Ginger, of each half an ounce, Arrack, twenty ounces. Macerate for seven days and strain Dose, a drachm twice or thrice daily A powerful stimulant, with probably no special claim to notice. The *root* is in great repute amongst the natives of India, it is the *Peepla mool* of the "Tíleef Shereef" (p 55, No 275), where it is described as bitter, stomachic and useful in promoting digestion. In Travancore, an infusion of the root is prescribed after parturition, with the view of causing the expulsion of the placenta It appears to partake, in a minor degree, of the stimulant properties of the fruit (Ph Ind)

As an alterative tonic, long pepper is recommended for use in a peculiar manner An infusion of three long peppers is to be taken with honey on the first day, then for ten successive days the dose is to be increased by three peppers every day, so that on the tenth day the patient will take thirty at one dose. Then the dose is to be gradually reduced by three daily, and finally the medicine is to be omitted Thus administered, it is said to act as a valuable alterative tonic in paraplegia, chronic cough, enlargements of the spleen and other abdominal viscera Long pepper enters into the composition of several irritating snuffs, boiled with ginger, mustard oil buttermilk and curds it forms a liniment used in sciatica and paralysis In the Concan, the roasted aments are beaten up with honey and given in rheumatism, they are also given powdered with black pepper and rock salt (two parts of long pepper three of black, and one of salt) in half tola doses in colic Mahometan writers, under the name of Darfilfil, describe long pepper as a resolvent of cold humours, they say it removes obstructions of the liver and spleen, and promotes digestion by its tonic properties, moreover, it is aphrodisiacal, diuretic, and emmenagogue Both it and the root Filfil-muiveh) are much prescribed in palsy, gout, lumbago, and other diseases of a similar nature A collyrium of long pepper is recommended for night blindness, made into a liniment, it is applied to the bites of venomous reptiles. (Dymock).

1079. . *P. Chaba, Hunter*, H.F.B.I., V. 83; Roxb., 52.

Sans.:--Chavika.

Vern. :—Chab (H.); Chai, choi (B.); Kankala (Bomb.).

Habitat :—Cultivated in various parts of India

A stout, climbing herb, quite glabrous Stem rooting. Branches flexuous, terete, hard, finely striate when dry, pale. Leaves 5-7 by 2½-3½in, rather coriaceous, pale when dry, shining above, oblong, ovate or lanceolate, acuminate, 3-5-nerved at the very obliquely cordate, auricled base, penni-nerved above it; 3 6 pair nerves above the basal nerves. Nervules arching. Petiole ¼-½in Fruiting spikes stoutly peduncled, sub-erect, conico-cylindric, 1-2in long,-½in diam., broadest at the base, obtuse, forming a fleshy cone of innumerable fruits, ⅛in. diam. The alternate nerves of the main portion of the leaf all starting from the midrib are very characteristic of the species (J. D. Hooker).

Uses :—It partakes of the stimulant and carminative properties of Black and Long Pepper, but does not appear to possess any special claim to notice Its use in haemorrhoidal affections is noticed in the "Tâleef Shereef," p 66 No. 340. (Ph. Ind.)

1080. *P. sylvaticum*, *Roxb.*, II.F.B.I., V. 81; Roxb., 52.

Vern. :—Pahâri pîpal (B.).

Habitat :—Upper and Lower Assam; jheels of Bengal.

A low, creeping herb, glabrous. Stem flaccid, angular, succulent, several feet long, contracting much in drying. Branches short, erect or ascending, flexuous. Leaves rarely puberulous on the nerves beneath, lower 3 by 2½-3in., nerves slender; upper as long but narrower; membranous, long-petioled, broadly ovate or ovate-cordate, acuminate, 5 7-nerved from the base or the linear pair, higher, inserted. Upper leaves elliptic or oblong-lanceolate, shorter-petioled. Petioles of lower leaves 2-4in. Spikes shortly peduncled. Male spikes slender, 2-3in., clothed with peltate bracts. Stamens generally 4 (Roxburgh finds 2). Anthers reniform; cells confluent, dehiscing over the crown; fruiting females always erect, ⅜-1½in. Fruit free, ⅛-⅛in. diam.

Use :—The fruit is used by the natives of Bengal as a carminative similarly to long-pepper (Watt).

1081. *P. Betle, Linn.*, H.F.B.I., V. 85 ; Roxb.,

Syn. :—Chavica Betle, *Miq.*

Sans :—Tâmbûla.

Vern. :—Pân (H and B.) ; Vettilee (Tam.) ; Tamal-pakoo (Tel.) ; nâgavela (Bom.) ; Vetta (Mal.).

Habitat :—Cultivated in the hotter and damper parts of India.

Stems and branches stout, climbing, compressed when coriaceous, ovate ; base usually cordate and unequal-sided ; blade 3-8in. ; petiole ½-1in. Supra-basal nerves alternate Spikes, male 3-6in., female longer, peduncled and longer than the leaves. Fruiting spike cylindric, pendulous, 1-5in. long, stout. Fruit ⅛-¼in. diam. very fleshy and often confluent into a cylindric red mass. Most plants female, says Brandis.

The ancient Hindu writers recommended that betel-leaf should be taken early in the morning, after the morning, after meals and at bed-time. According to Susruta, it is aromatic, carminative, stimulant, and astringent. It sweetens the breath, improves the voice, and removes all foulness from the mouth. According to other writers it acts as an aphrodisiac. Medicinally it is said to be useful in diseases supposed to be caused by deranged phlegm, and its juice is much used as an adjunct to pills administered in these diseases, the pills being rubbed into an emulsion with the juice of the betel-leaf and licked up. Being always at hand, Pan leaves are used as a domestic remedy in various ways. The stalk of the leaf smeared with oil is introduced into the rectum in constipation and tympanitis of children, with the object of inducing the bowels to act. The leaves are applied to the temples in headache for relieving pain, to painful and swollen glands for promoting absorption, and to the mammary gland with the object of checking the secretion of milk. Pan leaves are used as a ready dressing for foul ulcers, which seem to improve under them." (U. C. Dutt.)

" Its leaves, in conjunction with lime and the nut of *Areca Catechu*, are almost universally employed as a *masticatory*. The juice of the leaves is regarded as a *valuable stomachic*. Amongst the Indo-Britons of Southern India a use is made of the leaves, which merits notice. In catarrhal and pulmonary affections generally, especially of children, *the leaves warmed and smeared with oil* are applied in layers over the chest ; and the Editor, from personal observation in many instances, can testify to the relief afforded to the cough and dyspnœa, far more than can be accounted for by the warmth and exclusion of air, or by any rubefacient effect it produces, which, indeed, is very slight in most cases. Dr. Gibson, who corroborates this statement, states that he has often seen the application afford marked relief in congestion and other affections of the liver. Mr. J. Wood reports that the leaves warmed by the fire and applied in layers over the mammæ are used effectually for arresting the secretion of milk. Their use in this manner is also noticed by Dr. J. Shortt, who adds that the leaves are similarly employed as a resolvent to glandular swellings" (Ph. Ind.).

An essential oil obtained from the leaves by distillation at Samarang, by Herr Schmity, has been credited by him with having given good results in the treatment of catarrhal disorders and as an antiseptic, and the claim has been confirmed in the experience of Dr. Kleinstuck, of Jena (Ph. J., Oct 2, 1886, p. 268, also Ph. J. for 20th Nov., 1889, p. 423).

In the Konkan, the fruit is employed with honey as a remedy for cough, and in Orissa, the root is said to be used to prevent child-bearing.

" The juice of the leaves is dropped into the eye in painful affections of that organ ; it is also used to relieve cerebral congestions and satyriasis, and to allay thirst (Dr. Thompson, in Watt's Dict.)." The juice of the leaves is dropped into the eye in night-blindness (B. D. Basu).

Messrs. H. H. Mann, D. L. Sahasrabuddhe and V. G. Patwardhan of Poona have published in Memoirs of Depart. of Agric. in India," for July, 1913 and June 1916, their

interesting studies in the chemistry and physiology of the leaves of the Betel-Vine. According to them—

The younger leaves on the plant contain much more essential oil, much more diastase, and much more sugars than those which are older. On the other hand, the tannin does not vary in this direction. The leaves both on the middle branches and on the middle part of the main vine contain slightly the largest quantity of 'tannin.' * * * *

Nearly all the work done (except that of Eykman) has been done in Europe on dried leaves—and all, except the original preparation of Kemp, on Java or Siam oils. Our results differ considerably from those published hitherto, and we will simply indicate those which we have obtained.

As to the conclusions regarding the essential oil of betel-leaf, they say—

The essential oil of betel leaf consists essentially of two portions, consisting respectively of phenols and of terpene-like bodies. The relative proportion of these varies, and the higher the quality of the leaf, the higher the proportion of phenols in the essential oil. The proportion of phenols in our samples varied from 42 per cent. (Poona) to 70 per cent. (Ramtek *kapuri*) in green leaves of the light green variety, and from 39 per cent. to 45 per cent. in green leaves of the dark green variety. The bleaching of the leaves not only increases very much the total quantity of the essential oil, but also the proportion of the phenols in it. In two cases where bleaching was carried out, the increase in the percentage of phenols was from 17 to 33 per cent.

The phenols consist essentially of eugenol in all our cases, mixed with a small percentage of betel phenol. The latter can be largely separated by washing the phenols with water in which it is very much more soluble than eugenol. No sign of any substance having the properties attributed to chavicol has been found in any of our samples.

The nonphenolic portion of the essential oil is a mixture of a number of substances as yet univestigated. Over 60 per cent. boils between 240° and 255°C. This has a light green colour, and a somewhat objectionable smell. It is not cadinene or caryophyllene.

They conclude their interesting studies as follows :—

We have shown the character of the leaf which is required for chewing, and have found more clearly than ever that it is the quantity, and also the character, of the essential oil which seems most largely to determine the value of any sample of betel vine leaf for this purpose.

