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**STRUCTURE: OF CIMICIFUGA.**

BY EDSON S. BASTIN.

*Cimicifuga racemosa*, Nuttall, the source of the drug, is a native of the eastern portion of Canada and of the United States, extending as far south as Florida. It is a large, perennial, smooth herb, whose wand-like stem often attains a height of seven or eight feet, is leafy only near its middle, where it bears several large petiolate, triternate leaves, the leaflets of which are ovate or ovate oblong, acute and deeply serrate-toothed. The white flowers are borne in long, terminal, erect racemes which attain a length of from eight inches to three feet; the four or five small sepals fall when the flower opens; the petals, from one to eight in number, are small, clawed and two-horned at the apex; the stamens are indefinite in number, and constitute the most conspicuous part of the flower when fully expanded; the pistil is usually single, but sometimes there are two or three. The pods are oblong, dehiscent and many-seeded.

The thick, knotty rhizome, with its numerous rootlets, constitutes the official drug. The rhizomes have a horizontal growth and often attain a length of four or five inches, and the rhizome proper may attain an inch or more in thickness. On its upper surface are numerous stout, erect or somewhat curved branches which are terminated by cup-shaped scars, each of which usually show a distinct radial structure. The sides of the rhizome are more or less distinctly annulate with the scars of scales, and from the sides and lower surface, chiefly from the nodes, issue numerous rootlets. These, at their base, range from one-twelfth to as much as one-fourth of an inch in diameter and from six to ten inches long. In the dried form, as the drug occurs in the market, the roots are much broken, the rhizomes are blackish-brown, hard and break with a smooth or a somewhat fibrous fracture. The color internally is much lighter, being brownish or whitish. The roots are longitudinally wrinkled, brittle, and in cross-section appear obtusely triangular, pentangular or most commonly quadrangular, the number of angles depending upon the number of rays in the medullium.

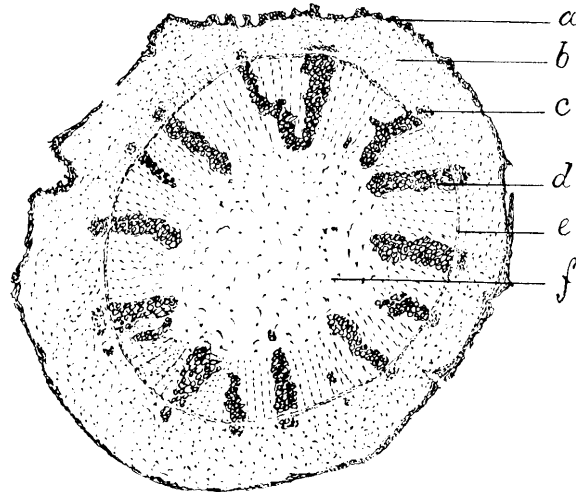


FIG. 1.



FIG. 2.

The drug in the dried form has a slight but heavy odor, and a bitter and acrid taste.

The cross-section of the rhizome or of its branches, when stained by aid of phloroglucin and hydrochloric acid to reveal distinctly the wood wedges, shows that the latter are rather short, irregular in size and placed at unequal distances apart around a large central pith. The vascular bundles are usually considerably narrower than the medullary rays which separate them, and the bark is rather thick. These facts are shown in *Fig. 1*.

A longitudinal section stained in the same way shows the bundles to be also irregular in their course, and that adjacent bundles frequently send out anastomosing branches, as indicated in *Fig: 2*.

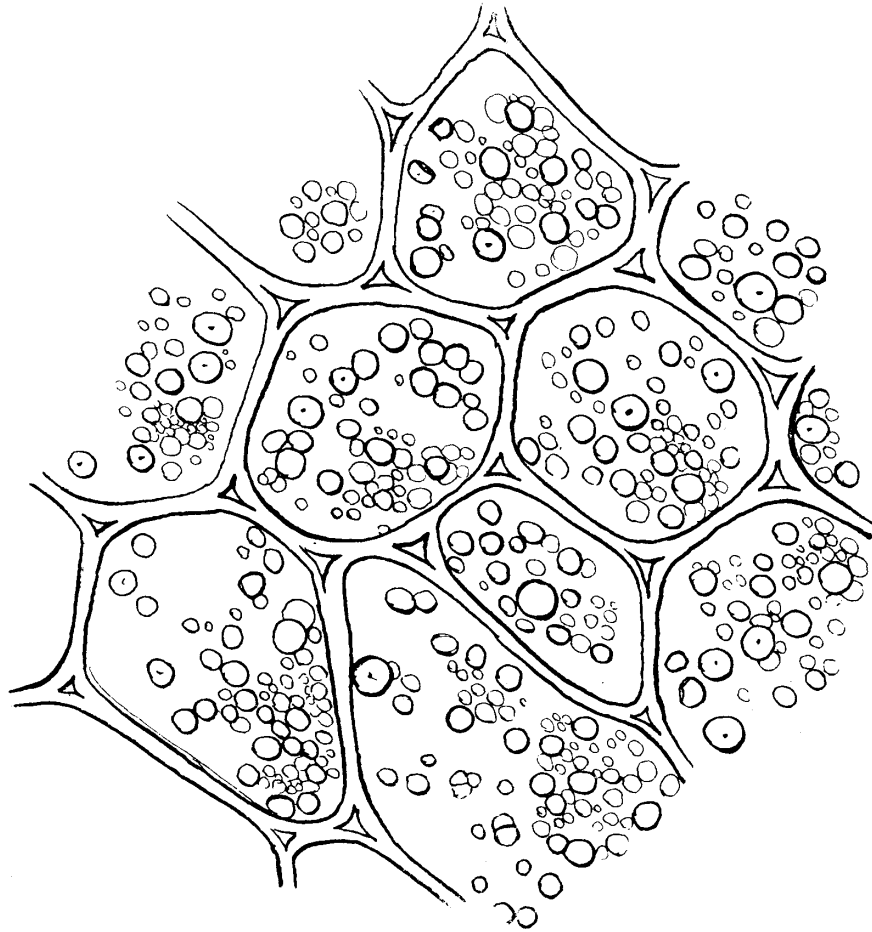


FIG. 3.

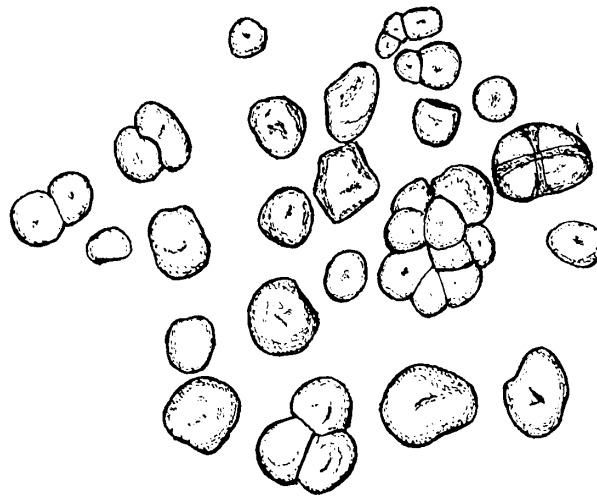


FIG. 4.

The parenchyma both of the rhizome and roots contain, if the drug is gathered in autumn, as should be the case, a considerable quantity of

rather fine-grained starch, as shown in *Figs. 3 and 4*. The starch grains are more commonly simple and rounded, or somewhat angular, with a central or subcentral not usually conspicuous hilum, and only rarely showing concentric markings. Many of the grains, however, are compound, in twos, threes, or occasionally even in masses composed of several grains, very rarely as many as nine or ten.

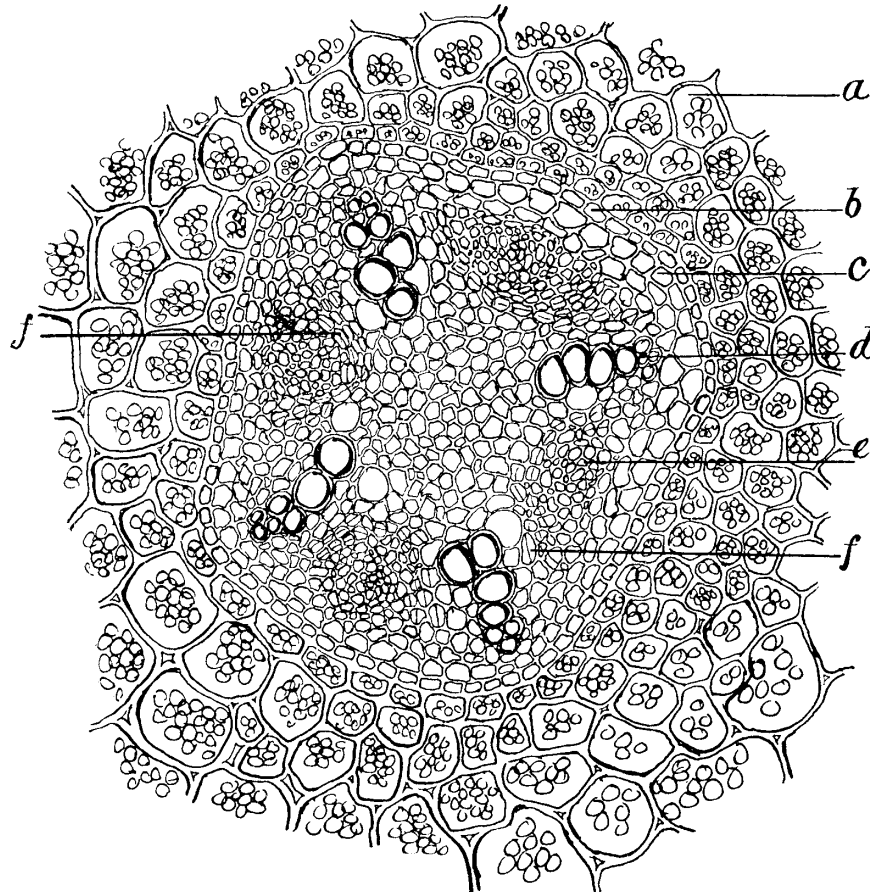


FIG. 5.

