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George Hayward, M.D.,

of Boston,

(Class of 1899).
ALL ABOUT SPICES:
PEPPER, CUBEBS, NUTMEGS, CLOVES, GINGER, VANILLA,
PIMENTO, CINNAMON;

INCLUDING PRACTICAL INSTRUCTIONS
FOR
PLANTING, CULTIVATION AND PREPARATION FOR MARKET,
WITH
PRACTICAL INFORMATION
FROM A VARIETY OF SOURCES, REFERRING TO THE SPICE INDUSTRY
IN
CEYLON, INDIA, EASTERN ARCHIPELAGO AND
WEST INDIES.

(WITH ILLUSTRATIONS.)

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COMPiled AND PUBLISHED BY

A. M. & J. FERGUSON,
of the "Ceylon Observer" and "Tropical Agriculturist,"
COLOMBO, CEYLON.


INTRODUCTION.

Following the plan we have adopted in our Manuals "All about Indiarubber," "All about the Coconut Palm," and "All about Tobacco," we have endeavoured to present an exhaustive reprint in "All about Spices," of everything of use to the planter and curer. The compilation comprises all that we could bring together in reference to Pepper, Cubebs, Mace, Nutmegs, Cloves, Ginger, Vanilla, Pimento, and Cinnamon.

It will be observed that apart from the information gathered from all Spice-growing countries—from South America, Jamaica, and the West Indies generally, across to the Eastern Archipelago, the home of so many spice-yielding plants,—we have papers from Ceylon writers giving the results of local experience and observation from their cultivation of some of the products in our list. This is especially the case in reference to Pepper and Cinnamon, the former of which was a Ceylon staple 150 years ago; while the natural habitat of the latter is in our island, which has produced from time immemorial, as it is doing today, the finest cinnamon.

On pages 27, 34 and 35 we have given engravings useful to the Pepper cultivator, and on page 169 (prepared by Messrs. H. W. Cave & Co.) a whole page of well-executed engravings intended to illustrate with botanical and indeed mathematical accuracy the various processes in the fertilization of Vanilla. In this, we think the engraver has admirably succeeded—so that any cultivator with the page of explanations and indicating figures before him, can perform this indispensable part of Vanilla culture.

Finally, we feel sure that in the 290 pages included in this volume there is enough information given to warrant the title of "All About Spices."

"Ceylon Observer" Office:
Colombo, 26th July 1889.
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ALL ABOUT PEPPER.
ALL ABOUT PEPPER.

PEPPER.

(From the "Encyclopædia Britannica," vol. xviii.)

PEPPER, a name applied to several pungent spices known respectively as Black, White, Long, Red or Cayenne, Ashantee, Jamaica, and Melegueta Pepper, but derived from at least three different natural orders of plants.

Black pepper is the dried fruit of *Piper nigrum*, L., a perennial climbing shrub indigenous to the forests of Travancore and Malabar, from whence it has been introduced into Java, Sumatra, Borneo, the Malayan Peninsula, Siam, the Philippines, and the West Indies. It is one of the earliest spices known to mankind, and for many ages formed a staple article of commerce between India and Europe,—Venice, Genoa, and the commercial cities of central Europe being indebted to it for a large portion of their wealth. Tribute has been levied in pepper; one of the articles demanded in 408 by Alaric as part of the ransom of Rome was 3,000 lb. of pepper. Pepper-corn rents prevailed during the Middle Ages, and consisted of an obligation to supply a certain quantity of pepper, usually 1 lb. at stated times; and the term still lingers in use at the present day. The price of the spice during the Middle Ages was exorbitantly high, and its excessive cost was one of the inducements which led the Portuguese to seek a sea-route to India. The discovery of the passage round the Cape of Good Hope led (1498) to a considerable fall in the price, and about the same time the cultivation of the plant was extended to the western islands of the Malay Archipelago. Pepper, however, remained a monopoly of the Portuguese crown as late as the 18th century. In Great Britain it was formerly taxed very heavily, the impost in 1623 amounting to 5s., and as late as 1823 to 2s. 6d. per lb.

The largest quantities of pepper are produced in Penang, the island of Rhio, and Johore near Singapore,—Penang affording on an average about half of the entire crop. Singapore is the great emporium for this spice in the East, the largest proportion being shipped thence to Great Britain. In 1880 the imports into England from Singapore amounted to 21,179,059 lb., valued at £385,108, and from other countries 559,909 lb. valued £12,979, the re-exports being 12,925,886 lb., chiefly to Germany, Italy, Russia, Holland and Spain. The varieties of black pepper met with in commerce are known as Malabar, Alleppy or Tellicherry, Cochin, Penang, Singapore, and Siam. The average market value in the London market is—Malabar, 3d to 5d per lb.; Penang, 2d to 4d; Singapore, 3d to 4d.
Pepper owes its pungency to a resin, and its flavour to a volatile oil, of which it yields from 1½ to 2½ per cent. The oil agrees with oil of turpentine in composition as well as in specific gravity and boiling point. In polarized light it deviates the ray, in a column 50 mm. long, 1½ to 3¾ to the left. Pepper also contains a neutral crystalline substance, called piperin, to the extent of 2 to 8 per cent. This substance has the same empirical formula as morphia, C₁₂H₁₉NO₃, but differs in constitution and properties. It is insoluble in water when pure, is dephoid of colour, flavour, and odour, and may be resolved into piperic acid, C₁₂H₁₀O₄, and piperin, C₆H₁₁N. The latter is a liquid colourless alkaloid, boiling at 106°C., has an odour of pepper and ammonia, and yields crystallizable salts. A fatty oil is found in the pericarp of pepper, and the berries yield on incineration from 4½ to 5½ of ash. The only use of pepper is as a condiment. Notwithstanding its low price and the penalty of £100 to which the manufacturer, possessor, or seller of the adulterated article is liable, powdered pepper is frequently diluted with starch, sago, meal, and other substances, which can be readily detected under the microscope.

In the south-west of India, where the pepper-plant grows wild, it is found in rich, moist, leafy soil, in narrow valleys, propagating itself by running along the ground and giving off roots into the soil. The only method of cultivation adopted by the natives is to tie up the end of the vines to the neighbouring trees at distances of at least 6 feet, especially to those having a rough bark, in order that the roots may easily attach themselves to the surface. The underwood is then cleared away, leaving only sufficient trees to provide shade and permit free ventilation. The roots are manured with a heap of leaves, and the shoots are trained twice a year. In localities where the pepper does not grow wild, ground is selected which permits of free drainage, but which is not too dry nor liable to inundation, and cuttings are planted at about a foot from the trees either in the rainy season in June or in the dry season in February. Sometimes several cuttings about 18 inches long are placed in a basket and buried at the root of the tree, the cuttings being made to slope towards the trunk. In October or November the young plants are manured with a mixture of leaves and cowdung. On dry soils the young plants require watering every other day during the dry season for the first three years. The plants bear in the fourth or fifth year, and if raised from cuttings are fruitful for seven years, if from seed for fourteen years. The pepper from plants raised from cuttings is said to be superior in quantity and quality, and this method is in consequence most frequently adopted. Where there are no trees the ground is made into terraces and enclosed by a mud-wall, and branches of Erythrina indica are put into the ground in the rainy season and in the course of a year are capable of supporting the young pepper plants. In the meantime mango trees are planted, these being preferred as supports, since their fruit is not injured by the pepper plant, while the Erythrina is killed by it in fourteen or fifteen years.

In Sumatra the ground is cleared, ploughed, and sown with rice, and cuttings of the vine are planted in September, 5 feet apart each way, together with a sapling of quick growth and rough bark. The plants are now left for twelve or eighteen months and then entirely buried except a small piece of bent stem whence new shoots arise, three or four of which are allowed to climb the tree near which they are planted. These shoots generally yield flowers and fruits the next year. Two crops are collected every year, the principal one being in December and January and the other in July and August, the latter yielding pepper of inferior quality and in less quantity. Two or three varieties are met with in cultivation; that yielding the best kinds has broadly ovate leaves, five to seven in number, nerved and stalked. The flower-spikes are opposite the leaves, stalked and from 3 to 6 inches long; the fruits are sessile and fleshy. A single stem will bear from twenty to thirty of these spikes. The harvest commences as soon as one or two berries at the base of the spikes begin to turn red, and before the fruit is mature, but when full-grown and still hard; if allowed to ripen, the berries lose pungency, and ultimately fall off and are lost. The spikes are collected in bags or baskets and dried in the sun, on mats or hard ground, for two or three days. When dry the pepper is put into bags containing from 64 to 128 lb., and is then ready for the market. The yield varies in different localities. In Sumatra it is estimated at about 1½ lb. per plant per annum. In Malabar each vine gives 2 lb. a year up to the fifteenth or twentieth year, or about 24 lb. from each

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PEPPER.

tree, a single tree sometimes supporting eight or twelve vines; an acre is calculated to bear 2,500 plants, to cost about £4 in outlay to bring it into bearing, and to yield a produce of £80 when in its best condition.

White pepper is obtained from the same plant as the black, and differs only in being prepared from the ripe fruits. These, after collection, are kept in the house three days and then bruised and washed in a basket with the hand until the stalks and pulpy matter are removed, after which the seeds are dried. It is, however, sometimes prepared from the dried black pepper by removing the dark outer layer. It is less pungent than the black but possesses a finer flavour. It is chiefly prepared at the island of Rhio, but the finest comes from Tellecherry. The Chinese are the largest consumers. In 1877 Singapore exported 48,461 piculs (a picul = 133 1/3 lb.) to that country. The London market value is about 4½d. to 7d. per lb. White pepper affords on an average not more than 19 per cent. of essential oil; but, according to Caseneuve, as much as 9 per cent. of piperin, and of ash not more than 11 per cent.

