

1894

Columba from Colombo &
Weddell on Lichena omitted

Thesis
On
the History
of some of the
Vegetable Tonics.
by
William Robinson Hill.

Thesis &c,

Before proceeding immediately to the subject of which I am to treat, it may perhaps be as well to give a short definition of the word Tonics, as applied to medicines. It is the name given to a class of remedies (from *tonos*, a tone) which heighten the tonicity of various structures of the body. Stimulants in some cases very much resemble tonics in their action, such as *Myrrh*, *Cascarilla* &c, which are both stimulant & tonic, but they must not be confounded together. The main difference between them lies in the fact, that the action of stimulants is immediate & for the time, intense, but soon passes off, while that of tonics is slower & more permanent. The effect of stimulants taken into the stomach is to quicken the digestive functions, whereas tonics render them stronger by slow degrees & for a longer period. The muscles are excited to action to a great degree of strength & frequency for a short period by alcoholic or other stimulating draughts, but they are left in greater weakness & depression after the primary effect has passed off. Tonics, on the other hand, restore the muscular fibre to its wonted

(a) Principles of Medicine. p. 92. 2nd edit.

(b) Ditto p. 93.

(c) Ditto p. 97.

degree of tension slowly, but more certainly, & maintain it in that state. The following is the definition given by ^(a)Billings; "Tonics are substances which neither immediately, nor sensibly, call forth actions, like stimulants, nor repress them, like sedatives, but give power to the nervous system to generate or secrete the nervous influence, by which the whole frame is strengthened.

The action of tonics (which can be traced to their effect on the nervous system) is gradual. ^{"(b)"} We must observe this difference; tonics give strength, stimulants call it forth; a man may be very strong without putting forth his strength ----- Stimulants excite action, but action is not strength;" & again he says ^(c) "The term tonic is applied to all those medicines, which cure chronic inflammation, without being either stimulant or directly sedative or depletory". Tonics are included by Dr. Pereira under his 6th class of pharmacological remedies, these are Neurotics, or remedies acting on the nervous system. This class he subdivides into two sub-classes, Cerebrospinals & Ganglionics. The Cerebro-spinals he divides into four orders; Phrenica, Esthetica, Cinetica & Hypnetica. The Cinetica or agents affecting the voluntary or reflex-spinal movements he again divides into sub-orders, of which the first, Tonica, agents which increase

the tone of the system, or, rather, the vegetable portion of it, is to be the subject of this Paper, They are derived ~~at most exclusively from this vegetable & goggetly thing~~ and I now proceed to the history of those tonic remedies which are supplied by the vegetable kingdom.

The Radix Calumbæ is the perennial root, consisting of several fasciculated, fleshy, fusiform tubers, of a plant called Cocculus palmatus by De Candolle, or Menispermum palmatum of Lamarck, belonging to the Linnean class Diacia & order Hexandria and to the natural order Menispermaceæ. It takes its name from Colombo, a town in Ceylon, from whence it is exported - Its native habitat was supposed to be in Asia by Dr. Percival, but Dr. Pereira says it is now known to be the produce of the thick forests on the shores of Obo & Mozambique, as well as inland for 15 or 20 miles. The root, as imported into England, is in slices cut transversely, being from $\frac{1}{4}$ to $\frac{1}{2}$ an inch thick & from 1 to 3 inches in diameter, each surface being somewhat concave on account of the greater shrinking of the medulla, when drying, which is of a more porous & spongy texture than the ligneous portion. It is of a dusky yellow colour covered with a dark-brown, slightly wrinkled bark. In many of the pieces small holes are found which were

made for the purpose of drying them. It is ^{very} bitter to the taste, possesses no astringency, & is considered to be one of the best tonic remedies.

Botanical Characters. Flowers unisexual, dioecious. Calyx of 12 sepals in 4 series, with 2, 3 or more bracteoles. Males: - stamens 6, or rarely 3, opposite to the inner sepals, distinct; anthers - 2-celled, terminal, dehiscent vertically; filaments either filiform, with the anther-cells horizontal, approximate & each externally 2-lobed, or thickened at the apex with the cells divaricating downwards & separated by the connective. Females: - ovaries 3, 6 or numerous; drupes 1-6 or numerous, 1-celled, 1-seeded; peduncles axillary, or rarely lateral; leaves cordate at the base, 5-7 lobed, lobes entire, acuminate. Stems & ovaries clothed with glandular hair. (Lindley & De Candolle).

Chemical Characters. The salts of iron produce no effect on an infusion of calumba, but there is a root called American Calumba, which is sometimes mixed with the true calumba & from which it may be discerned by becoming dark-green on the application of a salt of iron. An infusion of galls produces a copious grey precipitate with an infusion of true Calumba root & produces no effect on the American Calumba. The following is the

analysis of the Radix Calumbæ by Planché.

Bitter matter	13
Animal matter	6
Volatile Oil	atrac
Gum	9
Starch	33
Woody Fibre	39
	100

The true & false Calumbæ may further be distinguished by the fact that the genuine root contains a large quantity of starch, about $\frac{1}{3}$ of its weight, while the false contains none, this may be proved by touching them, when moistened, with tincture of iodine, by which the former becomes black, but the latter is not changed.

Uses. In Dr Percival's experiments on this root he found that it was very useful in a languid state of the stomach for restoring its vigour, & also in vomiting, especially bilious vomiting, & to this it is that he ascribes the benefit that has been sometimes derived from its use in Cholera morbus. He also found it useful in diarrhoea & dysentery. "In Germany it is denominated Ruhrwurzel, i.e. Dysenteric root." (Pereira)

Preparations and Doses. The root is given in powder in doses of from ~~8~~ to ~~xxx~~ grains. The preparations are Infusum Calumbæ & Tinctura Calumbæ, of which the doses are 3j or

Wine and Chamber

3ij of the former & 3ss to 3j of the latter.

Radix ~~Pikatanhia~~. For the introduction of this root into medicine we are indebted to the celebrated Ruiz who discovered it in 1779 & during a sojourn in Peru made himself acquainted with its properties, in which he was confirmed shortly after by several French practitioners (Fée). It was not however till the year 1808 that it was introduced into England by Dr. Kcece. It grows in Peru in dry places on the sides of hills, especially near Huanuco, Castambo, Huamalis & Tarma, & takes its name from a Peruvian word signifying a climbing Plant. It is the root of a plant known by the botanical name *Krameria Triandria*, belonging to the Linnaean class *Tetrandria* & order *Monogynia*, & to the natural order *Polygalaceae*. It is a woody, branching root varying in size, the medium being that of a goosequill, in pieces generally about a foot in length. The ligneous part is hard & very tough, being of a paler colour than the bark, which is reddish-brown & contains the greatest amount of bitterness & astringency.