The roots afford an interesting microscopical study and reveal a structure which is quite characteristic. If a section be made a little way back of a root-tip, another near its middle and a third near its base, the primary structure of the central bundle and the secondary changes it undergoes may be easily traced. The primary bundle is usually tetrarch or possesses four xylem rays, but is sometimes tri-arch or pentarch. *Fig. 5* shows a tetrarch bundle from a young portion of a root in which the bundle is but little altered by secondary changes. A wavy zone of cambium has only just been formed between the phloem masses and over the ends of the xylem rays.

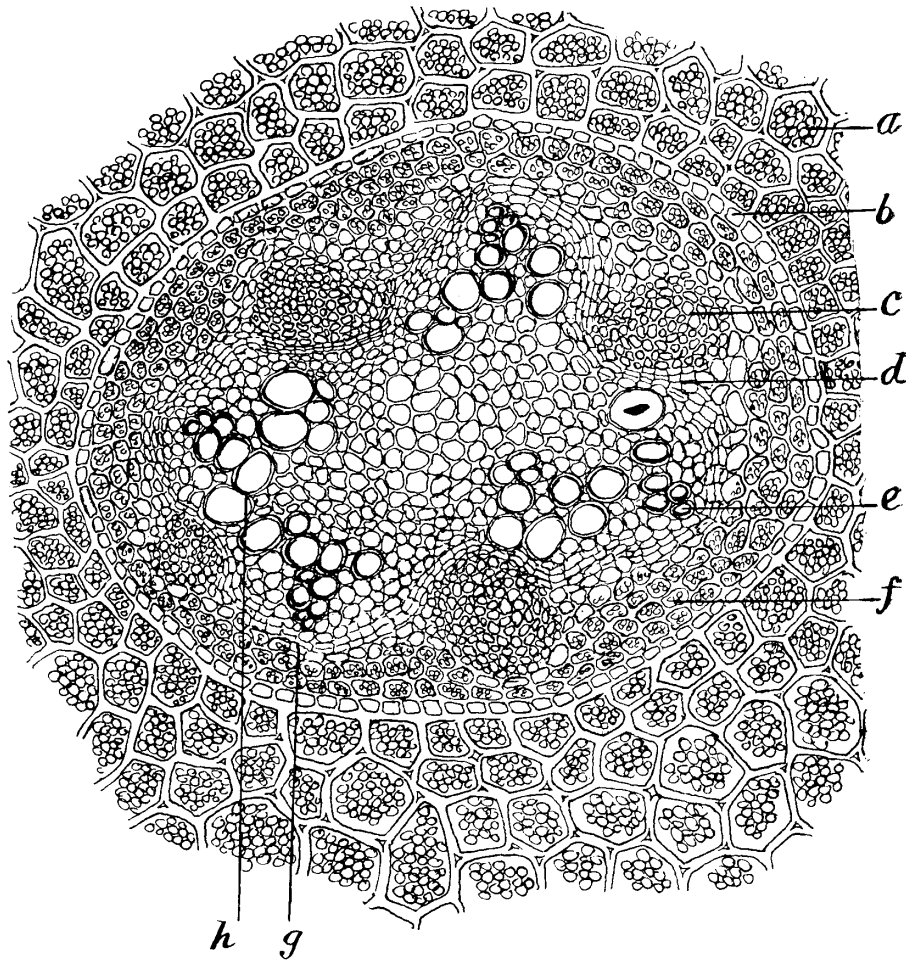


FIG. 6.

In *Fig. 6* the secondary changes have progressed much farther, the whole bundle is much increased in size by growth in the endo-dermis, in the pericambium and particularly in the cambium zone. The inner ends of the xylem rays have grown by the formation of new ducts until the bases of some of the adjacent rays appear to coalesce. The phloem masses have also increased considerably in size by new growths on their inner face. Finally, in *Fig. 7*, a section of the old or mature portion of the bundle is shown. In this the bundle is observed to be enormously increased in size, and most conspicuous among the structural changes observed are the formation between each pair of primary xylem rays and back of each phloem mass a large xylem wedge, so that the xylem elements in their arrangement now present the form of a Maltese cross. Alternating with the arms of this cross are four broadly-wedge-shaped medullary rays (also secondary formations), the thin inner end of each

wedge resting upon one of the original xylem rays, as shown at *f* in the figure.

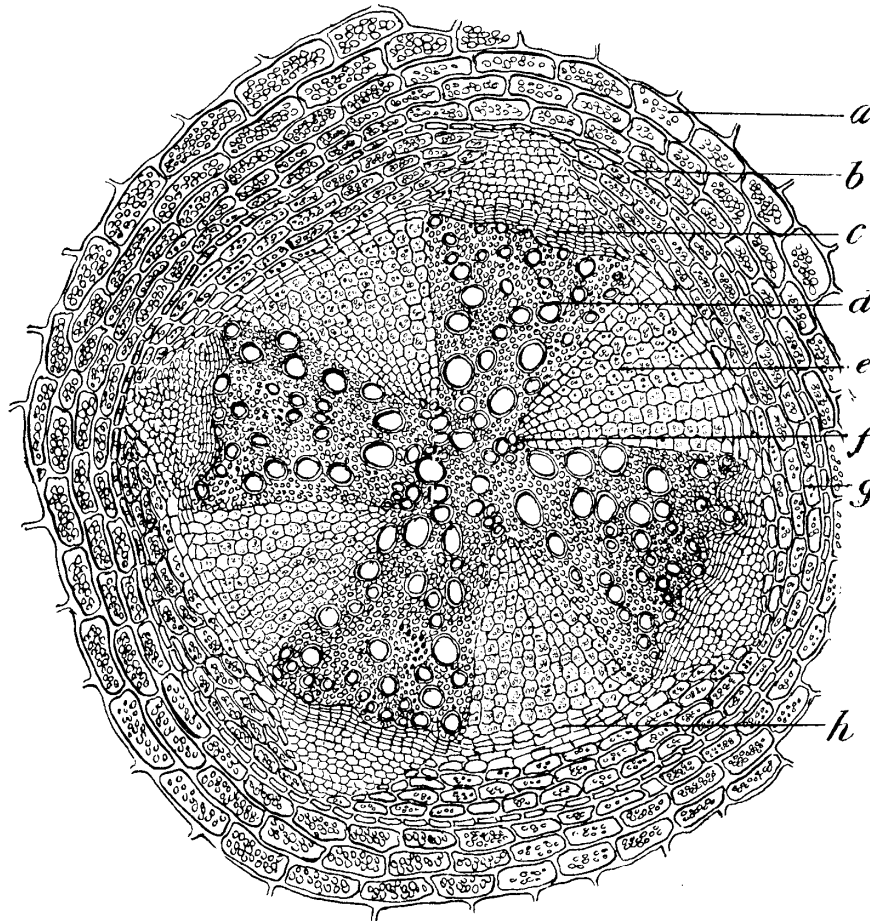


FIG. 7.

In this species it will be seen that the number of secondary xylem wedges and of medullary rays corresponds to the number of xylem rays and of phloem masses in the primary radial bundle.

The root thus affords us the best characters for the identification of the drug. There are few roots in which the most characteristic secondary changes that occur in the roots of dicotyls are traceable with so little difficulty as in this. It therefore affords an especially good example for the young microscopist to study.

It should be observed also that the number of rays is not always constant in the same root. It may, for example, be triarch at the apex and tetrarch near its base, or it may be tetrarch near its apex and pentarch toward its base. In this respect, however, the roots of *cimicifuga* are not exceptional, many other dicotyls as well^as many

monocotyls showing similar variations in the number of rays.

### DESCRIPTION OF FIGURES.

Fig. 1.—Diagram of cross-section of a small rhizome of *Cimicifuga*, magnified 6 diameters, *a*, cork; *b*, middle bark; *c*, phloem mass or bast; *d*, xylem of a bundle; *e*, cambium zone; *f*, pith.

Fig. 2.—Diagram of a longitudinal tangential section of same rhizome, also magnified 6 diameters, showing anastomosing bundles, *a*, cork; *b*, middle bark; *c*, xylem of a bundle; *d*, small portion of bundle passing out to supply rootlet.

Fig. 3.—Small portion of cortical parenchyma, showing starch grains. Magnification, 495 diameters.

Fig. 4.—Starch of *Cimicifuga*. Magnified 1000 diameters.

Fig. 5.—Drawing showing tetrarch radial bundle of root of *Cimicifuga*, magnified 110 diameters. The section was from a young root, in which the medi-tullium had undergone but little secondary change, *a*, a parenchyma cell from cortex; *b*, cell of endodermis; *c*, pericambium; *d*, outer end of xylem ray; *e*, phloem; *f*, *f*, meristem forming between xylem ray and phloem.

Fig. 6.—Section showing central part of an older root in which the secondary changes have made further progress. Magnification, no diameters, *a*, parenchyma cell of cortex; *b*, cell of endodermis; *c*, phloem; *d*, meristem now traceable as a cambium zone; *e*, outer extremity of xylem ray; *f*, starch-bearing cells formed beneath pericambium; *g*, cambium opposite outer end of xylem ray; *h*, new ducts in process of formation, the beginning of the secondary xylem.

Fig. 7.—Section of central part of a mature root in which the secondary changes have been completed. Magnification, about 60 diameters, *a*, parenchyma cell of cortex; *b*, cell of endodermis; *c*, cambium zone; *d*, duct in secondary xylem; *e*, broad, wedge-shaped, medullary ray; *f*, outer end of one of the original xylem rays at inner end of medullary ray; *h*, inter-fascicular cambium. *Figs. 5, 6 and 7* are from the author's Laboratory Exercises.

## NOTES ON SOME SAPS AND SECRETIONS USED IN PHARMACY.

BY P. L. SIMMONDS, F.L.S. [Continued from February]

*Butea frondosa*, Roxb. This Indian tree—the Dhak or Pulas— yields a gum which is sold as Bengal kino. It occurs in the form of fragmentary pieces of a deep claret color, mixed with similarly-shaped particles of

gray bark. The purer qualities are met with in round tears, often bright claret colored and free from dirt. It may be purified by solution in water. The brilliant ruby-red colored tears are translucent and very brittle, heat rendering them more so, instead of melting the gum. With age, it darkens, and becomes opaque. In native medicine, in India, it is largely used as an astringent.