Long pepper is the fruit-spike of Piper officinarum, C.D.C., and P. longum, L., gathered shortly before it reaches maturity and dried. The former is a native of the Indian Archipelago, occurring in Java, Sumatra, Celebes, and Timor. It has oblong, ovate, acuminate leaves, attenuated to the base, which are pinnate and veined. The latter is indigenous to Ceylon, Malabar, eastern Bengal, Timor, and the Philippines; it is distinguished from P. officinarum by the leaves being cordate at the base and five-veined. Long pepper appears to have been known to the ancient Greeks and Romans under the name of "μακόν"; and in the 10th century mention is made of long pepper, or macropiper, in conjunction with black and white peppers. The spice consists of a dense spike of minute baccate fruits closely packed around the central axis, the spike being about 13 inch long and ¾ inch thick; as met with in commerce they have the appearance of having been limed. In Bengal the plants are cultivated by suckers, which are planted about 5 feet apart on dry rich soil on high ground. An English acre will yield about 3 maunds (80 lb.) the first year, 12 the second, and 18 the third year; after this time the yield decreases, and the roots are therefore grubbed up and sold as "pipi mut," under which name they are much used as a medicine in India. After the fruit is collected, which is usually in January, the stem and leaves die down to the ground. Long pepper contains piperin, resin, and volatile oil, and yields about 8 per cent. of ash. Penang and Singapore are the principal centres in the East for its sale. In 1871 Singapore shipped 3,366 cwt., of which 447 were sent to Great Britain. Penang exports annually about 2,000 to 3,000 piculs. The value in the London market is from 37s. to 45s. a cwt.

Ashantee or West African pepper is the dried fruit of Piper Clusii, C. DC., a plant widely distributed in tropical Africa, occurring most abundantly in the country of the Niam-niam. It differs from black pepper in being rather smaller, less wrinkled, and in being attenuated into a stalk, like cubebes, to which it bears considerable resemblance externally. The taste, however, is pungent, exactly like that of pepper, and the fruit contains piperin. It was imported from the Grain Coast by the merchants of Rouen and Dieppe as early as 1364, and was exported from Benin by the Portuguese in 1485; but, according to Clusius, its importation was forbidden by the King of Portugal for fear it should depreciate the value of the pepper from India. In tropical Africa it is extensively used as a condiment, and it could easily be collected in large quantities if a demand for it should arise.

Jamaica pepper is the fruit of Pimenta officinalis, Lindl., an evergreen tree of the Myrtle family. It is more correctly termed "pimento," or "allspice," as it is not a true pepper.

Melequeta pepper, known also as "Guinea grains," "grains of paradise," or "alligator pepper," is the seed of Amomum Melequeta, Roscoe, a plant of the Ginger family; the seeds are exceedingly pungent, and are used as a spice throughout central and northern Africa.

PEPPER.

(From "Spon's Encyclopaedia."
two others are dealt with under Narcotics—Betel-pepper, p. 1305. There remain for description as spices, the common black pepper, white pepper, long pepper, and Ashantee pepper.

1. Black pepper.—The plant (Piper nigrum) affording black pepper is a perennial climbing shrub, indigenous to the forests of Travancore and Malabar, and cultivated also in Sumatra, Java, Borneo, the Malay Peninsula, Siam, the Philippines, and the W. Indies. Several accounts have been published of the cultivation and harvesting of black pepper; they differ mainly in minor details, and may be summarized as follows:—

When pepper-vines are found already growing, the forest is cleared of underwood, and sufficient trees only are left to provide shade, while permitting free ventilation, 6 ft. apart being considered a proper distance. The vines are trained up to the nearest trees, which are preferably 8-12 in. diam., for convenience in climbing when harvesting the fruit, all kinds of trees being apparently available of indiscriminately. The root of the vine is manured with a heap of leaves, and the shoots are trained up twice annually. The vines live about 30 years, and are then replaced by others found growing wild around, or systematically planted. The pepper obtained from spontaneous plants is said to quite equal that grown in gardens, while the care necessary is almost nominal.

A very wasteful plan sometimes adopted for manuring these natural pepper-plantations consists in setting fire to the trunks of very large trees, which are thus killed, and soon devoured by insects, becoming a heap of rotten dust, which gets washed by the rain around the roots of the vines.

In considering a new plantation where vines are not to be found growing spontaneously, the first consideration is choice of site. Preference is to be given to level ground bordering rivers or streams, but not subject to inundation; slopes are to be avoided, unless very gentle; and plains will require deep ploughing and much manure. Propagation may be from cuttings and suckers, or from seed. The plants raised by the latter means are said to yield for 14 years, while those from the former are only fruitful for 7 years, but their crops are superior in both quantity and quality, consequently the planting of suckers or cuttings is most generally adopted. The next consideration will be the kind of tree to plant as a support and shade for the vines. Where trees are growing on the ground to be planted with pepper, preference is given to the mango (Mangifera indica), whose fruit is not injured by the development of the pepper-vine; failing this, recourse may be had to the jack (Artocarpus integrifolius), whose fruit, however, is said to be diminished in quantity and injured in quality by the presence of the pepper. When it is necessary to plant trees, choice is made of the Erythrina indica as a large branch of it put into the ground in the rainy season will be capable of supporting the vine in the course of a year; mango-trees may then be raised meantime, as 6-15 years' bearing of the vines suffices to kill the Erythinas. In commencing a plantation upon Erythinas, the ground is usually fenced with a mud wall, and made into terraces. Between mid-July and mid-November, the ground is deeply hoed and set out with plantains at about 12 paces apart; between the first week in February and first in March, branches of Erythrina 6-12 ft. long are planted at 60 paces apart, and watered till the rainy season sets in. Between May 10 and June 10, the pepper-vines are planted, which may be done in several ways. One plan is to put 4 doz. cuttings each 18 in. long into a basket, which is filled with earth, and buried at the foot of the tree, with the cuttings sloping towards it. Between mid-October and mid-November, the ground around the basket is dug, and the vines are manured with cow-dung and dead leaves. The baskets are said to be a great protection to the plants in their early life, but are often omitted. In either case during the dry seasons of three years after planting, the vines need watering, in favourable soils, once in 3 days; in dry soils, on alternate days. Between mid-October and mid-November they are manured, and are trained up to the tree till 6 ft. high, after which they are self-supporting. After the 3rd year, the plantains are dug up; and then this manuring and hoeing of the ground is performed twice annually, viz., between mid-October and mid-November, and between mid-July and mid-August. The vines produce in 4-5 years, and are in full bearing in the 6th or 7th, continuing to yield for 12-14 years, when the Erythinas die. In some cases, the trees supporting the vines are pruned, and their branches are lopped; in others, the leaves only are thinned. Mango-tree should be at least 20 years old before having to support the vines.

The Sumatran mode of cultivation differs considerably. The ground is cleared, ploughed, and sown with rice; cuttings of the vine are then planted 5 ft. apart each way, with a sapling of some tree of quick growth and rough bark, in September. The vines are left alone for 12-18 months, then entirely
buried, except a small surface of the bent stem, whence spring new shoots, 3-4 of which are allowed to climb the tree planted with them, and are expected to give flowers and fruits a year later. There are two crops annually, the 1st in December-January, the 2nd in July-August; the latter is much inferior in both quantity and quality.

The yield of the plantations varies somewhat according to circumstances. In Sumatra, the dual crop is estimated to average 14 lb. from each vine per annum. In Malabar, each vine gives a mean of 2 lb. a year up to the 15th-20th year, or about 24 lb. for each tree, which may support 8-12 vines. Sometimes 8-10 lb. is got from a single vine. An acre is reckoned to bear 2,500 plants, and to cost not more than 4l. to bring into bearing, while yielding a produce worth about 50{c} when in full bearing. The fruits grow in masses of 20-30 on a single stem. The harvest takes place when they are full grown and hard, but before they mature, in which latter state they lose pungency and fall off. The season for gathering falls between mid-December and mid-February. The bunches (amenta) are hand-plucked in bags or baskets, and the berries (pepper) are then detached from the stem by rubbing with the hands or feet on a mat. The sound berries are then sun-dried for 2-3 days, in a single layer, either on mats or on a patch of smooth ground, being collected in earthen jars at night away from the dew. Matting is said to give a heavier return than ground-drying. The dry pepper is put up in mat bags of 61-128 lb., and is ready for the market.

