

base narrowed acute obtuse ; Basal nerves 3, midrib penninerved. Petiole 1-3in. Flowers small, dioecious in terminal often paniced brown brick-red stiff spikes. Calyx 3-cloft. Petals distinct, and globose. Female flowers solitary. Ovary 3-celled. Cells 1-ovuled. Styles 3, papillose inside. Fruit 3-lobed, Capsules loculicidally 3-valved  $\frac{1}{3}$ - $\frac{1}{2}$ in. diam., densely covered with a bright red or crimson powder when ripe. "The bright red or crimson powder consists of resin mixed with stellate hairs." (Brandis). Seeds globose, smooth, black.

*Uses*:—The powder prepared from the tricocous fruit is used as an anthelmintic, vermifuge and purgative medicine. It is also said to possess cathartic properties.

*Rottlerin*,  $C_{11}H_{10}O_3$ , the principal constituent of Kamala, crystallises in thin, salmon-coloured plates melting at 191-191.5°. When heated with caustic potash at 150°, it yields benzoic acid, acetic acid, and an amorphous substance, and when oxidised by means of hydrogen peroxide in alkaline solution the same compounds are obtained. On treatment with cold nitric acid (sp. gr. 1.5), rottlerin yields, besides oxalic acid, two new acids melting at 282° and 226°, and having respectively the formulæ  $C_{17}H_{14}O_9$ , and  $C_{17}H_{16}O_9$ . These are readily separated by recrystallisation from alcohol. Boiling nitric acid of sp. gr. 1.5 decomposes rottlerin, forming oxalic acid and a bibasic acid of the formula  $C_{13}H_{10}O_9$ , melting at 232°, and yielding a crystalline silver salt,  $C_{13}H_8O_9Ag_2$ . When heated with acetic anhydride, rottlerin yields a diacetyl derivative of the formula  $C_{11}H_8O_3(C_2H_3O_2)$ . The molecular weight of rottlerin has not yet been satisfactorily determined, but probably about 485.

The *resin of low melting point* agrees with the formula  $C_{12}H_{12}O_3$ . It resembles rottlerin, from which its formula differs by  $CH_2$ .

The *yellow crystalline colouring matter* obtained in the first extractions of Kamala with carbon bisulphide is closely allied to rottlerin. It forms a beautiful, glistening mass of yellow needles, and melts at 192-193°.

The *wax* extracted gave as a mean C=79.70 p.c., H=12.86 p.c., agreeing with the formula  $C_{28}H_{54}O_2$ . This wax is a colourless, apparently crystalline mass melting at 82°.

*Irorottlerin*  $C_{12}H_{12}O_5$ , crystallises in groups of minute plates melting at 198-199°, and in its appearance greatly resembles rottlerin, from which, however, it is readily distinguished by being practically insoluble in carbon bisulphide, chloroform, and benzene, whereas rottlerin is comparatively soluble in these liquids.

The *resin of high melting point* is a pale yellow, amorphous substance of the formula  $C_{13}H_{12}O_4$ , closely allied to rottlerin in many of its properties, and which also yields the acid of the formula  $C_{13}H_{10}O_9$ , when boiled with nitric acid of sp. gr. 1.5.

Kamala was first analysed by Dr. Thomas Anderson of Glasgow in 1855 who found the following constituents in 100 parts:—78.19 of resinous colouring matter, 7.84 of albumen, 7.14 of cellulose, a trace of volatile oil, 3.84 of ashes, and 3.49 of water. Of the resinous colouring matters Dr. Anderson obtained one in a pure state by allowing a concentrated ethereal solution to stand for two days, drying and pressing in bibulous paper the resulting mass of granular crystals, and purifying them from adhering resin by repeated solution in ether and crystallisation. To this substance he gave the name of Rottlerin. It occurs in crystalline plates of a yellow colour insoluble in water, but soluble in alcohol, ether and alkaline solutions. The formula was  $C_{11} H_{10} O_3$ .

E. G. Leube, Jr. (Jahresbericht, 1860, 562), however, was unable to obtain any crystalline product, but he describes a resin melting at 80°, having the formula  $C_{15} H_{18} O_4$ , and a resin melting at 191°, of the formula  $C_8 H_{12} O_5$ . Oettingen of Russia, in 1862, was unable to obtain any crystalline substance from kamala.

A. G. Perkin and W. H. Perkin, Jr., in 1886 made a preliminary examination of kamala and separated by means of carbon bisulphide a yellow crystalline body Mallotoxin. On pursuing the investigation, Mr. A. G. Perkin contributed a full account of the constituents in Journ. Chem. Soc. LXIII. (1893), pages 975-90. Rottlerin, the principal constituent, crystallises in salmon-coloured plates melting at 191-191.5°. When heated with caustic potash it yields benzoic acid, acetic acid and an amorphous substance. A resin of low melting point with the formula  $C_{12} H_{12} O_3$  and closely associated with Rottlerin in many of its properties. When boiled with dilute alkalis the odour of benzaldehyde is noticeable.

A yellow crystalline colouring matter present in minute amount melting at 192-193°.

A wax, having a composition agreeing with the formula  $C_{24} H_{34} O_2$ , and melting at 82°, the melting point of cetyllic cerotate.

The residue left on extracting kamala with carbon bisulphide contains two substances isorottlerin and a resin of higher melting point both soluble in ether.

Isorottlerin crystallises in groups of minute plates melting at 198-199°. It differs from rottlerin by being practically insoluble in carbon bisulphide, chloroform and benzene.

The resin of high melting point is a pale yellow amorphous substance of the formula  $C_{13} H_{12} O_4$ .

In a subsequent paper on the chemistry of kamala [Journ. Chem. Soc. LXVII (1895), 230], Perkin continued the study of Rottlerin, the principal crystalline constituent, and showed the action upon it of nitric acid and sodium carbonate, the former yielding ortho and para-nitrocinnamic acids and the latter rottlerone. The yellow crystalline colouring matter contained more hydrogen than Rottlerin and is probably a reduction product of this body. The name homo-rottlerin was given to it.

In a further note on Rottlerin (Journ. Chem. Soc. 1899, LXXV., page 827) Perkin deduced from analyses of its mono-substituted salts the formula  $C_{33}$

H<sub>3</sub>, O<sub>3</sub>. It contains hydroxyl groups. By fusion with alkalis at 220-240° it yields acetic and benzoic acids together with phloroglucinol. (The *Agricultural Ledger*, 1905. No. 4. pp. 61-62.)

The ash of Kamala contains a considerable proportion of manganese.

When extracted with ether, Kamala yields a dark, brownish, resinous product from which six distinct substances can be isolated. Five of these, namely, rottlerin, isorottlerin, a wax, and two resins, one of high and the other of low melting point, form the principal constituents, but there is also present a trace of a yellow, crystalline colouring matter.

Kamala contains also a minute amount of an essential oil or similar substances, giving to it when gently warmed a peculiar odour, but from which it can be readily freed by treatment with steam.

Kamala contains, moreover, a small quantity of a sugar, which is extracted from it by water.

*Seeds*.—The seeds, of which three are contained in each capsule, are black or dark grey, rounded, and slightly flattened on one side. They are about the size of black pepper. Their resemblance to the fruits of *Embelia Ribes* has been observed in the Panjab where the confusion of the names—baobiang for *Mallotus* and bebiang for *Embelia*—has existed. In Katha, Burma, the seeds ground to a paste are applied to wounds and dah cuts.

Greshoff, in 1898, discovered in the seeds a bitter glucoside soluble in water and alcohol, that may be shaken out of a water extract by chloroform.

The seeds analysed in the Indian Museum afforded:—Moisture, 8.75; fat 5.85; albuminoids, 16.81; carbohydrates, 47.49; fibre, 17.35; ash, 3.75. They are, therefore, not oil-yielding seeds as has been reported.

1157. *Macaranga Roxburghii*, Wight. H.F.B.I., v. 448.

*Vern*.—Chandkal (Kanara), Chandwar, chandâḍâ (Mar.); Vattekanni (Tam.); Boddichettu (Tel.); Chentha-kanni (Mysore).

*Habitat*:—The Deccan Peninsula; in the Circars and on the ghats, from the Concan to Travancore

A small or middle-sized resinous tree. Wood reddish brown or soft. Branchlets stout, glaucous, youngest shoots stellatomentose. Leaves deltoid-or rhombic-ovate or orbicular, broadly peltate, cuspidate, palmati-nerved, entire or minutely toothed; 5-8 in. diam., coriaceous or thin, glabrous above, except the pubescent nerves, and eglandular at the rounded base, beneath finely pubescent or glabrate and gland-dotted with 6-8 pairs of

strong nerves above the basal, and strong cross nervules. Petiole 3-6in, glabrous or puberulous. Stipules ovate or oblong lanceolate, not broad, tomentose. Panicles densely rusty-tomentose or the branches nearly glabrous. Bracts at the axils and at the bases of the terminal branches very broad, dentate, and often veined, floral hemispheric. Bracteoles concave. Flowers  $\frac{1}{8}$ in. diam. Male flowers:—Clusters enveloped in bracts and bracteoles; sepals 3; stamens 2-5. Female flowers.—panicles simpler, in racemose branches with larger bracts. Calyx-limb obsolete; ovary densely glandular, 1-celled, glabrous or puberulous, style lateral. Stigma sessile, persistent, often embracing one side of the ovary, thickly papillose. Capsule globose,  $\frac{1}{4}$ - $\frac{1}{3}$ in diam., covered with hairs and glands. Seed globose; testa brown, crustaceous, rough.

*Uses*.—The gum powdered and made into a paste is reckoned a good external application for venereal sores. (Diury.)

The country people used the following in *jarandi* (Liver) — One part of the young shoots, with three parts of the young shoots of *khoreti* (*Ficus asperimma*) are sprinkled with hot water and the juice extracted, in this is rubbed down two parts each of the barks of both trees. The preparation may be administered twice a day in doses of  $\frac{1}{8}$ th of a seer. (Dymock.)

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1158. *Ricinus communis*, *Linn.*, H.F.B.I., v. 457; Roxb. 690.

*Vern.*.—Arand, Eranda

*Habitat*:—Cultivated throughout India and naturalized near habitations.

An evergreen, small tree. Shoots and panicles glaucous. Leaves green or reddish, 1-2ft diam., membranous, lobes from oblong to linear-acute or acuminate, glandserate; petiole 4-12in. Racemes stout, erect. Male flowers:— $\frac{1}{2}$ in. diam., being above the female in the same panicle. Stamens numerous. Female calyx  $\frac{1}{2}$ in. long. Ovary 3-celled; styles spreading, feathery, often highly coloured, principally crimson. Capsule globose, generally echinate,  $\frac{1}{2}$ -1in. long. Seeds mottled, oblong, smooth, with fleshy albumen.





*Uses*:—Official in both the Pharmacopœias, and its uses are too well known to be mentioned here.

"Leather has examined a large number of seeds from Madras, Bombay, United Provinces and Central Provinces, and shows that they contain from 25 to 85 per cent. of shells, and the kernels, with few exceptions, afford from 60 to 70 per cent. of oil, or 35 to 50 per cent. on the entire seed. Larger seeds as a rule contain more oil than smaller seeds.

Castor oil is a colourless or pale greenish oil having a taste at first mild, then harsh. The oil is very viscous, but does not dry even when exposed in thin layers. Most commercial samples contain only very small proportions of free fatty acids, this is due to the refining process which consists in the coagulation of albuminous matters by steaming and then removing them by filtration. Castor oil is strongly dextro-rotatory. Deering and Redwood examined twenty three samples of Indian oil and observed that in a 200 mm. tube in a Hoffmann-Laurent polarimeter the variation was from  $+7.6^{\circ}$  to  $+9.7^{\circ}$ . Castor oil may be said to consist of a small quantity of tristearin, of the glyceride of dihydroxystearic acid, and to a large extent of the glyceride of ricinoleic acid.

The physical and chemical constants of the oil have been found as follows: Specific gravity at  $15.5^{\circ}$ , 0.963 to 0.964; saponification value, 177 to 184; iodine value, 81.4 to 85.3; Richert-Meissl value, 1.1; Maumene test, 46-47; oleo refractometer degrees at  $22^{\circ}$ , 41 to 42.5. Insoluble fatty acids: Melting point,  $13^{\circ}$ ; iodine value, 86 to 88.