Botanical Characters. Sepals 4 or 5, irregular, coloured, spreading, deciduous, Petals 4 or 5 irregular, smaller than the calyx. Stamens 1, 3 or 4 hypogynous, unequal. Ovary 1-celled, or incompletely 2-celled. Style terminal, stigma simple; ovules in pairs, suspended. Fruit between hairy &

leathery, globose, covered with hooked prickles. Leaves alternate, simple, entire or 3-foliate. Racemes simple. Leaves oblong, somewhat acute, villous-silky. Pedicels somewhat longer than the leaf, forming a short raceme. (Lindley & De Candolle).

. Chemical Characters. The analysis of this root by C.G. Genelin is as follows:

Tannin	38.3
Sweet matter	6.7
Mucilage	8.3
Nitrogenous matter	2.5
Lignin	43.3
Loss	0.9
	100.0

By this analysis it is seen that woody fibre exists in large quantity in this root, as also tannin, the presence of which in the form of tannic acid is indicated by the formation of a precipitate, which the infusion of ratanhy root forms with a solution of gelatine or with sesqui-chloride of iron. Peschier, of Geneva, in his analysis of the root, mentions an acid, Krameric acid, to which it owes its stypticity, but M. Chevallier says that he could not discover this acid, although pursuing the process indicated by Peschier. (Fée).

Uses. Ratanhy root is generally used in profuse discharges, as mucous discharges, or in hæmorrhage; it is also

employed sometimes as a tooth-powder to strengthen the gums, its astringency being of more importance than its tonic properties.

Preparations & Doses. It is given sometimes in powder the dose being from ~~℥~~ to ~~℥℥℥~~ grains. The preparations are Infusum Krameria, dose 1 or 2 oz, & the Extractum Krameria, of which the dose is ~~℥~~ on ~~℥℥~~ grains.

Cortex Angusturae or Cusparia was first brought from St Domingo in 1778 & was then supposed to be the bark of the Magnolia glauca (L'ée). Humboldt & Bonpland afterwards decided that it was obtained from a large tree, which forms immense forests, near the Orinoco, in South America. In 1802 it was called Bonplandia trifoliata by Willdenow; Humboldt named it Galipea Cusparia, but Dr Hancock says it is obtained from another species of the same genus, viz: Galipea officinalis, which is a shrub never more than 2 feet high, growing south of the Orinoco, whereas the former grows to the north of that river. (Christison). It belongs to the Linnaean class Diandria, order Monogynia, & to the natural order Rutaceae. This bark is sometimes adulterated with another bark, long erroneously supposed to be the bark of Brucea ferruginea, but Dr Christison & others ascertained it to be the bark of Strychnos Nux Vomica. At one time serious results from this adulteration were not

unfrequent on the continent. It is known by the little tubercles on its surface & the peculiar ochreate efflorescence it presents.

Botanical Characters. Calyx short, 5-toothed. Petals 5 united into a salver-shaped corolla or closely approximating. Stamens 4-7, unequal, sometimes all fertile, commonly 2 antheriferous, 2-5 shorter, sterile. Rectary cupuliform. Styles 5, afterwards combined into one. Carpels 5. Seeds solitary by abortion. Leaves alternate, simple or plurifoliate. Leaflets oblong, acuminate. Peduncles axillary, many-flowered.

Chemical Characters. The true Angustura bark communicates its bitterness to water, alcohol, ether & to the essential oils. Its infusion is precipitated by sulphate of iron, tartarate of antimony & sulphate of copper, but not by gelatine nor ammonia. The following are the analyses of the true & false barks, the former by Fischer, the latter by M. M. Pelletier & Caventon.

True Bark

False Bark

Volatile Oil	0.3	Gallate of Bruciz
Peculiar bitter principle	3.7	Fatty matter
Bitter hard resin	1.7	Gum (a considerable quantity)
Balsamic soft resin	1.9	Yellow coloring matter & alcohol.
Elastic resin	0.2	Sugar (traces)
Gum	5.7	Woody fibre
Lignin	89.1	

Uses. It has been thought by some to be superior even to cinchona in intermittents & remittents, especially those forms of bilious remittents which occur in hot climates; this supposition however is not fully established. It is also used in general debility of the stomach & intestinal tube, & in chronic diarrhoea & dysentery.

Preparations & Doses. The powdered bark is given in doses of $\mathbb{I}$ grains to 3fs. Its preparations are the Infusum Cusparia, dose from 3fs to 3ij, & the Tincture.

Cortex Radicis Simarubae, or Simaruba bark is the root-bark of a tree called Simaruba officinalis by De Candolle, & *S. amara* by Aublet, Nees von Esenbeck & Lindley. This bark is brought to England in long, folded pieces, being light, fibrous, & very tough, it is brownish-yellow, lighter on the surfaces than in the middle, possesses no odour, but is very bitter to the taste. It comes from Jamaica, Cayenne, the Caribbee Islands & America, its name being derived from an American word. It belongs to the Linnaean class Decandria, order Monogynia, & to the natural order Simarubaceae.

Botanical Characters. Flowers unisexual; calyx small, cup-shaped, 5-toothed or parted; petals 5, longer spreading. Males: - stamens nearly equal to the petals

arranged around a receptacle bearing at its apex 5 very minute lobes (rudiments of ovaries). Females:- ovaries 5 placed on an even disc surrounded at the base by 10 short hairy scales (rudiments of stamens). Styles 5, short; stamens 10; leaves abruptly pinnate; leaflets alternate, somewhat stalked, pubescent beneath. (Lindley & De Candolle).

Chemical characters. The analysis of this bark which I here give is by Morin. It contains resinous matter, volatile oil, having the odour of Benzoin, acetate of potash, an ammoniacal salt, malic acid, traces of gallic acid, malate & oxalate of lime, Quassin, some mineral salts, oxide of iron, silica, ulmin & lignin. According to Pfaff mucilage constitutes $\frac{1}{4}$ of the bark, but this is not noticed in Morin's analysis. Quassin or Quassite is the active principle to which Sinaruba bark owes its medicinal properties.

Uses. Altho' not much used in the present day, it was formerly celebrated in the treatment of dysentery. It may be likewise employed in intermittents, dyspepsia & the advanced stages of diarrhoea. In large doses it proves an emetic, whence it was classed with emetics by Richat & Desbois de Rochefort.