Our imports of black pepper in 1880 were 21,179,059 lb., 385,108l., from the Straits, and 550,909 lb., 12,979l., from other countries; total, 21,729,968 lb., 398,087l. The total in 1879 was only 17,532,958 lb.; in 1877 it was 28,643,635 lb. Our re-exports in 1880 were 12,925,886 lb., 235,801l., chiefly to Germany, Russia, the U.S., and Spain. The fluctuations in the imports from different countries have been as follows:—Java: 2,702 lb. in 1876, 74,250 in 1879, none between; Abyssinia: 180,887 lb. in 1876, 0 in 1879, 12,950 in 1880; Siam: 60,000 lb. in 1876, none since; Cochín China: 210,100 lb. in 1876, 0 in 1878 and 1879, 4,850 in 1880; Cape: 19,988 lb. in 1876, 180,154 in 1879, 18,642 in 1880; Straits: 27,825,576 lb. in 1877, 16,932,073 in 1879. In the E. Archipelago, pepper-culture is widely spread. It is again assuming large proportions in Atjeh [Atchin or Acehen], the produce being shipped chiefly to Penang and Batavia, Edi on the N.-E. coast (of Sumatra) being the principal mart. In 1822, the Kingdom of Deli had a harvest of 26,000 piculs. The country and the people are remarkably adapted to pepper-growing, and the Bataks of N. Sumatra have long been exclusively devoted to it. The value of the foreign exports from Brunei (Borneo) in 1879 was only 362 lb. In 1801, the S. Bornean district of Banjarmassing was alone capable of producing 1,500 tons of the spice. The Java exports of the 1877 crop were 1,889,132 lb., 299,132l., to Holland 77,370, to Singapore, 1,855 to Italy, 1,711 to America, 1,000 to the Channel for orders, 244 to Australia, 100 to France, total, 26,515; for the 1879 crop, 6,106 piculs to Singapore, 4,571 to France, 3,956 to Holland, 1,501 to England, 1,253 to America, 644 to Italy, 100 to Australia, total, 18,131. Saigon (French Cochín China) had 2,777 acres under pepper in 1879, when 4,145 piculs (of 133 lb.) were sold at the rate of 3d. a lb.; in 1878, the exports were 3,500 piculs, 5,000l.; in 1880, there was a great falling off, only 3,000 piculs being brought into the market. The cultivation is extending in Ceylon. China imports large quantities of both black and white Pepper. Of the former, Hankow took 24,805 piculs (of 133 lb.), value 49,920l., in 1879; Kukiang, 5,143; Newchwang, 1,435; Ningpo, 1,257; Shanghai, 2,737.

Whole black pepper is seldom or never adulterated in Europe; but in India, the berries of Embelia [Samara] Ribes, are often mixed with the spice for sale in the bazaars. Ground pepper, on the other hand, is frequently sophistication with starches and other matters detectable with the microscope, despite the very heavy penalty (100l.) which has been in force since 1819. The approximate London market values of black pepper are:—Malabar, 34-5d.; Penang, 24-4d.; Singapore, 38-4d.

2. White Pepper.—This is produced by the same plant as the black pepper, and is prepared by allowing the berries to ripen, keeping them for 3 days in the house after gathering, washing and bruising them in a basket with the hand till the stalks and pulp are removed, and then drying the white seeds. It is said that the lives of the vines are endangered by allowing the fruit to ripen on them. Sometimes white pepper is prepared from black by removing the dark outer layer of pericarp. The article is most largely prepared in the Straits, but the finest is produced in Tellicherry, China is the great market for it. Singapore exported 48,460 piculs (of 135 lb.) in 1877. In 1879,
6

PEPPER.

Hankow imported 250 pincula, 885l.; Ningpo, 238 pincula; Shanghai, 357 pincula. The London market value of white pepper is about 45-7d. a lb.

3. Long Pepper.—This is the fruit-spike of *Piper longum* [Chavica Roxburghii] and of *P. [C.] officinarum*, collected and dried shortly before it reaches maturity. The latter is a native of the Indian Archipelago (Java, Sumatra, Celebes, and Timor). The former is indigenous to Malabar, Ceylon, E. Bengal, Timor, and the Philippines, and is cultivated along the E. and W. coasts of India. In Bengal, the plants are raised from suckers set 5 ft. apart in rich, high, dry soil. The yield from an acre is 3 maunds (of 80 lb.) in the 1st year, 12 in the 2nd, 18 in the 3rd; after this, the return diminishes, and the roots are grubbed up, dried, and sold as pipilt-mul. The pepper is harvested in January, and thoroughly sun-dried. It is brought from Java and Rio to Singapore and Penang for re-export. Singapore shipped 3,866 cwt. in 1871, 447 being to the United Kingdom. Penang despatches 2,000-3,000 pincula (of 13½ lb.) yearly. The London market value is 37-45s. a cwt.

4. Ashamtee or W. African Pepper.—This spice, sometimes called also “African cubeb,” is the fruit of *Piper [Cubeba] Clusii*, widely distributed in Tropical Africa, most abundantly in the Niam-niam country, about, 4° to 5° N. lat. and 28° to 29° E. long. It is locally used as a substitute for common black pepper, and could be procured in large quantity.

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(From Simmond’s Commercial Products of the Vegetable Kingdom.)

The black pepper of commerce is obtained from the dried unripe fruit (drupes) of *Piper nigrum*, a climbing plant common in the East Indies, and of the simplest culture, being multiplied with facility by cuttings or suckers. The ripe fruit, when detached from its outer fleshy bloom by washing, forms the white pepper of the shops. The dried fruiting spikes of *P. longum*, a perennial shrub, native of Malabar and Bengal, constitute long pepper. The fruit of *Xylopia aromatica* is commonly called Ethiopian pepper, from being used as pepper in Africa. The seeds of some species of fennel-flower (*Nigella sativa* and *arvensis*), natives of the south of Europe, were formerly used instead of pepper, and are said to be still extensively employed in adulterating it. In Japan, the capsules of *Xanthoxylum piperitum*, or *Pogara Piperita*, are used as a substitute for pepper, and so is the fruit of *Tasmannia aromatica* in Van Diemen’s Land. According to Dr. Roxburgh, *P. triocicum* is cultivated in the East, and yields an excellent pepper.

The pepper vine rises about two feet in the first year of its growth, and attains to nearly six feet in the second, at which time, if vigorous and healthy, the petals begin to form the corolla or blossom. All suckers and side shoots are to be carefully removed, and the vines should be thinned or pruned, if they become too large, as the too parasitical plants should be uprooted. The vine would climb, if permitted, to the elevation of twenty feet, but is said to bear best when kept down to the height of ten or twelve feet. It produces two crops in the year. The fruit grows abundantly from all the branches, in long small clusters of from 20 to 50 grains; when ripe it is of a bright red color. After being gathered, it is spread on mats in the sun to dry, when it becomes black and shrivelled. The grains are separated from the stalks by hand rubbing. The roots and thickest parts of the stems, when cut into small pieces and dried, form a considerable article of commerce all over India, under the name of *Pippula moola*.

Almost all the plants of the family *Piperaceae* have a strong aromatic smell and a sharp burning taste. This small group of plants is confined to the hottest regions of the globe; being most abundant in tropical America and in the East Indian Archipelago, but more rare in the equinoctial regions of Africa. The common black pepper, *P. nigrum*, represents the usual property of the order, which is not confined to the fruit, but pervades, more or less, the whole plant. It is peculiar to the torrid zone of Asia, and appears to be indigenous to the coast of Malabar, where it has been found in a wild state. From this it extends between the meridians of longitude 96 deg. and 116 deg. S. and the parallels of latitude 5 deg. S. and 12 deg. N., beyond which no pepper is found. Within these limits are the islands of Sumatra and Borneo, with the Malay peninsula and part of Siam. Sumatra produces by far the greatest quantity of pepper. In 1842, the annual produce of this island was reckoned at 30,000,000 lbs., being more than the amount furnished by all the other pepper districts in the world.
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A little pepper is grown in the Mauritius and the West India Islands, and its cultivation is making some progress on the Western Coast of Africa, as we imported from thence 2,909 bags and casks in 1846, and about 110,000 lbs. in 1847. Mr. J. Crawford, F.R.S., one of the best authorities on all that relates to the commerce and agriculture of the Eastern Archipelago, recently estimated the produce of pepper as follows:—

<table>
<thead>
<tr>
<th>Region</th>
<th>1846 lbs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sumatra (West Coast)</td>
<td>20,000,000</td>
</tr>
<tr>
<td>(East Coast)</td>
<td>8,000,000</td>
</tr>
<tr>
<td>Islands in the Straits of Malacca</td>
<td>3,600,000</td>
</tr>
<tr>
<td>Malay Peninsula</td>
<td>3,733,333</td>
</tr>
<tr>
<td>Borneo</td>
<td>2,666,667</td>
</tr>
<tr>
<td>Siam</td>
<td>8,000,000</td>
</tr>
<tr>
<td>Malabar</td>
<td>4,060,000</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>50,000,000</strong></td>
</tr>
</tbody>
</table>

If we add to this:

<table>
<thead>
<tr>
<th>Region</th>
<th>1847 lbs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Western Coast of Africa and B. W. Indies</td>
<td>53,000</td>
</tr>
<tr>
<td>Java</td>
<td>4,000,000</td>
</tr>
<tr>
<td>Mauritius and Ceylon</td>
<td>80,000</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>54,133,000</strong></td>
</tr>
</tbody>
</table>

as the total produce of the world.

Black pepper constitutes a great and valuable article of export from the Indian Islands; which, as we have seen, afford by far the largest portion of what is consumed throughout the world. In the first intercourse of the Dutch and English with India, it constituted the most considerable and important staple of their commerce. The production of pepper is confined in a great measure to the western countries of the Eastern Archipelago, and among these to the islands in the centre and to the northern quarter, including the Peninsula. It is obtained in the ports on both sides of the coast of the latter, but particularly the north-eastern coast. The principal quarters (according to Mr. Crawford, my authority on this subject), are Patani, Tringanu, and Kalantin. In the Straits a large quantity is produced in the island of Singapore, and above all in Pinang, where the capital of Europeans, and the skill and industry of the Chinese have been successfully applied to its culture. The western extremity of Sumatra, and the north-west coast of that island, are the most remarkable situations in it for the production of pepper, and here we have Aceen, Tikao, Bencoolen, Padang, and the country of the Lampungis. The production of the eastern extremity of Sumatra or Palembang is considerable, but held of inferior quality. In the fertile island of Java, the quantity of pepper grown is inconceivable, nor is it remarkable for the goodness of its quality. The province of Bantam has always furnished, and still continues to produce, the most pepper; but the culture of this creeper is fast giving place in Java to staples affording higher profits and requiring less care. The exports were, in the following years:

<table>
<thead>
<tr>
<th>Year</th>
<th>Piculs</th>
<th>Lbs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1830</td>
<td>6,661</td>
<td>3,737,732</td>
</tr>
<tr>
<td>1835</td>
<td>11,044</td>
<td>6,508,000</td>
</tr>
<tr>
<td>1839</td>
<td>11,044</td>
<td>6,508,000</td>
</tr>
<tr>
<td>1841</td>
<td>13,477</td>
<td>13,500,000</td>
</tr>
</tbody>
</table>

The number of pepper vines in the district of Bencoolen, in the close of last year, 1852, was as follows:—1,571,894 young vines; 2,437,052 bearing ditto; total, 4,008,946.