*Camphora officinarum*, Nees. The aggregate exports of camphor from China have increased considerably of late years. They were 22,231 cwt. in 1892, and 40,763 cwt. in 1893. The island of Formosa yields the principal quantities, the yearly output being now as much as 41,650 cwt., shipped from the ports of Tamsui and Tainan. The exports from Japan range from 3,000,000 to 4,500,000 cattsen, = 35,714 cwt. to 53,571 cwt.

Malay or Borneo camphor is obtained from *Dryobalanops aromatica*. The imports of crude camphor into the United States seem on the decline, having been 2,857,222 lbs. in 1887, and but 1,733,425 lbs. in 1893.

*Canarium commune*, Lin. This tree yields the concrete resinous exudation, known as Manila Elemi. It has a fragrant, fennel-like odor, and is usually soft and unctuous to the touch. Its medicinal properties are analogous to those of turpentine, and it is for external use only. It is said, however, to have the same properties as copaiva.

*C. edula*, of Africa, exudes a similar resin.

*C. strictum*, Roxb. The black dammar tree, yields a brilliant resin, which is used medicinally in India as a substitute for Burgundy pitch.

*Carica papaya*, Lin. This tree has several valuable medicinal properties. The milky juice is among the best vermifuges known. The natives in India repeatedly use it for children. In the West Indies the powder of the seeds is used for the same purpose. The juice of the fruit is said to destroy freckles on the skin, caused by the sun's heat, and the negroes employ the leaves to wash linen, instead of soap. The fruit is pickled and preserved for curries. The milky, viscid juice of the fruit has a singular effect in rendering meat tender. It has this effect even if the meat is hung under the tree for two or three hours.



*Cedrus Dedara*, Loudon. This tall, handsome Indian tree yields a true resin, and, by destructive distillation, a dark-colored oil, resembling tar, which is used medicinally.

*Cistus Creticus*, Lin.

*Labdanum*, or Ladanum, is a viscous, resinous exudation from the above species, and also to some extent from *C. ladaniferus*, L., *C. Ledon*, Lam., *C. laurifolius*, L., and *C. monspiliensis*, Lin. It is black brown, soft, of pleasant smell and bitter taste, and was once in high repute in medicine as a stimulant and expectorant, and recommended in chronic catarrh; but at present is chiefly used in perfumery. About 50 cwt. are annually collected in Crete, and some quantity also in Cyprus, and sent to Constantinople. Labdanum was formerly regarded by the Turks as a preventive against the plague, and they wore pieces as amulets, or affixed to their walking-sticks. They chiefly use it now for fumigation.

*Cochlospermum Gossypium*, DeC. This tree and *Sterculia urens* yield a clear white gum, which can be employed as a substitute for tragacanth, and is exported to America. It is issued to the Government hospitals in Bombay instead of tragacanth, and is largely used in that city in the manufacture of sweetmeats.

*Commia Cochinchinensis*, Lour. This tree yields a white tenacious gum, of an emetic, purgative, deobstruent nature. If prudently administered, it is useful in obstinate dropsy and obstructions.

*Copaifera Lansdorffii*, Desf. This and some other species (*C. officinalis*, Lin., *C. Martii*, Hayne, *C. Guianensis*, Desf., and *C. coriacea*, Mart.) are believed to yield the medicinal oleo-resin. It is obtained chiefly from the Amazon district, by making incisions in the tree, and the sap flows so abundantly that as much as 12 pounds weight is collected in a few hours, and 42 quarts during the season. The source of copaiba is usually given as *C. multijuga*, but this is very questionable. In its medicinal action, copaiba is of great value as a diuretic and stimulant remedy in certain affections of the bladder and urethra; also in chronic bronchitis and other affections of the lungs and air passages, attended with excessive secretion. It has likewise been found serviceable in some chronic skin diseases, as leprosy and psoriasis. The imports into London are included with other balsams, therefore the quantity cannot be given. The imports into the United States, however, were, in 1888,

132,262 pounds; in 1889, 163,624 pounds, and in 1890, 206,240 pounds.

*Dichopsis Gutta*, Bentham; *Isonandra Percha*, Hooker; *Isonandra Gutta*, Lind.; *Palaquium Gutta*, Baillon and Burck. Gutta-percha, although chiefly employed for various economic purposes, has also a few medicinal and surgical applications. Sheets softened in water, when applied to injured limbs, harden and form good splints; dissolved in chloroform, it is applied as a dressing for wounds, and various surgical instruments are made of it. The imports into Great Britain in 1890 were 70,162 cwt, of the value of nearly £800,000, and in 1893, 40,497 cwt., valued at £303,593.

*Dipterocarpus laevis*, Ham.

The WOOD OIL known in all the Indian bazaars as "Gurgun," is obtained by tapping certain trees of this order, and applying heat to the incision. Several species yield the oil, which has all the medical properties of some of the more esteemed balsams, especially as a substitute for capaiva, in gonorrhoea and certain skin diseases.

*D. incanus*, Roxb., is reported to furnish the largest proportions of the best sort. The following is Roxburgh's account of the manner of obtaining this oil from *D. turbinatus*, Gaert.: "This tree is famous over all the eastern parts of India and the Malay Islands, on account of its yielding a thin, liquid balsam, commonly called 'wood oil,' which is much used in painting ships, houses, etc. To procure the balsam, a large notch is cut into the trunk of the tree, near the earth, and, say, about 30 inches from the ground, where a fire is kept up, until the wood is charred, soon after which the liquid begins to ooze out. A gutter is cut in the wood to conduct the liquid into a vessel placed to receive it. The average product of the best trees during the season is said to be sometimes 40 gallons. It is found necessary, every three or four weeks, to cut off the old charred surfaces, and burn them afresh; in large, healthy trees abounding in balsam, they even cut a second notch in some other part of the tree, and char it as the first. These operations are performed from November to February. Should any of the trees appear sickly the following season, one or more year's respite is given them."

This oleo-resin has been used in the cure of leprosy. Large quantities are exported from Burma to Europe, as it has become an important drug

in trade. From the port of Hankow, in China, in 1893, 403,200 cwt. of this oil was exported.

*Dorema ammoniacum*, Don.

*Diserneston gummiferum*, Sp. and Jaub.

*Peucedanim ammoniacum*, Nees.

This fetid gum resin, having properties similar to asafetida<sup>^</sup> comes in mass and in tears from Persia.

Lump ammoniacum resembles galbanum, while that in tears is somewhat like olibanum, but has a smooth surface outside, and an opaque fracture, It is used in medicine as an antispasmodic, stimulant and expectorant, in chronic catarrh, bronchial affections and asthma, and also for some plasters.

The imports into London are not large, and average about 100 packages, but fluctuate; in 1891, only 46 packages were received, but in 1892, 279 cases of 1 1/2 cwt. each, and in 1893, 45 cases.

It is called "Uschekh" in Persia; in that country it is much used as an inward medicament, and also frequently for greasing the spinning wheels, as it is very cheap.

*Dracaena* species. The dragon's blood of Africa has been known in medicine from the earliest historical times. About 200 chests in mass or blocks come into London yearly. It is the resinous exudation of several different plants, is dark red-brown, and, when pulverized, carmine red, without taste or smell.

The African from Somali land is yielded by *D. Schizantha*, and that of Socotra by *D. Ombet*. The resin exudes, after the bark has been scraped, in about a fortnight. The Socotra kind is exported from Aden to Bombay.

Dragon's blood was formerly referred to *Dracaena Draco*, Lin., and *Calamus Draco*, Lin. The Sumatra dragon's blood appears in commerce in the form of reeds or sticks about a foot long wrapped in palm leaves. It is, sometimes, employed in the composition of tooth-powders, but seldom now in medicine. *Pterocarpus Draco* also yields dragon's blood, and other species kino.

*Eperua falcata*, Aubl., *Dimorpha falcata*, Swartz. The Wallaba resin obtained from this tree in Guiana is inflammable and gives a bright light,

Its styptic and curative powers in cuts and bruises are well appreciated by the Indians and other natives of the Colony. An oil obtained from the wood is also used as a dressing for incised wounds.

*Eucalyptus rostrata*, Schlechtendal. An exudation from this tree is a most invaluable medicine in certain disorders. It exudes in a fluid state from the bark, and in some instances between the different layers of the wood, and by the evaporation of the watery particles by which it is held in solution, it concretes into a beautiful ruby-colored gum, which, when exposed for a length of time to the air and sun, assumes a black color from an imperfect oxidation, losing at the same time its astringency. This gum is an original astringent principle, analogous in some respects to tannin, the basis of other vegetable astringents, but by no means identical with that compound.

It is more effective than catechu, or Indian kinos, although it contains a less amount of astringent matter.

Dr. J. Sutherland, of Bathurst, Australia, in a communication to my *Technologist* (vol. 3, p. 69), thus speaks of it:

"As a medicine, it is a more powerful astringent than any in our Pharmacopoeias, and justly merits a place among the legitimate articles of the Materia Medica. I have prescribed it in a variety of disorders in which astringents are indicated, and found it peculiarly serviceable in certain stages of diarrhoea and dysentery, in passive haemorrhage, as an injection in leucorrhoea, gonorrhoea and gleet, in scurvy of the gums; as a gargle when the acute symptoms have subsided, in relaxation of the uvula, in haemorrhoids; in the form of an ointment made by dissolving a drachm of the gum in a tea-spoonful of water, and, when intimately mixed, rubbing it up with an ounce of lard. The dose for internal administration varies from one or two grains to twenty, dissolved in water."

*Euphorbia officinarum*, Lin., or *E. resinifera*, Berg. The above, *E. canariensis*, Lin., and some other fleshy species, produce the saline, waxy resin, called in the shops "Gum Euphorbium," which is the

inspissated, milky juice of these plants. It is chiefly obtained in the neighborhood of Mogadore and called "Dergmuce." It is used as a vesicant in veterinary medicine, but is seldom employed otherwise. The inhabitants of the lower regions of the Atlas Range make incisions in the branches of the plant, and, from these, the milky sap exudes, which is so acrid that it excoriates the fingers when applied to them. This exuded juice hardens by the heat of the sun, and forms a whitish-yellow solid, which drops off in the month of September and forms the Euphorbium of commerce. It causes considerable irritation of the nostrils and eyes when powdered. *E. Antiquorum*, Lin. yields a hydrocarbon, gutta-percha-like substance, known as "Cattimandoo," which is the *Dorf* of the Hindus—a much-prized medicine.

