymung, chini-badham, mung phuli, earth* or *ground-nut.*

The legumes contain two or three irregular-formed beans of nut-like flavour somewhat resembling the pestachio, but rather inferior. They are eaten raw, but are much better for being roasted.

Pueraria tuberosa, Dalz. & Gibs. Bby. Fl. 67. *Dari?*

Root large, tuberous, stem twining, shrubby with large trifoliate leaves and beautiful blue flowers. The root is eaten. Poultices made of the pounded tuber are applied to reduce swellings of the joints.

Food Plants.

Cicer arietinum, Roxb. Fl. Ind. iii. 324; Dalz. & Gibs. Bby. Fl. Suppl. 22. *Chenna-hurbara, gram.*

It is extensively cultivated all over India.

Vicia hirsuta, Hook. Fl. of Brit. Ind. ii. 177.—*Ervum lens*, Dalz. & Gibs. Bby. Fl. Suppl. 22. *Lentil, massur.*

Much cultivated for the sake of its seeds, which are red, and is highly esteemed by the natives. It is said that they enter into the composition of *Revalenta Arabica.*

Lathyrus sativus, Roxb. Fl. Ind. iii. 321; Dalz. & Gibs. Bby. Fl. Suppl. 22. *Lang*, Gujarát; *kesāri, thēori*, Beng.

Cultivated and wild. The dhall of the seeds is used by very poor people, but causes paralysis when used in large quantity.

Pisum sativum, Roxb. Fl. Ind. iii. 321; Dalz. & Gibs. Bby. Fl. Suppl. 22. *Common pea.*

Cultivated in Bombay, Konkan and Gujarát during the cold season and in the Deccan in the rains.

Canavalia ensiformis, D. C. Prod. ii. 404. *Gaivara.*

Stem rather twining, perennial or biennial, wild and cultivated everywhere throughout India and in the tropics. Several varieties are described:—

(1st.) *C. virosa*, Dalz. & Gibs. Bby. Fl. 69. This is perhaps the wild form of the plant rather than a variety; the pods of this are bitter.

(2nd.) *C. turgida* of Wallich or *C. Stocksii* of Dalz. & Gibs. Bby. Fl. The pods of this are larger and more turgid; and

(3rd.) *C. mollis*. Pods smaller, those of the cultivated variety are sweet. The tender pods are eaten like French-beans.

Phaseolus lunatus, Roxb. Fl. Ind. iii. 287.

Cultivated everywhere for the sake of the legumes which are known as French-beans. There are several varieties.

Ph. vulgaris, Roxb. Fl. Ind. iii. 287; Dalz. & Gibs. Bby. Fl. Suppl. 22.

Everywhere cultivated for the sake of its seeds. This is a variety of the last.

Ph. adenanthus, Hook. Fl. of Brit. Ind. ii. 200.—*Ph. rostratus*, Dalz. & Gibs. Bby. Fl. Suppl. 23. *Hullounda, hullowla?*

Said to be cultivated. The tuberous roots are cooked and eaten.

Ph. trilobus, Roxb. Fl. Ind. iii. 298; Dalz. & Gibs. Bby. Fl. 71. *Arkmut.*

Wild and cultivated for the sake of the pods.

Ph. aconitifolius, Roxb. Fl. Ind. iii. 299; Dalz. & Gibs. Bby. Fl. Suppl. 23. *Mat.*

Commonly cultivated with bájri, good for horses. The leaves are eaten as vegetable.

Ph. mungo, Roxb. Fl. Ind. iii. 292; Dalz. & Gibs. Bby. Fl. Suppl. 23. *Urid* (with green seeds), *mung* (yellow seeds).

Cultivated extensively. Its *dhal* is highly esteemed by people.

It presents several varieties :—*Ph. glaber; Ph. Wightianus; Ph. radiatus; Ph. Roxburghii; Ph. setulosus.* Botanically the plants yielding *urid* and *mung* are the same. They are most useful to the people of this country.

Vigna catiang, Hook. Fl. Brit. Ind. ii. 205.—*Dolichos sinensis*, Dalz. & Gibs. Bby. Fl. Suppl. 23. *Chowli, safed lobeh, hurrea lobeh, gat-val.*

An annual, sub-erect or twining shrub with membranous leaflets and yellow or reddish flowers. Pod in cultivated plant 1-2 ft. long. Seeds, 10-20 in each pod, are much used, especially by Pársis, who even import them from China.

Dolichos lablab, Roxb. Fl. Ind. iii. 305.—*Lablab vulgaris*, Dalz. & Gibs. Bby. Fl. Suppl. 23. *Pauti, valpapri.*

A perennial or under cultivation annual, wide-twining herb with trifoliate leaves with white or reddish flowers, and pod about 2 in. long. It is extensively cultivated all over India, specially during the cold season, on the sloping lands along the banks of rivers. The seeds are much relished; they are boiled and eaten.

D. biflorus, Roxb. Fl. Ind. iii. 313.—*D. uniflorus*, Dalz. & Gibs. Bby. Fl. Suppl. 23. *Kulti.*

An annual twining (former) or sub-erect (latter) plant with trifoliate leaves, yellow flowers, and pod much recurved about 2 in. long, 5-6 seeded. Commonly cultivated, chiefly as food for cattle.

Psophocarpus tetragonolobus, D. C. Prod. ii. 403; Dalz. & Gibs. Bby. Fl. Suppl. 23. *Chowdari, chevaux-de-frize* of the French.

A twining herb with large root, blue flowers, and pod about one foot long, square, with a distinct fringed wing to each angle. It is cultivated throughout Bombay and India.

Atylosia lineata, W. & A. Prod. 258.—*A. Lawii*, Dalz. & Gibs. Bby. Fl. 74. *Jungli-tur.*

An erect, annual herb with trifoliate leaves and small 2-3-seeded oblong pods. The seeds are eaten by the poor people, specially during seasons of scarcity.

Cajanus Indicus, Dalz. & Gibs. Bby Fl. Suppl. 24. *Tur.*

Cultivated throughout India for the sake of its seeds, which are much used by the people of this country. The *dhal* of this is highly nutritious, and is much prized.

Cassia tora, Dalz. & Gibs. Bby. Fl. 81. *Tacla.*

The tender leaves of this common weed are boiled and eaten as pot-herb. The seeds are said to be a good substitute for coffee.

C. sophora, Dalz. & Gibs. Bby. Fl. 81.

A common weed. Its leaves are, as those of the last species, eaten as vegetable. The heavy disagreeable smell is removed by boiling.

Tamarindus Indicus, Dalz. & Gibs. Bby. Fl. 82. *Chinch, ambli.*

The seedling or tender plant about a foot high together with the cotyledons are eaten as vegetable. The flowers made into a dish

Food Plants.

called *chingar* are also eaten, as also the pulp of the fruit. The seeds are also eaten roasted in ordinary seasons as well as in times of scarcity.

Ceratonia siliqua, Dalz. & Gibs. Bby. Fl. Suppl. 28. *Carab-tree* or *algaroba* of the Spaniards.

Indigenous in Spain, Algeria and Syria. Its pods full of sweet nutritious pulp are a common article of food for man, horses, pigs and cattle in those countries. The plant has been lately introduced into India, but it is of slow growth.

Bauhinia Vahlii, Dalz. & Gibs. Bby. Fl. 83. *Chamboli.*

The large seeds eaten when ripe, taste like cashew nuts.

B. Malabarica, Dalz. & Gibs. Bby. Fl. 82. *Amlee, koral.*

The acid leaves eaten as vegetable and the flower buds pickled.

B. purpurea, Dalz. & Gibs. Bby. Fl. Suppl. 30. *Karvallika.*

Cultivated. The flower-buds pickled and eaten as vegetable.

B. variegata, Dalz. & Gibs. Bby. Fl. Suppl. 30. *Karal.*

The flower-buds are pickled.

Entada scandens, Brand. For. Fl. 167.—*E. pusætha*, Dalz. & Gibs. Bby. Fl. 83. *Gardal, garbi.*

An immense climber. Leaves bipinnate, the rachis usually ending in a tendril. Pod 1-2 ft. long, constricted between the seeds. These, which are about 2 in. broad, are eaten boiled or roasted.

Adenanthera pavonina, Dalz. & Gibs. Bby. Fl. Suppl. 26. *Thorla gunj.*

A large timber tree. Leaves large, bipinnate. Flowers yellow. Pod 6-9 in. long, falcate, 10-12-seeded, seeds flat, scarlet. These are eaten raw or roasted; they are also used as weights, and are worn as necklaces.

Prosopis spicigera, Dalz. & Gibs. Bby. Fl. 84. *Sumri, shemi.*

The sweetish pulp surrounding the seeds eaten in Gujarát and in the Deccan.

Acacia concinna, Dalz. & Gibs. Bby. Fl. 87. *Sikakai.*

A large, common, prickly climber. The leaves are acid, and are used in curries instead of tamarind. (*See* Vegetable Soaps.)

Pithecolobium dulce, Bedd. Fl. Sylv. Tab. 188.—*Inga dulcis*, Dalz. & Gibs. Bby. Fl. Suppl. 25. *Bilaiti ambli.*

The fruit eaten at Manilla.

ROSACEÆ.

Parinarium excelsum, Dalz. & Gibs. Bby. Fl. Suppl. 32. *Guinea-plum.* Naturalized in Goa, where it is called *matomba.*

The fruit eaten.

Prunus amygdalus, Brand. For. Fl. 190.—*Amygdalus communis*, Dalz. & Gibs. Bby. Fl. Suppl. 32. *Almond, badam.*

Introduced in gardens, but does not flourish in Bombay; most successfully cultivated in Afghanistán, Cashmere, Persia and in the plains of the Punjáb and other cooler parts of India.

Food Plants.

P. Persica, Brand. For. Fl. 191; Dalz. & Gibs. Bby. Fl. Suppl. 32. *Amygdalus Persica, peach tree, aru* (Pers.)

Cultivated successfully in cooler parts of India, Deccan, Mahábaleshvar, Punjáb, Sikkim, etc. "Flourishes well at Belgaum, Dhárwár, Ahmednagar, etc. The air of the Konkans does not suit it".—Bby. Fl. It is said that the peach cultivated in the North-West Provinces is a very sweet, mellow fruit; that of Pánchgani is not good.

The nectarine is a variety with glabrous smooth fruit, and the peach with downy pericarp.

Rubus lasiocarpus, Dalz. & Gibs. Bby. Fl. 89. *Raspberry.*

Common on the hills of India ascending up to 8000 ft. It is cultivated also at Mahábaleshvar. The authors of Bombay Flora say that "common raspberry of England (*R. Idæus*) has been successfully cultivated at Phondá Ghát, south of Kolhápur. It probably would not succeed further inland."

Fragaria vesca, Hook. Fl. Brit. Ind. ii. 344. *Strawberry.*

This species is cultivated at Mahábaleshvar and various parts of India. The authors of Bombay Flora state that "the species *F. elatior* is successfully cultivated in gardens above the ghâts, and extensively by natives near Poona for sale in camp. The strawberries of Kolhápur and its vicinity appear to be the best."

Eribotra Japonica, Dalz. & Gibs. Bby. Fl. Suppl. 32. *Loquat.*

This is a Chinese fruit-tree. Belgaum is the only place where it flourishes and yields fruit of good flavour.

Pyrus Malus, Dalz. & Gibs. Bby. Fl. Suppl. 32. *Apple-tree.*

Cultivated in the Deccan, Mahábaleshvar and various other parts of India; but the fruit is small, and not of good flavour.

COMBRATACEÆ.

Terminalia bellerica, Dalz. & Gibs. Bby. Fl. 91. *Bherda.*

The kernel eaten as nut. It acts as a poison when eaten in large quantity.

T. chebula, Dalz. & Gibs. Bby. Fl. 91. *Hirda.*

The kernel eaten as nut.

T. catappa, Dalz. & Gibs. Bby. Fl. Suppl. 33. *Bengali badham, desi-badham.*

The nut has a most delicious flavour. The small white kernel when extracted is steeped in a plate containing water for a short time before it is eaten.

MYRTACEÆ.

Eugenia Malaccensis, Dalz. & Gibs. Bby. Fl. Suppl. 35. *Malacca jam, Malacca amrul.*

Cultivated. The fruit is as big as an ordinary apple, which it also resembles in form; smooth, white, and slightly crimson. It is not much prized as a fruit.

Food Plants.

E. jambos, Hook. Fl. Ind. ii. 474—*Jambosa vulgaris*, Dalz. & Gibs. Bby. Fl. Suppl. 35. *Rose-apple, gulab-jam.*

Cultivated on this side. The fruit is of the size of an apple, very handsome, yellowish, with a tinge of red; rather poor in taste, and therefore scarcely eaten.

E. jambolana, Hook. Fl. Ind. ii. 499.—*Syzygium jambolanum.*—Dalz. & Gibs. Bby. Fl. 93. *Jambul.*

The fruit, which is common in India, is about as big as Adam's fruit (*Mimusops kanki*), of a beautiful dark-purple colour and succulent, though not of a very good flavour. It has a single stone. Good wine is made from it at Goa.

E. caryophyllæa, Hook. Fl. Ind. ii. 490.—*Syzygium caryophyllæum*, Dalz. & Gibs. Bby. Fl. 93.

This plant grows in Southern Konkan, and always on the banks of the streams. The berry globose, size of a large pea, eaten.

Psidium guayava or **pyriferum**, Dalz. & Gibs. Bby. Fl. Suppl. 34. *Guava, jám* (Dec.), *peru* (Bomb.)

The fruit, size of a lemon, sometimes larger, generally smooth and pale-yellow outside, white or red inside. It possesses a delicious flavour and strong scent, and requires to be protected whilst on the tree from being devoured by bats and squirrels. It affords an excellent preserve. There are several varieties.

Caryophyllus aromaticus, Dalz. & Gibs. Bby. Fl. Suppl. 34. *Clove-tree, lawang.*

Cultivated in Bombay. The part used as condiment is the unexpanded dried flower-bud. The Americans have introduced into commerce an imitation: dealwood cut into appropriate pieces are soaked into a solution of true cloves. Cinnamon is also imitated in the same way.

MELASTOMACEÆ.

Melastoma malabathricum, Dalz. & Gibs. Bby. Fl. 92.

Common in the Konkan. The fruit is short-ovoid, truncate. The pulp eaten.

Memecylon edule, Dalz. & Gibs. Bby. Fl. 93. *Anjan, karpa.*

Common in the hilly parts of the Konkan and elsewhere. The berry ¼ in. diam., dark-purple, globose. The pulp eaten.

LYTHRARIEÆ.

Punica granatum, Dalz. & Gibs. Bby. Fl. Suppl. 34. *Pomegranate, dhalim, anar.*

Common. There are several varieties in India, the best being that from Cabul. The Patna variety is also much esteemed. The fruit eaten.

ONAGRARIEÆ.

Trapa bispinosa, Dalz. & Gibs. Bby. Fl. 99. *Water-chestnut, shingara.*

Found in Asia and tropical Africa; common in tanks in the Konkan and Gujarát. Very extensively cultivated in Cashmere, and the Cashmere authorities admit it that for five months, during the late famine, 3,000 human beings lived on the nut of this plant, and that an annual revenue of £100,000, or ten lákhs of rupees, was derived therefrom.

Colonel Sleeman in his "Rambles" gives the following account of this plant in the North-West Provinces:—

"Here, as in most other parts of India, the tanks get spoiled by the water-chestnut (shingara) which is everywhere as regularly planted and cultivated in fields under a large surface of water as wheat or barley is on the dry plains. It is cultivated by a class of men called Dheemurs, who are everywhere fishermen and palankeen-bearers; and they keep boats for the planting, weeding and gathering the shingara. The holdings or tenements of each cultivator are marked out carefully on the surface of the water by long bamboos stuck up in it; and they pay so much the acre for the portion they till. The long straws of the plants reach up to the surface of the water, upon which float their green leaves; and their pure white flowers expand beautifully among them in the latter part of the afternoon. The nut grows under the water after the flowers decay, and is of a triangular shape and covered with a tough brown integument adhering strongly to the kernel, which is white, esculent, and of a fine cartilagenous texture. The people are very fond of these nuts, and they are carried often upon bullocks' backs 2 or 3 hundred miles to market. They ripen in the latter end of the rains or in September, and are eatable till the end of November. The rent paid for an ordinary tank by the cultivator is about 100 rupees a year. I have known 200 rupees to be paid for a very large one, and even 300, or 30 pounds a year. But the mud increases so rapidly from this cultivation that it soon destroys all reservoirs in which it is permitted; and where it is thought desirable to keep up the tank for the sake of the water, it should be carefully prohibited."

PASSIFLORACEÆ.

Carica papaya, Dalz. & Gibs. Bby. Fl. Suppl. 37. *Papai.*

The fruit, which is as big as an ordinary cocoanut, is pale-yellow when ripe, presenting the tempting appearance of a ripe mango when cut open. It has a sweetish taste, and makes an excellent tart. It resembles the apple in taste, and is substituted for the sauce of the latter fruit. It has the property of making meat hung on the branches of the tree, tender; the green fruit is also mixed with meat when set to boil for the same purpose, and also cut into slices and eaten as vegetable. It is also pickled.

Passiflora quadrangularis, Dalz. & Gibs. Bby. Fl. Suppl. 38. *Square-stalked passion-flower; common granadilla.*

Cultivated. The fruit size of a skinned cocoanut, much prized in the hot weather for its sweetness and slight acidity, which renders it very agreeable. There are several varieties of it.

CUCURBITACEÆ.

Trichosanthes anguina, Dalz. & Gibs. Bby. Fl. Suppl. 37. *Common snake gourd, parwar, paddvala, patola* (Sans.)

The long curiously twisted fruit, eaten as vegetable.

Food Plants.

T. cucumerina, Dalz. & Gibs. Bby. Fl. 102. *Jangli-padavala, kadu-padavala, pudoli.*

Stem annual, twining. Common throughout India, Ceylon, Malaya and South Australia. Very common in hedges in Gujarát and Konkan. The unripe fruit, about 2-4 in. long, ovate, is bitter, but after being boiled is eaten in curries. The seeds are said to be anti-febrile; the whole plant is bitter, and is used in moderate doses as anti-periodic and for promoting digestion. In larger doses it acts as purgative and emetic.

Lagenaria vulgaris, Dalz. & Gibs. Bby. Fl. Suppl. 36. *Harrea-kuddu* (Dec.), *tumbi, bobora branca* of the Portuguese.

Supposed to be a native of India and tropical Africa, but now cultivated throughout the tropics. The fruit oblong, about 1 ft. long, broader towards the top, is at first greenish, then whitish-yellowish. The rind becomes hard by age. The soft meal is eaten cooked in various ways. In the wild state the fruit, specially the rind, is poisonous. (*See* Poisons.)

Momordica charantia, Dalz. & Gibs. Bby. Fl. 102. *Karela, karati.*

The fruit is oblong-ovate, about 1-3 in. long, very bitter, but extensively eaten after being boiled and variously cooked.

M. Dioica, Dalz. & Gibs. Bby. Fl. 102. *Karatola* or *vanthakaratolu.*

The ovate muricated fruit eaten variously cooked.

M. balsamina, D. C. Prod. iii. 311. *Karelo-jangro*, Sind.

Grows in Sind, North-West Provinces, Punjáb, Australia, Africa, etc. Fruit 1-3 in. long, rostrate, orange-red, eaten as vegetable. This is a variety of the last, but described here, as a distinct species, in deference to the opinion of some of the Indian botanists.

Luffa acutangula, Dalz. & Gibs. Bby. Fl. Suppl. 36. *Gonsali. turai, jinga.*

Cultivated in India, Africa and America. Said to be a native of India. Fruit about 6-10 in. long, is marked with 10 prominent and acute ridges. It is eaten as vegetable.

Luffa amara is the parent of this plant.

Luffa cylindrica, Naud. Ann. Sc. Nat.—*L. Ægyptiaca*, D. C. Prod. iii. 303.—*L. pentandra*, Dalz. & Gibs. Bby. Fl. Suppl. 36. *Parula, turi, gonsali.*

Indigenous in the tropics of the Old World. Cultivated also in America. The fruit, size of that of the last, but smooth, marked by 10 dark-green, longitudinal lines, not raised. It is eaten as a vegetable.

Cucumis melo, Dalz. & Gibs. Bby. Fl. Suppl. 36. *Melon, karbuj.*

The fruit is odorous, varies in size and taste, highly delicious when carefully raised, and commands a good price. The plant is cultivated in several parts of India along the banks of rivers. *C. utilissimus*, Roxb.; *C. momordica, C. agrestis*, Nand.; *C. culta*, Kur.; *C. maderaspatanus, C. turbonatus*, are all varieties of the same plant. *C. pubescens*, Dalz. & Gibs. Bby. Fl. 103; and *C. cicatricatus* described

by Dr. Stocks (a variety of the last) are said to be parents of the cultivated species:—

"This appears to me to be far the most useful species of *cucumis* that I know; when little more than one-half grown they are oblong and a little downy; in this state they are pickled; when ripe they are about as large as an ostrich's egg, smooth and yellow; when cut they have much the flavour of the melon, and will keep good for several months, if carefully gathered without being bruised and hung up; they are also in this stage eaten raw, and much used in curries by the natives.

"The seeds, like those of the other *cucurbitaceous* fruits, contain much farinaceous matter blended with a large portion of mild oil; the natives dry and grind them into a meal, which they employ as an article of diet; they also express a mild oil from them, which they use in food and to burn in their lamps. Experience as well as analogy prove these seeds to be highly nourishing and well deserving of a more extensive culture than is bestowed on them at present.

"The powder of the toasted seeds mixed with sugar is said to be a powerful diuretic, and serviceable in promoting the passage of sand and gravel.

"As far as my observation and information goes, this agriculture is chiefly confined to the Guntoor Circar, where these seeds form a considerable branch of commerce; they are mixed with those of *Holcus sorghum* or some other of the large culmiferous tribe and sown together; these plants run on the surface of the earth, and help to shade them from the sun, so that they mutually help each other.

"The fruit I observed above keeps well for several months if carefully gathered and suspended. This circumstance will render them a very excellent article to carry to sea during long voyages."—Roxb. Fl. Ind. 701.

C. sativus, Dalz. & Gibs. Bby. Fl. Suppl. 36. *Common cucumber, kakri* or *kankri.*

Supposed to be a native of India; cultivated. There are numerous varieties throughout the Old and New World. The fruit is eaten as vegetable, pickled and made into salad.

Citrulus vulgaris, Dalz. & Gibs. Bby. Fl. 102. *Water melon, turbuj* (Hind.), *kalinga* (Bomb.)

Cultivated throughout India for its large oval fruit, which in some instances is very delicious and greatly prized in the hot months, as it is then very refreshing. The small flat seeds when dried taste like almonds. This is the cultivated form, but the wild species named at Gujarát *dilpussund* and *meho* in Sind is eaten as vegetable.

Benincasa cerifera, Dalz. & Gibs. Bby. Fl. Suppl. 36. *Pandrichicki, camolenga* or *cambulana.*

Said to be wild in India. Cultivated throughout India, Malaya, China, Japan, Africa, etc. Fruit round, oblong, about 12-18 in. long, whitish, hairy when young, smooth and covered with a waxy bloom when ripe. The meal is eaten as vegetable, cooked in various ways and made into sweets with jaggri or sugar.

Coccinia Indica, Dalz. & Gibs. Bby. Fl. 103.—*Cephalandra Indica*, Naud. in Ann. Sc. Nat. *Tendli, tenduli, bhimb.*

The oblong fruit about 2-2½ in. long, green when young, scarlet red when ripe, fleshy, smooth, is eaten both raw and cooked. The ripe fruit is sweet.

Food Plants.

Cucurbita maxima, Dalz. & Gibs. Bby. Fl. Suppl. 37. *Pumpkin* or *red gourd, dudhi bhopali.*

Cultivated throughout India, and warm parts of the globe. The fruit is large, depressed, and marked with several depressed lines. It is eaten as a vegetable.

C. pepo, D. C. Prod. iii. 317. *Kaula.*

Cultivated throughout India, and in all warm and temperate regions of the globe. The fruit is very variable, dark-green, orange-coloured or white, ribbed or unribbed, smooth or tubercled, small or as large as the fruit of *C. maxima*. *C. melolepo*, *C. ovifera* of Linn. are varieties.

C. moschata, D. C. Prod. iii. 317. *Kali-duddi, abobra de Guinea* of the Indo-Portuguese.

Fruit varies, oblong, round or compressed, marked with several lines, 1-2 ft. in diameter. The meal is yellow and of a sweetish taste.

The fruit of all these species are cut into slices and made into sweets. They are also eaten as vegetable.

Melothria heterophylla, cogn. in D. C. Prod.—*Zehneria umbellata*, Hook. Fl. Ind. ii. 225.—*Bryonia umbellata*, Dalz. & Gibs. Bby. Fl. 101. *Gametta.*

Common in Bombay and throughout India. Oval berry, size of a pigeon's egg, smooth, red when ripe; is eaten always in association with *Capparis Zeylanica* as stated above.

CACTEÆ.

Opuntia Dillenii, Dalz. & Gibs. Bby. Fl. Suppl. 39. *Prickly-pear, nayphana* (Hind.), *chappal* (Dec.)

The fruit is like a pear, covered with thin sharp spines, and containing a pulp which is highly refreshing. It is much resorted to in times of scarcity.

FICOIDEÆ.

Mollugo stricta, Dalz. & Gibs. Bby. Fl. 16. *Zarus.*

Very common. About 1 foot high. Eaten as pot-herb in all seasons.

Sesuvium portulacastrum, Dalz. & Gibs. Bby. Fl. 15.

A fleshy, prostrate herb, rooting at the joints. Common on the shores of India from Bombay to Calcutta and Singapore. Eaten as pot-herb.

Trianthema monogyna, D. C. Prod. iii. 352.—*T. obcordata*, Dalz. & Gibs. Bby. Fl. 14. *Khopra, biskhopra, sveta punarnava.*

A common, prostrate, diffuse, succulent herb. Eaten as pot-herb.

UMBELLIFERÆ.

Apium graveolens, Dalz. & Gibs. Bby. Fl. Suppl. 41. *Celery.*

A biennial herb found in the hills of the Punjáb, Himalaya, Cabul, Europe, etc. The stalk eaten as salad.

Carum copticum, Benth. in Gen. Pl. i. 891.—*Ptychotis ajwan*, Dalz. & Gibs. Bby. Fl. Suppl. 41. *Owa, ajwan.*

This perennial herb, 1-3 ft. high, is widely cultivated in the Deccan, Punjáb, Bengal, etc. The aromatic seeds are used as a garnish in curries, and as medicine. It is officinal in the Indian Pharmacopœia.

C. Roxburghiana, Benth. in Gen. Pl. i. 891.—*Apium involucratum*, Dalz. & Gibs. Bby. Fl. Suppl. 41.

Extensively cultivated in Gujarát and throughout India. It is the substitute for parsley. Seeds employed as carminative in native medicine.

C. petroselinum, Benth. in Gen. Pl. i. 891.—*Apium petroselinum*, Dalz. & Gibs. Bby. Fl. Suppl. 41. *Parsley.*

Cultivated throughout India.

C. carui, D. C. Prod. iv. 115. *Caraway.*

Often cultivated and found wild in Cashmere, Garwhal and various parts of Asia and Europe. The seeds are used as an aromatic condiment. Their oil is officinal in the Indian Pharmacopœia.

Fœniculum vulgare, Dalz. & Gibs. Bby. Fl. Suppl. 41.—*F. panmorium*, D. C. Prod. iv. 142. *Common fennel, panmuohri*, or *barra-sof.*

Common in gardens. Widely cultivated throughout India.

Peucedanum graveolens, Benth. in Gen. Pl. i. 919.—*Anethum sowa*, Roxb. Fl. Ind. ii. 94.—*Dill seed, sowa* (Hind.)

The herb eaten as vegetable and the fruit used in curries as garnish, and often added to sweets on account of its sweet perfume.

Coriandrum sativum, Dalz. & Gibs. Bby. Fl. Suppl. 41. *Common coriander, danya* (Hind.), *khotbir* or *khotmir* (Bomb.)

An annual herb cultivated throughout India. Used as garnish and the fruit as condiment.

Cuminum cyminum, Dalz. & Gibs. Bby. Fl. Suppl. 41. *Cummin seed*, the *jirá* of the natives.

This annual herb is cultivated in the Deccan, Punjáb and other parts of India for the sake of its seeds, which are used as carminative and garnish in curries.

Daucus carota, Dalz. & Gibs. Bby. Fl. Suppl. 41. *Carrot, gagar* (Hind.)

Cultivated everywhere in India. In the Balághát and Deccan it thrives well, and forms during the cold season the staple food of the people.

CORNACEÆ.

Alangium Lamarckii, Dalz. & Gibs. Bby. Fl. 109. *Ankul, ankóla.*

The fruit eaten.

RUBIACEÆ.

Anthocephalus cadamba, *Nhiu, Cadam, Nipa*; Bedd. Fl. Sylv. t. 35.—*Nauclea cadamba*, Dalz. & Gibs. Bby. Fl. Suppl. 43.

Food Plants.

The fruit, size of a small orange, is eaten by natives, but is not very palatable.

Mussænda frondosa, Dalz. & Gibs. Bby. Fl. 121. *Bedina* (Hind.), *sarwadh, bhurt-kasi* (Mar.)

Common in the Konkans and all over India. The white leaf of the calyx eaten as vegetable.

Randia dumetorum, Dalz. & Gibs. Bby. Fl. 119. *Ghela.*

The unripe fruit is pounded and thrown into ponds to poison fish. The fresh ripe fruit roasted and eaten; the dried fruit used as an emetic. (*See* Brand.)

R. uliginosa, Dalz. & Gibs. Bby. Fl. 119. *Kaurio.*

The fruit, cooked or roasted, is eaten in Oude and Behár.

Gardenia gummifera, Dalz. & Gibs. Bby. Fl. 120. *Dikamali.*

Fruit is eaten. (*See* Brand.)

Canthium parviflorum, Dalz. & Gibs. Bby. Fl. 113; Roxb. Fl. Ind. i. 534. *Kirni.*

A shrubby plant, usually with opposite supra-axillary thorns. Flowers in the hot season, and ripens fruit in about July.

Grows in Belgaum, Southern Marátha Country, Travancore and Coromandel, etc. The natives use the leaves in curries.

Vanguiera spinosa, Roxb. Fl. Ind. i. 536.—*V. edulis*, Dalz. & Gibs. Bby. Fl. 114. *Atú.*

Fruit eaten by the natives, but unpalatable. It has a rather large stone.

Pavetta Indica, Dalz. & Gibs. Bby. Fl. 112. *Paput.*

A shrub common in the ghâts; flowers in April and May in large, globose, white corymbs. Fruit pickled and eaten in some parts of the Madras Presidency, and the flowers also eaten by the hill people of Mátheran.

Coffea Arabica, Dalz. & Gibs. Bby. Fl. Suppl. 44. *Kawa, caffi, bun.*

This is the well-known coffee tree extensively cultivated in Southern India and throughout the tropics of both hemispheres. Of late *Coffea siberica* is being introduced in India.

Morinda citrifolia, Dalz. & Gibs. Bby. Fl. 114. *Bartundi, aal, ainshe.*

The fruit when ripe is eaten, while the green ones are used in curries.

M. umbellata, D. C. Prod. iv. 449.

Cultivated. The ripe fruit eaten; the green ones used in curries.

COMPOSITÆ.

Eclipta prostrata, Dalz. & Gibs. Bby. Fl. 127. *Maka, bangrak.*

This very common weed is used as a pot-herb.

Helianthus tuberosus, Dalz. & Gibs. Bby. Fl. Suppl. 47. *Jerusalem artichoke, brahmoka* (Beng.)

This plant is cultivated successfully throughout India for the sake of its tuber, which is a very delicious vegetable.

H. annuus, Roxb. Fl. Ind. iii. 443. *Sunflower, suraj-maki.*

The receptacle and the roasted seeds are eaten. The oil is also used for culinary purposes. (*See* Oils.)

Spilanthes acmella, Dalz. & Gibs. Bby. Fl. 129.

Erroneously supposed to be the source of akalkara of the bázárs. It is said to be cultivated as a pot-herb in Poona. In Silhet, where it is indigenous, the leaves are eaten as pot-herb.

Guizotia Abyssynica, Cass. in Dic. Sc. Nat. 59-248.—*G. oleifera*, Dalz. & Gibs. Bby. Fl. 128.

The oil is used for lamps and culinary purposes. (*See* Oils.)

Cynara scolymus, Dalz. & Gibs. Bby. Fl. Suppl. 45. *Artichoke, kingin.*

This vegetable and its variety, cardoon (*C. carduriculus*), are generally cultivated in India, but not with full success, for the leaves are fully developed before the involucre is well formed. The immature flower head and involucre and receptacle are eaten.

Carthamus tinctorius, Dalz. & Gibs. Bby. Fl. Suppl. 45. *Safflower, kosumba, kardai.*

The herb is said by Dr. Birdwood to be eaten, in reference probably to the tender leaves of the cultivated plant which are not spinous, and are used as an article of food. The roasted seeds are eaten; they were much procured by well-to-do people during the late famine at Sholápur. The cake is excellent for fattening poultry. The plant is extensively cultivated throughout India for the use of dyers. The Bombay plant is not so good as that from Bengal or Madras for the latter purpose. (*See* Oils.)

Cichorium endiva, Dalz. & Gibs. Bby. Fl. Suppl. 45. *Kassani.*

Cultivated; when properly blanched, is said to be as delicate as the following.

Lactuca sativa. *Garden letuce, kahu* (Hind.)

Herb eaten as salad.

Launæa pinnatifida, Cass. Ann. Sc. Nat.—*Mychrorhyncus sarmentosus*, Dalz. & Gibs. Bby. Fl. 132.

Leaves eaten as a pot-herb.

GOODENIACEÆ.

Scævola taccada, Dalz. & Gibs. Bby. Fl. 134. *Bhadrak.*

Leaves eaten as vegetable.

SAPOTACEÆ.

Achras sapota, Dalz. & Gibs. Bby. Fl. Suppl. 50. *Naseberry, sapota-plum, chiku* (Bomb.)

The fruit, size of a small orange with a dark-brown skin and a yellowish pulp, is delicious and agreeable. The tender rind covers a juicy pulp and almond-like seeds.

Food Plants.

Mimusops elengi, Dalz. & Gibs. Bby. Fl. 140. *Buckhool, wowli.*

The fruit eaten.

M. Indica, D. C. Prod. viii. 205—*M. hexandra,* Dalz. & Gibs. Bby. Fl. 140. *Kerni, rahjan.*

The fruit eaten.

M. Kauki, Dalz. & Gibs. Bby. Fl. Suppl. 50. *Khirni.*

The fruit is known at Goa as *pome* or *fructa d'Adão* (Adam's fruit). It resembles an Ahmedabad bhôr *(Zyzyphus jujuba)*; is slightly acid, and is eaten.

Bassia latifolia, Dalz. & Gibs. Bby. Fl. 139; Roxb. Corom. Pl. t. 19. *Mowah* or *mawrah-tree.*

It yields the well-known *mowah* flowers from which *mawrah spirit* is largely distilled for exportation in Uran, Surat and Poona. Both the ripe and the unripe fruit is eaten by the natives, but perhaps the most important product of this plant is the flower, of which 200 to 400 lbs. are sometimes collected from a single tree. These flowers are always gathered early in the morning, dried in the sun, and then sold as an article of food, being consumed either raw or cooked along with parched grain. Many of those who have gone to Mátherán must have seen the natives at the foot of this hill collecting the flowers of the *mowah* which are much esteemed by them, and indeed during the famine of 1873-74 at Behár they are said to have kept thousands of people from starvation. They have a sweetish smell and taste. The seeds of the *mowah* yield by expression a greenish yellow oil which is used by unscrupulous dealers for adulterating ghee. It is also used in making soap in Kaira. The oil cake is employed for poisoning fish, and when burnt its smoke is reported to be a good insecticide and to kill rats also. The timber is of very fair quality. (*See* Oils and Timber Trees.)

B. longifolia, Dalz. & Gibs. Bby. Fl. 139; Roxb. Fl. Ind. ii. 523. *Ippi, ilupi,* also sometimes named *mowah.*

This is equally useful as the last, and the flowers and seeds are used for the same purposes. Grows at Dhárwár, Malabár, Circárs, Mysore and the Annamallay Hills.

EBENACEÆ.

Diospyrus melanoxylon, Roxb. Fl. Ind. iii. 530.—*D. exculpta,* Dalz. & Gibs. Bby. Fl. 142. *Timburni, temru, tumri.*

This is a middle-sized tree found in various dry parts of India; fruit yellow when ripe, globose, 1-1½ in. across. Pulp yellow, soft, sweet; eaten.

D. Goindu, Dalz. & Gibs. Bby. Fl. 141.—*D. montana,* Roxb. Cor. Pl. t. 48.—*D. cordifolia,* Roxb. (Cor. Pl. t. 50). *Goindu, kundu, temru.*

Common on the ghâts and throughout India. The fruit globose, size of a large cherry, yellow when ripe, is said by Dr. Birdwood to be eaten as fruit.

D. chloroxylon, Roxb. Cor. Pl. t. 49; Fl. Ind. ii. 538; Dalz. & Gibs. Bby. Fl. 140. *Ninai.*

A large tree found at Surat, Násik, Gujarát and Southern India as far as Orissa. Fruit globose, size of a large pea; eaten when ripe.

D. embryopteris, Bedd. Fl. Sylv. t. 60.—*Embryopteris glutinifera*, Roxb. Cor. Pl. t. 70. *Gáb, kusi.*

Common on the hilly parts of Sálsette (*see* Grah. Cat. Bby. Pl.) and in Southern India. The fruit is globose, size of a crab-apple; said by Dr. Birdwood to be eaten as fruit.

Maba buxifolia, Roxb.—*M. nigrescens*, Dalz. & Gibs. Bby. Fl. 142. Ripe fruit is eaten; said to be palatable.

OLEACEÆ.

Olea dioica, Dalz. & Gibs. Bby. Fl. 159. *Parjamb.*

This tree bears fruit about the size of a Spanish olive, and is eaten in curries and also pickled.

GENTIANEÆ.

Limnanthemum cristatum, Dalz. & Gibs. Bby. Fl. 158. (*See* "Wild Herbs and Tubers".)

This is eaten at all times, but specially in seasons of scarcity.

ASCLEPIADEÆ.

Holostemma Rheedei, Dalz. & Gibs. Bby. Fl. 148. *Sidodi.* Leaves and flowers eaten as vegetable.

Sarcostemma brevistigma, Dalz. & Gibs. Bby. Fl. 149. *Sóma.*

A leafless twining plant, common in the Deccan and other dry places. "The plant yields a quantity of milky juice, but of such a mild nature that travellers often suck the tender shoots to allay thirst".—Roxb. Has this juice any intoxicating effect, as stated by some?

Leptadenia reticulata, Dalz. & Gibs. Bby. Fl. 152.—*Asclepias tuberosa*, Roxb. Fl. Ind. ii. 38.

A twining shrub with corky bark. Very common, particularly near the sea. The leaves and tender shoots are used as a vegetable at all times, specially during scarcity.

Ceropegia bulbosa, Dalz. & Gibs. Bby. Fl. 153. *Patalatum bari.*

Common in Bombay and elsewhere. Every part of this plant is said to be eaten by the natives, either raw or stewed in their curries. The fresh roots taste like raw turnips.

Caralluma fimbriata, Dalz. & Gibs. Bby. Fl. 155. *Makarsing.*

A small, fleshy, leafless, cactus-like stem of the thickness of a man's finger with small flowers—white and pink—curiously fringed with hairs at the top of the branches. About Dhárwár, and sparingly scattered over the Deccan. Eaten as a vegetable.

APOCYNEÆ.

Carissa carandas, Dalz. & Gibs. Bby. Fl. 143. *Karanda* (Bomb.)

Food Plants.

Found everywhere in India. The fruit, black, is about the size of a marble, and contains several small seeds. It makes a good pickle when unripe, and tarts and puddings when ripe. Jelly is also made from it, and posted for local sale and exportation. It has to be thrown into salted water a little before being eaten, whereby the taste is improved. Wine is also made in a small quantity at Goa for local consumption.

C. lanceolata, Dalz. & Gibs. Bby. Fl. 143.

The fruit like that of the last; eaten.

C. spinarum, Dalz. & Gibs. Bby. Fl. Suppl. 53.

Said to have been introduced from the Eastern Islands; looks beautiful when covered with its white and bright red fruit. This last is eaten in tarts.

Wrightia tinctoria, Dalz. & Gibs. Bby. Fl. 145. *Kalla-kuda.*

Tender leaves and pods eaten as vegetable.

LOGANIACEÆ.

Strychnos nux-vomica, Dalz. & Gibs. Bby. Fl. 155. *Kajra.*

Common in the Konkan and throughout India. The seeds yield the deadly poison *strychnia*; but "there can be no doubt," says Dr. Birdwood, "that this fruit is commonly eaten in the Konkans for the sake of the pulp enclosing its deadly seeds." The latter are removed, and the pulp alone is eaten.

S. potatorum, Roxb. Fl. Ind. i. 576; Dalz. & Gibs. Bby. Fl. 156. *Gajrah, nirmali.*

A middle-sized tree common all throughout India in the Konkan, Southern Marátha Country and the ghâts. The ripe fruit is eaten; the dry seeds are employed for cleaning muddy water; hence the fruit is known as "*clearing-nut*".

BORAGINEÆ.

Ehretia lævis, Dalz. & Gibs. Bby. Fl. 170. *Tambolli* (Beng.), *paldantum* (Tel.)

The fruit eaten.

Cordia Rothii, Dalz. & Gibs. Bby. Fl. 174. *Gundni* (Hind.)

The pulp of the drupe is viscous, and though insipid is eaten.

C. myxa, Dalz. & Gibs. Bby. Fl. 173. *Bargund, vargund* (Mar.); *lepistán/pistan* (Guj.); *lesuri goduri* (Sind.)

A middle-sized tree, wild and cultivated throughout India. Unripe fruit is eaten pickled and cooked as vegetable. The ripe fruit is eaten by men and birds. The viscid pulp is used as bird-lime.

CONVOLVULACEÆ.

Calonyction speciosum, Dalz. & Gibs. Bby. Fl. 164. *Bániabauri, gulchándri.*

The fleshy peduncles with the unripe seed vessels eaten as vegetable.