Up to the end of September there had been delivered to the Government 1,145 piculs white pepper, and 1,128 piculs black pepper, while of the harvest of 1852 there were still probably to be received 330 piculs white, and 4,967 piculs black pepper.

The south, the west, and the north coasts of the great island of Borneo produce a large quantity of pepper; as early as 1721 it was a staple commodity of this island. Banjarmassin is the most productive place on the south coast, and the State of Borneo Proper on the north coast. The best pepper certainly does not grow in the richest soils, for the peppers of Java and Palembang are the worst of the Archipelago, and that of Pinang and the west coast of Sumatra are the best. Care in culture and curing improves the quality, as with other articles, and for this reason chiefly it is that the pepper of Pinang is more in esteem than that of any other portion of the Archipelago. From the ports and districts of Siam 3,500 to 4,000 tons are exported annually.
The duty at present levied on pepper in England is 6d. per lb., while the wholesale price for that of Pinang, Malabar, and Sumatra is about 4d. per lb. White pepper ranges from 9d. to 1s. 6d. per lb. The prime cost in Singapore is not more than 1½d. per lb.

About 70,000 or 80,000 piculs of pepper are annually exported from Singapore, of which between 30,000 and 40,000 piculs have, until within the last two years, gone on to Great Britain. More than one-half of the pepper exported from Singapore is grown in the island by Chinese settlers.

The low selling price of the article in the English market, the high duty levied upon it, and the large freight paid for its carriage to Great Britain, now leave so small a price to the cultivator in Singapore, that the cultivation ceases to be remunerative, and is carried on at a loss; and has consequently within the last year or two begun to decrease rapidly, involving the Chinese growers, who are generally of the poorest class, and without capital, in great distress.

A reduction in the duty on pepper has always been followed by a very large increase in the consumption of the article, as will appear from the following table, showing the importation and consumption in Great Britain during some of the first and last years of the different rates of duty:

<table>
<thead>
<tr>
<th>Year</th>
<th>Quantity consumed</th>
<th>Duty</th>
<th>Singapore price</th>
</tr>
</thead>
<tbody>
<tr>
<td>1811</td>
<td>1,457,353</td>
<td>1 10½</td>
<td>0 7¼ to 0 7½</td>
</tr>
<tr>
<td>1814</td>
<td>941,599</td>
<td>1 10½</td>
<td>0 11 to 1 1</td>
</tr>
<tr>
<td>1820</td>
<td>1,404,021</td>
<td>2 6</td>
<td>0 6 to 0 6¼</td>
</tr>
<tr>
<td>1824</td>
<td>1,447,030</td>
<td>2 6</td>
<td>0 4 to 0 4¼</td>
</tr>
<tr>
<td>1826</td>
<td>2,509,037</td>
<td>1 0</td>
<td>0 4 to 0 4½</td>
</tr>
<tr>
<td>1836</td>
<td>2,749,431</td>
<td>1 0</td>
<td>0 0 to 0 0¼</td>
</tr>
<tr>
<td>1837</td>
<td>2,925,075</td>
<td>1 0</td>
<td>0 0 to 0 0¼</td>
</tr>
<tr>
<td>1845</td>
<td>3,103,415</td>
<td>0 6</td>
<td>0 2½ to 0 4¼</td>
</tr>
</tbody>
</table>

In a memorial from the mercantile community of Singapore, sent home in 1848, it is asserted that a reduction in the duty of pepper being always attended by a large increase in the consumption, would not lead to any serious loss in the revenue, while it would confer a great boon on the poorer classes, to whom it has now become a necessary article of life. The reduction would also be of great advantage to British manufacturers, as well as to our Indian possessions, by giving rise to an increased demand for British goods and productions, and of the highest benefit to the agricultural settlers in the island of Singapore, enabling them to procure for their labor an honest means of livelihood.

The pepper vines, which are allowed to climb poles or small trees, are tolerably productive at Singapore; and pepper planting is esteemed by the Chinese to be a profitable speculation, particularly if they are enabled to evade the payment of quit-rent. An acre of pepper vines will yield 1,161 lbs. of clean pepper. In Sumatra, a full grown plant has been known to produce seven pounds; in Pinang the yield is much more. The average produce of one thousand vines is said, however, to be only about 450 lbs.

Colonel Low, in his "Dissertation on Pinang," published at Singapore some years ago, gives an interesting account of the culture:

"Pepper was, during many years, the staple product of Pinang soil, the average annual quantity having been nearly four millions of pounds; but previous to the year 1810, the above amount had decreased to about two and a half millions of pounds, which was the result of the continental system.

The price having fallen at length to three and three-and-a-half dollars the picul—with only a few occasional exceptions of rises—the cultivation of this spice was gradually abandoned, and the total product at this day does not exceed 2,000 piculs. The original cost, when pepper was at a high price, together with charges of transporting it to Europe, amounted to £36,357 for every five hundred tons, and the loss by wastage was estimated at £5,405. In 1818 there remained on the island 1,480,265 pepper vines in bearing, and the average value of exports of pepper from Pinang, including that received from other places, was averaged at 106,870 Spanish dollars.

As might have been foreseen, the fall of prices has so greatly diminished the cultivation of pepper to the eastward, that a reaction is likely to take place; and has in fact partly shown itself already. Some Chinese in Pinang and Province Wellesley seem to be preparing to renew the cultivation. There is abundant scope for the purpose on both sides of the harbour, and every facility is at hand for carrying it on.

The pepper plant or vine requires a good soil, the richer the better, but the red soil of higher hills is not congenial, the Chinese think, to it. The
PEPPER.

undulations; skirting the bases of the hills, and the deep alluvial lands, where not saturated with water, or liable to be overflowed, are preferred.

The Chinese have always been the chief cultivators, and when the speculation flourished they received advances from the merchants, which they paid back in produce at fixed rates.

When pepper was extensively cultivated on Prince of Wales Island, the European owner of the land had the forest cleared by contract, and the vines planted by contract, and when the vines came into bearing the plantation was farmed to the Chinese from year to year, on payment of a specific quantity of pepper. Any other plan would have ruined the capitalist, as the culture is almost entirely in their hands in the Straits Settlements, and they will not work so well for others as when they are specially interested.

The plants are set out at intervals, every way, of from seven to twelve feet, according to the degree of fertility of the soil, so that there are from 800 to 1,000 vines in one orlong of land; to each vine is allotted a prop of from ten to thirteen feet high, cut from the thorny tree called dadap, or where that is scarce, from the less durable boonglai; these props take root, thus affording both shade and support to the plant. The plant may be raised from seed pepper, but the plan is not approved of, cuttings being preferable, as they sooner come into bearing. The pits in which these cuttings are set should be a foot-and-a-half square, and two feet in depth; manure is not often applied, and then it is only some turf ashes. However unpicturesque a pepper plantation may be, still its neat and uniform appearance renders the landscape lively, and there can be little doubt that the island has suffered in its salubrity since the jungle usurped the extensive tracts formerly under pepper cultivation.

When the vine has reached the height of three or four feet, it is bent down and laid in the earth, and about five of the strongest shoots which now spring up are retained and carefully trained up the prop, to which they are tied by means of ligatures of some creeping plants.

One Chinese, after the plantation has been formed, can take care of two orlongs of land. The usual mode is this:—An advance is made by the capitalist to the laborer for building a house, and for agricultural implements; he then receives two dollars monthly to subsist on, until the end of the third year, when the estate or plantation is equally divided betwixt the contracting parties.

The Chinese and even European cultivators used formerly to engage the Chinese who had just arrived from China; they paid off their passage-money, and then allowed them two dollars monthly, for provisions, for one year, with a suit of clothes, by which means the cost of the labor of one man averaged about three dollars monthly; but this plan is attended with risks.

The cost attendant on the cultivation of two orlongs of land, with pepper, for three years—the Chinese laborer receiving the usual hire of five Spanish dollars monthly—will be nearly as follows:—

<table>
<thead>
<tr>
<th>Description</th>
<th>Spanish dollars</th>
</tr>
</thead>
<tbody>
<tr>
<td>Price of land, clearing, and planting</td>
<td>40</td>
</tr>
<tr>
<td>Quit rent, at 75 cents per annum per orlong</td>
<td>9</td>
</tr>
<tr>
<td>Two thousand plants</td>
<td>4</td>
</tr>
<tr>
<td>&quot; dadap props</td>
<td>6</td>
</tr>
<tr>
<td>Implements</td>
<td>6</td>
</tr>
<tr>
<td>House</td>
<td>10</td>
</tr>
<tr>
<td>Labor</td>
<td>200</td>
</tr>
<tr>
<td>Interest, loosely calculated at</td>
<td>30</td>
</tr>
<tr>
<td><strong>Total Spanish dollars</strong></td>
<td><strong>305</strong></td>
</tr>
</tbody>
</table>

In a very good soil a pepper vine will yield about one-eighth of a pound of a dry produce at the end of the first year; at the end of the second, about a quarter of a pound; and at the expiration of the third, probably one pound; at the end of the fourth, from three to three-and-a-half pounds; ditto fifth, from eight to ten pounds. After the fifth year up to the fifteenth, or even the twentieth year, about ten pounds of dry merchantable produce may be obtained from each vine, under favorable circumstances. The Chinese speculator used to rent out his half-share of a new plantation for five years, to his cultivating partner, after the expiration of the first three years, at the rate of thirty picles per annum; the total produce of these five years giving about fifty-six picles annually as an average.