*Feronium elephantum*, Corr.; *Crataeva Valanga*, Kon. This tree yields a brownish or reddish gum with a small proportion of clear, yellow tears, soluble in water. The Pharmacopoeia of India pronounces it as superior to gum arabic for medicinal purposes.

*Ficus elastica*, Roxburgh; *Urostigma elasticum*, Miqu. To give some idea of the vastly increasing extent to which rubber, obtained from various elastic saps, is now required, it may be stated that the British imports of caoutchouc, in 1893, were 293,373 cwt., and the United States import even more. The combined imports of India-rubber and gutta-percha into the United Kingdom in 1893. were about 324,000 cwt. Great Britain also imports about 3,250,000 pounds of rubber manufactures. At Wedzell's factories, in Munden and Hildesheim alone, there were produced, a few years ago, over 100,000 pounds of surgical articles from it.

*Fraxinus ornus*, Lin.; *F. rotundifolia*, Lam.; *Ornus Europaea*, Pers.; or *Ornus rotundifolia*. The sweet exudation, known as "Manna," is chiefly the concrete juice obtained by incising the bark of the ash and collecting it on pieces of stick, hence, called flaky manna. The best is in oblong, light, friable pieces, of a whitish color and somewhat transparent, with a sweetish, sharp taste and a weak smell. The inferior kinds are moist, unctuous and dark-colored. It is a mild aperient medicine. Each hectare (of two and one-half acres) planted with the ash—4,000 to 5,000 trees—produces on an average nearly 2,000 pounds of manna. It used to be produced in Calabria, but that exported comes chiefly now from Palermo, in tin boxes weighing about 14 pounds. Small flake-manna is sent out in cases of about 120 pounds, large flake-manna, in cases of

half that size. The export of manna from Italy, in 1884, was about 446,000 pounds. Spurious manna is known by its uniform color and freedom from the slight impurities, as well as from the peculiar odor and slight bitterness of true manna.

Calabria was, many years ago, the only source of the manna of commerce, but the production there has ceased, and, as stated above, Sicily is now the chief seat of production. Manna is nutritious, particularly when recent. It is a mild laxative, does not excite inflammation, useful for children and delicate females, usually operating mildly, but in some cases produces flatulence and pain.

In certain cases, the leaves of *Larix Europaea* exude a species of manna called "Manna of Briancon," which is eaten in Russia. Another kind is from *Tamarix mannifera*, and the Oriental manna of the desert from *Alhagi maurorum*, DeC., *A. mannifera*, Desf. The sugary secretion obtained naturally from this plant is chiefly collected in Khorasan, Kurdistan and Hamadan, and imported into Bombay. As a medicine its effects correspond to those of the ash manna.

The Arabs who cross the deserts avail themselves of the manna of the camel's thorn (*Alhagi camelorum*, Fisch.). It is found in the morning on the ground round the plant, during several days of the summer, and is collected before the sun can melt it. It occurs in small, round, unequal grains, the size of coriander seed, of a yellowish white or greenish yellow color, caking together and forming an opaque mass, in which are found portions of the thorns and points of the plant. This manna is inodorous, its flavor is sweetly saccharine, followed by slight acidity. The Khergese use it for various kinds of sweetmeats. The inhabitants collect these exudations and make them into loaves or cakes. These soon become of a black color, owing to a kind of fermentation, produced by the air and moisture. The flavor of these manna loaves resembles that of senna in taste; they also resemble senna combined with sweetness. These two characters lead one to suppose that this manna is more purgative than nutritive. Some authors, as Halle and Guillamin, state that this constituted the manna of the Hebrews, but it is more generally supposed that the *Lecanora affinis*, Eversm, was the substance upon which the Israelites fed in the wilderness.

Some kinds of manna are obtained in Kurdistan from the dwarf oak, tamarisk, and other trees, but are seldom met with in commerce, being

used up locally.

A kind of manna is found in small quantities on the branches of the cedar of Lebanon, in the form of transparent, resinous drops, indubitably the result of the puncture of an insect, like the lerp of Australia. The monks collect this manna and prepare with it various electuaries and ointments, which are sold to strangers visiting the monasteries. This cedar manna enjoys a considerable reputation in Syria as a remedy in phthisis.

The imports of manna into the United States were as follows: in 1888, 31,703 pounds; in 1889, 25,246 pounds; and in 1890, 43,509 pounds.

*(To be continued.)*

## **THE APOCYNACEAE IN MATERIA MEDICA.**

BY GEORGE; M. BERINGER.

*(Continued from February. Conclusion).*

O Henry and Ollivier, in 1824, first obtained from *Tanghin* a fixed oil, a crystalline substance, very poisonous, and a varnish-like substance which they named *Tanguine*. J. Chatin obtained the crystals in prisms, of which the nature was not determined. In 1889 Arnaud isolated the active principle, *Tanghinine*, in crystals, and presenting the singular property of swelling up with water. It is present in the kernels to the extent of 1 per cent. It is neither an alkaloid nor a glucoside. Arnaud states that the seeds contain an abundant amount of oil, which cannot be obtained by simple expression, as an emulsion is formed with the water. He recommends the extraction with carbon disulphide. J. Chatin concludes, from his experiments with this oil, that it is absolutely inoffensive. Quinquaud observes the great excitability of the medulla by the poison, and employed it in some toxic paralyses, and likewise in intestinal atony and in incontinence of urine, but the symptoms indicated the danger of toxicity.

**THE SEED OF CERBERA MANGHAS.**—The *Cerbera Manghas* L. is a tree found in India and nearly all of Oceanica. In the various islands we find numerous varieties based on details of the flowers. The fruit is the size of a hen's egg. In the fresh state it is fleshy, with a fibrous stone, coriaceous and black at maturity, and confining a large oily kernel.

According to Horsfield the pulp is employed in Java as a cataplasm in some cutaneous maladies.

The seeds and leaves are considered as very dangerous, and are stated to be drastic purgative and emetic, and too violent for use. The kernels are said to be narcotic, and produce effects comparable with those of *Datura*. M. Jeanneney, by expression, first cold and then with heat, obtained from the kernels 72 per cent. of a limpid golden yellow-colored oil, which burns with a clear flame and an odor resembling that of cocoanut oil. It is very acrid to the taste, producing a sensation of burning in the stomach, vertigo, nausea and violent purgation and colic.

**THE SEEDS OF CERBERA ODALLAM.**—The *Cerbera Odallam* G.ertn.(*Odallam* Rheede; *Cerbera Manghu* Lin.; *Manghas* Sims not L.; *Tanghinia Odallam* G. Don.) is a shrub or tree inhabiting the western coast regions of India. Plugge describes the fruit as a red drupe, spherical or ovoid, the size of an apple, with a stone in the centre surrounded by a mesocarp. The fruit contains generally two hemispherical seeds with a tough, horny, granular envelope. The kernel is rounded on the outside, flattened or depressed about the centre on the internal side. It is formed of two unequal cotyledons, the external surrounding the internal and a short ascending radicle. The seeds of *Cerbera Odallum* contain a colorless crystal-lizable glucoside *Cerberine* isolated by De Vrij. It is distinct from the *Tanghinine* of Arnaud, of which it is probably an isomer. It yields with dilute acids *Cerberetine* equally toxic and of a handsome yellow color.

The seeds contain 77 per cent. of fixed oil. *Cerberine* is very toxic, and acts by arresting heart action. It presents some of the advantages of *Digitalis*, and merits clinical study. The seeds are employed as an emeto-cathartic, the bark, the latex (rich in caoutchouc) and the leaves as purgatives, but all are dangerous.

## **BARKS.**

**NERIUM OLEANDER.**—The bark of *Nerium Oleander* L. is the only one of note of this family obtained from Europe. The stem is vaguely triangular or tetragonal, depending whether the leaves are ternate or opposite. The bark is externally yellowish green in the young parts, soon becoming grayish. The internal face is greenish white, the fracture green, the latex originates especially in the internal region of the bark,



which is quite thick compared with the wood. The liquid is likewise abundant in the neighborhood of the periphery of the pith, which is large, triangular or square, greenish yellow, with a green line of contact with the wood. The leaves and young stems appear absolutely glabrous. The microscope, however, shows a few hairs, very short and large, unicellular, with a small cavity.

ANATOMY.—The young bark of the stem shows: an epidermis with walls externally thickened, soon replaced by a zone of a few suberous layers; a *collenchyma* very clear and quite thick, with elements elongated in the direction of the axis; these contain chlorophyll and starch; a *chlorophyll-bearing tissue* with rounded thin-walled cells containing an abundance of starch. The *Endodermis* is not visible excepting near the summit of the stem. The *pericycle* is thick and contains the bundles of cellular fibres extremely long, pearly white, and with cavities very straight, often flattened; and the cells with a thin membrane with macles of calcium oxalate. The *liber* encloses not macles, but numerous rhomboids, often in longitudinal or radial series. Sometimes a number of crystals are enclosed in a single cell. *Cambium*. *Wood* rich in starch. The *laticiferous vessels* are difficult to see; we find them especially in the pericycle and in the exterior parenchyma.

THE BARK OF THEVETIA NERIIFOLIA Juss. Generally the bark is obtained from the young branches; it is thin, delicate, strongly enrolled upon itself from one or both borders. The surface is gray, greenish or a little yellow, rarely glossy, is finely striated longitudinally, with few whitish streaks, more or less numerous elongated lenticels and scars of the alternate leaves. The internal face is bluish-black or reddish-violet, smooth. The fracture sometimes quite clear, is nearly always lengthily fibrous, with soft fibres in the liber. The length is variable, 15 to 20 c.m.; the thickness 1 m.m. or more; odorless; taste pungent, then strongly bitter.

The *anatomical structure* shows: (1) a suber formed of cells with white flattened walls; (2) a parenchyma of which the cells are tan-gentially compressed, the walls colored and with brownish contents; (3) a zone constituted of numerous white fibres, very long and large, and cavities sometimes quite large and flattened. Beneath this is the liber region, the color analogous to that of the cortical parenchyma, but with the medullary rays. In this tissue are the laticiferous canals filled with a substance at times granular, at other times transparent, little starch,

some rhomboids of oxalate. The bark contains the same active principles as the seeds and pseudoin-dican. It is employed as an anti-periodic, febrifuge and purgative. Shortt and Bidie employed it in remittent fever with satisfactory results: a tincture (1 part to 5 of rectified spirit) in doses of 15 to 18 drops during the interval of the attack is recommended.