Ipomœa batatas, *Batatas edulis*, D. C. Prod. ix. 338. *Ratalu, shakar-kandu* (Dec.)

Very generally cultivated all over India. The tuber is sweet, is eaten as vegetable, and made into sweets. Food Plants.

I. reptans, Dalz. & Gibs. Bby. Fl. 164. *Pan-vel, nari.*

Common on the banks of rivers and borders of tanks. The leaves eaten as a pot-herb.

SOLANACEÆ.

Lycopersicon esculentum, Dalz. & Gibs. Bby. Fl. Suppl. 9. *Love-apple, tomato, wal-wangi* (Bomb.).

The fruit eaten as salad and also made into sauce. Two varieties are cultivated: one with large fruit, size of an orange and marked with several longitudinal depressed lines, and the other the small round variety.

Solanum tuberosum, Dalz. & Gibs. Bby. Fl. Suppl. 60. *Batata, ratala alu.*

Tuber eaten as vegetable. Several varieties of this useful tuber are cultivated throughout India; that produced at Mahábaleshvar in this Presidency was reddish and highly esteemed, but the stock is now deteriorated. The potatoes cultivated lately in Sind are said to be very good.

S. melongena, Dalz. & Gibs. Bby. Fl. Suppl. 61. *Egg-plant, waingi, bengan* (Bomb.), *brinjal.*

This vegetable is extensively cultivated throughout India. There are two chief varieties: one with large oblong fruits more of the form of a cucumber, and the other size of a large orange or larger. The fruits of both kinds are of a fine polished green or more or less deep purple. They are eaten as vegetable variously cooked and made into salads or omolette, prepared by the cavity being filled up with minced meat, or prawns cut into small pieces, etc.

S. nigrum, Linn. Sp. Pl. 266. *Kamuni.*

It is a small annual or biennial plant common in all tropical and temperate parts of the world. The berries, which are black, yellow, or red, are eaten, even in Australia.

Physalis Peruviana, Dalz. & Gibs. Bby. Fl. Suppl. 61. *Cape gooseberry, mako.* (Hind.), *phopti* (Mar.), *chirput* (Goa and Konkan). Found in many places of India. The fruit has an agreeable acid taste, and makes an excellent jam or preserve; used also in tarts.

Capsicum frutescens, Dalz. & Gibs. Bby. Fl. Suppl. 61. *Lalmirchi.*

There are several varieties cultivated in this Presidency.

BIGNONIACEÆ.

Sterospermum xylocarpum, Hook. & Benth. Gen. Pl. ii. 1047.—*Bignonia xylocarpa*, Dalz. & Gibs. Bby. Fl. 159. *Korsing.*

Young pod eaten as vegetable.

PEDALINEÆ.

Sesamum Indicum, Dalz. & Gibs. Bby. Fl. 161. *Gingelly-oil plant, til, krishna-til, barik-til.*

Food Plants.

The roasted seeds are eaten alone or made into cakes and *ladhus* with sugar or *jaggri*. (*See* Oils.)

VERBENACEÆ.

Gmelina aborea, Dalz. & Gibs. Bby. Fl. 201. *Sirvan* or *surni*.

This tree is common.

The drupe is smooth, yellow when ripe, 1 in. long, eaten as fruit.

Chlerodendron serratum, Dalz. & Gibs. Bby. Fl. 200. *Bharang*.

Tender leaves eaten as vegetable.

LABIATEÆ.

Coleus barbatus, Dalz. & Gibs. Bby. Fl. 205. *Garmal*.

The aromatic root is pickled and much used, especially by Gujarátis. Wild and cultivated for the sake of the roots.

C. aromaticus, Dalz. & Gibs. Bby. Fl. Suppl. 66. *Country borage, pathur-chur*.

It is said to be a native of Northern India, but common in gardens. It forms an agreeable addition to the cooling drinks used in the hot season. The leaves, which are very fragrant, are eaten with bread and butter, and mixed with various articles of drink, food or medicine.

Anisochilus carnosus, Dalz. & Gibs. Bby. Fl. 206. *Vanva. Thick-leaved lavender* of the English.

The leaves are used as condiment.

Mentha viridis, D. C. Prod. xii. 168. *Mint, spear-mint, pudina*, or *pahadi-pudina*.

M. arvensis, D. C. Prod. xii. 171. *Pudina*.

Both these species are cultivated in gardens; both, specially the latter, are much used as condiment.

M. piperita, D. C. Prod. xii. 169. *Peppermint, piprimut*.

Cultivated; thrives well in this country, delighting in a good soil and shady place. In habit and general appearance it much resembles the common mint.

Origanum vulgare, D. C. Prod. xii. 193. *Marjoram, marwa, marru, mardakush, sathra*.

This herb is not much used for culinary purposes.

Thymus vulgaris, Dalz. & Gibs. Bby. Fl. Suppl. 67. *Thyme, ipan, hasha*.

Cultivated, but does not thrive well in this country. Used as condiment.

Meriandra Benghalensis, Dalz. & Gibs. Bby. Fl. 66. *Bengal sage*.

Cultivated in gardens. It is a large glaucous shrub resembling much the true sage of English gardens. It has a strong camphoraceous smell when bruised. It is much used in Bengal as a condiment under the name of sage.

Salvia officinalis, D. C. Prod. xii. 264. *Sage, salbia sefakuss*.

Food Plants.

Cultivated from seeds brought from Europe. Used as condiment.

Anisomeles Malabarica, Dalz. & Gibs. Bby. Fl. 210. *Gaozaban* or *gul-i-gaozaban.*

Common at the ghâts. Used as a condiment. The leaves are bitter, and are used as a tonic and against flatulence.

CHENOPODIACEÆ.

Beta vulgaris, Dalz. & Gibs. Bby. Fl. Suppl. 73. *Common-beet, palak, chukandar, chinchinda.*

Much cultivated throughout India. The root eaten as salad. The variety that is deep-coloured is generally held in the highest estimation.

Chenopodium album and its variety, *C. viride*; D. C. Prod. xiii. S. 2-70. *Chakwit.*

These are cultivated throughout India and eaten as vegetable.

Spinacia oleracea, Dalz. & Gibs. Bby. Fl. Suppl. 73. *Common spinach, palak, isfanaj.*

The herb is eaten as vegetable. Two varieties are cultivated, the smooth-seeded with round leaves, and the prickly-seeded with triangular leaves.

Arthrocnemum Indicum, Dalz. & Gibs. Bby. Fl. 212 *Machur.*

The herb is common in salt-ground, and is sold in the bázár; it is eaten pickled, or as a pot-herb.

Basella alba; B. rubra, Dalz. & Gibs. Bby. Fl. Suppl. 73. *Myal-ke-baji, nal-chi-baji,* or *yal-chi-baji.*

A twining plant with succulent red or green stems and leaves.

Cultivated by people of this country against their dwellings. The leaves and tender stalks used as a pot-herb much in the way of spinach.

AMARANTACEÆ.

Amaranthus paniculatus, Dalz. & Gibs. Bby. Fl. 215.—*A. frumentaceus*, Roxb. Fl. Ind. iii. 699. *Cahola-baji.*

An erect stout annual with greenish-coloured striated stem 5-6 ft. high, the foliage and inflorescence assuming a reddish hue.

Common everywhere. Leaves eaten as vegetable. It is cultivated in some parts, chiefly for the flour of its seeds, which is a much prized article of food.

A. tristis, Dalz. & Gibs. Bby. Fl. 215. *Chulai.*

Common; wild and cultivated. It resembles *A. campestris.* Leaves and young shoots eaten.

A. oleraceus. *Tandulja, tambri-mat.*

Described in Dalz. & Gibs. Bby. Fl. 216 under the name of *Euxolus* with its varieties *A. viridis, A. giganteus*, etc., is wild and cultivated throughout India. Leaves eaten.

A. spinosus, Dalz. & Gibs. Bby. Fl. 216.

A weed common in gardens. Leaves eaten.

A. polygonoides—**Amblogyna** of Dalz. & Gibs. Bby. Fl. 218.

Food Plants.

Stem about 1 ft. high. Young shoots and leaves eaten.

Celosia argentea, Dalz. & Gibs. Bby. Fl. 215. *Kudhu.*

An annual herbaceous plant common throughout India in the rainy season. Leaves and young shoots eaten.

Mengea tenuifolia, Dalz. & Gibs. Bby. Fl. 218.

A common weed; used as a pot-berb.

POLYGONACEÆ.

Rumex vesicarius, D. C. Prod. xiv. 70. *Chuka-ke-baji, chuka, ambari-chucka.*

The herb eaten as garnish.

Fagopyrum esculentum, D. C. Prod. xiv. 143. *Buck-wheat.*

Native of Nepaul, Assam, Kumaon; cultivated in the Deccan, where the grain is eaten roasted as a fast-day food by Hindus.

MYRISTACEÆ.

Myristica Moschata or **M. officinalis**, Dalz. & Gibs. Bby. Fl. Suppl. 75. *Nutmeg-tree, jaya-phala, jayapatri* (the aril).

A native of the Moluccas and other eastern islands where it is much cultivated for the sake of the well-known spicy arils of its fruit. It has been successfully reared at Sion and Poway and in other places, but does not thrive well away from the sea-coast. The aril is only used as a spice.

M. Malabarica, M. attenuata, Dalz. & Gibs. Bby. Fl. 4. *Maya-putri* (arillus); *mayaphala, ran* or *jungli jayaphala.*

These two trees, indigenous to the forests of the Konkan and Malabár, furnish what is known as Malabár nutmeg.

M. tomentosa of Penang also furnishes a nutmeg which is substituted for the above.

LAURACEÆ.

Cinnamomum Zeylanicum, D. C. Prod. xv. 1-13. *Taj, dalchini.*

This is the true cinnamon tree, a native of Ceylon and naturalized in Bombay and the Konkan, and may be recognized by its thick, opposite, oblong, coriaceous leaves, pale beneath, 3-nerved at the base, terminal lax panicles, silky, 6-fid perianth, of which the lobes during a time fall off near the base, the remaining part being persistent, 9 antheriferous, stamens of which 3 have a pair of glands at the base, 3 staminodes, and small oblong, ½ in. long fruit, black when ripe.

The bark used as condiment. (*See* Oils.)

Persea gratissima, D. C. Prod. xv. 52; Dalz. & Gibs. Bby Fl. Suppl. 75.

The *alligator* or *avocate pear* of the West Indies, indigenous in South America, introduced in India. It is a tree 30-40 ft. high, grows in gardens at Belgaum, has paniculate greenish white flowers, and a pear-shaped fruit 3-4 in. long. The fruit produced in this

Presidency is not very delicate. It is said that in the West Indies and in tropical America the fruit is eaten raw, or as a vegetable. Food Plants.

ELÆAGNACEÆ.

Elæagnus latifolia, Wight. Icon. t. 1856.—*E. conferta*, Dalz. & Gibs. Bby. Fl. 224. *Nargi, ambgul.*

A large climbing shrub with ovate leaves, shining and silvery beneath and green above. The fruit succulent, rather acid, which when boiled and sugared is not unpalatable. When ripe it is pale, red or yellow, size of a damson. It has a single stone marked with 8 prominent ribs.

EUPHORBIACEÆ.

Phyllanthus emblica, Bedd. Fl. Sylv. t. 258.—*Emblica officinalis*, Dalz. & Gibs. Bby. Fl. 235. *Avala.*

Often grown in gardens for its small acid fruit which makes pretty good pickle. The unripe fruit eaten raw or pickled, also used as medicine for dyeing and tanning. It is known in commerce as emblic myrabolan.

Syn. **Cicca disticha**, Dalz. & Gibs. Fl. Suppl. 78. *Harfarori, narphala, cherambola, rose avala* (Goa).

Cultivated in gardens. This plant produces a small, yellowish, white fruit, marked with several longitudinal lines, which is used for pickle. The fruit being sour is not fit to be eaten raw, but makes a good compote when cooked and sweetened.

Securinega obovata, Bedd. Fl. Sylv. 197.—*Fluggea virosa*, Dalz. & Gibs. Bby. Fl. 236.

The fruit is eaten; but being poisonous, not safe to eat.

S. leucopyrus, Bedd. Fl. Sylv. 197.—*Fluggea leucopyrus*, Dalz. & Gibs. Bby. Fl. 236.

Fruit eaten.

Antidesma diandra, Dalz. & Gibs. Bby. Fl. 237. *Ambli.*

Found throughout India, at Vengúrla, etc. The drupe small, of a pleasant acid taste; is eaten as fruit. The leaves, which are also acid, are made into chutney.

Briedelia retusa, Bedd. Fl. Sylv. t. 250.—*B. montana*, Dalz. & Gibs. Bby. Fl. 233. *Phatar-phor, assana.*

A common tree with or without thorns. The fruit globular, succulent, size of a pea, black when ripe, is sweet and edible.

Aleurites moluccana, Bedd. Fl. Sylv. t. 276.—*A. triloba*, Dalz. & Gibs. Bby. Fl. Suppl. 76. *Akhrut* (Bomb.), *Belgaum walnut, hijlibaddam.*

The nut is roundish, size of a walnut, and like it has a good flavour.

Trewia nudiflora, Dalz. & Gibs. Bby. Fl. 231. *Petari.*

A large tree with long-petioled, heart-shaped leaves, resembling those of *Thespesia populnea*. The drupe depressed, globose, 1 in. diam. The pulp under the rind is sweet and edible.

Jatropha manihot, Dalz. & Gibs. Bby. Fl. Suppl. 77.

Food Plants.

The *tapioca, mandioca* and *cassava plant* introduced by the Portuguese in Goa, and has thence spread into gardens, and is extensively cultivated in Cochin, Travancore, and throughout Southern India. Birdwood quotes the following from Monardes and Piso:—

"The rasped root mixed with water, boiled and fermented, yields a liquor called *cassiri*. Cassava meal is obtained by subjecting the grated root to pressure to express the juice, and then drying and pounding the residual cake. Of this meal cassava-bread is made. The expressed juice by repose deposits the farina called cassava starch or tapioca. A sauce called cassareep or cassireepe is made from the juice."

The juice of the root is poisonous, and is said to be used by South Americans for poisoning their arrows. This poison, known as mandioca poison, is obtained by distillation, although it can only be expelled by the roots being roasted or boiled. Cases are reported of people being poisoned by incautiously eating the root before it is properly baked or boiled. The tapioca is a nourishing food, and affords a light diet for sick people. Cassava flour is also nourishing, and many poor people in Travancore and Southern India use it as food during the rainy months when rice is scarce and dear.

URTICACEÆ.

Artocarpus integrifolia, Dalz. & Gibs. Bby. Fl. 244. *Jack-fruit-tree, jaca, panas.*

This tree is found in most parts of India producing about the largest known fruit, which is of two kinds—*ghilla* or the soft, and *kajja* or the hard kind, the latter being very generally preferred. The two varieties are known here and in Goa as *rassal* and *kappa*. It is said that a thick jelly-like substance of an agreeable melon-like taste can be made by boiling the pulp in fresh milk and straining the whole. The seeds, roasted or boiled, are eaten, and are as good as chestnuts. The unripe fruits and seeds are eaten as vegetable.

A. incisa, Dalz. & Gibs. Bby. Fl. Suppl. 79. *Bread fruit tree.*

A handsome tree producing a large oval fruit much like the preceding, though smaller in size. It has got its name from its resemblance when roasted to the crumb of a fresh loaf.

A. Lakoocha, Dalz. & Gibs. Bby. Fl. 244. *Diphal* (Beng.), *watlam* (Goa).

The ripe fruit eaten, and the unripe fruit cut into slices, used in curries, or dried and kept for use as kokam.

Ficus carica, Dalz. & Gibs. Bby. Fl. Suppl. 80. *Common fig, anjir.*

The fig tree is cultivated almost all over India. The fruit, which is of the size of a small apple, is sweet. That growing in Bombay is superior in quality to that found at Poona and other places. This plant is easily propagated.

The ripe fruit of *Ficus glomerata, umbar*; *F. cordifolia, pair*, and other wild fig trees are eaten. The tender shoots of *F. infectoria* are eaten in curries.

Morus Indica, Dalz. & Gibs. Bby. Fl. Suppl. 80. *Tul* or *tula, ambor.*

Generally cultivated for its leaves, which are used to feed the silk-worm. The fruit eaten.

M. alba, Dalz. & Gibs. Bby. Fl. Suppl. 80. *Tut, tukhu.*

Cultivated in Cashmere and many other parts of India. The leaves of this tree are chiefly used for feeding the silkworm. The fruit, of which there are many varieties—white, purple and black, acid and sweet—is eaten.

PIPERACEÆ.

Piper nigrum, Dalz. & Gibs. Bby. Fl. Suppl. 84. *Miri, kala-miri.*

Denuded of its outer covering it is called *safed-miri* (white pepper). Terete, woody stems rooting from the lower nodes, coriaceous, alternate, petioled, broad-ovate leaves, cordate, 5-ribbed at the base with 2 strong ones arising from the mid-rib immediately above these, monœcious or diœcious spikes arising opposite the leaves. 2 anthers, 5-6 stigmas, and a sessile fruit size of a pea. The part used in commerce is the dry wrinkled fruit employed as a condiment and in medicine. It is cultivated throughout India from the earliest ages and in this Presidency from Sind up to Dhárwár, and over some of the ghâts. The fruits of the following plants are said to be substituted for true pepper :—*Nigela sativa ; Zantoxylon Badrunga ; Z. Rhetsa ; Vitex negundo* or *bicolor ;* and *Myrtus communis.*

The pepper vine is indigenous to Malabár and Travancore, and is now cultivated throughout India, Malay Peninsula, Java, Sumatra and West Indies. The plant is propagated by being planted on a rich soil near the trees on which or bamboo poles it is made to climb. It attains the height of 20-30 ft., but is usually kept down.

Pepper is one of the spices earliest used by mankind, it having for many ages been the staple article of trade between Europe and India. It was known to be of two kinds (black and long) to Theophrastus who flourished in the fourth century, and in the time of Pliny the long variety used to be sold for 15, the white for 7, and the black for 4 *denarii* the pound. It began to be more generally used in Europe during the Middle Ages, and was the "very symbol of the spice trade to which Genoa, Venice and the commercial cities of Central Europe were indebted for a large part of their wealth ; and its importance as a means of promoting commercial activity during the Middle Ages, and the civilizing intercourse of nation with nation can scarcely be overrated."

Piper betle, Dalz. & Gibs. Bby. Fl. Suppl. 84. *Betel-leaf plant, pán.*

Scandent shrub rooting at the lower nodes, leaves alternate, membranous ; bract ovate, cordate, 7-ribbed at the base with 2 more ribs rising immediately above these, from the mid-rib, spikes half a foot long arising opposite the leaves, and a globose fruit size of a pea.

It is cultivated throughout India, and in various places in this Presidency, but that which is produced in Poona, Sátára and above the ghâts is preferred. A large quantity is brought down from these places to

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Bombay. It is chiefly consumed here, and partly exported to Karáchi. The leaves are used as a masticatory folded with powdered cardamom, chalk, and areca-nut. They are carminative and stomachic, and assist in promoting digestion. In Sátára and Poona the betel-vines are planted near the roots of *Melia azadarach*, *Moringa pterigosperma* and *Sesbania Ægyptiaca* over which they are made to climb. Besides giving support these trees afford the necessary shade, which is much needed for their successful cultivation. Bamboo posts are also used for support.

LORANTHACEÆ.

The fruits of several parasitic species belonging to this order contain sweet mucilage, which is chewed by hill people.

O. arborea, Wall.

SANTALACEÆ.

Syn.

Osyris Wightiana, Dalz. & Gibs. Bby. Fl. 223. *Popli, Belgaum lotal.*

This large shrub is common on the ghâts. Drupe sub-globose, ¼ in. long; red when ripe, sweet and very pleasant.

GNETACEÆ.

Gnetum scandens, Dalz. & Gibs. Bby. Fl. 246. *Kumbal, kumbli, umbli.*

A stout scandent shrub, common in the ghâts, Khandála, Mahábaleshvar, etc. The red fruit and the seeds are said to be eaten.

SCITAMINEÆ.

Musa paradisiaca, Linn. Sp.—*M. sapientum*, Dalz. & Gibs. Bby. Fl. Suppl. 88. *Common plantain, banana, khela.*

Cultivated throughout the tropics. Of this plant there are several varieties, all producing fruits of a peculiar pleasant taste which are designated by the general name *plantain*. The ripe fruit denuded of its rind is often cut in longitudinal slices and dried in the sun, and kept in well-covered jars to be used at desert. The dried plantain is an article of commerce in Bombay and many parts of India. An excellent jelly is made varying in consistency according as it is wished for immediate use or to be preserved for a length of time. In Mauritius, West Indies and South America the fruit dried in the sun is reduced to powder, and this powder is given as a light, nourishing food to infants and invalids. It is stated that the banana is highly nutritious, and equally with the potato is fitted to sustain the strength of the human body. The flowers, unripe fruit, tender spathes and spadix eaten as vegetable.

Zinziber officinale, Dalz. & Gibs. Bby. Fl. Suppl. 87.

The fresh root is called *alch* or *alem, adu, adrack*; the dry root *sunt* or *sunta*. A small, annual, reed-like plant with distichous radical leaves.

It is indigenous to Asia, and is now cultivated throughout India, tropical America, Africa and Queensland in Australia. It is planted in May or beginning of June, and the produce is gathered in the following February and March or earlier. The tuberous roots form the *alch* of commerce, and are used as condiment.

Curcuma longa, Dalz. & Gibs. Bby. Fl. Suppl. 87. *Halad* or *halada, haldi.*

Is indigenous to Southern India, and is now cultivated in various parts of the country, and used as condiment or for dyeing. In Gujarát and Kaira it is planted towards the end of May, and yield from 60-300 maunds (of 26 lbs. each) per *bigah*. The *halad* of commerce is the tuberous root roasted to dryness in ovens.

C. Angustifolia, Dalz. & Gibs. Bby. Fl. 274. *East Indian arrowroot plant, tickar.*

It is an annual plant springing up at the beginning of the rains. Bulbs with oblong tubers hanging from the fibres; leaves narrow, lanceolate petioled; striated with fine longitudinal lines, petioles 6-10 in. long; spike radical, 4-6 in. long, crowned with a coma of purple bracts, flowers yellow, large, expanding in the morning and fading at sunset. It grows wild in various parts of India, Travancore, Nagpore, etc., and in Bombay at Rám Ghát.

This species is said to yield a portion of what is called *Travancore arrowroot*. There is no doubt that curcuma arrowroot (known in this country as *tickar*, and to Europeans as *East India arrowroot*) is extensively manufactured in Southern India, specially in Cochin, Travancore and Kánara, but in a very rude manner, the granules resembling much those of *Marantha arundinacea*, which is also cultivated in India, and in fact what is called *tickar* arrowroot is often the produce of the latter plant, or curcuma starch mixed with that of cassava or tapioca plant.

There exists much confusion regarding the curcumas yielding *tikars*. Royle says:—

"The pendulous tubers of *Curcuma rubescens*, *C. leucorrhisa*, and *C. angustifolia* yield a very beautiful fecula or starch which forms an excellent substitute for the West Indian arrowroot, *Marantha arundinacea*. It is sold in the bázárs of Benares, Chittagong and Travancore, and eaten by the natives; a very excellent kind called *tickar* is also made at Patna and Boglipore from the tubers of *Batatas (Ipomœa) edulis*."

Drury thus describes the mode of preparing arrowroot at Travancore:—

"The tubers are first scraped on a rough stick, generally part of the stem of the common rattan, or any plant with rough prickles to serve the same purpose. Thus pulverised the flour is thrown into a chatty of water, where it is kept for about two hours; all impurities being carefully removed from the surface. It is then taken out, and again put into fresh water, and so on for the space of four or five days. The flour is ascertained to have lost its bitter taste when a yellowish tinge is communicated to the water, the whole being stirred up, again strained through a piece of coarse cloth, and put in the sun to dry. It is then ready for use.—Roxb. Pers. Obs."

C. caulina, Dalz. & Gibs. Bby. Fl. 275. *Chowar.*

Large bulb with oblong tubers pendulous from the fibres. Leaves 12-20 in. long, upper alternate, short-petioled, frequently tinged red. Scape leafy, 2-3 ft. high. Coma of white bracts. Flowers yellow.

Very common at Mahábaleshvar. First described by the late Mr. Graham of the Bombay Civil Service.

Curcuma caulina grows at Mahábaleshvar abundantly, and for many years the Chinese ticket-of-leave men used to manufacture arrowroot from it, and sell it to the Commissariat, and in the bazárs at Bombay. In 1878 a European prepared a few hundred pounds of it, and sent samples to be tried by Messrs. Treacher & Co., Phillips & Co., and Kemp & Co., but it was

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found wanting in nutritive properties, though no objection was made to the colour and taste. That it is inferior to West Indian arrowroot, may be gathered from its market value, 5 to 6 lbs. to the rupee.

During the famine of 1877 it was recommended to the suffering poor, but they never used it except in extreme scarcity.

The preparation of arrowroot at Mahábaleshvar is simple. The root (of which a cooly will gather 4 or 5 large basketsful a day for as many annas) is scraped, washed and rubbed to pulp on a grater, as mortars are found to crush the globules. The pulp must then be washed no less than a dozen times at least, the sediment being stirred at each washing. The dark scum on the sediment and the muddiness of the water of the first washing slowly disappear, till when the sediment is pure white it is allowed to harden into a cake, which is afterwards reduced to powder. A basketful of roots yields 3-4 lbs. of pure arrowroot.

C. pseudo-montana, Dalz. & Gibs. Bby. Fl. 275. *Sinderwani, sinderbur, sindelwan, hellounda.*

Bulb oblong with round, small, potato-like tubers, hanging from the fibres. Leaves including the petiole 2-3 ft. long, narrow at both ends, 6-19 in. broad in the middle, quite green. Coma of a beautiful dark-rose colour, waved. Flowers yellow; appear in September.

This plant, which was first described by Mr. J. Graham, is common in the Konkan, where it arises at the beginning of the rainy season. The tubers, which are perfectly white inside, are boiled and eaten by the people during seasons of scarcity. Perhaps this plant, too, yields a part of East India arrowroot; that which comes from Ratnágiri is manufactured from its tubers.

Elettaria cardamomum, Maton.—*Alpinia cardamomum*, Roxb. Fl. Ind. i. 70; Cor. Pl. t. 226. *Ilachi, Malabari-elachi, cardamom.*

A perennial plant with erect jointed stem, 6-12 ft. high. Leaves lanceolate, acuminate 1-2 ft. long, on long sheathing petioles. Flowers greenish-white, alternate, short-peduncled on lax, flexuose, horizontal scapes 6-18 in. long, which are thrown out in number of 3-4 close to the ground. Capsule oval, 3-sided, 3-valved, smooth. Seeds numerous, angular, dark.

The cardamom plant grows wild in the Anamallay, Cochin and Travancore forests, and in Kánara, and is also cultivated there as well as in Wynaad, Coorg, etc. There occurs in Ceylon a plant described by some authors as *Elettaria major* which yields a fruit elongated in form and larger in size. This is a mere variety of *E. cardamomum*.

The seeds are used as condiment, a carminative in medicine, and chewed along with areca-nut and betel leaf. It is said that Ceylon cardamom is much used in Russia, Germany, Sweden and Norway for flavouring cakes and for the manufacture of liqueurs.

ORCHIDEÆ.

Eulophia herbacea, Dalz. & Gibs. Bby. Fl. 265.

A small plant with a potato-like root found in the Konkan and Himalaya.

This orchid, *E. campestris*, and probably some others are said to be the source of the best *salep* of India. Dr. Royle believes that *E. vera* yields the best salep of this country.

There are sold in the bázárs, under the name of *banavatisalem*, an imitation of salep tubers made of wheaten flour. There are also sold another kind of tubers, or rather pseudo-bulbs, under the name of *badassahisalem* the source of which is unknown. It is very cheap and a poor substitute for true salep. There are in Europe and Asia many orchids with tubers more or less large, capable of yielding salep. The following species are some of those which have been actually tried :—*O. maculata ; O. saccifera ; O. latifolia ; O. conopsea; O. longieruris ; O. ustulata ; O. mascula, etc.*

Salep is extensively used as a nutritive substance and a tonic, specially of the sexual organs, though it is very dear. The powdered salep is not easily mixed with water : for preparing a sort of conjee or decoction powdered salep must be first stirred with a little spirit of wine, water must then be added, and the whole boiled. The proportions are—salep one drachm, spirit 1½ drachm, and water half a pint. Natives boil the powder in a large quantity of water till the latter is reduced to half the quantity by evaporation.

Vanilla planifolia, Andr.—*V. aromatica*, Dalz. & Gibs. Bby. Fl. Suppl. 85.

It is a plant striking roots on the trunks of trees on which it is made to climb, with fleshy leaves and large green flowers and obscurely triquetrous pod, size of a small finger.

It is indigenous to the Tierra Caliente of Mexico, but now generally cultivated throughout the tropics of both the New and Old World. In Bombay it was introduced about half a century ago by the late Colonel Jervis. It grows vigorously at Siwri, where it has been re-introduced by a graduate of Grant Medical College, Mr. Furdoonjee, and at Goa by Mr. M. R. de Quadros in his plantation at Sáttári. It has been also introduced on a large scale in the Mauritius, and from 1867 in the French colony of Réunion. For the effects of vanilla which has been made to climb the trunk of *Jatropa curcas*, see the general observations made at the beginning of this chapter.

Vanilla is chiefly used for flavouring chocolate, ices, creams and confectionery in general.

IRIDEÆ.

Crocus sativus, Royle Ill. Himal. Bot. t. 90. *Safran, kessar* or *kesari*.

It is a small beautiful crocus, with a fleshy corm, grassy leaves, purple flower, with 3 large orange-brown stigmas on a thread-like style.

This crocus is supposed to be indigenous to Greece, Asia Minor and perhaps Persia, but is now cultivated throughout the world—Cashmere, China, France, Spain, Austria, United States, etc.

The part used consists of the styles and stigmas which have a powerful aromatic odour, and when rubbed on moistened fingers leave an orange yellow tint. Saffron is extensively used in this country in religious ceremonies and flavouring and colouring sweets, rice, and food in general.

It is believed to be antispasmodic and emmanagogue, and is employed in native medicine. Saffron is also used as condiment in Austria, Germany, some districts of Switzerland, etc. It is said that in Cornwall the practice of colouring cakes and other sweets with it is still prevalent.

Food Plants.

TACCACEÆ.

Tacca pinatifida, Roxb. Fl. Ind. ii. 172.

Root tuberous, often as large as a child's head, round, smooth. Leaves radical, long-petioled, large, 3-partite; divisions pinnatifid down to a narrow wing with irregular acute segments; in fact, they resemble those of *Amorphophalus campanulatus*. Flowers greenish in a dense umbel, subtended by several leafy bracts, and numerous long drooping filiform filaments or barren pedicels. Stamens 6, inserted at the throat of the perianth, with coloured filaments and mushroom-like peltate stigma. Ovary inferior, one-celled, with three parietal placentas. Fruit baccate, globose, as large as a plum.

Grows on Warli and Parel Hills in Bombay, and throughout the Konkan (*see* Grah. Cat. Bby. Pl.); also in the Malay Archipelago. Cultivated at the Mauritius. Roxburgh says that an excellent starch is obtained from the tubers. In Otaheite, where the plant also grows, bread is made of the starch.

DIOSCOREÆ.

Dioscorea sativa, Dalz. & Gibs Bby. Fl. Suppl. 92. *Godri.*

Stem cylindrical, unarmed, twining. Leaves long-petioled, deeply cordate-ovate, membranous, 7-9 nerved, often bearing green globular bulbs in their axils. Male spikes simple or panicled, 1-2 in. long. Flowers very small; female flowers in longer single fascicles. Capsule oblong. Seeds winged at the lower end.

Wild and cultivated in India and the Archipelago; also cultivated in the West Indies, Australia and Mauritius.

D. aculeata, Dalz. & Gibs. Bby. Fl. Suppl. 92. *Kanta, kangia,* or *kangi* (Goa); *botat* of the Bombay bázárs.

Tuber oblong, about 4-5 in. long and 2 in. in circumference. Stem terete, armed, twining. Leaves alternate, cordate, acuminate, 7-9 nerved. Male flowers whitish panicled; female in simple lax spikes. Capsule very broad.

This yam grows in very good soil to a very large size; white and mealy, and is much appreciated.

D. alata, Roxb. Fl. Ind. ii. 797. *Kam-alu, yam* of the English

Stem 4-winged or angular, twining. Leaves opposite, deeply-cordate-ovate, or cordate-oblong, devoid of pellucid lines, 9-nerved; the exterior pair united; petiole slightly winged. Male and female flowers in compound spikes. Capsule leathery, elliptical. Seed winged.

Wild in the Konkan, and cultivated throughout India, West Indies, etc. Tubers oblong and white; much esteemed. Said to be among yams the second best.

D. globosa, Dalz. & Gibs. Bby. Fl. Suppl. 92. *Chopri-alu, safed kan-phal.*

Stem twining, 6-winged. Leaves alternate and opposite, cordate, sagitate. Flowers whitish; male in long compound spikes; female in simple spikes.

Native of Bengal and cultivated throughout India. Tubers round, white, most esteemed of all yams amongst both natives and Europeans.

D. oppositifolia, Dalz. & Gibs. Bby. Fl. 247. *Mar-paspoli.*

Stem round, smooth, glabrous, twining. Leaves petioled, mostly opposite, oval-oblong or lanceolate, acute, waved, 3-7-nerved. Flowers distant, male in axillary clustered or panicled spikes; female, few, distant, in simple racemes. Capsule 3-winged. Seeds also winged all round.

Common on the Bombay ghâts and throughout India, Kassia, Ceylon and China. The tuberous roots are eaten by the natives of this country.

D. pentaphylla, Dalz. & Gibs. Bby. Fl. 247. *Ulsi, kanta-alu.*

Stem furrowed, prickly; prickles twin. Leaves digitate 5-divided, membranous; segments oblong-acuminate, cuspidate. Male flowers numerous, greenish-white and very fragrant, female flowers in short axillary twin simple spikes.

Common in the Konkan, on the ghâts and throughout India. Tuber rather large, oblong and white; esteemed by the natives as wholesome and palatable. The male flowers are also eaten, and said to be wholesome; they are sold in the bázár during the rainy season.

D. bulbifera, Dalz. & Gibs. Bby. Fl. 247 under the name of *Helmia bulbifera. Hadu-karanda.*

Stem round, smooth. Leaves alternate, scattered, cordate-ovate, or sub-rotund, membranaceous, cuspidate, glabrous, 9-nerved, bearing in the axils brown, globose, scabrous bulbs; male spikes axillary, simple, about 5 together, or compound panicled; female spikes about 3 together longer than the leaves. Capsule oblong, smooth.

Common in this Presidency. Both the tuber and the bulb are eaten. All plants of the yam tribe contain an acrid bitter principle, but this is reduced to a minimum under cultivation. After undergoing the process of roasting, steeping in cold water, and boiling, both the tubers and the bulbs become eatable. The best mode of cooking *yams* is, after the tuber has been boiled, to cover it with hot ashes for half an hour or more. Natives of this country steep the tubers, cut into slices in cold water, and then boil and cook them with various spices and other vegetable.

LILIACEÆ.

Smilax ovalifolia, Dalz. & Gibs. Bby. Fl. 246. *Guti wail.*

A large prickly climber with orbicular or ovate-lanceolate leaves, 5-8 in. long and 5-7 nerved, and numerous umbels of flowers.

Common in the Konkan and Deccan. The tender shoots are eaten as a vegetable by the people at Mahábaleshvar.

Allium cepa, Dalz. & Gibs. Bby. Fl. Suppl. 92. *Common onion, piaj* (Hind.), *kandá* (Bomb.)

The bulb eaten as a vegetable and as garnish.

A. sativum, Dalz. & Gibs. Bby. Fl. Suppl. 92. *Common garlic, lasun.*

Cultivated throughout India; in this Presidency in the irrigated lands of the Konkan and Deccan. The root consists of several small what are called cloves, which are used as condiment.

Food Plants.

A. porrum, Dalz. & Gibs. Bby. Fl. Suppl. 92.

This is not much cultivated in this Presidency

Asparagus officinalis. *Common asparagus, chard, nagdown, haliyun.*

The young shoots eaten; said to be inferior in taste to what is grown in Europe. Hakims use the fruit as a tonic and diuretic.

Asparagopsis sarmentosa, Dalz. & Gibs. Bby. Fl. 246. *Catavari, satavari.*

Root oblong, fleshy, tuberous. Stem much branched, climbing, armed with small recurved prickles; branches grooved. Leaves narrow linear. Flowers small, white in racemes. Berries red when ripe. Wild and cultivated in gardens.

It is largely used in native medicine as a nervine tonic said to be efficacious in the debility of the seminal organs and in pulmonary consumption.

Phalangium tuberosum, Dalz. & Gibs. Bby. Fl. 251. *Kali.*

This is a small plant, springing up at the beginning of the rains in the Konkan and Deccan with numerous roots, each terminated by an oblong tuber and white flowers in racemes or panicles.

The whole herb is eaten; it is sold in the bázárs. The tubers are also edible.

BROMELIACEÆ.

Ananassa sativa. Described in Dalz. & Gibs. Bby. Fl. Suppl. 94 as *Bromelia ananas. Common pine-apple, annanas* (Bomb.)

Naturalized in several parts of India from a remote period, and much esteemed for its delicious fruit, of which there are several varieties. To make the pine-apple ripen sooner, the crown should be plucked out, which also adds to the flavour.

PALMÆ.

Cocos nucifera, Dalz. & Gibs. Bby. Fl. 279. *Cocoa-palm, mahad, nárel.*

The nut is used in various ways. The kernel, which is enveloped by a hard shell, enters into nearly all culinary preparations, such as curries, sweetmeats, etc. The cabbage or tender leaf when boiled is a delicate vegetable. It is also eaten raw, pickled, or made into conserve.

Borassus flabelliformis, Dalz. & Gibs. Bby. Fl. 278. *Palmyra palm, tad, tadi.*

This palm yields a large black fruit containing a gelatinous pellucid pulp called *tad-gollah* in Bombay about the size of an ordinary orange, sometimes larger. The unripe fruit is sometimes pickled, and makes a good conserve. The tender leaf is a good vegetable. The fusiform roots are also eaten by very poor people. Young plants, 2-3 months old, are sold in Bombay under the name of *tárla*, and form an important article of food. (*See* Brandis about the manufacture of sugar.)

Food Plants.

Phœnix sylvestris, Dalz. & Gibs. Bby. Fl. 278. *Wild date palm, kajuri.*

Leaf bud or cabbage and ripe yellow fruit are eaten. The tree is common in Gujarát, Konkan, Bengal and Madras, and is highly esteemed on account of its juice called *toddy*. This is extracted by removing the lower leaves with their sheaths and cutting a notch into the pith of the tree near the top. The juice issuing from this notch is conducted by a small palm-leaf channel into an earthen vessel placed to receive it. Toddy is abundantly used by the natives as a cooling beverage, being sweet and like the water from a tender cocoanut; it is converted by a process of boiling into sugar, or distilled after allowing it to ferment into a kind of inferior spirit called *arak*. The tree begins to yield toddy towards the age of 7-10 years, the trunk being then about 4 ft. high, and continues to do so for about 25 years. The juice is extracted from November to February, each tree yielding during that period 180 pints on an average. Twelve pints of toddy can be converted into one of jaggri, and 4 of this into a pound of sugar, so that each tree produces annually between 7-8 lbs. of sugar, which being inferior in quality to cane-sugar sells usually for three-fourths the price of the latter.*

P. dactylifera, Roxb. Fl. Ind. iii. 786. *Date palm, kajúr.* The fruit *tamara, rajib, nakel, kurma, chuara.*

This is the common date palm. Is very high, attaining 100-120 ft. Indigenous to the lower part of the Euphrates and Tigris, Dooab, Arabia, Syria and Palestine, and the great African Sahara. It is now cultivated in Spain, Italy and Greece. In India it is cultivated but sparsely; it is, however, self-sown in Sind, Multán, Muzaffurgurh, Bundelkund, etc.

The ripe fruit forms an important article of food of the people of Arabia, Palestine, etc., and is largely consumed in Bombay, where it is known by the name of *tamara*. In Sind it is called *khurma* when collected ripe, and *chuwarar* or *chuárá* where removed before it is fully ripe and boiled and dried in the sun. In the Punjáb the produce of the best palm is named *chirni*; this is usually split in the middle and dried in the sun. The inferior varieties are named *pind* and *bujri*. The large, tender, succulent head of the palm, named *gaddah, gari* or *galli*, is also eaten like cabbage. Indian dates are smaller and less sweet than those imported from Arabia.

Areca catechu, Dalz. & Gibs. Bby. Fl. Suppl. 95. *Betel-nut, areca palm, mádi, phopali* (Goa and Southern Konkan).

This palm is extensively cultivated in low shady land in Goa, Kánara and Sunda for the sake of its fruit called *suppari*, which is exported to other parts of India. The kernel is chewed with *betel-leaf, chunam* and *cardamoms*.

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* See *Ph. sylvestris* in the next section.

Food Plants.

AROIDEÆ.

Colocasia antiquorum, Schot. Milit. i. 18. *Kachu? alu, terém.*

Stemless. Leaves radical, more or less peltate-ovate, shortly acute at the apex, cordate at the base, with a broad sinus, often above 1 ft. long; primary veins about 4-5 on each side of the mid-rib, pedate at the base of the leaf. The tube or convolute base of the spathe ovoid-oblong, usually about 1½ in. long, neutral portion shorter or nearly equal; the male portion almost twice longer; the terminal appendage acute, varying in length or obsolete. Stigmas sub-sessile.

This excellent *arum* varies in the size of its leaves, and the length of its spathes, spadices and appendage. Is endemic in India, but cultivated throughout the tropical and sub-tropical regions of both worlds, in India, Spain, Portugal, Meridional Italy, Sicily, Greece, Creta and Cyprus, Egypt and tropical America. It is described under various names—*Arum colocasia, A. esculentus, Alocasia illustris, Colocasia Acres, C. Tontanesii.* The common variety found in India is the one described by Roxburgh under the name of *Arum nyphæfolium.* He says: "I doubt if this can be reckoned anything more than a large aquatic variety of *colocasia.* In Bengal it is rarely cultivated, but found wild in abundance on the borders of the lakes and pools of fresh water. Every part of this plant is eaten by the Hindus. The root or rather the subterraneous stem often grows to the length and thickness of a man's arm. The petioles, scapes and leaves are of a reddish colour, and the plants considerably larger than any of the varieties of *colocasia* just mentioned, yet the leaves are narrow in proportion to their breadth. The only good specific mark to know it from *colocasia* by, is the shortness of the club of the spadix. Every part of this plant, variously prepared, is eaten."