The high specific gravity and acetyl value and its very high viscosity afford ready means of identification. It is also miscible in all proportions with glacial acetic acid and absolute alcohol, but is nearly insoluble in large quantities of petroleum ether, kerosene and higher boiling paraffin oils." (Agricultural Ledger, 1911-12 No. 5 pp. 164-165)

*Ricinin*,  $C_{17}H_{13}N_4O_4$  is the poisonous principle of the seeds. The pressed seeds yield 0.3 per cent., whereas the husks yield 1.5 per cent., of ricinin. To obtain the ricinin, the pressed seeds or husks are extracted with boiling water; the extract evaporated on the water bath, and the residue treated with alcohol. The alcoholic solution is then evaporated to dryness and the residue treated with caustic soda; by this means, the impurities are dissolved out, and the ricinin which remains behind may be crystallised from alcohol or water. It crystallises in glistening plates; melts at  $194^{\circ}$ , has a bitter taste, is readily soluble in water, alcohol, chloroform, benzene and ether; the aqueous solution is neutral and optically inactive. Ricinin may be sublimed when carefully heated; it is soluble in concentrated sulphuric acid, yielding a colourless solution, which becomes straw-yellow, and then bright claret red, on warming. The colourless sulphuric acid solution gives, with a crystal of potassium dichromate, a bright green coloration; this is suggested as a test for ricinin. Ricinin does not give the usual tests for alkaloids, neither does it form salts with strong mineral acids; it yields a bromo-derivative,  $C_{17}H_{13}Br_2N_4O_4$ , which melts at  $247^{\circ}$ , and a corresponding chloro-derivative, which melts at  $240^{\circ}$ . With mercuric chloride, it yields the compound,  $C_{17}H_{13}N_4O_4 \cdot 2HgCl_2$ , which melts at  $204^{\circ}$ . When oxidised, it yields a new acid,  $C_{15}H_{11}$

$N_4 O_4$ , which is termed *ricininic acid*; the same acid may also be obtained by the hydrolysis of ricinin with caustic soda. It is a dibasic acid, which melts at  $295^\circ$  yields a silver salt, a barium salt crystallising with  $4 H_2 O$ , and a bromo-derivative,  $C_{15} H_{12} Br_2 N_4 O_4$ , melting at  $180^\circ$ . (J. Ch. S. 1896, A. I, 388.)

1159. *Baliospermum axillare.*, Blume. H.F.B.I., V. 461.

*Syn.*:—*B. montanum* Muell.-Arg, *B. polyandrum*, Wight; *Croton polyandros*, Roxb' 687.

*Sans.*:—Danti.

*Vern.*:—Danti, hakum or hakun (H and B.); Konda-âmu-dam naypawlum, adavi-âmudam (Tel); Poguntig (Lepcha); Jangli jamâlgota (U. P); Danti (Mar); Jamâlgota, dantimul (Bomb., Guj. and Cutch).

"The vernacular names of *B. Montanum*, *Croton tiglium*, *Jatropha glandulifera* and *J. curcas* are confounded with each other in most districts of India, particularly in the Madras Presidency." (Moodeen Sheriff) Roots sold as *Danti-mul* in the Bazars.

*Habitat*:—Tropical and subtropical Himalayas, from Kashmir to Bhotan; from Assam and Khasia mountains to Chittagong Deccan Peninsula from Behal and the Concan to Travancore.

A stout leafy undershrub 3-6ft high with herbaceous branches from the root, glabrous except the young shoots and sometimes the leaves beneath. Leaves firmly coriaceous, very variable in size and shape; the upper 2-3in. long, lanceolate, penninerved; the lower 6-12in long, often palmately 3-5 lobed and with sinuate-toothed margins; base rounded or cuneate, petioles 2-6in. long; stipules of 2 glands. Flowers usually monœcious, arranged in many axillary racemes or contracted panicles, all male or with a few females at the base. MALE flowers:—Calyx globose,  $\frac{1}{10}$ in., 4-5-partite, often slightly hairy; segments finely mottled. Disk of 6 glands. Stamens about 20. FEM. flowers:—Sepals not enlarging in fruit. Disk thin,  $\frac{1}{10}$ in. in diam. Ovary hairy; styles about  $\frac{1}{18}$ in. long. thick, 2-partite, dull-red. Capsules  $\frac{1}{8}$ - $\frac{1}{2}$ in. long. obovoid, usually hairy. Seeds  $\frac{1}{4}$ in. long, smooth, mottled. (Duthie.)











*Uses*:—The seeds are used as a drastic purgative, but in over-doses are an acro-narcotic poison; they are sometimes used as a substitute for *Croton Tiglium*. They are also used externally as a stimulant and rubefacient. The oil is a powerful hydragogue cathartic and is useful for external application in rheumatism. Madden states that to the east of the Sutlej its leaves are in high repute for wounds, and its sap is believed to corrode iron. The root is considered cathartic, and is used in dropsy, anasarca, and jaundice.

“A decoction of the leave said to be useful in asthma.”  
(Asst -Surg Bhagwan Das, Râwal Pindi, Punjab)

1160. *Tragia involuerata*, *Lin.*, H.F.B.I., V 465; *Roxb.* 652.

*Sans.* .—Vrischi-kali.

*Vern.* .—Bahanta (H); Bichati (B.); Kan churi (Tam.); Sengel, sing (Santal); Kinch-kuere (Deccan); Kâneh kûri, khâj-kolti (Bomb); China-dûla gondi, révati-dula gondi, truna-dula, gondi, duruda-gunti, tella-dura dagondi (Tel.).

*Habitat.* .—Throughout India, from the Punjab and Lower Himalaya of Kumaon, eastward to Assam, and southward to Burma, Travancore and Ceylon.

A perennial, evergreen twiner, more or less pubescent or hispid and with scattered stinging bristles, rarely almost glabrous. Leaves from linear-oblong to broadly ovate-cordate, acuminate, serrate, and from entire to deeply 3-fid or tripartite, with irregularly serrate or sub-pinnatifid lobes, 1-4in., membranous, protean in form. (J. D. Hooker.) Racemes 1-2in., slender, hispid or glabrous. Bracts small or minute. Male flowers minute, shortly pedicelled, sepals and stamens 3; pistillode 3-fid. Female flowers strigosely hispid, fruiting  $\frac{3}{4}$ in. diam., stellately rigid, spreading, oblong, pinnatifid, rarely sub-entire.

*Uses*:—The root is valued in febricula and in itching of the skin. (Rheede). The Vytians reckon it amongst those medicines which they conceive to possess virtues in altering and correcting the habit, in cases of *mayghum* (cachexia) and in old venereal

complaints attended with anomalous symptoms. By the Hindu doctors of the Coromandel coast, it is given in quantity of half-a-teacupful of the decoction twice daily. (Ainslie.) The root forms the basis of an external application in leprosy while the leaves dried, reduced to powder, and mixed with ginger and *kaiphul* form an "errhine" which is prescribed in cases of headache. (Taylor.) In the Konkan, the root is used to aid the extraction of guinea-worm, a paste made from them being applied to the part. A paste with *tulsi* juice is also employed as a cure for itchy skin eruptions. (Dymock.) In Chutia Nagpur, the root is given when the extremities are cold during fever; also for pains in the legs and arms. (Campbell.)

The fruit rubbed over the head with a little water is useful in cases of baldness. (Dr Thornton in Watt's Dictionary.)

*Var.* :—*Cannabina*.

*Vern.* :—*Sirru-kánchari* vayu (Tam.).

An erect or climbing shrub 4-5ft. high, not twining, more or less hispid and with stinging hairs. Stems stout, woody. Leaves palmately 3-partite, up to 3½ in. long; lobes toothed or pinnatifid, the mid lobe much longer than the lateral ones. Male flowers and calyx of female flowers as in *T. involucrata*. Styles 3, slightly spreading, not revolute. Capsules ¾ in across, 3-lobed, hirsute; lobes globose. Seeds globose, smooth, ¼ in in diam. (Duthie).

*Uses* :—The root is considered diaphoretic and alterative, and is prescribed in decoction, together with other articles of like virtues to correct the habit; an infusion of it is also given as a drink in ardent fever in the quantity of half a tea-cupful twice daily. (Ainslie).

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1161. *Sapium indicum*, Wild., H.F.B.I., v. 471  
Roxb. 691.

*Syn.* :—*Excœcaria indica*, Muell.

*Vern.* :—*Huruá*; *Batul* (B.); *Hurná* (Bomb.).

*Habitat* :—Bay of Bengal, from the Sunderbans to Tenasserim. S. Konkan. (Bay plant is growing in the Konkans, but







is not indigenous within the limits of the Bombay Presidency (Talbot.)

An evergreen, glabrous tree, 20-25ft., with acrid milky juice. Bark white, smooth, grey, says Gamble. Wood soft, white with small, brown heartwood. Leaves  $3\frac{1}{2}$ -5in., lanceolate, sub-acute at base, alternate, acute at apex, finely crenate, serrate, glabrous, shining above, venation translucent. Petiole  $\frac{1}{2}$ in, bi-glandular at tip. Spikes 2-3in., leaf-opposite or sub-terminal. Flowers greenish-yellow, sessile, male numerous in clusters. Female flowers larger, usually 1 or 2 at base of the spike, sepals ciliate. Styles 3, very long. Capsule depressed, globose, not lobed, about 1in diam., glabrous, blackish-green. Pericarp thin. Cocci thick and hard, woody. Seeds  $\frac{1}{2}$ in, grey.

The woody fruit is characteristic, says Trimen. The young fruit is succulent, says Brandis, mentioned by Graham.

*Uses* :—The juice of this tree is reckoned of a very poisonous nature. The taste of the fruit is nauseous beyond description. The seeds are used for intoxicating fish. (Roxb.)

The kernels afford to ether 50.3 per cent. of a thick greenish-yellow oil, which, when smeared on glass, dried to a skin in two days. The iodine value was 130.4. This oil is worthy of further notice. (Agricultural Ledger, 1911-12 No. 5. p. 165.)

1162. *S. insignis*, Benth., H.F.B.I., v. 471.

*Syn.* :—*Excoecaria insignis*, Bedd

*Vern.* :—Dúdla, bilodar, biloja (Pb), Khinna, Khiria, Khirni Dudla (Bomb.); Khirni, lendwa (H.).

*Habitat* :—Sub-tropical Himalaya from Simla and Kumaon to Bhotan. Chittagong.

A moderate-sized, deciduous, glabrous, milky-juiced tree. Branches thick, soft, leafy toward the end. Leaves alternate, bright-green, toothed, ovate-lanceolate, 6-12in. Stalks 1-2in., bearing two large glands near top. Flowers small, yellow-green, appearing before the leaves, on thick, erect terminal. Solitary spikes, 3-10in. long, on different spikes. Male flowers in circular clusters,  $\frac{1}{2}$ in. diam., central ones falling off and leaving their short stalks, outer ones sessile. Calyx

membranous, deeply 2-lipped; segments concave, rounded. Stamens 2; filaments very short, free. Anthers scarlet. Female flowers solitary, shortly stalked; spike thickened in fruit. Sepals 2-3, ovate, long-pointed; ovary globose, 3-celled. Styles 3, free, short, recurved. Capsule  $\frac{1}{4}$  in. long, obscurely 3-lobed, fleshy when young. Seeds 3.

*Use*:—The whole tree is full of an acrid milk which, when applied to the skin, produces vesication. (Lisboa.)

1163. *Excoecaria Agallocha*, Linn., H.F.B.I., V. 472; Roxb. 713.

*Vern.*:—Gangwa, geor, uguru, geia (B.); Guna (Uriya); Geva (Bom.); Chilla, tella-chettu (Tel); Haro (Kan.).

*Habitat*:—Tidal forests on all the coasts of India.

An evergreen, small tree. Bark grey, smooth, shining, with numerous, round, prominent lenticels. Wood very soft, spongy. Branchlets rather thick, marked with leaf scars, smooth. Leaves  $2\frac{1}{2}$ - $3\frac{1}{2}$  in., alternate, oval, acute at base, shortly obtusely acuminate, obtuse, entire or obscurely crenate, rather thick; veins except midrib very inconspicuous. Petiole  $\frac{1}{2}$ -1 in., slender. Spikes androgynous; male flowers at the base of spikes. Filaments much lengthening after flowering. Styles free, nearly to the base. Male flowers:—sepals minute, unequal, sub-serrulate. Capsule  $\frac{2}{3}$  in. diam,  $\frac{1}{4}$ - $\frac{1}{3}$  in. diam, very variable. (Trimen). Seeds glabrous, smooth. Flowers yellow, fragrant. Grows occasionally to 5ft. in girth and 40ft. in height.