The essential oil itself, however, is not always the same. It consists of a mixture of certain phenols and of certain terpene-like constituents. As far as the phenols are concerned, eugenol is always the chief constituent in Indian oils, mixed with a small quantity of betel phenol. We have never found chavicol in Indian oils. The best essential oil, from a point of view of public taste, is that which contains as large a proportion of phenols as possible. Those varieties of leaf which give an essential oil containing much terpene, are very pungent, but are looked upon as very coarse. Bleaching not only

increases the amount of essential oil in the leaf, but also increases the proportion of phenols in the essential oil. The nature of the terpene-like constituents is still unknown, but will be investigated at the first opportunity.

1082. *P nigrum, Linn.*, H.F B.I., V. 90; Roxb., 51.

Vern. :—Golmirch, kâlî-mirch, habsh, choca mirch, white form = saféd-mirch (Hind.); Muricha, kâlâ-morich, gôl-morich (Beng.); Spôt (Bhote); Martz (Kashmir); Gol-mirch (Pb.); Dârugarm, daurgarm, march (Afg.); Gûlmirien (Sind); Miri, kalamiri, white form = saféd-miri (Bomb.); Kâlîmirch, miré (Mar.); Kâlâmari, kâlo-mirich, miri (Guz.); Choca, kali mirchingay, Milâgu (Tam.); Miryâla tîge, miriyâlu (Tel.); Menasu, kare menasu, molû-vukodi, mirialu (Kan.); Lada, kuru mulaka (Malay).

Habitat :—Native in the forests of the Circars and of Assam and Malabar; cultivated in hot damp parts of India.

A stout climber. Branches trailing and rooting at the nodes, terete, quite glabrous. Leaves coriaceous, 5-7 by 2-5in., sometimes glaucous beneath, usually broadly ovate, oblong or nearly orbicular; base acute, rounded or cordate, equal or unequal, nerves stout, alternate, 2-3 pair basal, with another pair higher up which run to the tip (J. D. Hooker). Supra-basal nerves, says Brandis, usually alternate "Basal nerves 3-5." Petiole ½-1½in., stout. Bracts of female short, cupular, wholly adnate, without raised margins. Flowers usually diœcous, but often the female bears 2 anthers or the male a pistillode. Anthers 2-celled. Fruiting spikes loose, glabrous, variable in length and robustness, slightly interrupted, drooping 4-6in. long (Brandis). Fruit globose, sessile, red when ripe; pulp thin.

Uses :—It is officinal in both Pharmacopeias, and its uses are too well known to be mentioned here.

N. O. MYRISTICEÆ.

1083. *Myristica malabarica, Lamk.*, H.F.B.I., V. 103.

Vern. :—Kanagi (Kan.); Pindi-kai (seeds), **rânajayaphala, jangli-jâyaphal, Kâiphal (Bomb.).**

Habitat:—The Concan, Canara and N. Malabar.

A large, nearly glabrous tree. Wood reddish-grey, moderately hard. Branchlets nearly smooth, slightly ribbed. Leaves 4-8in. by 1½-4in., linear-oblong or elliptic-lanceolate, sub-acute, glaucous beneath, thinly coriaceous on the flowering branches, thick and leathery on the fruiting, more or less shining above, nerves 8-14 pair, very slender; petiole ¼-1in. Male panicles sub-cymose, bracteolate, 1-1½in, axillary or supra-axillary; peduncles naked below, sub-umbellately cymose above; bracteole an orbicular scale Perianth ⅛in., puberulous globose, 3 toothed, anthers 10-15, connate, in a cylindric, shortly stipitate column. Female panicles few-fid; flowers larger. Fruit 2 by 1in, rusty, brown, pubescent, narrowly oblong, aril yellow, completely enclosing the seed (J. D. Hooker and Brandis).

Uses.—'It yields a variety of nutmeg (Malabar or false Nutmeg?), larger and much longer than the officinal nutmeg, and possessing little of its fragrance or its warm aromatic taste When bruised and subjected to boiling, it yields a considerable quantity of a yellowish concrete oil, analogous to expressed oil of nutmeg, which has been represented to the Editor as a most efficacious application to indolent and ill-conditioned ulcers, allaying pain, cleansing the surface and establishing healthy action. For this purpose it requires to be melted down with a small quantity of any bland oil. It may be found serviceable as an embrocation in rheumatism. (Ph. Ind., p. 190.)

The seeds in the form of a *lepa* are used as an external application in Bombay. (Dymock.)

"The *arillus jáyapatri* is considered to be a nervine tonic and is used in stopping vomiting," (Dr. Peters in Watt's Dic.)

The dried juices from the bark of several Asiatic species of *Myristica* show but little difference from officinal Malabar Kino The crude, inspissated, fresh juice from the Myristica species differs by containing crystalline calcium tartarate suspended in, and depositing from it. This distinguishes it from all the other kinos of commerce. (Edward Schaer, Ph. J. Trans. 1896.)

The seeds contain 40·7 per cent. of fat, and the mace 63·2 per cent., in each case the fat is associated with a red resin. Bombay mace differs entirely in its composition from that of genuine mace (M. fragrans, Houtt.). According

to Arnst and Hart (1893), the former contains 61·05 per cent. of fat and only 0·27 per cent. of essential oil, while the latter contains only 26·78 per cent. of fat and 4·12 per cent. of essential oil.

This difference is observed not only in the composition of the crude material, but also in the characters of the separated fats E. Spaeth in 1895 determined the constants of the fat from the Bombay mace and compared them with those of genuine Banda mace, with the following results —

	Bombay.	Banda.
Melting point . .	31°	25° to 26°
Iodine value	51·3 to 53·5	78 to 80
Saponification value . . .	189·4 to 191·4	170 to 173

It would seem that both these fats contain myristin and olein in varying proportions (Agric. Ledger, No 3 of 1907.)

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N. O. LAURINEÆ.

1084. *Cinnamomum Tamala*, *Fr. Nees*, II F.B.I., V. 128.

Vern. :—Dâlchîni, kirkuia, kikia, talisputai, silkanti (Hind.); Chotâ sinkoli (Nepal); Nupsor (Lepcha); Dopatti (Ass.); Zarnab (Arab.); Tejpât (Dec.), Talisha-pattiri (Tam.); Talisha-patri (Tel.).

N.B.—"The word *tamali* occurs in the *Raja Nighantu*, and *tejpat* is apparently derived from the Sanskrit *tvach*' (Watt).

Habitat :—Tropical and sub-tropical Himalaya, from near the Indus to Bhotan and Sikkim, Silhet and Khasia Hills.

A moderate-sized, very aromatic, evergreen tree. Bark thin, compact, brown, wrinkled, with an aromatic taste. Wood reddish-grey, splits and warps, moderately hard, close-grained, scented. Leaves usually 4-5in. long, very variable in breadth, glabrous, 3-nerved, opposite or nearly so, often alternate on the same branch Petiole ½in. long, the young foliage pink. Flowers ¼in. diam.; perianth silky, of 6 equal lobes, in fruit breaking off transversely about the middle. Fruit black when ripe, succulent, ½in. long, supported by the thickened pedicel at the base of perianth with short truncate teeth. The lobes are ribbed longitudinally. "Perfect stamens 9, the 6 outer eglandular with 4-celled anthers opening inwards, the inner 3 with 2-glands at the base, and 4-2-celled anthers

opening outwards, innermost or fourth series of 3 short staminodes. Ovary free. Style filiform" (Kanjilal).

Uses —In the Punjab, the leaves are used in rheumatism, being considered stimulant, also in colic and diarrhœa The bark is given for gonorrhœa. "Given in decoction or powder in suppression of lochia after childbirth, with much benefit" (Dr. Ratton, in Watt's Dict.)

Mr D Hooper writes —'In collecting barks from wild trees belonging to the genus Cinnamomum, an inexperienced native is likely to mistake the species of Litsaea for the proper tree The fragrant bark of the species of Litsaea is something like Cinnamon, but is very poisonous, as it contains an alkaloid which acts on the muscular system like strychine"

The leaves contain an essential oil of a lemon-yellow colour, and a clove-like peppery odour Sp Gr at 15° C, 1·0257; phenol content 78 per cent; soluble in 1-2 volumes and over of 70 per cent alcohol. It is closely allied to the ordinary oil from Ceylon cinnamon leaves (J. C. I. for 15th June, 1910 p. 715)

1085. *C. obtusifolium*, *Nees*, H F B I, v. 128.

Syn. —Laurus obtusifolia, *Roxb* 330

Vern —Tejpat, rantejpat, kinton Beng), Phat-goli (Kumaon), Bara singoli (Nepal), Nupsor (Lepcha), Patichanda (Ass.), Dupatti (Mechi), Krowai (Magh.) Looleng-kyaw (Burm.).

Habitat Central and Eastern Himalaya Nepal, Sikkim, Assam, Sylhet and the Khasia Hills

An evergreen tree. Bark grey, moderately hard, shining The bark of the roots resembles cinnamon (Gamble). This is a large robust plant, the largest leaved of the Indian species. Leaves quite glaucous beneath, elliptic oblong, obtuse, acute or acuminate, 3-nerved, nerves not impressed above; nervules faint or distinct, petiole short, robust. Flowers small, ¼in. diam., often crowded at the ends of the much-branched, crowded panicles, with long peduncles. Perianth sub-silky, pubescent; lobes persistent in fruit. Stamens and ovary sparsely hairy or glabrous. Fruit small, ellipsoid or sub-globose, ⅓-½in. long, succulent. Peduncle and calyx ⅓-½in. long, the latter ⅓in. broad in fruit.

N. B.—Col.Beddome, Dr.Dymock and others believe this to be a variety of C. Zeylanicum.

Uses:—Dr. Kurz says the aroma of the bark is variable, and the bark of the root of the Martaban plant is as aromatic as the best Ceylon cinnamon. Dr. Gimlette says in Nepal, the bark is used in dyspepsia and liver diseases

1086. *C. iners, Leiner.*, H.F.B.I., v. 130, Roxb. 338 (*under Laurus nitida*)

Vern.: —Janglî-dârchînî (Hind.); Kattu-karurâf pattai (Tam.); Adavi-lavanga-patta (Tel.); Sikivabo, loolong-kyaw (Burm.).