Amorphophallus campanulatus, Dalz. & Gibs. Bby. Fl. 259. *Suran.*

Root tuberous, spheroid, as large as a cocoanut, covered with dark-brown skin externally. Leaves radical, few; lamina 3-fid, lateral divisions dichotomous, the central and the secondary lateral ones pinnatifid; segments obliquely-oblong, acuminate, unequal; petiole round, smooth or verrucose, light green with dark-green spots. Spathe large, leathery, convolute, infundibuliform at the base, membranaceous and patulous at the upper portion, purplish towards the curved and undulating margin. Spadix about as long as the spathe; female portion cylindric, male ob-conic, a little shorter than the female; appendage dark-purple, conical or sub-conical, lobate, rugose, sinuose. Flowers appear long after the leaves.

Wild on the banks of the streams in the Konkan and various other parts of India, Ceylon, Sumatra, Java, Moluccas, Timor, New Guinea, Taiti. Cultivated throughout India for the sake of its tuber, which affords good wholesome food to millions of this country. It contains an acrid principle which is removed by steeping the sliced tuber for a sufficient length of time in water.

Pinellia tuberifera, Schot. Prod. A. 20.

Under the name of *ziravandmudhiraj* there are sold in all the bázárs in India small tubers of various sizes, from a pea to a betel-

nut, round or depresso-globose, light reddish colour. These arise from the inferior third of the petiole of the above plant which is indigenous in China and Japan. They are starchy, and possess nutritive properties. They are sold here in India as the produce of *Aristolochia rotunda* with which they have nothing to do.

Typhonium bulbiferum, Dalz. & Gibs. Bby. Fl. 258.

Growing in the Konkan and Malabár, and *Amorphophallus bulbiferous*, described by Roxburgh under the name of *Arun bulbifera*, indigenous to Bengal also yield bulbs, but they are not stated to be edible.

THYPHINÆ.

Typha elephantina, Roxb. Fl. Ind. iii. 366. *Elephant grass, ramban*, or *rámbana* (the arrows of Rám).

A large, reed-like, marsh and aquatic plant. Stem smooth, round, 6-12 ft. high. Leaves linear, ensiform, smooth, 4-6 ft. long, ¾ in. broad, parallel veined, sheathing at the base. Flowers unisexual, very closely packed in separate spikes; the upper spike terminal, cylindric, about a foot long and 1 in. in circumference, 2-3 in. above the female spike; anthers yellow with green top, which gives to the spike a greenish appearance; filaments filiform surrounded by very thin hair. Female spike about as long and thick as the male. Each ovary is surrounded by a calyx consisting of fine capillary hairs. Fruit oblong, one-seeded.

Grows on the margins of tanks and slow-running rivers in the Konkan and Deccan. It is said that *buri-bread* is made in Sind from the pollen of this plant. Elephants are very fond of the leaves; they are also used for thatch by the poor people.

It is called *pauna-grass* in Sind, and is of great importance for binding the soil on the banks of the Indus with its long tortuous roots of which great care is taken when the culms are cut down to make matting of. They are tied in bundles and used like sedges *(Spargium ramosum)* in England as buoys to swim with.—Grah. Cat. Bby. Fl.

ALISMACEÆ.

Aponogeton monostachyum, Dalz. & Gibs. Bby. Fl. 248; Roxb. Cor. Pl. t. 81.

Root bulb-like tuber, covered with the remains of the old leaves and emitting fine roots from the base. Leaves radical, mostly submerged, long-petioled, linear, oblong, or lanceolate, acuminate or obtuse at the apex, cordate or round at the base, entire, smooth, 3-7-nerved, 3-6 in. long, ½-¾ in. broad; scape as long as the leaves. Flowers hexandrous in densely packed terminal spikes. Perianth segments of 2 obovate, concave, membranous divisions. Fruit ovoid, smooth, tapering into a short, recurved point, 1-celled, 2-8 seeded.

In the tanks of the Dhárwár and Belgaum districts and throughout India. The tubers are starchy, and eaten as a vegetable.

Food Plants.

CYPERACEÆ.

Scirpus kysoor, Dalz. & Gibs. Bby. Fl. 288. *Kacherá.*

Root tuberous, size of areca-nut. Culm 5-6 ft. high, triangular hispid. Leaves broad-linear, acuminate, sheathing at the base as long as the culm. Umbil supra decompound, many-flowered, erect, leaflets of the involucre from a few inches to 1-2 ft. long. Spikes brown-coloured. Fruit oblong, bristles 5, oblong.

Common in Sálsette and Thána and throughout India, on the margins of tanks and rivers. The tuber is sold in Bombay, and is eaten by all classes here, in Sálsette, Ahmadabad, etc. It is sweet and starchy.

GRAMINEÆ.

Paspalum scrobiculatum, Dalz. & Gibs. Bby. Fl. Suppl. 97. *Kodra, kodri, harick.*

Root fibrous, culm tufted, 2-3 ft. high; nodes 3-4, glabrous, brown. Leaves bifarious, smooth. Sheaths terete, nearly as long or longer than the internodes. Spikes usually 2-4 alternate, 1-4 in. long. Rachis flat-keeled. Spikelets shortly-pedicellate, or sessile, imbricate, glabrous in 2 rows, ovoid, orbicular, flat.

Wild and cultivated in the tropical regions of the Old World. In India it is chiefly sown in the mountains, dry barren regions, and the grain forms the food of the poor people. It is said to be as palatable as rice, but occasionally it induces symptoms of intoxication like those caused by the seeds of datura. For further information see remarks at the beginning of this chapter.

Panicum miliaceum, Dalz. & Gibs. Bby. Fl. Suppl. 98. *Small-millet, wadi, sawa, chenah, sama, varika, unu.*

Culm erect, much tufted, very hairy, 2-4 ft. high. Leaves broad, very hairy, sheathless. Panicles nodding, much divided. Spikelets numerous, very small, ovoid, pedicellate. Fruiting glume (palea) smooth and shining, the outer glume acute, 3-nerved, the next two glumes broad, 7-11-nerved, acute. This is the common millet cultivated throughout India over the ghâts and the Mediterranean coast.

Panicum (Setaria) Italicum, Dalz. & Gibs. Bby. Fl. Suppl. 98. *Kangu, kángni, rala, rawla, bertia, kakun, keraij, kerakang, chena, kora* (Dec., Hind. and Beng.)

Culm tufted, erect, smooth, round, 3-5 ft. high. Leaves very broad, hispid, sheaths hairy at the mouth. Panicle much branched, cylindrical, stout, at length nodding at the summit; branches usually contiguous, oblong. Fertile floret minutely dotted at length smooth. Bristles at the insertion of the spikelet 1-3 roughened upwards, usually much exceeding it.

Cultivated throughout the hilly parts of India and other tropical regions. This is the Italian millet of the Europeans.

P. frumentaceum, Dalz. & Gibs. Bby. Fl. Suppl. 98. *Shamula, kathi, kangra, sawa, sawwa, saon, shama* (Dec., Hind. and Beng.)

Food Plants.

Culm erect, 2-4 ft. high, flattish, smooth. Leaves large with hispid margins. Panicle erect, oblong, nodding; spikes numerous, secund, incurved, occasionally verticelled. Rachis angular, sparingly hairy. Flowers almost always 3 from the same point, unequally pedicelled. Glumes 3-nerved, the two large empty glumes with shorter awn than the lowest glume; the flowering glume awnless. Fruit ovoid, pointed.

Wild and cultivated through India in and near the ghâts and also in Africa. The grain is said to be wholesome and nutritious and is used chiefly by poor people inhabiting the hills. Cattle is said to be very fond of it.

P. pilosum, Dalz. & Gibs. Bby. Fl. Suppl. 98. *Arzan, bhadli.*

Erect or ascending, pilose, bearded at the nodes and mouth of the sheaths. Leaves lanceolate or linear acuminate, round at the base. Panicle spreading; rachis pilose with scattered hairs; branches numerous. Spikelet ovate, glabrous. Empty glumes 3-5-nerved. Fertile flowers ovate, pointed, smooth. This small plant is also cultivated over the ghâts.

There are other grains sold in the bázárs of India named *nella-shama, nella-shamalu, barti, dandiy, rali, shallu, sundia, kunki,* the botanical sources of which are not ascertained. They are supposed to be varieties of the millets already described.

Millet grain is largely used in India, China, Africa and in some parts of Europe. It is said to be very nutritious. Parkes says that "millet bread is very good, and some was issued to the troops in the last China expedition. This should always be done in a millet country if wheat or barley cannot be obtained. In Northern China millet is almost exclusively used."

These observations are equally applicable to bájri, jowári and náchni, which are also included by European authors under the name of millet.

Ponicillaria spicata, Wild. described in Dalz. & Gibs, Bby. Fl. Suppl. 98 under the name of *Holcus spicatus. Bájri, bajera, bajra, sazgaran.*

This is extensively cultivated in Khándesh, Gujarát, Deccan and throughout India and Africa. It does not grow in the Konkan and other low lands, but the grain is largely imported there and used by the poor people instead of rice, which costs them more.

Saccharum officinarum, Dalz. & Gibs. Bby. Fl. Suppl. 99.

This useful plant is cultivated thoughout the tropics of both hemispheres. The varieties introduced in Bombay are numerous; the chief are—

1. The large yellow or Mauritius cane.
2. The common red.
3. The Bamani or striped red and white.
4. The small white or reed cane.
5. The black Egyptian variety. This is quite equal to the Mauritius variety, but has disappeared.

Food Plants.

The Mauritius cane was introduced into this country by Government, but it is found that it requires more water, and is more liable to be eaten by jackals and porcupines than the red Indian variety.

The plant is cultivated throughout the tropics, China, etc. Nowhere found wild.

Sorghum vulgare, Pers., described in Dalz. & Gibs. Bby. Fl. as *Holcus sorghum. Jowári, joar, jondla, kangra, jaundri* (*karbi* dry culm and leaves).

This grain is extensively cultivated in the Karnátic, Berárs, and throughout the hilly parts of India for the sake of its grain, which forms the staple food of millions of this country, and for the sake of the fodder (in its fresh and dried state called *karbi*) which is given to cattle of all kinds. For the latter purpose it is often so cultivated as to cause more the development of the culms and leaves.

Sorghum saccharatum, Dalz. & Gibs. Bby. Fl. Suppl. 99. *Shalu, devdhan.*

Cultivated throughout India in the rainy and cold seasons.

Oryza sativa, Dalz. & Gibs. Bby. Fl. Suppl. 98. *Chaul, bhat, tandul.*

This is the common rice plant cultivated in both hemispheres. It is stated that about fifty varieties are cultivated in India; the large grain is preferred by most of the working people, who find it more substantial. It is not known, however, whether this variety contains more of the nitrogenous principles, nutritive fat and salts. Parkes says:—

"The whole grain (paddy) deprived of the husk is sold as rice. There are many varieties of different colours (white, red, brown?) and composition. The amount of nitrogenous matter varies greatly from 3 to 7·5 per cent. of the moist grain. As an article of diet it has the advantage of an extremely digestible starch grain, and like the other cereals there is a great admixture of substances; it is, however, poorer in nitrogenous substances than wheat, and is much poorer in fat: consequently among rice-feeding nations leguminous seeds are taken to supply the first, and animal and vegetable fats to remedy the latter defect. Rice is also poor in salts."

Rice with or without the husk is called on this side of India *chaul* and *tandul*. Boiled rice is the *bhat* of some, and *dhan* and *sit* of others. In its wild state rice is known in some places as *nivari* and *uri*. A rice field is generally sown twice in the year, the most fertile soil for this cultivation being land periodically inundated by rivers, nálas, etc., which carry with them much fertilizing matter. At first rice is sown thick, and then transplanted in between five to six weeks, the whole time from the planting to the reaping being from 2 to 2½ months.

Zea Mays, Dalz. & Gibs. Bby. Fl. Suppl. 100.

This is the common *Indian corn* known to people in this country as *bhutá, maká*. It is indigenous to America, and now cultivated extensively in India and throughout the tropics. In Bombay it is grown at the beginning of the rains for the sake of the grain which is roasted and eaten, and in the hot season (beginning of March) to

afford fodder (called *khadol*) for cattle; for the latter purpose it is sown very close so as to cause the development of the leaves.

This Indian corn is very nutritious; it contains a large quantity of fat (6 to 7 per cent.). The gluten cannot be washed out as in wheat. It should be well cooked before being eaten, otherwise it is liable to cause diarrhœa. The bread is said to be palatable and nutritious.

Eleusine coracana, Dalz. & Gibs. Bby. Fl. Suppl. 97. *Náchni, nagli, ragi, mand, marna, marha, kangra.*

This is extensively cultivated on the ghâts and in the plains to about 20 miles inland and also in Egypt and South America. It is transplanted like rice and is a very productive crop.

The flour is baked into bread, and boiled and drunk as gruel either alone or with chillies. Said to be very nutritious, even more so than wheat. The grain is indestructible, and can be preserved for more than fifty years in dry grain pits.

"This is the most prolific of the cultivated grasses, forming the chief diet of the poorer classes in some parts of India as Mysore, Northern Circars and slopes of the ghâts. Roxburgh says "he never saw it in a wild state." "A fermented liquor is prepared from the seeds, called *bojah* in the Marátha Country."

Avena sativa, Dalz. & Gibs. Bby. Fl. 97. *The common oat.*

This is pretty extensively grown in many parts, principally in Northern India; also near some of the more southern European stations like Poona. It is much used for feeding horses, but is apt to give rise to chronic cough and huskiness, as it contains much more of the paleaceous element than the European oat. Hence the preference shown by many to gram. Parkes says:—

"Oats have been considered even more nutritious than wheat or barley, and certainly not only is the amount of nitrogenous substance great, but the proportion of fat is large. Unfortunately the nitrogenous substance has no adhesive property, and bread cannot be made; the amount of indigestible cellulose is large. But on the other hand, oatmeal has the great advantage of being very readily cooked, much more so than wheat or barley.

"The late researches of Kreusler show that the nitrogenous substances of oats contain *gliadin*, and especially *gluten-casein*. This last substance is called "avenin" by Norton and Johnstone; it approaches very closely the legumin of peas and beans, and is so called by Retthausen. In nutritive principles it causes oatmeal to stand nearer to the *Leguminosæ* than the other cereals do. It contains double as much sulphur as the legumin of peas."

For this reason and because it contains much nutriment in a small bulk, can be eaten for long periods with relish, and keeps unchanged for a long time, it would seem to be an excellent food for soldiers during war, an opinion which does not lose in force when we remember that it formed the staple food of one of the most martial races on record, the Scotch Highlanders, whom Jackson considered also one of the most enduring races. Formerly when oats were badly cleaned, intestinal concretions of the husk and hairs were common among those who lived on oatmeal, but these are now uncommon. It has been thought to be "heating" when taken continually, but this is probably a prejudice.

Bambusa arundinacea, Dalz. & Gibs. Bby. Fl. 299. *Vansa* (Sans.), *mánga, máns, bans, tokar.*

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This is the tallest bambu, attaining a height of 30-50 ft. and a diameter of 4-8 in. Culm green, shining and spinescent. Grows in Poona, Malabár, etc.

B. vulgaris, Dalz. & Gibs. Bby. Fl. 299. *Kalaka* or *bámbu*.

Culm unarmed, 20-50 ft. high, green or greenish-yellow. Cultivated in Sátára and various parts of India.

Dendrocalamus strictus, Brand. For. Fl. 569.—*Bambusa stricta*, Dalz. & Gibs. Bby. Fl. 299. *Bans, bás, bassa, vassa.*

Culm armed or unarmed, straight, strong and elastic, with a small cavity or none; attains 20-40 ft. in height. Common throughout India.

Arundinaria Wightiana, Brand. For. Fl. 561.—*Bambusa arundo*, Dalz. & Gibs. Bby. Fl. 299. *Chevari.*

It is a small thorny bambu 6 to 12 ft. high; grows at higher ghâts. Walking sticks are made out of this for sale at Mahábaleshvar.

Bambus flower once in about 30 to 32 years, and when such an occurrence takes place the whole tract extending over many miles is in full flower; it sometimes happens, however, that only a few bambus of a cluster flower each year, when the flowering goes on every succeeding year with the other bambus of the cluster. The variety *Arundinaria Wightiana*, however, flowers and dies down annually, when new shoots spring up from the roots and attain their full size in a single season. Both in this variety and in others, the flowering is followed by the death of the stems, so that after seasons of general flowering a whole district presents for some time the spectacle of a large forest of dried up clumps. The product of the flowering of the bambu is a rice which is consumed by the poorer people in lieu of common rice. A very palatable bread is said to be made of the flour of this rice, although the colour of it is somewhat dark.

In the scarcity of 1812 in Orissa, of 1864 in Kánara, and of 1866 in Malda this rice formed the principal article of the food of the poor population: hence perhaps the belief, entertained by some Government officials, that the bambu only flowers in seasons of general scarcity.

From the young tender bambu shoots pickle and preserves are made which are considered very palatable by the natives. The sliced shoots are also made into dishes.

There are other uses to which the bambu is put. Of the *Bambusa arundinacea*, which attains a height of from 60 to 80 ft. and a diameter of 6 to 8 in. and is by far the most important of the several varieties, many uses are made. It supplies poles for carrying purposes, tents, scaffolding, timber rafts, &c., and is used, besides, in the manufacture of furniture and for ladders, fencing, mats, baskets, fishing rods, window and door blinds and for many other useful purposes. The next in importance is the *Dendrocalamus strictus*, which grows from 20 to 40 ft. All this growth is attained in a single season. This bambu is solid and elastic, and is much

used for roofing purposes and making shafts for spears, besides several of the purposes mentioned previously. Mr. Lethbridge says that all the varieties of bambus are capable of being employed in the manufacture of paper.

Triticum æstivum, Dalz. & Gibs. Bby. Fl. Suppl. 97. *Gium, ghawn, mar-ghum, ghawut-ghum.*

This is the common wheat cultivated throughout India. It does not grow below the ghâts, as neither the soil nor climate suit it. There are several varieties known in the Presidency, such as *kaple, baksi*, etc. Both these are sown in irrigated lands; that which is raised in higher ghâts is said to be proportionally heavier than that raised in the plains. The Indian wheat produced in Northern India is of late largely exported to Europe, where it fetches very good prices.

This grain is an article of diet, and is consumed all over the world; it is rich in nutritive principles and easily digestible. The nitrogenous substances are in large and varied proportions, consisting of soluble albumen (1 to 2 per cent.) and gluten (8 to 12 per cent.). The starchy substances, including sugar, are also in large proportions—60 to 70 per cent., and are easily digested. Wheat, however, is deficient in nutritive fat and salts.

Hordeum hexastychon, Dalz. & Gibs. Bby. Fl. Suppl. 96. *Jow, satu, jáb.*

This is the common barley cultivated throughout India in the cold season; alluvial soil suits it best. On this side of India it is much cultivated and consumed in the north of Gujarát and in the Deccan. In the latter place it is said to be also grown as an offering to the gods.

It is very nutritious and like wheat contains a large proportion of nitrogen and other nutritive principles, and the Greeks trained their athletes on it. Dr. Pereira says that it is rather laxative, and hence not suited to such as suffer from relaxation of the bowels. For gruel country raised barley is superior to "pearl" and other kinds imported from Europe, because it is fresh.

"According to Bretschneider barley is included among the five cereals which, it is related in Chinese history, were sowed by the Emperor Shen-nung, who reigned about 2700 B.C.; but it is not one of the five sorts of grain which are used at the ceremony of ploughing and sowing as now annually performed by the emperors of China."

FAMINE PLANTS.

WILD HERBS, TUBERS, etc., USED AS FOOD DURING SEASONS OF SCARCITY.*

NOTWITHSTANDING the efforts made by Government to inquire into and study the various plants used as food by the natives of India during seasons of drought, it is curious to find so many errors in the various reports that have been published on this subject—plants and vegetables that are eaten all the year round in ordinary times being sometimes included in the list of famine foods. The officers who were employed on relief works during the last famine in some districts of the Bombay and Madras Presidencies, having for the first time seen natives using certain wild herbs naturally enough concluded that these were resorted to for want of ordinary food, or, in other words, that they were famine plants. It is a difficult task for a single man, howsoever long he may have resided in this country, to obtain an accurate list of all the food-grains and vegetables eaten by the natives of India during ordinary seasons and those of scarcity. Hence the most intelligent of these officers do not appear to have steered clear of such mistakes, and I particularly remember a certain gentleman who once belonged to the covenanted service of this Presidency and whose goodness of heart led him to constantly mix himself up with and inquire into the wants, habits and customs of the poor natives in the districts he happened to be located, asking me the question "Do the natives eat *tackla (Cassia tora)*? it has such a disagreeable smell." Now the natives use this plant not only during famines, but almost all the year round, specially at the commencement of the rainy season; they also partake of it made into "*shak bâji*" on every Monday of the month *Shrâwan*. The question was, therefore, one that much surprised me, the more so that the gentleman referred to, besides his particular interest in the natives, was himself a botanist. I have compiled a list of fruits and vegetables used by the people of this country which contains names that, I am sure, have never been heard by many Europeans and I will make bold to say by even a large majority of the natives, especially those who live in large towns. It is a fact, however, that even well-to-do natives eat some of the wild herbs found in or about their villages, either as a change, or as an addition to their meals, or when a supply of good cultivated vegetables is not procurable; nay many of them make a point to use, at least once a year, made into *shak bâji*, herbs and tubers usually eaten by the humbler classes, whether cultivated or uncultivated,

* This paper was read at one of the meetings of the Bombay Branch Royal Asiatic Society.

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which appear successively in each season of the year, under the belief that such a proceeding assists in warding off the various causes of disease.

It is to be regretted that we have no chemical analysis of the various food-grains and vegetables eaten by the natives, nor is there any reliable information as to the knowledge which guides them in the selection of one species and the rejection of others, though all belonging to the same genus and order. This knowledge is perhaps the result of the accumulated experience of bygone generations. Afflicted by periodical droughts, subjected to persecutions by native princes whose armies plundered their fields during the intestine wars which were in past times very frequent, the people were driven from home to distant secluded places and hills for shelter and refuge. Here they must have learnt, from want of their ordinary food, to use various herbs, and must also have acquired the knowledge of the fact that the seedlings and tender stalks of almost every plant are wholesome; nay that even poisonous roots and tubers, if properly boiled, may be eaten with impunity.

Almost all the species of plants belonging to the order *Aroideæ* are more or less poisonous: some, like *Lagenandra toxicana*—*Vatsumb* of the Maráthás, etc., are deadly poisonous. They contain an acrid principle which is said to be destroyed by the application of heat, or by the mere drying of the aroids. During the late famine in Madras and the Southern Marátha Country thousands of people were seen to live upon tuberous roots and leaves of some aroids known to be poisonous. It is believed that the boiling or stewing process these herbs were subjected to prior to being eaten, destroyed their deleterious principle, and thus the tubers, etc., became innocuous, or rather wholesome food. With the exception of these the plants in the list below contain neither acrid nor poisonous principles; nay many of them are, I believe, used at all times of the year, though in small quantity, mixed with other food; but are they all equally nutritious? Cultivated pulses are known to be very nutritious, some of them coming up, in the quantity of nutrient principles they possess, to the best cereals. In the late famine people were seen at Kaládgi, Sholápur, Ahmednagar and elsewhere to use the seeds of *Abutilon muticum*, *Indigofera linifolia*, *I. cordifolia*, *I. glandulosa*, *Alysicarpus rugosus*, etc., which were ground and made into cakes or conjee either alone or mixed with the flour of *bájri*. The analysis of Surgeon-Major Lyon has shown that all these seeds contain a large quantity of nitrogenous and carbonaceous principles,—some quite as much as the best of cultivated pulses,—in fact, it would appear that cultivation increases the cellulose of certain pulses at the expense of their nitrogen. But it does not follow from this that the wild grains above mentioned are easy of digestion, for it was a common complaint that the people who had lived on them alone had become lean, and weak, and suffered from bowel disorders, due perhaps to the fact that large quantities had to be eaten to satisfy the wants of the system, which could not be digested. And if these were the results of eating such pulses as were just referred to, it is not difficult to imagine what results would follow upon the prolonged use of such gritty grain as that of *Tribulus terrestris*, *Cyanotis cæspitosa*, and others which, although containing a fair proportion of nitrogenous principles, cannot be easily assimilated.

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In order that a substance, vegetable or animal, may be wholesome or useful as an article of food, it is necessary that it should contain principles, nitrogenous and carbonaceous, in due proportion, and in such a state of combination that they may be easily separated, disintegrated and digested in the stomach. It is a fact that many of the plants in the list given below contain less of nutritive principles and more of woody tissue, gummy and resinous substances and various extractive matters which are neither digestible nor nourishing; they may be palatable to the taste and temporarily appease the craving of hunger, but their exclusive use for a lengthened period brings on decay and emaciation, and renders the constitution an easy prey to disease. This assertion is not based on theory alone. Numerous facts observed during the famines in Orissa, Behar, Madras and Southern Marátha Country prove that the protracted use of such herbs alone, even of *tackla*, *muchur*, etc., which are used in ordinary seasons in small quantities along with other food, was followed by emaciation and other symptoms of slow starvation such as anæmia, scurvy, etc., often proving fatal by inducing diarrhœa, dysentery, dropsy of the whole body, or of the abdomen alone.

Man whether asleep or awake, whether in a state of rest or actively engaged in the multifarious duties of life, is perpetually undergoing an imperceptibly slow process of disintegration. To put it clearer, every action in his life, from the involuntary one of breathing to that which demands the largest amount of physical or mental energy, causes the waste of a certain amount of muscular and nervous substance in the shape of nitrogen and carbon which exist in the various organs and tissues of the body and the loss of which has to be made up by food. It has been calculated by eminent authorities that a healthy adult excretes as much as 140 to 180 grains of nitrogen a day when at rest, the proportion of carbon excreted being placed by some at 4 and by others at as much as 7 times the quantity of nitrogen. In ordinary labour about 300 grains of nitrogen are excreted, the quantity lost under great physical exertion of many consecutive hours reaching as much as 5 to 600 grains. It is upon a knowledge of these facts that the dietaries of jails, hospitals, barracks and like establishments are based; for it is clear that, unless the quantity of food taken in contains enough of nitrogen and carbon to make up for the waste the body has undergone, the latter must prey upon itself so long as there is anything left to prey upon, and then die. This is exactly what happens when the food taken into the body is deficient either in quantity or in the elements that compose it. The diets of our jails are calculated to provide 200 to 300 grains of nitrogen daily, and care is taken to supplement these when necessary by meat, vegetables, &c., to prevent the body falling into a low condition incompatible with the exertion it has to undergo. The staple-food of the natives in India is rice, which contains between 70 to 80 grains of nitrogen per pound. An ordinary labourer would, therefore, require about 3 pounds per day of rice to keep his body at its working standard. Any great deduction from this quantity might perhaps suffice to maintain a state of feeble vitality for a certain length of time, but it admits of no doubt that before long the system begins to suffer the effects of starvation. This was well exemplified by the effects of what is now

historically known as the one-pound ration of Sir Richard Temple during the famine of 1876-78. Such as were strong enough to resist the immediate effects of hunger for some time, even when afterwards well fed and taken care of, were found to be suffering from diarrhœa, dropsy, &c., from which nothing subsequently cured them, the tissues engaged on the process of assimilating food having from lack of sufficient nourishment undergone a degenerative process which unfitted them for their work. Famine Plants.

There is another way in which the wild herbs and tubers mentioned below are said to affect injuriously those who eat them. In the presidential address delivered before the Grant College Medical Society in 1878, in speaking of the causes of leprosy, I said the following :—"Some attribute it to deficiency of salt in the food of the poor people of this country, and to the use of *dall*. The proportion of common salt existing in the blood is very great, and absolutely necessary for the due performance of various vital processes. The experiments made by Boussingault show that the addition of salt to the fodder of animals has no influence in the quantity of flesh, fat, or milk obtained from them, but it appears to have a favourable effect on the appearance and quality of the stock. After detailing his experiments he says :—'The hair in the oxen which had got salt was smooth and shining ; that of the other which had no salt added to their fodder, was matted, and the skin here and there devoid of hairs. Those of the first lot, on the contrary, retained the look of stall-fed beasts ; their liveliness and frequent indication of a desire to leap contrasted strikingly against the heavy and cold temperament observed in those of the second lot. There is no doubt'—continues Boussingault—'that a higher price would have been obtained in the market for the oxen reared under the influence of salt.' Baron von Leibig (from whose Letters on Chemistry the above extract is taken,) after remarking how the constitution is lowered by deficiency of salt in food and thus becomes liable to be easily attacked by various morbific agents, says: 'Many agriculturists have, however, drawn very different conclusions from these experiments (Boussingault's). As addition of salt yields to them (the farmers) no profit, since by the outlay in salt nothing is gained in flesh, they conclude that salt is of no use whatever ; nay these experiments have actually been abused as proofs and arguments against the reduction of the *impost on salt*,—of all taxes on the Continent that which is the most odious, the most unnatural, and the most disgraceful to human nature. We may here see that more wisdom is displayed in the instinct of an ox, or a sheep, than in the arrangement of him, who, strange to tell, often regards himself as the image of Him who is the perfection of all kindness and of all reason.' You all know that the high tax on salt imposed by the Indian Government falls chiefly and heavily on the poor population. The Government is desirous of abolishing or reducing it, and we must hope that the time of its remission will soon arrive. The poor population of India generally uses as articles of food various wild and uncultivated herbs mixed with cultivated grain and pulses ; but during scarcity and famine it lives entirely on the former. In this kind of food some find the cause of leprosy. I have examined all the wild vegetables said by the Government officers to be used by the poor natives, and have

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found that the greater number of them must be of easy digestion and all innocuous; but it remains to be ascertained if the prolonged use of these substances can exercise any influence in engendering some morbid state of constitution; and if in times of scarcity good legumes are mixed with diseased grain, etc. It is a fact that all pot herbs, grains, pulses and tubers contain less salt: for example, potatoes and spinach cannot be eaten without salt; perhaps uncultivated leguminous vegetables, which by themselves are innocuous when eaten for a long period without being seasoned with a proper quantity of salt, may lead to deterioration of the nutrient fluid of the human body, ending ultimately in the production of the disease. Dall, good or diseased, may be noxious for the same reasons. This opinion does not appear, however, to have been based upon well-observed facts.

The following list, collected some four years ago is now with a few additions and corrections, brought before the Society, in the hope that it may not be deemed to be wholly uninteresting and that it may be useful in inducing such of the members as have opportunities of adding to it; for besides the plants below mentioned, there are many others which famine-stricken people make use of,—in fact, it would appear that they devour whatever more or less tender vegetable substances they come across, provided they are not either very acrid or bitter."

POLYGALEÆ.

Polygala chinensis, Hooker Fl. of Brit. Ind. i. 204.—*P. arvensis*, Roxb. Fl. Ind. iii. 218; Dalz. & Gibs. Bby. Fl. 12. *Negli* (Mar. and Hind.)

An annual diffuse leafy plant 3-10 in. high. Leaves orbicular or linear. Flowers small, yellow.

It grows in the Konkan, but is common in Sholápur, Poona and other high dry situations. The young leaves are eaten with salt, chillies, and other condiments. Said to be pleasant to the taste, and perfectly wholesome.

This is one of the herbs sent from the Kaládgi District to the Bombay Secretariat. Its identification, however, is doubtful.

MALVACEÆ.

Abutilon muticum, Hook. Fl. Brit. Ind. i. 327.—*A. tomentosum*, Dalz. & Gibs. Bby. Fl. 18. *Chakrabenda* (Bombay name).

An annual or perennial plant, 4-6 ft. high, with large leaves, tomentose on both sides, large yellow flowers and globose capsules.

Grows at Surat, Poona, Sátára, Kaládgi, Sholápur and throughout India, Ceylon, Afghanistan and tropical Africa. The seeds are said to be highly nutritious. They were ground and made into cakes either alone or mixed with jowári flour. Sometimes they were boiled and drunk in the form of conji.

Hibiscus tiliaceus, Roxb. Fl. Ind. iii. 192.—*Paritium tiliaceum*, Dalz. & Gibs. Bby. Fl. 17.

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The bark abounds in mucilage, which is sucked by natives of West Indies in times of scarcity. The inner bark yields excellent fibre which is made into cords, ropes, whips and mats. This plant is cultivated in gardens and is found wild in Ratnágiri and Tiracol and in many other parts of India.

Eriodendron anfractuosum, Dalz. & Gibs. Bby. Fl. 22.—*Bombax pentandrum*, Roxb. Fl. Ind. iii. 165.

A very common prickly tree with palmate leaves and dingy white flowers. Capsule oblong, like cucumber, contains numerous pyriform black seeds. These are roasted and eaten. The cotton surrounding the seeds is only used for stuffing pillows and cushions.

STERCULIACEÆ.

Byettneria herbacea, Roxb. Cor. Pl. 29; Fl. Ind. i. 619; Dalz. & Gibs. Bby. Fl. 23.

A small unarmed herb not uncommon all over the Konkan, Kárnatic and Orissa; pretty common in Bombay during the rains. Its corolla resembles that of *Guazuma tomentosa*, petals yellow outside and red within. Capsule the size of a pea, 5-lobed, and covered with small prickles. Leaves used as a pot herb. I suspect that the plant identified as *Polygala chinensis* is *B. herbacea*

Guazuma tomentosa, Dalz. & Gibs. Bby. Fl. Suppl ii.

A middle-sized tree, widely planted in Bombay and in the warmer parts of India. Capsules 1 in. oblong, covered with obtuse black tubercles, are filled with mucilage which being agreeable to the taste are chewed. The glutinous mucilage of the bruised bark is employed for clarifying sugar. It is often obtained for the purpose by boiling the bark. The wood is light and loose-grained, and is used for furniture and by coach-builders for panels.

TILIACEÆ.

Corchorus trilocularis, Roxb. Fl. Ind. ii. 582; Dalz. & Gibs. Bby. Fl. 25. *Kaunli* (Sans.), *tandassir* (Kan.).

Annual herb with small yellow flowers and angular and scabrous capsules. It is found in Gujarát, Sholápur and other high dry ranges.

Corchorus olitorius, Roxb. Fl. Ind. ii. 581; Dalz. & Gibs. Bby. Fl. 25. *Jute.*

Very common everywhere. It is eaten as a pot herb in Aleppo and Egypt, but not in India so far as my inquiries go. I am, however, informed that some natives of this country do eat it.

LINEÆ.

Erythroxylon monogynum, Roxb. Cor. Pl. t. 88; Fl. Ind. ii. 449.—*Sethia Indica*, Wight. Ill. t. 48. *Tavádrum, semmenatty, davádaoor.*

This is a large shrub or a small tree; it grows in hilly dry parts of Madras and Ceylon. Leaves and young shoots used as green. They are said to have afforded food to many thousand people dur-

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ing the late famine in Madras. The *Indian Agriculturist*—Edit. Notes, 1877—says thus regarding this plant:—

"This plant belongs to the same genus as the South American which yields the substance called *coca*. This coca is used as a masticatory by the native races on the Western Coast of South America, and produces a stimulating effect on their nervous system, banishing care, allaying the pangs of hunger, and enabling those under its influence, to endure great fatigue without any other sustenance. The Indian plant is nearly allied to the coca, and possesses some of the specific properties of that plant. It would appear very strange that the famine-stricken natives of India, like their brethren of the new world, should have resorted to this particular plant when there is nothing either in the appearance, taste, or texture of the leaves of the Indian plant likely to induce hungry men and women to eat them in preference to the leaves of any other plant common in the district. Experience has, no doubt, taught them that they have the power of mitigating the pangs of hunger and acting as a stimulant."

The virtue of the leaves is due to the presence of an alkaloid *cocaina* which in small doses is strongly stimulating, and produces a feeling of intoxication; in fact, it resembles in its action opium administered in small doses. Dr. Lindley in his Flora Medica, page 200, says that the leaves are "a powerful stimulant of the nervous system, affecting it in a manner analogous to opium. Less violent in its effects than that drug, but more permanent in its action. The Peruvians chew the leaves with finely powdered chalk, and the Government of Potosi alone derived a revenue of as much as 500,000 pesos duros in the year 1583 from their consumption."

The revenue has since increased to a considerable extent. We have no information whether the leaves of the Indian species contain the alkaloid in sufficient proportions to produce similar effects. Observations are wanting in this respect. Probably *cocaina*, if really present, must exist in very small quantity, for people use the leaves and tender stalks as green and not as a masticatory.*

Tribulus terrestris, Dalz. & Gibs Bby. Fl. 45. *Gokhrū.*

It is a small humifuse plant, branches 1-2 ft. long. Flowers yellow. Fruit angular, prickly. Common in Káthiáwár, Gujarát and the Deccan and all over India in hot dry places. The herb is eaten as pot herb. The hard seeds are also gathered and reduced to powder, are eaten baked into bread; but they are indigestible, hard and brittle.

GERANIACEÆ.

Oxalis corniculata, Roxb. Fl. Ind. ii. 457; Dalz. & Gibs. Bby. Fl. 42. *Amru* (Hind. and Beng.), *ambuti* (Dec.)

The leaves of this very common weed are eaten as salad at all times, but much procured in seasons of drought.

MELIACEÆ.

Melia azadirachta, Roxb. Fl. Ind. ii. 394.—*Azadirachta Indica*, Dalz. & Gibs. Bby. Fl. 36. *Nim.*

* For further information see Pharmaceutical Journal for 1879 and 1880 and Markman's "Peruvian Barks" in which he details his own observations and numerous facts collected from various sources.

The ripe fruits are eaten, as they contain a small quantity of sweetish pulp.

SAPINDACEÆ.

Cardiospermum Halicacabum, Roxb. Fl. Ind. ii. 292; Dalz. & Gibs. Bby. Fl. 34. *Naphatki.*

An annual climbing plant with small white flowers and an inflated mebranaceous capsule. Very common in hedges. Leaves and young shoots eaten as green.

LEGUMINOSÆ.

Rothia trifoliata, Wight. Ic. t. 199.—*Trigonella Indica*, Roxb. Fl. Ind. iii. 389.

A copiously branched annual about a foot or more long. Pods 1½-2 in. long. Found on high dry ranges.

The leaves and pods eaten as vegetable.

Indigofera linifolia, Dalz. & Gibs. Bby. Fl. 58. *Burburra, Pandhari plate, bhangra, torki.*

A small diffused annual with simple linear leaves, bright red flowers and small globose, 1-seeded pods. The whole plant is persistently silvery-hoary.

Common throughout India, Afghanistan, Abyssinia, Australia, etc. During the late famine the seeds of this plant, though unpleasant to the taste, were largely consumed by people of Kaládgi, Dhárwár, Sholápur, Ahmednagar, etc. They were pounded and made into cakes either alone or with some cereals. The analysis made by Dr. Lyon goes to show that this uncultivated pulse is rich in nitrogen. This and several other plants were sent to me for identification by a gentleman from Sholápur.

Indigofera cordifolia, Dalz. & Gibs. Bby. Fl. 58. *Godadi, bodaga, botsaka.*

A much branched annual with cordate leaves, bright red flowers and oval legumes, 1-2-seeded.

Very common throughout Bombay and India in general, Afghanistan, Australia, etc.

The seeds were used by famine-stricken people when other food could not be obtained. They were prepared as those of the last plant, and may be classed, according to the analysis of Dr. Lyon, as a highly nitrogenous pulse.

Indigofera glandulosa, Dalz. & Gibs. Bby. Fl. 58 (note). *Vekhariyo, baragadam* (Tel.)

An annual shrubby species with trifoliate leaves, small red flowers and reflexed 2-seeded legumes. Very common everywhere. The natives make flour of the seeds, and baked into bread use it as an article of diet in times of scarcity. The seeds are also rich in nitrogen.

Sesbania Ægyptiaca, Dalz. & Gibs. Bby. Fl. Suppl. 21. *Sewri.*

A small tree, 8-12 ft. high, of a few years' duration, with 21-41 leaflets, yellow flowers, sometimes more or less tinged with red lines. Pods 6-9 in. long, many-seeded.

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From Himalaya to Ceylon and all over tropics. It is cultivated and naturalized in Poona, Sátára, etc., to shade and support the betel vine and various cucurbitaceous plants. The seeds are said to contain much nitrogenous principles, but were occasionally resorted to during the last famine. Rope is made of the bark, wood furnishes good charcoal for gunpowder and is also used to boil jágri, and the leaves and tender shoots afford fodder for cattle.

Æschynomene aspera, Dalz. & Gibs. Bby. Fl. 63 (note). *Sola* (Bengal),

Not found on this side. It grows in Bengal, Ceylon, etc. The leaflets are used as vegetable. Sun-hats are manufactured from the pith of this plant,

Alysicarpus rugosus, D. C. Prod. ii. 352.—*A. styracifolius*. Dalz. & Gibs. Bby. Fl. 65.

A small diffuse or ascending herb with small leaves, red flowers and pod ¼ in. broad, 3-5-jointed, plicate.

Common in Surat, Poona, Ahmednagar and throughout India. The seeds were used as food, though not to a great extent, during the seasons of scarcity.

Phaseolus trinervius, Dalz. & Gibs. Bby. Fl. 71. *Múkani, mataki.*

It is a perennial twining plant, densely clothed with ferruginous hairs, has tri-foliolate leaves, yellow flowers and pod 10-12-seeded.

Common in this Presidency and throughout India. The seeds, said to be rich in nitrogenous principles, were largely used by the famine-stricken people.

The plant is closely allied to *P. Mungo* var. *radiatus*.

Cassia tora, Dalz. & Gibs. Bby. Fl. 81. *Tacla.*

Common all over India, ascending to 5000 feet above the level of the sea.

Leaves were largely used during famine times; they are also eaten at all seasons, specially during the month of *Shráwan*. The seeds are said to be a good substitute for coffee.

Cassia auriculata, Dalz. & Gibs. Bby. Fl. 81. *Tarwar, aral.*

A tall shrub with 8-12 pair of leaflets, large yellow showy flowers and pods about 5 in. long, few-seeded.

Common in Gujarát, the Deccan, Central Provinces and Ceylon. The leaves are used as green like those of *Cassia tora*.