*Uses*:—The milky juice, which exudes from the bark of this tree when green and fresh, is very acrid and injurious to the eyes, hence it is called "the blinding tree of India."

A decoction of the leaves is occasionally given by Hindu doctors in epilepsy, in the quantity of a quarter of a teacupful twice daily. This decoction is also used as an application to ulcers. (Ainslie.)

From the lower part of the trunk and roots, a soft, light, reddish suber is obtained, which is sold by the itinerant medicine men of Western India, under the name of *Tejbul*, as an aphrodisiacal tonic. (Pharmacogr. Ind. III. 315.)

In Fiji, it is employed for the cure of leprosy, its mode of application being very singular. The body of the patient is first rubbed with green leaves; he is then placed in a small room and bound hand and foot, when a small fire is made of pieces of the wood of this tree from which rises a thick smoke; the patient is suspended over this fire, and remains for some hours in the midst of the poisonous smoke and under the most agonizing torture, often fainting. When thoroughly smoked, he is removed, and the slime is scraped from his body; he is then scarified and left to await the result. In some cases he is cured, but frequently the patient dies under the ordeal. (Smith's Econ. Dic.)

1164. *E. acerifolia*, F. Didrichs, H.F.B.I., V. 473.

*Vern.*:—Básingh (Kumaon).

*Habitat*:—Western and Central Himalaya from Nepal to Kumaon. Khasia Mts.

A small evergreen tree, milky, glabrous; foliage deep-green. Leaves 3-6 by 1-2 in., alternate, membranous, elliptic, oblong-lanceolate, or oblanceolate, acuminate, serrulate or crenulate; nerves 8-10 pairs, strong beneath, arched, petiole  $\frac{1}{8}$ - $\frac{1}{4}$  in., stout, eglandular. Spikes terminal and axillary, 1-2 in., slender, androgynous; bracts rounded or acuminate, broadly ovate, acute, entire, 2-3-lid. Male flowers:—sessile, 2-3 in.; the axil of a broadly ovate bract. Female flowers pedicelled, at the base of the spikes. Male sepals lanceolate, acuminate, entire; female sepals broadly ovate, acute, glandular at the base within; style stout, very short. Capsule about  $\frac{2}{3}$  in. diam., 2-3-lobed; seeds smooth, globosely ovoid, mottled. (J. D. Hooker.)

*Uses*:—The Bhutias inhabiting East Kumaon use the leaves of this plant as a remedy for rheumatism. (Watt.)

1165. *Sebastiania Chamælea*, Mull-Arg., H.F. B.I., V. 475.

*Vern.*:—Bhüi-Erandi (Concan).

*Habitat*:—Behar, Hazaribagh. Deccan Peninsula, from Bombay southwards; found in the open places and waste ground, common in the Tropics of the Old World generally.

An annual, glabrous herb, with the habit of an annual Euphorbia; 1-2ft. high, with numerous, prostrate or ascending, slender branches from the root. Leaves small, alternate, distant,  $\frac{1}{2}$ -3in., by  $\frac{1}{4}$ - $\frac{1}{2}$ in., nearly sessile, linear, acute at base, obtuse, apiculate, very minute, serrate, glabrous, often rather glaucous beneath. Stipules ovate, acute, ciliate. Flowers monœcious, yellowish, apetalous. Male very minute in short axillary or leaf-opposed spikes, female solitary at base of the male, or axillary. Male flower:—Calyx minute, 5-lobed, membranous, not covering the stamens in bud; stamens 1-4, filaments distinct. Pistillode 0. Female flower.—Sepals 3, longer than in male, obovate, acute, lacerate and ciliate, 2-glandular within; ovary much exserted, 3-celled, with 1 ovule in each cell, styles 3, small, not bifid. Fruit under  $\frac{1}{4}$ in., glabrous, smooth, except for the two dorsal rows of spinules, thinly crustaceous, sub-globosely oblong. Seeds oblong, mottled. Endosperm fleshy; cotyledons broad. (Trimen and J. D. Hooker.)

*Uses*:—The juice of the plant in wine is used as an astringent; a *ghrita* of the plant is considered to be tonic, and is applied to the head in vertigo. (*Pharmacogr. Ind.* III. 316.)

## N. O. URTICACEÆ.

1166. *Haloptela integrifolia*, Planch., H.F.B.I., V. 481.

*Vern.*:—Papri (H.); Vavala (Mar.), Aya (Tam.); Navili (Tel.); Rasbija (Can.).

*Habitat*:—Outer lower ranges of the Himalaya, from Jammu to Oudh, ascending to 2,000ft. From Banda and Bihar to Travancore.

A large, spreading deciduous tree. Bark  $\frac{1}{3}$ in. thick, whitish-grey, exfoliating in long irregular flakes, soft, with an offensive smell when fresh, like the leaves and branchlets. Wood light,





yellowish-grey, moderately hard, no heartwood. Young shoots and inflorescence pubescent, otherwise mostly glabrous. Leaves elliptic, entire, those of the seedlings and coppice-shoots usually serrate; blade 3-5; petiole  $\frac{1}{3}$ - $\frac{1}{2}$  in. long; secondary nerves 5-7 pair. Flowers in short lateral, often compound corymbs. Male and female flowers mixed; perianth cleft nearly to the base; segments 5, hairy. Male flowers:—Stamens 8; anthers hairy, no rudiment of ovary. Hermaphrodite flowers:—Stamens 5; ovary compressed, 1-celled, stalked; the stalk lengthening as the seed ripens, sometimes with the remains of the calyx at its base. Samara nearly orbicular, 1 inch diam., on a long slender or obliquely elliptic, glabrous or pubescent stalk. Wings membranous or chartaceous; tip 2-fid, lobes incurved.

*Uses*:—The tree has a mucilaginous bark, which is boiled, and the juice squeezed out and applied to rheumatic swellings, the exhausted bark is then powdered and applied over the parts covered by the sticky juice. (*Pharmacogr. Ind.* III. 318).

1167. *Celtis australis*, Linn., H.F.B.I., v. 482.

*Vern.*:—Batkar, brimdu, brimla, bigni, bingu, kharg, (Pb); Tughar (Pushtu).

*Habitat*:—The Salt Range and Temperate Himalaya from Murree to Nepal.

A middle-sized, deciduous tree. Bark bluish-grey, smooth, with horizontal wrinkles. Wood grey or yellowish-grey, with irregular streaks of dark colour, hard. Branchlets slender, pendulous; branchlets, petioles and young leaves glabrous or hairy. Leaves ovate to ovate-lanceolate, acuminate, base very oblique, sharply serrate, sometimes entire; blade 3-5; petiole  $\frac{1}{2}$  in. long; the lateral basal nerves extending beyond the middle, but not to the tip of the leaf. Flowers with or before the leaves. Male flowers in axillary tufts, or racemed on short, leafless, axillary branchlets; pedicels capillary. Sepals oblong, obtuse, marginally woolly. Female or bi-sexual flowers rather larger than the male. Ovary ovoid, woolly at the base all over. Drupe very variable in size and shape;  $\frac{1}{4}$ - $\frac{1}{2}$  in. long. (Brandis.)

*Use*:—The fruit is given as a remedy in amenorrhœa and colic. (Stewart.)

1168. *Gironniera reticulata*, Thwaites, H.F.B.I., v. 486.

*Vern.*:—Koditani (*Tam.*) ; Khomanig (*Nilgiri*) ; Nāra Kiyood (Ind. Bazars).

*Habitat.* Sikkim Himalaya, Assam ; Khasia Mts. ; Deccan Peninsula ; on the Ghats from S. Canara to Travancore.

An evergreen, lofty or small tree, 30-40ft. Branchlets slender, glabrous. Leaves entire or serrulate at the tip, coriaceous, penni-nerved ; secondary nerves 10-12 pair, impressed on the upper, and very prominent on the pair underside, 3-7in. Flowers dioecious. Male cymes shortly peduncled, branches short, many-fid. Male flowers rarely glabrous ; sepals 5, broad, obtuse, imbricate ; stamens 5, erect in bud ; pistillode woolly. Female flowers :—Sepals narrow, acute ; ovary sessile ; style central ; arms 2, filiform, ovate, pendulous. Drupe usually 2-keeled, about as long as the pedicel,  $\frac{1}{2}$ - $\frac{3}{4}$ in long ; endocarp hard ; embryo contorted.

*Uses*:—Thunberg says :—“ The tree is called by the Dutch *Strunthont*, and by the Cingalese *Urenne*, on account of its disgusting odour, which resides especially in the thick stem and the larger branches. The smell of it so perfectly resembles that of human ordure, that one cannot perceive the smallest difference between them. When the tree is rasped, and the raspings are sprinkled with water, the stench is quite intolerable. It is nevertheless taken internally by the Cingalese as an efficacious remedy. When scraped fine and mixed with lemon juice, it is taken internally, as a purifier of the blood in itch and other cutaneous eruptions, the body being at the same time anointed with it externally.” (Travels, Vol IV. p. 234).

1169. *Humulus Lupulus*, Linn., H.F.B.I., v. 487.

*Habitat*:—Cultivated in N.-W. Himalaya.

A perennial, twining, scabrid herb. Rootstock stout branched ; stem tall, scabrid or prickly, with reversed bristles.











Leaves 3-4in. diam., petioled, cordate, toothed, upper ovate, lower 3-5-lobed. Bracts and bracteoles scarious, covered with resinous glands. Male flowers:— $\frac{1}{4}$ in. diam.; panicles 3-5in. across. Female flowers:—In heads,  $\frac{1}{2}$ in. diam., yellow; styles purple; fruiting  $1\frac{1}{2}$ in. diam.; scales orbicular.

*Uses*:—It is officinal in both the British and Indian Pharmacopœias

1170. *Cannabis sativa*, Linn., H.F.B.I., v. 487; Roxb. 718.

*Syn.*:—*C. indica*, Lamk.

*Eng.*:—Indian hemp.

*Sans.*:—Ganja, vajradru, bhangah, vijayá.

*Vern.*:—Gánje-ká-pér, kinnab, bháng (H.); gánjá, bháng, siddhí (B.); Bhang, charas (Pb.); Bháng (Mar.); Gánja-ched, korkkar-muli, gánja-ilai, kalpam (Tam.); Ganjari-chettu, bangi-aku, kalpam-chettu, ganjah (Tel.); 'Esjerucansjava, kancháva-chetti (Mal.).

*Habitat*:—Throughout India, wild in the N.-W. Himalaya, cultivated elsewhere.

A tall, erect, annual herb. Stem 1-8ft., Leaves alternate or the lower opposite, upper 1-3-lower 5-11-partite, serrate, palmati-nerved, 4-8in. diam. Stipules lateral. Flowers green, small, axillary, dioecious; males fasciated in short, pendulous panicles. Female flowers crowded under leafy convolute bracts. Male flowers:—Sepals 5, imbricate, stamens 5, erect in bud. Pistillode 0. Female flowers:—Perianth hyaline, embracing the ovary or 0. Ovary sessile; style central; arms 2, filiform, caducous; ovule pendulous. Achene compressed, crustaceous. Seed flattened, albumen unilateral, fleshy. Embryo curved, cotyledons broad, thick, sub-equal, radicle upcurved incumbent.

*Uses*:—Officinal in the Indian as well as British Pharmacopœias, and its uses are too well-known to be detailed here.

It should be used fresh. It deteriorates on keeping. Hence those imported from Europe not efficacious, and so, the necessity of making its preparations in India.

Hemp seeds yield from 25 to 30 per cent. of a light green or greenish-yellow oil becoming brownish-yellow on keeping. The specific gravity is

from '925 to '931; saponification value, 190 to 193; iodine value, 144 to 166; the fatty acids melt at 17° to 19°. It is used on the Continent as a paint oil and for making soft soap. (Hooper.)