Habitat:—Tenassarim, Mergui, etc.

A large tree. Bark grey, smooth, with horizontal, wavy bands, ¼-½in. thick. Wood light, yellowish-brown, moderately hard, shining. smooth, scented (Gamble). Branchlets nearly glabrous. Leaves opposite, as a rule, glabrous, very variable in breadth, 3-8in. lanceolate, oblong or linear-oblong, rarely ovate and rounded at base, shining above, 3-nerved, nerves continued up to the tip; sometimes acute at base Panicles slender, long peduncled, often exceeding the leaves, silky, pubescent. Flowers about $\frac{1}{10}$in. long. Fruiting perianth rather spreading when dry, ⅓in diam.; lobes persistent. Fruit ⅓in. long, base sunk in the perianth.

Uses:—Dr. Kurz remarks that he does not know in what this species should differ from the true Cinnamon. The inner bark possesses in the fresh state a powerful cinnamonic odour and taste, and by careful drying and preparation appears capable of affording *Cassia ligna* of good quality. The seeds, bruised and mixed with honey or sugar, are given to children in dysentery and coughs, and combined with other ingredients in fevers.

Sir George Watt writes:—"It would seem probable that much of the economic information given in works on Economic Botany, under this species, should be transferred to the *C. Zeylanium* of Western and Southern India."

1087. *C. zeylanicum, Breyn.*, H.F.B.I., v. 131.

Syn.:—Laurus cinnamomum, *Roxb.* 336.

Vern. :—Dâlchînî (H); Karruwâ (Tam.); Sanalingu (Tel.); Lavanga-patte, dâla-chînî (Kan.).

Habitat :—Deccan Peninsula; also Burma, Malay Peninsula and Ceylon.

A large tree, all parts very aromatic Bark brown rough, ½ to ¾in. thick Wood light-red, moderately hard. Leaves, as a rule, opposite, thick, coriaceous, glabrous, upperside shining, underside dull, 3-5 basal nerves. Young foliage pink. Panicles as long as or not much longer than the leaves, sometimes terminal Flowers grey-silky, ⅛-⅓in. diam Fruit dark-purple, elongate, ellipsoid, ¾-1in long, supported by the much enlarged perianth

Use :—The bark is official in the British Pharmacopeia.

Three oils are obtained from C. zeylanicum: the bark yields essential oil of cinnamon to the extent of 1 to 1 per cent; from the leaves is expressed a brown viscid essential oil sometimes exported from Ceylon as "Clove Oil" (it has a somewhat similar medicinal value to the true oil of cloves); and from the root a yellow oil which is specifically lighter than water and has a strongly camphoraceous flavour In their report for April-May, 1904, Schimmel & Co discuss several reactions for distinguishing between Ceylon cinnamon oil and cassia oil, with which the former is not infrequently adulterated. [Cf. Gildemeister and Hoffmann, Volatile Oils, 1900 377-92]

1088. *C. macrocarpum*, *Hook*, H.F.B.I., V. 133.

Vern :—Karua, bahena, tikhi (Malayálam).

Habitat.—North Kanara.

An evergreen shrub Branches slender Wood rather thinly coriaceous, very faintly reticulate beneath. Leaves 5-8in. long, 1½-3in. broad, oblong-lanceolate, 3-5-nerved, lateral nerves ⅔in above the base Petiole ¾-1in. Panicles shorter than the leaves Fruiting peduncle long, slender for the size of the fruit, which is much the largest of the genus. Fruiting perianth apparently fleshy together with the thickened pedicel nearly 1in. long, broadly funnel-shaped, very shortly 6-toothed. Fruit 1in. long, globosely oblong.

Use. :—From the root bark, as also the leaves, an oil is prepared and used as an external medicine (Rheede).

1089. *C. glanduliferum, Meissn.*, H.F.B.I., V. 135.

Vern. :—Mallígiri, marisgiri (Nepal); Rohu (Lepcha); Gunserai (Assam); Gundroi (Cachar).

Habitat :—Central Himalaya, from Nepal and Kumaon, eastward to Assam, Khasia Hills and Sylhet.

A tree with branches, stout, smooth, black when dry. Leaves very variable, 3-5in, alternate, elliptic or lanceolate, caudate, acuminate, penni-nerved, thickly coriaceous, often glaucous beneath, brown when dry; nerves erecto-patent; petiole ½-1in., slender. Panicles axillary, 2in long; peduncle very slender, glabrous; flowers very shortly pedicelled, $\frac{1}{10}$in diam., sparsely pubescent without, villous within Stamens hairy. Ovary glabrous.

Use :—The wood may be used as a substitute for Sassafras It seems worthy of more attention than has been awarded to it. (Ph. Ind.)

1090. *C. Parthenoxylon, Meissn.*, H.F.B.I, V. 135.

Syn. :—Laurus porrecta, *Roxb.* 340.

Vern. :—Kayo-gadis (Mal.).

Habitat :—Malay Peninsula, from Tenasserim to Penang.

A large tree. Branches stout, black when dry, with very smooth bark. Leaves alternate, elliptic, ovate or oblong, subcaudate-acuminate, penni-nerved, often glaucous beneath, extremely variable, the largest 8 by 4in., coriaceous; others thinner, almost membranous and glaucous beneath; base acute; nerves spreading, the lowest pair sometimes longest. Petiole slender, 1-1½in. Panicles 1-3in long, with the young shoots enclosed in round, coriaceous, silky, caducous scales, black when dry, many-fid. Flowers $\frac{1}{10}$in. diam, pedicelled. Perianth nearly glabrous without, pubescent within; stamens very short, hairy Ovary glabrous. Stigma discoid. Fruiting perianth ¼-⅓in. long, funnel-shaped, suddenly expanding into the fruit-bearing disk; lobes broadly oblong, wholly deciduous. Fruit ⅓in. diam., globose, succulent.

Use :—The fruit yields an oil used in rheumatic affections. An infusion of the root is also employed as a substitute for Sassafras.

1091. *Actinodaphne Hookeri, Meissn.*, H.F.B.I., V. 149.

Vern. :—Pisi (Bomb.).

Habitat :—A small tree or shrub of Sikkim, and of the Eastern and Western Ghâts of South India and in Kanára and Sattára, and particularly at Mahábaleshwar.

A moderate-sized tree in evergreen forest Bark light-brown, smooth Wood light-brown, moderately hard, even-grained Branchlets and young leaves usually densely, softly, rusty-tomentose or villous. Buds large, silky. Leaves whorled, coriaceous, elliptic, ovate-lanceolate, finely acuminate, glabrous and shining above, but often tomentose beneath when full grown, blade 5-7in., petiole ½-¾in., secondary nerves 6 8 pair, the lowest pair often extending almost to the middle of the leaf. Clusters of female flowers sessile Fruit ellipsoid, seated on the campanulate, entire perianth-tube

Uses :—A cold infusion of the leaves is mucilaginous, and is used in urinary disorders and in diabetes The oil of the seeds, *Pisa tela*, is used as an external application to sprains; it is of a reddish colour, and has a fatty odour. (Dymock.)

1092. *Litsea sebifera, Pers., Var sebifera proper*; H.F.B.I., V. 158.

Syn. :—Tetranthera apetala, *Roxb*, 731.

Vern. :—Garbijaur, singraut, medh, menda, bark—maidâ-lakrí (Hind.), Kúkú chita, ratún, garur, bark—maidâ-chhâl (Beng.); Suppatnyok (Lepcha); Medasak, chandna, gwâ, riân, medachob, bark—méda-lakrî, maidasak (Pb.); leaves—chickanâ (Bomb.); bark—Mnio (Goa), Maida-lakadî (Mar.; mushaippé-yetti, pishin-pattai (Tam.); Narra alagi, nara mamidi, meda (Tel.).

Habitat :—Widely distributed throughout India

A moderate-sized evergreen tree, 20-50ft., very variable in foliage and inflorescence Bark 1in. thick, brown. Wood greyish-brown or olive-grey, moderately hard, shining, close and even-grained. Inner bark viscid. Branchlets and inflores-

cence more or less pubescent, sometimes almost glabrous. Leaves subterminal on branches, alternate, 3-6in., thin oblong glabrous above, sparingly pubescent beneath; tip acute, obtuse or rounded; nerves 8-10 or 12 pair, joined by finely reticulate veins. Petiole ½-2in. long. Flowers in umbels, corymbose or racemose, usually long pedicelled, few or many, ¼in. before opening, white or yellowish; perianth very incomplete, or 0. Pedicels clustered on a stout or slender common Peduncle, ½-3in. long. Bracts 4, more or less tomentose. Stamens 9-20 or more, filaments clothed with long, soft hairs. Fruit ¼in. diam., pea-sized, globose, on the small thickened perianth-tube.

Uses:—The feebly balsamic, mucilaginous bark is one of the best known and most popular of native drugs. Dymock states that it does not appear to have been mentioned by Sanskrit writers, and is only briefly noticed in Muhammadan works. He considers it probable that the drug has been adopted by Muhammadan physicians in India as a substitute for an Arabian drug, called *Maghath*, the botanical source of which is uncertain. At the present time it is largely employed as a demulcent and mild astringent in diarrrhœa and dysentery. According to Irvine, it is also esteemed as an aphrodisiac in Patna. Fresh ground, it is used either dry, or triturated in water or milk, as an emollient application to bruises, and as a styptic dressing for wounds. It is also supposed to be anodyne, and to act as a local antidote to the bites of venomous animals.

The oil from the berries is used in rheumatism; the leaves are mucilaginous and have a pleasant odour of cinnamon (Watt).