Preparations & Doses. The dose of this bark in powder in which form it is difficult to obtain it on account of its exceeding toughness, is from ℥ to ℥℥℥ grains. The Infusum Sinarubæ

is the only preparation. $\mathfrak{Z}$; or $\mathfrak{Z}ij$ are given as a tonic.

Lignum Quassia is the wood of a tree called *Picroena excelsa* & is imported from Jamaica & Surinam in large pieces several feet in length. Formerly it was obtained from the *Quassia amara* of Linnaeus, by whom it was first made known in Europe in the year 1760, its properties as a febrifuge having been discovered & communicated to Dahlberg by a Negro called Quassi; hence Linnaeus denominated the tree *Quassia*. It belongs to the same Linnaean class & order & to the same nat: ord: as the *Simaruba officinalis* before described. The wood is of a whitish colour, slightly tinged with yellow; it is light, hard & tough, covered with a thin pale greyish-coloured bark.

Botanical Characters. Flowers polygamous. Sepals 5, minute. Petals 5, longer than the sepals. Stamens 5, rather shaggy; anthers roundish; ovaries 3; style 3-cornered, bifid. Stigmas simple, spreading. Fruit 3, 1-celled, bivalve drupes. (Lindley)

The *Quassia amara* or true *Quassia* is distinguished from the *Picroena excelsa* by the following botanical characters. The flowers are hermaphrodite. Petals united. Stamens 10. Ovaries 5.

Chemical Characters, There has been no perfect analysis as yet of this wood, but according to Dr Pereira, its prin-

(m) Pereira, *Materia Medica*. vol:ii. p. 1640. 2nd edit.

cipal constituents are; volatile oil, a bitter principle (quassite) gummy extractive, pectin, woody fibre & various salts, as, oxalate, sulphate & tartrate of lime, chlorides of calcium & sodium, an ammoniacal salt & nitrate of potash. Quassin or Quassite to which both the Simaruba bark & this wood owe their bitterness & properties is ⁽⁹²²⁾ obtained by adding lime water to a concentrated aqueous decoction of quassia (to separate the pectin &c) evaporating & treating the residue with alcohol which takes up the quassite, a brown colouring matter & some salts. By repeated solution & evaporation in alcohol with a little ether, the quassite is obtained pure. It occurs in small white prismatic crystals, which are fusible, odourless, intensely bitter, readily soluble in alcohol, but very slightly so in water or ether."

Uses. Quassia is a pure bitter possessing no astringency & as such is used as a stomachic & tonic to promote digestion. It has also been employed in intermittents, but being inferior to cinchona & other tonics, it is seldom used as a febrifuge.

Preparations & Doses. The preparations of Quassia are the Infusum Quassiae, the Tinctura Quassiae & Tinctura Quassiae Composita, the dose of the Infusion being from ℥j to ℥iij, of the simple tincture ℥ss to ℥ij, & of the compound tincture ℥j or ℥ij.

Lignum Hamatoxyli, or Logwood, is the heart-wood of a tree called Hamatoxylon Campechianum, its generic name

being derived from the words *αἷμα*, blood & *ξύλον*, wood, on account of its red colour, and the specific name indicates its native country, viz Campeachy in the province of Yucatan, Central America. It is also imported from Jamaica & other islands of the West Indies, where it has been introduced & become naturalized. The Albuminum or sap-wood, which is white, is stripped off, & the heart-wood alone is sent to England, in billets of about 3 feet in length, of a brownish colour outside & red in the interior. It is a hard, compact wood & bears a fine polish, sweetish to the taste, but slightly styptic & of a pleasant odour. It belongs to the Linnean class Decandria, order Monogynia & to the nat. ord: Leguminosae.

Botanical Characters. Sepals 5 united at the base; the lobes deciduous, oblong, obtuse. Petals 5. Stamens 10; filaments hairy at the base, anthers without glands. Style capillary. Legume compressed flat, lanceolate, 1-celled, 2-seeded. Seeds transversely oblong; cotyledons 2-lobed. (De Candolle).

Chemical Characters. A decoction of Logwood yields a blue precipitate with acetate of lead & lime-water, & a violet precipitate with alum. Its colour is changed to a deep violet-blue by salts of iron & by the alkalis. Chevreul, who analysed the root in 1811, gives the following as its constituents: - Volatile oil, lignin, oxyde of manganese, tannin, oxyde of iron, alumina,

phosphate of lime, brown colouring matter, animal matter, hæm-
tin, acetic acid & some salts.

Uses. Logwood was introduced into medicine by Pringle
& Aleton, as a tonic & astringent in diarrhoea & dysentery.

Preparations & Doses. The Decoctum Hæmatoxyli is given
in doses of ℥j or ℥ij; being mild in its action it is useful for
children for whom the dose should be from ℥j to ℥iv. The dose
of the Extractum Hæmatoxyli is from gr. x. to 3℥.

Cortex Cinchonæ. In consequence of the conflicting
statements of authors & the vast discrepancies that exist in their
writings with regard to the cinchona tribe, whether as to the dis-
covery of the medicinal properties of their bark, or as to the num-
ber of the distinct kinds of bark found in commerce, or as to the
number of the distinct species of the cinchona family that yield
those various kinds, it is a very difficult task to give an accu-
rate, connected & methodical account of this the most important
& most useful of febrifuge remedies.

As an example of the difficulties wh^{ch} I encounter, I
may state that with regard to the number of species which
produce cinchona bark, Mutis states that there are 7, Zea
reduces them all to four, Lee mentions 23 well-known species
& 15 which are less known and somewhat doubtful, De.

Candolle admits only 15 altogether, & Lindley describes ~~21~~
21 known species & 6 which are imperfectly known.

X. Weddell?

It is a pretty well established fact that the properties of Cinchona were first known by the Europeans in the year 1640, but how they were discovered & by whom remains a mystery. Some maintain that the Indians were well acquainted with the bark as a febrifuge long before the Spaniards visited America, & that they discovered its properties by an Indian afflicted with ague, who drank the water of a pool, in which some Cinchona trees were lying & found relief, but from hatred to the Spaniards they kept it a secret. Others deny this; L'ée asserts that the Indians, who called it Kina or Kinkin, hardly ever made use of it as a febrifuge, but ranked it amongst poisons & for a long while thought that we used it only as a dye. Humboldt thinks that it was discovered by the Jesuits who, according to their custom of distinguishing trees, chewed the cinchona bark & perceiving its bitterness, used an infusion of it in tertian agues. This tradition (he says) is still current in Loja, where agues are very common. L'ée mentions another tradition, that the Countess of Chinchon, wife of the Viceroy of Peru, having experienced the good effects of the bark as a febrifuge in 1638, brought some of it to Europe in 1640. Hence it was called Pulvis Comitissae (the Countess's powder). Of the truth of this statement L'ée does not seem to be quite convinced. Dr. Pereira does not think it an improbable story, but Guibourt

asserts it as a fact concerning which he entertains no doubt, and he also says that the genus Cinchona takes its name from that of the Countess of Chinchon.