A pepper plantation never survives the thirtieth year, unless in extremely rich soil, and then it is unproductive, or will the young vine thrive on an old worn out pepper land, a peculiarity which is applicable to the coffee tree. The chief crop lasts from August to February. Four pounds of dry produce, for ten
of green, is considered a fair estimate. Great care is requisite in the manage-
ment of the vine, and especially in training and tying it on the props. It is
subject to be injured by the attacks of a small insect. The green pepper dries
in two or three days, and if it is intended that it shall be black, it is pulled
before it is quite ripe. To make white pepper, the berry is allowed to
remain somewhat longer on the vine; it is, when plucked, immersed in boiling
water, by means of which process and subsequent friction, before drying, the
husk is separated.

The exports of pepper from Pinang in the last four years have been—in
1849, 2,591,233 lb.; in 1850, 6,397,733 lb.; in 1851, 2,366,933 lb.; in 1852,
2,112,133 lb."

A small quantity of pepper seems to be annually exported from Ceylon,
which I presume is the growth of that island; thus there were:

<table>
<thead>
<tr>
<th>Year</th>
<th>Cwts. Shipped</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>1842</td>
<td>54</td>
<td>1843</td>
</tr>
<tr>
<td>1844</td>
<td></td>
<td>29</td>
</tr>
</tbody>
</table>

In the Customs returns of Ceylon, it is classed with cardamoms, and
160 to 170 cwt. of the two were shipped in each of the years 1850 and 1851.
Last year the quantity was smaller.

Pepper cultivation has been introduced into the Mauritius, and in 1839
more than 500,000 lb. were imported from thence, but as the shipments have
since decreased, I presume it has given place to the more profitable staple sugar.
I have been able to glean no information as to the progress it has made in
the West Indies. In Cayenne it has been successfully carried on for many
years; and large shipments of pepper have been made thence to France.

---

**BLACK PEPPER EXPORTED FROM SINGAPORE.**

<table>
<thead>
<tr>
<th>Year</th>
<th>Total Exports</th>
<th>Piculs</th>
</tr>
</thead>
<tbody>
<tr>
<td>1841</td>
<td></td>
<td>66,810</td>
</tr>
<tr>
<td>1842</td>
<td>Exports</td>
<td>21,231</td>
</tr>
<tr>
<td>1843</td>
<td>Exports</td>
<td>32,777</td>
</tr>
<tr>
<td>1844</td>
<td>Growth of Singapore</td>
<td>57,883</td>
</tr>
<tr>
<td>1845</td>
<td>Exports</td>
<td>67,148</td>
</tr>
<tr>
<td>1846</td>
<td>Growth of Singapore</td>
<td>42,095</td>
</tr>
<tr>
<td>1847</td>
<td>Exports</td>
<td>65,892</td>
</tr>
<tr>
<td></td>
<td>Growth of Singapore</td>
<td>39,019</td>
</tr>
<tr>
<td></td>
<td>Exports</td>
<td>56,709</td>
</tr>
<tr>
<td></td>
<td>Growth of Singapore</td>
<td>35,712</td>
</tr>
<tr>
<td></td>
<td>Exports</td>
<td>60,994</td>
</tr>
<tr>
<td></td>
<td>Growth of Singapore</td>
<td>36,595</td>
</tr>
</tbody>
</table>

Pliny, the naturalist, states that the price of pepper in the market of
Rome in his time was, in English money, 9s. 4d. a pound, and thus we have
the price of pepper at least 1,774 years ago. The pepper alluded to must have
been the produce of Malabar, the nearest part of India to Europe that produced
the article, and its prime cost could not have exceeded the present one, or
about 2d. a pound. It would most probably have come to Europe by crossing
the Indian and Arabian ocean, with the easterly monsoon, sailing up the Red
Sea, crossing the desert, dropping down the Nile, and making its way along
the Mediterranean by two-thirds of its whole length. This voyage, which in
our times can be performed in a month, most probably then took eighteen.
Transit and customs duties must have been paid over and over again, and there
must have been plenty of extortion. All this will explain how pepper could
not be sold in the Roman market under fifty-six times its prime cost. Immediately
previous to the discovery of the route to India by the Cape of Good Hope,
we find that the price of pepper in the markets of Europe had fallen to 6s.
a pound, or 3s. 4d. less than in the time of Pliny. What probably contributed
to this fall was the superior skill in navigation of the now converted Arabs,
and the extension of their commerce to the islands of the Eastern Archipelago,
which abounded in pepper. After the great discovery of Vasco de Gama, the
price of pepper fell to about 1s. 3d. a pound, a fall of 8s. 1d. from that of the
time of Pliny, and of 4s. 9d. from that of the Mahommedan Arabs, Turks,
and Venetians.

In 1826, 14,000,000 lb. of pepper were imported into the United Kingdom,
of which about 5,500,000 were re-exported. In 1841, 15,000,000 lb. were imported,
of which 6,500,000 were re-shipped to other countries.
### PEPPER.

The home consumption, it will be seen, now averages about 3,250,000 lb.—

<table>
<thead>
<tr>
<th>Year</th>
<th>Imports (lbs.)</th>
<th>Home consumption (lbs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1845</td>
<td>9,852,984</td>
<td>3,209,728</td>
</tr>
<tr>
<td>1846</td>
<td>5,906,586</td>
<td>3,299,955</td>
</tr>
<tr>
<td>1847</td>
<td>4,669,930</td>
<td>2,966,622</td>
</tr>
<tr>
<td>1848</td>
<td>8,125,545</td>
<td>3,185,337</td>
</tr>
<tr>
<td>1849</td>
<td>4,795,042</td>
<td>3,257,911</td>
</tr>
<tr>
<td>1850</td>
<td>8,028,319</td>
<td>3,170,883</td>
</tr>
<tr>
<td>1851</td>
<td>3,966,496</td>
<td>3,363,403</td>
</tr>
<tr>
<td>1852</td>
<td>6,641,699</td>
<td>3,524,501</td>
</tr>
</tbody>
</table>

The following return shows the number of bags of pepper imported into the United Kingdom, with the quantity retained for home consumption:

<table>
<thead>
<tr>
<th>Year</th>
<th>Black bags.</th>
<th>White bags.</th>
<th>Retained for home consumption</th>
</tr>
</thead>
<tbody>
<tr>
<td>1843</td>
<td>37,840</td>
<td>3,661</td>
<td>21,163</td>
</tr>
<tr>
<td>1844</td>
<td>60,705</td>
<td>2,123</td>
<td>23,525</td>
</tr>
<tr>
<td>1845</td>
<td>80,600</td>
<td>3,208</td>
<td>30,204</td>
</tr>
<tr>
<td>1847</td>
<td>37,194</td>
<td>1,236</td>
<td>28,758</td>
</tr>
<tr>
<td>1848</td>
<td>65,518</td>
<td>3,042</td>
<td>31,665</td>
</tr>
<tr>
<td>1849</td>
<td>43,651</td>
<td>2,616</td>
<td>32,246</td>
</tr>
</tbody>
</table>

### CHILLIES AND CAYENNE PEPPER.

Chillies or capsicum are long roundish taper pods, divided into two or three cells, full of small whitish seeds. When this fruit is fresh, it has a penetrating acrid smell; to the taste it is extremely pungent, and produces a most painful burning in the mouth. They are occasionally imported dry, and form the basis of Cayenne pepper; put in vinegar when green or ripe, they are an acceptable present in Europe. In Bengal the natives make an extract from the chillies, which is about the consistence and color of treacle. The consumption of chillies in India is immense, as both rich and poor daily use them, and it is the principal ingredient in all chutneys and curries ground into a paste, between two stones, with a little mustard, oil, ginger and salt, it forms the only seasoning which the millions of poor in the country can obtain to eat with their insipid rice. They are worth in the Bombay market about 40s. the candy of 600 lbs.

Immensely quantities of the capsicum are used by the native population of the West Indies, Africa, and Mexico, the consumption as a condiment being almost universal, and perhaps equal in quantity to salt. Ten barrels of these peppers were shipped from Montego Bay, Jamaica, in the first six months of 1851.

The wholesale price of chillies in the London market is from 15s. to 25s. the cwt., and there is a duty of 6d. per pound on them. Cayenne fetches 9d. to 2s. the pound.

Chilli is the Mexican name for all varieties of Capsicum. They are natives of the East and West Indies, and other hot climates. *C. annuum* is the species commonly noticed, but there seems to be numerous varieties, which by many are reckoned species. Thus, *C. frutescens* is a shrubby plant, which, along with *C. minimum*, supplies the variety called bird-pepper, it grows to a larger and more bushy size; *C. baccatum* has a globular fruit, and furnishes cherry or berry capsicum. They are all of the simplest culture, and may even be grown with very little care in England. Culture appears to increase the size, but to diminish the pungency of the fruit. In capsicums irritant properties prevail so as to obscure the narcotic action. Their acridity is owing to an oleaginous substance called capsicin. Cayenne pepper is used in medicine chiefly in the form of tincture, as a rubefacient and stimulant, especially in cases of ulcerated sore throat. It acts on the stomach as an aromatic condiment, and when preserved in acetic acid it forms chilli vinegar.