Chem. comp.—This bark, an authentic specimen of which was supplied by Mr. Hollingsworth of the Madras Medical College, gave, on an air-dried sample, 4·6 per cent. of ash, and 14·2 per cent. of alcoholic extract, affording very strong reactions with alkaloidal tests. On separating the alkaloid, it was found to agree with the characters of Laurotetanine, an alkaloid which has been discovered by M. Greshoff in three species of Litsæa in Java, and in several other plants of the natural order Laurineæ. Laurotetanine is crystalline, and has a strong tetanic action on animals; it is sparingly soluble in other, more readily in chloroform. It is precipitated by sodium carbonate from solutions of its salts, but readily redissolves in an excess of potash or soda, and is precipitated by the usual alkaloidal reagents.

It gives a dark indigo-blue coloration with Erdmann's reagent, a pale rose-red with pure sulphuric acid, and a reddish-brown with nitric acid. A base, which seems to be identical with laurotetanine, is also found in the varieties of Tetranthera, Notophœbe, Aperula, Actinodaphne and Illigera pulchra. It is also possible that Laurotetanine is the alkaloid discovered in 1886 by Eijkman in Haasia squarrosa, Z. et M. (Meded. uit S'Lands Plantentuin, vii, p. 77-101.) —(Pharmacog. Ind. III, 212)

The seeds yield a solid white fat called in Java Tang kala fat. The fat melts at 42 and has acid values ranging from 3·3 to 8·8; specific gravity at 41°, 0·1734; saponification value, 268·2; iodine value 2·28; Reichert-Meissl value, 1·47; Hehner value, 76·1. The fat appears to contain olein 2·6, laurin 96·0 per cent. (A. Schroeder, *Archiv Pharm.*, 1905, 243, 628)

1093. *L. polyantha*, *Juss.*, H.F.B.I., V. 162. Roxb. 735.

Vern.—Meda, gwa, singraf, sangrau, marda, kat marra, kakúri, kerauli, patoia, katmoria, papria, katmedh, kari, rand-kari (Hind.), karkawa, karka (Dehra Dun), Boro kúkúrchita (Beng.); Pojo Santal), Sualu (Assam), Huaia (Kachar), Ratmanti, kadmero (Nepal), Suphut (Lepcha); But, mugasong (Michi); Bolbek (Garo); Mendab, kari, kjera, toska, leja. (Gond.); Leinja (Kuiku), Rian, gwa, harein, bark=meda lakri (Pb.), Ranamba (Mar.); Nara mamúdí, nara (Tel.)

Habitat.—From the Punjab and the Salt Range along the foot of the Himalaya, eastwards to Assam, and southwards to the Satpura Range.

A middle-sized evergreen tree. Bark dark-grey, smooth when old, exfoliating in corky scales. Wood olive-grey, soft, not durable, is readily attacked by insects. Branchlets underside of leaves and inflorescence, with soft brown or rust-coloured pubescence. Height of tree 20-40ft. Branches rather stout. Leaves extremely variable, the largest (Ava; Wallich) 16 by 9in., usually rusty brown when dry, rarely green, glossy above; nerves strong beneath, 8-10 pair, joined by parallel transverse veins, petioles ½-1in. Male flower heads ⅛-⅓in. diam. before opening in sessile or nearly sessile clusters. Flowers 5-6 in each head, sessile or on short hairy pedicels. Involucre of 5 rounded membranous bracts. Fruit ¼in. ovoid, long seated on the persistent base of the perianth. Ovary in

male flower ♂ or with a slender style and small stigma. Stamens 9-13, filaments hairy.

Uses:—Ainslie writes: "The bark is mildly astringent, and has a considerable degree of balsamic sweetness." "It is used by the hill people in the cure of diarrhœa." Stewart writes:—"The bark with that of Tetranthera Roxburghii, *Nees* (Litsæa sebifera, *Pers*, *var.* proper) is officinal, being considered stimulant, and after being bruised, applied, fresh or dry, to contusions, and sometimes mixed with milk and made into a plaster." Campbell confirms the above, writing: "The powdered bark is applied to the body for pains arising from blows or bruises, or from hard work; it is also applied to fractures in animals." The seeds yield an oil which is used medicinally. The medicinal properties above enumerated are very similar to those of the better-known, and more largely employed, L. *sebifera, Pers*, the vernacular names for which also strongly resemble—and, indeed, in certain dialects are identical with—those of this species.

1091. *L. Stocksii, Hook*, F.I.B.I., v. 176.

Vern.—Pisi (Mar.).

Habitat.—The Concan and Canara, on the Ghats and Mahableshwar Hills.

A large tree, glabrous, except the brown velvety inflorescence, and very minute hairs occasionally on underside of leaves; branches stout. Bark smooth, greyish-brown. Wood yellowish-grey, moderately hard. Leaves 1-2in. broad, 1-2in., often of a purplish or brown glaucous hue beneath, greenish above with impressed nerves, coriaceous, elliptic, oblong or oblanceolate, alternate, rarely ovoid, acute or acuminate, very finely, but distinctly, reticulate and sometimes puberulous beneath, with 10-13 pairs of strong nerves; petiole ⅓-½in. Female umbels shortly pedicelled; flowering nearly ½in. diam., 6-8-fid, in stout sub-erect racemes, 1-3in. long. Male heads ¼-½in. diam. before opening. Perianth grey-silky. Perianth-tube oblong, turbinate in flower. Stamens (of female) reduced to 2 glands and a ligule. Fruiting umbels sometimes solitary or corymbose.

Fruit ellipsoid (unripe), ½in. long, seated on the entire or irregularly lobed, turbinate, thickly pedicelled perianth-tube.

Uses:—A cold infusion of the leaves is mucilaginous, and is used in irritation of the bladder and urethra. The oil of the seeds, *Pisa-taila*, is used as an application to sprains and itch (Pharmacog. Ind. Vol III., p. 213).

Chem. comp.—The dried and powdered red fruits of this tree yielded to other 31·6 per cent. of extract consisting mainly of crystalline fats. Petroleum ether separated this extract into a soluble fatty portion, and an insoluble neutral reddish resin. The petroleum ether solution left on evaporation some fatty acids melting at 39° and solidifying at 35°, but which, on crystillization from boiling alcohol and pressure between filtering paper, afforded some purely white crystals melting at 42·5. The fatty acids would appear to consist of lauric acid with a small admixture of oleic acid.

The resin in the fruits was associated with a volatile oil to which the fragrance is due. The alkaloid detected in the spirituous and the watery extracts of the drug had the reactions of laurotetanine. The dried fruits left after ignition 4·77 per cent. of mineral matter.

The seeds contain 31·6 per cent. of fat extracted by ether. The fat melted at 39 and afforded white crystals melting at 42·5 , consisting of lauric acid.

1095. *Lindera Neesiana, Benth.*, H F.B.I., V 186.

Habitat:—Temperate Himalaya ; Nepal and Sikkim,

A middle-sized very aromatic tree, deciduous, quite glabrous, excepting the hairy pedicels. Shoots terete, smooth, quite black when dry, often very stout Leaves 3-7in , membranous, ovate or lanceolate, acute or acuminate. Petiole slender, ¼-1in. Basal nerves three, short, not reaching the middle of the leaf. Umbels unopened, globose, ⅓in. diam., solitary or clustered, on slender pedicels, ⅛-½in. long. Bracts, outer membranous, glabrous, hemispherical ; inner narrower. Flowers on tomentose pedicels, ¼in diam., green, 5-7 flowers in each head. Sepals orbicular, nearly glabrous, very membranous. Stamens 9, filaments short, glabrous, seated on the unaltered 6-lobed perianth.

Use:—Yields excellent Sassafras (Kurz).

1096. *Cassytha filiformis, Linn.*, v. 188 ; Roxb. 342.

Sans.:—Akás Valli.

Vern. :—Amarbeli (H.); Akásbel (B.); Alagjari (Santal); Akáswel, Amarvélla (Mar.); Kotan (Duk.); Cottan (Tam.); Paunch figa (Tel.); Acatsjabulli (Mal.).

Habitat :—From Banda to Bengal, and Chittagong and southwards to Travancore.

A filiform, twining, parasite, adhering to the host by suckers, quite glabrous; young parts puberulous Stems slender. Branches numerous, forming a web of leafless cords over bushes Spikes ½-2in. Bracts rounded, ciliate Perianth twice the length of the rounded, ciliate bracteoles. Perianth segments, outer sepals small, rounded ciliate; inner much longer, oblong or ovate. Fruit glabrous, globose, succulent, smooth (not ribbed), the size of a pea, crowned with perianth-lobes.

Uses :—Sanskrit writers describe it as a tonic and alterative, and regard it as possessing the power of increasing the secretion of semen. (U. C. Dutt.)

The drug consists of the slender thread-like stems of the plant. It has a mucilaginous taste, but no odour. It is employed in Mauritius in the form of decoction for intestinal derangement and as a tonic for scrofulous and rachitic infants. This is another eastern remedy whose use extends to Madagascar. In India, the powdered plant mixed with sesamum oil is used to strengthen the hair, and by the Brahmins for cleansing inveterate ulcers, for which purpose it is mixed with butter and ginger. The juice mixed with sugar is considered a specific in inflamed eyes (Treas Bot., p 231.) Its properties are probably due to a mucilage (Ph. I 12 8 82, p. 122)

Chem. comp.—M. Greshoff has detected an alkaloid in this plant, having the following colour reactions: sulphuric acid faint red, Erdmann's reagent (sulphuric acid mixed with a little nitric acid) blue, nitric acid red-brown, Fröhde's reagent dirty blue. Dr. Greshoff believes that on a closer investigation of this alkaloid, it will be found to be identical with laurotetanine described under Litsæa sebifera. (Pharmacog. Ind. III 216.)

N. O. THYMELACCEÆ.

1097. *Daphne oleoides, Schreb.*, H.F.B.I., V. 193.

Syn. :—D. mucronata, *Royle.*

Vern. :—Pech (Sind) ; Kutilâl, kanthan, gândalûn, mæshúr, shalangi níggí, chanuí zhi, kak, zosho (Pb.), Laghûne (Afg.).

Habitat :—Western Himalaya, from Garhwal westwards to Murree and the Sulaiman Range.