Cassia sophora, Dalz. & Gibs. Bby. Fl. 81.

Cassia occidentalis, Dalz. & Gibs. Bby. Fl. 81. *Thorlá-tacla.*

The leaves of these two cassias are also used as green even in ordinary seasons when other vegetables are not easily procurable.

Tamarindus Indica, Dalz. & Gibs. Bby. Fl. 82. *Chinch, amli.*

Common throughout India and the tropics generally; probably indigenous in Africa. Leaves and seeds were used during famine times. Roasted seeds are eaten even at ordinary times entire or reduced to powder by being pounded and baked into bread.

Neptunia oleracea, Dalz. & Gibs. Bby. Fl. 84. *Pani-lajak.*

Annual, prostrate. Leaflets 16-30, flowers yellow. Pod oblique, 6-10-seeded.

In tanks in the Konkan and all over India. Eaten as a pot herb. The pods are also used as a vegetable.

Acacia Arabica, Dalz. & Gibs. Bby. Fl. 86. *Babul, babhul, kikar.*

A tree with thorny branches, flowers yellow in globose heads, pod 6 in. long, 8-12-seeded.

The seeds were eaten roasted or raw. "The *babul* seeds, even that have been voided by goats that have eaten the pods, are gathered and roasted and eaten." These seeds cooked in any way are found deleterious to health. *See* Sanitary Commissioner's Report for 1879.

Acacia leucophlæa, Dalz. & Gibs. Bby. Fl. 87; Roxb. Cor. Pl. t. 750. *Hewar.*

The bark is ground and mixed with flour in times of scarcity and eaten. The young pods are also used as vegetable.

This tree is common in the Sholápur districts and in the Southern Marátha Country, where the bark is largely used in the preparatinn of spirits from jágri and palm juice; it is employed on account of the tannin it contains, which serves to precipitate the albuminous principles of the palm juice. The trees are farmed out for the purpose on account of Government.

Albizzia procera, Dalz. & Gibs. Bby. Fl. 87. *Kinye.*

This tree is common in the Konkan and in the Deccan, specially over the ghâts.

CACTACEÆ.

Opuntia Dillenii, Roxb. Fl. Ind. ii. 475; Dalz. & Gibs. Bby. Fl. Suppl. 39. Prickly pear, *nagphanna* (the hood of a serpent), *nagphansi.*

This species, indigenous in America, is naturalized all over India. Its pyriform, tubercled fruit is sweet and juicy and is eaten especially by children. In the Deccan it is given baked in whooping cough. There are three species of this genus closely allied to the Indian species naturalized in Spain, Portugal, Italy and in the Mediterranean region; the most common is *Opuntia vulgaris.* Regarding this a correspondent of the Calcutta *Englishman* gives the following extract from a Report on the Food Products of the North American Indians, issued by the Department of Agriculture and Commerce, United States of America:—

"The fruits of these species of cactus is much eaten by all the Indians of New Mexico * * * under the common Spanish name of *tunas*, great quantities being dried for use in the winter. These plants grow in arid desert localities which produce nothing better; the fruits are large and of a bright red or purple colour; of a rather pleasant, sweet, somewhat acid taste and have thin skins and rather large seeds which

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are discarded. The skin is studded with bunches of very fine downy spines which the Indians brush off with a bunch of grass. * * *". "The dry unripe fruit" is "cooked with meat and other substances. The fresh unripe fruit" is often boiled in water from ten to twelve hours until soft, when it becomes like apple sauce; then being allowed to ferment a little it becomes stimulating and nutritious. Some Indians roast the leaves of the '*Opuntia*' in hot ashes, and when cooked, the outer skin with the thorns is easily removed leaving a slimy, sweet, succulent substance which is eaten, etc."

CUCURBITACEÆ.

Rhynchocarpa fœtida, Hook Fl. Brit. Ind. ii. 627.—*Æchmandra rostrata,* Dalz. & Gibs. Bby. Fl. 100.

This fœtid climbing cucurbit grows in Bombay, the Deccan and Gujarát. Fruit and leaves are eaten. Fruit bright red when ripe, 2-celled.

FICOIDEÆ.

Trianthema pentandra, D. C. Prod. iii. 352.

Is a small prostrate plant, common in the Punjáb, Sind and plains of North-West India. Leaves and tender shoots are boiled and eaten as green.

Orygia decumbens, Hook. Fl. Brit. Ind. ii. 661.

This wild herb grows in dry places in the Deccan; also from the Punjáb and Sind to Mysore and Coimbatore. The leaves eaten as vegetable.

Gisekia pharnecioides, Hook. Fl. Brit. Ind. ii. 664; Roxb. Cor. Pl. t. 183.

A small diffused herb, 8-18 in. long. Grows in the Southern Deccan, Peninsula, Konkan and other hot and dry places.

Used as a pot herb.

RUBIACEÆ.

Morinda citrifolia, Dalz. & Gibs. Bby. Fl. 114. *Al* or *aal, bartundi.*

Common. The green fruits are used in curries; the riper ones are also eaten.

Morinda umbellata. *Al. (?)*

Cultivated on this side for the sake of the bark of the root, which is used for dyeing red and yellow. The green fruits are used in curries and the ripe ones eaten.

COMPOSITÆ.

Glossocardi Boswellia, Dalz. & Gibs. Bby. Fl. 129. *Pithari* (Sans.), *pitpapra, phathurswea.*

This is a weed found in dry soil. Very common in Poona and other places. The leaf is said to be eaten in ordinary years as vegetable and is believed to be perfectly wholesome. This plant

was sent from Kaládgi, and identified by Dr. Gray. The identification is, however, doubtful; for the flowers of *Glossocardia* are yellow, and not rose-coloured, as stated in the printed list of the Bombay Secretariat. The specimens sent from Kaládgi with the above native names belong probably to *Cyathoclyne stricta*, the flowers of which are purple, and the leaves deeply cut.

SAPOTACEÆ.

Bassia latifolia, Dalz. & Gibs. Bby. Fl. 139; Roxb. Cor. Pl. t. 19.

Both the ripe and the unripe fruit are eaten by the natives, but perhaps the most important product of this plant is the flower, of which 200 to 400 lbs. are sometimes collected from a single tree. These flowers are always gathered early in the morning, dried in the sun, and then sold as an article of food, being consumed either raw or cooked along with parched grain. Many of those who have gone to Mátherán must have seen the natives at the foot of this hill collecting the flowers of the *mowah* which are much esteemed by them; and, indeed, during the famine of 1873-74 at Behár they are said to have kept thousands of people from starvation. They have a sweetish smell and taste.

The seeds of the *mowah* yield by expression a greenish-yellow oil which is used by unscrupulous dealers for adulterating ghee. It is also used in making soap in Kaira. The oil-cake is employed for poisoning fish and to kill rats, and when burnt its smoke is reported to be a good insecticide. (*See* Timber Trees.)

Bassia longifolia, Roxb. Fl. Ind. ii. 523; Dalz. & Gibs. Bby. Fl. 139. *Ippi, illupi*, also named *mowah*.

This is equally useful as the last, and the flowers and seeds are used for similar purposes: grows at Dhárwár, Malahár, Circars, Mysore and Annamallay. (*See* Timber Trees.)

ASCLEPIADEÆ.

Hoya viridiflora, Dalz. & Gibs. Bby. Fl. 153. *Hiraṅdodi* or *khandodi*.

A twining plant very common in hedges. Leaves used as vegetable.

Leptadenia reticulata. Dalz. & Gibs. Bby. Fl. 152. *Rayadodi, shinguti, dodhi, pala-kuda*.

A shrubby twining shrub with corky bark.

Common, particularly near the sea. The leaves and tender shoots are used as a vegetable in some parts of India at all times; so also the follicles, known as *shinguti* or *dodhi*.

GENTIANEÆ.

Limnanthemum cristatum, Dalz. & Gibs. Bby. Fl. 158.—*Menyanthes cristata*, Roxb. Fl. Ind. i. 459. *Khatara, kumuda*.

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An aquatic plant resembling water lilies, common in the Konkan and in various other parts of India. Flowers white, about one inch in diameter; appear in wet and cold seasons. The stems and fruit are curried, or simply boiled and eaten.

BORAGINEÆ.

Ehretia lœvis, Dalz. & Gibs. Bby. Fl. 170.

The inner bark is mixed with bájri flour and eaten.

CONVOLVULACEÆ.

Rivea hypocrateriformis, Dalz. & Gibs. Bby. Fl. 168. *Phanja.*

Grows in Bombay and the Deccan and other parts of India. Leaves and young shoots used as vegetable.

Ipomœa reniformis, Dalz. & Gibs. Bby. Fl. 164. *Undirkani.*

Common in Bombay and the Deccan. Used as a pot herb.

Ipomœa sepiaria, Dalz. & Gibs. Bby. Fl. 166. *Aámti.*

Common in hedges. Used as above.

SOLANACEÆ.

Solanum nigrum, Linn. Sp. Pl. 266. *Ghati, cammuni, mako.*

A common weed in almost all tropical and temperate parts of the world. Leaves and young shoots used as a pot herb. Ripe fruits eaten as fruit. The herb is cultivated in Mauritius, where it is called *brede.*

Solanum Jacquinii, Dalz. & Gibs. Bby. Fl. 175. *Bhúringni.*

A diffuse plant, trailing over the ground and armed all over with prickles. Found on waste places. Berry yellow when ripe, size of a plum. Unripe fruits eaten in curries and as a vegetable.

Solanum torvum, Dalz. & Gibs. Bby. Fl. 175.

A shrub 3-4 ft. high with berries the size of an apple. Southern Marátha Country. Used as a vegetable.

ACANTHACEÆ.

Asystacia Gangetica, Thwait. Enum. Pl. Zeyl. p. 235.—*Asystacia Coromandeliana*, Dalz. & Gibs. Bby. Fl. 186.

A small shrub with white or pale-blue flowers. Very common; often cultivated in gardens on account of its beautiful flowers. Eaten as a vegetable.

VERBINACEÆ.

Premna latifolia, Roxb. Fl. Ind. iii. 76; Dalz. & Gibs. Bby. Fl. 200. *Chámbari.*

A small shrub with rounded leaves and small greenish flowers. Very common in hedges in the Konkan. The leaves when bruised

have a peculiar and rather unpleasant smell, but these and the tender shoots are boiled with condiments and eaten as vegetable.

Syn.—**Premna serratifolia**, Roxb. Fl. Ind. iii. 77. *Bhut-bhiravi*, Bengal.

A native of Bengal. The tender leaves and shoots are cooked and eaten.

LABIATÆ.

Leucas aspera, Dalz. & Gibs. Bby. Fl. 211. *Tumba.*

A small, rough, hispid, herbaceous plant, ½ foot high, growing all along the coast. The leaves and tender shoots are boiled and eaten as vegetable, even in ordinary seasons.

NYCTAGINEÆ.

Boerhaavia diffusa, Dalz. & Gibs. Bby. Fl. 213. *Punarnava.*

A very common weed. The natives use it as *bhaji*, even in ordinary seasons.

Boerhaavia repanda, Dalz. & Gibs. Bby. Fl. 213. *Punarnava.*

Common in the Deccan, Surat and in various parts of this Presidency. Leaves and young shoots are eaten as *shak-bhaji.*

Mirabilis jalapa, Dalz. & Gibs. Bby. Fl. Suppl. 72. *Gul-bhaji, gul-abbass.*

Common in every garden. The flowers have various colours—yellow, white, red and white, red and yellow. It is said that the leaves are used largely as vegetable at Oosson, in the Salem District.

CHENOPODIACEÆ.

Suæda Indica, Dalz. & Gibs. Bby. Fl. 213. Indian salt-wort.

A small erect-growing herb with woody stem. Leaves round, fleshy; grows in salt marshes in the Konkan. The natives eat the leaves as vegetable. Largely resorted to during scarcity.

AMARANTHACEÆ.

Achyranthes aspera, Dalz. & Gibs. Bby. Fl. 218. *Agárch* or *agárah.*

The leaves are used as vegetable, and Dr. Moore says that the natives of Rájputána used to eat the seeds of this plant during the famine which occurred there. Several other species of Amaranth, such as *Æerva lanata, Celosia cristata, Alternanthera sessilis, Amaranthus tristis, A. panniculatus, A. spinosus*, etc., are used as pot herb, and all are wholesome.

EUPHORBIACEÆ.

Euphorbia pilulifera, Euphorbia hirta, Dalz. & Gibs. Bby. Fl. 225.

An annual common weed. Leaves and tender shoots eaten as green.

Forest Plants. **Acalypha Indica**, Dalz. & Gibs. Bby. Fl. 228. *Khokati* (Mar.), *kupi* (Hind.)

A common weed. Leaves used as vegetable.

URTICACEÆ.

Pouzolzia tuberoza, Wight. Icon. Pl. Ind. Or. t. 697.—*Urtica tuberoza*, Roxb. Fl. Ind. iii. 587. *Pilli-dumpa* (Tamul).

It is a small perennial herb, about from 1 to 6 ft. long, growing in good moist soil in Circars and other parts of India. Not described from Bombay. Spindle-shaped, tuberous roots are eaten raw, roasted or boiled.

Ficus Bengalensis, Roxb. Fl. Ind. 539. *Vad* (*wur*).

Ficus glomerata, Roxb. Fl. Ind. 547. *Umbar*.

Ficus religiosa, Roxb. Fl. Ind. 558. *Pimpal*.

Ripe fruits of these and other fig trees are eaten, especially in times of scarcity. The unripe fruit of *F. glomerata* is also eaten in times of scarcity pounded with rice or bájri and made into cake. The tender buds of *F. religiosa* are eaten as vegetable by hill people of Central India during times of scarcity.

SANTALACEÆ.

Santalum album, Roxb. Fl. Ind. i. 449. *Chandan*, sandal-wood tree.

Indigenous in Mysore, Coromandel Coast, Timor and Java. Cultivated in gardens. Naturalized in the Deccan, Gujarát, Central India, Bengal and elsewhere. The seeds eaten during seasons of scarcity.

SCITAMINEÆ.

Musa ornata } Dalz. & Gibs. Bby. Fl. 272. *Chavaya, ran-*
Musa superba } *kela*.

These are common at Mátherán, Rám Ghát, Khandála and sides of precipitous crags. The scape and the convolute leaf sheaths which immediately surround it, are cut into pieces, and boiled and made into a dish with spices, or they are dried and pounded into a kind of flour out of which cakes are made. These are resorted to especially in times of scarcity.

AMARYLLIDEÆ.

Crinum Roxburghii, Dalz. & Gibs. Bby. Fl. 275. *Nag-down?*

Bulbous root, radical concave leaves, compressed scape with umbels of 6-16 white flowers.

Common on the banks of the Deccan rivers and throughout India.

The bulb is boiled and eaten as *shak-baji*.

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Agave Americana, Agave cantula, Dalz. & Gibs. Bby. Fl. Suppl. 93. *Jungly annanas.*

Cultivated in many parts of India. Dr. Cornish in his report on the famine relief measures in North Arcot mentions the use of the flowering stalks of the American aloe as food by the distressed population, and writes as follows:—

"The American aloe is common in waste dry soils, and is used also for fencing. The flowering stalk of the aloe contains a sweet fibrous substance something like the pith of the sago palm, and for miles around Palmanair every flower stalk of the aloe has been cut down for food. The people boil it with tamarind, and it is by no means disagreeable to the taste. The nutritious matter is sugar and starch, but the great bulk of the pith is woody fibre. The interior of the lower part of the leaf stalk of the aloe is used in the same way, and the dried aloe leaf is given to the cattle. The green part of the aloe leaf contains a bitter purgative juice; but when dried in the sun, cattle will eat a little of the lower and thicker end of the leaf. I fear it cannot be a very nourishing diet for them. The prickly pear is fruitning very abundantly this year, and the children especially are eating the fruit to a great extent. The ripe fruit is sweet and juicy, and probably not unwholesome, except where it is used in undue proportion to other kinds of food."

And the "*Englishman*" had some time ago a letter from one of its correspondents containing an extract from a "Report on the Food Products of the North American Indians" in which the following was stated about the American aloe. This plant, called *mescal* by the Americans, "grows upon the most barren mountains, and is taken for food when old enough at any season of the year. It is in its prime, however, when about putting forth its flowering stem. To prepare it for use, the leaves are cut off at the base or crown, leaving a hard, white, bulbous mass, measuring one or two feet in circumference, having a flavour like chestnuts, but somewhat peppery. It cannot be eaten in its fresh state, but must be cooked. For this purpose the Indians dig a hole or pit, ten or twelve feet in diameter and three feet deep, lined with stones, upon which a fire is made, and the stones thoroughly heated. The fire being removed, a layer of damp grass is placed upon the rocks; then the bulbs, which are covered with the tender inside leaves taken from the crowns; a layer of grass is placed over these, and over all a thick coating of earth. After three days the contents of the pit are found to be thoroughly baked and converted into a sweet, juicy article of food; a favourite for use in camp; of a brown colour and resembling pears in taste. It is used as an article of commerce * * * * and is not only pleasant to the taste, but acts as an antiscorbutic * * Cut up into slices it is easily dried, and retains its sweetness for years. * * * * The leaf when washed and dried is employed by the Indians for smoking like tobacco, but being sweet and gummy, it chokes up the pipe. * * * * The crowns are sometimes baked in hot ashes, but are not so good as when baked in the pit. It is a common practice to collect the leaves into suitable bundles and press them flat. They soon dry, and are very sweet, but inferior to the crown. * * The leaf has a dirty black, stringy look, but is the favourite food of the *Apachis* when they are at war or on the hunt * * * A fine *mescal* spirit is prepared from the roasted leaves of *Agave Americana* * * * It is a strong, fiery drink, but not half so injurious as modern whiskey * * * The wasted pulp when cut up, mixed with water, and boiled form a fine syrup, and when dissolved in cold water forms a pleasant drink and an excellent sauce to the usually very dry and insipid articles of Indian food. Although the roasted root is very dark, the distilled

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spirit is of a clear yellow colour. It cannot be adulterated with water without immediately rendering it ropy and distasteful, the water precipitating some mucilagenous matter or resin contained in it.

LILIACEÆ.

Aloe Indica, Royl. Ill. 390.—*A. perfoliata*, Roxb. Fl. Ind. ii. 107. *Kumar.*

Growing in sandy places in the N.-W. Provinces, and cultivated in gardens of Bombay.

Aloe litoralis, Pharmacop. Ind. 24. *Chota-kunwar, kumar-bij.*

On the sea-coast of the Madras Presidency. The leaf bud or cabbage and tender pith of both these species are much resorted to during famines; but they are unwholesome, and cause dysentery and diarrhœa.

COMMELYNACEÆ.

Commelyna communis, Dalz. & Gibs. Bby. Fl. 555. *Kena.*

An annual with much-branched procumbent stems; deep blue flowers on two peduncles on each circulate spathe. Common in Bombay and throughout the tropics. The rugose seeds contained in oblong capsules were largely consumed in the Sholápur District during the famine.

Cyanotis axillaris, Dalz. & Gibs. Bby. Fl. 256. *Itsáka.*

A creeping annual with 2 or 3 deep blue flowers, nearly sessile within the sheaths, filaments thickened above a dense tuft of hairs, and capsule 3-valved, 3-seeded. Common throughout India, Ceylon and Archipelago. It is stated that the seeds of both these spiderworts were eagerly sought during the famine, and it appears both from experience and from the chemical analysis that they are wholesome and nutritious.

PALMÆ.

Phœnix sylvestris, Dalz. & Gibs. Bby. Fl. 278. *Kajuri.*

Leaf bud or cabbage and ripe yellow fruit are eaten. The tree is common in Gujarát, Konkan, Bengal and Madras, and is highly esteemed on account of its juice, called *toddy*, which is extracted by removing the lower leaves with their sheaths and cutting a notch into the pith of the tree near the top. The juice issuing from this notch is conducted by a small palm-leaf channel into an earthen vessel placed to receive it. *Toddy* is abundantly used by the natives as a cooling beverage, being sweet, and like the water from a tender cocoanut; it is also converted by a process of boiling into sugar, or distilled, after allowing it to be fermented into a kind of inferior spirit called *arak*. The trees begin to yield toddy towards the age of 7—10 years, the trunk being then about 4 feet high, and do so for about twenty-five years. The juice is extracted from November to February, each tree yielding during that period 180 pints on an average. Twelve pints of toddy can be converted into one of jággri, and 4 of this into a pound of sugar, so that each tree produces annually between 7—8 lbs. of sugar, which being inferior in quality to cane sugar, sells usually, for three-fourths the price of the latter.

Phœnix farinosa, Roxb. Fl. Ind. iii. 785.

Found in dry sandy places along the coast. Its black ripe fruit eaten.

Borassus flabelliformis, Dalz. & Gibs. Bby. Fl. 279. *Tar, tár-máy.*

The juice is named *tarri* and the fruit *tárgolláh*. The fusiform roots of this plant are eaten by very poor people, even in ordinary times.

PANDANACEÆ.

Pandanus odoratissimus, Dalz. & Gibs. Bby. Fl. 279. *Kewr.*

Common in the Konkan. The tender floral leaves are eaten raw or cooked with various condiments, and the pulp contained in the lower part of the drupes of the compound fruit is sucked.

AROIDEÆ.

Besides several cultivated species of Arum tribe, numerous wild ones afforded food to thousands of people during the late famine. Almost all the species are acrid and some poisonous, but, as stated above, by being boiled their acrid principle is destroyed or removed. The following are some of those which are supposed to have been resorted to :—

Amorphophalus campanulatus, Dalz. & Gibs. Bby. Fl. 259.

The root tuberous, brown-coloured, of enormous size. Leaves radical, thrice bifid. Spathe large of a dull-red colour. It grows wild on the banks of rivers in the Konkan, and throughout India. It is widely cultivated for the sake of its root, which is said to be a very nutritious food. It is to be remembered that even this cultivated root is acrid.

Arisæma curvatum, Dalz. & Gibs. Bby. Fl. 258. *Sap-kanda* (Khándála name).

Mátherán, Khandála and other Konkan hills.

The tuberous roots of this and allied species of *Arisæma* are used for food in times of scarcity by the Lipchas of Sikkim; they are prepared by burying them in masses in the ground, until acetous fermentation sets in, when they are dug up, washed and cooked. By this means the poisonous properties of the root are in part dispersed, but not altogether, and violent illness often follow a hearty meal of "tong", as this food is called. The nutritious starch, with which these tubers are filled, might be easily separated by grating and washing, and an aliment as good as Portland Island arrow-root (the starch of *Arum maculatum*) be thus procured in quantities.

Typhonium bulbiferum, Dalz. & Gibs. Bby. Fl. 258.

Found in Malabár and Konkan. Both the bulbs and leaves were eaten boiled.

Typhonium divaricatum, Wight. Icon. t. 790.—*Arum divaricatum*, Roxb. Fl. Ind. iii. 503.

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Common in Bombay, Ceylon, Timor, China, etc.

Theriophonium Dalzelii, Schot. Aroideæ i. 15.

Konkan and Southern Marátha Country and Madras. Leaves and petioles eaten.

Synantherias sylvatica, Schot. Gen. Ar. t. 28.—*Amorphalus sylvaticus*, Dalz. & Gibs. Bby. Fl. 259.

Root, petioles and leaves eaten.

CYPERACEÆ.

Fimbristylis Kysoor, Dalz. & Gibs. Bby. Fl. 288. *Kachera.*

In marshy places in India. The tuber is sold in Bombay and eaten boiled; also in Thána and other places.

During the famine in Behár the root of several other sedges furnished food to numerous people, but these are not identified.

GRAMINEÆ.

Cynodon Dactylon, Dalz. & Gibs. Bby. Fl. 297.

This is a small grass, very common throughout India, known as *Harayali* and *Durva*. Under leaves and culms were eaten during the late famine in Madras.

Eleusine Ægyptiaca, Roxb. Fl. Ind. i. 24.—*Dactyloctenium Ægyptiacum*, Dalz. & Gibs. Bby. Fl. 297. *Mhar-nachani, natchni, nagli, ráj.*

Very common in the rains. The rugose seed grains are eaten cooked into porridge.

Panicillaria spicata, Holcus spicatus of Dalz. & Gibs. Bby. Fl. Suppl. 99. *Bájri.*

Cultivated in the Deccan, Gujarát and Khándesh.

Sorghum vulgare, Holcus saccharatus, Dalz. & Gibs. Bby. Fl. Suppl. 99. *Jowári.*

Cultivated in Sholápur, Berár, etc.

Zea Mays, Dalz. & Gibs. Bby. Fl. Suppl. 100. *Butta, mocca.*

Indian corn or maize cultivated both on account of its grain and its leaves, which are a good fodder for cattle.

The cobs of *maize, jowári* and *bájri* are ground and mixed with meal or flour of rice to make bread. They are a little sweet, and at any rate will help to fill the empty stomach.

Triticum Æstivum, Dalz. & Gibs. Bby. Fl. Suppl. *Kapale, gahu or gohum*; wheat.

The chaff of this was used in the same way.

Bambusa Arundinacea, Dalz. & Gibs. Bby. Fl. 299. *Varisa* (Sanskrit), *mauga, man, bans, tokar.*

This is the tallest bambu, attains 30-50 feet in height and 4-8 in diameter. Culm green, shining, and spinescent. Grows in Poona, Malabár, etc.

Bambusa vulgaris, Dalz. & Gibs. Bby. Fl. 299. *Kalaka* or *bambu*.

Culm unarmed, 20-50 feet high, green or greenish-yellow. Cultivated in Poona, Sátára and various parts of India.

Dendrocalamus strictus, Brand. For. Fl. 569.—*Bambusa stricta*, Dalz. & Gibs. Bby. Fl. 299. *Bans, bas, bassa, udha*.

Culm armed or unarmed, straight, strong and elastic, with a small cavity or none. Attains 20-40 feet in height. Common throughout India.

Arundinaria Wightiana, Brand. For. Fl. 562.—*Bambusa arundo*, Dalz. & Gibs. Bby. Fl. 299. *Chivari*.

It is a small thorny bambu, 6 to 12 feet high; grows at higher ghâts. Walking-sticks are made of this, and sold at Mahábaleshvar.

The tribe *Bambusaceæ* is represented by several genera, of which the above are found in the Bombay Presidency.

Some of the bambus flower once in about thirty to thirty-two years, and when such an occurrence takes place, the whole tract extending over many miles is in full flower; it sometimes happens, however, that only a few bambus of a cluster flower each year, when the flowering goes on every succeeding year with the other bambus of the cluster. The variety *Arundinaria Wightiana*, however, flowers and dies down annually, when new shoots spring up from the roots and attain their full size in a single season. Both in this variety as in others the flowering is followed by the death of the stems, so that, after seasons of general flowering, a whole district presents for some time the spectacle of a large forest of dried up clumps. The product of the flowering of the bambu is a rice which is consumed by the poorer people in lieu of common rice. A very palatable bread is said to be made of the flower of this rice, although the colour of it is somewhat darker.

In the scarcity of 1812 in Orissa, 1864 in Kánara, and 1866 in Málda this rice formed the principal article of the food of the poor population: hence perhaps the belief entertained by some Government officials that the bambu only flowers in seasons of general scarcity.

From the young and tender bambu shoot, pickle and preserves are made which are considered very palatable by the natives. The sliced shoots are also made into dishes.

Mr. Lethbridge says that all the varieties of bambus are capable of being employed in the manufacture of paper.

/2/ Mr. Routledge

Anamirta cocculus, Dalz. & Gibs. Bby. Fl. 4. *Kakamari.*

The drupes of this twining plant are the *Cocculus Indicus* of commerce. The seeds contained in the drupes are used in Europe to adulterate beer, and in this country to intoxicate and poison fish. It is said that they are also employed in Bombay to increase the intoxicating effects of country spirits sold in retail. As an insecticide they prove very effectual in destroying the pediculi which infest the human body. The drupes are subglobose, or somewhat kidney-shaped, ½ in. diameter, black, wrinkled, enclosing an yellowish, oily, very bitter seed, which contains a crystallisable principle named *picrotoxin*. This is not affected by the re-agents which are usually employed for detecting the bitter poisonous alkaloids. Besides this principle, the seeds contain fat, which amounts to about half their weight, and which is said to be employed for industrial purposes; and *stearic acid*, formerly thought to be *anamirtic* or *stearophanic* acid. *Cocculus Indicus* is exported from Bombay and Madras, and the stock in the dock-warehouses of London on the 1st December, 1872, was 2,010 packages.

Drury says :—"That the seeds are illegally employed in the adulteration of beer by the lower class of brewers in England is an undoubted fact, although the penalties imposed by the Legislature are very severe. It is said that 1 lb. of these berries is equal to a sack of malt in brewing, and it was even recommended by one man, who wrote on the 'Art of Brewing', to add 3 lbs. of seeds to every 10 of malt. A considerable quantity of *Cocculus Indicus* is exported from Malabár and Travancore, and shipped for the London market, where the price varies from 18 to 24 shillings per cwt. The exports from Travancore alone for 1854-55 were upwards of 75 candies. The imports in the English market are about 240 tons annually. In the four years ending 1856, 5,817 cwts. of the seeds were exported from the Madras Presidency, valued at Rs. 7,124, chiefly to Bombay, the United Kingdom and the Persian Gulf."

It is clear that *Cocculus Indicus* has been exported to various ports of Europe from the earliest times. Gerard (Herbal) says it was well known in England (1597) as *Cocculus Indicus*, otherwise *Cocci vel cocculus orientalis*. In 1635 it was subject to an import duty of 2 shillings per pound as *Cocculus Indiæ*. It is said that at the present time it is mostly exported to the Continent of Europe, very little being shipped to England.

Anacardium occidentale, Dalz. & Gibs. Bby. Fl. Suppl. 18. Cashewnut, *kaju*.

A large quantity of spirit is distilled at Goa and on the Malabár Coast.

Acacia leucophlæa, Dalz. & Gibs. Bby. Fl. 86.

A spirit is distilled from the bark mixed with *goor*, and the trees are farmed on account of Government.

A. ferruginea, Bedd. Fl. Sylv. t. 51. *Kaiger, anasandra.*

From this also a spirit is distilled and the trees farmed on account of Government.

Eugenia jambolana, Hook. Fl. Ind. ii. 499.—*Syzijium jambolanum*, Dalz. & Gibs. Bby. Fl. 93. *Jambul.*

It appears that this tree, although very common at Mátherán and Mahábaleshvar, does not bear good large fruit like the ones on the lower ranges. From the large sweet fruits, wine, resembling port in taste and colour, is manufactured at Goa; and spirit is also distilled for local use.

Bassia latifolia, Dalz. & Gibs. Bby. Fl. 139. *Mowah.*

The well-known mowrah spirit is distilled from the flowers of this tree. (*See* Chapter on Timber Trees and Oils.)

Bassia longifolia, also known as *mowah*. The flowers are used for the same purposes.

Ligustrum robustum allied to **L. Neilgherense** of Dalz. & Gibs. Bby. Fl. 159.

In South India the bark of this tree is put into the toddy of *Caryota urens, birly-már*, to accelerate fermentation.

Calatropis gigantea, Dalz. & Gibs. Bby. Fl. 149. *Rui, arkar* or *ak.*

The tribes of the Western Ghâts make an intoxicating drink, called *barr*, from the milk sap of the *mudar* or *ak*. The great Akbar was born beneath the ak, and took his name from it according to the local tradition of Umarkot. Barth states that the pagan tribes of Central Africa also prepare from this plant their *giya*. —Birdwood (B. Products).

Cannabis Indica or **Sativa**, Dalz. & Gibs. Bby. Fl. Suppl. 79. *Indian hemp* or *ganja.*

The three principal forms in which Indian hemp is met with in Indian bázárs are, first, *ganja*, the dried flowering twigs and leaves from which the resin has not been removed; second, *churras*, the resinous exudation from the stems, leaves and flowers; and, third, *bang, subji* or *sidhi*, the larger leaves and capsules without the stalks. In addition to these a sweetmeat, called *majum*, is made and sold, composed of bang, butter, sugar, flour and milk. An infusion of ganja or bang is also made, to which pounded *datura* seeds are added with the view of increasing the intoxicating and exhilarating effect. Cases of datura poisoning do occur when datura seeds are mixed in greater proportion than usual.

Fermented Drinks.

Dalz. & Gibs. Bby. Fl. says:—"In Poona a native beer, called *bhoja*, is brewed from jowári grain malted, and the bang is added as a substitute for hops; this is drunk in large quantities, and is said to be a refreshing and innocuous drink."

Caryota urens, Dalz. & Gibs. Bby. Fl. 278. *Már.*

Toddy is made and spirit distilled from the sap of this palm.

Borassus flabelliformis, Dalz. & Gibs. Bby. Fl. 278. *Tár-golláh, tár, már.*

Toddy is made and spirit distilled from the sap of this palm.

Cocos nucifera, Dalz. & Gibs. Bby. Fl. 279. *Már, narel.*

Spirit is distilled from its sap.

Phœnix sylvestris, Dalz. & Gibs. Bby. Fl. 278. *Kajuri.*

Toddy is made from the sap. (*See* Chapter on Fruits and Vegetables and Chapter on Famine Plants.)

Saccharum officinale, Dalz. & Gibs. Bby. Fl. Suppl. 99.

Strong spirit, named *agua ardente*, is distilled at Goa from the juice.

OIL-YIELDING PLANTS.*

BEFORE giving an account of the oil-yielding plants of this district it may be as well to begin by stating that all oils are either *fixed* or *volatile*. Some of the *fixed* oils are called *concrete* oils, *fatty* oils, *butyraceous* oils or *vegetable butters*, from the fact of their being solid at ordinary temperature.

CONCRETE OILS.

GUTTIFERÆ.

Garcinia Indica, D. C. Prod. i. 561, better known as *Garcinia purpurea*, Dalz. & Gibs. Bby. Fl. 31.

The oil is obtained from seeds by boiling them in water, and as the decoction cools, it concretes into a solid cake, which is brittle, of a pale-yellowish colour, bland and mild taste, and preserving its solidity to 98° Far. When melting in the mouth, it leaves on the tongue a sensation of cold similar to that produced by allowing a piece of ice to dissolve upon it. *Kokum* oil, as it is called, is used by the natives in cases of chapped skin, hands, face, etc., and also for adulterating *ghee*. It is an excellent substitute for spermeceti ointment, and is said to be exported to England for admixture with bear's grease in the preparation of pomatums. Experiments conducted by Mr. D'Oliveira Pimentel and various English chemists have shown that this oil can be utilized for candle-making, and the only difficulty in the way of such a use appears to be that the oil cannot be obtained in sufficiently large quantities to serve such a purpose. The seeds yield only 10 per cent of oil.

SAPOTACEÆ.

Bassia latifolia, Dalz. & Gibs. Bby. Fl. 139. *Mohwah* tree.

From the seeds a large quantity of oil is obtained by expression which is used in lamps and for adulterating ghee. It is thick and coarse, and concretes at 95°. It was experimented upon some years ago in England, and found useful in candle-making. A ton of it was reported worth £35, at which figure large quantities could be easily disposed of. (*See* Timber Trees.)

Bassia longifolia, Dalz. & Gibs. Bby. Fl. 139, or *mohe* (Hind.)

Also furnishes an oil very like the above, and used for the same purposes. (*See* Timber Trees.)

* These notes on the oil-yielding plants of the Konkan are culled from an unpublished paper written for another purpose.

MYRISTICEÆ.

Oil-yielding Plants.

Myristica Malabarica, Dalz. & Gibs. Bby. Fl. 4.—*Myristica attenuata*, Dalz. & Gibs. Bby. Fl. 4. *Jungle jaiphal.*

The fruits of these, like the officinal nutmeg, when bruised and subjected to pressure yield oils which are used medicinally.

FIXED OILS.

(Liquid at the ordinary temperature.)

PAPAVERACEÆ.

Argemone Mexicana, Dalz. & Gibs. Bby. Fl. Suppl. 3. Gamboge thistle and *fico del inferno* of Europeans, and *Feringhee datura* or *pilá datura* of the Deccan; *suchianas, brahma dundie.*

A native of South America, naturalized and very common throughout India. It is an annual, from the seeds of which a bland oil may be obtained by expression, which in half-drachm doses is reputed by West Indian practitioners to act as an aperient and at the same time allay by a sedative action the pain in colic. The cake is extremely nutritious to cattle.

CRUCIFERÆ.

Brassica campestris, Napus and **B. juncea** and their varieties, Hook. Fl. Ind. i. 156 and 157. *Sarson, kai, kali, surson, looria,* rape seed plant.

About 33 per cent. of oil is obtained by expression from the seeds, and is used in India for lamps and dietetical purposes, being seldom exported. A large quantity of the seeds (502,739 cwts. in 1879-80 from Bombay) is, however, being constantly shipped to Europe, etc., where the oil is employed for lubricating machinery. A single locomotive is said to consume 90 to 100 gallons of it annually. Rape seed oil burns considerably longer than olive oil (11 hours of the former to 9 of the latter), and the natives apply it to the body which it is believed to strengthen.

BIXINEÆ.

Hydnocarus Wightiana, Dalz. & Gibs. Bby. Fl. 11. *Kowti oil, kois-tel.*

The seeds yield on being boiled with water an oil which is sometimes used in lamps at Goa, where it is called *koshtel*, and also as an external application in cutaneous affections. The natives consider it to be of use in leprosy and ophthalmia.

GUTTIFERÆ.

Calophyllum inophyllum, Dalz. & Gibs. Bby. Fl. 31. *Andi.*

C. Wightianum, Hook. Fl. Ind. i. 274.—*C. spurium*, Dalz. & Gibs. Bby. Fl. 32. *Cherupinai.* (*See* Timber Trees.)

Mesua ferrea, Dalz. & Gibs. Bby. Fl. 31. *Nág champa* or *thorla champa.* (*See* Timber Trees.)

The seeds of the first-named yield on expression 60 per cent. of an oil used in lamps and for cutaneous affections. The second supplies the oil known under the name of *pootunjee oil*, used also in skin diseases and for lamps. The oil from the seeds of the third is, according to Dr. Æ. Ross, used in Kánara as an embrocation in rheumatism.

MALVACEÆ.

Gossypium (several varieties), Dalz. & Gibs. Bby. Fl. 21. Cotton plant, *kapás*, *rúi*.

A very pure oil is obtained on expression from the seeds of the cotton plant which can be recommended for its cheapness, and may, no doubt, be utilized for burning in lamps. Large quantities of this oil are manufactured at Marseilles, where 96 lbs. of Egyptian seed yielded 2 gallons of oil. The cake is valuable as fodder, and large quantities of it are shipped to the English market from China, especially from Shanghai. 53,616 tons were imported into the United Kingdom in 1852. In India the natives believe in the antidotal virtues of cotton-seed oil when used in cases of poisoning from narcotics. Perhaps as a demulcent the oil may be useful. (*See* Fibres.)

Amongst the *Sterculiaceæ* and *Tiliaceæ* there are several plants capable of yielding oils. Very little use is, however, made of them for this purpose.

LINEÆ.

Linum usitatissimum, Dalz. & Gibs. Bby. Fl. Suppl. 16. The well-known common flax plant, called *tisi* or *alsi*.

Linseed yields 22 per cent. of oil, the remaining 78 per cent. of crushed seed or cake being very useful for fattening cattle. Linseed oil burns 11 per cent. longer than olive oil, and is a good drying oil, being, therefore, in request among painters. Indian linseed oil being, however, mixed with mustard oil, is not so much prized as the foreign. This adulteration is inseparable almost from Indian oil, as the flax and mustard are always cultivated side by side in the same field. Linseed is used for a variety of purposes. It is a demulcent useful in diarrhœa, catarrh, dysentery and visceral obstructions (Ainslie). A decoction of the seeds is employed with advantage in the shape of enema in abrasions of the intestines. When mixed with lime water the oil is a favourable application (Carron oil) to burns and scalds. It is one of the chief ingredients in painter's inks and oil varnishes. It may be either expressed cold, or by first heating the seeds to about 200° and then crushing them. The oil obtained by the latter method has a disagreeable smell and brownish colour. Large quantities of flax are annually imported into England from foreign parts. Russia sent in 1872 £3,000,000 worth, India £1,144,942, Germany £144,108. The total quantity imported was 1,514,947 quarters. Bombay exported in 1879-80 539,182 cwts. valued at Rs. 36,10,165.

MELIACEÆ.

Melia azadirachta, Hook. Fl. Ind. i. 544. Better known under its other name *Azadirachta Indica*, Dalz. & Gibs. Bby. Fl. 36. *Nimb*.

Oil-yielding Plants.

From the pericarp of the seed an acrid, bitter oil, called "Margosa oil", is obtained which is considered to be useful in leprosy and is, moreover, anthelmintic and stimulant, being used externally in cases of bad ulcers and as a liniment in headaches and rheumatic affections. The oil may be obtained either by expression or by boiling and is also used for burning and in imparting colour to cotton cloths, as it has itself a deep yellow dye. A large quantity of it is exported annually from Madras to Ceylon. (*See* Timber Trees.)

CELASTRINEÆ.

Celastrus paniculata, Dalz. & Gibs. Bby. Fl. 47. Staff tree, *malkungani, kanguni.*

A tall, scandent, unarmed shrub with small yellow flowers in terminal panicles.

Common on the ghâts and the hilly parts of the Konkan. From the seeds an empyreumatic oil is obtained to which Dr. Herklots gave the name of "Oleum nigrum", and which he employed in the treatment of "beri-beri", in the early stages of which disease it is, no doubt, highly beneficial. It has stimulant properties, and is administered in emulsion in doses of a few drops daily, its introduction into the system being followed in a few hours by free diaphoresis unattended by subsequent exhaustion. The natives call the oil "Kanguni tel".

SAPINDACEÆ.

Sapindus emarginatus, Dalz. & Gibs. Bby. Fl. 35, or *S. trifoliatus*, Hook. Fl. Ind. i. 682. Soapnut tree, *rhita.*

From the seeds an oil is obtained which the natives suppose to possess medicinal virtues, and use externally. The capsule is too well known for its detergent properties producing suds when agitated with water. (*See* Timber Trees.)

ANACARDIACEÆ.

Anacardium occidentale, Dalz. & Gibs. Bby. Fl. Suppl. 18. Cashewnut tree, *kaju.*

Two oils are obtained from this plant: one black and acrid from the pericarp of the nut, which is rubefacient and vesicant, and is used to floors, wooden rafters, etc., to prevent the ravages of the white ant; and the other from the kernel, which is remarkably sweet, edible and wholesome, and might be employed for pharmaceutical purposes. (*See* Timber Trees.)