It was not however till the year 1649, eleven years after the above-mentioned occurrence, that it came into general use in Europe, at which time the Jesuits in Rome received a large quantity from their brethren in Peru, & distributed it always in powder in order to keep its origin a secret; it was therefore called Jesuit's powder. It was afterwards taken up again by Sir Robert Talbot or Talbot, who likewise made a secret of it & used it first in England & afterwards in Paris with great success. It was from him called Talbot's powder. Louis XIV. having heard of the celebrated powder, bought it of Talbot at a great price & made it known to the world. Little was known however at this time of the tree which produced the bark, until La Condamine, who was sent to Peru for scientific purposes, made himself acquainted with it & published an account of it in 1738. The barks which are found in commerce are arranged according to their colour under three heads; Grey, Yellow & Red Cinchonas, of each of which I shall give a short description. The Grey cinchonas are those in which the epidermis is of a greyish colour, generally covered with cryptogamic parasites. They occur always in quills more or less rolled upon themselves, fibrous in structure, being very

astrigent & moderately bitter to the taste, yielding a pale, yellow-greyish powder. They contain a large quantity of ~~the~~ cinchonine & tannin, but little or no quinine. The quills of the Yellow Cinchona are generally larger than those of the grey. It occurs sometimes in flat pieces. Their epidermis is yellow, likewise covered with lichens, mosses &c. Their texture is more fibrous & they possess more bitterness & less astringency than the pale barks. The yellow bark contains a large quantity of quinine & little cinchonine; it contains likewise a large amount of lime in the form of salts, which is immediately precipitated by sulphate of soda. The Red cinchona bark seems to occupy a middle place between the grey & yellow barks. Its structure is more fibrous than the grey & less so than the yellow. It contains both quinine & cinchonine, & is astrigent and bitter to the taste. Under the head of grey barks are included three sorts in English commerce, the Cinchona Corona, Crown or Loxa bark; the Cinchona Guanaco, the grey or silver cinchona; & the Cinchona Jaen, ash cinchona; Guibourt includes likewise under this head the Cinchona Guamalis, Guamalis or Rusty bark.

Crown bark or Quinquina gris-brun de Loxa, is the bark of Cinchona condamnica. It occurs always in quills varying in size from 4 to 10 inches in length & from $\frac{1}{2}$ to $\frac{3}{8}$ of an inch in thickness. The epidermis is wrinkled with transverse

pieces, of greyish-brown colour generally whitened by cryptogams. The Loza bark was the first kind which was known in Europe. Condamine says that "the best quinquina, at least the most celebrated, is gathered in the mountains of Cayamuna, situated 22 leagues south of Loza, & it was from thence that the first which was brought to Europe was derived". It received the name of crown bark from the fact of its being used by the royal family of Spain. Packets of it were found in a Spanish galley taken in 1804 marked "Para de la real familia;" i.e. "for the royal family." (Pereira). Doubts have been entertained by some as to whether the bark now known in commerce by the name Loza & Crown is the same as that which was thus formerly distinguished; Dr. Pereira says that Gayne has pointed out some difference between the Loza bark of commerce & a bark found in Humboldt's collection marked Quina de Loza & which has been collected from the Cinchona Condaminea.

The Cinchona Quaqueo, grey or silver cinchona, called Quinquina de Lima by Guibourt, & Cinchona cinerea by the Edinburgh Pharmacopoeia, is the produce of the cinchona micrantha, according to Pereira, the *C. lanceifolia* of Mutis according to Lée, the *C. lanceolata* according to Guibourt, & by some others said to be the produce of *C. glandulifera*.

(2) *Pharmaceutical Journal*. Aug: 1882

The description of this bark is very similar to ^{that of} Crown bark, the quills being a little larger & the bark itself thicker. It is also more bitter, on which account it is superior to it, but since the year 1815 it has almost ceased to be distinguished on account of the negligence of collectors & merchants in keeping them distinct. The edges of the perfect quills may be seen to be cut obliquely, done probably in stripping it from the tree (Pereira). M. Guibourt distinguishes four varieties of this bark, the *Quinquina gris-fin de Lima*, of wh. the quills are small & the epidermis thin, The *Quinquina Lima blanc*, the *Quinquina gris Quanaes* & the *Quinquina gris imitant le jaune royal*.

The *Cinchona Jaen* or ash *Cinchona* was called by Guibourt, *Quinquina de Loja cendré*, who supposed it to be a variety of *Loxa* bark. It occurs always in quills which are never larger than the little finger, characterized by their remarkable crookedness, being more or less arched ~~and~~ and twisted, & by the number of lichens which cover them. This bark is said by Mr. J. Howard ^(or) to be obtained from the *C. cordifolia*, var. β . *rotundifolia* of Pavon.

Two kinds of ash bark are described by Bergen, the pale ten bark (ten being a corruption of Jaen) which he says is produced by the *C. ovata* of Ruiz & Pavon & *C. pubescens* of Vahl, and the dark ten bark or *China pseudo-Loxa*.

produced by *C. nitida* of Ruiz & Pavon & *C. lanceifolia* of others. The pale ten bark is ash-grey with brown spots, the dark ten bark is quite white, but the lichens which cover it in great quantity give it a dark appearance; this is often passed off for true Loza bark. Guamalis, or rusty bark, *C. Guamalis*, so called from a province in Peru, is known in France by the name *C. havanne*. It is not used in England as a distinct kind, but Dr. Pereira says that he has frequently found pieces of the grey, corky Guamalis bark mixed with the true Loza bark of commerce. It is very apt to be confounded with this bark on account of its great similarity, but may be distinguished by its paler colour & by being wrinkled generally longitudinally & seldom transversely. One kind of Guamalis bark, called by Guibourt *Quinquina Guamalis ferrugineux* is distinguished by its ochre-red colour & warty epidermis. The Guamalis bark is said by Guibourt to be produced by the *C. Humboldtiana*. Dr. Pereira says that the bark of *C. purpurea* (Ruiz & Pavon) brought from South America by Pöppig was found by Reichel to be identical with the Guamalis bark. Mr. J. Howard in the Pharmaceutical Journal for Aug: 1852. proves from both chemical & microscopic examination that Reichel was mistaken in his opinion. He says:—"I conclude, therefore, on