A small, much branched shrub Bark grey, with occasional prominent, horizontal lenticels. Wood white, soft Young shoots pubescent Branches green-brown or purple, pubescent or glabrate Leaves sub sessile, lanceolate or linear lanceolate, very variable, coriaceous ; midrib prominent, terminating in a sharp mucr Flowers white, with a pink tinge, slightly scen to in terminal heads of 3 9 flowers Perianth-tube ⅛in. long, outside densely tomentose, inside glabrous Ovary pubescent. Fruit orange or scarlet, dry or rather fleshy, ¼ in long, ellipsoid.

Uses Aitchison, in his *Flora of Kurram Valley*, says that the roots of this plant are used internally, after boiling as a purgative He, in another place, says. "Camels will not eat this shrub except when very hungry It is poisonous, producing violent diarrhœa I feel certain that much of the mortality of camels in the Kurram division was due to the prevalence of this shrub.'

The bark and leaves are used in native medicine The berries are eaten to induce nausea Stewart refers to this plant as hurtful to camels, making the same observation as was made by Aitchison in Kurram He further says: "The bark is used by women in Kanîwar for washing their hair," and adds that it has been tried for paper-making. The bark and leaves are used in cutaneous affections and, on the Chenab, the leaves or an infusion are given for gonorrhœa and applied to abscesses (Stewart)

1098. *Wikstroemia Indica, C. A. Mey.* H.F.B.I., v. 195.

Syn. :—Daphne Viridiflora, *Wall.*

Habitat :—Chittagong, Tenasserim, Singapore. Distributed to China, Mauritius, Philippines.

A glabrous shrub. Leaves 1-1½in., sub-opposite, oblong, thinly coriaceous, oblong or obovate-oblong, tip rounded, base cuneate; brown when dry; nerves numerous, very slender. Flowers few, interminal subsessile fascicles. Perianth ½in. long, glabrous, greenish-yellow. Disk-scales usually united in pairs. Fruit ¼in. long, ovoid, scarlet

Uses:—In his Madagascar drugs, in Ph J, 12th Aug, 1882., Mr. E. M. Holmes writes under Hazomafanu "The pounded bark given in doses of 1 dram, mixed with salt and ginger, as a purgative. It probably possesses similar properties to *Daphne Mezereun*, and would be worthy of a trial as a substitute for it in the native materia medica." There is no record of the use of this drug in any part of India.

1099. *Lasiosiphon eriocephalusl*, *Dene.*, H.F.B.I., v. 197.

Vern.:—Ramethâ (M); Râmi (Kan); Naha (Sing.).

Habitat:—Deccan Peninsula; on the Ghats from the Concan southwards, ascending to 7,000 ft on the Nilghiris.

A large shrub or small tree Bark grey, rather smooth, inner bark fibrous. Wood white or yellowish white, hard, much-branched Branchlets usually purplish. Leaves 2-3 by ¾-1in., sub-sessile, lanceolate-oblong, opposite or scattered, not coriaceous; nerves very slender and oblique. Flowers thickly clothed with white or bluff, long, silky, villous hairs, in dense globose heads, 1-2in. diam, supported by silky, involucral bracts, shorter than flowers. Perianth ½-¾in. long, yellow; tube slender; lobes 4-5, oblong, obtuse; scales at its mouth very variable, alternating with the lobes, oblong or cordate, or bi-fid. Fruit dry, included in the lower persistent of the perianth (hollow receptacle).

Uses:—A powerful vesicant, but very uncertain in its action. A tooth-brush, made of the young branch, is said to cause falling out of the teeth (Sakharam Arjun). The bark is used to poison fish. In the Deccan the leaves are applied to contusions, swellings, etc. (B. D. Basu.)

Chem. con.—The fresh bark was beaten into a paste in a mortar, and the mass divided and placed in two bottles, one containing ether and the other spirit of wine; they were both shaken occasionally and the mixture allowed to macerate for 24 hours. The ether extract was filtered off and evaporated at a very low temperature until a thick, green, greasy substance was left. This was washed with warm water and a small piece placed upon the skin of the arm and spread, so as to cover a space the size of a rupee. In about two hours irritation of the skin was produced, and, on removing the covering of the arm, it was found that several small blisters had formed under the extract and extending beyond it. The alcoholic tincture was then removed by filtration and carefully evaporated under a gentle heat. The residue contained very little of the green-coloured resinous matter, but a large quantity of saccharine substance which was non-crystalline. This extract was applied to the skin as in the previous experiment but the application was followed by only a slight reddening due to the small amount of resin in the dried extract. The resin appears to be the source of the vesicating principle of the bark. It has an acid reaction in neutral solvents, is soluble in ammonia with a yellowish brown colour, and is associated in the ethereal extract with a fatty base which facilitates its use as a blistering agent. (Pharmacog. Ind. III. 226.)

1100. *Aquilaria Agallocha, Roxb.* F.B.I., V. 199; Roxb. 377.

Sans.—Aguru.

The Sanskrit *agaru* (*a* privative, and *garu* heavy) a name given to it from the circumstance that it does not float on water) is the root from which most of its vernacular names have been derived. *Laghu* of *lauha*, another Sanskrit and Pali synonym, is supposed by some to be the origin of the expression Aloes wood—and might therefore be accepted as denoting a light form that would float on water. (Watt's Comml. Prod.)

Vern.—Agar (Hind.); Agaru, ugar (Beng.), Agare-hindi, ûd, aud, aude-hindi, ûde-hindi, agalugen (Arab.), Agre-hindí, agar (Pers.); Ûd, ûd farsi (Pb.); Agara hindiagara (Bomb.); Agar (Guj.); Agar, aggalichanda (Tam.), Krishna agaru, agui, Kashtamu (Tel.); Sasi, sachi, bislatn (Ass.)

Habitat.—Eastern Himalaya, Bhotan; Assam; Khasia Mts.; Silhet and Tippera hills.

A tall, evergreen tree; young shoots, silky. Bark thin, tough and very even in surface and texture. "The bast," says Brandis, "when prepared, resembles parchment, and was used by the old King of Assam to write upon." Wood white, soft, even-grained, scented when fresh cut. In the interior of old trees

are sometimes found irregular masses of harder, much darker-coloured-wood, with a honey-like scent, which constitute the Aloe or Eagle-wood of commerce Leaves 2-3½in., thinly coriaceous, shining, caudate, acuminate; secondary nerves slender, with numerous, parallel, intermediate nerves; petiole ¼in Flowers white, in many-fid; sessile or shortly peduncled, silky umbels; pedicels slender, ⅛in. long Perianth persistent in fruit, ⅛in. long, silky without, densely villous within Fruit thinly velvety, 1½-2in long, obovoid, thinly coriaceous.

Uses:—The fragrant resinous substance is considered cordial. It has been prescribed in gout and rheumatism. (Ainslie) It is a delightful perfume, serviceable in vertigo and palsy, and the powder is useful as a restrainer of the fluxes and vomiting In decoction, it is useful to allay thirst in fever. (Loureiro) An essential oil prepared from the wood is also used medicinally. The wood is a preventive against fleas and lice, and in the form of a powder is rubbed into the skin and the clothes. In medicine, aloes wood is considered a stimulant and cordial in gout, rheumatism and paralysis, also as a stimulant astringent in diarrhœa and vomiting It is taken internally as a tonic in doses of ten to sixty grains. Under the name of *agalochi* Celsus ranks it among medicines which invigorate the nerves. The wood has long had a place in the Materia Medica of the Pharmacopœias of Europe, but it does not appear to possess any properties that call for its admission to modern local practice. (Pharmacog. Ind.)

N. O. ELÆAGNACEÆ.

1101. *Elæagnus hortensis, M. Bieb.*, H.F.B.I., v. 201.

Vern:—Sanjit (Afg); Sirshing (Tibet); Shiûlik (U.P.); Botvir, Gangu (Kashmir)

Habitat:—Western Himalaya.

A small, deciduous tree or large shrub, 12-30ft. high, often spinous, young, silvery. Bark light grey, thick, fibrous, smooth,

with deep longitudinal furrows. Wood soft to moderate hard; heartwood orange-brown; sapwood white Branches dark brown. Leaves ovate-oblong or linear-oblong, silvery beneath, 1-3in., obtuse; nerves faint, petiole ¼in. Flowers 1-3-nate, pedicelled, yellow, fragrant. Perianth ⅙-¼in. long, silvery, campanulate above; teeth triangular, ovate; style glabrous. Fruit ellipsoid, oblong, ¾in. long, red, dry or fleshy; endocarp thick, long, sweet and mealy when ripe.

Uses:—The flowers are reported to be medicinal. "The oil from the seeds with syrup, as a linctus recommended in catarrhal and bronchial affections" (Honnigberger, Vol. II. p. 273)

1102. *E. umbellata*, *Thumb.*, H.F.B.I., v. 201.

Vern.:—Ghiwain, ghain, kankoli, bammewa (Pb); Ginroi (Jaunsar).

Habitat:—Temperate Himalaya, from Kashmir to Nepal.

A thorny, deciduous shrub. Bark grey. Wood white, hard, even-grained, warps in seasoning. Branches numerous, often forming a dense bush. Branchlets and underside of leaves densely clothed with shining silvery scales, upperside bright green with scattered stellate hairs. Leaves 1-3 by ⅓-¾in., elliptic-lanceolate; blade ¾in., petiole ¼in. long. Flowers white, exquisitely scented; axillary often fasciculate on the current year's branchlets appearing with or after the leaves Upper portion of perianth slender tubular Fruit ovoid or globose, ½in. long, succulent, endocarp ribbed, coriaceous, clothed inside with a dense felt of white hairs

Uses:—The seeds are said to be used as a stimulant in coughs, the expressed oil in pulmonary affections, and the flowers as a cardiac and astringent. (Watt.)

1103. *E. latifolia*, *Linn.*, H.F.B.I., v. 202.

Syn.:—E. conferta, *Roxb.* 148.