The essential oil purified by distillation in a current of steam and extraction with ether, is a mobile liquid boiling at 248-268°; after repeated distillation from metallic sodium in order to remove as tearoptene, it yields a sesquiterpene  $C_{15}H_{24}$ , as a mobile, colourless oil of aromatic odour, which boils at 256°, and has a density of 0.897 at 15.3°, and is slightly laevorotatory. This soon resinifies on exposure to air, and on adding concentrated sulphuric acid to its chloroform solution, the liquid becomes first green, then blue, and red on heating. "Cannabene" prepared from this essence by Personne, was a mixture. (J. Ch. S. LXVIII., pt. 1 (1895), p. 623.)

*Charas*, the natural exudation of the plant contains no chlorophyll. On analysis, it was found to contain 33 per cent. of an oil, having the formula  $C_{18}H_{24}O_2$ . As this compound gives rise to all the symptoms of cannabis poisoning, the main effects produced by the drug are due to the action of this.

The ethereal extract from *charas* has yielded four distinct chemical compounds:—

1. A terpene, boiling at 160-180°. Yield 1.5 per cent.
2. A sesquiterpene, boiling at 258-259°. Yield 2 per cent.
3. A parffin ( $C_{29}H_{60}$ ), m. p. 63-64°. Yield 0.15 per cent.
4. A toxic red oil,  $C_{18}H_{24}O_2$ , boiling at 265° under a pressure of 20 mm. Yield 33 per cent. of the *charas* taken. This is a mixture of at least two compounds having similar physical characters. One of these, of the formula  $C_2H_{26}O_2$ , has been isolated, and this has been named cannabinal.

The physiological action of the terpenes closely resembles that of the other members of this class, of which ordinary turpentine may be taken as the type. In doses of 0.5 gram, they have very little effect and produce none of the characteristic symptoms of cannabis action. The red oil, on the contrary, is extremely active, and taken in doses of 0.05 gram induces decided intoxication followed by sleep. The symptoms produced by it are peculiar to *Cannabis indica*, and as none of the other products appears to possess this action, this substance must be regarded as the active constituent of the plant. (J. Ch. S. 1896, T. 539 and 1899, T. 20.)

*On the standardisation of preparations of Indian Hemp.* In 1908, Mr Hooper suggested a chemical method of valuing Indian hemp, and proposed that the iodine value of the resinous constituents containing cannabinal should be taken as a gauge of the activity. In the *British Medical Journal* for May 20th, 1911, p. 1176, Messrs. Marshall and Wigner have examined this method and shown that this method is of no value and could not be used as a substitute for physiological standardisation. According to them, the "acetyl number" should be used for determining the Standardisation. But in a report on the value of the "Acetyl number" by Messrs. Marshall and Wood published in the same journal for June 1, 1912, p. 1234, they came to the conclusion that the Acetyl number cannot be used as a substitute for physiological standardisation.







1171. *Streblus asper*, Lour., H.F.B.I., v. 489.

*Syn.* :—*Trophis aspera*, Retz., Roxb. 714.

*Sans.* :—Sákhotaka.

*Vern.* :—Siorá, karchanna, rusa, daheya (H.); Sheora, (B.); Hara saijung (Kol.) ; Sahra (Santal) ; Sahuda (Uriya) ; Nugnai (Magh) ; Karasni (Gond.) ; Jindi, dahya (Pb.) ; Karvati, karera, karaoli, karchanua, rusa (Bomb.) ; Prayám, palpirai (Tam.) ; Bariniki, bari venka, barranki, pakki (Tel.) ; Mitli, punje (Kan.).

*Habitat* :—Drier parts of India, from Rohilkhund, eastward and southward to Travancore, etc.

A small, evergreen, rigid, shrub or scraggy, gnarled tree, attaining 20ft. in height. Bark  $\frac{1}{2}$ in. thick, soft, light-grey, irregularly ribbed. Wood white, moderately hard, no heart-wood, no annual rings. All parts full of milky juice. Branchlets many, tomentose or pubescent. Leaves elliptic or obovate, penni-nerved, irregularly dentate, rough on both sides, with minute, raised, round dots, blade 2-4in., petiole very short, about  $\frac{1}{2}$ in. long, stipules obliquely lanceolate. Flowers dioecious. Male in globose heads ; perianth campanulate, deeply 4-fid, pubescent outside ; sepals 4, imbricate. Stamens 4, long, inflexed in bud. Females solitary, on axillary, usually fasciated peduncles,  $\frac{1}{2}$ in. long, perianth yellow, of 4 decussate ; closely imbricate sepals. Ovary straight, retuse ; styles 2, filiform, connate at base. Ovule pendulous. Fruit a yellow, 1-seeded, pisiform berry, enclosed in enlarged, fleshy sepals. Seed globose ; testa membranous ; albumen 0 ; embryo globose ; one cotyledon, very large, fleshy, enclosing the other, which is very small, and the upcurved radicle.

*Uses* :—The milky juice has astringent and antiseptic qualities, and is applied to sore heels and chapped hands. The bark in decoction is given in fevers, dysentery and diarrhœa. The roots are used as an application to unhealthy ulcers and sinuses. It is said to be an antidote to snake poison.

1172. *Morus indica*, Linn., H.F.B.I., v. 492.

*Syn.* :—*M. alba*, Var. *Indica*. Roxb. 658.

*Sans.* :—Shálmali, tula, tuda.

*Vern.* :—Tut, tutri (H.); Tut (B.); Nuni, bola (Assam); kimbu (Nepal); Mekrap, nambyong (Lepcha); Singtok (Bhutia); Tut, tutri, ambor, setur, tula ambor (Bomb.); Tut (M); Shetur (Guz.); Kambili-púch; Mushu kattai (Tam.); Kambali, kambali-búchi (Tel.); Hippal-verali (Kan.).

*Habitat* :—Temperate and Sub-tropical Himalaya, from Kashmir to Sikkim; wild and cultivated (for silk-worm feeding) in Bengal, Assam, etc.

A moderate-sized, deciduous tree, with reddish or yellowish-brown, smooth bark, marked with long, horizontal lenticels. Leaves 2-5 by 1-3in, ovate, caudate, acuminate, sharply serrate, often lobed, membranous, pubescent when young, scabrous when mature, 3-nerved at base; petiole  $\frac{1}{2}$ -1 $\frac{1}{2}$ in, long, sparsely hairy. Flowers monoecious. Female spikes  $\frac{1}{3}$ - $\frac{1}{2}$ in. long, ovoid; styles long, hairy. Fruiting spikes black when ripe. Petuncle  $\frac{1}{10}$ - $\frac{1}{5}$ in. long, slender. Some consider this a more form of *M. alba*, with long points to the rougher leaves, connate styles and obovate sepals.

*Uses* :—The fruit has an agreeable, aromatic and acid flavor, is cooling and laxative, allays thirst, and is grateful in fevers.

The bark is supposed to be vermifuge and purgative.

The root is considered anthelmintic and astringent.

A decoction of the leaves is used as a gargle in inflammation and thickening of the vocal cords.

1173. *M. alba*, Linn., H.F.B.I., v. 492; Roxb. 658.

*Sans.* :—Tula.

*Vern.* :—Tút, túl, tulklu, chinni, chun (H.); Tut, chinni, satur, tutla, shah-tut (Bomb.); Uppu nute (Kan.).

*Habitat* :—Cultivated in the Punjab and N.-W. Himalaya.

A small or moderate-sized, deciduous tree, 30-40ft. Bark brown, rather rough. Wood hard; sapwood white; heartwood yellow or yellowish-brown, darkening on exposure, young shoots, petioles and underside leaves along nerves, slightly pubescent. Leaves ovate-dentate, frequently lobed, acute; base often cordate, 2-3in., sometimes larger, rather membranous; petiole  $\frac{1}{2}$ -1in.;





basal nerves 3-5. Flowers monœcious, the sexes often on distinct branches. Spikes short, under 2 inches. Perianth of male flowers :—Sepals hairy, elliptic. Sepals of females 4, the 2 inner flat or concave, the outer more or less keeled. Female spikes ovoid, pedunculate. Styles free, short. Fruiting spikes peduncled, white or red, sweet.

*Use* :—The sweet, deep-red juice of the white or red form of the fruit is used for sore-throat, and acts as a pleasant refrigerant in cases of fever. The fruit is employed, by *hakims*, as remedy for sorethroat, dyspepsia and melancholia. The bark is considered purgative and anthelmintic. (Punjab Products.)

The seeds, on extraction with ether, yield 33 per cent (A) and on pressing 24 p. c., (B) of a thick golden-yellow oil with a faint odour and a pleasant taste. It is very soluble in boiling 95 p. c. alcohol, soluble in an equal volume of absolute alcohol at 39°C. or of acetic acid at 41°C; easily soluble in all fat solvents.

1174. *M. nigra*, *Linn.*, II.F.B.I., v. 492. .

If specifically distinct, this plant, cultivated in Baluchistan, is allied to *M. alba*, *Linn.* The leaves are broader, firm, thick, 5-nerved, sub-sessile; sepals and styles densely hairy, purple. Fruit acidulous-sweet.

*Uses* :—It is used like the other species of this genus.

1175. *Ficus gibbosa*, *Blume.*, II.F.B.I., v. 496.

*Syn.* :—*F. excelsa*, *Vahl.*, *Roxb.* 641.

*Sans.* :—Udumbar.

*Vern.* :—Dátir (Bomb.); Umbar (Guz. and Mar.); Kouda-juvee; Tellabarin ka (Tel.).

*Habitat* :—Bases of the hill ranges throughout India from Kumaon eastwards to Burma and southwards to Ceylon.

A small or at times large tree, erect, often epiphytic or climbing, enclosing the trunk of trees in a perfect network of branches or creeping along the walls and on the sides of wells. "Bark thin, smooth, greenish-yellow. Wood light-brown or grey, soft to moderately hard, divided into alternate, broad, hard, dark, and narrow, light, soft, more or less wavy, concentric rings.

The light rings occasionally anastomose. Pores moderate-sized to large, scanty, irregularly distributed. Medullary rays moderately broad, light coloured, rather short, not numerous. (Gamble). Leaves thinly coriaceous (broad, rhomboid, says Gamble), often very unequal-sided, angular and with intra-marginal veins, the lowest pair of the base usually running near the edge, intermediate and tertiary distinct. Petiole  $\frac{1}{3}$ - $\frac{1}{2}$ in.; stipules  $\frac{1}{3}$ - $\frac{1}{2}$ in., ovate-lanceolate, convolute. Male sepals 4-6, linear, fleshy, hairy; stamens 1, filament short, united by its base to an abortive (insect attached) pistil. Gall flowers perianth of the male; ovary globose, smooth; style short, lateral. Female sepals 4, hyaline, linear, slightly hairy; achene slightly papillose, obliquely ovoid. Style lateral, elongate. Receptacles minutely hairy,  $\frac{1}{4}$ - $\frac{1}{2}$ in. diam, peduncle up to  $\frac{1}{3}$ in. long, bracts at base of the peduncles. Fruit yellow when ripe. A variable species.

*Uses*:—The decoction of the root acts as a powerful aperient. The root-bark is stomachic and gently aperient. The leaves are used to polish ivory and given to cattle, being supposed to increase the flow of milk.

1176. *F. bengalensis*, Linn., H.F.B.I., v. 499.

*Syn.*:—*Ficus indica*, Linn., Roxb. 639.

*Sans.*:—Vata.

*Vern.*:—Bor, ber, bargad (H.); Bot (B. and Ass.); Boi (Kol.); Boru (Ur.); Bare (Santal); Ranket (Garo); Borhar (Nep.); Kangji (Lep.); Bor, bohr (Pb.); Baagat, bar (Pushtu); Phagwari (Hazara); Wur, bur (Sind); War, vada (Mar.); Ala (Tam.); Mari, peddi mari (Tel.); Ahlada, (Kan.), Peralu, peralin (Mal).

*Habitat*:—Planted in all the plains of India; wild only in the Sub-Himalayan forests and on the lower slopes of the Deccan Hills.

A large or very large tree, branches spreading, sending down to the ground numerous aerial roots which afterwards become trunks. Bark  $\frac{1}{2}$ in. thick, greyish-white, smooth, exfoliating in

small, irregular plates. Wood grey, moderately hard ; no heart-wood, having narrow, wavy, concentric bands of soft tissue and darker colour. Pores moderate-sized and large, sometimes very large, often sub-divided, scanty, scattered irregularly. Medullary rays fine, equi-distant, but not numerous. On a radial section the pores and soft bands are distinctly marked, giving the wood a characteristic grain, but larger pores being frequently oblique (Gamble). Young shoots pubescent. Leaves glabrous when mature, approximate near the ends of branches, ovate, mostly obtuse ; base cordate or rounded ; basal nerves 3-5 ; the midrib with 4-6 pair of secondary nerves ; blade 4-8 in. ; petiole 1-2 in. Fruit globose, pubescent,  $\frac{1}{2}$ - $\frac{1}{3}$  in. diam., sessile, scarlet when ripe, supported by 2-4 broad, obtuse bracts.