the whole that Reichel must have been misled by some superficial resemblance. The bark of *C. purpurea*, in Pavon's collection, has some few warts & so has the Guamalies; but on comparison the apparent coincidence disappears. The warty excrescences are wholly unlike & the barks are altogether markedly distinct.-----It follows then that this must be left as one of the unsolved problems, & yet I cannot but think the *C. Chatarguera* of Pavon is very near to (if not identical with) the Guamalies bark." *Cinchona Calisaya* seu regia, royal yellow bark, sometimes called *Collisalla*, is called *Quinquina Calisaya* ou *jaune* royal by Guibourt. It received its name *Calisaya* from a province in Peru, whence it is obtained. This bark is met with both in quills & in flat pieces, & this is the only distinction made in commerce. The quills are marked with transverse fissures, for the most part large, being from 1 to 1½ inches in diameter. The flat yellow bark is subdivided into coated & uncoated, the greatest number of pieces being uncoated. It is less esteemed than the quills, being thicker & more woody. The origin of this bark is unknown; many have referred it to the *C. cordifolia*; this mistake originated from Mutis, who called the bark of this species *Quina jaune*, but Guibourt & Bergen state that the *Quina jaune* of Mutis is that which

in England & France is known by the name Hard Carthagena bark. Ruiz and Lindley both referred the Calisaya bark to *C. lanceolata* (Hb. Peru;) & others have thought it was obtained from the *C. lancifolia* or Luningina orange of Mutis, but Bergen states that he found a great difference between these barks and our yellow ~~to~~ cinchona. There are three varieties of yellow bark mentioned by Guibourt the Luningina Pitaya or Luningina de la Colombie sur de l'Antioquia & the Luningina de Colombie ligneuse, woody Carthagena bark, which are closely allied & are considered by Pereira merely as varieties one of another. The third is the Luningina orange de Santa Fe or Luningina de Carthagene spongiosa, which was met with only once by Dr Pereira in England under the name of new spurious yellow bark. Its origin was discovered by Guibourt who found in the Natural History Museum of Paris a specimen, which had been deposited there by Humboldt as the Luningina orange of Mutis, the bark of his *C. lancifolia*.

The *Cinchona rubra* or red cinchona, is, like the yellow, met with in quills & in flat pieces. Pieces of the true red bark are now seldom met with, but inferior kinds are not uncommon. Some pieces are covered with warts, others are free from them; the former are called by Guibourt

Lumiquina verruquea, the latter *Lumiquina non verruquea*.
The botanical source of the red bark is unknown, as Ruiz,
Pavon & Humboldt have declared, but Fée & some other French
writers state that it is the produce of *C. oblongifolia* of
Mutis (*C. magnifolia* of Ruiz & Pavon). This mistake arose
because Mutis called the bark of *C. oblongifolia* *Lumiquina*
zonge; it was discovered however by Bergen that this bark
is that which in Europe is known by the name *Lumiquina non*.
"Thus", says Guibourt, "nothing is better proved to this day than
this fact, that the *C. oblongifolia* produces the *Lumiquina non*,
& not the red cinchona bark." And he goes on to state that
"according to La Condamine the yellow cinchona & the red
cinchona present no remarkable difference in the leaf, flower
& fruit, & that it is only by the colour of the interior of the bark
they can be distinguished. Thus it must be either the same
tree which is described by La Condamine, or a species nearly
allied, which produces the red Cinchona." With this statement
the opinion of Mr. J. Howard, who ranks it amongst those
barks produced by *C. Condaminea*, var: *vera*, coincides.
The quills of this bark are from $\frac{1}{3}$ of a line to 2 lines in thick-
ness, varying in colour on the outside from greyish-brown
to a chestnut-brown, according to the size of the piece. The
inner surface varies likewise from a light brown to a deep
purplish brown, being finely fibrous in the smaller quills &

coarser in the large ones which do not exceed $1\frac{1}{2}$ inch in diameter. The flat pieces are frequently curled, from 1 to 5 inches in breadth & from $\frac{1}{3}$ to $\frac{3}{4}$ of an inch in thickness. The varieties of this bark mentioned by Guibourt are the Quinquina rouge de Lima, called by Lée & others Quinquina rouge de Santa Fé, the Quinquina rouge-orangé plat, distinguished by being less bitter to the taste & by the surface being covered with small warts, the Quinquina rouge-pâle, very similar to the former, but differing by its paler epidermis, & lastly the Quinquina Carthagène rouge, with a whitish & micaceous epidermis.

The Cinchona de Carthagena dura, or hard cinchona bark, called by Guibourt Quinquina de Carthagène jaune, is produced by the C. cordifolia of Mutis. It occurs in quills but more generally in flat pieces, which become twisted during the process of drying. The quills are small, about $\frac{1}{2}$ an inch in diameter & from $\frac{1}{2}$ to $1\frac{1}{2}$ lines in thickness. The outer surface is a yellowish-grey colour, wrinkled longitudinally; the inner surface is smooth.

The Cinchona de Cusco, Cusco cinchona, is said by Guibourt to be the Cchina rubiginosa of Bergen; this is doubted by Pereira. The oldest & largest pieces of this bark are very similar to the yellow Calisaya bark & are very apt to be mistaken for it; they can be readily distinguished by

testing with sulphate of soda, which gives a copious precipitate with the Calisaya bark, but does not affect an infusion of Eusco bark.

The *Cinchona nova*, or *Quinquina nova* of Guibourt, I have before noticed when treating of the *Cinchona rubra*, with which it has often been confounded. It is the *Quinquina rouge* of Martius, the produce of his *C. oblongifolia* (*C. magnifolia* of Ruiz & Pavon). The large pieces are almost flat, whilst the smaller ones are quilled, being often perfectly cylindrical, hence, says Guibourt, is the name *Quinquina chandelle*, (candle *Cinchona*) given to it.