Semicarpus anacardium, Dalz. & Gibs. Bby. Fl. 52. Marking nut tree, *biba, bilama.*

This plant also yields two oils like the preceding. The oil of the pericarp is used to remove rheumatic pains, aches, and sprains, and is said to be useful in leprosy and scrofula;—that of the kernels is also useful in sprains and rheumatism. Undiluted it is said to act as a blister. (*See* Timber Trees.)

Buchanania latifolia, Dalz. & Gibs. Bby. Fl. 52. *Pyal, chároli.*

From the kernels "cheronji oil" is obtained. It has a pale straw colour and is seldom utilized. A black varnish, similar to that of the cashew-nut and other trees of this order, is likewise procured from the pericarp of the nuts of this plant. (*See* Timber Trees.)

LEGUMINOSÆ.

Arachis hypogœa, Dalz. & Gibs. Bby. Fl. Suppl. 27. *Bhuimung* or *bhuising.*

An annual, the nuts of which are good for eating and wholesome, and yield 50 per cent. of their weight of an oil considered fit for use for all purposes for which almond and olive oil are employed. This oil does not become easily rancid and has, therefore, been introduced into the Pharmacopœia of India as a basis for ointments. In Calcutta it is used for adulterating gingelly and other oils and for making soaps, but it can be employed for lubricating the most delicate machinery even. French chemists convert it into a very fine imitation of Lucca oil.

Pongamia glabra, Dalz. & Gibs. Bby. Fl. 77. *Karunj.*

From the seeds an abundance of oil is obtained by expression which is used by the poorer classes in lamps, and is also an efficient application in scabies and other cutaneous affections. It is said to have been used with benefit in mange. (*See* Timber Trees.)

Wagatea spicata, Dalz. & Gibs. Bby. Fl. 80. *Wakiry, wagati.*

An annual climber with tapering spikes 1-2 feet long, of scarlet and orange-coloured flowers and legumes constricted between seeds. Common in the Konkan jungles.

An oil used in lamps is procured from the above.

At the exhibition of 1852 in London, oils from the following were shown :—

Abrus precatorius, Dalz. & Gibs. Bby. Fl. 76. *Gunj*, a climbing shrub.

Butea frondosa, Dalz. & Gibs. Bby. Fl. 71. *Palas.* (*See* Timber Trees.)

Cæsalpinea bonducella, Hook. Fl. Ind. ii. 254.—*Guilandina bonducella*, Dalz. & Gibs. Bby. Fl. 79. *Ságargota.* (*See* Timber Trees.)

Pithecolobium dulce, Hook. Fl. Ind. ii. 302.—*Inga dulcis*, Dalz. & Gibs. Bby. Fl. Suppl. 25. *Vilaiti ámli, chinch.* (*See* Timber Trees.)

Trigonella fœnum-grœcum, Dalz. & Gibs. Bby. Fl. Suppl. 21. *Methi.*

Dolichos biflorus, Hook. Fl. Ind. ii. 210.—*D. uniflorus*, Dalz. & Gibs. Bby. Fl. Suppl. 23. *Kulith.*

Dalbergia sisso, Dalz. & Gibs. Bby. Fl. Suppl. 24. *Sissu.* Oil is extracted from the wood.

Oil-yielding Plants.

That from the bonduc or *sagargota* nut seems to be only one used medicinally.

MORINGACEÆ.

Moringa pterygosperma, Dalz. & Gibs. Bby. Fl. 311. Indian horse-radish, *sujna*, *mungay*, *segat*.

A well-known tree, the flowers, pods, and leaves of which are eaten by the natives. The root is said to have medicinal properties, and is a valuable rubefacient. The pods contain about 15 seeds, which when deprived of their 3-winged envelope look like pith-balls. These balls contain about 24 per cent. of a clear, colourless, tasteless and scentless oil, called "Ben oil", which might be kept a long time without becoming rancid, and is, therefore, well adapted for the use of the perfumer and watchmaker. (*See* Timber Trees.)

M. aptdera, another species indigenous to Africa, also yield "Ben oil".

COMBRETACEÆ.

Terminalia Bellerica, Dalz. & Gibs. Bby. Fl. 91. The Belleric myrobalan.

Oil obtained from the seeds of this is considered a good application to the hair. (*See* Timber Trees.)

Terminalia catappa, Dalz. & Gibs. Bby. Fl. Suppl. 33. Indian almond tree.

The seeds yield a straw-coloured oil which becomes turbid by keeping. When fresh it has a pleasant taste and is edible. The cake is a good feeding for pigs. From the milk of the young leaves an ointment is prepared useful in scabies, leprosy and other cutaneous affections. The juice of the leaves is said to be useful in headache and colicky pains. (*See* Timber Trees.)

Terminalia chebula, Dalz. & Gibs. Bby. Fl. 91. The chebulic myrobalan.

Dr. Birdwood states that an oil is obtained from this plant, but does not tell us to what purposes it is applied. (*See* Timber Trees.)

CUCURBITACEÆ.

Cucumis sativus. Cucumber, *kakri*.

The seeds yield a sweet edible oil which is seldom extracted.

Cucumis melo. Melon, *tarbuj*.

From the seeds of this a similar oil is obtained.

Cucurbita pepo. White gourd or pumpkin, *kaula*.

The oil from the seeds of this is considered to be anthelmintic by American authors.

COMPOSITÆ.

Carthamus tinctorius, Dalz. & Gibs. Bby. Fl. Suppl. 45. Bastard safflower, *kasumb*, *kardai*.

This plant is widely cultivated in Europe and Asia from its yielding a dye used for colouring silks. The seeds yield 28 per cent. of a light-yellow oil possessed of drying properties, and useful for culinary purposes and for lamps. This oil is supposed to be the Macassar oil of European perfumers, and although not exported, large quantities of the seed are sent to Liverpool and London.

Guizotia Abyssinica, Cas. in Dicc. Sc. Nat. 59-248.—*G. oleifera*, Dalz. & Gibs. Bby. Fl. 128. *Ramtil, kalátil.*

Extensively cultivated on account of its seeds, which yield 35 per cent. of a sweetish oil, which is very cheap, and resembles gingelly oil. It is used in lamps and for culinary purposes by poor people.

Helianthus annuus, Roxb. Fl. Ind. iii. 443. Sun-flower plant, *brahmok* (Mar.), *suraj maka.*

Every part of this plant has been applied to some useful purpose. Planted on swampy soils, where it grows without any care, it is a protection against intermittent fevers. The seeds yield 15 per cent. of an oil of superior quality used for edible purposes, for lubricating machinery and for mixing colours which artists employ; the pressed residue or cake forming a good, fattening, wholesome food for cattle. When shelled and ground, in place of being crushed for oil, it produces the finest and most palatable of all flour for the preparation of tea-cakes and other fancy bread, for which purpose it is largely used in Spain; and those who have resided in that country will have observed the peculiarly rich and yellowish tinge upon the best bread supplied to them there, which agreeable peculiarity is derived from the flour used. For this and other purposes it has from time to time been imported in considerable quantities into England. The leaves and stalks are good fodder for cattle and poultry of all kinds, though the stalks when reduced to fibre are much more profitable for the manufacture of paper.

It is said that the sun-flower is extensively cultivated in China, where from the stalk is extracted a fine fibre with which silk is adulterated. Each main head of flowers yields about 800 to 1000 seeds, and the collateral ones 50—60 each.

SAPOTACEÆ.

Bassia latifolia, B. longifolia, Dalz. & Gibs. Bby. Fl. 139. *Mowah.*

A large tree which attains the height of 40—60 ft. From the seeds a greenish-yellow oil is obtained by expression which unscrupulous Banias employ to adulterate ghee (clarified butter) with in some parts of India. The seed-cake is stated to be useful for poisoning fish, and its smoke to act as an insecticide, and to kill smaller animals like rats, etc. (*See* Timber Trees.)

PEDALINEÆ.

Sesamum Indicum, Dalz. & Gibs. Bby. Fl. 161. Gingelly oil plant, *til, krisha-til, barik-til.*

Oil yielding Plants.

Extensively cultivated every where on account of its seeds, which yield 45 to 50 per cent. of oil. This oil, which was used in Europe in the days of Pliny instead of olive oil, has a light-yellow colour, a mild agreeable taste, scarcely any smell, and is used in lamps and cookery. It keeps for years without becoming rancid, and in Japan it substitutes butter in frying fish and other purposes. The cake, left after the expression of the oil, is very good fodder for fattening cattle. The seeds are abundantly used in native confectionery mixed with sugar or jaggri; or, roasted and ground into meal, are eaten. Large quantities of it are annually exported to Europe. The exports from Bombay in 1879-80 amounted to 511,368 cwts. valued at Rs. 40,63,241.

Gingelly seeds of commerce are of two kinds, one white and the other black, the white variety being the rarer of the two. The black seed or *kalá-til* must be carefully distinguished from that of *Guizotia Abyssynica*, which also bears the same vernacular name.

The following mode of extraction of the oil is given in the Jury Reports of the Madras Exhibition:—"The method sometimes adopted is that of throwing the fresh seeds, without any cleansing process, into the common mill, and expressing in the usual way. The oil thus becomes mixed with a large proportion of the colouring matter of the epidermis of the seed, and is neither so pleasant to the eye nor so agreeable to the taste as that obtained by first repeatedly washing the seeds in cold water, or by boiling them for a short time, until the whole of the reddish-brown colouring matter is removed, and the seeds have become perfectly white."

The black seeds yield the largest percentage of oil. The oil from both kinds of seeds sells at the same price, the average being from 3 to 4 rupees per maund of 25 lbs.

EUPHORBIACEÆ.

Aleurites Moluccana, Bedd. Fl. Sylv. t. 276.—*A. triloba*, Dalz. & Gibs. Bby. Fl. Suppl. 76. *Akhrut*, Indian or Belgaum walnut.

The nut is palatable, and 31½ pounds of it yield, with very little labour, 10 gallons of a clear oil considered a good substitute for rape seed oil, and fit for employment in the manufacture of candles. (*See* Timber Trees.)

Ricinus communis, Dalz. & Gibs. Bby. Fl. Suppl. 78. Castor-oil plant, *erandie* (Dec.)

There are two species, the large and small seeded. The former yields a heavy, disagreeable, dark-coloured, gross oil which is only fit for burning. The medicinal oil is extracted from the smaller seeds, either with or without the aid of heat, the last being more esteemed as it is paler and cleaner. For domestic use the oil may be obtained by taking, say, 5 sers of the small castor-oil seed, soaking them in cold water for one night, next morning straining off the water, and putting the seeds in fresh water and boiling them for about two hours, then again straining the water off. The seeds must now be dried for three days in the sun, bruised in a mortar

and set to boil with the addition of ten measures of water, the whole being constantly stirred till all the oil comes up to the top; it may now be strained off, and on cooling is fit for use. Castor-oil is not only purgative, but also used by the Hindus as an external application in skin-diseases. Large quantities of the oil and seed are exported to Europe. In 1872-73 Bombay sent to Genoa 1350 cwts. seeds and 352 gallons of oil.

Jatropha curcas, Dalz. & Gibs. Bby. Fl. Suppl. 77. Physic nut, *Arabi* or *Mooglai erundie, Japal erundi.*

A hedge plant well known to school-boys on account of its juice, which seems to contain caoutchouc, and which is easily blown into bubbles. The seeds yield on expression 30 per cent. of a colourless or pale-yellow oil, which has purgative properties. 12 to 15 drops of this oil are said to be equal in action to an ounce of castor-oil, but the effect is uncertain. The seeds act as an acro-narcotic poison. The diluted oil forms a useful embrocation in chronic rheumatism. It has received the name of seed oil, and has within the last few years been brought to notice as a substitute for olive oil in dressing woollen cloths. It is a good drying oil, and the Chinese employ it in conjunction with oxide of iron in the preparation of a varnish.

PALMÆ.

Cocos nucifera, Dalz & Gibs. Bby. Fl. 279. Cocoanut tree, *naril.*

Every body is acquainted with the manifold useful purposes for which this palm is applied. An old writer said that this tree was alone sufficient to build, rig, and freight a ship with bread, wine water, oil, vinegar, sugar and other commodities. The leaves are used for thatching roofs; the thick stem makes picture frames and other articles of furniture; the shell of the nut is made into curiosities. The husk boiled in water is used in fevers; that of the green nut is an anthelmintic. The cabbage or terminal bud makes a fine pickle. The spathes yield toddy used for conversion into *jaggri*, vinegar, or *arrack* spirit. The fibres of the husk constitute the coir of commerce. The kernel yields oil, which, besides being used in lamps and cookery, is exported in enormous quantities for employment in soap and candle manufacture. It is also sometimes prescribed medicinally in cases where cod-liver-oil is indicated. Some idea of the enormous quantity of cocoanut oil exported from India may be formed from the fact that from Travancore alone about 1063 candies of oil, besides 20,000 candies copra and above 5 million nuts are shipped annually to various ports. To obtain the oil the kernel is divided into pieces and placed on a shelf with a charcoal fire underneath to dry them. After two or three days they are placed on mats and kept in the sun to dry, when they are fit for the press. A hundred nuts yield in this manner about 2½ gallons of oil; but, since the introduction of steam presses, the yield has considerably increased. The cake is capital food for animals, and is said to be also a very superior kind of manure.

Oil-yielding Plants.

VOLATILE OILS.

ANONACEÆ

Uvaria narum, Dalz. & Gibs. Bby. 1. 3.

A climbing shrub, which is a native of the Konkan, Mátherán and Travancore, and bears flowers, at first brownish-green, but which subsequently become reddish. The anthers are yellow, and an unctuous secretion exudes from them. From the roots a sweet-scented medicinal oil is extracted on the Malabár Coast.

RUTACEÆ.

This order, of which the orange is a well-known product, furnishes oils of considerable value. The various species of the genus *Citrus* were originally of Asiatic origin, but are now extensively cultivated throughout temperate Europe also. Oils are procured from the rind, leaves and flowers, principally in Italy and France. The industry is, however, one that can hardly be expected to flourish in India, where the sale of the fruit, which is produced in comparatively small quantity, will be found to be more profitable than its use for the extraction of oil. Small quantities of oil are, however, obtained from the following :—

Murraya Koenigii, Hook. Fl. Ind. i. 503.—*Bergera Koenigii*, Dalz. & Gibs. Bby. Fl. 29. *Khari nimb* (Mar.)

An oil extracted from this is used medicinally.

Zanthoxyllum Rhetsa, Dalz. & Gibs. Bby. Fl. 45. *Cherphal tephli* (Goa.)

The seeds yield an oil which is highly aromatic, and is possessed of medicinal virtues. Being very expensive it is seldom extracted. It may, however, be sometimes met with at Goa.

Atalantia monophylla, Dalz. & Gibs. Bby. 28. *Makur-limboo, makri.*

A medicinal oil esteemed by the natives is obtained from this plant.

Ægle marmelos, Dalz. & Gibs. Bby. Fl. 31. *Bela* (Mar.)

From the flowers a scented water is distilled in Southern India.

ROSACEÆ.

Rosa, Dalz. & Gibs. Bby. Fl. Suppl. 31. *Gulâb* (Mar.)

The several varieties of the rose all yield, or are capable of yielding, rose water and *attar* or otto. In Ghazipore the distillation of rose water is an industry that engages a large portion of the population—men, women and children, the value of the roses grown in that district amounting to about 15,000 to 20,000

Rs., and the profit made by their distillation to Rs. 40,000. A thousand roses yield 1½ ser of rose water, but it is estimated that a tola of the attar requires one lac of flowers. This attar, which is pure (that sold in the bázár is always adulterated with sandal-wood or geranium oil or roosa-oil) is sold at 50 to 60 Rs. per tola, and is not exported, being barely sufficient to meet the demands of native princes and magnates. It congeals at 20° C. The method of obtaining the oil and water employed at Ghazipore is of the most primitive kind and involves much wastage. An account of it may be found in Dr. W. W. Hunter's Statistics of Bengal. Improved methods would, no doubt, increase both the yield as well as the profits. The natives consume large quantities of rose water on occasions of marriage festivals, and use it also in their sweetmeats.

UMBELLIFERÆ.

Carum copticum, Hook. Fl. Ind. ii. 682.—*Ptychotis ajowan*, Dalz. & Gibs. Bby. Fl. Suppl. 41. The *ajowan*, *owá*, or *oomum* plant, Bishop's weed.

An annual cultivated all over India the seeds of which yield a volatile oil, colourless at first, but which soon acquires a yellow tinge. It has the odour of the fruit, and an acrid burning taste, and is used as a stimulant, carminative and antispasmodic.

Ptychotis montana, a common plant in the hills of the Konkan.

The seeds yield oil, which is used in rheumatism.

SAPOTACEÆ.

Mimusops elengi, Dalz. & Gibs. Bby. Fl. 140. *Wowli* (Mar.), *bacul mulsari* (Hind.)

A tree common to the whole of India, the flowers of which contain a volatile oil from which a sweet-scented water is distilled. The seed also contains oil. (*See* Timber Trees.)

OLEACEÆ.

This order supplies us with some of the most sweet-scented of our garden plants, such as—

Jasminum sambac, Dalz. & Gibs. Bby. Fl. 137. *Mogra.*

Jasminum latifolium, Dalz. & Gibs. Bby. Fl. 138. *Kusser.*

Nyctanthes arbortristis, Dalz. & Gibs. Bby. Fl. Suppl. 51. *Parijatukk.*

And several other jasmines from all of which we may distil the volatile oils, or, if they are fugaceous, employ them for scenting some of the fixed oils. (*See* Timber Trees.)

Olea fragrans, Dalz. & Gibs. Bby. Fl. Suppl. 50.

Introduced from China, and used for perfuming teas.

Oil-yielding Plants.

LABIATÆ.

In this order, instead of the English thyme, lavender, rosemary, mint, &c., we have—

Ocimum sanctum, Dalz. & Gibs. Bby. Fl. 204. The sacred *tulsi* (Mar.) used in Hindu worship.

Ocimum basilicum, Dalz. & Gibs. Bby. Fl. 203. Sweet basil, *firanjmushk* (Pers.) which possesses a fragrant camphoraceous taste, and is used for its supposed stimulant, diaphoretic and expectorant virtues.

Ocimum pilosum. *Tukhm-i-rahan* (Mar.)

Used as a demulcent in catarrh and for the relief of after-labour pains.

Ocimum gratissimum, Dalz. & Gibs. Bby. Fl. 203. *Tulsi-bija, tulsi bij.*

Considered to be useful in the aphthæ of children.

Micromeria Malcolmiana, Dalz. & Gibs. Bby. Fl. 209. Possessed of all the aromatic and carminative properties of peppermint.

Anisomeles Malabarica, Dalz. & Gibs. Bby. Fl. 210, or *Gul-i-gaozaban*, than which few plants are more appreciated by the natives; an infusion of the bitter aromatic leaves being useful as a stomachic, and the oil distilled from them being considered an effective application in rheumatism.

Pogostemon patchouli, Dalz. & Gibs. Bby. Fl. Suppl. 66. *Patcha* (Mar.), the tops of which were at one time used for scenting Cashmere shawls exported to Europe, and are now left in our cupboards for the like purpose.

Lavandula Burmanni, Dalz. & Gibs. Bby. 207. *Gorea* (Mar.)

Very common in Poona and the Deccan. And many other highly aromatic plants common in India might be utilized in substitution for oils received from Europe.

LAURACEÆ.

Cinnamomum Zeylanicum, D. C. Prod. xv. 1-13. *Dara chini* (Mar.)

The bark is met with in the bázár in closely rolled quills of a light-yellowish brown colour and fragrant smell. This smell is due to the presence of a volatile oil possessed of aromatic, carminative and stimulant properties which is much used in medicine. A drop or two introduced into a carious tooth is found useful in relieving toothache. (*See* Timber Trees.)

SANTALACEÆ.

Santalum album, Dalz. & Gibs. Bby. Fl. 224. White sandal-wood or *safed chandan.*

This tree is well known for its fragrant wood, the distillation of which yields 3 per cent. of a fragrant oil which is a perfect substitute for copaiba. The part of the wood nearest the root yields the best oil. The wood rubbed in water is used as an application to erysipelatous inflammations and cutaneous affections, and allays the itching. (*See* Timber Trees.)

PANDANACEÆ.

Pandanus odoratissimus, Dalz. & Gibs. Bby. Fl. 279. The screw pine, *kewra* (Mar.).

A well-known bushy shrub with long imbricated leaves, the margins of which are armed with fine sharp spines. The sexes on separate bushes. Fruit like a pine apple. The bracts are very fragrant, and an oil, called *kewra oil*, is distilled from them. The perfume is chiefly extracted from the male flower bracts. The oil impregnated with the odour of the flower bracts, and the water distilled from them called *kewra-arak*, are esteemed stimulant and antispasmodic, and employed in headache and rheumatism. A medicinal oil is also prepared from the roots.

GRAMINEÆ.

The scented grasses are grown and cultivated throughout the Presidency. The following are frequently met with :—

Andropogon nardoides, Dalz. & Gibs. Bby. Fl. 302; Linn.

The grass which yields the oil of *citronella*, and is cultivated in Ceylon, where it reaches the height of 6 to 7 ft. This oil has a light-greenish colour, and is exported to Europe. It is used in medicine for the same purposes as the lemon grass or verbena grass oil.

Andropogon Schœnanthus, Dalz. & Gibs. Bby. Fl. Suppl. 99; Linn.; which yields oil known as lemon oil.

This oil is used in Turkey for adulterating otto of roses. Before being mixed with the attar it is shaken with water acidulated with lemon juice, and then exposed to the sun and air. This process gives to the oil a pale straw colour and deprives it of its penetrating after smell. A large quantity of grass oil added to the attar prevents the congelation of the latter.

Andropogon Iwarancusa, Roxb.; Dalz. & Gibs. Bby. Fl. 301.

It is found at Ahmedabad and Karáchi. It yields an oil named *cusha* oil.

The oil-yielding grasses of India require careful examination. It appears to me that *Andropogon Martini* of Roxburg and *A. nardoides*, found in Khándesh and parts of the Deccan, are varieties of *Andropogon Iwarancusa*.

Andropogon muricatus, Dalz. & Gibs. Bby. Fl. 302. *Khus-khus* (Mar.)

This grass is well known from its fragrant root used for making *tatties*. No oil, however, appears to be extracted from it.

FIBROUS PLANTS.*

The Bombay Presidency produces a large number of plants that yield fibre for conversion into strings and ropes, or suitable for paper manufacture.

ANONACEÆ.

Unona pannosa, Bedd. For. Sylv. An. Gen. ix.

The inner bark gives strong fibre adapted for cordage and paper-making.

BIXINEÆ.

Bixa orellana, Dalz. & Gibs. Bby. Fl. Suppl. 5. *Kesri, shendri, arnotto.*

From the bark of this plant cordage is made in the West Indies. This is a tall shrub or small tree with cordate leaves on long petioles, flowers in terminal panicles, pale, purple, or white; capsules prickly. The red pulp which covers the seed is called *arnotto* and is used for colouring cheese.

MALVACEÆ.

This order contains numerous plants, the inner bark of which yields fibre.

Thespesia populnea, Dalz. & Gibs. Bby. Fl. 18. *Bendi.*

The bark yields coarse fibres adapted for paper.

Hibiscus cannabinus, Dalz. & Gibs. Bby. Fl. 20. *Ambari.*

It is cultivated for its capsule, which is used as a vegetable. An annual or perennial, stem glabrous, prickly, leaves lower cordate, upper deeply palmately five-partite, segments narrow, lanceolate, acuminate, serrate, petiole prickly. Stipules pointed. Flowers axillary, yellowish, with a crimson centre, sepals bristly.

The fibres of this plant—which are prepared by steeping the stems in water, are hard, and more remarkable for strength than for fineness—might be considerably improved by care. A line made of them, 4 ft. long, sustained, when dry, a weight of 115 lbs.; in the wet state its tenacity was greatly increased, and it bore a strain of 133 lbs. Is only adapted as a mixture for the commoner description of paper.

* These notes are a summary of an unpublished paper written for another purpose.

Hibiscus mutabilis, Dalz. & Gibs. Bby. Fl. 1. The changeable rose, or "*amor inconstante*" (inconstant love) of the Portuguese.

A tall shrub common in gardens.

Hibiscus (Abelmoschus) esculentus, Dalz. & Gibs. Bby. Fl. Suppl. 7. *Bhendy.*

A much cultivated esculent. A line made from the fibres of this sustained, when dry, a weight of 79 lbs., and when wet of 95 lbs. This fibre is rougher than that of *H. cannabinus*, and therefore, adapted for conversion into paper.

Hibiscus tiliaceus, Roxb. Fl. Ind. iii. 192.—*Paritium tiliaceum*, Dalz. & Gibs. Bby. Fl. 17.

A tree met with in Bombay wild and in gardens, of the inner bark of which in Otaheite, matting, lines for fishing and ropes are made, and which in the West Indies is sucked in times of famine.

Hibiscus furcatus, Dalz. & Gibs. Bby. Fl. 19.

A prickly plant the bark of which is also full of strong white fibres possessed of considerable tenacity. A dry line made from them broke at 89 lbs. and a wet one at 92 lbs.

Hibiscus Surratensis, Dalz. & Gibs. Bby. Fl. 20. *Rhan bhendy*, the bark of which also yields strong fibre.

Hibiscus sabdariffa, Dalz. & Gibs. Bby. Fl. Suppl. 7. *Roselle* plant.

From the bark of this, when the stem is cut while the plant is in flower, a fine and silky fibre may be obtained. Of the calyces and capsules freed from the seed jellies and tarts are made.

Another Malvaceous plant, which has of late attracted much attention is—

Malachra capitata or rotundifolia, Dalz. & Gibs. Bby. Fl. Suppl. 9.

An annual or perennial, prickly. Leaves orbicular, and rather angled 5-6 in. broad. Stipules narrow. Flowers small, yellow, in axillary or terminal heads. Fruits nearly globose, depressed.

This plant is said to have been introduced into India from Brazil; it now grows and thrives everywhere, attaining in good situations the height of 4-9 ft. The fibre has a silvery appearance with a peculiar lustre, and is almost as soft as silk. In passing the fibre through the machinery damped with oil and water, as is commonly done with Konkan jute, yarn was produced strong enough and nearly equal to that made from the second quality of Bengal jute. If the plant is carefully grown and well looked after, the fibre would, no doubt, rank fully equal to Bengal and Bombay *jute*. Owing to the high prices ruling for *jute* in Bengal and elsewhere the new fibre, if carefully prepared, would command a ready sale at Rs. 3-12-0 to Rs. 4 per Indian maund. But it is not so valuable for spinning as *jute*, being harsh, and lacking the forked ends of the latter.

Fibrous Plants.

Abutilon Indicum, Dalz. & Gibs. Bby. Fl. 18.

Belonging to the same family, also yields good fibre. It is a tall herbaceous plant, 3-5 ft. high, known at Goa, Málva and Bengal as *petari* (a name given also to an euphorbaceous plant, *Trewia nudiflora*) and in Bombay as *mudmi* and sometimes as *kangai* (comb). Other species of this genus also furnish good fibre.

Urena lobata and **Urena sinuata**, Dalz. & Gibs. Bby. Fl. 18.

The latter known at Málvan and Goa as *tupkoty*, both supplying a material fit for conversion into cordage and paper.

Sida carpinifolia, D. C. Prod. i. 460.—*Sida acuta*, Dalz. & Gibs. Bby. Fl. 17.

Pat, called *chá* (tea plant) at Goa, and the several species of this genus all of which abound in very tough and strong fibres, which are easily made into ropes, and are also fit for the manufacture of paper.

Then again we have the cotton plant. Although merchants deal in a large number of cottons, there are, as a matter of fact, only four species of the genus *Gossypium*, with their varieties, which are recognized by botanists, *viz.* :—

Gossypium Stocksii, Hook. Fl. Ind. *i*. 349.

Found wild in Sind.

Gossypium herbaceum, Dalz. & Gibs. Bby. Fl. Suppl. 8.

Cultivated all over India, and having four varieties—

G. obtusifolium, Roxb. Fl. Ind. iii. 183.

G. hirsutum, Roxb. Fl. Ind. iii. 185.

G. religiosum, Dalz. & Gibs. Bby. Fl. Suppl. 8.

G. vitifolium, Roxb. Fl. Ind. iii. 186.

Gossypium arboreum.

Found in the plains of India and in gardens; not generally cultivated.

Gossypium Barbadense, Roxb. Fl. Ind. iii. 187.

It is cultivated, and yields the several American varieties. Of this form we have the variety—

G. acuminatum, Dalz. & Gibs. Bby. Fl. Suppl. 8.

It is usually larger in foliage than the other varieties and species. The natives call the cotton plant *kappas* or *kapus*.

The white hairs obtained from the capsules are known all the world over from the many domestic and manufacturing uses to which they are applied. The sacred thread of the Bráhmans must, according to the institutes of Manu, be made of cotton only, and Zoroaster enjoined on his followers the use of the cotton *sadra*, and on the priesthood the white cotton turban as symbolic of their holy calling and of the pure lives they were expected to lead. Besides the hairs obtained from the capsules of the cotton plant, fibres may also be extracted from the bark of the stem, which are fit for conversion into cordage and paper.

Kydia calicyna, Dalz. & Gibs. Bby. Fl. 24. *Warung.* Also yields excellent fibre.

Adansonia digitata, Dalz. & Gibs. Bby. Fl. Suppl. 9. *Gorik-chinch, gorak-ambla, baobab.*

Contains fibres fit for cordage and for the manufacture of paper.

Eriodendron anfractuosum, Dalz. & Gibs. Bby. Fl. 22.

Yields an excellent, clean, white fibre adapted for rope and paper-making.

STERCULIACEÆ.

In this order, which is allied to the *Malvaceæ*, we find the following fibre-yielding plants :—

Sterculia guttata, Dalz. & Gibs. Bby. Fl. 23.

A large tree common along the ghâts, yielding seeds the size of a chestnut which are roasted and eaten by the natives.

The tree is known to them by the name of *kukar* or *goldar*. Cloth is manufactured from the bark of this tree at Malabár in the following manner :—The tree is felled, its branches lopped, the trunk cut into pieces, 6 ft. long, a perpendicular incision is made in each, the bark opened, taken off entire, chopped, washed, and dried in the sun. In this state it is used for clothing. The tree is not cut for this purpose till the tenth year. The fibres are well adapted for cordage and for coarse paper.

Sterculia colorata, Dalz. & Gibs. Bby. Fl. 23. *Khowsey* or *bheekhol.*

A large tree, found in the jungle tracts of the Konkan, which also yields fibre.

Sterculia villosa, Dalz. & Gibs. Bby. Fl. 22. *Gul-kandar.*

A large tree growing in the Konkan, Vengúrla and Kánara, from the bark of which ropes and bags are made in Goa and Kánara.

Sterculia urens, Dalz. & Gibs. Bby. Fl. 23. *Kavali* or *kandul.*

Also a large tree furnishing fibres as good as those of the preceding, and a gum resembling and used as a substitute for tragacanth.

Sterculia fœtida, Dalz. & Gibs. Bby. Fl. Suppl. 10. *Jungly badám, poón* or mast-tree, *deodar* of the natives of Bombay.

A tall straight tree, the trunk of which is used by the natives for masts.

Helicteres isora, Dalz. & Gibs. Bby. Fl. 22. *Muradsing, kwaan, kiwani, dhamni*, or screw-tree.

A tall shrub or small tree. Flowers bright red and showy, appear in the rains, carpels five, screw-like, twisted together. The fibres are used in the manufacture of ropes ; they are very coarse.

Guazuma tomentosa, Dalz. & Gibs. Bby. Fl. Suppl. 11.

The *bastard cedar* of American origin and common in Bombay. The inner bark yields good strong fibre.

Fibrous Plants.

TILIACEÆ.

In this order, which is also allied to the two preceding, several fibre-yielding plants are to be met with.

Grewia tiliæfolia, Dalz. & Gibs. Bby. Fl. 26. *Daman.*

Grewia microcos, Dalz. & Gibs. Bby. Fl. 26. *Shiral, ansale.*

It bears fruit of a blackish purple colour, eaten by the natives.

Grewia Asiatica, Dalz. & Gibs. Bby. Fl. 26.

Cultivated on account of its gratefully acid fruit called *phalsi.*

Grewia polygama, Dalz. & Gibs. Bby. Fl. 26. *Gowli* or *gœwali.*

Common in Sálsette and the ghâts. The other species of *Grewia* also yield good fibres.

Triumpheta angulata, Dalz. & Gibs. Bby. Fl. 25.

T. rotundifolia, Dalz. & Gibs. Bby. Fl. 25. Called at Málvan and Goa *tupcoty.*

It might be utilized for the same purposes as *Grewia oppositifolia,* of the inner bark of which the Himalayan natives make ropes and coarse cloth.

But the most important plant belonging to this order is

Corchorus capsularis, Dalz. & Gibs. Bby. Fl. 25. The *jute* plant.

An annual. Leaves oblong, acuminate, coarsely toothed, base generally prolonged into tail-like appendages. Flowers small, yellow. Capsule truncate, wrinkled, muricated, 5-celled. Seeds few in each cell.

Common throughout India. Jute is an article that has begun to figure in commerce only during the last quarter of a century. About that time barely 5000 tons of it were imported annually into England; forty years ago the imports were nil. At present England imports, on an average, 300,000 tons of the fibre annually, and all this enormous quantity and more is produced in India, whence it is also sent to other parts of Europe and America. The fibres of *C. capsularis* are remarkable for their strength: a line 4 ft. long made from them sustained, when dry, a weight of 143 lbs., and when wet of 146 lbs. Similar to it is

Corchorus olitorius, Dalz. & Gibs. Bby. Fl. 25.

An annual. Leaves ovate, acuminate, 3-5 nerved, serrated, the two lower serratures prolonged into long sharp points. Flowers yellow, pedunclos 1-3-flowered. Capsules nearly cylindrical, elongated, 10-ribbed, 10 to 12 times longer than broad, with sometimes 5 terminal points.

Commonly cultivated as a pot herb, and for its fibres; also called jute. These filaments are, however, not so thin as those of the foregoing, nor so strong. A dry line made from them sustained only 113 lbs., and a wet one 125 lbs. The natives are said to use the leaves and tender shoots of this plant for making salad.

LINEÆ.

Fibrous Plants.

In this order we have the following very common and extensively cultivated plant:—

Linum usitatissimum, Dalz. & Gibs. Bby. Fl. Suppl. 16. *Alsi*, the common flax plant.

An annual. Stem 2-4 ft. high, erect, branched above, simple below. Leaves narrow, lanceolate. Flowers blue-coloured, 1-in. diam. Capsule 5-celled.

The plant yields excellent filaments, but unfortunately they are utilized in few places for commercial purposes, in this country the cultivation being carried on more with a view to producing a large crop of the seed from which linseed oil is obtained, than for the fibre.

RHAMNACEÆ.

Represented by only one small shrub,

Ventilago Madraspatana, Dalz. & Gibs. Bby. Fl. 48. *Lakandi kanvail.*

From the bark of this cordage is made. Rumphius says that the Amboyna fishermen use the flexile stems of it instead of ropes.

LEGUMINOSÆ.

This order is represented by a few fibre-yielding plants, although it supplies us with a large quantity of beans, grains, medicines, dyes and timbers. The plant best known is

Crotolaria juncea, Dalz. & Gibs. Bby. Fl. 54. The hemp; *sunn* or *tag* as it is called by the natives.

Annual, stem erect, 4-8 ft. high, slightly striated, and more or less clothed with shining silky pubescence. Stipule and bracts setaceous. Leaves scattered, narrow, lanceolate, obtuse, mucronate, 2-6 in. long by ½ in. broad. Racemes terminal. Flowers papilionaceous, large, of a beautiful bright-yellow colour; calyx densely covered with rusty tomentum. Pod club-shaped, 2 in. long, broader upwards, twice the length of the calyx, downy. Seeds numerous, kidney-shaped.

It is hardly necessary here to enter into a description of the various methods of extracting the *sunn* fibre, or of the several purposes for which it is employed. The usual method is by steeping the stems in running or stagnant water for a few days. It may be stated here that the great Hindu lawgiver Manu enjoined on the Kshatrias the use of the sacred thread made of the *sunn* fibre. *C. Burhia* and several other *Crotolarias*, of which there is a goodly number, all yield more or less good fibre which is extensively used for cordage and gunnies. The refuse could be employed (as well as the fibre itself) for paper-making. In fact, old gunnies are often used here and also exported for this purpose.

Butea frondoza, Dalz. & Gibs. Bby. Fl. 71. *Pallas.*

The bark of the roots of which yields a fibre used for caulking boats on the Ganges and other rivers; also for slow matches and cordage.

Fibrous Plants.

Bauhinia racemosa, Dalz. & Gibs. Bby. Fl. 82. *Apta* tree, the fibres of which make strong and durable ropes, and the bark slow matches for matchlock men.

Bauhinia Vahlii, Dalz. & Gibs. Bby. Fl. 83. *Chambuli.*

Common at Khandála, Thal and other ghâts. Is an immense stout climber, from the bark of which ropes are prepared by boiling and then beating it. This fibre is suited only for the coarser kind of paper. The seeds are eaten raw, and the leaves are employed for thatching houses.

Acacia leucophlea, Dalz. & Gibs. Bby. Fl. 86. *Hiwar.*

Is said to yield a strong and tough fibre used for fishing nets and cordage.

MYRTACEÆ.

Is represented by a single plant.

Careya arborea, Dalz. & Gibs. Bby. Fl. 95. *Kumba* or *kumbia.*

It supplies coarse strong cordage, and a stuff suitable for brown paper of good quality.

ASCLEPIDEÆ.

In this order we meet with

Calotropis gigantea, Dalz. & Gibs. Bby. Fl. 159. *Rui* or *rowee, arka* or *akari.*

A tall shrub covered with soft white tomentum. Leaves 4-8 in. long, oblong, ovate or obovate, downy, short-acuminate, nearly sessile, with a cordate, often amplexicaul base. Flowers large, purplish, lilac, or white, inodorous, with a grey down outside. Corolla, lobes spreading or reflexed. Follicles ovoid, ventricose, green.

Common in the Konkan. From incisions in the bark an article which, when duly prepared, answers all the tests and has many of the properties of gutta-percha, can be produced.

The stems, when cut and dried, yield a lustrous, silk-like fibre, equal in many respects to flax, and superior in strength to hemp. To obtain it the method followed in some places is: the largest branches are cut during the flowering season in October-November, and allowed to dry for three days. They are then beaten, and the fibre is picked off the inside of the bark, the workmen biting through it about the centre of the whole length, holding the tissue of the fibre in one hand, and separating the bark with the other. The fibre is also obtained by steeping the stems in water, but this process injures the filaments. Ropes and fishing lines are made from the fibre, and hill-men make their bow-strings from it, as it lasts well (about five years) through all sorts of weather. In former times a cloth for the use of princes was manufactured from it.

The follicle on bursting yields a smooth, glossy, yellowish-white product much resembling *silk floss*. This floss or cotton is utilized for spinning and weaving, but being difficult to spin on account of its glossy nature and short fibre, it is usually mixed with cotton in various proportions. It seems also capable of being blended with silk or wool to produce a brilliant, yet cheap, article of wear. It is also employed for stuffing pillows and quilts, and if collected free from dirt it only requires the ordinary bow to make it fit for use.

For paper manufacture this cotton has the great advantage that it can very easily be had clean, and requires no elaborate preparation beyond maceration in water, pulping, and but little washing to convert it into paper stuff. Some very fair paper was prepared in this manner in the Gujarát Jail. The fibres of the stem are also well suited for making a first-class paper, being long, flexible, and very strong; in fact, in Bellary and Furruckabad paper has been manufactured from it.

The leaves and stalks serve for reclaiming *reh* (covered with saline efflorescence) lands. These leaves are strewn about the ground and covered with earth, and then crushed by being stamped upon. Water is then let on the land enough to flood it. When the water subsides the crushing is repeated, and the land again inundated. The decomposition of the leaves somehow or other "kills the salt", as the natives say. In fact, land that was thus treated for two successive years got so free from saline matter as to yield a very fair crop.

All parts of the plant are full of milk, which has powerful medicinal properties.

Calotropis procera, Dalz. & Gibs. Bby. Fl. 149.

Closely allied to the last, if not the identical species.

Met with in the arid places of the Deccan and Gujarát. The dried and powdered root bark is an excellent alterative, diaphoretic and in large doses an emetic, and is used in cutaneous diseases, especially leprosy. The supposed active principle extracted from this plant is called *mudarin*, and has the property of being soluble in water and coagulating by heat. Fibres are also extracted from this plant in Arabia. They are very strong.

Hoya viridiflora, Dalz. & Gibs. Bby. Fl. 153. *Dodi* or *hiran dori*.

A common creeper used as a substitute for rope to tie up bundles of firewood.

Hoya pendula, Dalz. & Gibs. Fl. Bby. 152.

Found in the Konkan and the hills about Nágotna. Both of these have excellent fibres.

Dæmia extensa, Dalz. & Gibs. Bby. Fl. 150. *Utarni*.

The commonest of Asclepids next to *Calotropis gigantea*, the roots of which are used in infantile diseases.

Holostemma Rheedii, Dalz. & Gibs. Bby. Fl. 148.

Common in the rains, when it runs up trees and hedges, the pods of which are eaten as a vegetable by the natives, who call the plant *shidodi*. The fibres are fine and silky, and are adapted for cordage and for paper manufacture.

BORAGINÆ.

In this order only one plant is found,

Cordia Rothii, Dalz. & Gibs. Bby. Fl. 174.

From the bark of this ropes are made.

URTICACEÆ.

To this order belongs the well-known

Cannabis Indica or **C. sativa**, Dalz. & Gibs. Bby. Fl. Suppl. 79. *Ganja* plant.

Fibrous Plants.

It supplies the hemp of commerce. It is cultivated throughout Hindustan, but principally at Nagar and in the peninsula, more on account of its leaves, stalks and flowers, wherein resides the intoxicating substance which furnishes *bhâng* and *churrus*, and which the natives use in smoking and as a drink. The use of this resin is almost general, and in small doses is not hurtful to health. In Poona, beer, called *bhoja*, is manufactured from the grain of *jowâri*, to which *bhâng* is added in place of hops. The Indian method of cultivating the hemp plant, which consists in sowing the plants at great distances from each other so as to allow a large number of branches to come out, is not fitted for the production of good long fibre. Hemp was known to the ancients long before the birth of Christ. Pliny says that the Romans were well acquainted with it, and Hiero, king of Syracuse, rigged his ships with ropes made of this fibre. The plant flourishes best at elevations of 4 to 7000 ft., and the best fibre is obtained from the male plants, which are cut a month earlier than the females.