Vern.:—Ghiwain, mijhanla (Kumaun); Loharu (Garhwal); Jarila (Nepal); Guara (Beng.); Kamboong (Magh.); Kunkœ (H.); Shenshong (Garo Hills); Amgul, nurgi (Bomb.).

Habitat:—Subtropical and temperate Himalaya, from Kumaon to Sikkim; Bhotan and the Mishmi Hills; Khasia Mts.,

Bengal, at Comilla, Chittagong, Deccan Peninsula, from the Concan southwards.

A straggling shrub, climber or erect tree Bark dark-brown, ¼ or ½in thick, deeply cleft in vertical or spiral fissures and peeling off in thick plates Wood light-yellow, moderately hard. Trunk sometimes 6in. diam.; branches often spinescent. Leaves ovate-oblong, elliptic or almost rounded, obtuse or acute; blade 3-5in.; petiole ¼-½in. long. Branchlets, petioles, underside of leaves densely clothed with ferruginous or silvery, circular, dentate and lobed scales. Flowers male and bi-sexual, scented; pedicellate in few or many-fid, often pedunculate fascicles. Perianth clothed outside with silvery or ferruginous scales; in the fertile flower much constricted above the ovary. Fruit 1-1½in., ovoid-oblong, succulent, red or yellow pulp when ripe, edible. Endocarp ribbed, coriaceous, clothed inside with a dense felt or white hairs.

Uses:—The flowers are officinal in Sind and Punjab, and are considered cardiac and astringent. (Stewart) Griffith says that fruit is used medicinally in Kashmere as an astringent. Very agreeable to taste.

1104 *Hippophæ rhamnoides, Linn.*, H.F.B.I., v. 203.

Vern.—Tsarap, tsarana, sirna, tsuk, tasru (Ladak, Piti and Lahoul); Dhûrchûk, târwâ, chûk, chuma (U P.); Kâla bisa, bânt phût, amb, kando, milech, miles, suts, rul (Pb.).

Habitat:—North-Western Himalaya; in the beds of streams of the inner drier ranges, from Kumaon westwards.

A large, thorny, dioecious shrub, sometimes a small tree, with rigid branches, and silvery twigs and leaves. Bark grey, rough, with vertical furrows. Heartwood yellowish-brown, mottled, moderately hard, close-grained Leaves short-petioled, alternate, ½-2 by ⅒-⅓in., sub-coriaceous, glabrescent and dull-green above, felted with grey or rust-coloured, circular or irregularly indented scales beneath. Male flowers in axillary clusters on the old wood. Perianth with two opposite oblong segments, filaments short. Female flowers axillary, solitary, pedicelled.

Perianth tubular, 2-dentate. Fruit oblong or globose, orange-yellow, or bright-scarlet when ripe, enclosed in the succulent perianth. Seed dark-brown, shining

Uses:—The natives of Kanâwâr are stated by Longden to eat it as a sort of *chatni*. As a *chatni*, it is recommended for lung complaints in a Tibetan Pharmacopœia

The Siberians and Tartars make a jelly from these berries and eat them with milk and cheese, whilst the inhabitants of the Gulf of Bothnia prepare from them a sort of rob, which they use as a condiment with fish. In some districts of France a sauce is made from these berries and eaten with fish or meat A decoction of them is said to be useful in cutaneous eruptions The roots of the plant are long and straggling, and often assist in binding the loose sand on which it grows (Sowerby's English Botany, Vol. VIII. p. 83.)

1105. *H. salicifolia, Don.* H.F.B.I., V. 203.

Vern.:—Ashûk (Nepal); Lhâla (Bhotan and Lepcha); Sûrch, suts, kâlî bis, tserdkar, dhûrchuk, tarwa-chuk, chuma (Pb.).

Habitat:—Temperate Himalaya, from Jammu to Sikkim.

A willow-like shrub, 10-20ft. high, with lateral thorns. Very similar in appearance and hardly specifically different from H rhamnoides Bark dark-grey, brown, soft, ¼in thick, cleft in deep vertical furrows and shallow cross ones into somewhat rectangular ones. Leaves membranous, glabrous or pubescent above, 2-4in., dull-green, linear-lanceolate, densely clothed beneath with white or rusty stellate hairs and some circular scales, so also are in the petioles and branchlets covered.

Use:—The fruit is employed in cases of lung disease. (Punjab Products.)

N. O. LORANTHACEÆ.

1106. *Viscum album, Linn.*, H.F.B.I., V. 223.

Vern.:—Turâpâuli (Afg.); Bhangrâ, bândâ, bamba, kahbang (Pb.); Bambal, wahal, ahalû (Pb.); Dibk (Arab.); Ban, banda

(H.); Chûlû-Kâ-Bânda (Jaunsar); Hurchu (Nepal); Perbika (Rawalpindi).

Habitat :—Temperate Himalaya, from Kashmir to Nepal.

A large, parasitic, leafy shrub, green all over. Branches dichotomous or whorled, jointed, terete. Leaves about 2 by $\frac{2}{3}$in., sessile, very coriaceous, cuneate, oblong or oblanceolate, with 3 to 5 longitudinal basal nerves. Flowers diœcious, sessile in clusters of 3 to 5, supported by concave bracts Perianth-segments 3 4, triangular, deciduous. Fruit $\frac{1}{5}$-$\frac{3}{10}$in. long, ellipsoid, white, smooth, almost transparent. Chiefly on rosaceous shrubs, such as apricot and on elm, walnut and willows. (U. Kanjilal.) Bird lime is made of the viscid pulp of the fruit The parasite is also found on the Alder, Maple, Poplar, Olive and Mulberry (Gamble.) Embryos sometimes 2-3in. each; seed, terete, in fleshy albumen.

Uses :—Mr. Honigberger states that it is given by the Hakims in enlargement of the spleen, in cases of wound, tumour, diseases of the ear, etc. The dried berries imported into Bombay under the name of *Kishmish-i-kâwuliyân* (vulg., *Kishmish kawli*) are probably obtained from this plant The plant is used as a medicine in Lahoul (Stewart.)

It contains a liquid volatile base, $C_5 H_{11} N$, with an odour resembling that of nicotine or of coniine. It forms a crystalline sulphate, a very deliquescent crystalline hydrochloride, and a more stable platino-chloride $(C_5 H_{11} N, HCl)_2 PtCl_4$, in yellowish, shining, micaceous scales, darkening at 230 °C, and melting, with decomposition, at about 250°C. The base is extracted from the dry plant by means of 95 per cent. alcohol, acidified with 1 per cent. of hydro chloric acid. After distilling off the solvent, the residual extract is made alkaline with sodium carbonate and distilled The alkaline distillate is saturated with sulphuric acid, evaporated *in vacuo*, and the sulphate of the alkaloid crystallised in the usual manner It also contains a viscachoutin, viscic acid, a glucoside, and a resinoid substance. (J Ch. I. Jan. 31, 1908, p. 88.)

1107. *V. monoicum*, *Roxb.* H.F.B.I., v. 224; Roxb. 715.

Vern. :—Kuchle-kâ-malang (Hind.); Kuchlê-kî-sonkan (Dec.); Pullurivi (Tel.); Uchchichedi, Kâmaricham; Pulluri (Tam.); Kâsarakana-bandanige (Kan.); Pet chamra banda (Santal).

Habitat :—Sikkim Himalaya ; Khasia Mts.; Ganges Delta ; Oudh ; Nilghiri or Kurg hills.

A large, parasitic shrub. Branches dichotomous, leafy, terete, slightly swollen at the nodes. Leaves rather thin and usually drying black, 1-5in. long, very variable in breadth, petioled, obliquely ovate or falcate, acute or acuminate, 3 5 nerved ; nerves often strong Flowers monœcious, in axillary, sessile or shortly peduncled fascicles, 1-3in , minute, greenish ; the lateral usually female, central male or absent, sometimes appearing spicate from terminating leafless shoots, deciduous. Bracts cuspidate Perianth-lobes 3 or 4, triangular oblong. Fruit oblong, of the size of a pea ($\frac{1}{4}$-$\frac{1}{2}$in. long), truncate, smooth, yellowish (Kurz), "blackish brown" (Brandis).

Mr Duthie writes in his Flor Upp. Gang Pl., III p. 65—

The Bundelkhand specimens collected by Edgeworth near Banda on *Zizyphus xylopyrus* and *Bassia latifolia* indicate a more robust habit of growth. The leaves are much broader and excessively coriaceous, and the light-brown colour to which they have dried, gives them a different aspect as compared with typical specimens from other localities in N. India. Trimen says, that in Ceylon the plant dries to a pale yellowish-brown colour. Sir Joseph Hooker was of opinion that the Banda plant might prove to be a different species. The only available material now at Kew is, however, insufficient to settle this point.

Uses :— The leaves of a viscum, doubtfully referred to this species, growing on Nux-Vomica trees in the neighbourhood of Cuttack, have been found to possess poisonous properties, similar to those of the tree on which it grows. The subject was investigated by Sir William O'Shaughnessy, who detected in the powdered leaves the presence of strychnine and brucine.

The powder of the dry leaf was used as a substitute for these drugs in the Hospital of the Medical College, Calcutta, with complete success, in doses of one to three grains thrice daily. (Bengal Disp)

1108. *V. orientale, Willd.* H.F.B.I., V. 224 ; Roxb. 715.

Vern.:—Banda (H., Santal. and Kol.); Gurbel (Gond); Sundara badinika (Tel.).

Habitat.:—Behar, Bengal and Travancore.

A rather much-branched, leafy shrub, black or brown when dry. Branches often very slender, terete or angled and grooved, opposite and whorled; branchlets angular. Leaves rarely more than one inch, often unequal, petioled; from obovate to elliptic-oblong and linear-oblong, obtuse, 3-5-nerved, base narrowed, or rounded. Flowers minute, under $\frac{1}{10}$in. long, rarely more than 5, in sessile or pedunculed clusters, monœious. Perianth usually 3-cleft Perianth-lobes deciduous. Fruit of the size of a pea, smooth (Kurz), "purple," copiously minutely dotted (W. and A.).