### BARKS OF THE PLUMERIAS.

This genus is represented by tropical trees or shrubs, frequently cultivated as ornamental plants. The medical properties are due to the latex, frequently drastic and corrosive. The barks of several species are employed. The *Plumeria alba* L., a native of the Island Sante Croix, now found in all the warm regions of the Antilles, India, the Mascarene Islands, etc., is known under the French names *Frangipanier blanc*, *Bois de lait*, and the English *Jasmine-tree*. It is the *Topaiba* of the Spanish, and in India is called Arali. It attains a height of 5 to 6 m., and bears alternate leaves and handsome odorous flowers. It contains an abundance of a white poisonous juice.

The bark of this species in commerce is separated from the wood and is in very irregular strips ordinarily curved, rolled up or shrivelled, the length ranging from 10 to 12 c.m. These strips are constituted of an external envelope, papyraceous, cartilaginous, and an internal region tougher and thicker: these two parts are frequently united, but more often, however, detached from each other. The external layer is parchment-like, ranging in color, reddish brown, more or less glossy, or yellow marked with lichens, showing a few whitish streaks and black points, and the leaf scars.

The internal layer attains in old barks 3 m.m., and the internal face more smooth and dark in young barks, is brown and quite rugose in older barks. It breaks readily, the fracture being short, non-fibrous, except in the inner zone, and with white points rather regularly marking the brown body. In mass the odor is slightly acid; taste nil near the parchment-like region, feebly pungent and bitter in the bark proper.

The bark is purgative, alterative, depurative, and given especially in blenorrhagia. It may be administered in a form of decoction or by macerating the powder in sweetened water, wine or beer. The remedy is often associated with other plants (*Aristolochia trilobata*; *Cynosurus sepiarius*, etc). It is also given in herpes, syphilis, and, externally, in

lotions upon syphilitic ulcers.

*Plumeria rubia* L. (*P. flore roseo odoratissimo* Tournef.; *Nerium arboreum* Sloane, etc.), the *Frangipanier rouge* is found in tropical America, Venezuela, Mexico, etc. The bark of the root is generally employed and greatly resembles that of the root of the *P. alba*, and is used in the same maladies as the bark of the latter species.

The *Plumeria phagedenica* Mart. occupies the valleys in Brazil, the indigenous name being *Sebni-iiga*. Heermeyer has described the anatomical structure of the bark (*Pharmaceutische Post*, Sept. 24, 1893). The bark is vermifuge and drastic.

The *Plumeria drastica* Mart. inhabits the Brazilian province Minas-Geraes, where it bears the name *Tiborna*. The bark is employed as a febrifuge, anti-icteric, drastic, etc.

The *Plumeria acutifolia* Poir. (*P. obtusa* Lour. not L.; *P. acuminata* Roxb.) is native of America, but extensively cultivated in the Indies. The bark has been employed against abscess, gonorrhoea and fevers. The juice has been applied to carious teeth, ulcers and wounds, and is rubifacient and anti-rheumatic.

### QUEBRACHO.

The name *Quebracho* (pronounced *Québratcho*) is applied in South America, especially in the Argentine Republic, to a number of trees of entirely different families having in common an extreme hardness of the wood and being very rich in tannin. Among these we may mention *Cæsalpinia melanocarpa*, *Quebracho rouge* (Leguminosae); the *Machærium fertile* Grisb., or the *Machaerium Tipa* Grisb. (*Tipuana speciosa* Benth.), (Leguminosae). It may be the *Iodina rhombifolia* Hook et Arn, or *Quebracho flojo*, a handsome Santalaceae commonly known as *Sombra del toro*, whose bark is sometimes mixed with that of the *Q. blanco*. The *Quebracho Colorado* is the wood of a Terebinthaceae, the *Loxopterygium Lorentzii* Grisb. The *Quebracho Blanco* is an Apocynaceae, the *Aspidosperma Quebracho* Schlecht [Macagha *Quebracho* H, Bn.).

The discovery of the tree known as *Quebracho Blanco* is due to Burmeister, who considered the two sorts, white and red, but two

varieties differing simply in a few details, among others the color of their wood. Schlechtendal gave to the tree the name *Aspidosperma Quebracho*, but he continued the red sort under the name *A. Quebracho Colorado*. Ten years later, Griesbach recognized in the red *Quebracho* a Terebinthaceae of the group *Anacardium* and assigned the name *Loxopterygium Lorentzii*, in honor of Professor Lorenz, of Cordoba. Many of the specimens arrived in Europe without specific name or precise information as to botanic origin, leading to serious confusion and diverse results in clinical experiments with this important drug.

All the *Aspidosperma* are from tropical America. The *Quebracho* abounds particularly in the Argentine Republic, and more especially in the district of Catamarca. It extends to the south as far as the north of Patagonia. The *Loxopterygium* seems rather to belong to the province of Corrientes.

The genus *Aspidosperma*, Mart. et Zucc., is formed of shrubs or trees of tropical America with solid wood, leaves ordinarily alternate and with small flowers in cymes, with one or two ligneous dehiscent follicles, and with seeds exalbuminous and winged.

The *Aspidosperma Quebracho* is an evergreen tree with very straight trunk, attaining the dimensions of 15 m. in height and 1.20 metres in diameter. The branches are long and flexible, recurving toward the ground, giving the tree the appearance of a weeping willow. The bark, the wood and the leaves are rich in tannin, bitter and astringent.

The bark of *Quebracho*, as collected, dried and shipped to Europe, appears in thick fragments, little bent, nearly flat, evidently collected for the most part from old plants. One writer says that the trees employed are more than seventy years old. These fragments vary in thickness between 1/2 and 3 1/2 cc., and with the suber more or less developed.

The exterior face is very rugose, irregularly marked by deep fissures. The color varies, even in the same fragment, from grayish brown to yellowish-brown, fawn, brick-red, etc., the tint being dull and earthy. The perider, when present, is very tough and frequently bears lichens.

The internal face is finely striated lengthwise, sometimes the striae are sinuous. The color of this face varies also from a steel gray to a much darker fawn or even distinctly rose.

The transverse fracture is short, strongly granular and very stony; with a lens we see the fascicles of fibres come to the surface in the internal region. The vertical fracture shows these same fibres as small white lines. The taste is bitter but not extremely so.

The most interesting elements in the anatomy of this bark are the curious fibres which it bears in great numbers, but always isolated and embedded in the ordinary parenchyma. The fibres are large, elongated, spindle-shaped ; the thickening very considerable in concentric zones and with small clear lumen. Each fibre is surrounded completely by an envelope of small cells forming a single layer, in which each cell contains a large rhombohedral crystal of calcium oxalate.

The chemical composition is extremely complex. The first research was made by G. Fraude, who extracted an alkaloid, *aspidospermine*. Hesse demonstrated the presence of six alkaloids in this bark: *Aspidospermine*, *Aspidospermatine*, *Aspidosamine*, *Hypo-quebracine*, *Quebrachine*, *Quebrachamine*, and a neutral body *Quebrachol*. The *Aspidospermine* of commerce is an indefinite mixture of these various bodies. Tanret thinks that some of these alkaloids are produced in the reactions from the others. He has extracted likewise two new sugars, *quebrachite* and *levogyre inosite*. The bark contains also tannin and starch. According to Huchard the action of *Aspidospermine* appears to be directed especially toward the respiratory centre. It augments the amplitude and then the frequency of the respiration, diminishes and regulates the action of the heart and lowers the temperature. Outside of this action due to the pure *Aspidospermine* all the alkaloids are antithermic, but more especially *Quebrachine*; all color the blood a vinous or currant-red, all cause an increase in salivary, intestinal and renal secretions; all are toxic, especially *Quebrachine* and *Hypoquebracine*. The least toxic is *Aspidospermine*. They cause death by asphyxia.

Quebracho is employed in its native country as a febrifuge, and according to Schikendanz, the physicians of Tucuman esteem it as equal to cinchona, but this reputation has not been justified in Europe. As a tonic it is of less value than many European astringents. Its antidyspnoeic action renders it especially valuable in asthma, emphysema and even in phthisis.

PAO-PEREIRA.—This drug is the bark of *Geissospermum Vellozit* Fr.

Allem. (*Tabernaemontana laevis* Veil., *Vallesia inedita* Guib., *Vallesia punctata* Spreng., *Geissospermum laeve* H. Bn.), a tree of tropical Brazil. It is in flat or slightly-curved pieces, 15 to 20 centimetres long, 1 to 5 centimetres broad and 4 to 8 millimetres in thickness. The external surface is reddish-yellow, more or less fissured, and the internal is generally formed of thin papyraceous layers, having a tendency to strip off. The transverse fracture is difficult and unequal. The odor is very slight. Taste extremely bitter. According to Hesse, it contains two principles, the one Geissospermine crystalline and the other Pereirine amorphous. It is recommended as antithermic, antiperiodic and tonic.

OCHROSIA BORBONICA.—The bark of *Ochrosia borbonica*. Gmel. This tree inhabits Reunion, Mauritius, Ceylon, Java, the Mascarenes, etc., and is commonly known as "Yellow-wood." The bark is ordinarily in pieces, 4 to 6 cm. long by 2 to 4 cm. wide and 2 mm. in thickness.

The external surface is nearly entirely covered with greenish or grayish lichens, is strongly ridged and brownish in color beneath the lichens. The internal face is red to dark brown, striated longitudinally and with the internal layers only slightly adhering. The fracture is clear on the outside, unequal, but not fibrous on the inner layer. M. Boissard has separated from the yellow-wood a shining white substance, crystallizing in fine needles. This substance, named *Ochrosine*, has been studied by Dr. Vinson, who writes it is tonic and analeptic. The bark is employed among the Mascarenes as tonic, stomachic and febrifuge.

HOLARRHENA AFRICANA.—The bark of *Holarrhena africana* A.DC., appeared in commerce under the name of African quinine bark and erroneously also as conessi bark. This bark is employed in tropical Africa, where it is known as "Gbomi," against dysentery. Externally it is brown or blackish gray, suberous and more or less covered with lichens. Internally, fawn or brownish in color, raised in irregular fibrous plates. Fracture coarse, but little fibrous; odor slight and taste bitter.