Girardinia heterophylla, Dalz. & Gibs. Bby. Fl. 238. *Awâl.*

A large shrub, armed with long stinging bristles which produce intense pain on being touched.

Common in the plains and forests of India and Burma, but chiefly in the Himalayas. Yields a fine fibre used in Sikhim for ropes, twines and coarser cloths.

Debregeasia longifolia, Wedd.—*Conocephalus niveus*, Dalz. & Gibs. Bby. Fl. 239. *Kâpsi.*

A tall shrub or small tree.

Common at Mahábaleshvar and the Konkan jungles. The inner bark yields a fibre which in Ceylon, etc., is used for cordage and fishing-nets.

Bœhemeria nivea, D. C. Prod. xvi. i. 206.—*Urtica tenacissima*, Dalz. & Gibs. Bby. Fl. Suppl. 78.

It grows spontaneously in Assam, where it is called *rhea* or *china grass*, and from which a fabric, called "grass cloth", is manufactured.

It was cultivated experimentally in many places, and during the administration of Lord Mayo the Government offered a prize of 50,000 Rs. for the best machine for extracting rhea fibre, and took other measures for extending the cultivation of this plant. The fibre is one of the best produced in the world, but difficult of preparation.

Splitgerbera scabrella, Dalz. & Gibs. Bby. Fl. 239.—*Sponia Wightii*, Dalz. & Gibs. Bby. Fl. 238.

From the latter plant, called *gol* in Bombay, the Garrows of Assam obtain a cloth with which they cover themselves.

Antiaris toxicaria, Lesch.—*A. saccidora*, Dalz. & Gibs. Bby. Fl. 244. *Chandul.*

Common on the ghâts and in Konkan, and from the bark of which sacs used to carry rice are made in a curious way. It yields also a good fibre which makes good cordage, and affords an excellent material for paper.

Morus Indica } Cultivated. Their bark is of a fibrous nature,
M. alba. } well adapted for the manufacture of paper.

The twigs of *M. Indica* are, on account of their toughness and strength, employed in some parts of India in binding and tying bundles of fuel, loads, etc,

Ficus Bengalensis, Dalz. & Gibs. Bby. Fl. 240. *Vad* or *war.*

The bark and the aerial roots give a coarse fibre adapted for rope-making. The fibre is used by the Sikhs for slow-matches to their match-locks.

Ficus religiosa, Dalz. & Gibs. Bby. Fl. 21. *Pipal.*

It is said that paper for green umbrellas was made in Burma from the bark of this tree.

Ficus infectoria, Dalz. & Gibs. Bby. Fl. 241.

The inner bark yields a tough fibre good for rope. Many other plants of this order yield excellent fibre for cordage and as a material for paper.

SCITAMINEÆ.

This order furnishes us with the various species of the plantain, of which the ordinary table plantain is a well-known specimen. It is called

Musa paradisiaca or **sapientum,** Dalz. & Gibs. Bby. Fl. Suppl. 88.

The outer layers of the sheaths of the leaves yield a fine white fibre of considerable length and strength.

The ordinary method of obtaining the fibre is by scraping the sheathing footstalk of the leaf with a piece of iron and subsequently washing it to free it from pulp; but if the stem, previously cut longitudinally into four parts, is crushed between proper rollers, a much better quality of fibre can be had; each tree being calculated to yield about 4 lbs. of it. This fibre is fitted for conversion into straight ropes of considerable strength; a rope made from it sustaining 864 lbs. as against 924 lbs. borne by a similar one of pine-apple fibre. It can also be turned to use for making paper, as can also the combings. These combings make a good substitute for horse hair for stuffing purposes, etc. The peduncle or core can also be made to yield a half of it of stuff for paper-making.

Musa superba and **Musa ornata,** Dalz. & Gibs. Bby. Fl. 212.

These also contain fibre. These plants are known as *ran-kela.* Common over the slopes of Khandála and other ghâts.

AMARYLLIDEÆ.

Agave Americana, Roxb. Fl. Ind. ii. 166.—*A. Cantula,* Dalz. & Gibs. Bby. Fl. 93. *Jungly annanas.*

From its leaves very tough and silk-like white fibres are procured which the natives of Malabár use for making ropes and cordage.

Fibrous Plants.

LILIACEÆ.

Sanseviera Zeylanica, Dalz. & Gibs. Bby. Fl. Suppl. 91. Bowstring hemp, *murgali, mórwa.*

Wild and cultivated in Malabár, Konkan, Ceylon, etc.

The fibre is usually removed by either steeping the leaves in water till the pulpy part has become rotten and can then be easily separated, or the leaves being placed on a board are scraped with a rough stick or iron till all the pulp has come away. The best method appears to be the latter, which is the same as is followed in the case of the *Ananasa sativa.* The first-mentioned one yields a discoloured fibre in consequence of the fibres having to be steeped in water.

The fibre is pliant, soft and silky, and much resembles that of the pine-apple. It is used for making thread, twine, bow-string, ropes, etc., and stands a greater strain than even Russian hemp : a line made from it bearing a weight of 120 lbs., while a similar one of Russian hemp broke at 105 lbs. It is also sometimes used for making a fine class of cloth, and is considered very valuable for paper manufacture, for which last mentioned purpose it has been utilized at Trichinopoly.

Yucca gloriosa.

A native of America, but cultivated every where—in this Presidency and elsewhere—thrives well even in Mahábaleshvar. Has long sword-like leaves, terminating in a thorny point, and throws out a long flowering stalk surmounted by an ample panicle consisting of numerous (about 150-200) lily-like yellowish white flowers.

The fibre is 2-4 ft. long, rather wiry, fine, and strong; takes colour easily.

BROMELIACEÆ.

This order gives us the pine-apple.

Ananasa sativa or **Bromelia Ananas,** Dalz. & Gibs. Bby. Fl. Suppl. 94. Pine-apple.

From its leaves beautiful silky fibres are obtained. The process is extremely simple. The leaf is stretched on a board, and the epidermis removed with a blunt knife, when the long white fibres lying on the lower parenchyma, running in a longitudinal direction, are exposed. These are easily detached by means of a pin, and are fit for use.

A cloth from these is manufactured in the Philippines which equals, if it does not surpass, the finest muslins and cambrics. The fibres are very strong, and are not injured by immersion in water. In the Southern Marátha Country, at Goa, and along the coast of Malabár, the natives use a string made from them for stringing gold ornaments and pearls.

PANDANACEÆ.

This order is represented by only one plant,

Pandanus odoratissimus, Dalz. & Gibs. Bby. Fl. 279.

This is the well-known and much used *kewra* of the natives, an elegant shrub 6-10 ft. high, roots fusiform, issuing from the stem. Leaves 3-5 ft. long, at the extremities of the branches, drooping, smooth and shining; margins and back armed with sharp spines.

Flower bracts light-yellow, very sweet-scented, fruit like a pine-apple and orange-coloured.

The fibres are obtained from the leaves which are cut for this purpose every second year. Each plant yields enough fibre to make two bags. In the Mauritius, sugar and coffee are packed in these bags; 140 lbs. of sugar are put into each bag, which never bursts, although holding so great a weight. The floral leaves are eaten either raw or boiled. The lower pulpy part of the drupes is eaten by the natives in times of scarcity. The roots are used by basket-makers to tie their work with, and being spongy they make a substitute for corks. The fibres are said to be also good for making paper, and the natives use them for the manufacture of a fine kind of mat to sleep upon. An oil prepared from the roots is employed in rheumatism.

PALMÆ.

This order, to which the well-known cocoanut and date palm belong, also supplies very tough, durable and elastic fibres.

Cocos nucifera, Dalz & Gibs. Bby. Fl. 279. *Maar*, cocoanut.

Produces all our coir, which is used for a variety of purposes.

Caryota urens, Dalz. & Gibs. Bby Fl. 288. *Birli-maar.*

Common all over the Konkan, and supposed by some to be a native of Ceylon; also yields very strong fibres. They are obtained from the long flower-stalks, and ropes made from them are so strong that they are used for securing wild elephants; fishery lines are made from them.

Borassus flabelliformis. *Tar* or *tad.*

The leaf fibres, which are about 2 ft. in length, are used in some parts of the Madras Presidency for making ropes and strings. The fibre round the nut is said to be suited for paper, but the supply of it would be small.

Phœnix sylvestris. *Khajuri.*

Bags, basket work and mats are made from the leaves, and the footstalks of which are converted after being beaten into well ropes. The fibres are plentiful, soft, bleach well, and are very well adapted for the use of paper-makers. A free supply can always be obtained.

Areca catechu.

The nut is imbedded in a covering of coir, consisting of three layers, the middle one of which is woody and coarse; the other two are fine and soft, and it is believed might be utilized for paper.

GRAMINEÆ.

Saccharum spontaneum, Dalz. & Gibs. Bby. Fl. 304.

Common in every part of India. In Sind it is abundant, and grows to be a tall grass about 3-15 ft. high. It is also found on the banks of the Deccan rivers and in Domus. It is distinguished from the other varieties by its wavy feathery flowers which have a silky whiteness. The culms are made into native pens, brooms, and the leaves after being deprived of their soft parts are used to make

Fibrous Plants.

strings of. The whole plant is sometimes employed for thatching. It is also used as fodder.

Saccharum mimja is a tall grass which is found throughout India, and principally in the Punjab, where it covers large tracts of land, and often encroaches upon cultivated ground.

The part of the plant which is most useful is the flower-stalk, which, after being deprived of its sheath and spathe and cut as high up as it remains of a uniform thickness, is made into chicks, the upper and tapering part being employed to form "sirki". The thin stalk-ends arranged side by side are bound together with grass, forming a species of matting, which, besides being employed for the ordinary purpose of giving shelter to carts, etc., is also used for thatching. The sheaths and spathe when reduced to shreds supply a material much used in making strings and ropes. This string or twine is reported to be of excellent quality and cheap; while the rope, which is very strong, is employed for rigging boats, and as a tow line on the Punjab rivers, as it does not deteriorate by being kept constantly wet. It is also used for Persian wheels and well ropes. The refuse yields a paper stuff, from which a very fair, almond-coloured, paper has been made; and as the grass grows in abundance and thickly every where, especially in Upper India, it may be said to supply an almost unlimited stock of stuff for paper-making; in fact, all the species of *Saccharum* are more or less adapted for the manufacture of paper.

BAMBUS.

The various varieties of the bambu, such as *Dendrocalamus strictus, Arundinaria Wightiana, Bambusa arundinacea*, etc., are to be met with wild or cultivated in almost every part of India growing to an enormous height of 60-70 ft. and even more in moist alluvial lands, and near places where water is abundant. They propagate themselves by throwing outshoots, of which a single bambu produces as many as 10 to 20 a year. Three-fourths of these might be cut down each year without causing injury to, or bringing about the death of the parent shoot, which can thus be made to reproduce itself for many successive years.

The uses of the bambu are multifarious and too well known. Leaving every one of these aside, the grass is one that has latterly attracted considerable attention as a substitute for the esparto and alpha grasses in the manufacture of paper. Experiments conducted by Mr. Routledge, a well-known name in connection with the paper trade, tend to show that, in economy of production and quality, no other article approaches the bambu as a source of paper-supply, and its rapid growth establishes it at once as furnishing an unfailing supply of raw material. Another advantage which the bambu possesses is that being an endogen, it does not call for any elaborate manipulation such as that which is needed in exogenous plants, to separate the fibre from the woody stem-bark and other extractive matters; all that is required being to crush the sufficiently young bambus, previously split into halves, between proper rollers, dry them of their moisture, of which they hold between 60 to 75 per

cent., and pack them for export or local use. An acre of ground which yields about 40 tons of stems can thus be made to represent 10 tons of dried produce. The stem proper for crushing are such as have, at least, one full season's growth, as in the very young ones the fibre is not sufficiently mature, and in old ones it is much too woody. The crushed material prepared in the manner just described only requires soaking down and bleaching to fit it for pulping and conversion iuto paper.

The best variety of bambu for paper manufacture is that which grows the fastest and has the longest space between the joints. These joints have to be removed and rejected; hence the greater their number the greater the wastage. In planting the bambus they ought to be sown close, so as to make the stem shoot upwards, thus securing a finer fibre with longer joints.

DYES.

In the Bombay Presidency the vegetable kingdom yields a good many dyes. Some of these and the modes of fixing them are pretty generally known; certain remote villages, however, produce dyes which are not met with, and the methods for fixing which are not understood elsewhere.

BIXINEÆ.

Bixa orelana, Dalz. & Gibs. Bby. Fl. Suppl 5. *Kisri, sendri.*

A native of South America, naturalized in India.

The pulp covering the seed contains the dye known under the name of *arnotto*. This dye is orange-red, and is obtained as follows. The pods are marcerated for a week or more in boiling water, the seeds extracted, and the pulp left to subside. The liquor is then passed through sieves into proper vessels, and again boiled till it throws up a sort of scum, which holds the colouring matter. This scum, which is carefully removed from time to time, is now subjected to a further process of boiling, until it acquires sufficient consistence to be manipulated into balls or cakes, in which state the dye is fit for sale or the dyer's use. A better process, and one that is certainly less injurious to those engaged in the manufacture of this article, consists in washing the seeds of arnotto, on the surface of which the colour lies, thoroughly, and precipitating the colour by means of vinegar or lemon juice. This precipitate might then be removed and manipulated as already explained.

Arnotto does not appear to be much used in dyeing silk and woollen fabrics; on cotton, however, several beautiful shades are produced from it. In Sambalpur, in the Central Provinces, cotton cloths are dyed with it of a nice salmon colour, which, however, is not fast, and does not stand many washings. In Assam it produces a fleeting yellow. It is said that by the use of alkaline mordants the colour might be fixed on silk and wool. Several other uses are made of arnotto. It is employed, for example, to give butter, cheese, oils, etc., a yellow tinge, and milkmen sometimes colour buffalo milk with it to pass it for cow milk.

TAMARISCINEÆ.

Tamarix gallica or **T. Indica**, Roxb. Fl. Ind. ii. 100. *Jhau, lai.*

A small tree or tall shrub common in Sind, Cutch, throughout India, Ceylon, and Burma on the banks of rivers; also in Africa and Southern Europe.

T. dioica, Roxb. Fl. Ind. ii. 102. *Sarru, laljhau, pichula.*

A small tree common in the beds of rivers in the Deccan and Konkan, and found from Sind and the Punjab to Assam and Burma.

T. articulata, Hook Fl. Ind. i. 249.

Common in Sind, Punjab, etc.

The galls of all the above varieties are known as *máy* or *barri máy*, and are produced by the puncture of an insect which generally burrows in the branchlets. They are not used as dyes by themselves, but are employed as a mordant by tanners, calico-printers and dyers. Madder-dyed cloths have the colour fixed through their agency. Prepared with salts of iron these galls are employed to dye black.

GUTTIFERÆ.

Garcinia purpurea, Dalz. & Gibs. Bby. Fl. 31. *Kokam.*

The acid juice is used as a mordant by people working in iron.

G. xanthochymus, Hook. Fl. Ind. i. 269.—*X. pictorius*, Dalz. & Gibs. Bby. Fl. 31. *Tamal, dampel.*

From the full-grown, but not ripe, fruit a quantity of creamy, resinous, yellow, gum-like gamboge is obtained which makes a tolerably fair water colour which might be used either by itself or to mix with blue to form green. The water dissolves a larger quantity of gum if a little alkaline salt be added to it.

G. Cambogia, Roxb. Fl. Ind. ii. 621.

The fruit, like that of the preceding, yields a yellow juice, an inferior sort of gamboge.

Ochrocarpus longifolius or **Calysaccion longifolium** Dalz. & Gibs. Bby. Fl. 32 *Suringee.*

The tree grows in Kaládgi, Sholápur and Belgaum districts where its bark and root are used, and also exported to Ahmednagar for colouring red. Enormous quantities of this dye are used in Surat and Kaira also. It was believed by some that *nagkesar* (the flower buds) was employed for dyeing silk; but this is doubtful.

BURSERACEÆ

Garruga pinnata, Dalz. & Gibs. Bby. Fl. 312. *Kurak.*

MELIACEÆ.

Melia azadirachta, Dalz. & Gibs. Bby. Fl. 36. *Nim.*

Cedrela toona. *Tun.*

The white fragrant flowers boiled in water till one-fourth of the latter has evaporated, yields a yellow dye into which the cloth is simply dipped, and then squeezed to give it a fleeting yellow colour. Various shades ranging from light to deep yellow are thus produced, the mordant sometimes employed with them being alum. A red dye is obtained from the seeds. A sulphur yellow is sometimes

Dyes.

produced by mixing tun flowers *(C. toona)* 4 oz., with turmeric 2 oz., lime 2 oz., and acidulated water.

RHAMNACEÆ.

Zizyphus jujuba, Dalz. & Gibs. Bby. Fl. 49. *Bhor.*

Z. xylocarpa, Dalz. & Gibs. Bby. Fl. 49. *Gutti.*

Ventilago Madraspatana, Dalz. & Gibs. Bby. Fl. 48. *Lokandi, kanyeil.*

Common on the ghtás. From the root bark a beautiful chocolate dye is extracted. It is usually mixed with the root of *Hedyotis umbelata.* Added to galls a black dye is produced.

Buchanania latifolia, Dalz. & Gibs. Bby. Fl. 52. *Pial, charoli.*

Odina Odier, Dalz. & Gibs. Bby. Fl. 51. *Shemti.*

Semecarpus anacardium, Dalz. & Gibs. Bby. Fl. 52. *Biba, bilambi.*

This is used for producing a black colour which is not removed even by alkalies. It is, however, a caustic, and has, therefore, to be mixed with various other substances to modify its action.

LEGUMINOSÆ.

Indigofera tinctoria, Dalz. & Gibs. Bby. Fl. 59. *Nil.*

A shrub, 4-6 ft. high, faintly silvery white. Leaves pinnated, 1-2 in. long; leaflets 9-13 oblong ovate, turning blackish when dried. Flowers reddish-yellow. Legumes 1 in. long, approximated towards the base of the peduncle, slightly curved upwards.

Found wild in the Konkan and elsewhere, but generally cultivated, especially in Bengal, North-West Provinces and Madras, on account of the indigo it yields.

The blue dye indigo is too well known to require any description; and various methods are employed for extracting it, all of which, generally speaking, consist in macerating the leaves in water and oxidising the liquid by agitation and exposure to the air.

Indigo by itself produces a fast dye; but every colour in the production of which it enters, is not necessarily fast, the fastness of the colour depending upon the nature of the other dyes used. Several shades are produced by the agency of indigo, such as blue in all its shades and blends, and various blends of green; the dye first applied giving the prevailing tint.

All sorts of textile fabrics can be dyed by the agency of indigo. Mordants, properly so called, are not needed to fix the colour if simple blue is used; whenever such are employed, their action is called into requisition for the purpose of clearing the colour. The native method of dyeing blue consists in simply dipping the cloth into a solution of indigo and then squeezing it, and allowing it to dry. The oftener the cloth is dipped into the liquid, the deeper the shade of colour produced.

Two other plants described elsewhere produce a sort of indigo, *viz.*, *Wrightia tinctoria* and *Crosophora plicata.*

Butea frondosa, Dalz. & Gibs. Bby. Fl. 71. *Pallas.*

The bright scarlet flowers of this tree, infused either fresh or dry in water holding alum, or alum and tartar in solution, are employed for dyeing a beautiful bright yellow. The dye known in Gujarát as *kissu* may be extracted by simply pressing the flowers when fresh, or boiling them when dry in a weak solution of lime-water, but it is not permanent.

From wounds in the bark a ruby-coloured astringent gum exudes, which loses colour by exposure, but it may be preserved by the gum being closely locked up in a bottle.

B. superba, Dalz. & Gibs. Bby. Fl. 71. *Pallas yel.*

A gigantic climber; leaflets membranous, the terminal 6-20 in. long, lateral oblique, smaller. Flowers orange-coloured, larger than those of the preceding, in racemes 1 ft. long.

Found in Northern Konkan, Circár mountains, Travancore, Bengal, Oude, North-West Provinces, Burma, Pegu, etc.

A yellow dye is obtained from the flowers, and from incisions in the bark a kino-like substance exudes.

Petrocarpus santalinus, Dalz. & Gibs. Bby. Fl.

The wood contains a red colouring matter, called santalin, which, though insoluble in water, is readily dissolved out by the alkalies producing a lasting dye. For dyeing cloth, however, a decoction of the wood is prepared into which the cloth is dipped. In Europe the dye-stuff is employed by pharmaceutists as a colouring agent, and also for dyeing leather red.

Cæsalpinia coriana, Dalz. & Gibs. Bby. Fl. Suppl. 27. *Libi.*

This beautiful tree, indigenous in the West Indies and Central America, was introduced into India by Dr. Wallich, and is now cultivated in Bombay, Poona and elsewhere. The pod contains a large quantity of tannin which is a valuable material for tanning. The average yearly produce from a single tree in the West Indies is said to be 100 lbs.

C. sappan, Dalz. & Gibs. Bby. Fl. Suppl. 27. *Bakkam, patáng.*

The wood, broken into chips and boiled, yields a red dye which in the dry state is called *gulál*, and is imported into Bombay from Rájápur. In Rájápur it is prepared from wood imported from the Malabár Coast. Some of the dye imported into Bombay finds its way to Násik, where it is used for dyeing cotton thread. To dye cloth, the wood has to be soaked in water with lac and alum for two days and then boiled. This *sappan* decoction gives a fast colour. In the North-West Provinces sappan wood is employed in calico-printing.

Cassia auriculata, Dalz. & Gibs. Bby. Fl. 81. *Tarwar.*

C. tora, Dalz. & Gibs. Bby. Fl. 81. *Tacla.*

The seeds of this plant are used in dyeing with indigo, their action being supposed to be that of starch in the indigo solution.

Dyes.

Acacia Arabica, Dalz. & Gibs. Bby. Fl. 86. *Babul.*

This tree yields catechu, or *kath* as it is called by the natives. Kath produces various shades of brown, and is also employed as a mordant in conjunction with other colouring stuffs. It is also eaten by the natives with *pan* and betel-nut.

For preparing catechu, after the proper tree has been selected, cut down, and the wood broken to pieces, boil the pieces in water till it assumes a port-wine colour, and set the water to cool. Hang a quantity of leaves or twigs into this water, and the catechu will coagulate on them.

A. suma, **A. catechu**, Dalz. & Gibs. Bby. Fl. 86. Also *A. sundra.*

All these produce catechu, and are used in much the same way and for the same purposes as the preceding.

Albizzia procera, Dalz. & Gibs. Bby. Fl. 87. *Kinye.*

RHIZOPHOREÆ.

Brugueiria gymnorhiza vel **Rheedii**, Dalz. & Gibs. Bby. Fl. 95. *Kankra.*

COMBRETACEÆ.

Anogeissus (Conocarpus) latifolius, Dalz. & Gibs. Bby. Fl. 91. *Dhaura.*

Terminalia catappa, Dalz. & Gibs. Bby. Fl. Suppl. 33. *Bengali-baddam.*

T. bellerica, Dalz. & Gibs. Bby. Fl. 91. *Bherda, goting.*

T. chebula, Dalz. & Gibs. Bby. Fl. 91. *Hirdá.*

T. tomentosa, Dalz. & Gibs. Bby. Fl. 91. *Ain.*

T. paniculata, Dalz. & Gibs. Bby. Fl. *Kinjal.*

All the above species are more or less employed in dyeing. *T. catappa* is the Indian almond tree, the astringent bark and leaves of which yield in combination with salts of iron a black pigment from which Indian ink is made, and with which the natives sometimes colour their teeth.

The nut of *T. bellerica* also furnishes ink, and besides its medicinal use is employed in tanning and dyeing cloth and leather.

The *hirdá* is by far the most important of the *terminalias*. The bark is boiled, and the decoction employed as a mordant in dyeing, as also for curing or tanning leather. The fruits are used to make ink. Mixed with alum they produce a very durable yellow dye which is much esteemed by chintz-painters and carpet-weavers. An equally good black dye is produced by acting upon the fruits with mud containing iron, and this dye is used by harness-makers as well as by dyers. The outer coat of the fruit produces with ferric sulphate a fine durable black colour, as does also the nut enclosed in it. This last mentioned is extensively used in ink-making, tanning and dyeing, and large quantities of it are annually exported from this country.

Dyes.

The barks of the remaining two *terminalias* also contain tannin, and both are employed in dyeing black. The fruits of both varieties are myrabalans.

MYRTACEÆ.

Eugenia jambolana vel **Syzigium jambolanum**, Dalz. & Gibs. Bby. Fl. 93. *Jambul.*

MELASTOMACEÆ.

Memecylon edule, Dalz. & Gibs. Bby. Fl. 93. *Anjan.*

A large shrub; branches round. Leaves ovate or oblong, 1-2 in. long, green and shining above, paler underneath, 1-nerved. Peduncles axillary, and below the leaves in older branches bearing an umbel-like cluster of small flowers of a beautiful purple. Fruit globose, smooth, about 3-4 lines diam., crowned by the 4-toothed limb of the calyx.

Very common every where in the ghâts and plains.

An infusion of the leaves in cold water yields a yellow colouring matter which becomes deep-red with the addition of myrabalans and sappan wood. Both dyes are employed in giving colour to cloths and mats.

Melastoma Malabaricum, Dalz. & Gibs. Bby. Fl. 92.

A shrub about 3 ft. high, more or less clothed with hairs or bristles; branches 4-angled, ultimate ones compressed. Leaves elliptic-oblong, 3-6 in. long. Flowers usually about 5-11 in terminal cymes, rose-coloured, handsome, large. Fruit nearly globular, small. Seeds embedded in a purple pulp.

Found in Southern Konkan. The fruit is eatable, and yields a purple dye used for cotton-cloths.

LYTHRACEÆ.

Woodfordia floribunda vel **Grislea tomentosa**, Dalz. & Gibs. Bby. Fl. 97. *Dhauri, dhayati.*

A shrub. Leaves 2-4 in. long, lanceolate, hoary underneath, and having numerous small black glands. Flowers in axillary clusters, handsome red.

Common in our ghâts. From the leaves and twigs a yellow colouring matter is extracted, used sometimes by calico-printers; the petals furnish a red dye which does not appear to be known outside of India.

Lawsonia alba (inermis), Dalz. & Gibs. Bby. Fl. 97. *Mendi.*

This very common plant yields an orange-red dye which is easily obtained by macerating the leaves in water; mixed with alum this colour becomes permanent. It is employed for dyeing cloths, and forms a hair-restorer, the addition of indigo being needed to make the hair black. The triturated leaf is employed for staining red the nails, palms of the hands and soles of the feet. Acids destroy the colour.

Lagerstræmia parviflora, Dalz. & Gibs. Bby. Fl. 98. *Nana bondaroh.*

Dyes.

Punica granatum, Dalz. & Gibs. Bby. Fl. Suppl. 34. *Dalim, anar.*

The rind of the fruit, particularly the wild one, boiled in water until the latter is reduced to one-fourth, yields a green decoction into which the cloth has to be simply dipped to colour it. But it is as a mordant that the rind is more generally used, being for this purpose always boiled along with the other dye with which it is employed.

A light-red dye is obtained from the flowers, which, however, does not seem to be much used. The bark is said by some to be useful for tanning, and to be employed in dyeing Morocco leather.

RUBIACEÆ.

Hymenidictyon excelsum, Dalz. & Gibs. Bby. Fl. 117. *Karwah.*

Morinda citrifolia; **M. tinctoria** and their varieties; **M. bracteata**; **M. tomentosa**; **M. exerta**, etc.—Dalz. & Gibs. Bby. Fl. 114. *Aal, bartundi, madar.*

Wild and cultivated in Bombay, Madras and throughout India.

The barks of all the above varieties yield a beautiful red dye which is obtained by bruising and boiling them in water; the root bark produces the best dye, with which alum is generally employed as a fixing agent. A bright yellow colour is said to be prepared from the wood in Bengal. In Ahmednagar a scarlet dye is obtained from the root bark, and is used for dyeing handkerchiefs, turbans, etc. It is also used to mix with other more expensive red dyes employed in colouring cloth and yarn. The red thread of carpet-makers is entirely dyed with it. In Madras turbans are coloured with this agent.

Rubia cordifolia, Dalz. & Gibs. Bby. Fl. 121. *Manjet, madar.*

This yields a colour that is much brighter, though not so durable as the madder of Europe. Being, however, very expensive, its use is entirely restricted to Farakabad and Bareilly.

COMPOSITÆ.

Carthamus tinctorius, Dalz. & Gibs. Bby. Fl. Suppl. 45. *Kassúmba*, safflower.

Cultivated throughout India for the sake of the oil which is extracted from the seeds, and the dye obtained from the flowers. To obtain the dye the flowerets are gathered immediately on opening without being allowed to expand fully, and dried in the shade. After they are dry, water is poured over them, and they are made into lumps. These lumps are next placed on a mat-strainer, and a man treads them with his feet while water is slowly poured over the pulpy mass. The result of this process is the removal of the yellow colouring matter (which runs down) from the flowers, while the residual mass, which is made out into flat circular cakes and dried in the sun, constitutes the safflower of commerce.

Dyes.

Safflower is used to dye silk and cotton cloths is nearly every part of India. It yields a number of shades of red, such as pink, scarlet, crimson, and is employed with other ingredients to produce the various series of oranges, purples, mauves, etc. All these colours are, however, very fleeting, and will not stand any washing, unless fixed by some mordants. The mordants more generally employed are the berry of *Ziziphus jujuba* and the carbonate of soda. The best safflower is said to be that from Dacca; that procured in Bombay is inferior.

The cultivation of the *Carthamus tinctorius* is very expensive and unremunerative if carried out by itself; it is, therefore, almost always grown as a subordinate crop along with barley, gram, etc., to which last the cultivator looks for his profits.

Tagetes patula, Dalz. & Gibs. Bby. Fl. Suppl. 46. *Gul-jafri*, French marigold.

Cultivated extensively for the sake of the flowers, which are used by the natives in their temples, and worn in garlands by women round the neck and head. The flowers yield a yellow dye of inferior quality used by the poorer classes of some parts of India for dyeing their coarse cloths. The dye is extracted by soaking the flowers in water and squeezing them with the hands.

STYRACEÆ.

Symplocos racemosa vel **Hopea racemosa**, Dalz. & Gibs. Bby. Fl. 140. *Lodhra, lodh.*

Common at Mahábaleshvar and other ghâts.

From the bark and leaves a yellow dye is extracted, which is used for mixing with madder. Its action appears, however, to be more that of a mordant than of a pure colouring agent, and, as such, it is used by the calico-printers and dyers in Calcutta.

An allied species—*S. paniculata*—found in the Himalayas yields a brownish or dark-bluish colour.

OLEINEÆ.

Nyctanthes arbortristis, Dalz. & Gibs. Bby. Fl. Suppl. 51. *Parijatak.*

The flower stalks yield a fine, but fleeting, buff or orange colour. To extract the dye the dried flowers are boiled in water, 1 lb. of flowers requiring 10 gallons of water, which are evaporated till only one gallon is left; the cloth is then dipped into the liquor and hung out to dye. Five yards of muslin can thus be dyed with 1 lb. of flowers. Silk also takes the colour very well.

But, besides being used by itself, the dye is often compounded with red, and produces rich flame, orange and salmon colours.

The bark is employed for tanning.

APOCYNACEÆ.

Wrightia tinctoria, Dalz. & Gibs. Bby. Fl. 145. *Kala-kuda.*

Dyes.

From the leaves and young shoots a blue dye—indigo—is extracted.

W. tomentosa, Dalz. & Gibs. Bby. Fl. 145. *Kala-inderjao.*

The remarks about the foregoing apply to this also.

BORAGINEÆ.

Cordia myxa, Dalz. & Gibs. Bby. Fl. 173. *Bhokar, bargund.*

It is said that in Otaheite the juice of the leaves is used in dyeing.

BIGNONIACEÆ.

Ouroxylon Indicum vel **Calosanthes Indica**, Dalz. & Gibs. Bby. Fl. 161. *Tintun.*

The bark and fruit are used in dyeing and tanning.

ACANTHACEÆ.

Adhatoda vasica, Dalz. & Gibs. Bby. Fl. 194. *Adussa.*

The leaves yield a more or less durable yellow colour which is used by some people to dye coarse cloths with. Mixed with indigo a beautiful dark blue-green is obtained. The colour is obtained by boiling the leaves in water (10 lbs. to 16) slowly for a long time till half the water has evaporated.

VERBENACEÆ.

Tectona grandis, Dalz. & Gibs. Bby. Fl. 199. *Sal.*

Avicenia officinalis, Brand. For. Fl. 371.

EUPHORBIACEÆ.

Euphorbia Tirucalli, Dalz. & Gibs. Bby. Fl. Suppl. 76. *Nival.*

Common in hedges.

This is not a dye-producing plant properly so called, but the ashes of the burnt plant are used as an alkali in dyeing in certain parts of India, principally in Southern India.

Jatropha curcas, Dalz. & Gibs. Bby. Fl. Suppl. 77. *Jepal.*

The oil extracted from the seeds and boiled with oxide of iron often forms a varnish used in China for covering boxes (Lindley).

Mallotus Philippinensis vel **Rottlera tinctoria**, Dalz. & Gibs. Bby. Fl. 230. *Shendri, kapela, kamala.*

The bark of the tree is used for tanning.

The reddish-yellow powder which covers the ripe fruit is brushed off and collected, and wants very little preparation before being used; all that is needed being to mix it with water holding in solution half its weight of carbonate of soda. Silk dipped into this takes a fine yellow colour, and cotton cloths may also be similarly dyed. Alcohol and ether dissolve the colouring matter with facility. The dye is in some places mixed with other substances to produce various shades of red, orange and brown. In Ahmedabad a deep orange colour is produced by mixing it with lime water, alum and turmeric or safflower.

Dyes.

Briedelia retusa, B. montana, Dalz. & Gibs. Bby. Fl. 233. *Phatarphod, assana.*

Crosophora plicata, Dalz. & Gibs. Bby. Fl. 232.

An annual, erect, hoary plant, common in Bombay, Deccan and Gujarát.

The juice of the green capsules imparts to wet cloth a beautiful blue colour similar to that of indigo.

Phyllanthus emblica, Dalz. & Gibs. Bby. Fl. *Aola.*

Preticulatus Anisonema multiflora, Dalz. & Gibs. Bby. Fl. 234. *Kalla Mahomed.*

A large climbing shrub with numerous twiggy branches; floriferous branches angular. Leaves about 1 in. long, ovate, membranous. Flowers aggregated, axillary, several males and 1 or 2 females in a cluster; of a purplish colour. Berry succulent, somewhat depressed, size of a pea, dark-purple. Very common. Ink is sometimes made from the fruit.

URTICACEÆ.

Artocarpus integrifolia, Dalz. & Gibs. Bby. Fl. 244. *Phanas.*

A. Lakoocha, Dalz. & Gibs. Bby. Fl. 244. *Watamb.*

MYRICEÆ.

Casuarina equisetifolia, Dalz. & Gibs. Bby. Fl. Suppl. 82

The bark contains tannin.

A dye was prepared from it some years ago and shown at the Madras Exhibition of 1855. It gave a reddish nankeen with alum, and with iron a black colour. Exposure to the air also produced a stable nankeen red.

SCITAMINEÆ.

Curcuma longa, Dalz. & Gibs. Bby. Fl. Suppl. 87. *Halad.*

Besides being used in various religious ceremonies, in medicine, and as a condiment by the natives, the tubers of turmeric are employed as a colouring agent by dyers throughout India, being used either by itself or with other dyes to produce various shades of yellow and other colours. The colouring agent is curcumin, which is freely taken up by ether and alcohol, and which is changed to a deep red or brown by alkalies. The colour of turmeric is not always fast, even when used with mordants; still it is extensively employed in dyeing, not only cotton cloths, but also silk and woollen fabrics,—carbonate of soda and alum being the mordants more generally used along with it.

GUMS AND RESINS.

BIXINEÆ.

Cochlospermum Gossypium, Hook. Fl. Ind. i. 90. *Kumbi, kathalya.*

A small tree, trunk erect. Leaves scattered about the ends of branchlets, palmately 3-5-lobed, 3-8 in. long. Flowers golden-yellow, 4-5 in diam. Capsules oval, nearly the size of a goose-egg, 5-valved; seeds numerous, enveloped in a soft silky wool.

Deccan, but planted everywhere. It yields the *kuteera* gum used as a substitute for tragacanth. The cotton is of no value, except for stuffing pillows. The timber is soft, and only used as firewood.

ANACARDIACEÆ.

Spondias mangifera, Dalz. & Gibs. Bby. Fl. Suppl. 19. *Ambéra, rhah amb.*

A small tree. Leaves near the extremities of branches, 1-1½ ft. long; leaflets 4-6 pair, 2-9 in. long by 1-4 in. broad. Flowers small, greenish-white in long panicles. Drupe ovoid, 1½-2 in. long, yellow when ripe; kernel tough, fibrous outside.

Wild, and cultivated throughout India. It yields an insipid gum. The ripe fruit has an astringent acid taste, and is eaten, while the raw one is pickled. The wood is soft and brittle, and only used as fuel.

Bombax Malabaricum. *Saúr, saúr.*

Sterculia villosa. *Gul-kandar.*

„ **urens.** *Kandal, katiri.*

„ **gutta.** *Kukar* and *goldar.*

Feronia elephantum. *Kowla.*

Canarium strictum. *Dhúp, gugal.*

Zizyphus jujuba. *Bhor.*

Mangifera Indica. *Amb.*

Anacardium occidentale. *Káju.*

Buchanania latifolia. *Piál.*

Odina Woodier. *Shimti.*

Holigarna Arnottiana. *Biba.*

Semecarpus Anacardium. *Biba.*

Butea frondosa. *Pallas.*

„ **superba.** *Pallas gel.*

Odgeinia Dalbergioides. *Tiwas, tiwar.*

Pterocarpus marsupium. *Bibla.*

Anogeissus latifolius. *Dhaura.*

Terminalia belerica. *Bherda.*

Gardenia lucida. *Dikamali karunga.*

Mimusops elengi. *Buckhul* and *wowli.*

Sponia Wightia. *Gol* (*Portulaca oleracea* is also known by the name of *gol*).

See Chapter on Timber Trees for the description of these and of other trees.

VEGETABLE SOAPS.

Sapindus trifoliatus, S. emarginatus, and **S. laurifolius.** Dalz. & Gibs. Bby. Fl. 34, 35. *Rhitá.*

The fruit when rubbed with water has the property of making the latter soapy, and is extensively used for cleaning cloths, boards, etc.

The fruit of *S. Mukorossi*, described by Roxb. ii. 280 under the name of *S. detergens*, said to be wild in Kumaon and Silhet and cultivated throughout the North-West Provinces and Bengal, is saponaceous, and is used for the same purpose. It is said that the fruit of *Dittelasma rarak*, belonging to the same order and described by Loureiro as *Sapindus saponaria*, is also saponaceous.

Acacia Arabica, Dalz. & Gibs. Bby. Fl. 86.

A decoction of the bark is a substitute for soap.

Acacia concinna, Dalz. & Gibs. Bby. Fl. 87. *Sikhákai.*

A large climber. Branchlets, petioles and peduncles grey-downy and armed with numerous, minute, recurved prickles. Petiole 3-4 in. long with a large gland below the first pair of pinnæ, and 1 between the uppermost pair; pinnæ 12-16, 2-3 in. long; leaflets 30-50, ¼-½ in.; membranous, linear, sensitive, with an oblique mid-rib, glabrescent, stipules large, cordate-ovate. Flower bud purple; flowers yellow in globose heads ¼-½ in. diameter arranged in racemose panicles. Pod thick, succulent, straight, when dry shrivelled, 3-4 in. by ¾-1 in. long, 6-10-seeded, slightly contracted between the seeds.

This shrub is common over the ghâts and in the plains. The pod is very much used as a substitute for soap.

Randia dumetorum, Dalz. & Gibs. Bby. Fl. 119. *Ghela.*

Common everywhere.

The fruit is used instead of soap by the hill-people, but is said to destroy cloths.

WATER-CLEARING NUT.

Strychnos potatorum, Dalz. & Gibs. Bby. Fl. 156. *Nirmali.*

The seeds are used for clearing muddy water: they are rubbed on the sides of the earthen vessel containing the muddy water; within a short time the mud subsides, leaving the water clean.

At a time when filters were not in use, and means of communication difficult, Europeans also resorted to this mode of clearing water. Vegetable Soaps.

Phyllanthus emblica, Dalz. & Gibs. Bby. Fl.

Chips of the wood thrown into muddy water assist in clearing it. The wood of this tree is frequently used for well-curbs, etc.

MEDICINAL PLANTS.

THERE are in the Konkan numerous medicinal plants, some of which possess very active properties, and are officinal in the Indian Pharmacopœia. A few shall be mentioned here, arranged in groups according to their properties.

PURGATIVES.

Argemone Mexicana.

The oil acts as a mild laxative in ½-drachm doses. (*See* Chapter on Oils.)

Cassia fistula, Dalz. & Gibs. Bby. Fl. 80.

Common in the hilly parts of the Konkan, and also planted. The part used is the pulp, in 1 to 2 drachm doses. It acts as a mild purgative, and briskly in 1 to 2 oz. doses.

Cassia alata, Dalz. & Gibs. Bby. Fl. Suppl. 29. *Dad-mardun.*

A handsome shrub with long pinnate leaves, conspicuous, erect racemes of yellow flowers and winged pod. Found in gardens. The parts used are the leaves: a tincture of the dry leaves acts in the same way as senna, and the extract from fresh leaves is analogous in its action to colocynth.

The leaves of *C. sophora*; *C. occidentalis (hikal)*; and *C. tora (takla)*,—all very common, are used by natives as mild laxatives.

Clitoria ternatea, Dalz. & Gibs. Bby. Fl. 68. *Gokarnā mul.*

Stem twining. Leaflets 2-3 pair. Flowers large, blue or white. Legume linear, compressed, straight, many-seeded.

Very common in hedges and cultivated in gardens. The seeds of this elegant plant possess purgative properties; they are roasted, powdered and administered in drachm doses. Dr. Dymock advises the administration in combination with twice their bulk of acid tartrate of potash. The root has purgative and diuretic properties assigned to it.