Botanical Characters. The characters by which the genus *Cinchona* is distinguished are as follows. It belongs to the Linnean class Pentandria, order Monogynia, & to the Nat: Ord: Rubiaceae. Tube of the calyx top-shaped, with a permanent 5-cleft limb. Corolla with a tapering tube & 5-parted limb. Filaments short, inserted into the middle of the tube. Stigma 2-cleft, a little clavate. Capsule ovate or oblong, 2-celled, crowned by the calyx, dividing thro' its dissepiments into two halves. Placenta long; Seeds numerous, erect, with a broad, membranous winged border; albumen fleshy. Leaves shortly stalked with flat edges. Stipules ovate or oblong, leafy, deciduous, inter-petiolar, having oil-secreting glands at their base. Flowers

in terminal panicle corymbs, white, or of a rosy-purple colour.

Of the numerous species which are included under the genus *Cinchona*, I shall give the distinctive characters only of this which I have above mentioned, that is, of those which produce the barks found in English commerce. I shall quote principally from the descriptions of Lee and De Candolle.

Cinchona Condaminea. Leaves oblong, acute at both ends, very smooth, shining, with pits on the under surface in the axils of the veins, which are not fringed with hair & secrete a transparent bitter fluid. Panicle much branched, calyx urnshaped, capsule oblong. This is the *C. officinalis* of Lemnæus.

C. lancifolia. Leaves obovate-lanceolate, very smooth not pitted; panicle branching; calyx campanulate, with acute teeth; corolla silky on the outside; capsule oblong. This species is called by Ruiz & Pavon *C. nitida* & *lanceolata*.

C. cordifolia. Leaves subovate, acute, hairy beneath, smooth above; panicle branched, diffuse. Teeth of the calyx round, acuminate. Stigma 2-lobed; capsule oblong-ovate. It has been called *C. hirsuta* by Ruiz & Pavon.

C. Humboldtiana. Leaves oval, rather obtuse, shining on the upper side, silky & downy beneath. Panicle brachiate

2-flowered. Anthers twice as long as the filaments. Stigma bi-partite. Capsule ovate, longitudinally ribbed. Called by Bonpland *C. ovalifolia*.

C. glandulifera. Leaves ovate-lanceolate, with glands on the upper surface. Panicles sub-corymbose, corolla velvety on the tube, woolly within the limb, pale rose colour. Capsule oblong.

C. purpurea. Leaves ovate, nearly smooth on both sides; panicle corymbose, pubescent; anthers shorter than the filaments, exserted; stigma 2-lobed, included; capsule ovate, oblong, longitudinally ribbed.

C. magnifolia. Leaves oval, acuminate, smooth; panicle brachiate, sub-corymbose; capsule oblong, 7 times as broad as long.

C. micrantha. Leaves ovate, obtuse, glabrous; panicle bi or trichotomous; capsule oblong, 3 times as long as broad.

C. pubescens. Leaves ovate, elongated at the base; panicle brachiate; corolla downy outside, the limb hairy inside; capsule ovate, oblong. This is the *C. ovata* of Ruiz & Pavon.

Chemical Characters. The most important constituents of cinchona bark are cinchonin, quina & Tannin, the two former existing in combination with kinic acid. Cinchonin was first obtained in 1810 by Gorney. It was not known to be an alkali until the year 1820, when Pelletier

& Caventon discovered cinchonina & quina. Cinchonina or
 cinchonine is obtained in the form of white transparent crys-
 tals ~~from~~^{by} precipitation from one of its salts by ammonia
 & then crystallizing from its alcoholic solution. Quina or
 quinine is obtained in the same way. Cinchonina & its salts
 are said to be equal in value to quina & its salts, as thera-
 peutic agents, altho' the former are very seldom made use of.
 The different kinds of bark contain different quantities of
 cinchonine and quinine as will be seen in the analysis
 below. It is upon this that their commercial value de-
 pends, & several tests of the goodness of the bark have been
 proposed. The following is the one given in the Edinburgh
 Pharmacopoeia; "A filtered decoction of 100 grains in two
 fluid ounces of distilled water gives, with a fluid ounce
 of concentrated solution of carbonate of soda, a precipitate
 which, when heated in the fluid, becomes a fused mass,
 weighing when cold two grains or more & easily soluble
 in solution of oxalic acid."

		<u>Cinchonine</u>	<u>Quinine</u>	
One pound of Crown bark contains	5 grains	"	0 grains	(Von Santen)
" Grey "	50 "	"	32 "	(Michaelis)
" Ash "	44 "	"	12 "	(Do)
" Red "	32 "	"	64 "	(Do)

From 1 lb of yellow bark Pelletier obtained 3ij of di-
 sulphate of quina. An ounce has been obtained from 2 lb

of this bark, but this is beyond the average produce (Pereira). The following analyses of the grey, yellow & red barks have been made by Pelletier & Caventon.

Grey cinchona	Yellow cinchona	Red cinchona
Kinate of Cinchonine	Quinine	Kinate of Cinchonine
Red cinchonin	Kinate of Quinine	— — — Lime
Tannin	Red cinchonin	Red cinchonin
Yellow colouring matter	Tannin	Tannin
Kinate of Lime	Kinate of Lime	Yellow colouring matter
Gum	Yellow colouring matter	Lignin
Starch	Starch	Starch
Lignin	Lignin	
Fatty matter	Fatty matter	

Uses. The uses of cinchona bark are very varied, but it has been found to be chiefly beneficial in intermittent diseases, in which it surpasses all other tonics. It is also useful according to Pereira in (1) continued fever, (2) in inflammatory diseases, when they assume an intermittent or remittent form, (3) in maladies characterized by atony & debility, (4) in the convalescence of either acute or chronic lingering diseases, (5) as a topical astringent or antiseptic.

Preparations & Doses. The bark is seldom given in powder but is superior to the infusion or decoction; the latter are given

in doses of from ℥j to ℥ij. The other preparations are Tinctura Cinchonae & Tinctura cinchonae composita, of which the doses are from ℥j to ℥iij; The Extractum Cinchonae, which is given in pills from gr. V. to gr. XX, and the Quinae Sulphas or sulphate of Quinine, in which form it is generally administered. Its dose is from ℥grj to ℥j.

The Artemisia Absinthium, or common Wormwood, takes its specific name from two Greek words ἀ, privative, & ψίνθος, sweetness, having been termed by the Greeks ἀψίνθιον. It belongs to the Linnaean class Syngenesia & order Polygamia superflua, & to the Nat: Ord: Compositae. It is the tops of the plant that are used in medicine.

Botanical Characters. Heads discoidal, homogamous or heterogamous. Florets of the ray in one row, usually female & 3-toothed, with a long bifid protruding style; of the disc 5-toothed, hermaphrodite or by the absorption of the ovary, sterile or male. Involucral scales imbricated, dry, scarious at the edges. Receptacle without pappus, naked or fringed with hairs. Achene obovate, bald, with a minute epigynous disc. (De Candolle).