CONESSI BARK.—Conessi Bark or Tellichery is obtained from *Holarrhena antidysenterica* R.Br. In its native country it has a great reputation and is known there under the name of *Codaga-pala*. The true *Holarrhena* bark is in curved pieces of varying size. Externally it is earthy brown to a light fawn color, irregularly striated with oblique furrows. Internally, the striations are always longitudinal.

The fracture shows an external rose-colored zone, an internal zone with brownish striations. The bark is quite thick. As previously stated it is frequently substituted by products from various species of *Wrightia*, and to this is attributed the unsatisfactory results obtained in Europe. It is largely used in India as a remedy in dysentery. The bark contains the same alkaloid as the seeds, Wrightine.

#### DITA BARK.

Dita or Alstonia bark is obtained from *Alstonia*<sup>1</sup> *scholaris*<sup>2</sup> R.Br., which tree is very common in the forests of India. The remedy was introduced into Europe by Graham, in 1839, and Alexander Gibson, in 1853, contributed an account of the drug. The bark as it enters commerce is in more or less contorted fragments of varying size, and in thickness from 4 to 12 m.m. The external face is frequently marked with blackish lichens and in some fragments the suberous portion is quite thick; the periderm is reddish-brown. Frequently it is marked by large transverse lines and fissures and leaf-scars. The internal face shows a tough grey or brownish-grey zone. The fracture is short, granular, porous but not fibrous and yellowish-white. The microscopic structure shows the suber, (where it remains), formed of cells very regularly piled up in series somewhat tangentially elongated and at times with a reddish-brown contents. Immediately beneath the suber is a layer of small cells, nearly all of which contain a large rhombohedral crystal of oxalate. Beneath this the layers of cells pass insensibly into the fundamental parenchyma formed of irregular, sinuated cells, with walls irregularly thickened and elongated in the direction of their axes. The limit of the liber portions is not very distinct. The medullary rays traverse the parenchyma in a sinuous manner and are formed of 2 or 3 rows of cells. The sclerotic elements are numerous and scattered throughout the external parenchyma and disappearing almost entirely in the liber. The laticiferous vessels on transverse section appear like the other cells except for their granular contents; on longitudinal section, they appear large and distinct.

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1 The genus *Alstonia* was named in honor of Charles Alston, a professor of botany, at Edinburgh, about the middle of the last century. It consists of large trees with verticillate or opposite leaves, calyx without appendages, corolla without crown, stamens included, two carpels containing numerous ovules, two follicles elongated and seeds peltate and are rich in caoutchouc.

2 The specific name *scholaris* was applied to this plant, because in the schools of India school-boards are constructed from planks of this tree, the fine grained wood being well adapted for such purposes.

The first analysis of Dita bark appears to have been by Gruppe, who separated a bitter non-crystallizable substance, which he named *Ditaine*. Gorup Besanez, by Stass' method separated this in a crystallized condition. Hesse and Jobst succeeded in isolating *Ditamine*, an alkaloid, and a closely related body, *Echitamine*. Harnack obtained the *Ditamine* pure by crystallizing from ether under the name of *Ditaine* crystallized, and concluded that this was the only body present. Hesse, as a result of a later complete analysis, described the following constituents, *Echiceric acid*, *Ditamine* (alkaloid), *Ditaine* or *Echitamine* (alkaloid), *Echicaoutchine* (amorphous resin), *Echiretine* (amorphous neutral body), *Echcerine*, *Echitine*, *Echiteine* (non-crystallizable bodies).

Dita bark is greatly employed as an antiperiodic in the countries of its production, where it is even claimed to be superior to quinine and, in a number of intestinal disorders, as diarrhoea, and dysentery, it has given good results. It is recommended in debility and such fevers as typhoid and puerperal, and also as a vermifuge. It is a bitter tonic, stimulant and astringent. The powdered bark is administered in doses of .3 gm. to 1 gm., frequently associated with ipecac or gentian. The 10 per cent. tincture is used in doses 1 to 4 gms.

#### ALSTONIA CONSTRICTA.

The *Alstonia constricta* F. von Mueller (*Tabernaemontana* sp. Mitch.) furnishes the *Queensland Fever-Bark* used to some extent in Europe. The bark in commerce appears to be from branches 10 to 12 cm. in diameter, and is found in curved pieces varying in length from 20 to 30 cm. and about 12 cm. wide. The thickness varies from 7 m.m. to 10 m.m., depending upon the development of the suber. The external face is yellowish-gray, marked by deep fissures. The internal face is brown, finely striated longitudinally. The fracture is granular, short in the periderm, and although quite fibrous in the internal zone, is easily broken; the color is lighter than that of the faces. The odor is very slight. The taste is strongly bitter, slightly pungent and disagreeable. Hesse has isolated from this bark the following alkaloids, *Alstonine* and *Alstonidine*, and *Porphyrine* and *Porphyrosine* possibly alkaloidal. The analysis of Oberlin and Schlagdenhauffer indicates the presence of the alkaloids *Alstonine* crystallized and *Alstonicine* amorphous.

Hesse attributes to *Alstonidine* properties analogous at once to those of



quinine and to nux vomica. The experiments of Bancroft and of Bixby prove that this drug is valuable as a tonic febrifuge and more valuable as a febrifuge than as a tonic, while the *Alstonia scholaris* is more generally employed against dysentery. The *A. constricta* is, however, a good stimulant to the nervous system. As a bitter, it is comparable with gentian. It is ordinarily administered in powder, .5 gm. per day in syrup or in tincture 4 to 8 cc. per day.

## ROOTS AND RHIZOMES.

The subterranean organs, with the exception of the Apocynums of America, are relatively unimportant. They are at times swollen and tuberculous, but more often the roots are ligneous and cylindrical. The cortex presents the same general constitution as that of the stem, with usually an abundance of starch and frequently a diminution of the thickened elements (fibres and sclerotics). The oxalate and the laticiferous vessels are less abundant than in the stem. The pith is ordinarily absent.

**APOCYNUM CANNABINUM.**—The rhizome of the *Apocynum cannabinum* L. is commonly known as the root of the Indian hemp of Canada and as Bowman's root, and also as bitter-root. These vulgar names have caused considerable confusion. The plant is a perennial 3 or 4 feet high, branched with slender branches, opposite leaves, greenish-white corolla, follicles hanging, seeds have a tuft of silky white hairs at the summit. If the plant grows in the shade the bark is green; if exposed to the sun it is brown. The Indians employed it for binding on account of its fibrous nature, and hence the name Indian hemp.

The rhizome is in the fresh state 8 to 18 m.m. in diameter and frequently branched, and is quite soft. The bark is quite thick and clearly distinct from the wood. The horizontal portion is devoid of pith; the other portion possesses a pith more or less developed and rich in latex. If collected in the spring the pith is absorbed, leaving a cavity. It is usually collected in the fall and cut in fragments, and in drying becomes hard, brittle and transversely fissured.

Schmiedeberg has separated two bodies having a cardiac action, similar to Digitalis and to Strophanthus; *Apocynine-resin* and *Apocyneine* a glucoside. To this drug are ascribed diuretic, diaphoretic, emetic, cathartic and expectorant properties.

**APOCYNUM ANDROSAEMIFOLIUM L.**—This plant has also a number of common names, some of which are identical with those applied to the *A. cannabinum*; such as Indian hemp, bitter-root, dogs-bane, milk-weed, etc. It inhabits generally the same region as the latter and in commerce the rhizomes of the two are frequently mixed under the name of *A. cannabinum*. The rhizome is of a reddish color, and more contorted and generally longer and less bitter in taste than the latter. The anatomical structure shows no distinguishing characters between the two species, and their properties appear identical.

**JALAPA.**—The root of the *Echites longiflora* Desf., inhabiting portions of Brazil, Uruguay and the Argentine Republic is said to be purgative, and likewise the leaves. Anatomically the root is remarkable for the regularity of the arrangement of the elements of the wood and bark in radial rows. The names *Jalapa*, *Yalapa* and *Yalapina* are applied in the Argentine Republic to the roots of a number of species of *Echites*.

**THE MADAGASCAR PERIWINKLE.**—The root of the *Vinca rosea* L. is yellowish, quite small and thin, with a relatively thick bark and yellowish wood, and with numerous rootlets. The leaves and roots are both credited with depurative, antiherpetic and vulnerative properties.

**NERIUM ODORUM.**—The *Nerium odorum* Solander, considered by many authors as a species, is probably only a form of *N. Oleander*. It inhabits the western base of the Himalaya mountains extending thence to the eastern part of Persia. The root is considered the most active part, but the bark, stems and leaves are also used. The root is somewhat twisted 15 to 20 c.m. in length, and 5 to 15 m.m. in diameter. The surface is reddish-fawn colored in places, longitudinally ridged with short nearly smooth striations; few rootlets; bark relatively very thin, frequently separated from the wood and formed of two zones.

Greenish has isolated from the roots of *N. odorum* two glucosides *Neriodorine* analogous to *Oleandrine* and *Neriodoreine* analogous with *Digitaleine*: the two principles are bitter and poisonous. In India, a decoction of the stems in oil is applied externally against leprosy and other cutaneous affections, and the fresh juice in ophthalmies. The juice is said to be strongly irritant, and caustic and very poisonous and used for poisonings and suicide.

OPHIOXYLON SERPENTINUM.—The root of the *O. serpentinum* Willd., the *Rauwolfia serpentina*. Benth., is described as quite large 1/2, to 2 c.m. in diameter recurved, sinuate, tapering to the extremity and light brown in color. The section shows a ligneous axis yellowish white and hard, and a thin brown cortex. The odor is slight, taste strongly bitter, disagreeable, alliaceous and nauseous. The cortical parenchyma is filled with starch and the laticiferous ducts contained are filled with a brown substance. According to the investigations of Prof. Wefers Bettnick the root contains a resin, a volatile oil, tannin and a yellow crystalline substance *Ophioxylin*.<sup>3</sup>

The specific name indicates the use to which it is applied in India against snake bites and the sting of the scorpion, being employed internally in decoction and externally in powder. It is largely used as a bitter febrifuge and extensively in febrile intestinal affections: cholera, dysentery, etc. It is also recommended as an anthelmintic and as augmenting uterine contractions in labor.