*Uses* :—The milky juice is externally applied for pains and bruises and in rheumatism and lumbago. It is considered as a valuable application to the soles of the feet when cracked or inflamed, and is also applied to the teeth and gums as a remedy for tooth-ache.

An infusion of the bark is supposed to be a powerful tonic and is considered to have specific properties in the treatment of diabetes. The seeds are deemed cooling and tonic. The leaves are applied, heated as a poultice, to abscesses, and after they have turned yellow are given with roasted rice in decoction as a diaphoretic. The root fibres are given in gonorrhœa in the Punjab, being considered by Vaidis to resemble Sarsaparilla. An infusion of the small branches is useful in hæmoptysis. The tender ends of the hanging roots are given for obstinate vomiting.

(1) Composition of a dried specimen of *Ficus bengalensis* (from Perawa)—

Water	...	...	...	...	11·4
Albuminoids	...	..	...	...	7·1
Oil	...	.	...	...	4·0
Carbohydrates	...	...	...	...	35·2
Fibre	...	...	...	...	36·8
Ash	...	...	...	...	5·5
					—
					100·0
					—

(2) A sample of the fresh fruit was gathered in Calcutta.

As the sample was very wet, it was partially dried for analysis. It then contained :

Water	...	...	...	...	12.9
Albuminoids *	...	...	...	...	8.1
Oil	...	...	...	...	6.1
Carbohydrates †	...	...	...	...	35.5
Fibre	...	...	...	...	31.0
Ash †	...	...	...	...	6.4

The alcoholic extract contains a glucoside, a trace of acid, but no appreciable quantities of tannin or alkaloid. The colouring matter is precipitated from its deep purple alkaline solution as a reddish brown deposit which dries to an almost black powder.

1177. *F. Benjamina*, Linn., H.F.B.I., V. 508.

*Syn.* :—*F. comosa*, Roxb. 644

*Vern.* :—Sunonijar (Santal); Juripakri Assam, Chittagong (Nepal); Kunhip (Lepcha); Pimpri (Bomb.); Jili (Chutia Nagpur); Pútra-janvi (Tel.)

*Habitat* :—Base of the Eastern Himalaya, Assam, and the Deccan Peninsula.

A very large, evergreen tree, with drooping branches. Wood soft, light-brown, in alternate layers of light-brown, soft tissue and darker (light on a vertical section) hard tissue, the breadth of the soft layers about half that of the hard ones. Pores moderate-sized to large, very scanty, evenly distributed. Medullary rays fine to moderately broad, rather numerous, uniform. A fine, avenue tree, and excellent for shade. (Gamble.) The tree is 50-60ft. in height; it has 12-20ft., clear stem; and 6-8ft. girth. (Kurz.)

An evergreen tree, with a dense, divaricate crown and pendulous branches, all parts glabrous; stipules small, lanceolate, glabrous; leaves ovate to elliptically ovate on a slender petiole, 5-8in. long, obtuse at the base, rather long and bluish,

---

* Containing nitrogen	...	...	...	1.31 per cent.
† Ditto colouring matter	...	...	...	7.7
‡ { Ditto silica (Si O <sub>2</sub> ).	...	...	...	0.35
‡ { Ditto phosphoric acid (P <sub>2</sub> O <sub>5</sub> )	...	...	...	0.58











acuminate, 2-3½ in. long, rigidly chartaceous, entire, glabrous; the nerves thin, much crowded and uniting near the margin, all parallel with a transverse net venation between, prominent on both sides; receptacles sessile by pair or solitary in the axils of the leaves, globular or almost obovate and narrowed at the base, varying in size from ½ to ¾ in. in diameter, blood-red when fully ripe, glabrous, 3-bracted, the lateral bracts broad, but short, rounded, glabrous. Male flower, very few scattered, pedicelled; sepals 2, large, flat; anther sessile. Gall flower, mostly pedicelled; sepals 3 or 4, long, spathulate, ovary ovoid, smooth. Female flower sessile; Sepals shortly spathulate, achene ovoid-reniform, longer than the style, stigma large.

*Uses*:—A decoction of the leaves mixed with oil is believed in Malabar to be a good application to ulcers. (Drury.)

1178. *F. retusa*, Linn., H.F.B.I., v. 511.

*Syn.*:—*F. Benjamina*, Willd., Roxb. 643.

*Vern.*:—Kamrup, Zir (H. B.); Butisa (Kol.); Sunumjon (Santal); Jili (Chutia Nagpur); Jamu (Nepal); Sitnyok (Lepcha); Nandruk (Mar.); Yerrajuvi, nandireka (Tel.); Pilála, pinval (Kan.)

*Habitat*:—Base of the Eastern Himalaya, Khasia Hills, Assam and the Deccan Peninsula.

A large, evergreen umbrageous, tree, often epiphytic, aerial roots slender, quite glabrous. "Bark brown, fairly smooth. Wood light, reddish-grey, moderately hard, with narrow, wavy bands of soft tissue, alternating with broader bands of firm texture. Pores moderate-sized, often sub-divided, scanty. Medullary rays short, moderately broad." (Gamble). Leaves elliptic, ovate or obovate, apex rounded, or shortly and bluntly acuminate; blade 2-4 inches, narrowed into petiole, ¼-½ in. Male flowers numerous, scattered, sessile, or short-pedicelled; sepals 3, sub-spathulate; stamen single; anther cordate, apiculate, as long as the filaments. Gall flowers sessile or pedicelled; sepals 3, broadly spathulate; ovary smooth. Female flowers sessile, much smaller than in the gall; styles of both short;

stigma cylindric or clavate. Receptacles finely pubescent while young. Fruit sessile, yellow or reddish;  $\frac{1}{8}$  in. diam.; basal broadly ovate, obtuse, spreading.

*Uses* :—The bark of the root, the root itself, and the leaves boiled in oil form good applications for wounds and bruises. (Rheede.)

In rheumatic headache, the leaves and bark pounded are applied as a poultice. In flatulent colic, the following prescription is used in the Concan:—Take of Nândruk leaf juice, Tulsî leaf juice, and *qhi* equal parts; boil until all the water has evaporated; do this again 21 times with fresh quantities of the juice of the two plants; the residuum may then be applied to the belly, and fomentation with hot brick be practised. The juice of the bark has a reputation in liver disease; dose 1 tola in milk. (Dymock.)

1179. *F. Rumphii*, Blume, H.F.B.I., v. 512.

*Vern.* :—Kabar, gajna, pîpul, gajîun, pipal, gagjaira, pakar, khabar (Hind); Gaiaswât (Beng.); Suman-pîpar Kol.); Sunamjor (Santal); Pakri (Assam); Sat-bur (Cachar); Pakar (Nepal); Prab (Garo); Kabai pipal (Kumaon); Pulâkh, rûmbal, badha, palâk, pilkhan (Pb); Parâs, pîpal (Raj); Pair, piyar, asht (ashta), (Mar.); Kabai pipal, ganjar, suman, pipar (Lohardugga); Nyung byu (Burm.)

*Habitat* :—On the dry lower slopes of the mountains of the Punjab; and the Northern, Western and Central India, Assam.

A large, deciduous tree, often epiphytic, all parts glabrous. "Bark smooth, grey,  $\frac{1}{2}$  in. thick. Wood very soft, spongy, with alternating bands of loose and firm tissue of equal width. Pores oval, scanty, moderate-sized. Medullary rays fine, uniform, equidistant." (Gamble.) Leaves sub-coriaceous, upper surface minutely tuberculate when dry, shining, long-petiolate, broadly ovate, with acuminate apex; edges entire, sub-undulate; base broad, but slightly narrowed towards the petiole; basal nerves 5, rarely 7 (2 being minute); lateral primary nerves 3-6 pair, rather irregular, prominent only in the young state;

length of blade 4-6in. of which the acuminate apex forms only about one; petioles 2·5 to 3·5in. Stipules ovate-lanceolate, from  $\frac{1}{2}$  to 1in. long; receptacles sessile, in pair in axils of leaves or of leaf scars, globular, smooth when young, whitish with dark spots, when ripe nearly black; 5in. across; basal bracts 3, rotund, small. Male flowers few, and only near mouth of the receptacle, the perianth of 3 spathulate pieces, anther single, on a filament about as long as itself; gall and female flowers with perianth of 3 lanceolate pieces; the gall ovary, smooth and usually ovoid; achene minutely tubercled, mucilaginous, style in both elongate, stigma clavate. (King.)

*Uses*:—The Santals use the fruit as a drug. The juice is used in the Concan to kill worms and is given internally with turmeric, pepper and *ghi*, in pills, the size of a pea, for the relief of asthma; it causes vomiting. The juice is also burned in a closed vessel, with the flowers of *mudar* and 4 *gunjas* weight of the ashes mixed with honey, is given for the same purpose. (Dymock.)

1180. *F. religiosa*, Linn., H.F.B.I., v. 513; Roxb. 642.

*Sans.*:—Aswaththam.

*Vern.*:—Pīpal (H.); Ashathwa, (B.); Hesar, pīpar (Kol.); Hesak (Santal); Jāri (Uriya); Bor-bur (Kachar); Pipli (Nepal); Ali (Gond.), Pipri (Korku); Pīpal, boṛ (Pb.); Pimpala (Mar.); Pīpul (Guz.); Arasa; Aswartham (Tam.); Rai, raiga, rāgi, rāvi or kulla rāvi (Tel.); Rangi, basri, arali, arle, haspath, rāgi, asvalta (Kan.)

*Habitat*:—Wild in the Sub-Himalayan forests, in Bengal and in Central India.

A large, glabrous, usually epiphytic tree. Bark grey, nearly  $\frac{1}{2}$ in. thick, exfoliating in rounded, irregular flakes of varying size, often leaving rounded depressions. Wood greyish-white, moderately hard; having narrow bands of soft tissue, which alternate with broader bands of firmer substance. Pores moderate-sized and large, often sub-divided, rather scanty.

Medullary rays uniform and equidistant, moderately broad. (Gamble). Leaves coriaceous, upper surface shining, lower minutely tuberculate when dry, long-petiolate, ovate-rotund, narrowed upwards and the apex produced into a linear lanceolate tail, edges entire, undulate; base broad, rounded to truncate, sometimes a little narrowed at the union with the petiole occasionally emarginate or in young leaves, very cordate, from 5 to 7-nerved; lateral primary nerves about 8 pairs, reticulations five, distinct; length of blade from 4-5 to 7in. of which the apical tail forms about a third, breadth 3 to 4-5in. petioles from 3-4in., long, slender. Stipules minute, ovate, acute; receptacles in pair, axillary sessile, smooth, depressed, spheroidal, when ripe dark-purple, 5in across, with 3 broad, spreading, coriaceous basal bracts. Male flowers very few and only near the mouth of some receptacle (absent in many), sessile; the perianth of 3 broadly ovate pieces, anther single, ovate-rotund, its filament short. Gall and fertile flowers:—sessile or pedicellate; the perianth of 5 lanceolate pieces; style short, lateral; stigma rounded, the galls much more numerous than the fertile females, and many of them without perianth.

*Uses*:—The bark is astringent, used in gonorrhœa. It has also maturative properties. The fruit is laxative and helps digestion. The seeds are said to be cooling and alterative. The leaves and young shoots are used as a purgative, and an infusion of the *bark* is given internally in scabies. (Ainslie and Wight.) A paste of the powdered bark is used as an absorbent in inflammatory swellings. (Dr. Emerson.) According to Bartolomeo (Voyage to the East Indies) the dried fruit “pulverized and taken in water for a fortnight, removes asthma and produces fruitfulness in women.” Water in which the freshly-burnt bark has been steeped is said to cure cases of obstinate hiccup. (Dr. Thornton.) In cracked foot the juice is employed. (Asst.-Surg. T. N. Ghose.) The powder of the dried bark is used in fistula in ano. I have seen a *Hakim* use it with benefit in the following way: he introduced a metallic tube, something like a blow pipe, into the fistula, and putting a small quantity of the powder into it, blew the same into the fistula. (Asst.-Surg. Nobin Ch. Dutt Watt's Dic.)