Chemical Characters. The following analysis of Wormwood has been made by Braconnot:—

Volatile Oil	0.15
Green resin	0.50
Bitter resin	0.233
Albumen	1.250
Starch	0.133
Azotized matter	4.333
Lignin	10.833
Absinthate of Potash	0.917
Nitrate of D ^o .	0.330
Sulphate of D ^o .	a trace
Water	61.2

Tannate of iron is formed on the addition of sesquichloride of iron to an infusion of wormwood. Absinthin, its bitter principle, has been obtained ~~from~~ ^{by} Caumont from its infusion by forming a precipitate with acetate of lead.

Uses. Wormwood was at one time in great repute in medicine, having been much used in intermittents, dyspepsia & sometimes as a vermifuge, but of late years more powerful remedies have been used in preference.

Preparations & Doses. The dose of the powder is from ℥j to ℥j; of the infusion from ℥j to ℥ij.

Chamomile Flowers are the produce of a plant named *Anthemis nobilis*, belonging to the Linnaean class Syngenesia, order Polygamia superflua, & to the Nat: Ord: Compositae. This

is one of the most important of our indigenous plants; on account of its great utility it has received its specific name. Its English name "chamomile" is derived from the words $\chi\alpha\mu\alpha\iota$ (chumi) & $\mu\acute{\epsilon}\gamma\lambda\omicron\nu$ (malum) signifying a dwarf or creeping apple.

Botanical Characters. Heads many-flowered, heterogamous; florets of the ray female, ligulate, white; of the disc hermaphrodite, tubular, yellow. Receptacle convex, covered with membranous paleae. Involucre imbricated. Achene tapering or acutely 4-cornered.

Chemical Characters. Chamomile flowers contain a volatile oil, which is obtained by distilling the flowers with water, a bitter principle, soluble in water & alcohol, a tannic acid, the presence of which is proved by its infusion being rendered dark with sesquichloride of iron. No analysis has yet been made of this plant, altho' its near ally, the *Matricaria chamomilla* has been analysed by Freudenthal.

Uses. An infusion of chamomile is much used in domestic practice as a tonic & stomachic, under the familiar name of chamomile tea. It has been also celebrated in the cure of intermittents, but is much inferior to other febrifuge remedies. The infusion is sometimes taken warm as an emetic.

Radix Gentianae, Gentian root, is said to have been introduced into medicine by *Asclepiades*, King of *Illyria* about 160 or 170 years before Christ, by *Gentius*, King of *Illyria*;

from whom also it takes its name (Pereira). It grows in different places on the mountains of Central & Southern Europe more especially on Mount Jura. The root is generally about 1 inch in thickness, is branched & much wrinkled with transverse & longitudinal furrows. It is a yellowish-brown colour on the outside, passing to reddish-yellow internally having an intensely pure bitter taste. The plant from which it is derived, is named *Gentiana lutea*, of the Linnean class Pentandria, order Sygginia, & of the Nat: Ord: Gentianaceae. The roots of *Gentiana purpurea* & *punctata* are sometimes mixed with it, with no great detriment, as they possess much the same properties.

Botanical Characters. Calyx 4-5 parted or slit, valvate, yellow. Corolla yellow, withering; the limb 4-5 parted or spuriously 10-parted. Stamens 4-5, inserted in the tube of the corolla. Ovary 1-celled. Stigmas 2 Terminal, revolute. Style 0. Leaves oval or ovate. (Grisebach).

Chemical Characters. The following analysis is by Henry & Caventon. A volatile, odourous matter, a bitter yellow crystalline principle, matter identical with violine, a green fixed oil, a free organic acid, uncrystallizable sugar, gum, yellow colouring matter, lignin. It is owing to the sugar mentioned in the analysis, that the Swiss are enabled to extract an alcohol from the gentian root, after subjecting it to a fermentation in

lukewarm water (Tee). In an infusion of gentian a precipitate is formed by salts of lead, iron & mercury.

Uses. Gentian is a pure simple bitter & as such is used as a stomachic & tonic in dyspepsia & other diseases of the digestive organs. In intermittent diseases it is very beneficial having occupied the first rank among febrifuge remedies before the discovery of cinchona. Dr. Cullen says that "joined with galls or tormentil in equal parts & given in sufficient quantity, it has not failed in any intermittents in which he tried it."

Preparations & Doses. The dose of the powdered root, in which form it is seldom administered, is from gr. ~~X~~ to gr. ~~XV~~. The Infusum Gentianae Compositum is given in doses of ℥ss to ℥j. The dose of the Tinctura Gentianae Composita is from ℥ss to ℥ij, of the Vinum Gentianae ℥ss to ℥j. The Extractum Gentianae is given in the form of pills in conjunction with chalybeates &c from gr. ~~X~~ to ℥ss.

Belonging to the same natural order is the Agathotes Chirayta or Gentiana Chirayita of Fleming. It comes under the Linnaean class Tetrandria & order Monogynia. Guibourt says it is the same as the κάλαμος ἀγρωχαιτός of Dioscorides, but Pereira & Christison are of a contrary opinion.

Botanical Characters. ~~The analysis of the~~ The general characters of this plant are similar to those of Gentiana lutea, but

(2) *Cours d'histoire naturelle pharmaceutique. vol. ii. p. 571.*

They may be distinguished from one another by the following characters. Leaves cordate-ovate, acuminate, sessile, 5-7 nerved. Cymes lax, few-flowered. Corolla 2-parted, the segments ovate-lanceolate, acuminate.

Chemical Characters. The analysis of the stalks of this plant by Lassaigne & Boissel is as follows. Resin, yellow bitter matter, brown colouring matter, gum, malic acid, malate of potash, chloride of potassium, sulphate of potash, phosphate of lime, silica & a trace of oxide of iron.

Uses. It has been much employed in India as a febrifuge, but is inferior to other species of the gentian tribe.

Preparations & Doses. It is sometimes administered in powder in doses of $\mathfrak{zj}$. The Infusum Chiretiae is given in doses of $\mathfrak{zj}$ or $\mathfrak{zij}$.