#### WOODS.

The wood of a number of species of apocynaceae is useful both in medicine and in industrial operations. Those of Africa and neighboring islands appear to be the most important.

STEM OF THE GUACHAMACA.—The *Malouetia nitida* Spruce, *Guachamaca toxifera* Grosourdy is a small tree inhabiting Venezuela. On incision there exudes from the cortex a white latex. The bark is the most active organ, but generally the entire branch is used. Externally it

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<sup>3</sup> The authors of the Pharmacographia Indica report examining this root and finding traces of alkaloid present in extracts made with petroleum ether, ether, alcohol and amylic alcohol, and state as follows:

"At present we do not offer any opinion as to whether the alkaloidal principles we have referred to in the various extracts are identical or not; we are also at present unable to state whether these alkaloids are new or merely principles which have already been described as occurring in other plants of the same natural order. An analysis of the root of *O. serpentinum*, by W. Bettnick, has been published, where no alkaloid is reported to have been found, but a crystalline body related to juglone. We feel convinced that the drug examined by Bettnick was not authenticated. Prof. Eykman has recorded the discovery of an alkaloid in an Indian species *ophioxylina*, and later still (1890) M. Greshoff has found an alkaloid giving a veratrine reaction with Frohde's reagent, thus substantiating our analysis. It is probable that as the root resembles plumbago root. Prof. Bettnick's *ophioxylin* was only *plumbagin*."

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is reddish-gray, ridged longitudinally and marked by leaf scars. The bark is thin reddish, wood is reddish in concentric zones; pith is small and brown. Taste is a little acrid, slightly astringent and not bitter. The cortical parenchyma is rich in resin and contains numerous groups of sclerotic elements.

*Guachamanine* separated by Schiffer appears to approach curare but in action has not been sufficiently studied.

QUEBRACHO.—The wood of the *Aspidosperma quebracho* is extensively used in South America in various industries. It was exhibited for the first time in Europe at the Vienna Exposition in 1873, and again at Paris in 1878. The name *quebracho blanco* is in allusion to the color of the wood and not to the bark. The wood contains but little tannin, and will not answer for the purpose of tanning, but is highly prized by the wheelwright and carpenter.

*Aspidosperma excelsa* Benth, a tree of British Guiana known as "Yaruri," has a light, elastic and solid wood, which is greatly used for the construction of oars.

*Aspidosperma sessiflorum*, Fr. Allem.—This wood is esteemed for building and carpenter-work in Brazil. The juice which exudes from incisions in the bark in drops, is caustic and bitter, and is probably very toxic. It is one of the *satin woods*. A number of trees which in the Brazilian provinces are known under the names of *Peroba* or *Paroba*, are probably obtained from other members of the genus *Aspidosperma*. Brazil appears to be very rich in these species, 39 being described. From the vulgar names it is very difficult to determine the species.

OUABAIA.—This arrow poison of the Somali tribe of Africa is prepared from the wood of an Apocynaceae. The history of this substance is entirely recent. In 1882, De Rochebrune and Arnaud examined this drug, but their investigations were interrupted by lack of material. In 1888, Arnaud isolated from the wood brought from Oriental Africa by Revoil, a crystallized glucoside, *Ouabaine*, and which was proved by Gley to be a heart tonic. Poisson studied the botany of the plant, and showed its resemblance to *Carissa Schimperii*, A.DC., and in the absence of flowers and fruit, classed it provisionally in the genus *Acokanthera*. which G. Don in 1838 had separated from *Carissa* on account of the absence of spines. The plant being named *Acokanthera Ouabaïa*, Poiss.

In 1889, Cathelinau, as a result of microscopic study, concluded that the genus *Acokanthera* agreed with *Carissa*, with but one single exception. Bentham and Hooker likewise considered these two genera as differing but very little, and Dyer thinks they should be reunited. Franchet also identifies the *Carissa ouabaïa*, with the *C. Schimperi*, A.DC., a species found in Zanzibar, among the Somali and in Abyssinia. Finally, M. Max Cornu reunites the plant with the *Arduina*, under the name of *A. Ouabaïa*, M. Cornu.

More recently Lewin has investigated the subject and distinguishes true *Carissa*, while being bitter and containing a glucoside, as inoffensive, while the true *Acokanthera* are toxic. To the three species *A. Ouabaïa*, *A. Schimperi*, *A. Deflersii*, has been successively attributed the veritable *Ouabaïa*.

*Acokanthera Ouabaïa*, Poiss., known under the vernacular names of *Wabet*, *Wabajo*, *Ghedulajo*, according to Schweinfurth, is the accepted species. D. Hanbury and Holmes consider it identical with the *A. Schimperi*. It is a tree attaining a height of 5 metres and inhabiting that portion of the Somali country 1,000 to 1,200 metres in altitude. Schweinfurth states that the leaves of the plant are much thicker than those of *A. Schimperi*, and have three lateral nerves instead of four or five, and are of brown color.

*A. Schimperi* B et H. (*Strychnos abyssinica* Hochst.; *Carissa Mpte* Hochst.; *C. abyssinica* R. Br.; *C. Schimperi* A. DC.) the "Mptah," "Mupta," "Maktat," "Mepti," "Menbtchen," etc., occupies a large surface of oriental Africa to about 1,800 metres altitude. The leaves are entirely glabrous, shining, and flowers without odor, often rose-colored.

*A. Deflersii* Schw. This species inhabits the region in Africa around the Red Sea, and extends throughout Yemen in Asia at an altitude of 600 to 1,000 metres. According to Schweinfurth the leaves are rough in the lower surface, especially the midvein and the flowers are larger and pure white. In these three species the wood appears to be identical.

The drug is constituted of fragments of wood obtained from the stem, but the root is equally active. They attain 3 to 5 c.m. in diameter. The bark is 1 to 1.5 mm. thick, greyish yellow in color with silvery appearance in spots. It adheres closely to the wood, but the suber can be easily scratched off. Externally it is longitudinally ridged and somewhat

scaly. The fracture is brownish, taste is peculiar and persistent.

The wood is very hard and compact, yielding a clear, bright section without pores; the concentric zones scarcely visible; the pith is very small quadrangular and eccentric. The color is a pale yellow and clear on fresh section, deeper ochre-yellow on old surfaces, and quite dense, odorless and having very little taste. Ligneous fibres very abundant; the vessels are relatively few in number and quite small. The medullary rays consist of one or two rows of cells which frequently contain crystals of calcium oxalate. The decoction of the wood yields a green coloration after twelve to forty-eight hours, which lasts for several days. A green fluorescence is also produced by sulphuric acid in either solutions of ouabaine or in decoctions of the wood.

Arnaud, in 1888, separated a white crystallized glucoside, the *Ouabaine*, which is inodorous and not bitter, or but very slightly so in comparison with the wood. Its formula differs from that of Strophanthine by  $\text{CH}_2$ . It has been found by the same chemist in the *Strophanthus glaber of Gaboon*. The wood and the root contain about 3 parts in 1,000.

Lewin has separated from *A. Schimperi* A. DC. a product different from the *Ouabaine* of Arnaud, which he named *amorphous Ouabaine*. He likewise separated an oily substance readily solidified *Carissol*. From the bark he separated impure *Ouabaine*, and a very bitter, non-poisonous substance *Carissine*.

The toxicity of the wood of the *Ouabaia* is demonstrated by usage to be the same as that of the arrow poison. For the latter purpose the aqueous extract is made into balls, and a small amount is spread on the extremity of the arrows; 5 to 10 m.gm. being sufficient to kill a rabbit. The physiological action seems to be similar to that of Strophanthine, only many times stronger. On the conjunctiva of animals it produces anaesthesia, but according to Panas it is inactive upon the human. According to Lewin this anaesthesia of the cornea is much slower but more perfect and durable than that of cocaine. The *Amorphous Ouabaine* is toxic in the dose of 2 mgm. per kilo in the rabbit, and 3 to 5 mgm. in the pigeon. *Carissol* is said likewise to be toxic.

The extremely small dose allowable renders the employment of *Ouabaine* in medicine very difficult. Its use at present appears to be

restricted to the treatment of whooping cough. The dose is one to two-tenths of a milligramme.

CARISSA XYLOPICRON Dup.-Th. The *Carissa coriacea*, Wall.; the Bitter-Wood of Bourbon, *Bois d' absinthe*. The wood appears in the market in pieces with or without the bark, and is used in cups, etc., the same as the wood of *Picraena excelsa* or the *Ochrosia borbonica*. The wood is of an orange or yellowish-white color, odorless, very bitter and a persistent aftertaste, and colors the saliva yellow. It has a reputation as a bitter tonic, febrifuge and stomachic and also as a vermifuge.

### HERBS AND LEAVES.

LEAVES OF THE ROSE LAUREL.—These leaves are at times opposite, but the more frequently verticillate in threes about the young branches. They are rigid, tough and coriaceous, on short petioles. They are lengthily lanceolate, margins entire, attenuated at both extremities, the point acute. The upper face is a deep green, dull; the lower surface is somewhat brighter. The midvein is prominent with numerous very fine secondary veins. The leaves are quite acrid and bitter.

According to Schmiedeberg they contain three glucosides, *Nerein* which he considered identical with *Digitalein*; *Neriantin* and *Oleandrin*. The therapeutic action appears to be that of a heart tonic and more distinctly diuretic than *Digitalis* without accumulation, and is likewise said to be useful in dyspnoea, oedema and palpitations. It is likewise frequently used in certain cutaneous affections as an antipruritic and parasiticide.

PERIWINKLES.—The various species of *Vinca* that are recognized as interesting medicinally are *Vinca minor* L., *V. major* L., *V. media* Link et Hoffm., *V. acutiflora* Bertol., *V. herbacea* Waldst et Kit. These may be substituted one for the other without any great disadvantage, but the two first mentioned are the most important. They are said to be bitter and astringent and serviceable as vulneraries and are slightly laxative. They have also been recommended in leucorrhoea. No active principle has yet been isolated.

ALLAMANDA CATHARTICA L., all the *Allamanda* are energetic evacuants. The *A. cathartica* is a native of Guiana, where the leaves are commonly employed as a purgative. The *A. Schottii* Pohl. of Brazil has similar properties.