Red pepper may be considered one of the most useful vegetables in hygiene. As a stimulant and auxiliary in digestion it has been considered invaluable, especially in warm countries. A kind called the tobacco red pepper, is said to possess the most pungent properties of any of the species. It yields a small red pod, less than an inch in length, and longitudinal in shape, which is so exceedingly hot that a small quantity of it is sufficient
to season a large dish of any food. Owing to its oleaginous character, it has been found impossible to preserve it by drying, but by pouring strong boiling vinegar on it a sauce or decoction can be made, which possesses in a concentrated form all the essential qualities of the vegetable. A single drop of this sauce will flavor a whole plate of soup or other food.

The "wort" or Cayenne potage may be termed the national dish of the Abyssinians, as that, or its basis "dillock," is invariably eaten with their ordinary diet, the thin crumpet-like bread of teff or wheat flour. Equal parts of salt and the red cayenne pods are well powdered and mixed together with a little pea or bean meal to make a paste. This is called "dillock," and is made in quantities at a time, being preserved in a large gourd-shell, generally suspended from the roof. The "wort" is merely a little water added to this paste, which is then boiled over the fire, with the addition of a little fat meat and more meal to make a kind of porridge, to which sometimes is also added several warm seeds, such as the common cress or black mustard, both of which are indigenous in Abyssinia.—("Johnston's Abyssinia."

A great quantity of Agi or Guinea pepper is grown in Peru, the natives being very fond of this condiment. It is not uncommon for an American Indian to make a meal of twenty or thirty pods of capsicum, a little salt, and a piece of bread, washed down by two or three quarts of chicha, the popular beverage.

PEPPER.

(From "Porter's Tropical Agriculturist.")

Pepper vine—Piper nigrum—belonging to a genus of the class and order Dianandra Trigynia.

The pepper-plant is indigenous to both the Indian peninsulas. It grows most abundantly on the coast of Malabar, whence pepper forms a considerable export. Java, Sumatra, and Borneo likewise produce it in large quantities.

The Dutch, with that grasping policy which has always characterized the management of their Eastern possessions, long strove to monopolize the whole of the pepper trade; and, to forward their views, forced its cultivation in Java with an avidity which defeated its own purpose. Sir Stamford Raffles, in his excellent History of Java, observes on this subject, that "Pepper which at one time formed the principal export from Java, has, for some time, ceased to be cultivated to any considerable extent. It was reared principally in Bantam and the dependencies of that province in the southern part of Sumatra; and, in the flourishing state of the monopoly, these districts furnished the Dutch with the chief supply for the European market. But the system by which it was procured was too oppressive and unprincipled in its nature, and too impolitic in its provisions, to admit of long duration. It was calculated to destroy the energies of the country, and with them the source whence the fruits of the monopoly proceeded. In the year 1811, accordingly, neither Bantam nor its dependencies furnished the European government with a single pound of this article."—Vol i. p. 131.

A more enlightened system has, however, for the last few years have been pursued with regard to the cultivation of pepper in Java. It is no longer engrossed as a government monopoly, and perfect freedom is allowed in the raising of this production.

When the East India Company first formed a settlement on the coast of Sumatra, its attention was directed to procure an extensive growth of pepper. For this end a stipulation was made with some of the native chiefs, binding them to compel their subjects each to cultivate a certain number of pepper vines. The whole of the produce obtained from these plants was to be delivered exclusively to the Company's agents at a price far below what would constitute a proper remuneration for the labour bestowed on its cultivation and preparation. The authority of the chiefs for a while enforced obedience to this arbitrary measure; and their interest in causing its continuance was supposed to be

* The price which was for many years paid to the cultivators of pepper was ten Spanish dollars, or fifty shillings, per bahr (5 cwt.). About 1780 the price was augmented to fifteen dollars. Duty in addition paid to the chiefs was from one and a half to two dollars per bahr. This low price afforded to each cultivator an income of not more than from eight to twelve dollars.—Marsden's Sumatra.
sufficiently engaged by granting them an allowance proportionate to the quantity of pepper delivered. This gross oppression was, however, too keenly felt to be willingly endured; and accordingly, as the influence of the chiefs declined, the people relaxed in their exertions, and the annual supply fell off, the natives refusing to work on such unjust terms. The chiefs, unable any longer to obtain acquiescence in their despotic behests, abandoned to the agents of the Company the task of obliging the people to labour, that others might reap; and as long as an efficient establishment was kept up, this work of oppression continued successful, inasmuch as the stipulated number of vines were still cultivated, and the usual consignments made to Europe.

Happily the rights of others are now better understood and respected, and the impolicy, as well as the injustice of such measures, are fully acknowledged. The pepper of Sumatra is no longer obtained by oppressing the natives, and its cultivation is declared free.

The cultivation of the pepper plant has been successfully pursued in the Western hemisphere. We learn from "La Guiane Francaise" of 5th February, 1825, that it was a few years since introduced at Cayenne, and followed up with uncommon perseverance by General Bernard. Commenting on this circumstance, the writer in the publication just named, remarks: "The results give reason to hope that the time is not very far distant when France will be delivered from the tribute which she pays to foreigners for the supply of this spice. More than thirty thousand pepper-trees are about to enter into bearing on the estate of theCmd a \ Momente, the settler whom we admire, and whose promise to furnish for exportation from four to five kilogrammes of pepper."

The berries of the *piper nigrum* are the black and white pepper of commerce. This is a perennial plant, with a creeping or climbing stem of a dark colour, which soon becomes ligneous, and acquires considerable thickness. The leaves are heart-shaped and pointed, with a glossy surface, and of a dark green colour. They have very little smell or pungency. The branches are short and brittle, not projecting above two feet from the stem, and separating readily at the joints. Clusters of small white flowers are succeeded by round berries, green when young, and turning to a bright red as they arrive at maturity. They grow abundantly upon all the branches, from which they hang in large bunches, resembling, in form, clusters of grapes; but the berries grow distinct, and more in the manner of currants or elder-berries.

This plant thrives luxuriantly in most soils, and, when once reared, requires comparatively little care and labour. The preference, in choosing a situation, is usually given to level grounds along the banks of rivers (provided they are not so low as to be inundated), on account of the rich vegetable mould found in those localities, and for the advantage of water carriage. Plantations of this tree are seldom made on rising ground, unless the ascent be very gentle; otherwise the soil is liable to be loosened and washed away from the roots of the vines. The goodness of pepper is considered to depend more upon the natural qualities of the soil than upon the care bestowed on its cultivation. It is a hardy tropical plant and grows readily from cuttings or layers, rising in several knotted stems, which cling round any neighbouring support, and adhere to it by means of fibres that shoot from every joint at intervals of from six to ten inches, and through which it probably imbibes its nourishment. If left without any means of climbing upwards, the stalk, unable to support itself, creeps along the ground. The fibres at the joints then become roots, but in this situation "the plant would never exhibit signs of fruitification."

Like ivy, it is encouraged by support to throw out bearing shoots. If left in its natural state it climbs to twenty or five-and-twenty feet high; but it is more fruitful when not allowed to attain this height. Restrained in its growth, to from twelve to fifteen feet high, it bears both foliage and flowers within a foot of the ground; but in the former case, the lower part of the stem is entirely devoid of these.

In order to give to the pepper-vines the support they require, it is usual to plant some other trees with them for that purpose. The Jacca tree—(*Artocarpus integrifolia*) is selected in Malabar thus to lend its support, since the same soil is equally well adapted to the growth of both plants. In Sumatra a thorny tree, called by the natives chinngkariang (*erythrina coralloidendron*) is employed. In Borneo the vines are supported like hops by poles; but there is a great disadvantage attendant on this method, as the poles thus exposed decay at the end of two or three years, while the plants last many years, and they are much

* Marsden's Sumatra.*
PEPPER.

injured in the removal of the old poles, and the placing of new ones. Besides this, the use of poles has another disadvantage in the absence of foliage, which during the dry season, is of service in sheltering the vines from the too ardent rays of the sun.

When a piece of ground is to be converted into a pepper plantation, it is marked out by means of a line into regular squares, having their sides about six feet, the intervals at which the plants are intended to be placed from each other. The points of intersection are noted by slight stakes, and at each of these points a tree intended for the prop is planted; for this purpose cuttings of about two feet long are put into the ground a span deep; sometimes cuttings six feet long are used, but these often fail, are not so rigorous as shorter ones, and generally grow crooked.

When the shoots of the chinkariang are twelve or fifteen feet high, a height they usually attain during the second year of their growth, they are topped, and not allowed to grow much beyond this altitude. The branches are lopped annually at the commencement of the rainy season in November. leaving little more than the stem, or otherwise the droppings from the leaves might injure the vines.