Cortex Cascarillae, the Cascarilla bark, is derived from a shrub belonging to the Linnaean class Monœcia, order Monadelphica, & to the Nat: Ord: Euphorbiaceae. Its generic name is Croton, but the specific name is not so easily decided, as there is a diversity of opinion, whether it is the Croton Cascarilla, or the C. Eleutheria. L'ée thinks it is the C. cascarilla, & states as his reason that the C. eleutheria is still little known; "it is abundant in the Indies, but," he says, "as we derive all our Cascarilla from America & the Antilles, we must refer it to the C. cascarilla, a plant well-known, & which is known positively to furnish the bark of commerce." On the other

(12) *Materia medica*, vol. ii. p. 1118, 2nd edit:

Hand Pereira⁽²⁾ says that he was at one time inclined to believe that the *C. Cascarilla* produces the bark of the shops, but that "Dr Lindley adduced several reasons for believing that the *C. Eleutheria* was the true species, as Dr Wright & Woodville had already asserted, & the subsequent receipt by Dr Lindley of specimens of the plant from the Hon^{ble} J. C. Lees, chief judge in the Bahamas, has fully confirmed the accuracy of Dr Lindley's opinion". It is in the form of short, thin, fragile quills; the epidermis is covered with a large number of lichens.

Botanical Characters. Flowers monœcious. Calyx 5-parted. Males:- petals 5, whitish. Stamens 10-12, distinct. Females, Petals 0, ovary roundish, styles 3, bifid, stigmas obtuse, capsular trilocular, with one seed in each ~~shale~~ cell.

Chemical Characters. Analysis of Cascarilla bark by Frommendorf. Volatile oil, 1.6. Bitter resin, 15.1. Gum and a bitter principle, 18.7. Woody fibre, 65.6. A peculiar alkaline substance is also said to have been discovered by Brandes.

Uses. This bark is said by Fée to be deserving of more notice, than is now bestowed upon it. It has been, like many other tonics, superseded by Cinchona bark, but is sometimes preferable to it, when the digestive organs are in an irritable state.

Preparations & Doses. The dose of this bark in powder is from gr^{ss} to gr^{xxv}, but the Tinctura Cascarilla is given in conjunction with other tonics in doses of ʒj or ʒij. The dose of

the Infusion is 3j or 3ij.

The Cortex Quercus is obtained from the *Quercus pedunculata*, the common oak, *Quercus Robur* of Linnaeus belonging to his class Monœcia & order Polyandria, & to the Nat: Ord: Corylaceæ or Cupuliferae of Richard. A description of this bark is hardly necessary, as the oak & its bark are familiar to everyone.

Botanical Characters. Monœcious; Males: - catkins lax, pendulous. Stamens 5-10. Females: - Involucre scaly; the scales numerous, imbricated, combined with a coriaceous, hemispherical cup; ovary 3-celled, 2 of the cells abortive; stigmas three; nut one-celled, one-seeded. Leaves deciduous, shortly stalked. (Pot. Gall.)

Chemical Characters. The constituents of oak bark according to Macconnot are: - Tannic acid, tannates of lime, magnesia & potash, gallic acid, uncrystallizable sugar, pectin and lignin. The bark contains the greatest proportion of tannin in spring; 80 parts of tannin were obtained by Wiggins from the bark of a tree felled in winter, whereas 100 parts were obtained from the same quantity of one felled in spring.

Uses. Oak bark is chiefly used as an astringent in diarrhoea & dysentery, also as a gargle, as a wash or as an enema. It has been used with success in intermittents, but is much inferior to Cinchona.

Preparations & Doses. The dose of the powder is from 3ʒ to ʒij; of the Decoctum Quercus ʒij to ʒvi.

(2) Gregory, *Outlines of Chemistry*. p. 374. 2nd edit.

Cortex Salicis, Willow bark, is obtained from several species of *Salix*. It was made use of by the ancients & having fallen into disuse was brought into notice as a remedy for agues in 1763. The species which are considered to produce the best bark are, *Russelliana*, *alba*, *Capria*, *fragilis*, *pentandra* & *purpurea*. The genus *Salix* belongs to the Linnean class *Dioecia*, order *Dicandria* & to the Nat. Ord: *Salicaceae*.

Botanical Characters. The generic characters are; Flowers dioecious, amentaceous; scales imbricated. Males: - stamens 2-5, Females: - seeds comose, the radical inferior. (Bot: Gall.)

Chemical Characters. Analysis of the bark of *Salix alba* by Pelletier & Caventon: Bitter, yellow, coloring-matter, green fatty matter, tannin, resinous extract, gum, wax, woody fibre, a salt of magnesia. Salicine, the active principle of this bark, was first obtained by M. Leroux. It is a white, bitter, crystallizable substance. ⁽²⁾ "It is extracted by boiling the bark with water, decolorizing the decoction with litharge, removing the lead dissolved by a sulphuric acid & sulphurets of barium, & evaporating to a syrup. The Salicine crystallises on standing, in fine scales of a silky lustre, which have a very pure bitter taste & are highly febrifuge."

Uses. Salicine is said by some to be a good substitute for Cinchona, for altho' its properties are inferior, it irritates the stomach less. M. Guibourt says it is a feeble febrifuge & not to be compared

with Cinchona; its dose is from gr ~~x~~ to gr ~~xxx~~.

Ice-land Moss, *Cetraria Islandica*, is said to have been known in Europe in 1673. The thallus is large & of a greyish-white colour. In the Linnæan system it is included under the class Cryptogamææ, & order Algae. Its Nat. Ord. is Lichenes.

Botanical Characters. Thallus foliaceous, on each side smooth & naked, erect, tufted, olive-brown, paler on one side, channelled. Apothecia orbicular, brown, flat, with an elevated border; the disc coloured, plano-concave, with a border formed of the thallus & inflexed. (Hooker).

Chemical Characters. The analysis obtained by Bergellius is as follows:

Bitter principle	3.0
Uncrystallizable sugar	3.6
Salts of potash & lime	1.9
Green wax.	1.6
Gum	3.7
Yellow extractive matter	7.0
Starchy skeleton	36.6
Starch	44.6
	102.0

Its active principle is cetrarin or cetrarinic acid occurring in the form of small acicular crystals, soluble in boiling alcohol, slightly so in ether or water.

Uses. Ice-land Moss is a very mild tonic & is generally

given when a light diet & a weak tonic are required.

Preparations & Doses. The only form in which it is administered is as a decoction, *Decoctum Lichenis Islandici*, of which the dose is from $\mathfrak{Zj}$ to $\mathfrak{Ziv}$.

In treating of the History of Vegetable Tonics I have selected for discussion those which are most familiar, being well-known in common practice. I might have increased the pages of this essay to an almost unlimited extent, both by giving a fuller and more particular account of those remedies which I have before mentioned and also by describing other tonics which however I deem of insufficient importance to merit particular notice.

W. B. Hill.