ECHITES SUBERECTA Jacq.—A plant of the West Indies, especially Jamaica, and introduced into the Bahamas. Bowrey has analyzed the plant and isolated *Urechitine* a very toxic, crystalline glucoside; *Urechitoxine*, likewise a toxic glucoside, acrid and crystalline or amorphous. These two bodies are extremely active cardiac poisons and their therapeutic application does not appear permissible. The plant is stated to be used for criminal poisonings by the negroes.

The leaves of the *Echites biflora* Jacq. of Central America and the Antilles is stated to be purgative and applied topically to scrofulous ulcers. The leaves of *Echites longiflora* Desf, of the Argentine Republic are strongly purgative and in infusion are employed against haemorrhoids and used also in cataplasm.

ASPIDOSPERMA QUEBRACHO Schlecht.—The leaves of this tree are verticillate in threes, deep green, lanceolate, subsessile, coriaceous, smooth and terminated as in many of the species of this genus by a sharp point. They are said to contain 27.5 per cent. of tannin and to be employed in the industries.

GEISSOSPERMUM VELLOSI Fr. Allem.—The leaves of this plant are extremely bitter. They contain *Pereirine*, but in less quantity than the bark and seem to be but little used. They are lanceolate, attenuated at the base and short petiolate and prolonged into a long point at the summit; borders undulate, entire; the surface smooth and shining ; greenish or brownish, brighter but less glossy beneath.

#### CAOUTCHOUCS AND GUTTAS.

The products formed by coagulation of the latex of the apocynaceae nearly all caoutchoucs, but some are true *guttas*<sup>4</sup> The number of apocynaceae containing caoutchouc is considerable, but only in comparatively few are the products utilized or of commercial importance.

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<sup>4</sup> Caoutchouc and Gutta Percha are two substances very similar, differing only in a few points. At the ordinary temperature Caoutchouc is elastic, Gutta is solid. On warming, the caoutchouc becomes adhesive, but remains elastic; the gutta becomes malleable and plastic, but not elastic. With prolonged action of heat and air caoutchouc is transformed to a sort of pitch, gutta becomes brittle and resinous. Ether readily dissolves caoutchouc, and is a poor solvent for gutta; with oil of turpentine the solvent action is reversed. Sulphur combines readily with caoutchouc and but poorly with gutta.



They are, for the most part, obtained from the stems of climbing plants. The solidification is sometimes allowed to take place naturally, but generally by concentrating by exposure to the sun or by fire. Rapid coagulation has the advantage of preventing from the beginning injurious fermentation, which develops disagreeable odors in the caoutchouc and alterations, and yields a product harder, more dense and containing less water. Coagulation can also be produced by chemical means, as by acids (sulphuric, nitric, tartaric or lemon juice, etc.) or by sodium chloride, sea-water, alum, etc. Coagulation by heat is usually preferred, and during the operation it is necessary to strongly compress the product.

For the most part the American caoutchoucs are excellent for industrial purposes; their resistance, their toughness and their considerable hardness is much appreciated, and equatorial America furnishes alone the best caoutchouc for all the rest of the world.

All the caoutchoucs of Mexico, Central America, Columbia Guiana, Ecuador, and likewise a large part of that from Brazil, are exclusively furnished by Euphorbiceae (*Hevea*, *Siphonia*, etc.) or by Urticaceae (*Castilloa*, *Cecropia*, etc.) The *Hancornia speciosa*. Gomez is, with one or two closely allied species, the principal caoutchouc yielding Apocynaceae of America. It yields the varieties known as *Pernambuco caoutchouc*, *Maranham Caoutchouc*, and *Bahia Caoutchouc* The first appears in plates varying in thickness from 0.5 to 7 c.m., of a rose color and an efflorescence of alum on the surface. Its quality is very inferior to that of Para or of the Malay caoutchoucs. The Maranham Caoutchouc is deeper in color, like wine-lees, with brown marbling. The surface is smooth, non-erflorescent, harder and less porous, and contains less water. It is probably coagulated by sulphuric acid. The Bahia Caoutchouc is said to be produced from the variety *minor* of *Hancornia*. It is rare and of but little value, possessing none of the excellent qualities. It contains much water and foreign substance and a certain quantity of non-solidified latex. It is in masses or large plates, rose-colored, and is probably prepared by spontaneous coagulation.

The caoutchoucs of Africa are furnished almost exclusively by two genera of Apocynaceae, the *Vahea* and the *Landolfia*, which many botanists consider under one genus. A few *Ficus* and some *Asckpiadese* may produce a little of the gum elastic, but generally this is not appreciable and the true caoutchoucs of Africa are furnished by these

Apocynaceae. The *Vahea tomentosa* Leprieur, furnishes a large proportion of the Senegal caoutchouc. The *V. Senegalensis* A. DC. likewise is said to yield a large quantity. These lianes are of small diameter and greatly entangled and the most usual method of collection is to cut them and collect the juice, which flows very rapidly. Each plant yields 3 to 4 kilos of caoutchouc. The solidification is accomplished by water containing acids or salt in solution. In the interior of the continent, the coagulation seems to be accomplished by sun heat and the product made into balls with ashes. This caoutchouc enters commerce generally in plates weighing 130 to 150 gm. blackish externally, and grayish within and containing a large proportion of water, or in balls, more highly esteemed and freer from impurities, varying from 8 to 60 gm. and united in groups of from 15 to 20, and these are of a rose color.

The *Landolfia Heudelotii* A. DC. and the *L. Owariensis* Pal. de Beauv., are important as caoutchouc producing plants. They inhabit the western side of tropical Africa and the latter plant is said especially to produce the caoutchouc from Sierra-Leone, which appears in balls, mostly of a slate color internally. The *Landolfia florida* Benth, occupies an altitude of 2,500 feet and is found also in Mozambique and is the source of a large amount of caoutchouc. The caoutchouc of Gaboon is undoubtedly derived from the two last-named plants. It appears in masses, white upon cutting, quite consistent, containing much water and but little foreign matters. It is readily purified and then remains firm and resistant. It is estimated that from the French colonies there is annually exported 400 tons. The *Landolfia Kirkii* occupies the oriental regions of Africa, especially Zanzibar and Mozambique, being the "Matire" or "Mtiri" of the natives. It is the most important species of this region and its latex solidifies spontaneously so readily that artificial coagulation is unnecessary. The exportation of this product in 1879 was valued at 1,125,000 francs. The *L. Petersiana* inhabiting the same region is characterized by an extremely fluid latex, the coagulation being secured by acids or by fire.

The caoutchoucs of Madagascar are furnished by *Vahea mada-gascariensis* Boj. *V. gummifera* Lamk, and *V. Comorensis* Boj.; and are coagulated by acids, lemon juice being mostly used.

In India several species of *Willughbeia* are said to yield caoutchoucs. The *Alstonia scholaris*, the source of Dita bark, is said to yield a gutta of

poor quality. In the region of Indo-China a number of species yield caoutchoucs generally of little value.

The only *Apocynaceae* of Oceanica important in this respect is the *Urceola elastica* Roxb. This plant and the Asclepiad, *Calotropis gigantea* furnish nearly all of the caoutchouc of Borneo and is likewise known as white Assam caoutchouc. The *Urceola* is a tree about 10 c.m. in diameter and the latex is extracted by making a V-shaped incision as far as the cambium.

## **PINEAPPLE CULTIVATION IN THE INTERIOR OF FLORIDA.**

The question is frequently asked us: "Can pineapples be successfully grown in Lake County?" We unhesitatingly answer, they can. Many are grown, but generally in small patches, here and there, of which little is known except to the individual growers; yet sufficient to demonstrate the adaptability of our soil, and showing that with the same treatment they require elsewhere success is equally certain. We give below a few facts concerning the plant and the mode of culture in the interior of the State.

Although the lower Indian River and Lake Worth region is the great pineapple district of Florida, yet there are other portions of the State where much attention is now being given to pineapple culture. In the vicinity of Orlando the industry has probably made the greatest advancement, although possessing no greater natural advantages than many other portions of South Florida. The best results are reached in this region by growing the plants under a grating cover, which affords protection from occasional frosts and strong winds, and shuts out some of the summer sunshine. The cover is made of narrow boards placed a few inches apart on stringers and supported by posts at an elevation sufficient to allow persons to walk upright under it. The sides of the sheds on the north and west are weather-boarded in order to further protect the plants from cold winds. The cost of such sheds varies from \$300 to \$500 per acre.

Near Orlando there are three large pineries—Russell's Fairview and Modela Park. The latter is the largest covered pineapple field in Florida, and probably the largest in the world. It contains six acres and about 60,000 plants.

Pineapples grown under cover average much larger in size and have a better flavor than those grown in plantations, and hence command a better price. They generally net the shipper from 15 to 30 cents each. Six thousand apples sold from the Fairview pinery last year brought \$1,200. The suckers, however, produced by this pinery, which are in great demand for planting, were much more profitable, nearly \$8,000 having been realized from their sale.

While the pineapple ripening season in the Indian River region is from April to September, in interior Florida it is not strictly confined to these months, as, under cover, the flowering, and hence the fruiting of the plant, can be to some extent controlled. There is hardly a month in the year when ripe apples cannot be picked from the covered pineries. Grounds bordering lakes are favorite pinery sites. The plant requires frequent fertilizing to insure good and large fruit. Cotton seed meal is considered one of the best fertilizers for pineapple plants.

A few facts concerning the pineapple plant botanically considered may add interest to this article. Not many years ago many people who had not studied the subject thought that it was a parasite growing on pine trees, and that the fruit was grown in its aerial position. This idea may be accounted for by the fact that the fruit resembles the pine cone (it was so named from this resemblance), that the pineapple belongs to the botanical family, Bromeliaceae, of which the long moss is a member, and that botanists say that all plants of this family are capable of "living on air alone." The pineapple plant has long, serrated, sharp-pointed rigid leaves, springing from the root of the plant, and from the centre of the leaf cluster a short flower stalk growth, bearing a single spike of flowers and a single fruit. In the development of the fruit each flower and the bract accompanying it become thickened and fleshy, and this causes a crowding or growing together of the mass forming a single fruit covered with berry-like projections—the withered tips of the remaining petals. It is these petal tips that give the fruit the appearance of being covered with eyes. The plant grows to the height of from three to five feet.