The usual mode of propagating the pepper-plant is by cuttings of a foot or two in length taken from the horizontal shoots, which spring forth from the foot of the old vines. One or two of these cuttings are planted close to the young chinkariang tree, sometimes as soon as the latter has taken root, but often after a lapse of six months from its first being planted—a few cultivators allow an interval of twelve months, fearful lest the growing vine should overpower its support; but in general, if this be a healthy and vigorous shoot, so long a period of priority is unnecessary for its thriving, as it advances in strength and growth in proportion as the vine requires its sustaining power. The vine rises about two feet in the first year, and four or five more in the second; at this time, or between the second and third year of its growth, it first begins to put forth blossoms. In the rainy season which succeeds this first promise of fruit, the entwining stem is uncoiled from its support, and placed in a spiral form into a hole dug in the ground for the purpose, close to its root, leaving only the top of the plant above ground; it soon reascends the chinkariang-tree with renewed vigour, and in the ensuing season the plant, then eight or ten feet high, usually bears a full crop of fruit. If this operation be performed too soon, the vines will not be forwarer than those newly planted, and will not bear fruit until the third year. On the other hand, if delayed beyond the proper time for the sake of saving the first fruit, the produce is ultimately retarded, although the desire of a present good, in preference to a future greater advantage sometimes incites the cultivator to adopt this plan, and to omit turning his plants down until he has gathered in a premature harvest. During three or four years after the first crop, the produce annually increases; a plantation of about seven or eight years' growth is then in its prime; it continues in this flourishing state from one to four years longer, according to the fitness of the soil, and then gradually declines for about the same period, till it is no longer worth the labour of keeping it in order. Fruit has been gathered from some plants of twenty years' growth, but that is a very uncommon circumstance. As soon as there is any appearance of decline in the crop, the plantation should be renewed, or rather another garden should have been planted to succeed it, so that it may come into full bearing at the time required. The vines sometimes grow bushy at top, when they must be pruned or thinned by hand; the flexible stems generally entwine to the top of their support, and then bend downwards, having their extremities as well as their branches loaded with fruit. In the early growth of the plant it is immaterial how many stalks grow to one root; but when it begins bearing fruit, then only one or two stems should be suffered to rise and cling to the prop; more would weaken the root, and cause it not to bear so abundantly. All suckers and side-shoots must be carefully removed. Some which are healthy and of vigorous growth are usefully employed, trenches are cut to the neighbouring props where the vines have failed, through these the superfluous shoots are conducted, and thence soon ascend round the adjacent tree; otherwise they are at once separated from the parent root, and transplanted to other spots; by which means the plantation is of uniform growth, though many original vines may not have succeeded. These shoots may likewise go to the formation of new gardens.

The ground is always kept well weeded. During June, July, and August, the finer kind of grass is permitted to remain on the ground as a protection against the rays of the sun, and as the means of preserving and attracting the dews, which are then heavy. As the vines increase in size, less
care is necessary in clearing the ground, since the shade prevents the weeds from growing.

Plantations are divided into gardens containing from five hundred to one thousand plants. Industrious or opulent cultivators have sometimes gardens containing as many as two or three thousand vines. These gardens are commonly separated from each other by hedges of shrubs, and have an open border of twelve feet wide round every garden. The gardens are kept with scrupulous neatness: "no rubbish, not so much as a stick or a straw, is to be found on the ground." Their symmetry and neatness give to them an appearance of beauty, although this very symmetry deprives them of the picturesque appearance admired by lovers of nature. Should the season happen to be dry, the cultivators are indefatigable in giving to their plants the necessary moisture; nearly their whole subsistence depending on the success of their crop. In very dry weather the blossoms are liable to fall untimely, or to be shaken off by high winds, in which cases the crop fails. To guard against this latter accident, the gardens are usually placed in a sheltered situation. Long continued drought arrests the progress of vegetation, but does not destroy it. We learn in Marsden's History of Sumatra, that in 1775 there were eight months of continued drought; no foliage appeared on the pepper-plants, and their general destruction was expected; but when the rain at length came, the blossoms appeared in a profusion unknown before. Old gardens which had been unproductive for one or two years, then put forth flowers and bore fruit, so that the crop of 1776-7 was unusually abundant.

The customary time for gathering the principal crop is in September and October, another smaller crop is obtained in March and April. Sometimes the gathering continues at intervals the whole year round; sometimes only one crop is taken, the growth being irregular and dependent on the season. From the first appearance of the blossoms, a period of four months elapses before the berries arrive at maturity. But the blooming is not simultaneous, and there are to be seen growing together on the same vine clusters of flowers, green fruits, and berries already in a fit state for gathering. As soon as any of the berries begin to redden, and it is thought a favourable time for collecting them, they should be plucked, for if delayed too long they fall off. The natives make use of small triangular ladders made of bamboo, with which they go round the tree and reach all the fruit, which is collected in small baskets slung over the shoulders of the gatherer. It is then conveyed by women and children to a smooth level spot of clean hard ground, and there spread on mats to dry in the sun. The vicissitudes of the weather are not thought to injure it in this stage. As it dries it is occasionally rubbed with the hand to separate the stalks from the berries, which soon become black and shrivelled, and assume the well-known appearance of the black pepper of commerce. When dry, they are winnowed in large round shallow sieves, and put under shelter into vessels made of bark, until all the crop is gathered in and dried, or until there is a sufficient quantity to be carried to the factory. That gathered in the properest stage of maturity will shrivel the least; if taken off the tree too soon, it will, after being dried, quickly become mere dust.

The pepper at Borneo is classed into three different qualities. The Molucca, which is the best; the Cayonge, which is an intermediate sort; and the Negaree, which is of the worst quality, and of which the greatest quantity is obtained. This is a small hollow, light pepper, generally full of dust, and if the purchaser incalculately procures his pepper by measure instead of weight, it is said the native dealers generally contrive to substitute this for their heavy Molucca berries.

The white pepper, which is sold at an advanced price, was, for a long time, supposed to be the berries of another plant; it is now, however, pretty well ascertained that this is merely the black pepper decorticated either from accidental circumstances, or by a process to which it is subjected for the purpose. The first is called genuine, the other factitious white pepper. The manner in which the first is obtained, is thus described in Salmon's Modern History, vol. ii. p. 128.

As soon as the pepper is gathered, our merchants tell us that the poor people bring it to them in small quantities, having picked it off the ground, and they apprehend that a small bird called ballaree, feeding on black pepper, digests nothing but the outward husks, and the rest having passed whole through the body of the bird, acquires whiteness. Now, if I may be allowed to give my thoughts of the matter, where the facts are uncertainly transmitted to us, I believe it may be true that this pepper is picked up by the poor people under the black pepper trees; but, as to the birds swallowing and voiding it whole, I must desire to
be excused if I do not assent to it; for it seems much more probable that this is the best of the fruit which drops by itself, and by lying exposed to the weather becomes of a whitish colour, and the reason why this is so much dearer than the other is, because it is really the best fruit, and has the fire taken out of it by lying on the ground, but chiefly because there is so very little of it to be had."

The factitious white pepper is made by steeping the ripest red grains in running water, or in pits made near the banks of rivers or in stagnant pools, sometimes it is only buried in the ground. It swells in consequence of this treatment, and in little more than a week, bursts the outer husk, of which it is then divested by being dried in the sun, rubbed between the hands and winnowed. The real goodness of the pepper is in fact, not improved by this process, the water injures its strength, while the outer husk of which it is deprived, contains more aroma than the inner part, but it is reduced to powder more readily in consequence, and presents a more uniform appearance than the ground black pepper.

The pepper-plant when in full bearing is very prolific, the bunches commonly contain as many as twenty or thirty berries in each, and sometimes one vine will yield as much as six or seven pounds of pepper, this is, however, an uncommon case, and the general average of produce in very far below this quantity. Mr. Crisp made observations on the crops obtained from the pepper gardens of Sumatra, during twelve years. At the end of that time (1777), taking the average produce of the whole number of bearing vines, he found the annual produce of 1,000 vines was 453 pounds: from other calculations, the mean annual produce of the same number of vines is given as being 404 pounds.

Pepper yields a green-coloured matter by distillation, this is found by analysis to be partly resinous and partly oily, the pungent properties of the berry reside in this mixed product.†

Quantities of Pepper retained for Home Consumption from 1821 to 1831 inclusive:

<table>
<thead>
<tr>
<th>Year</th>
<th>Imported</th>
<th>Duty</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1821</td>
<td>1,256,532</td>
<td>2s. 6d. per lb.</td>
<td>1,256,532</td>
</tr>
<tr>
<td>1822</td>
<td>1,446,400</td>
<td></td>
<td>1,446,400</td>
</tr>
<tr>
<td>1823</td>
<td>1,360,693</td>
<td></td>
<td>1,360,693</td>
</tr>
<tr>
<td>1824</td>
<td>1,447,030</td>
<td></td>
<td>1,447,030</td>
</tr>
<tr>
<td>1825</td>
<td>850,067</td>
<td></td>
<td>850,067</td>
</tr>
<tr>
<td>1826</td>
<td>2,529,027</td>
<td>1s. British plantation.</td>
<td>2,529,027</td>
</tr>
<tr>
<td>1827</td>
<td>1,949,931</td>
<td>1s. 2d. East India.</td>
<td>1,949,931</td>
</tr>
<tr>
<td>1828</td>
<td>1,927,718</td>
<td>1s. 6d. other sorts.</td>
<td>1,927,718</td>
</tr>
<tr>
<td>1829</td>
<td>1,933,641</td>
<td></td>
<td>1,933,641</td>
</tr>
<tr>
<td>1830</td>
<td>2,009,154</td>
<td></td>
<td>2,009,154</td>
</tr>
<tr>
<td>1831</td>
<td>2,050,082</td>
<td></td>
<td>2,050,082</td>
</tr>
</tbody>
</table>

Quantities of Pepper imported, exported, and Revenue obtained from the Duty on Pepper from 1827 to 1831 inclusive:

<table>
<thead>
<tr>
<th>Year</th>
<th>Imported</th>
<th>Exported</th>
<th>Revenue</th>
</tr>
</thead>
<tbody>
<tr>
<td>1827</td>
<td>9,083,605</td>
<td>4,092,386</td>
<td>97,496</td>
</tr>
<tr>
<td>1828</td>
<td>4,987,630</td>
<td>4,226,031</td>
<td>96,468</td>
</tr>
<tr>
<td>1829</td>
<td>2,015,184</td>
<td>2,962,003</td>
<td>96,726</td>
</tr>
<tr>
<td>1830</td>
<td>2,816,598</td>
<td>1,488,238</td>
<td>100,492</td>
</tr>
<tr>
<td>1831</td>
<td>6,273,480</td>
<td>6,844,616</td>
<td>102,639</td>
</tr>
</tbody>
</table>

Price of Pepper at the present time (Nov. 1832)—

White, from 5d. to 9d. per lb.
Black, from 3½d. to 4½d.