Use.—In Chutia Nagpur, this plant is largely used medicinally, and is believed to derive some particular property from the tree on which it is found. It is employed in as many different diseases as the trees on which it is found. (Campbell.)

1109. *V. articulatum*, *Burm*, H.F B.I., V. 226.

Vern.:—Pan, pûdû (H.); Katkom janga Santal); Hurchu (Nepal); Patha (Banda); Banda (C. P.); Harmore (Thana).

Habitat:—Sub-tropical Himalaya, from Chamba to Sikkim, also Assam, Mishmi, Khasia mountains, southwards to Travancore.

A much-branched, leafless, green parasitic shrub, forming pendulous tufts 6in. to 3ft. long; greenish-yellow when dry Main stem terete Branches flat, longitudinally striate, and furrowed, contracted at the nodes, internodes, widening upwards, 1-2in. long. Flowers sessile, in sessile, 3-flowered spikes; two or several spikes at a joint. Perianth of male flowers reflexed. Female flowers 2-bracteolate, the perianth-lobes erect, triangular. Fruit sub-globose, $\frac{1}{8}$in. long, yellow when ripe, sessile, in clusters of 4-5 at the nodes, each fruit supported by a shallow cup-shaped bract. Found on Cordia vestita, Cornus capitata, Pyrus, albizzia stipulate, Albizzia amara (Mahableshwar, Pratapgad Road).

Uses:—In Chutia Nagpur, a preparation from the plant is given in fever attended with aching limbs. The many joints in the plant have probably influenced the Santal ojhas in their

application of it. It is probably one of the many cases of the use of a remedy from a belief in the theory of signatures (Revd. A. Campbell.)

N. O. SANTALACEÆ.

1110. *Santalum, album, Linn.* H.F.B.I., V. 231; Roxb. 148.

Sans.:—Chandana, srikhanda.

Vern:—Chandan, sufed-chandan (Hind.); Chandan Beng.) Sandal (Dec.); Shandanak-kattai, Chandanamaren (Tam.); Gandhapu-chekka (Tel.); Chandana mutti (Mal.); Srigandha-damara, Gandhakâ-chekke (Kan.); Chandan Nasaphiyn, sandakú (Burm.).

Habitat:—Deccan Peninsula; from near Poona on the west and Midnapoor on the east, southwards, on dry hills, ascending to 3,000 ft, cultivated elsewhere.

A small, evergreen, glabrous tree. Bark dark-grey, nearly black, rough with short vertical cracks, inner bark red. Wood hard, very close-grained and oily; sapwood white, scentless; heartwood yellowish-brown, strongly scented. Branches slender, drooping Leaves opposite, ovate or ovate-lanceolate; blade 1½-2½in; petiole ¼in Flowers brownish-purple, in axillary or terminal panicled cymes. Perianth campanulate; limb of 4 valvate triangular segments. Stamens 4, exserted, alternating with 4 rounded, obtuse scales, which may be regarded either as petals or as lobes of the disk. Drupe globose, ½in. diam., black; endocarp hard.

Uses:—Sandal-wood is described in Hindu medical works "as bitter, cooling, astringent and useful in biliousness, vomiting, fever, thirst and heat of the body. An emulsion of the wood is used as a cooling application to the skin in erysipelas, prurigo and sudamina." (Hindu Materia Medica.) The wood, ground up with water into a paste, is commonly applied to local inflammations, to the temples in fevers, and to skin diseases to allay heat and pruritus. It also acts as a diaphoretic. A yellow volatile oil is distilled from the wood, which has been reported

as a remedy for gonorrhœa. (*Pharm Ind.*) It has of late been prescribed as a substitute for copaiba in modern European medicine. (*Pharmacographia*.) The author of *Makhzan-ul-Adwiya* describes the wood as cold and dry, cardiac, tonic, astringent, alexipharmic, anti-aphrodisiac, a resolvent of inflammatory swellings, &c. He recommends an emulsion in bilious fever on account of its cooling and protective influence over the heart, brain, stomach, etc. As an external application a paste made with rose-water and camphor, or with sarcocolla and white of egg, may be applied to relieve headache or to any kind of inflammatory swelling or skin affection. (Dymock.)

In cases of morbid thirst the powder of the wood is recommended to be taken in cocoanut water. A bolus of ground sandal checks haemoptysis in its mild form, when taken twice a day for two or three days.

The seeds contain an oil which is used in skin diseases The seeds are also eaten. (B. D. Basu.)

The wood yields an essential oil the amount of which, on the average, varies from 3 to 6 per cent. It has been observed that the wood growing on hard and rocky soil is richer in oil than those growing on comparatively fertile soil. (Puran Singh).

The constants of the oil made by mixing the products obtained in the distillations are as follows :

Specific gravity at 26°C	·9765
Optical rotation	−15·6° to −16
Saponification number before acetylation .	9·72
Saponification number after acetylation ..	21·13
Santalol content	99·4

1111. *Osyris arborea*, *Wall.*, H.F.B.I., V. 232.

Vern.:—Bakardharra, bakarja (Kumaon); Popli (Belgaum); Jhuri (Nepal).

Habitat:—Outer Himalaya, Sub-Himalaya-Tract from the Sutlej to Bhutan. Central Provinces, West Coast from the Konkan south-ward to the top of the Ghats, also in the Hill ranges of South India, Shan Hills, Burma; Ceylon.

An evergreen shrub or tree, twiggy, as a rule glabrous. Bark dark, greyish-brown, rough, with shallow, vertical fissures. Wood red, hard, close-grained (Gamble). Branches numerous, stiff, virgate. Branchlets 3-sided, with prominent, sharp angles.

Leaves rather crowded, coriaceous, ¼-1½in., elliptic or obovate, or lanceolate, acute at base, obtuse, but sharply apiculate, (mucronate), entire, glabrous, nearly sessile. Flowers pale-green, minute, 3 sometimes 4-merous. Solitary, sometimes 2-3 together, axillary, on long, slender peduncles. Males ⅛in. across, in axillary pedunculate, 5-10fid. clusters; perianth-lobes triangular; stamens opposite the lobes, disk fleshy, 3-lobed; the lobes alternating with stamens; bisexual Perianth superior, obconical; Drupe yellow, ¼-⅓in. diam Seed one (Brandis), ovoid, truncate, yellowish white, says Trimen

Use:—The infusion of the *Leaves* has powerful emetic qualities (Watt)

N. O. EUPHORBIACEÆ.

1112. *Euphorbia hypericifolia, Linn.*, II.F.B.I., v. 249.

Syn.—E. parviflora, *Linn*., Roxb. 391

Vern.—Hazârdâna (Pb.); Nayeti Dudh mogra (Bomb.), Dhâkti-dudhi (Mar.); Ela-dâdâ-kiriya (Sing.).

Habitat:—Common throughout the hotter parts of India, from the Punjab to the Southern Deccan

A rather slender, rarely stout annual, 3-18in long, glabrous or sparsely pubescent, erect or decumbent. Leaves ½-1in., rarely more or less, not coriaceous, more or less serrulate on all the margins except toward the base, opposite, obliquely, broadly or narrowly oblong, obtuse; nerves distinct; base rounded or cordate Stipules minute, setaceous, lacerate or O. Involucres, very minute, turbinate, glabrous, with quite entire, minute bracts at the base of the pedicel; glands very shortly stipitate; lobes usually projecting above the glands; limb of the latter white or pale-pink, always small, but very variable in size, sometimes O. Styles, very short. Capsule sub-globose, 1/12in. in diam.. Cocci more or less pubescent or glabrous. Seeds ellipsoid, 4-angled, with a thin, mucous coat, bluish when dry, very variable as to the amount and depth of the shallow depressions on the faces which are often obsolete.

Uses:—It is given with milk to children in colic (Stewart). It possesses properties similar to those of E. pilulifera and E. thymifolia (S. Arjun). Dr. W. Zollickoffer (in Am. Journ. of Med. Soc. XI. 22) recommends an infusion of the dried leaves as a remedy in dysentery, diarrhœa, menorrhagia, and leucorrhœa, and finds that it affects the system as an astringent and feeble narcotic.

1113. *E. pilulifera*, *Linn.*, H.F.B.I., V. 250.

Syn.:—E. hirta, *Linn.* Roxb. 394.

Vern.:—Buru keru (B.); Dudhi (H.), Pusi-toa (Santal); Gordon (C. P.); Nayeti (Bomb.); Dudhi or mothidudhi (Mar.); Dudheli (Guz.); Amumpatchay-arissi (Tam); Bidarie, nânâbeeam, nanabâla (Tel).

Habitat:—Throughout the hotter parts of India from the Punjab eastwards and southwards to Ceylon and Singapore.

An annual herb, erect or ascending, hispid with copious, crisped hairs. Stem and branches 1-2ft. Leaves very short, opposite, elliptic-oblong, obovate, or oblong-lanceolate, acute, toothed or serrulate, ½-1½in. long; base usually narrow and obliquely cordate; nerves distinct. Stipules minute, linear; petiole distinct, very short. Involucres numerous, in axillary and terminal dense-fid, sessile or peduncled cymes, minute, about $\frac{1}{20}$in., pubescent; limb or glands very narrow or obsolete; glands small, globose Capsule $\frac{1}{24}$in. diam., appressedly or patently hairy Seeds pale-brown, acutely-angled, transversely, shallowly rugulose, ovoid.

Uses.—Reported to have been successfully used in asthma and chronic bronchial affections. It is used in the forms of decoction or concentrated essence (Christy's New Plants and Drugs No. V., p. 64, 1882; No. VI, p 93, 1882; No. VII., p. 47, 1884; No. VIII., p. 55, 1885; No. IX, p. 35, 1886). "Dr. Daruty informs me that the juice of both the Euphorbia pilulifera and E. hypericifolia is given with benefit in dysentery and colic, and that the milk is applied to destroy warts" (Christy, N. C. P., No. IX., p. 36).