A dried specimen from Bundi was analysed and found to contain —

Water	...	...	...	...	9.9
Albuminoids *	...	...	...	...	7.9
Oil	...	...	...	...	5.3
Carbohydrates †	...	...	...	...	54.9
Fibre	...	...	...	...	33.7
Ash ‡	...	...	...	...	8.8
					100.0

The alcoholic extract contains a soluble tannin which gives a green precipitate with ferric chloride.

The colouring matter appears to be identical with that characteristic of the other varieties of *Ficus*.— (Agricul. Ledger 1904—No. 4).

1181. *F. infectoria*, Roxb., H.F.B.I., v. 515 ;  
Roxb. 643.

*Sans.* : —Plaksha ; Parkati.

*Vern.* : —Pilkhan, kahimal, ramanjir, pákar, kaol, kaim, Pipli, (H.) ; Pákar (B.) ; Baswesa (Kol.) ; Prab (Garo) ; Safed-kabra (Nep.) ; Kangji (Lep.) ; Pepre (Kurku) ; Serelli (Gond.) ; War, batbar, jang!pipli, palákh, pákhar, pilkin, trimbal (Pb.) ; Killah (Konkan) ; Pepar, gándhaum bara, dhedhumbara, lendva (Mar.) ; Pepri (Guz.) ; Jooi, kall-alun, pepre, kurku (Tam.) ; Jewi, yui, bassari (Tel.) ; Kari, bassari (Kan.).

*Habitat* :—Plains and lower hills of India, from the Salt Range to Sikkim ; Bengal ; Assam ; both Peninsulas.

A large, widely spreading, deciduous, fast-growing tree, usually epiphytic. Bark  $\frac{1}{2}$  in. thick, greenish-grey, smooth, exfoliating irregularly in flakes and patches. Wood grey, moderately hard ; with narrow concentric bands of soft tissue alternating with broader bands of firm texture. Pores large, scanty, often sub-divided. Medullary rays uniform, moderately broad, equidistant. (Gamble.) Young shoots and stipules minutely hairy. Leaves thinly coriaceous, glabrous, shining, ovate or ovate-oblong, shortly acuminate, margin undulate, base acute, rounded or cordate, blade 3-6 in., petiole 1-3 in.

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* Containing nitrogen	...	...	...	1.27 per cent.
† Ditto colouring matter	...	...	...	7.5
‡ { Ditto silica (Si O <sub>2</sub> )	...	...	...	1.85
‡ { Ditto phosphoric acid (P <sub>2</sub> O <sub>5</sub> )	...	...	...	0.69

long, secondary nerves 8-10 pair, the lowest pair from the base. Fruit sessile or shortly peduncled,  $\frac{1}{4}$ - $\frac{1}{5}$  in. diam., basal bracts minute.

*Uses* :—The bark of this, along with the barks of other four species of *Ficus* and of *Melia azadirachta*, pass by the name of *Panchavalkala* (or the five barks); they are used in combination. A decoction is much employed as a gargle in salivation, as a wash for ulcers, and as an injection in leucorrhœa. (Watt.)

1182. *F. heterophylla*, Linn., H.F.B.I., v. 518, Roxb. 637, 638.

*Sans.* :—Trayamáná.

*Vern.* :—Gaori-shiora, balábahulá, balalalá ghoti-suara, bhuidúmúr, ballam dúmúr (B.); Pakhur (H.); Datri (Mar); Buroni (Tel.); Valli-teragam (Mal.).

*Habitat* :—Throughout the hotter parts of India, near water, from the Gangetic Plain eastwards and southwards to Perak and Ceylon.

A shrub sometimes creeping on the ground or over rocks, with short, pubescent stem and branches, the leaves very variable, scabrid. Leaves petiolate, membranous; general outline usually more or less ovate-elliptic, but varying from elongate-lanceolate to ovate or ovate-round, often irregularly 3 to many-lobed, with the apex more or less acuminate, the edges irregularly and coarsely dentate or dentate-repand; the base blunt rounded, or cordate, 3-to-5 nerved; both surfaces scabrous, and covered with short, stiff hairs; lateral nerves from 4-8 pair according to the length of the leaf (in the much-lobed leaves the nervation is palmate); length of blade 2 to 4 in., petioles varying from  $\frac{1}{5}$  to  $\frac{2}{5}$  in.; stipules 2 to each leaf scarious, ovate, glabrous or nearly so, 3 to 4 in. long. Receptacles on peduncles of varying length, solitary, axillary, spherial to elongated-pyriform, always with a more or less prominent mammillate umbilicus which is but imperfectly closed by bracts, more or less hispid, scabrid, and sometimes verrucose when young; when ripe nearly smooth, dark-orange, 4 to 1 in. long; basal bracts minute, triangular, glabrous (in the much elongated forms appearing





to rise from below the base of the receptacle) ; peduncle proper from 4 to 1 in. long. Male flowers with 3 or 4 cleft gamophyllous perianth and a single stamen. Gall flowers with a perianth like the males ; the ovary ovoid, smooth, with a short, lateral style. Fertile female flowers with gamophyllous 4-cleft perianth, the achene sub-globular, minutely tuberculate, with a hyaline, viscid, external coat, style long, lateral stigma cylindrical.

This is a polymorphic species, and often presents great variety in foliage even in the same plant. (King.)

*Uses* :—The juice of the root of this shrub is internally administered in colic pains, and the juice of the leaves mixed with milk in dysentery. The bark of the root, which is very bitter, pulverised and mixed with coriander seed, is considered a good remedy in coughs and asthma and similar affections of the chest. (Rheede.)

1183. *F. asperrisma*, Roxb., H.F.B.I., v. 522 ; Roxb. 611.

*Vern* :—Kâl-ambar (Guj.) ; Kharwat (Mar) ; Karakarbudâ ('Tel) ; Khargas (Kan.) ; Irumbaruthan (Tam.)

*Habitat* :—Central India and the Deccan Peninsula.

A shrub or tree, all young parts very scabrous. Leaves collected about extremities of branches, alternate, petiolate, oblong-lanceolate to ovate or obovate or elliptic ; the apex blunt or acuminate ; the edges subentire, serrate, dentate or crenate in the upper three-fourths, and entire towards the rounded or blunt ; 3-nerved, primary nerves 3-5 pair, very prominent and hispid on lower surface, as are the reticulations ; the rest of the lower surface scabrid-hispid ; upper surface pretty uniformly and strongly scabrous, shortly hispid. Blade 1½-5 in. long, petiole ½-1 in. long, stout, stipules minute. Receptacles pedunculate, often reflexed, scabrous-hispid, globular, slightly depressed at apex, with rather prominent umbilicus. Umbilical scales erect. Male flowers numerous in part of receptacles ; perianth of 4-5 linear-lanceolate, scabrid pieces. Stamen 1. Ovary of gall-flowers ovate, lanceolate, with thick terminal style and dilated stigma ; the perianth like that of male flowers. Fertile female flowers :—with perianth of 6-7 linear-lanceolate, smooth pieces.

Achene elongated, obovoid, minutely tubercular. Style lateral, filiform, stigma obovate.

*Uses*:—The juice and bark are in Bombay well-known remedies for glandular enlargements of the abdomen, such as liver and spleen. (Dymock.)

1184. *F. hispida*, Linn., H.F.B.I., v. 522.

*Syn.*:—*F. oppositifolia*, Willd., Roxb., 647.

*Sans.*:—Kák dumbar.

*Vern.*:—Kagsha, gobla, totmila, kat-gularia, konea-dumbar Katumbri Rambal, dumbar, Bhudoi (Hind.); Dumar, kak-dumar (Beng.); Kotang, sosokera (Kol.); Sita pordoh (Santal); Khoskadumar (Ass.); Shakab (Garo); Koreh (Kurku); Kharwa (Nep.); Taksot (Lepcha); Poksha (Michi); Maiu-lok (Magh); Katumer, bomair (Gond); Daduri, degar, rumbal (Pb); Dhe daumaro, jangali anjir (Guz.); Dhedumera Kharawat (Mar.); Pe-attis (Tam.); Bodanamadi, brahma-médi, bummarri, korasana (Tel.); Adavi-atti (Kan.); Pe-yatti paraka (Mal.).

*Habitat*:—Throughout India, from the Punjab in the N. W. to Malacca and Ceylon.

A moderate-sized tree. Bark  $\frac{1}{2}$  in. thick, grey, peeling off in irregular flakes, with slight, horizontal ribs encircling the tree. Wood soft, dirty-grey, in regular concentric bands of soft tissue which alternate with firmer bands of equal width and darker colour. Pores scanty, moderate-sized, often oval and sub-divided. Medullary rays moderately broad and fine, prominent as long, narrow bands on a radial section. (Gamble.)

The tree is quick of growth, recognized easily by its opposite leaves. All parts more or less hispid pubescent, the branches and, in Malayan specimens, the upper surfaces of the leaves sometimes glabrescent when old. Leaves opposite, usually, says King; petiole membranous, ovate, ovate-oblong or elliptic to sub-ovate-elliptic, apiculate or abruptly acuminate, edges dentate or entire in old leaves, base rounded, emarginate, slightly







cordate or narrowed and subcunrate; 3-5-nerved; primary lateral nerves 3-5 pairs; secondary nerves rather straight; reticulations fine; the lower surface hispid-pubescent, the upper hispid-scabrid; length 4-9in. (in young shoots as much as 12in.); petioles from  $\frac{1}{2}$ -1 $\frac{1}{2}$ in. long (in young shoots often 3-3 $\frac{1}{2}$ in.), densely hispid-pubescent; stipules 2 to each leaf, ovate-lanceolate, pubescent externally, glabrous internally; about  $\frac{1}{2}$ in. long, often in shoots of four on the receptacles bearing leafless branches. Receptacles shortly pedunculate, turbinate, ovoid, or sub-pyriform, slightly umbonate, hispid and sometimes with bracts scattered along their sides; yellowish when ripe and from  $\frac{1}{2}$ -1in. across; umbilicus rather large; basal bracts 3, borne on peduncles,  $\frac{1}{5}$ - $\frac{2}{3}$ in. long, in pair from the axils of the leaves, or in fascicles from shortened tuberculate branches from the old wood, or in pair or fascicles on elongate, stipular, bracteate, sometimes leafy, branches issuing from the larger branches of the stem, and often reaching to or even penetrating the soil. Male flowers rather numerous near the apex of the receptacles containing the galls; the perianth of 3 concave hyaline pieces; stamen 1; the anther broad, filament short; gall flowers pedicillate with no obvious perianth; the ovary smooth, globular; style short, sub-terminal; stigma dilated. Fertile female flowers like the galls as regards perianth; the achene ovoid; the styte long, lateral hairy, the stigma cylindrical tubular.

*Uses*:—According to Sanskrit writers the figs of this plant promote the secretion of milk. They are also supposed to preserve the fetus in the womb. (U. C. Dutt.) The acid milk is used medicinally in Kangra. In Bombay and the Concan, the powdered fruit heated with water to form a poultice is applied to buboes. It is also given to milch cattle to dry up their milk. (Dymock.)

According to the report of Mr. Moodeen Sheriff, the fruit, seeds and bark are possessed of valuable emetic properties. The most eligible form of administration appears to be the seeds of the ripe fruit, dried and preserved from moisture in stoppered bottles. The dose is about one drachm, which in effect is equal to four or six of the ripe fruit. The emetic

action of the bark is generally attended with more or less purging. The dose is placed at from forty to sixty grains. The bark, in doses of from fifteen to thirty grains, three or four times daily, is stated to act effectually as an antiperiodic, and in half those quantities as a good tonic. (Ph. Ind.).

1185. *F. Cunia*, Ham., H.F.B.I., v. 523. Roxb. 646.

*Vern.*:—Khewnau, Kunia, khurhur, kassa, ghui (H.); Dumbur, jagya-dumur (B.); Riu, aiu (Kol.); Porok podha Horpodo (Santal); Kanhya (Nepal); Sangji (Lepcha); Kanai, palkai taikran (Michi); Kathgular, trumbal, karndol, kuri (Pb.); Porodumer, Kharwar. (Mar.)

*Habitat*:—Sub-Himalayan forests, from the Chenab to Bhotan; Central India, Assam, the Khasia Mts. and Chittagong.