Tamarindus Indicus, Dalz. & Gibs. Bby. Fl. 80.

The pulp of the fruit. (*See* Chapter on Timber Trees.)

Citrullus colocynthis, Dalz. & Gibs. Bby. Fl. 101. Bitter cucumber or colocynth plant; *kaddu kankri, indrayeen.*

Found in the Deccan, Gujarát and sparsely in the Konkan. From the fruit of this plant compound extract of colocynth was formerly prepared in large quantities at Hewra for the supply of the medical stores. It is

a hydragogue cathartic. The dose of the pulp is from 2 to 8 grs., that of the compound extract from 3 to 10 grs., and of the compound pill from 5 to 10 grs.

Cucumis trigonus, Dalz & Gibs. Bby. Fl. 103. *Kavitha*; also called *indrayeen*.

Common in the Deccan. The bitter pulp of the fruit of this plant is said to possess the purgative properties of the last.

Ipomœa hederacea, D. C. Prod. ix. 343 and 344. Generally known as *pharbitis nil*; *kala dana*.

A tall herbaceous twiner. Leaves 1½-4 in. long, broadly cordate, more or less 3-5-lobed, the middle one larger. Flowers blue or purple, often about 2 in. long.

Common throughout India and cultivated in gardens on account of its flowers. The officinal parts are the seeds (*kala dana*), which are a safe cathartic, and form a good substitute for jalap in doses of from 30 to 50 grs. (powdered seeds). The officinal preparations are:—Extract of seeds given in from 5 to 10 grs. doses in the form of pills; tincture of *kala dana*, 2 to 3 drachms; compound powder of *kala dana* in from 50 to 60 grs.; and resin of *kala dana* in from 5 to 8 grs doses.

I. turpethum, Dalz. & Gibs. Bby. Fl. 105. *Nisottar, dhudkulali, teuri*.

A tall twiner, old stems 4-angled, angles bordered by longitudinal wings. Leaves broadly cordate-ovate, 2-4 in. long or larger, entire or sinuate-angled. Flowers white, large. Capsule shorter than the calyx, globular.

Common in Bombay, the Konkan and throughout India. The root (turbith root of old pharmacologists) is used as a purgative in doses of from ½ to 1 drachm. An extract of the root is also made, which is given on 10-20 grs. doses.

Ricinus communis, Dalz & Gibs. Bby. Fl. Suppl. 78. *Erundee*.

Cultivated throughout India. (*See* Oils.)

Croton tiglium, Boxb. Fl. Ind. iii. 682. *Jamalgota*.

Found in the Indian Peninsula, and said to grow in the Konkan. The oil is a powerful drastic purgative. Dose from 1 to 2 or 3 drops.

Croton oblongifolius, Dalz. & Gibs. Bby. Fl. 231. *Ganisur*.

The oil of the seeds is as powerful as that of *C. tiglium*.

Baliospermum montanum, D. C. Prod. x.—*B. polyandrum*, Dalz. & Gibs. Bby. Fl. 232. Also called *jamalgota*.

Shrubby. Upper leaves lanceolate, lower ones broader, often lobed. Spikes axillary, about the length of the petioles. Flowers yellowish; female ones at the base. Capsul sub-globose, hispid; seeds smooth, marbled.

Found on the hills of Karanja. One powdered seed is the dose generally administered to produce cathartic effects.

Jatropha curcas, Dalz. & Gibs. Bby. Fl. Suppl. 77. *Jampal, jopal*.

Medicinal Plants.

Is common every where.

The oil expressed from the seeds is colourless or pale-yellow, and acts as a purgative in 12 to 15 drop doses.

EMETICS.

Brassica campèstris var. Napus.—*B. juncea*, Hook. Fl. Ind. i. 156 and 157.

The *mustard* plant cultivated in India. A tea spoonful or more of the powdered seeds mixed with water is given as an emetic in cases of drunkenness, and when it is desired to empty the stomach without causing depression of the system.

Barringtonia acutangula, Dalz. & Gibs. Bby. Fl. 95. *Samundárphal.*

The powdered fruit is given as an emetic; dose ½ to 1 fruit. (*See* Timber Trees.)

Randia dumetorum, Dalz. & Gibs. Bby. Fl. 119.

The fruit well bruised and mixed with water is administered to produce vomiting. The dose is one fruit. (*See* Timber Trees.)

Tylophora asthmathica, Dalz. & Gibs. Bby. Fl. 150. *Anthamul.*

Twining; branches slender. Leaves 2-3 in. long, ovate-roundish, pointed, cordate at the base. Flowers rather large, long-pedicelled, externally pale-greenish with a tinge of purple, internally light purple; divisions of corolla acute.

Common. Officinal part, the dried leaves which have a very disagreeable smell when bruised, and a nauseous taste. Dose as an emetic 25-30 grs. of the powder of the dried leaves conjoined with ½ gr. or a grain of tartar emetic. The powdered leaves are also given in catarrh, dysentery, fevers and in cases where ipecacuanha is generally employed. The root of this plant, found in the bázárs in the form of thick contorted pieces of a pale colour and a bitterish nauseous taste, has also emetic and diaphoretic properties, and is given in dysentery, etc. The natives bray on a stone 3-4 in. of the root, and administer the paste with a little water.

Asclepias curassavica, Dalz. & Gibs. Bby. Fl. Suppl. 54.

An herbaceous, erect-growing plant cultivated in every garden. Leaves linear lanceolate, resembling those of *Nerium oleander*. Flowers of a reddish-orange colour in terminal umbels.

The root dried and reduced to powder is administered in the West Indies as an emetic in doses of from 20 to 40 grs.: hence the name *bastard* or *wild ipecacuanha*.

Crinum Asiaticum, Dalz. & Gibs. Bby. Fl. 275. *Nagdaun.*

Stemless. Leaves lanceolate, 3-4 ft. long, 5-7 in. broad. Scapes axillary, shorter than the leaves, a little compressed. Flowers 12-50 in an umbel, white, said to be fragrant at nights. Berries the size of a pegeon's head.

Common in the Konkan and cultivated in gardens. Officinal part, the fresh root. Preparations:—Juice of crinum, dose from 2 to 4 fl. drachms; syrup of crinum, dose about 2 fl. drachms.

Boerhaavia diffusa, Dalz. & Gibs. Bby. Fl. 213.—*Punárnav* and *Damia extensa*, Dalz. & Gibs. Bby. Fl. 150. *Uttaran* or *utaran*.

Are used as emetics.

ANTHELMINTICS.

Melia azadirachta, Dalz. & Gibs. Bby. Fl. 36.

The root bark of this tree is administered as an anthelmintic in the form of decoction (4 ozs. of fresh root bark, water 2 pints, boiled down to a pint). The dose for a child is a table spoonful repeated every third hour, until the bowels or stomach are sensibly affected. Some doctors prefer giving a dose twice a day for several successive days, and then administering an active purgative. In larger doses it is said to produce narcotic symptoms.

Mucuna pruriens, Dalz. & Gibs. Bby. Fl. 70. Cowhage, cowitch.

An annual; branches hairy. Leaflets ovate, silvery beneath, ½-¾ ft. long. Racemes drooping, ½-1 ft. long; flowers purplish. Pod 2-3 in. long, 5-6-seeded, shaped like the letter S, turgid, clothed with tawny stinging hairs.

Common everywhere in hedges. The hairs are administered for the expulsion of round worms in the form of an electuary made with honey. A tea spoonful is given for a dose to a child and a table spoonful to an adult for 3 or 4 successive mornings, followed by a purgative. Applied to the skin, the hairs produce intolerable itching.

Butea frondosa, Dalz. & Gibs. Bby. Fl. 71.

The seeds of this tree are soaked in water, the testa carefully removed, and the kernel dried and reduced to powder; 20 grs. of this powder are given three times a day for three successive days followed by a dose of castor oil on the fourth. (*See* Timber Trees.)

Mangifera indica, Dalz. & Gibs. Bby. Fl. 51.

Powdered mango seed is effectually administered in doses of 20 to 30 grs. (*See* Timber Trees.)

Vernonia anthelmintica, Dalz. & Gibs. Bby. Fl. 313. *Kalenjiree.*

A large annual composite. Stem 2-3 ft. high, marked with elevated purple spots. Leaves lanceolate, irregularly serrated. Heads of flowers terminal, purple. Seeds cylindrical, about ⅛ in. long, of a dark-brown colour, marked with about 10 paler longitudinal ridges, and crowned with a circle of short brown scales.

Common in waste places near villages throughout India. The seeds are nauseous and bitter, and are administered, well bruised, for the expulsion of round worms in about 1½ drachm doses made into an electuary with honey. An infusion of the powdered seeds is also given. In some parts of India the powdered seeds made into a paste with lime juice are used to kill pediculi.

Punica granatum, Dalz. & Gibs. Bby. Fl. Suppl. 34.

The root bark is very effectual in expelling tape worm. It is given in the form of decoction, which is made by taking of fresh root bark, bruised, 2 ozs., water 2 pints, boiled down to a pint. The mode of administration

Medicinal Plants.

is, 2 fl. ozs. are given before breakfast, and the same quantity repeated every ½ hour, until 6 doses have been taken; these are followed by an aperient. (*See* Timber Trees.)

Mallotus Philippinensis, Bedd. Fl. Sylv. 282.—*Rottlera tinctoria*, Dalz. & Gibs. Bby. 230.

The powder is given in 2 to 3 drachm doses for the expulsion of tape worm. In these doses it acts on the bowels, causing in some cases considerable nausea and griping. (*See* Timber Trees.)

Aristolochia bracteata, Dalz. & Gibs. Bby. Fl. 224.—*Kiramar*.

Perennial plant trailing on the ground; stem about 12-15 in. long. Leaves kidney-shaped, whitish beneath. Flowers of a beautiful dark purple colour. Penduncles furnished at the base with a kidney-shaped curled bract.

Common all over India and kept in all houses in a dry state, and much appreciated on account of its anthelmintic properties. The whole plant is nauseously bitter. Two leaves bruised with water are given for a dose. The dry leaves are also administered in the form of infusion.

FEBRIFUGES.

Adansonia digitata, Dalz. & Gibs. Bby. Fl. Suppl. 9. (*See* Timber Trees.)

Melia azadirachta, Dalz. & Gibs. Bby. Fl. 36.

Officinal preparations are:—Decoction and tincture of the bark; the former is made by taking 2 ozs. of inner layer of the bark bruised; water 1½ pint, boiled for 15 minutes and strained when hot. Of this, 2 to 3 fl. ozs. are administered every second hour previous to the expected paroxysm. The tincture is made by macerating in a closed vessel 2½ ozs. of the inner layer of *nim* bark in a pint of proof spirit for seven days with occasional agitation. Dose 2-3 fl. drachms. There is a belief among the natives that sleeping under this tree is effective in preventing a paroxysm of fever. Whether the tree has the same properties as *Ucalyptus globulus* and destroys the poison of malaria, is a point that requires further examination.

Soymida febrifuga, Dalz. & Gibs. Bby. Fl. 38. *Rohan, rohing*.

It is astringent, tonic and antiperiodic. The powdered bark is used in drachm doses three or four times before the expected paroxysm. (*See* Timber Trees.)

Cedrela toona, Dalz. & Gibs. Bby. Fl. 38. *Tunna, tuni, limb*.

The bark of this tree is a powerful astringent and antiperiodic; the dose of the dry bark, about an ounce daily in the form of infusion. (*See* Timber Trees.)

Cæsalpinia bonducella, Dalz. & Gibs. Bby. Fl. 79. *Sagargotta*.

The seeds are tonic and antiperiodic; dose, 10 to 15 grs. Officinal preparation:—Compound powder made of equal parts of seeds

powdered after being deprived of their shells, and powdered black pepper; dose, 15 to 30 grs.

ASTRINGENTS USEFUL IN CASES OF DIARRHŒA AND DYSENTERY.

Ægle marmelos, Dalz. & Gibs. Bby. Fl. 31.

The pulp of the fruit is very efficacious in arresting chronic diarrhœa and dysentery. Officinal preparations :—Mixture, extract and liquid extract; but the best way of using it is making sherbet of the pulp of the ripe fruit, and taking it once or twice a day.

Adansonia digitata, Dalz. & Gibs. Bby. Fl. Suppl. (*See* Timber Trees.)

Punica granatum, Dalz. & Gibs. Bby. Fl. Suppl. 34.

Decoction of the rind of the fruit (rind bruised 2 ozs. boiled down with a pint of water for 15 minutes in a covered vessel) is given in cases of diarrhœa and chronic dysentery in doses of from 1 to 1½ fl. oz.

Eugenia jambolana, Roxb. Fl. Ind. ii. 484.—*Syzigium jambolanum*, Dalz. & Gibs. Bby. Fl. 93.

Its bark has very astringent properties, and is much used in the form of decoction. A syrup prepared from the juice of the ripe fruit is a very pleasant drink, and is administered in chronic diarrhœa with good success.

Mangifera Indica, Dalz. & Gibs. Bby. Fl. 51.

Powdered seed acts as an effectual astringent in cases of diarrhœa in doses of from 20 to 30 grs. (*See* Timber Trees.)

Terminalia chebula, Dalz. & Gibs. Bby. Fl. 91.

Fruit and galls found on the leaves are given in diarrhœa. (*See* Timber Trees.)

Holarrhana antidysenterica, Dalz. & Gibs. Bby. Fl. 145. *Dawla kura.*

The bark, known as *conessee* bark or *codoga palla*, is used with great success in dysenteric affections in the form of decoction (bark 2 ozs., water 2 pints, boiled down to 1 pint). (*See* Timber Trees.)

Alstonia scholaris, Dalz. & Gibs. Bby. Fl. 145. *Satwin.* (*See* Timber Trees.)

Phyllanthus emblica, Dalz. & Gibs. Bby. Fl. 235. *Amla.* (*See* Timber Trees.)

Butea frondosa (*see* Timber Trees) and *Pterocarpus marsupium.* (*See* Timber Trees). The gum (kino) of these trees is astringent.

Acacia catechu, Dalz. & Gibs. Bby. Fl. 86.

The extract of the wood of this tree is a powerful astringent. (*See* Timber Trees.) Baker in Hook. Fl. Ind. describes this tree under *A. suma.*

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ALTERATIVES.

Hydrocotyle Asiatica, Dalz. & Gibs. Bby. 105. *Brámee*, Indian penny-wort.

A slender herbaceous plant, trailing on the ground. Leaves round, kidney-shaped. Umbels capitate, 2-3-flowered; flowers greenish-white. Fruit orbicular, reticulated with 4 ribs on each of the flat sides. Grows in moist shady places, near tanks and wells. The dried powdered leaves are used with good results in anæsthetic leprosy, secondary syphilis and other cutaneous diseases, in from 5 to 8 grs. doses. Powdered leaves, either fresh or dried, are applied to indolent ulcers. Diuretic properties are also assigned to these leaves.

Eclipta alba Hassk.

Eclipta prostrata, Dalz. & Gibs. Bby. Fl. 127. *Maka, bhangrah.*

A common weed belonging to the Order *Compositæ*, to be met with almost everywhere. Stem prostrate or ascending, rough with adpressed hairs. Leaves oblong, lanceolate, slightly serrated, rough. The heads of flowers white. The plant is used in the form of decoction in affections of the liver and spleen, and in dropsy. It is supposed to be a good substitute for taraxacum in hepatic affections. The expressed juice appears to be the best form of administration. The natives use the plant as pot herb.

Hemidesmus Indicus, Dalz. & Gibs. Bby. Fl. 147. *Anantamul*, Mar.; *magrabu*, Hind.; *mackwy*, Dec.; country sarsaparilla.

Small, twining plant. Leaves cordate, narrow, linear, pointed. Flowers pale-green on the outside, dark-blood-coloured inside. Follicles slender, straight.

Common everywhere. The root is the officinal part, and is esteemed as a valuable alterative tonic, diuretic and diaphoretic, being used in all cases in which sarsaparilla is employed. It is best given in the form of infusion (bruised root 1 oz., boiling water 10 ozs., infused in a covered vessel for an hour). Dose from 2-3 fl. ozs., thrice daily.

Calotropis gigantea and **C. procera**, Dalz. & Gibs. Bby. Fl. 149.

Both the root and the milk of the stem are used in leprosy and other skin-diseases. (*See* Fibrous Plants.)

Hydnocarpus Wightiana, Dalz. & Gibs. Bby. Fl. 11.

The oil is used in leprosy. (*See* Timber Trees.)

Pongamia glabra, Dalz. & Gibs. Bby. Fl. 77.

The oil of the seeds is used in itch and other skin diseases. (*See* Timber Trees.)

Thespesia populnea, Dalz. & Gibs. Bby. Fl. 18. *Bhendi.*

The yellow viscid juice of the capsule is used in scabies, etc. (*See* Timber Trees.)

Schleichera trijuga, Dalz. & Gibs. Bby. Fl. 35. *Kussan, kussim.*

Used in curing itch. (*See* Timber Trees.)

Ficus Bengalensis,* Dalz. & Gibs. Bby. Fl. 240. *Wár*, banyan tree, *wád.*

The milky juice of this tree is applied with benefit to the troublesome cracks on the soles of the feet to which the natives are so liable.

TONICS.

Almost all the medicines described as "febrifuges" are good and efficient tonics when used in smaller doses. It is believed that they act as antiperiodic by exercising a tonic influence on the stomach and improving the general health. They are not regarded to possess the same power, or act in the same way as quinine. Besides these, we have in India, and especially in the Konkan many other pure bitter tonics. A few will be enumerated here.

Tilnospora cordifolia, Dalz. & Gibs. Bby. Fl. 5. *Gul-vel, gulancha.*

Grows in the Konkan and all over India. A climbing shrub, with scabrous corky bark, cordate leaves, small yellow flowers, and a berry the size of a cherry, red when ripe. It is a good tonic, given in cases of debility caused by repeated attacks of intermittent fever and enlargement of the spleen. The parts used are the root and the stem collected during hot season, when the bitter principle is most abundant.

Officinal preparations:—

Tincture of gulancha, dose 1 to 2 drachms, thrice daily.

Extract of gulancha, dose 10 to 30 grs., thrice daily.

This corresponds to an impure extract prepared by the natives of Southern Marátha Country, and called *palo*, being used in doses of from 1 to 2 drachms.

Infusion of Gulancha.—(Gulancha cut small 1 oz., cold water 10 ozs.; macerate in a covered vessel for two hours, and strain). Dose from 1 to 3 ozs., thrice daily.

Ophelia chirata. *Chiretta.*

This is a well-known plant, native of temperate Himalayas, whence it is brought to the plains; it is a pure tonic, extensively used in hospital and private practice.

Officinal preparations:—

Tincture of Chiretta.—Dose 1 to 2 drachms, thrice daily.

Infusion of Chiretta.—(A quarter of an ounce infused in 10 ozs. of hot water in a covered vessel for half an hour). Dose 1 to 2 ozs., thrice daily

*The genera *Urostigma* and *Covellia* are united with *Ficus*.

Medicinal Plants.

There are people who take a dose of this infusion every morning all the year round, in the belief that it prevents attacks of intermittent fever.

Ophelia multiflora, Dalz. & Gibs. Bby. Fl. 156. Also called *chiretta, kárwi.*

A small, herbaceous plant with quadrangular stem and white flowers; grows at Mahábaleshvar. The dried stems and roots, sold in the bázár, occur in pieces, about 2 inches long, of the thickness of a quill. It is an excellent substitute for officinal *chiretta*, and equal to it in effect.

Exacuum bicolor, Dalz. & Gibs. Bby. Fl. 156.

Pretty common in pasture grounds of the Konkan during the rains. It is worthy of a place in our gardens on account of its beautiful flowers. The Pharmacopœia of India says that its dried stalks are sold in Southern India under the name of *country kariyat*. It possesses the same tonic and stomachic properties of gentian, and may, where procurable, be substituted for it.

Erithræa Roxburghii, Dalz. & Gibs. Bby. Fl. 157. *Kuroo nai* or *kadavi nai.*

Another small, herbaceous plant with beautiful pink, star-like flowers, common in cultivated grounds after the rains. The whole plant is bitter like the other gentians, and is esteemed by the natives as a valuable tonic.

Eucostema (Hippion) orientalis, Dalz. & Gibs. Bby. Fl. 157.

Another gentian common in Gujarát, though rare in the Konkan. Stem four-sided, leafy from the base; small white flowers. The bitterness of this plant is not so intense as that of chiretta, and approaches more nearly that of gentian. The natives of Gujarát eat the herb pickled. It is said that it is much used by the natives of Madras as a stomachic, as, in addition to its tonic properties, it is also somewhat laxative.

Andrographis paniculata, Dalz. & Gibs. Bby. Fl. 198. *Kiraita, kriat, kiraittem, karyat.*

This is a small herbaceous plant blonging to the order *Acanthaceæ* with quadrangular stem and beautiful white flowers. Officinal preparations are infusion and tincture. It is a bitter tonic and stomachic, analogous in action to quassia. It is much used in Southern Marátha countries and Southern Konkan (where it is confounded with officinal chiretta) in cases of general debility, especially of the stomach, during convalescence from fevers, in advanced stages of dysentery, etc.

Acorus Calamus, Dalz. & Gibs. Bby. Fl. Suppl. 96. *Vakan*; sweet flag of the English.

A common plant in moist places of India, Europe and America. The rhizome (root-stalk) has an aromatic bitter taste, and has been held in high esteem from the earliest ages as a good stomachic tonic.

Its virtues reside in a volatile oil. The dried rhizome sold in the bázár is of the thickness of the thumb, of various lengths, and covered with sheath-like scales. It is administered in cases of debility of the stomach, or dyspepsia attended with flatulence. Rubbed with spirits of cashew or any other spirit it is used as an efficient external application in sprains and chronic rheumatism. It is often rubbed for this purpose with equal parts of common extract of aloes. Internally it is best given in infusion (dried rhizomes, bruised, 1 oz.; boiling water 10 ozs.) in doses of 1½ to 2 ozs. The natives administer it also in the form of powder in doses of from 20 to 40 grs. or more.

There are many oils minutely described elsewhere which are used medicinally. (*See* Chapter on Oils.)

VEGETABLE POISONS.

MENISPERMACEÆ.

Anamirta cocculus, Dalz. & Gibs. Bby. Fl. 4. *Kakmari.*

The seeds possess powerfully poisonous properties due to the presence of *picrotoxin*; 6 to 10 grains of them are stated to be sufficient to kill a dog. The symptoms produced are nausea, vomiting, tetanic convulsions, and finally insensibility. The chief use of the seeds is to poison fish, for which purpose they are mixed with rice and thrown into tanks and the stagnant water of rivers; the fish become stupefied, float on the water, and are thus easily taken. Though fish thus caught is thought to be poisonous, the natives eat it after repeatedly washing and cooking it. These seeds are officinal in the Pharmacopœia of India, and enter as an ingredient in the preparation of an ointment used for the destruction of pediculi.

CELASTRINEÆ.

Elœodendron Roxburghii, Dalz. & Gibs. Bby. Fl. 48. *Tamiuj.*

The bark is said to be a virulent poison.—Brand.

ANACARDIACEÆ.

Semecarpus anacardium, Dalz. & Gibs. Bby. Fl. 52. *Biba*; marking nut.

The kernel of the seeds is eaten, but the pericarp is full of acrid juice which is collected and used for marking cloth. This juice is a powerful vesicant, and is also extensively used by the natives in the treatment of rheumatism, liver and other painful affections. It must, however, be employed with caution, as in certain constitutions it is apt to produce erysipelatous inflammation of the whole body, followed sometimes by death. It also causes deep ulceration and sloughing which has at times resulted fatally. Criminally it is applied to the os uteri to produce abortion.

The juice of the tree is so poisonous and acrid that people are afraid of cutting it, and they only do so after killing it by removing the bark. It is said that disagreeable consequences often result by even sleeping under the tree.

LEGUMINOSÆ.

Lathyrus sativus, Dalz. & Gibs. Bby. Fl. Suppl. 22 *Lang.*

(*See* Vegetables and Fruits, etc.)

LYTHRACEÆ.

Ammania baccifera, Dalz. & Gibs. Bby. Fl. 97. *Daudmare* (Beng.). *jalmukhi*.

A small herb, 6 in. 2-ft. high, very common in cultivated ground during the rains. The leaves are very acrid, and are used by the natives to raise blisters, and as a counterirritant in rheumatic inflammations. The fresh leaves bruised and applied to the skin produce a blister within half an hour. It appears that the juice of the leaves mixed with cooked food has been often used as a poison; it produces extreme tormina and acute suffering, with burning pain in the abdomen.

SAMYDACEÆ.

Casearia graveolens, Dalz. & Gibs. Bby. Fl. ii. *Moda* (Mar.)

It is stated elsewhere that the fruit is used for killing fish. It is also believed that it acts as a poison upon men. An infusion of the leaves of *C. ulmifera*, named in Brazil "marmeleiro do matto", is given internally and also applied externally as a valuable remedy against the bites of serpents.

CUCURBITACEÆ.

Melothria Madraspatana, Cogn. in D. C. Prod. Cont.—*Muckia scabrella*, Dalz. & Gibs. Bby. Fl. 100. *Ghugri*.

This cucurbit common in every hedge is hispid and scabrous all over; stem angular and berry globular, scarlet when ripe, size of a pea; seeds rugose.

The seeds are stated to be poisonous.

Lagenaria vulgaris, Dalz. & Gibs. Bby. Fl. Suppl. 36. *Tumbe, harrea kaddu*; bottle-gourd.

The whole plant is of a musky scent, soft, downy. Leaves cordate, glaucous, with 2 glands at the base. Fruit smooth, bottle-shaped, yellow when ripe. In the wild state the fruit is poisonous, producing symptoms like those of cholera. Dr. Lindley says that some sailors were poisoned and died at one of the ports of England from drinking beer which was kept in a flask made of one of these gourds, and Dr. Royle states that he learnt from a respectable and intelligent native doctor attached to the jail hospital at Sharanpore that he had seen a case of poisoning from eating of the bitter pulp, in which the symptoms were those of cholera. The natives of the Deccan take advantage of the tough rind of the fruit for variety of purposes, and use the fruits as floats for crossing rivers. Four or five fruits are enough to support a man with a burden on his head.

COMPANULACEÆ.

Lobelia nicotianæfolia, Dalz. & Gibs. Bby. Fl. 133. *Dawal, bokenal.*

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This is an elegant tall shrub with hollow stems, long sessile leaves and large white flowers. Common on our ghâts. The seeds are said to be extremely acrid, and like those of the other species to contain an acro-narcotic poison, so much so that they are said to be preferred to datura when rapid effect is desired.

PLUMBAGINEÆ.

Plumbago rosea, Linn.—*P. coccinea,* Dalz. & Gibs. Bby. Fl. Suppl. 71. *Lal-chitra.*

A common shrub in the Southern Konkan and throughout India. The pounded root acts as a powerful vesicant, and a paste made from it is employed in rheumatism and other painful swellings of the joints, etc. It is also criminally employed to produce abortion, the scraped root-bark being introduced for this purpose into the os uteri. This is apt to result in inflammation of the uterus and the peritoneal cavity, and death. The action of the external application is often assisted by its internal administration. There are cases on record in which it has been used internally alone with criminal intention, and has resulted in death.

P. Zeylanica, Dalz. & Gibs. Bby. Fl. 220. *Chitrack, chitra.*

Common in Gujarát and the Konkan.

It is a shrubby plant, cultivated in gardens on account of its white flowers. The bark of its root is also poisonous and acrid.

APOCYNACEÆ.

Nerium odorum, Dalz. & Gibs. Bby. Fl. Suppl. 52. Oleander ; *kaner, ganira, karavera.*

A large shrub indigenous to North-West and Central India, Sind and Afghánistan. Cultivated in gardens for the sake of its sweet-scented, rose-coloured, white or red flowers. All parts of this plant are more or less poisonous, the bark of the root being especially so. The bark is prescribed in leprosy and other cutaneous diseases by native doctors, but has also been used for criminal and suicidal purposes. Usually it acts by directly depressing the nervous system. A case has, however, been recorded in which well-marked tetanic symptoms followed its exhibition. The red flowers are a choice offering to Ganpatti. In some parts of the Mediterranean the root is employed to kill rats.

Thevetia neriifolia, D. C. Prod. viii. 344.—*Cerbera Thevetia,* Dalz. & Gibs. Bby. Fl. Suppl. 53. The exile or yellow oleander ; *pivala kaner.*

A large shrub or a small tree, native of America and West Indies, and naturalized all over India. Leaves resembling those of the last species, bell-shaped, yellow flowers and fruit of the size of a crab apple. The bark of this plant, which is possessed of considerable antiperiodic properties, is employed in the treatment of intermittent fevers. In large doses it acts as an acro-narcotic poison by inducing purging and vomiting. Caution is, therefore,

Vegetable Poisons.

much needed in using it; for cases have been recorded in which the use of the kernels of the drupe produced symptoms of poisoning.

Cerbera odollam, Dalz. & Gibs. Bby. Fl. Suppl. 53.

It is common along the swamps in Southern Konkan and the coast of Madras, Bengal, Australia, Indian Archipelago, etc. Cultivated on account of its beautiful shining leaves and white sweet-scented flowers. The milky juice and leaves are stated to be possessed of purgative properties; but their use is to be deprecated, as there are reasons for believing that even in moderate quantities this tree, and specially its drupe, are possessed of poisonous properties.

Ophioxylon (Rauwolfia) serpentinum, Dalz. & Gibs. Bby. Fl. 143. *Chandra, chandrika, chotachand, karavi.*

This shrub is common in the Konkan, Goa, forests of Madras, Burma, etc. It is stated in the Bombay Flora that it is used to poison tigers. (*See* Antidotes to Snake-bites.)

LOGANIACEÆ.

Strychnos nux-vomica, Dalz. & Gibs. Bby. Fl. 155. *Kajra.*

Very common in the Konkan. The seeds contain *strychnia*, an extremely bitter and poisonous alkaloid, mixed with another poisonous alkaloid *brucia*. These substances are also found in the bark and root of this and other species of the genus; and it is remarkable that parasitic plants of the order *Loranthaceæ*, which grow on the trunk of *S. nux-vomica*, acquire the poisonous properties of the latter, and contain the same alkaloids. Sir W. O'Shaugnessy states that he saw an athletic European sailor killed in less than an hour by half a drachm of the powdered leaves (of one of these parasites) taken by mistake for cubebs. It appears, however, that the yellow juicy pulp between the nuts is not poisonous, for birds devour it voraciously, and Dr. Birdwood (Veg. Prod. of Bom. Pr.) says the same of the pulp enclosing its deadly seeds; in fact, he includes the fruit of *kajra* in his class of edible fruits. The seeds are swallowed by birds with impunity, being too hard to digest.

Strychnos colubrina, Dalz. & Gibs. Bby. Fl. 115. *Nagmassad* of Telingu.

The wood and root of this climbing shrub, which grows in the Konkans, contain strychnia. The fruit is also said to be poisonous. This is the true "*Páo de cobra de capello*" of the Portuguese, highly esteemed by the natives as an infallible remedy for the bite of the cobra and other venomous reptiles. For this purpose it is brayed in rice water, and given in small doses internally, and also applied externally.

ASCLEPIADACEÆ.

Tylophora fasciculata, Dalz. & Gibs. Bby. Fl. 151.

In one case, brought to my notice, the root of this plant is said to have caused poisoning. This requires confirmation.

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SOLANACEÆ.

Datura alba, Dalz. & Gibs. Bby. Fl. 174.

This is a well-known shrub. Every part is poisonous, but the part generally used, is the seed which after being pounded is mixed with food and used by thieves in order to deprive their victims of the power of resistance. This poison causes a sort of temporary insanity, during which the sufferer does not know what passes before his eyes.

Withania (Physalis) somnifera, Dalz. & Gibs. Bby. Fl. 175. *Asgund.*

A common herb, 2-3 ft. high, met with in Bombay and other parts of India. It is stated in the Bombay Flora that "the root and leaves are powerfully narcotic and diuretic; the seeds are employed to coagulate milk like the *Puncera* (in Sind), a plant of the same family.

THYMELACEÆ.

Lasiosiphon eriocephalus, L. speciosus, Dalz. & Gibs. Bby. Fl. 221. *Rametta.*

Common at Mátherán, Karli, Khandála and other ghâts. The leaves are said to be acrid and poisonous, and to affect men as well as fish. The trees are often met with stripped of their bark, which is used in poisoning fish. It is a fact that an acrid poisonous principle abounds in most of the species of this order, and which possess very valuable medicinal properties, though not devoid of dangerous effects.

EUPHORBIACEÆ.

The greater number of species of this order are violent poisons owing to the presence of an acrid principle existing in almost all the organs, especially in the milky juice. There are several plants in India which are very formidable and deleterious, such as

Euphorbia tirucalli, Dalz. & Gibs. Bby. Fl. Suppl. 76. Milk-bush; *nivul*, Goa; *tiru kally*, Malay.

The juice of this well-known and commonly cultivated (for hedges) *euphorbia* is extremely acrid and vesicant. (*See* plants used for poisoning fish.)

Exæcaria insignis, D. C. Prod. xv. p. ii. 1213.

Falconera Malabarica, Dalz. & Gibs. Bby. Fl. 227. *Honi*, Bomb.; *dudla*, Guz.; *hor* or *stiora*, Goa.

Fruit and juice very acrid and poisonous.

Mallotus Philippinensis, Bedd. Fl. Sylv. t. 282.—*Rottlera tinctoria*, Dalz. & Gibs. Bby. Fl. 230.

The powder *(kamela)* is administered for the expulsion of intestinal worms, but acts as an irritant poison if given in large doses (*see* medicinal and fish-killing-plants). (*See* Timber Trees.)

Baliospermum montanum, D. C. Prod. xv. p. ii. 1125.—*B. polyandrum*, Dalz. & Gibs. Bby. Fl. 232. *Jamalgota.*

The seeds are very acrid, and have very strong drastic purgative properties. One seed pounded and mixed with some bland oil is the dose usually administered. In larger quantities they produce violent symptoms.

Chrozophora plicata, Dalz. & Gibs. Bby. Fl. 232.

A common herb in Bombay and elsewhere. The whole plant is acrid, and possesses drastic properties. The powdered seeds, mixed with large quantities of some bland oil, is given as a cathartic.

Securinega obovata, D. C. Prod. xv. p. ii. 449.—*Fluggea virosa*, Dalz. & Gibs. Bby. Fl. 236. *Kandori.*

It has been stated elsewhere that the bark of this large shrub, common in Bombay, is employed in some parts of India to intoxicate fish. This bark is said also to affect men injuriously. (*See* Timber Trees.)

Croton tiglium, Roxb. Fl. Ind. iii. Purging croton ; *jamalgota, jepal.*

Rare in Southern Konkan. Common in Travancore and other parts of Madras, Bengal, Burma, Ceylon and Indian Archipelago. The seeds and their oil are well known as powerful cathartics : cases have, however, been recorded where their use in larger quantities, either criminally or unintentionally, have produced death from excessive purging. The oil applied externally produces a vesicular eruption ; it is, therefore, sometimes prescribed in the form of liniment in rheumatism, paralytic affections, diseases of the joints, chest, etc.

Jatropha curcas, Dalz. & Gibs. Bby. Fl. Suppl. 77. *Jempal* or *jepal, arbi erand.*

Native of Brazil, introduced by the Portuguese, and now common all over India. The expressed oil from the nuts is used in small quantities as a substitute for castor oil, but is very uncertain in its action. In over-doses its action is that of an acro-narcotic poison. A case is recorded in which the partaking of twenty nuts produced very violent purging and vomiting and other symptoms of poisoning. It yielded, however, to careful treatment. Lime-juice is the best remedy.

Jatropha multifida, D. C. Prod. xvii. 1089. French physic-nuts, coral plant.

Indigenous in America and Africa and cultivated in gardens. The seeds are even more powerfully purgative than those of the preceding, and a case has been recorded where only three of them being taken, violent vomiting and purging, intense pain and heat in the stomach, with great prostration followed, though the patient eventually recovered under treatment.

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Jatropha manihot, Dalz. & Gibs. Bby. Fl. Suppl. 77. *Tapioca, mandioca* and *cassava* plant. (*See* Chapter on Vegetables and Fruits.)

Hura crepitans, Dalz. & Gibs. Bby. Fl Suppl. 76. Sand-box tree.

A small tree with a few prickles on the trunk, native of South America and cultivated in gardens. Flowers red in pyramidal aments. Fruit round, smooth, size of a small orange, when ripe bursting into several valves with noise: hence the name. The juice of the bark and leaves is acrid and corrosive, produces blindness in a few days if touched to the eyes. The seeds are possessed of violent cathartic properties, and there are on record cases in which one or two seeds administered in the form of an emulsion nearly proved fatal.

AMARYLLIDEÆ.

Crinum Asiaticum, Dalz. & Gibs. Bby. Fl. 275. *Nagdown.*

The root is officinal in the Pharmacopœia of India, where it is recommended as a safe emetic. It has a peculiar narcotic smell. The plant was named by Rumphuis and others *C. toxicarium* on account of its virtues "in curing the disease caused by the poisoned arrows of the Macassars in their wars," and not because of its toxic effects. I must state here, however, for future observation what was narrated to me by a friend acquainted with botany, *viz.*, that a whole family had suffered from symptoms like those of cholera (vomiting and purging) from having accidentally eaten the powder of *nag-down.*

MELANTHACEÆ.

Methonia (gloriosa) superba, Dalz. & Gibs. Bby. Fl. 250. *Kharia-nag, kala buch-nag.*

The root of this climbing herbaceous plant, common everywhere and cultivated in gardens, is said by Gibson and Dalzell and others to be poisonous. Experiments made at the Calcutta Medical College have shown that the root is a very powerful poison.

AROIDEÆ.

Lagenandra toxicaria, Dalz. & Gibs. Bby. Fl. 257. *Watsanab.*

This aroid is common in the marshes of Belgaum and South Konkan.

See Famine Plants for the account of other poisonous aroids.

GRAMINEÆ.

Paspalum scrobiculatum, Dalz. & Gibs. Bby. Fl. Suppl. 97. *Kodra.*

Vegetable Poisons.

It is said that this grain occasionally produces violent symptoms of poisoning, purging, vomiting, and narcotism; perhaps it is the ergotised grain that is the cause of these. Gibson and Dalzell say that this is "a very common and cheap grain, but not wholesome; grown on the hill lands of the Konkan, especially the variety *Hareek*, which often induces temporary insanity and spasms, etc. Large numbers of people may be occasionally seen thus affected." (*See* Chapter on Vegetables and Fruits.)

PLANTS USED FOR POISONING FISH.

Anamirta cocculus, Dalz. & Gibs. Bby. Fl. 4. *Kakamari.*

It is the *Cocculus Indicus* of commerce. A twining shrub with thick corky bark. Leaves cordate, 4-8 in. long, pendulous panicles of greenish flowers and smooth black drupes. Common in the Konkan. The seeds are used in poisoning fish and game in India, and in Europe to adulterate beer.

Hydnocarpus Wightiana. The fruit. (*See* Timber Trees.)

Walsura piscidia, Dalz. & Gibs. Bby. Fl. 37. The bark. (*See* Timber Trees.)

Sapinolus trifoliatus. Fruit and soapy water. (*See* Timber Trees.)

Mundulea suberosa, Hook. F. L. Ind. ii. 110.—*Tephrosia suberosa*, Dalz. & Gibs. Bby. Fl. 60. *Surti*

A small tree with pinnate leaves. Racemes of rose-coloured flowers and long silky legumes, contracted between the seeds. Northern Konkan. The seeds are used for poisoning fish.

Ougeinia Dalbergioides, Bed. F. L. Sylv. t. 36.—*Dalbergia ougeinensis*, Dalz. & Gibs. Bby. Fl. 78. Pounded bark. (*See* Timber Trees.)

Albizzia procera, Dalz. & Gibs. Bby. Fl. 87.

The bark pounded and thrown into water stupefies fish.

Barringtonia acutangula, Dalz. & Gibs. Bby. Fl. 95. Pounded bark. (*See* Timber Trees.)

Casearia tomentosa. Acrid juice of the fruit. (*See* Timber Trees.)

Casearia graveolens. Fruit. (*See* Timber Trees.)

Randia dumetorum. Pounded bark. (*See* Timber Trees.)

Bassia latifolia. Oil cake. (*See* Timber Trees.)

Mæsa Indica, Dalz. & Gibs. Bby. Fl. 736. *Alki.*

A shrub. Leaves oblong pointed, dentate with large distant teeth, 3-6 in. long. Flowers small, pure white. Berry globose, white, size of a pea. Common along the ghâts. In Kânara the leaves are used to poison fish.

Securinega obovata (*Flueggea virosa.*)

Plants used for poisoning fish.

The bark and the juice are fatal to maggots in sores. (*See* Timber Trees.)

Euphorbia tirucalli. The acrid juice of the tender leaves. (*See* Timber Trees and Poisons.)

Excæcaria Indica, Fl. Beng.

A plant of Ceylon, Bengal and Burma. The seeds are used to intoxicate fish.

MYRSINEÆ.

Gnetum scandens, Dalz. & Gibs. Bby. Fl. 246. *Kumbal, umbli.*

An extensive scandent shrub, common in the ravines of Mahábaleshvar and forests of Khandála and Konkan. Leaves are said to be used to poison fish in the Konkan.

VEGETABLE ANTIDOTES TO SNAKE-BITES, etc.

NUMEROUS plants are held in great esteem by natives as valuable in the cure of snake-bites; but the subject of snake-poisoning is surrounded by so many elements of doubt that it is not safe to believe in the efficacy of remedies indicated on the testimony of ignorant people.

Limonia acidissima, Dalz. & Gibs. Bby. Fl. 29.

An armed shrub, belonging to the orange family, with pinnate leaves, white fragrant flowers and globose fruit. Found in Southern Konkan. The pulp of the fruit, which is of a reddish colour, is used as an antidote against snake-bites.

Glycosmis pentaphylla, Dalz. & Gibs. Bby. 29. *Kirmira; menki*, Goa; belongs to the same family.

An erect, unarmed shrub. Leaflets 3-5. Flowers small, white. Fruit size of a pea, whitish. Common in Southern Konkan. The wood bruised with simple or pure water is often given.

Elæodendron glaucum, Roxb. Fl. Ind i. 638.—*E. Roxburghia*, Dalz. & Gibs. Bby. Fl. 48. *Tamruj.*

The root bark of this plant, which grows chiefly in Sátára and other parts of the Deccan, is in high repute as an antidote against snake-bites. The stem bark is said to be a virulent poison.