The plant is chiefly used in the affections of childhood, in worms, bowel complaints and cough. Sometimes prescribed

also in gonorrhœa (S. Arjun). The root is given by the Santals to allay vomiting, and the plant to nursing mothers when the supply of milk is deficient or fails (Revd. A. Campbell). It has a reputation as a vermifuge (Dymock).

The capital symptom calling for this new remedy is paroxysmal spasmodic dyspnœa. ... ... Dr Tison gives favourable reports of this medicine in dyspnœas of cardiac origin. ... .. In all his patients the heart and kidneys seem to have been sound. The *Euphorbia pilulifera* has not seemed to have any action on the cough and expectoration in chronic bronchitis, nor it seemed to modify the râles of humid asthma .. In its mode of action it acts in two ways: locally on the stomach, and, after having been absorbed, on the respiratory functions.

Conclusions.

1. The active principle of euphorbia *pilulifera* is soluble in dilute alcohol and water, insoluble or but little soluble in ether, chloroform, di-sulphide of carbon and essence of turpentine. 2 It is toxic in small doses to small animals, killing them by arrest of the respiratory movements and cardiac pulsations, which are first accelerated, then slowed. 3 Its effects are not cumulative. 4. It seems to act directly on the respiratory and cardiac centres; it leaves intact the other organs. 5. It seems to be eliminated by the liver. 6. Locally it is without action on the skin and mucous membranes, except the gastric mucous membrane, which it irritates. 7. It gives good results in attacks of dyspnœa caused by spasmodic asthma, emphysema, or chronic bronchitis. It ought to be employed in daily doses corresponding at the most to one gramme of the dried plant, and should be taken well diluted with water at meal time. (*Quart Therap. Rev., Jul.* 1885)

The entire plant of *Euphorbia pilulifera L.* which had been obtained from the Fiji Island, was examined. The air dried material was extracted with alcohol, and the extract distilled with steam, when about 0·02 per cent. of an essential oil was obtained The following substances were isolated from that portion of the alcoholic extract soluble in water: gallic acid, quercetin, and a new phenolic substance, $C_{28}H_{14}O_{15}$. The aqueous liquid also contained amorphus glucoside material and a lævo-rotatory sugar which yielded alphenyl-glucosazone. The soft resinous material left aftertreating the alcoholic extract with water amounted to about 3 2 per cent of the original air dried material. This yielded the following substances: tricieontane and apparently a little ceryl alcohol; a new monohydric alcohol, *euphosterol*, $C_{25}H_{39}OH$, m. pt. 274°—275°C., giving an acetyl derivative m. pt. 295°—297°C., and a bromo acetyl derivative m. pt. 183°—186°C, a phytosterol m. pt. 132°—133°C; a phytosterolin; Jambulol $C_{16}H_3O_4$ (O. H)$_5$; melissic acid and a mixture of higher fatty acids. Euphosterol is evidently closely related to taraxasterol and homotaraxasterol—(Abstract from *Ph. J.* of 1913 in the *J. Ch. I.* for May 15, 1913, p. 505.)

Among the various constituents, there is none to which any specific physiological action may be ascribed. Such therapeutic virtues as the plant

has been presumed to posses would, therefore, not appear to depend upon any single substance of a definite chemical character. (Hooper.)

1114. *E. thymifolia*, *Burm.* H.F.B.I., V. 252; Roxb. 394.

Sans. :—Rakta vinda chada.

Vern. :—Dudiya sweta kerna (B.); Dudhi, chotka dudhi (H.); Bara dodak, hazârdâna (Pb.); Chinamam; Sittra paladi; Patcha arise (Tam.); Reddi vâri mânu bâla; Biduru nâna biyyam (Tel.); Nâyeti (Bomb.); Mathi-dudhi (Mar.).

Habitat :—Throughout India in the plains and lower hills, ascending in Kashmir to 5,500 ft

A small, pubescent, much-branched, annual herb; stems 4-12in. divaricately branched, spreading flat on ground, stipular, minute, serrate Leaves opposite, oblong, ¼in., obtuse; teeth acute or rounded. Involucres campanulate, minute, axillary; teeth 4; lobes very short; glands green, narrowly bordered with a white petitles; very short, rounded limb, sometimes absent. Styles short. Capsule pubescent with bluntly keeled lobes; seeds wrinkled.

"The whole plant has often a coppery tinge," says Trimen It flowers all the year round. Colour pink, a common weed. Flower heads very small, sessile, 1-3in axil. Trimen makes the following remark, which is well worth quoting here:—"The severed end of a branch, made to touch lightly the surface of water, has the singular effect of violently repelling to considerable distance all floating particles in the neighbourhood."

Uses :—The expressed juice or powdered plant with wine is given as a remedy for the bites of venomous reptiles, and is applied externally to the bitten part; with milk it acts as a purgative and expels all noxious humors from the body. According to Ainsile, the Sanskrit name is Rakta-vindu-chhada, which would imply that it is a remedy for *Rakta-vindu*, "gonorrhœa with sanious discharge." He remarks:—"The very small leaves and seeds of this low-growing annual plant, which, in their dried state, are slightly aromatic and a little astringent, are given by the Tamool doctors, in worm cases, and in certain bowel affections of children; they are commonly administered in the form

of powder, and in buttermilk, to the quantity of one pagoda and a quarter weight in the course of the day on an empty stomach. The leaves when carefully dried smell something like tea." (*Mat. Ind.*, ii., 75.) Irvine states that it is used as a stimulant and laxative in Northern India. In the Concan the juice is used to cure ringworm, and mixed with chloride of ammonium for the cure of dandriff. O'Shaughnessy says that the juice is a violent purgative, and that the fresh plant is, by the Arabs, applied to wounds. In the *Dict. Econ. Prod. of India*, it is stated, on the authority of the Rev. A. Campbell, that the Santals use the root of this plant, which they call Nanha-pusi-toa, as a remedy for amenorrhœa. (Dymock.)

Chemical composition.—An alcoholic extract of the whole plant was mixed with water acidulated with sulphuric acid, and successively agitated with petroleum ether and ether, and then reagitated with ether from the solution rendered alkaline with sodic carbonate. The petroleum ether extract contained a large amount of colouring matter; it had a very faint bitter taste; on standing, dark, and what appeared to be crystalline, points separated, but which, on microscopic examination, were destitute of regular structure. Euphorbon was specially sought for, but we arrived at no definite conclusion relative to its presence.

The acid ether extract was of a greenish colour, and partly soluble in water, the solution giving a greenish coloration with ferric chloride, and precipitating gelatine, but giving no reaction with cyanide of potassium.

After washing off by cold alcohol the extractive adhering to the sides o the capsule, and which was insoluble in water, a sulphur-yellow deposit was left, which, on microscopic examination, consisted of very minute needles. This principle was present in only minute traces, and was soluble even in warm alcohol with difficulty; it gave the reactions of quercitrin.

The aqueous original acid solution, before the addition of sodic carbonate, was of a bright claret colour; on the addition of the alkali sage-green flocks separated, the addition of acids causing solution, and reproducing the original claret-coloured solution but, after standing, the flocks became insoluble in acids, and only a faintly yellowish-red tint was produced by their addition.

The alkaline ether extract contained an alkaloidal principle which crystallized in fine colourless feathery crystals; it possessed no bitter taste. With Frohde's reagent in the cold a very faint-yellow tint was produced, which was changed to greenish on gently warming. Concentrated nitric acid gave a yellowish tint. Sulphuric acid and potassium bichromate no colour reaction. (Pharmacogr. Ind. III. 251-252.)

1115. *E. microphylla*, *Beyne*. H.F.B.I., V. 252.

Vern.:—Chhoto-Kernee (B.); Dudhia-phul (Santal).

Habitat:—Bengal, Bundelkand and Southern India.

An annual herb, quite glabrous or sparsely hairy. Stems very many, prostrate and spreading from the root; leafy, very slender, and much distichously branched, spreading in a whorl from the root, 4-10in. long, whitish brittle. Leaves always small, opposite, $\frac{1}{8}$-$\frac{1}{4}$in., very short, obliquely-oblong, rounded-oblong or sub-quadrate, coriaceous, opaque, sometimes as broad as long, spreading at right angles; if toothed, only at the broad end; nerveless. Stipules minute, triangular, 2-partite or laciniately toothed. Involucres numerous from the base to the tip of the stems and branches, minute, campanulate, very shortly pedicelled. Bracts at the base of the pedicels, subulate; lobes triangular, acute, nearly entire; glands very shortly stipitate. Style very short. Capsule shortly pedicelled, $\frac{1}{16}$in. diam. Cocci obtusely keeled, glabrous. Seeds smooth, bluish, when wet mucous.

Use:—In Chutia Nagpur, a preparation of this plant, along with that of *Cryptolepis Buchanani* is given to nursing mothers when the supply of milk fails or is deficient (Revd. A. Campbell).

1116. *E. tirucalli*, *Linn.*, H.F.B.I., v. 254; Roxb. 390.

Sans.:—Ganderi, trikaṇṭaka, vajradruma, daṇḍasnuha.

Vern.:—Sehud, thohar, sehunr (H.); Lanka sij, lâtadâona (B.); Siju (Sant.); Seju, ksharisiju, lanka (Uriya); Thora, Thúhá (Sind.) Niwal nivali shera, seyr, teg, vajradulu (Mar.); Thordandâlio (Guz.); Tirukali, kalli, kombu-kalli (Tam.); Jemudu, kalli (Tel.); Kodukalli, mondugalli (Kan.); Tirukalli; kâteruma (Mal.).

Habitat:—A native of Africa, naturalized in Bengal, the Konkan and the Deccan, as also in Sindh. Thrives very well at Karachi.

A large, unarmed, milky shrub or small tree, 10-20 ft. Bark brown or greenish-brown. Wood white or grey, moderately hard. Trunk 6-10in. diam., green, cylindric, densely branched above. Branches terete, smooth, green, jointed, slender like stout rushes, becoming as thick as the little finger. Leaves