A small or moderate-sized tree, usually evergreen branchlets, young shoots and midrib pubescent. "Bark thick, reddish-brown, rough; wood rough, moderately hard, greyish-brown with narrow, concentric bands which alternate with broader bands of firmer texture. Pores scanty, moderate-sized. Medullary rays fine, equidistant." (Gamble). Leaves alternate, entire or serrate, rough above, more or less pubescent beneath, semicordate, the lower half of the base large rounded, shape and size very variable; blade 8-16; petiole  $\frac{1}{2}$ - $\frac{2}{3}$  in; stipules  $\frac{3}{4}$ -1 in long, base broad, scar, annular. Receptacle  $\frac{1}{2}$  in. diam, in pair or clusters on long, leafless, scaly branches, from the trunk near the base of the ripening underground. Male sepals 3. Gall and female sepals about 4, lanceolate, gamophyllous. Ovary of galls, globose, smooth; style very short, lateral. Achones broadly ovate, emarginate on one side, tubercled, viscid; style very long, lateral; stigma large, bifid. Recognized at once by the long leaves with unequal semi-sagittate base.

*Uses*:—The fruit is given in aphthous complaints. A bath made from the fruit and bark is a cure for leprosy. (Rheede.) The juice from the roots is given in bladder complaints and, boiled in milk, in visceral obstructions. (Revd. A. Campbell.)





A dried specimen submitted by the Deputy Conservator of Forests, Angu Division, shewed the following composition :—

Water	...	...	...	...	13.5
Albuminoids *	...	...	...	...	8.7
Oil	...	.	...	...	5.7
Carbohydrates †	...	...	...	...	43.1
Fibre	...	...	..	...	1.77
Ash †	...	...		...	11.3
					—
					100.0
					—

(Agricul. Ledger 1904 No. 4).

1186. *F. Ribes*, Reinw. dt., II F.B.I., v. 524.

*Syn.* :—*F. polycarpa*, Roxb. 615.

*Vern.* :—Chhótá-junglí-anjír (H); Chiria-pé-atti (Tam); Chinna-verri-atti-pandu (Tel.); Cheriya-kât-tatti (Mal)

*Habitat* :—Tenasserim to Penang and Singapore.

A small tree, the young branches sparsely strigose, slightly swollen at the insertion of the leaves. Leaves alternate, petiolate, membranous, lanceolate or oblanceolate; the edges entire; lateral primary nerves 7 to 9 pairs, not prominent, both sides glabrous, except the lower which, on the midrib, and larger nerves, is appressed, pubescent; length of blade 2.5 to 4.5 in., petioles strigose,  $\frac{1}{2}$  in. long; stipule linear-lanceolate, convolute,  $\frac{3}{4}$  in. long. Receptacles rising from elongated, ramous, leafless, (sometimes stipulate towards the apex), glabrous branches which issue from the stem near the ground, pedunculate, sub-globose, strongly ribbed when young, verrucose, pubescent, about  $\frac{1}{8}$  in. across when ripe; umbilicus closed by 5 broad scales; the base constricted into a stalk about  $\frac{1}{10}$  in. long at the junction of which with the peduncle are 3 small bracts; peduncle proper  $\frac{1}{8}$  in. long. Male flowers numerous, the perianth of 2 large, inflated, roundish pieces, anther single, almost sessile, very broad. Gland flowers mostly sessile, without perianth, the ovary broad, obliquely obovoid, sub-rhomboid, with terminal thick style. Fertile female flowers on separate receptacles, mostly pedicillate; the

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* Containing nitrogen	...	...	...	...	1.40 per cent.
† Ditto colouring matter	...	...	...	...	9.0
† { Ditto silica (Si O <sub>2</sub> )	...	...	...	...	1.65
† { Ditto phosphoric acid (P <sub>2</sub> O <sub>5</sub> )	...	...	...	...	1.12

perianth tubular, short, covering only the pedicel of the rhomboid minutely tuberculate achene. Style much longer than the achene ; stigma cylindrical or clavate.

*Uses* :—It possesses, according to the experience of Mr. Moodeen Sheriff, all the medicinal properties of the preceding *F. hispida*. It is desirable to know more of the properties of these trees. (Ph. Ind.)

1187. *F. palmata*, *Horsk.*, II.F.B.I., v. 530.

*Syn.* :—*F. carica*, *Linn* Roxb. 636.

*Vern.* :—Gúlar, khabára, anjiri, beru, bedu (H.) ; Phagwara, kák, kok, phedú, inzar, phag, kirmi, phagou, fágú, phog, khabáre, phegra, thapur, jamir, dhúú, dhudi, daholia (Pb.) ; Phagwara (Pushtu) ; Anjir, inzar (Afg) ; Kembri (Raj.) ; Dhoura (C. P.) ; Pepri (Guz.) ; Fagwara, Thapur (Plains of Upper India).

*Habitat* :—N.-W. India, from the Indus eastwards to Oudh, ascending to 3,000ft. in the Himalaya, Mt. Aboo.

A bush or moderate-sized tree. Shoots tomentose, pubescent or glabrous. Bark grey, smooth. Wood white, close and even-grained, moderately hard, with wavy crescentic bands of soft tissue, alternating with bands of equal width of firmer tissue. Pores very small and moderate-sized, often oval and sub-divided. Medullary rays fine and moderately broad ; unequally distributed. (Gamble) Branches solid, with a large pith ; branchlets, petioles and underside of leaf soft-tomentose. Leaves rough above, broad-ovate, dentate, at times deeply lobed ; base truncate or cordate, sometimes abruptly narrowed to the petiole ; blade 3-5, petiole 1-2in. long ; 3-5 basal nerves ; secondary nerves on midrib 3-6 pairs. Stipules in pairs, ovate, acute, pubescent, deciduous. Receptacles axillary, more or less pear-shaped, umbonate,  $\frac{1}{2}$ -lin. diam. ; usually pubescent, yellow when ripe, edible ; basal bracts deciduous 3, acute, at the base of the stalk which often lengthen out to  $\frac{1}{2}$ in. as the fruit ripens, peduncle  $\frac{1}{2}$ -lin. Perianth ciliate with long hairs. Male flowers on hairy pedicels, sepals 4-5, lanceolate, hairy. Gall flowers, sessile or pedicelled ; perianth deeply 5-cleft ; ovary







ovoid, smooth; style very short, lateral stigma dilated. Female flowers, perianth of gall flowers; achene trigonous, granular; style sub-terminal, long, hairy; stigma bifid. The Indian representative of *F. carica*, Linn. (J. D. Hooker.)

*Uses* :—The fruits contain chiefly sugar and mucilage, and accordingly act as a demulcent and laxative. They are principally used as diet in cases of constipation and in diseases of the lungs and bladder. They are also used as poultices. (*Punjab Products*.)

1188. *F. glomerata*, Roxb., H.F.B.I., v. 535; Roxb. 646.

*Syn.* :—*F. racemosa*, Wall.

*Vern.* :—Gúlar paroa, lelka, umar, umrái, tue, dimeri (H.); Yajna dumbar (B); Loá (Kol.); Dumer (Chutia Nagpur); Dimeri (Uriya); Dumri (Nepal); Tchongtay (Lepcha); Thoja (Gond); Alawa (Kurku); Kathgúlar, krumbal, rumbal, batbar, palák, kakammal, dadhuri (Pb.); Ormul (Pushtu); Umbar gúlar (C. P.); Umbar (Bomb); Umbara, atti, runadi (Mar.); Umbar (Guz); Atti (Tam.); Moydi, atti, badda, paidi, mari, medi (Tel); Kulla-kith, atti (the gum is called *Chandarasa*) (Kan.)

*Habitat* :—Outer Himalaya and plains and low hills of India, from Rajputana and Salt Range to the Khasia Mts, Burma and the Deccan Peninsula.

A large, erect, deciduous tree up to 60 ft. high. Bark  $\frac{3}{4}$  in. thick, smooth, reddish-brown, with a few large cracks. Wood grey or greyish-brown, soft with broad, light-coloured bands of loose tissue, alternating with narrower, interrupted, darker bands of firmer texture. Pores large and very large, sub-divided. Medullary rays moderately broad and fine, bent where they touch the pores. (Gamble.) Shoots glabrous or pubescent. Leaves 4-7 in., tapering to the point, entire, base obtuse, rarely acute, 3-nerved; petiole 1-2 in.; stipules  $\frac{1}{2}$ -1 in., ovate, lanceolate, pubescent. Receptacles 1 $\frac{1}{2}$  in. diam., reddish; umbilicus depressed; base of young much contracted; basal bracts 3. Male flowers near the mouth of the receptacle sessile; sepals 3-4,

membranous inflated, gall and female flower intermixed; perianth toothed; gall ovary, ovoid, rough. Achene granulate; stigma clavate. (J. D. Hooker.)

*Uses*:—The leaves, bark and fruit are employed in native medicine. The bark is given as an astringent and as a wash for wounds. It is also employed to remove the poison from wounds made by a tiger or cat. The root is useful in dysentery, and a fluid obtained from it by incision is administered as a powerful tonic. The leaves reduced to powder and mixed with honey are given in bilious affections. The small blister-like galls common on the leaves, soaked in milk and mixed with honey are given to prevent pitting in small-pox. (Atkinson.) The figs are considered astringent, stomachic and carminative, and are given in menorrhagia and hæmoptysis. The milky juice is administered in piles and diarrhoea, and in combination with sesamum oil in cancer. The fresh juice of the ripe fruit is used as an adjunct to a metallic preparation which is given in diabetes and other urinary diseases. In Bombay, the sap is a popular remedy, which is locally applied to mumps and other inflammatory glandular enlargements, and is given in doses of four tolas with cumin and sugar for gonorrhœa. (Dymock.) The bark is given to cattle when suffering from rinder-pest. It is ground with onions, cumin, and cocoanut spathes and mixed with vinegar. (Coimbatore Dist Man.) The sap of the root is used in diabetes. (T. R. Moodeliar.) An infusion of the bark is much employed by the Tamil-speaking people for menorrhagia. (Dr. Thomas in Watt's Dic.)

*Chem. on analysis it was found to contain :*

Water ...	...	...	...	...	13 0
Albuminoids*	...	...	..	...	7 1
Oil ..	...	...	...	...	5 6
Carbohydrates†	...	.	...	...	40 0
Fibre ...	...	...	...	...	17 0
Ash‡	...	...	...	...	6 5

The alcoholic extract contains a strace of soluble tannin which gives a light-green precipitate with ferric chloride.—(Agricul. Ledger, 1904—No. 4.)

* Containing nitrogen	...	...	...	...	1.19 per cent.
† Ditto colouring matter	...	...	...	...	8.5
‡ { Ditto silica	...	...	...	...	0.25
{ Ditto phosphoric acid	...	...	...	...	0.01





1189. *Antiaris toxicaria*, Leschen, H.F.B.I., v. 537.

*Vern*:—Chándla, chándkuda, charvár mádá, karvat or kharvat (Bomb. and Mar.); Karwat (Konkan); Alli, netávil, nettá-vil maram (Tam.); Jazngri, Agganpatte, Jaguri (Kan.); Araya-angely, nettá-vil. (Mal.)

*English*:—The Upas tree.

*Habitat*:—The Deccan Peninsula, on the ghats, from the Concan southwards. According to Beddome, it is the largest tree of the Western forests attaining a height of 250ft.

A gigantic, ever-green tree, attaining 250ft. Trunk often buttressed. Bark thick, grey. Wood white, soft, even-grained; young shoots, petioles and midrib velvety. Leaves glabrous or hairy beneath, 1-8in. glossy, elliptic, acuminate, entire or serrulate; base rounded or cordate, young lanceolate, serrulate. Petiole  $\frac{1}{4}$ in. Flowers menacious. Males crowded on the surface of the pedunculate and usually fasciated receptacles, which are supported by imbricating bracts; sepals 3-4; stamens 3-8. Females solitary, enclosed in a pear-shaped involucre of numerous confluent bracts; perianth 0; ovary adnate to the involucre. Fruit like a small fig, purple scarlet or crimson; pyriform velvety, fleshy,  $\frac{3}{4}$ in. diam., "Male-receptacles 3-4, together, orbicular; and peduncles velvety,  $\frac{1}{2}$ in. diam." (J. D. Hooker.)