Alangium Lamarckii. (*See* Timber Trees.)

Notonia grandiflora, Dalz. & Gibs. Bby. Fl. 132. *Wanderrotti.*

This plant is common in gardens and on the ghâts. An infusion of the bruised stem in cold water is given as a preventive against hydrophobia.

Ophioxylon (Rauwolfia) serpentinum, Dalz. & Gibs. Bby. Fl. 143. *Chandra, chota chand.*

An elegant shrub common in the Konkan, Goa, in the forests of Madras, Burma and other parts of India. The root is held in very high esteem as an antidote against snake-bites. It is bitter, and is administered in the form of decoction as a febrifuge, anthelmintic, and to promote uterine contractions in cases of tedious labours.

Wrightia tomentosa.

The bark of the stem and root are used by natives in snake-bites and stings of scorpions. (*See* Timber Trees.)

Dœmia extensa, Dalz. & Gibs. Bby. Fl. 150. *Sagowani*; Hind. *utran*; Dec. *utarni.*

A perennial twining plant belonging to the order *Asclepiadeæ*. Flowers dull-white, on long peduncles, follicles covered with soft bristles. Common in Bombay, Poona, etc. The root is applied as a remedy in snake-bites. It is also employed extensively as an expectorant in the treatment of catarrhal affections in 10-gr. doses.

Gymnema sylvestre, Dalz. & Gibs. Bby. Fl. 151. *Kaoli.*

Also an *asclepiad*; found in Bombay and in the Southern Marátha Country. A large twining plant, with small, elegant, light-yellow flowers, which appear in the rains. The natives hold the root in esteem as a local and internal remedy in snake-bites.

Strychnos colubrina, Dalz. & Gibs. Bby. Fl. 155. *Nagmassad* of Telingu.

The wood and root of this climbing shrub, which grows in the Konkans, contains *strychnia*. The fruit is also said to be poisonous. This is the true "*Páo de cobra de capello*" of the Portuguese, highly esteemed by the natives as an infallible remedy for the bite of the cobra and other venomous reptiles. For this purpose it is brayed in rice-water, and given in small doses internally and also applied externally.

Achyranthes aspera, Dalz. & Gibs. Bby. Fl. 218. *Agarah* (Mar.)

A common weed belonging to the *Amaranthaceæ*; appears during the rains. Flowers greenish, shining, in rough panicles. These are used in infusions as external applications in snake-bites.

Aristolochia Indica, Dalz. & Gibs. Bby. Fl. 224. *Sapsan.*

A small, shrubby, twining plant. Leaves wedge-form. Flowers purple-coloured. Capsule oblong, pendulous.

Hills throughout the Konkans. The root of this plant, which is bitter, is held in high esteem as a specific in cases of snake-bites by the natives. It was known to the early Portuguese settlers, who called it *raiz de cobra*. The expressed juice of the leaves is also used for the same purpose. The root is used in fevers.

Bragantia Wallichii, Dalz. & Gibs. Bby. Fl. 225. *Alpam*, Mal.

A small shrubby plant found in Bombay, Southern Konkan, Goa and Malabár, belonging to the order *Aristolochia*. The juice of the leaves is considered as an antidote in snake-bites, especially in that of the cobra.

Euphorbia neriifolia, Dalz. & Gibs. Bby. 226. *Thor*, Bomb.; *nivul-kanta*, Goa; common milk-bush.

Shrubby, often arboreous. Branches 5-angled; stipulary spines paired. Leaves oblong, about 3 in long, fleshy. Common. The root enjoys an almost universal repute as an antidote in snake-bites, and is administered mixed with black pepper.

Mallotus Philippinensis.

The fruit and leaves rubbed with honey are applied to the bites of poisonous animals. (*See* Timber Trees and Medicinal Plants.)

FODDER.

NUMEROUS grasses, cultivated or indigenous, afford abundance of excellent green fodder. The several panicums, digitarias, coix and andropogons, etc, are considered more or less nourishing.

Cynodon dactylon, Dalz. & Gibs. Bby. Fl. 297. *Harryali* or *durva* is much valued all over India, being used both green and made into hay; but

Anthistiria polystachia and **A. cymbaria**, Dalz. & Gibs. Bby. Fl. 304, known in Bombay as *ful gans* or *gurat* and in the Southern Marátha Country and Goa as *korrud*, form the greatest part of the hay used in Bombay.

The natives feed their cattle on the sweet stalks and leaves of

Spicillaria spicata, Dalz. & Gibs. Bby. Fl. Suppl. 99. *Bájri.*

Sorghum vulgare, Dalz. & Gibs. Bby. Fl. 99. *Jowári.*

The stalk, called *karbi*, is much used, specially in the Deccan.

Adropogon (Holcus) cernuus, Dalz. & Gibs. Bby. Fl. Suppl. 99. *Shallu.*

This is also much valued, and said to be very nutritious.

A. glaber. *Tambut.*

A. scandens. *Marwail.*

Panicum (oplismenus) frumentaceum, Dalz. & Gibs. Bby. Fl. Suppl. 98. *Shamoola.*

P. Italicum, Dalz. & Gibs. Bby. Fl. Suppl. 98. *Kangni, kora-kang.*

P. miliaceum, Dalz. & Gibs. Bby. Fl. Suppl. 98. *Wurri, sava.*

P. pilosum, Dalz. & Gibs. Bby. Fl. Suppl. 98. *Badlee.*

All these panicums and bájri and jowári are cultivated for the grain, which forms the food of the people in various districts of this Presidency.

P. (oplismenus) colonum, Dalz. & Gibs. Bby. Fl. 291. *Borrur.*

P. (setaria) glaucum, Dalz. & Gibs. Bby. Fl. 293. *Kolara.*

Paspalum scrobiculatum, Dalz. & Gibs. Bby. Fl. Suppl. 97. *Kodrea-kora.*

(*See* Vegetables and Fruits). It produces poisonous symptoms in the cattle, etc.

Imperata (saccharum) spontanea, called *kan* in Sind.

Chloris barbata, Dalz. & Gibs. Bby. Fl. 296. Very common.

Saccharum officinarum, Dalz. & Gibs. Bby. Fl. Suppl. 99. *Us, sirdi*; sugarcane.

The leaves used as fodder and reckoned by some as superior to all kinds of food for cattle.

Bambusa arundinacea (*See* Timber Trees.)

Dendrocalamus strictus (*see* Timber Trees) and other bambus. Tender leaves eaten by cattle.

Medicago sativa, Dalz. & Gibs. Bby. Fl. Suppl. 21.

Cultivated as food for horses only. People who can afford it, give their cattle a daily ration of cakes of the various seeds already described in the chapter on oil-yielding plants and also the following pulses:—

Phaseolus aconitafolius, Roxb. Fl. Ind. iii. 299; Dalz. & Gibs. Bby. Fl. Suppl. 23. *Mhat.*

Phaseolus trilobus, Dalz. & Gibs. Bby. Fl. 71. *Arkmat.* Common.

P. mungo, Dalz. & Gibs. Bby. Fl. Suppl. 23. *Múng.*

P. mal (botanically a variety of the last). *Urid.*

Cyamopsis psoralloides, Dalz. & Gibs. Bby. Fl. Suppl. 21. *Gonar.*

Dolichos biflorus and uniflorus, Dalz. & Gibs. Bby. Fl. Suppl. 23. *Kulti.*

Cicer arietinum, Dalz. & Gibs. Bby. Fl. Suppl. 22. *Channa.*

Almost all these are dhal-producing plants used for feeding cattle and horses, and some for human food. The tender stalks and leaves of these and of several other leguminous plants are considered excellent fodder, especially for milch cattle. In fact, natives mix, whenever possible, straw with green grass or leaves of some of the plants mentioned below to whet the appetite and increase the nutritive properties of fodder.

Saccopetalum tomentosum. Leaves.

Caparis spinosa, C. Murraya, Dalz. & Gibs. Bby. Fl. 9. The leaves and ripe fruits are greedily eaten by goats and sheep.

C. horrida, Dalz. & Gibs. Bby. Fl. 10. Twigs, shoots and leaves eaten by elephants and goats.

Flacourtia cataphracta. Leaves.*

Flacourtia Ramontchii Leaves and twigs.

Grewia tiliafolia. Leaves and twigs.

Ægle marmelos. Leaves and twigs.

* See Timber Trees for the description of this and the following plants.

Fodder.

Garuga pinnata. Shoots and leaves.
Cedrela toona. In some parts, young shoots and leaves.
Zizyphus jujuba. The leaves are much valued.
„ **rugosa.** Leaves. (*See* Fruits.)
„ **xylopyra.** Young shoots, leaves and fruits.
Schleichera trijuga. Twigs and leaves.
Odina Wodier. Leaves and young branches.
Moringa pterygosperma. Leaves and twigs.
Alhagi maurorum. *Ut-katara* and *javus.* Leaves.
Parkinsonia aculeata. Young branches and leaves for goats.
Butea frondosa. Leaves are given to buffaloes.
Ougenia Dalbergioides. Leaves and twigs for cattle.
Dalbergia latifolia. Leaves and twigs serve as cattle fodder in Oude.
Prosopis spicigera. Pods for camels, cattle, and goats.
Albizzia odoratissima. Twigs and leaves.
„ **stipulata.** Twigs and leaves.
Stephegyne parviflora. Leaves.
Anthocephalus cadamba „
Hymenodictyon excelsum „
Randia dumetorum „
Ehretia lævis „
Briedelia retusa „
Briedelia montana „
Putranjiva Roxburghii „
Ulmus integrifolia. *Wallanj.* „
Ficus Bengalensis. Several other species of this genus.
Salix tetrasperma. Leaves.
Bambusa. Leaves.

SACRED PLANTS.

PLANTS MENTIONED IN THE RELIGIOUS BOOKS, AND USED IN THE RELIGIOUS CEREMONIES OF THE HINDUS.

THE Hindus hold the belief that the gods inhabit or frequent all sweet-scented or flowering plants;—such as are neither, being haunted by evil spirits. As might, therefore, be naturally expected, a good many plants are worshipped or used in some of their religious ceremonies. The most important are the following :—

Butea frondosa. *Palas.*
Prosopis spicigera. *Shami.*
Bauhinia racemosa. *Apta.*
Calotropis gigantea. *Rui.*
Achyranthes aspera. *Agarah.*
F. glomerata. *Umbar.*
Ficus Bengalensis. *Vad*
F. religiosa. *Pipal.*
Cynodon dactylon. *Dub.*
Eragrostis cynosuroides. *Kush.*
Eugenia jambolana. *Jambul.*
Mangifera Indica. *Amb.*
F. cordifolia. *Pair.*
Ocymum sanctum. *Tulas.*
Phyllanthus emblica. *Aula.*
Musa paradisiaca. *Kela.*
Ægle marmelos. *Bel.*
Saraca Indica. *Jassundi, asok.*
Cucurbita pepo. *Kohala*
Cucumis sativus. *Kakdi.*
Pandanus odoratissimus. *Keuda.*
Melia Azadirachta. *Nim.*

Butea frondosa. *Palas.*—The leaves of this plant are trifoliate; the middle leaflet is supposed to represent Vishnu, the left Brahma, and the right Shiv: hence its worship is enjoined in *Chaturmás Máhátma*. Hence also its use in the following three great ceremonies :—

Sacred Plants.

1. The leaves are used as platters on the occasion of the investiture of the sacred thread, when a particular part of the ceremony, called *chewul* (that is, when the barber removes the last tuft of hair from the head of the child to be invested), is being performed.

2. The dry twigs under the designation of *samidhas* are used for the feeding of *hom*, or sacred fire, in the ceremony which goes under the name of *nava grahas*, celebrated to secure the pacification of the nine planets (*nava*=nine; *grahas*=planets) on the occasion of *vastu shanti, i.e.*, entrance into a newly-built house, or one acquired from a non-Hindu.

3. The stem is used as a staff on the day of *sodmánj*, a part of the thread ceremony.

Prosopis spicigera. *Shami, shamri.*

The worship of this tree is enjoined at page 153 of *Vratraj* (selections from *Bhávishya Purán*) to be performed on the tenth of *Ashwin Shudhapaksha* (*Dasera* festival). This day, also called *vijaya dashmi*, is selected on account of its being the one on which Arjún—one of the Pándavs—took down the weapons he had left on this tree many years before, and fought one of his memorable battles with them. The tree is worshipped to obtain pardon for sins, success over enemies, and the realization of the devotee's wishes. It is believed that *shami* is transformed into the goddess that pleased Rám. The dry twigs are employed as *samidhas* for feeding the sacred fire already described. The leaves, as *patri* (leaf-offerings), are used in the worship of Ganpatti, being thrown at the feet of that god's idol.

Bauhinia racemosa. *Apta.*

An account of the way this tree is to be worshipped, is found in *Dharm Sindhu* in the Vol. *Dvitya Parichhed*, Section *Ashwin Máhátma*, Chapter *Vijaya Dashmi*.

This chapter tells us that this tree, called *ashmantak* (its Sanskrit name), must be worshipped instead of *shami* if the latter cannot be found. A complete narrative of this legend is also to be found in *Sahadri Kand*.

In the villages of the Konkan where *shami* does not grow, the ceremony of the worship of *apta* is performed somewhat as follows:—

Early in the morning, people dressed in rich clothes assemble together, and in procession go outside the town to where the *apta* tree may be, and there, after a priest has recited some prayers prescribed in the ritual, the chief man of the town cuts a bough of it, the other people following him. These boughs they take along with them, and going to the nearest temple, usually of a goddess, worship her, and make her an offering of a few of the *apta* leaves, together with flowers of *Tajetes patula* (French marigold), and blades of rice and corn.

On returning home they first make an offering of the remaining leaves to their household gods, then to their priests accompanied by some copper or silver coins, and to their parents and guardians,

or to the elderly people in the house; and, lastly, to their friends, saying: "Take this gold"; for the Hindus believe that the leaves over which the *muntras* are recited, are worth gold, or transformed into gold.

In Baroda this ceremony is performed with great pomp, the procession being headed by the Gáikwár himself, who is the first person to cut down the bough.

In Bombay there are two *shemi* trees, one at Mumbádevi and the other at Rámbagh, planted many years ago. Here the people go and worship these trees on the *Dasera* day, and afterwards they proceed to the temple of Mahálaxmi, carrying along with them the leaves of *apta*, flowers, rice and corn blades, and make an offering of these to the goddess, as already stated. A great quantity of boughs is sold in streets and near the temples on this day.

On the tenth day of the month of *Ashwin*, the *Dasera* festival is held, and during the nine preceding days, Hindus perform in their houses certain ceremonies.

On the morning of the first day of *Ashwin*, they raise a sort of altar or seat, called *ghat*, for the gooddess Bhagwati. There are two methods of putting up this altar—the wet *(ola)* and the dry *(suka)*. The wet is gone through in the following manner. On a raised seat is placed a copper or wooden tray filled with earth, on which wheat, rice and other grains are sown and watered. Over the top of this mound of earth they keep a copper or silver pot, called *tambya*, filled with water, and besmeared on the outside with *gandh*. A betelnut and some copper or silver coins are also put into the pot, over the *tambya* are fixed three or five betel-leaves (never two or four), and over these again a cocoanut on which is drawn with soot a human face (nose and eyes), sprinkled over with *kunku*, and covered with a hat, or rather a flat cap made of betel-leaves and the midrib *(vid)* of the leaves of the cocoa palm, tipped with the flowers of the French marigold. A canopy made of bambu, tastefully decorated with the choicest of flowers, is fixed right above this altar to a hook in the ceiling, and from which the light orange-coloured *kawndal* fruits *(Trichosanthes palmata)* and coloured glass globes are hung.

Before this altar, which is left standing for the space of nine days, every night one or more chapters from the sacred book, called *Sapta-siti-pat*, are read by the family priest: hence these devotions or readings are called *navratra* (literally nine nights) in honour of *Shri Bhagwati*, usually called *devi*. On the tenth day this altar is removed, the cocoanut is broken, and the kernel mixed with sugar is distributed among relatives and nearest friends; while the rice and corn plants, which have by this time grown to a pretty good height, are worn in the turbans.

The dry ceremony is performed in the same manner as the wet one, the only difference being that, instead of a mound of earth, a lot of dry rice is piled on a *chavrang*.

Sacred Plants.

On the midnight of the eighth day the *hom* ceremony is performed by some Hindus, and *purnávat* (rice, salt, etc.,) are thrown into the *hom* to appease the hunger of *Shri Bhagwati*; and on the ninth all the sacred books and weapons, if there be any at home at the time, are worshipped.

Calotropis gigantea *Rui.*

In *Chaturmás Máhátma*, Chapter XX, in the narration of *Gallava Rushi* taken from *Skand Purán*, this tree is mentioned to be the transformation of *Surya*, or the sun. It is used in various ceremonies, both religious and those of time-hallowed custom. The leaves are used as *patri*, in the same way as those of *shemi* in the worship of Ganpatti, Haritáliká, Pitthori, etc. They are also employed in *shusti pujan* (a ceremony performed on the sixth day after confinement for propitiating "Jewti", the goddess of destiny) by females. When a Hindu is to marry a third time, it is believed that the third wife will soon die; in order to avoid such a calamity, the man is first married to this tree, which is then cut down. This ceremony is believed to ensure the longevity of the fourth, but really the third wife whom he now marries.

It is ordered in the *Shrávan Máhátma* to worship Máruti (who is also known as Hunumán) or the monkey-god on every Saturday with a garland of the flowers of this tree, which are then offered to him. The twigs are also ordered to be used as substitutes for tooth-brushes in the Smritisar Granth. They are also employed as *samidhas* for the feeding of sacred fires, as mentioned before.

Achyranthes aspera. *Agarah.*

A very common, ash-coloured shrub, about 3 feet high. Leaves obovate rotund; branches 4-sided; spikes very long and slender; flowers purplish-green, shining; lateral bracts rigid and prickle-like.

In *Chaturmás Máhátma*, Chapter XX, this plant is mentioned as the transformation of Budh. In *Smritisar Granth* it is ordered to be used as a tooth-brush. In *Vratráj* (page 85) it is directed that on *Bhádrapad shudh* 5th, females should wash their mouths with 108 pieces of this plant, using them as tooth-brushes; but in case of need the number may be reduced as low as seven; also to bathe 108 times, keeping each time a leaf of this plant on the head. It is also used as *samidhas*. In *Shrávan Máhátma*, Chapter XIII, it is recommended to worship Ganpatti with the leaves of this plant on *Shrávan shudh* 4th. The same god is similarly worshipped on *Bhádrapad shud* 4th (or Ganesh Chaturthi).

Ficus glomerata. *Umbar.*

In Chapter XX of *Chaturmás Máhátma* it is mentioned that *Shukra* (teacher of the demons) was transformed into this tree. Its stem is used as a nominal prop for *mandaps* on the day of *Medmuhurth*—a ceremony performed a day or two before marriage. Its leaves are used as *patri* in the worship of Ganpatti, etc. The fruits are strung and put round a pregnant woman's neck on a particular day during the eighth month of pregnancy. This is not done by all, some using, instead, the flowers of various plants. It is mentioned in *Guru Charitra*, Chapter XIX, that *Guru* or the god *Datta* or *Dattatri* lives on this tree for ever. The fourth incarnation of the Hindu god named *Narashinh*, after tearing the demon

Hiranya Kashappu with his nails, relieved himself of the demon's poison by inserting them in the stem of this tree. Hence it is considered sacred, and worshipped.

Ficus Bengalensis. *Vad.*

In Chapter XX of *Chaturmás Máhátma* it is mentioned that Bráhma was transformed into a *vad* tree. Its dry twigs are used as *samidhas* for producing sacred fire. The leaves are employed as one of the *panch pallavs* or platters, and also for pouring libations. In *Vratráj*, page 267, females are ordered to worship this tree on *Jesht shudh* 15th, to water it, to wind a thread round it, and to worship it with *gandh*, flowers, etc., and make *pradakshanas* (go round it a certain number of times). They are further ordered to praise it, and to pray to it for the survival of their husbands and for the fulfilment of their wishes. They are also told that by worshipping this tree they secure one of the heavens named *Shivloke*. The reason of this worship is given at page 42 of *Vrat Kaumudi*, wherein it is mentioned that *Sávitri*, the wife of *Satyáwán*, worshipped this tree, and thereby got back her deceased husband. At page 78 of the same book it is stated that they should perform the thread ceremony of this tree and its marriage with the *durva* plant *(Cynodon dactylon)*.

Ficus religiosa. *Pipal.*

Chapter XX of *Chaturmás Máhátma* tells us that this tree is the transformation of the gods' *Guru*, and is termed *ashwath*. The cause of this transformation is mentioned in Chapter IV of *Kartik Máhátma*. It is stated in *Chaturmás Máhátma* that this tree is frequented by all the gods, and it is, therefore, ordered that it should be watered, worshipped, and *pradakshanas* performed round it. It is enjoined in the *Shrávan Máhátma* to worship this tree on every Saturday of the month *Shrávan*. On page 39 of *Vrat Kaumudi* is ordered the worship of this tree on every *Somvati, i. e.*, on every Monday on which a new moon should happen to fall. At page 342 of *Vratraj, Atharwan* tells the *Rushis* how to worship this tree; and *Valkhilya* mentions how Vishnu became a *pipal*. At page 65 of the same book is ordered the performance of the *múnj* or thread ceremony of this tree; at page 75 its marriage with *tulas (Ocymum sanctum)*. The tree is also used in *samidhas* and for platters in *panch pallov* and for pouring libations.

Cynodon dactylon. *Dub* or *durva.*

Chapter XX of *Chaturmás Máhátma* says that this grass is the transformation of *Ráhu*. At page 124 is given a description of the *Durva ashtámi, i. e.*, its worship on *Bhádrapad shudh* 8th. It is said that on this day the Hindus are ordered to go to this plant, pray to it, pluck it up from the ground, and bring it home, and worship it along with *Shiv*; pray to her (*Durva* is a goddess) to increase his family, as it (or she) is very fertile and gregarious. At page 156 of the same work is ordered the worship of *Ganpatti* with six *durvas*, etc., every day. At page 78 is ordered the marriage of this plant with *vad* or *wav*.

Sacred Plants.

Eragrostis cynosuroides. *Kush* or *darbh.*

It is mentioned in Chapter XX of *Chaturmás Máhátma* that this plant is a transformation of *ketu*. Chapter XXVI of *Shrávan Purán* orders that these darbhs should be pulled out of the ground on *Pithori Amváshya*. Unless this is done, the plants are not considered fit for use in sacred ceremonies. They are also employed in various funeral rites, such as *tarpan*, etc.

Eugenia jambolana. *Jambul.*

The god *Megh* is said to have been transformed into a jambul tree. The colour of the fruit being dark like that of *Krishna*, this plant is very dear to him; it is, therefore, worshipped, and Bráhmins are fed under it. The leaves are used as platters or *panch pallows* and for pouring libations.

Mangifera Indica. *Amb.*

In Chapter XX of *Chaturmás Máhátma* it is said that this tree is the transformation of the god *Prajapatti*. In *Smritisar Granth* the twigs of this tree are ordered to be used as tooth-brushes and its leaves as platters in *panch pallavs* and for pouring libations; and flowers in the worship of *Shiv* on the day of *Maha Shivrátri* in the month of *Mágh*. The leaves are also employed in adorning *mandaps* and houses on occasions of various ceremonies.

Ficus cordifolia. *Pair.*

The leaves are used in *panch pallavs.*

Ocymum sanctum. *Tulas.*

This is the holy basil common in all Hindu gardens and temples. Chapter XVII of *Chaturmás Máhátma* tells us that it is a goddess, and should be watered and worshipped daily, at least in *Chaturmás, i. e.* from *Ashad shudh* 11th to *Kartik shudh* 11th. The worship of this tree and its marriage with the god *Krishna* is mentioned in Chapters XIX, XX and XXI of *Kartik Máhátma* in selections taken from *Sanat Kumar Sumvheta*, also at page 72 of *Vrat Kaumudi*. At page 351 of the same book is ordered the *tulasi laksha vrat*, a ceremony performed when a vow is made, which consists in offering a lac of the leaves, one by one, to *Krishna*, the performer fasting until the ceremony is complete. It is said that Krishna recommended his king *Udeshtir* (Dharmráj) to perform this worship.

Phyllanthus emblica. *Aula.*

Chapter I of *Kartik Máhátma* orders the worship of this tree and the feeding of a Bráhmin couple under it, whereby all the sins are washed off. At page 73 of *Vrat Kaumudi* is ordered the *vrat* and worship of this plant.

Musa paradisiaca. *Kelá.*

At page 251 of *Vratráj* it is ordered that females should worship this tree on the 4th of *Kartik shudh*, whereby their husbands are said to survive them, and their life is lengthened. This tree is also worshipped on the 3rd of *Shrávan*. The stems of the plants, laden with their long rachises of fruits, are invariably placed by the natives at the entrance of their houses, during their marriage or other festivals, as appropriate emblems of plenty and fertility.

Ægle marmelos. *Bel* or *beli.*

In Chapter XVIII of *Chaturmás Máhátma* is mentioned the origin of this tree. Its leaf is the symbol of the Hindu triad, and represents *Brahma, Vishnu* and *Mahesh* (Shiv). It is employed as *patri* in worshipping the deity Shiv. At page 352 of *Vratráj*, taken from *Jaimini Aranya Katha, Durvas Rushi* orders *Draopadi*, the wife of *Pándavs*, to observe the *bel laksha vrat, i. e.*, the worship of *Máhádeo* with a lac of the leaves of this tree.

Saraca Indica (Jonesia Asoca). *Jassundi, asok.*

This is a small, handsome tree. Leaflets 6-12, oblong, lanceolate, 3-9 in. long. Flowers of a beautiful orange colour, collected in dense cymes at the ends of branches. Pod scimitar-shaped, 4-10 in. long, 4-8-seeded. Common in the Southern Konkan.

At page 224 of *Vratráj* it is ordered to worship this tree on *Chaitra shudh* 13th. It was under this tree that *Sitá*, the wife of *Rám*, passed her days when she was carried away and imprisoned by *Rávan*, and I believe that it is so named because under it she was relieved of her grief (*a*=away from ; *shoke*=grief.)

Cucurbita pepo. *Kohala.*

Page 46 of *Vrat Kaumudi* recommends the worship of this tree, considering it a goddess. *Dharmráj* tells *Krishna*, and *Narad* priest of the gods tells king *Chandrasen* to observe the *vrat* of this cucurbitaceous plant (*vide* page 370 of *Vratraj* in selections taken from *Padma Purán*). Its fruit is also cut with some ceremony, called *kohala muhurt*, a day or two before a marriage.

Cucumis sativus. *Kakdi.*

At page 371 of *Vratráj* it is related that *Suth* told the *Rushis* and *Shiv* told his wife *Párwatti* to worship this tree, as by doing so females do not lose their husbands, or that these survive them The fruit of this tree is cut into thin slices, and employed in the worship of snakes on *Shrávan shudh* 5th (*nágpanchmi* day). It is likewise employed in the worship of many other gods.

Pandanus odoratissimus. *Keuda.*

Chapter III of *Kartik Máhátma* relates that this plant is cursed by *Shiv* for telling a lie and giving false evidence on the occasion of a dispute between *Shiv* and *Vishnu*. But he again took pity on it, and ordered that he *(Shiv)* should be worshipped with this plant on the day of *Shivratri*. The plant is also employed in the worship of many other gods.

Melia azadirachta. *Nim.*

When nectar was being taken to heaven from the world below for the use of the gods, it is believed that a few drops of it fell on this tree. Hence on new year's day of *Shahalivan shak*, Hindus eat its leaves in the hope of thereby acquiring freedom from disease.

Ipomœa pes-capræ. *Markyada vel* or *marja vel.*

The following curious practice is observed by Hindus at Bassein and some villages of the Konkan, though I have found no authority on this subject in their sacred books :—

Sacred Plants.

This creeper is twined round the cot of a Hindu mother on the sixth day after her confinement, and is intended to serve as a protection to the new-born babe against any evil effects that might arise from the visit of *Jewti* or *Satvi* (goddess of destiny), who is supposed on this day to call for the purpose of writing the child's destiny on its forehead, and sometimes even carry it away. The notion of this creeper being used in the manner above described, seems to be probably suggested by the fact that as it grows on the sea side, and serves to bind the sands together, and prevents the encroachment of the sea, it might, so to speak, be used to bind the child to its mother, and prevent the effect of *Satvi's* evil intention.

Satvi is also propitiated by feasts (the members of the family keep a watch on and pass the fifth and sixth nights in jollity) and worship. This worship is of two kinds: one consists in drawing on the wall a female picture over whose face another face, made of dough is stuck and in whose four hands are four cradles with a babe in each. The figure is dressed in a cloth dyed with turmeric, and beneath it (the figure) is placed a stone, the one used for grinding *masala*, covered over with leaves of *rui (Calotropis gigantea)* having the figures of children drawn on them with red lead. Both the figures on the wall and on the leaves are then worshipped, different kinds of flowers and sweetmeats (usually gram and sliced cocoanut) being offered to the goddess. These sweetmeats are afterwards consumed by each and every member of the family and distributed among their friends. A widow in the family generally conducts this ceremony. The other form of worship, which is conducted by the father of the child, consists in placing on a four-footed stool *(chavrang)* a piece of gold or silver of the size of a four-anna piece with a female figure stamped on it and a handful of rice. These are then worshipped, and the gold or silver piece is subsequently tied round the neck of the child to guard it against any danger to its life. This ceremony is known by the name of *jivti pujan*.

Putranjiva Roxburghii.

The black nuts of this plant are made into necklaces or rosaries, and are put round the necks of children, as it is supposed that they have the power of warding off diseases caused by evil sight. Hence its name *putra jiv*=life of a child.

Melia azedarach.

The nuts are frequently strung and worn round the necks, and during the prevalence of epidemics of small-pox, etc., are suspended over the doors and verandahs.

Symplocos spicata. *Lodh.*

The fluted seeds are put round the necks of children as necklaces, to avoid evil spirits.

The rosaries made of the fruits of the following plants are worn as religious emblems:—

Elæcarpus ganitrus. *Rudraksh.*

This plant is to be found on the higher ghâts. The five-grooved and elegantly tubercled nuts are worn in the form of necklaces by

shivbhaktas (worshippers or followers of *Shiv*) in order to obtain *sivlocke* (*i.e.*, heaven wherein the god *Shiv* resides) and to gain his graces. A good account relating to this practice is to be found in *Sivlila mrut*. The plant being rare on our ghâts, the nuts are imported in large quantities from Singápore, Nepál, etc. I believe that beads are manufactured of the *aloes* wood *(Aquillaria agallocha)* and perhaps of some other trees.

Elæcarpus tuberculatus.

The nuts of this tree are also worn as necklaces.

Ocymum sanctum. *Tulas.*

The *Vishnuvas* wear necklaces made of the root or stem of this shrub.

Many plants, besides the above, are ordained by the sacred books of the Hindus to be used in religious ceremonies; a lengthy description of them would be beyond the scope of this paper. I shall, therefore, describe, as shortly as possible, the way the daily devotions are made, and mention the flowers and other vegetable substances used in their performance.

The gods, after being bathed (literally) in holy water (or water over which certain *mantras* are recited) and then dried with a towel, are placed in a copper dish according to their piously supposed rank. By some they are kept on a *chavrang*, a sort of small wooden altar. Then *gandh* (sandal-wood rubbed on stone which water) is applied to their heads or foreheads, followed by *akshata* (blessed rice) which is pressed or stuck over the *gandh*, then flowers of various hues are thrown over the head of each image, taking care to offer, whenever possible, those flowers which are most acceptable to each god. Then the images are dusted over successively with a pinch or two of "*abhir*", "*gulál*", "*halad*", "*kunku*" and "*shendur*" (red lead). At the end of this "*arti*", a lighted lamp fed with ghee is shown to or carried over the heads of the gods, and a food called "*nayaved*" is offered to them, the whole ceremony being wound up by burning a small bit of camphor and "*udbatti*" or "*agarbatti*". During the whole of the time the ceremony is being performed, both the hands and the mouth are constantly engaged.

Explanation :—

In the Hindu worship above described the images of the following five gods are indispensably present, *viz.*, *Shiv*, *Vishnu*, *Ganpatti*, *Surya* (sun) and one *devi* named *Anupurna* (an incarnation of *Párwatti*) the supplier of food. These five gods form the *Panchayatan*. To them are added the *penates*, or images of household gods, varying in number according to the wishes of the devotees.

Abhir is of a brown colour, and composed of various odoriferous substances.

Gulál is a reddish powder, made of the flowers of *Butea frondosa*, called *kissu* in Gujarát. It is also made of sapan wood *(Cæsalpinea sapan)* and of starch obtained from the tuberous root of an aroid or some other plant.

Halad is turmeric, the tuberous root of *Curcuma longa*.

Sacred Plants.

Kunku is the powder of the tuberous root of *Curcuma longa*, coloured red by being immersed for some days in some alkaline solutions, generally of lime water.

All these substances are, of course, pulverised before being used. *Halad* and *kunku* are sprinkled specially over the head of the *devi*; and *shendur* specially over *Ganpatti*.

Nayaved may either consist of sugar alone, or milk and sugar, or any cooked food. When only of sugar or milk, it is offered in a brass cup, or one of any other metal; but when it consists of any cooked food, it is offered in a brass dish only. This dish is placed on the ground, in a square previously marked out with the fingers dipped in water. The worshipper, who during the whole ceremony squats on a very low stool, then takes two leaves of *Ocymum sanctum (tulas)* in his right hand, dips them in water, throws one on the food and the other, after five peculiar motions of the hand, on the gods, keeping during this time his eyes closed with the left hand.

Camphor is the concrete oil of *Cinammomum camphora*, a plant of China, Japan, Cochin China, etc., now introduced into Java.

Udbatti is composed of several odoriferous substances, the chief ingredient being benzoin, a balsamic exudation procured by making incisions into the bark of a tree named *Styrax benzoin*, indigenous in Borneo, Java, Sumatra and Siam.

Agarbatti is also composed of several substances, the chief of which is aloes or eagle-wood *(Aquillaria agallocha)*, a tree growing in Bengal.

All the ingredients composing these two *battis* are made into paste, and then rolled into thin sticks, generally of the thickness of a small quill, and then dried. Either the one or the other is used according to the fancy and means of the devotee.

In the selection of the flowers to be offered to the deities, colour is carefully attended to. During the worship of the deity *Shiv*, white flowers are offered (those of water-lilies *nelumbium* and *nymphæa*, named *kamals*, being preferred); other colours are considered inadmissible. The leaves of *bel* tree *(Ægle marmelos)* are also offered; the whole leaf (not the leaflets) must be used. No other god is worshipped with these leaves.*

Pandanus odoratissimus is cursed by *Shiv*: so its flowers, though acceptable to the other gods, are not used during his worship, except on one particular occasion (*see* what is stated in the sacrificial woods about this plant).

Vishnu receives either white or red flowers or those of any other colour. He is the only god who is worshipped with *Ocymum sanctum (tulas)*.

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* In Chapter XVIII of *Chaturmás Máhátma* it is stated that other gods may also be worshipped with these leaves, but it is never done.

Sacred Plants.

To *Ganpatti* is offered flowers of all colours, but red are preferred, specially those of *Nerium odorum (kanir)* and *Hibiscus rosasinensis (jaswand)*; yellow and white varieties are not rejected. During his worship, *durva (Cynodon dactylon)* is absolutely necessary. This is a common grass called *huryiálli*, but known as *durva* or *dub* in religious books and during religious ceremonies.

Surya (Sun.) It is believed that white and yellow flowers are disliked by this god, and red preferred. Hence the red varieties of *Nerium odorum* and *Hibiscus rosasinensis* are only selected for offerings, the white and yellow flowers being rejected. It may be for this reason that, in the gardens of Hindus, the red varieties of the trees above mentioned are usually to be found. On some occasions *durva* is offered to him.

Devi.—Flowers of all kinds are offered to her; *kunku* and *halad* (turmeric) mentioned above, are particularly placed over her head.

Gaur.—The goddess of this name is much pleased with yellow flowers of *Thespesia populnea (bhendi)*: hence these are invariably offered to her during her worship. The same flowers are also offered to *Ganpatti* and other deities, male and female, which are not particularly averse to yellow colour.

Shank (shell) is worshipped with *gandh* and flowers, but no rice is put over the *gandh*.

Hanumán—Leaves and flowers of *Calotropis gigantea* are sacred to *Hanumán*, and are used during his worship.

Manja.—Euphorbia nerifolia (thor) is sacred to the goddess of serpents.

Lakshmi.—This goddess resides or has her abode in the central yellow part (stamens and stigmas) of *kammal* (flowers of *nelumbium* and *nymphæa*), but any flower can be used during her worship.

The spiral vessels which abound in the leaves and scapes of the water-lilies, after being carefully gathered, are made into wicks for lamps, which are lighted by the Hindus in the shrines of their idols.

The five flowers that tip the five arrows of *Kámadev*, the Indian Cupid, are—

Michelia champaca. *Champa.*

Mesua ferrea. *Nágkeshar.*

Pavonia odorata.* *Bala.*

Mangifera indica. *Amb.*

Pandanus odoratissimus. *Kewda.*

Ganeshwar.

The handsome tree *Cassia fistula*, called *bawa* in Bombay and *cacay* in Karnatak, is held sacred to *Ganeshwar*, the St. Januarius of

* This is a small, herbaceous plant with cordate 3-5-lobed leaves, pink flowers, clustered at the ends of branches, common in various parts of India and Ceylon.

Sacred Plants.

India; the people in Mysore put stakes of it in the ground and worship them.—Graham's Cat. Bombay Plants.

Nyctanthes arbortristis. *Parijatak.*

This tree is supposed by the Hindus to have been brought from heaven by the god *Krishna* for his wife *Satyábháma*, on account of the fragrance of its flowers. Hence the use of its high-scented flowers in the worship of all the gods.

Anthocephalus cadamba.

The flowers of this plant are also much esteemed in some parts of India, where this plant is common.

Stereospermum chelonoides.

The highly scented flowers of this plant are also much used by some people as an offering to the gods.

Cratæva religiosa, Dalz. & Gibs. Bby. Fl. 8. *Narvala, varvana.*

Drury states that "in the Society Islands, of which this tree is a native, as well as of Malabár, it is planted in burial grounds, being esteemed sacred to their idols." Probably this is the reason why it is named *C. religiosa*; for, so far as my enquiries go, it is not mentioned in Hindu religious books, nor used in their worship.

Gossypium.

The sacred thread of the Hindus must, according to the institutes of Manu, be made of cotton only. And, moreover, this thread should be spun, tied and finished by a Bráhmin alone; no person of any other caste being permitted to prepare it. (See Fibrous Trees.)

Crotolaria juncea, Dalz. & Gibs Bby. Fl. 54. *Sunn, tag.*

The great Hindu lawgiver Manú enjoined on the *Shkatrias* the use of the sacred thread of *sunn*. It appears that Manú, being a Bráhmin, always tried to keep this distinction, and claim superiority for his class. But, now-a-days, the sacred threads of almost all the Hindus are made of cotton.

The common sacrificial woods of the Hindus on this side of India are:—

Butea frondosa. *Palas.*

Prosopis spicigera. *Shemi.*

Calotropis gigantea. *Rui.*

Achyranthes aspera. *Agarah.*

Ficus glomerata. *Umbar.*

Ficus Bengalensis. *Vad.*

Ficus religiosa. *Pipal.*

Cynodon dactylon. *Dūb.*

Eragrostis cynosuroides. *Kuch.*

Sacred Plants

The five leaves *(panch pallav)*, used by the Hindus of this side of India as platters and for pouring libations, are gathered from the following trees :—

Mangifera Indica. *Amb.*

Eugenia jambolana. *Jambul.*

Ficus Bengalensis. *Vad.*

Ficus cordifolia. *Pair.*

Ficus religiosa. *Pipal.*

Lea macrophylla. *Dinda.*

The large leaves of this plant are used as platters for food every Monday during the month of *Shrávan*.

It appears that the Hindus are enjoined not to use tooth-brushes made of plants the sap of which is coloured ; those only being lawful whose sap is colourless. *Smritisar Granth* gives a long list of plants the twigs of which can be used for the purpose. The following are a few of them which have been identified :—

Bocagea Dalzellii. *Sajiri.*

Ægle marmelos. *Bel.*

Feronia elephantum. *Kavit.*

Zizyphus jujuba. *Bor.*

Mangifera Indica. *Amb.*

Butea frondosa. *Palas.*

Acacia catechu. *Kair.*

Albizzia Lebbeck. *Shiris.*

Anthocephalus cadamba. *Kadam.*

Calatropis gigantea. *Rui.*

Wrightia tinctoria. *Kuda.*

Achyranthes aspera. *Agarah.*

Briedelia montana. *Assana.*

The fruits of *wagatti (Capparis brevispina)* and of *gometti (Melothria heterophylla)*—*Bryonia umbellata* of Dalzell and Gibson—are eaten on *dwádashis* which occur in the month of *Ashad*. The fruits are invariably associated in the *bháji* or dish made for those days.

Smithia sensitiva. *Kaola.*

Eaten at all seasons as a pot herb, as stated elsewhere ; is especially used on every Monday of *Shrávan*.

Cassia tora. *Takla.*

Is also eaten as a pot herb in this district by some people.

Sacred Plants.

On Saturdays of the same month *Shrávan* the Hindus prepare a kind of *bháji* (called *panch-bhelli-bháji*) of the following five plants:—

Cassia tora. *Taklá.*

Bauhinia Malabarica. *Koral.*

Amaranthus oleraceus. *Mat.*

Celosia argentea. *Kurdu.*

Phalangium tuberosum. *Kuli.*

Mat is always taken, even if any one or more of the others be wanting. This kind of food is partaken of, because it is believed to be particularly acceptable to the gods.

Eclipta prostata. *Maaka.*

Is used in worship on the days when *shrádh* (office for the dead or ceremony in honour of the dead) is performed. The leaves of this plant and of *Ocymum sanctum* are thrown over the ball of cooked blessed rice (now called *pind*) made in honour of the dead. I believe some people use also the leaves and flowers of *augusta (Sesbania grandiflora).*

A branch of *gometti (Melothria heterophylla)* is suspended by some people over the hood of the idol of cobra on *nágpanchmi* day, or during his worship.

These notes were drawn up from information supplied to me by an intelligent Brahmin, and confirmed by a Hindu friend acquainted with the subject.