*Uses*:—The juice of the tree is the source of the fabulous *Upas* poison. The poison at first acts as a purgative and emetic, then as a narcotic causing death by violent fits of tetanic convulsions.

In the Concan and in Canara, the bitter seeds are used as a febrifuge, and in dysentery, one-third to one-half of a seed being given three times a day.

Antiarin, the most important constituent of the milky juice of *Antiaris toxicaria*, has the formula,  $C_{27}H_{42}O_{10} + 4H_2O$ , and antiarose,  $C_6H_{12}O_5$ , a sugar metamerie with rhamnose.

1190. *Artocarpus hirsuta*, Lamk., H.F.B.I., v. 541.

*Vern.*:—Ranphanas, Pat-phanas (Mar.). Ayni, Anjalli (Tam.).

*Habitat*:—Evergreen forests of the Western ghâts, from the Concan southwards.

A tall ever-green tree, attaining 200ft. Wood moderately hard; sapwood white; heart wood yellowish-brown, durable, seasons well. Pores large, sometimes subdivided, often filled with a white substance. Medullary rays fine to moderately broad, wavy very distinct, but distant, bent where they meet the pores (Gamble) Young shoots, petioles, peduncles, stipules, midribs, and main nerves appressedly hispid with long tawny hairs. Leaves 6-9 by 1-6in., broadly ovate or elliptic (rarely obovate), subacute, coriaceous, entire, smooth, and when adult glabrous except on the midrib and nerves beneath, slightly narrowed to the base; main nerves about 10 pairs, prominent beneath; petioles stout,  $\frac{1}{2}$ - $\frac{7}{8}$ in. long; stipules nearly lin. long, lanceolate. Flowers on axillary pedunculate receptacles; the male receptacles narrowly cylindrical, at first erect or ascending, afterwards pendulous, 4-6in. long and about  $\frac{1}{2}$ in. in diam.; the female receptacles erect,  $4\frac{1}{2}$  by  $3\frac{1}{2}$ in. MALE FLOWERS: Sepals 2, united below. Stamen 1; anther exerted, ovate. Receptacle scales (bracteoles) chafly, not peltate. FEMALE FLOWERS: Perianth tubular, confluent below with the receptacle. Fruit size of a lemon, echinate, the spines (free apices of anthocarps) about  $\frac{1}{2}$ in. long, cylindrical, straight, hispid, perforate at the apex for the filiform style, edible. Seeds  $\frac{1}{2}$ - $\frac{3}{4}$ in. long, ovoid. (Cooke.)

*Uses*:—The dry leaves and juice together with Zedory and Camphor are applied to buboes and swelled testicles. (Rheede)

The dried juice breaks with a resinous fracture, is only partly soluble in alcohol, wholly soluble in benzol and petroleum ether. (Pharmacogr. Ind. III. 355.)

1191. *A. integrifolia*, Linn., H.F.B.I., v. 541.

*Sans.*:—Panasa.

*Vern.*:—Kánthál (B. and Ass.); Kathal, chakki, panasa, panas (H.); Kanthar (Santal); Poros (Kol.); Panasa (Uriya); Phanas (Mar. and Bomb.); Pilá, pilápazham (Tam.); Panasa-pandu, pansa, véru-panasa (Tel.); Halsu, heb-helsu, halsina (Kan.); Teprong (Garo).

*Eng.*:—The Jack-fruit tree.







*Habitat* :—Deccan Peninsula, native of the forests of the Western ghats ; cultivated throughout the hotter parts of India.

A large, ever-green, glabrous tree, attaining 60ft. Wood moderately hard ; sapwood pale, heart-wood bright-yellow, darkening on exposure ; very durable, seasons well. Bark thick, blackish, deeply cleft when old, yielding a gum. The juice is used as bird lime. Youngest shoots and midrib with soft, stiff hairs (Brandis.) Leaves 4-8in., thickly coriaceous, dark-green, elliptic-oblong or ovate, acuminate, entire or 3-lobed ; base acute, rather rough beneath ; leaves of young plants often lobed ; nerves 7-8 pair. Petiole  $\frac{1}{2}$ -1in., rather slender ; stipules large spathaceous, lanceolate, glabrous. Flower-heads embraced by spathaceous deciduous stipular sheaths, axillary and terminal, often 2-nate. Peduncles  $\frac{3}{4}$ in., at first slender. Male cylindric, 2-6in., by 1-2in., diam ; bractioles 0 sepals 2, oblong or spathulate ; tips pubescent. Fruit 12-30 by 6-12in., in young trees on large branches in old trees hanging on short stalks from the main stem or branches through conical protruberance of the rind, oblong or cylindric, tubercled, *i.e.*, with flattish, rarely acute, tips of the pyramidal antho-carps. Seeds oily, numerous, an inch long, oblong. Testa thin, coriaceous, surrounded by a luxious pulp, which latter forms the staple food of the natives. Pulp is eaten cooked or uncooked when ripe, and preserved dry in flat pan-cakes. Seeds eaten boiled or roasted.

*Uses* :—The juice of the plant is applied externally to glandular swellings and abscesses to promote suppuration. The tublers, if worn on the waist, are said to cure hydrocele. The young leaves are used in skin diseases, and the root is used internally in diarrhœa.

The leaves considered an antidote to snake-poison. (T. N. Mukerji.) The unripe fruit is astringent, the ripe laxative, but rather difficult to digest, although very nutritious.

The dye stuff jackwood contains, in addition to morin, cyanomaclurin  $C_{15}H_{12}O_6$  or  $C_{18}H_{16}O_7$ . It possesses the characteristic property that its alkaline solution on warming develops a deep indigo blue colouration. It was noticed that in certain important respects its properties were similar to those of catechin, the colourless crystalline constituent of gambier catechu,

whose composition is  $C_{15} H_{14} O_6$ . The analytical results given by these substances were nearly identical.—*J. Ch. S.* 1905 T. p. 717.

1192. *A. Lakoocha*, *Roxb.*, H.F.B.I., v. 543; *Roxb.* 634.

*Sans.* :—Lakucha.

*Vern.* :—Tiun, tinu dheu, daheo, (Pb); Dahu dhan, baihal, lakûch, dhâvâ (Il.); Lîhu (Bomb. and Duk.); Votamba (M); Vonte (Kan); Dháo (Kumaon); Dephal, dahu, delua, lakúcha, mûlâr (B.); Dahu (Santal; Kol); Dewa, chama, chamba (Ass.); Dawa (Cachar); Barrâr (Nepal); Kamma régu; Lakuchamu nakka-rénu (Tel.).

*Habitat* :—Tropical Himalaya, from Kumaon eastwards to Burma, and southwards to Travancore.

A large, deciduous tree. Bark dark coloured, rough. Wood hard, sapwood large, white and soft; heartwood yellow, hard, shining, mottled. Branchlets densely grey or rusty tomentose. Leaves ovate or obovate, 3½-12 in. by 2-6 in., shortly finely acuminate or cuspidate at apex, truncate or sub-cordate at base; margins entire, sometimes serrate or subundulate in young leaves, coriaceous, glabrous, shining above, densely grey-downy beneath; lateral nerves 8-12 pair, prominent and with a fine, distinct reticulation between beneath. Petioles ½-lin. long. Stipules small, pubescent, caducous. Flowers in shortly pedunculate or sub-sessile, axillary, globose heads, ½-1 in. diam.; bractioles peltate. Male flowers:—sepals on sub-sessile receptacles, 3-4, triangular, truncate, pubescent, 2-3, says Trimen. Stamen 1; filaments broad at base, tapering upward. Anther exserted, broad, 2-celled. Female flowers on shortly peduncled receptacles. Anthocarps flat, smooth, at apices, completely united. Fruit oblong, irregularly globose, 2-3 in. diam., minutely velvety, yellow when ripe, edible. Seeds oblong, 1 in. thick, flat.

*Use* :—In Bengal, one or two seeds or a small quantity of the milk is popular as a purge. (Dymock.) Fruit eaten raw or dried and pickled. (Talbot.) In the Ratnagiri District and Bombay, it is curried, as well as pickled. (K. R. Kirtikar.)





1193. *Laportea crenulata*, Gaud., H.F.B.I., V. 550.

*Vern.* :—Chorpatta; Surat (B.); Utigun ka bij (Behar); Moringi (Nepal); Sir-nat (Assam); Mealum-ma, sunkrong (Lepcha).

*Habitat* :—Tropical Himalaya, from Sikkim eastwards, Assam, the Khasia Mts., and southwards to Perak; the Concan.

A large, evergreen shrub, 8-10ft., or a small tree. Wood very soft, separating when dry into concentric, long, fibrous layers. Cystolith cells conspicuous in the epidermis. Branchlets, petioles and inflorescence armed with stinging hairs of two kinds, minute and long. Branches stout, terete, green. Leaves 9-10in. long, largest, 16 by 12in., ovate or elliptic, crenulate in the upper part or nearly entire; petiole 1-4in. long, with a few long hairs, otherwise glabrous, round, raised, cystolith cells prominent on both surfaces. Stipules ovate, lanceolate. Flowers minute, green, dioecious, in axillary, paniced cymes, longer than petiole, dichotomously branched. Flower clusters remote, often unilateral. Male perianth deeply 4-partite. Female sub-campanulate; lobes acute. Achenes oblique,  $\frac{1}{2}$ in. diam., seated on the cup-shaped perianth, and crowned by the style. This is the worst of the stinging nettles of India, says Gamble. The effects last for many days, says Brandis.

*Use* :—In Patna, the seeds in doses of  $\frac{1}{2}$  dram to  $\frac{1}{2}$  ounce, are used in the same way as coriander. (Irvine)

N. O. PLATANACEÆ.

1194. *Platanus orientalis*, Linn., H.F.B.I., V. 591.

*Vern.* :—Buin, búná, chanár (Pb.); Chintar, chinar (Pushtu).

*Habitat* :—Cultivated in the N.-W Himalaya, from the Sutlej westwards.

A large, deciduous tree. Bark  $\frac{1}{2}$  in. thick, smooth, light or dark-grey peeling off in thin scales. Wood white, hard, with a faint tinge of yellow or red. Buds densely clothed with long hairs. Branchlets and young leaves with soft, deciduous, tawny

or ferruginous tomentum. Branches very spreading. Leaves 6-9in. diam, usually broader than long-alternate palmy-nerved glabrous when mature, deeply 3-5-nerved; base cuncate, truncate or cordate at the insertion of the petiole. Lobes irregularly toothed or lobulate. Petiole 1-3in., says Brandis, 3-5in., (Kanjilal.) Stipules large, deciduous on shoots, leafy and lobed. Flowers monœcious, in unisexual, usually sessile, globose heads, 1-1½in. diam, 2-5in., long; axillary peduncles 4-6in., long, male and female heads sometimes on the same peduncles. Sepals 3-6, petals as many, all extremely minute scale-like, often more or less confluent, formerly regarded as bracteoles. Male stamens as many as sepals, each consisting of a long almost sessile anther, the 2 cells parallel, adnate to a cuneate, connective with a truncate top. Female Ovaries hairy, at base, as many as sepals, surrounded by staminodes, narrowed into a long, subulate style, ovule 1, pendulous. Fruiting head 1-1½in. diam., consisting of numerous 1-seeded achenes, densely clothed at base, with long fine hairs, the broad apex narrowed gradually into the persistent long style.

*Uses* :—The fresh leaves bruised and applied to the eyes in cases of ophthalmia, the bark boiled in vinegar is given in diarrhœa, dysentery, hernia and toothache. (Honigberger.)

### N. O. JUGLANCEÆ.

1195. *Juglans regia*, Linn., H.F.B.I., v. 595  
Roxb. Fl. Ind. III. 631.

*Sans* :—Akshota ákschóda, ákhóda, ákhóta.

*Vern.* :—Akhrót, (H. and B.) Tagashing (Bhutia); Kabsing (Ass.); Kowal (Lep.); Akhor, krot dún (Kash.); Akhrót, dún, chármag., than thán, khór, ká, darga, akhóri, krot, ka-botang, starga, ughz, magz, thanka, [bark = dindása] (Pb.); Ughz, magz (Afg.); Akróda (Mar.); Akhrot (Guz.); Akróttu (Tam.); Akrótu (Tel.); Akródu (Kan.); Jouz (Arab.); Girdagán, chár-maghz (Pers.).

*Habitat* :—Temperate Himalaya, from Kashmir eastwards. Khasia Hills.