* Marsden's Sumatra.
† Thomson's Chemistry.
PEPPER BLACK.

(From "Materia Indica," by Whitelaw Ainslie, M.D., M.R.A.S.)
Mellagho (Tam.) Gammiris (Cynge) Mirialoo (Tel.) Meeritch (Hindoos).
Maricha (Sans.) Gol-mirch (Hind.) Kali mirch (Duk.) Fīfīl Usuud (Arab.)
Fīfīl seexh (Pers.) Lada (Mal.) Maricha (Jav.) Micha (Bal.) Sahan (Palembang).
Pöivre (Fr.) Schwarzen pfeffer (Ger.) Pepe negro (It.) Pimienta (Sp.) Pimenta (Port.)
Kaly meerechingay (Mah.) Hootseenau (Chin.)


In no part of the world does this species of pepper grow in greater abundance than on the Malabar* coast; whence it is a most lucrative export. It is, however, a production of many other Eastern countries; but in all these, Mr. Crawfurd† informs us, of a quality inferior to that of Malabar. The kingdom of Bantam on Java, alone, used to furnish to the Dutch;,* six millions of pounds annually; though Mr. Crawfurd is of opinion, that the Java pepper is the worst that grows in the Indian Archipelago. On Sumatra, three different kinds of black pepper are cultivated; the lada lavor, the lada manna, and lada jambee; the first or lampoon pepper, is reckoned the best and strongest. On Borneo§, pepper was first cultivated by the Chinese, about fifty years ago; the produce of that island is not good. At Palembang there is now produced upwards of fifteen thousand peculs annually. It is a common produce of Siam, at Prince of Wales's Island; at Malacca, and at the Philippine islands much attention is given to the rearing of this spice.

The piper nigrum, the tieo-bo of the Cochín-Chinese,‖ is the melagho-codi of Rheede (Hort. Mal. vii. p. 23. t. 12.), is a vine requiring the support of other trees; those commonly selected for this purpose in India, are the betel nut palm (arachca catechu), the moochie wood tree (erythrina Indica, Willd.), the mango tree (mangifera Indica), the jack tree (artocarpus integrifolia), and the hyperanthera moringa; but it has been remarked, that the vines which cling round the two last thrive best. The trees commonly preferred in the islands of the Eastern Archipelago, are what the Malays call the dapap (erythrina coralloidendron), and the mangbudu (morinda citrifolia). The plants are about four years old before they produce fruit, and the berries are nearly five months in coming to prefecture, from the time they first appear. The plant is the Fīfīl of Serapio (c. 367.). The Arabs consider pepper as powerfully debostrent, and as such, I see it has a place amongst their Mufettehat. With regard to the notions of the ancients respecting pepper, the reader may consult Pliny and Celsus; the first (lib. xii. cap. vii.) tells us where it was produced best in his day, and enumerates three sorts; the second mentions both the round and long pepper amongst his diuretics ** (lib. ii. cap. xxxi.). Nine species of piper are growing in the botanical garden of Calcutta; eight species grow in Ceylon.

As a medicine, the native doctors of India consider black pepper as stimulant and stomachic, and prescribe an infusion of the toasted berries in cases of cholera morbus; and I have myself known it put a stop to the vomiting in this disease,‖‖ when many other remedies had failed. They also prepare with it a kind of liniment, which they suppose to have sovereign virtues in chronic rheumatism. In Europe it is occasionally employed as a stimulant in retrocedent gout, and in palsy. The watery infusion has proved a useful gargle in relaxation of the uvula. The dose of the black pepper may be from six grains to a scruple. What is commonly called white pepper,

* Dr. Buchanan says, in his "Travels through Mysore, Canara," &c. (vol. iii. p. 269), that the best black pepper that grows in Southern India, is that of Naga; much better than that of the district of Malabar; that of Naga, sells at the rate of 8½ lb. for 92 rupees.
† See his History of the Indian Archipelago, vol. i. p. 481.
‖ See Sketches Civil and Military of Java, p. 37.
§ See Dr. Leyden's Sketches of Borneo, in the seventh volume of the Transotions of the Batavian Society.
|| See Do Comyn's State of the Philippine Islands, p. 20. Pepper is there chiefly cultivated in the provinces of Tayabas and Laguna.
†† Louristro speaks highly and justly of the virtues of black pepper, extending its tonic virtues to the brain as well as to the stomach. Vide Flora Cochín-China, vol. i. p. 30.
** The same virtue in pepper is noticed by Rhazes. Vide Opera Aphorismorum, lib. iii. p. 536.
‖‖ Though a far more certain mode of combating that disease, in its sporadic form, is by a speedy use of calcined magnesia, given not in milk, but in tepid water.
is merely the black pepper blanched by steeping it for a time in water, and afterwards gently rubbing it, so as to remove the dark outer coat; it is considerably milder than the other, and is much prized by the Chinese; a great deal of it is prepared at Bengcoolen. It appears from Avicenna (Can. lib. ii. tract ii.) that in his day the white pepper was most esteemed as a stomachic; and Celsus says, that it was one of the ingredients used in preparing a famous antidote (lib. v. cap. xxiii.). The use of black pepper as a seasoner of food, will be noticed in another part of this work, suffice it here to observe, that it is a never-failing ingredient in many of the Indian dishes, curries, mullaghbotanie, pilloes, &c., as well on account of its pleasant flavour, as from a conviction of its powerful stomachic virtues; it is, doubtless, the most valuable of all the spice kind. Before concluding, I shall shortly state, that the piper nigrum is "a climbing plant; the leaves, which are ovate, entire, pointed, seven-nerved, and dark-green, are petiolate at the joints of the branches; the flowers are sessile, white, small, and placed on terminal spikes, without any regular calyx or corolla; the fruit is a globular berry of a red-brown colour."

The piper peltatum, Dr. Horsfield informs us, is common at Java, there called lamba-ang gelumbo. The fruit is applied, externally, in swellings and dropsies, in many of the Eastern islands. Mr. Brande regrets that the piper nigrum has not been satisfactorily analyzed; it contains, he adds, a volatile oil, with starch and extractive matter.

PEPPER, CAYENNE, OR 'CHILLIE.'

(From "Materia Indica," by Whetelaw Ainslie, M.D., M.R.A.S.)

Mollahai (Tam.) Merapakia (Tel.) Brahui miricha (Sans.) Lal mirchic (Hind.) Fulka surkhe (Pers.) Felfel-achnar (Arab.) Meneshana (Can.) Lombok (Jav.) Lata mira (Mal.) Tabia (Bali.) Poivre d'Inde (Fr.) Spanischer odeerkereh pfaff (Ger.) Pepperone (It.) Gamsiris (Cyn.) Tambhudda meerchingay (Mah.)

CAPSICUM FRUTESCENS (Lin.)


Our present article, which is universally called red or Cayenne pepper, or Chillie by the English in India, is not the produce of the capsicum annuum, but of the capsicum frutescens (Lin.), which is the capsicum Indicum of Rumphius (Amb. 5. d. 248. t. 8.); it is usually termed the shrubby capsicum plant by botanists, and is the capo-molago of Rheede, in contradistinction to the capsicum annuum, which he calls the Valtia-capo-molago. The difference betwixt the two does not appear to be considerable, and would seem clearly to consist in the nature of the stem, which in our article is shrubby; while in the other it is herbaceous. The Chili plant is the lat-tsiu of the Cochin-Chinese, who use much of the fruit with their victuals (Flor. Cochin-Chin. vol. i. p. 128.). It is cultivated in every part of India, on account of the pod, or rather pod-like berry, so much used by the natives as a warm seasoner. As a medicine, the Vajiana believe it, and justly, to be stomachic and stimulant; and also prepare with it cataplasmas, which they employ in cases requiring rubefacients. It has of late years been successfully given in England in atonic gout, dyspepsia, accompanied with much flatulence, tympani tis and palsy. Dr. Wright has recommended capsicum in dropsies, and other cachetic complaints, when chalybeates are at the same time indicated:—does from gr. vi. to gr. x. in pills; of the tincture, from 3i. to 5i. in a glass of water. As a gargle it is supposed to clean, without impeding the healing of ulcers in the fauces; this gargle, Dr. Thomson says, is prepared by beating into a paste 3i. of the cayenne pepper, and 9i. of common salt, then adding 3vi. of boiling water, and to the solution, when cold, 5vi. of vinegar. With hogs' lard, capsicum forms a good liniment for paralytic limbs.

There are growing in the botanical garden of Calcutta, six species of capsicum; the annuum, grossum, frutescens, bacatum, purpureum, and minimum. The grossum is called in Hindooستان kafrë-murich. Of our article, the

A virtune Roques is quite sensible of: in his Phytographie Medicale he says, in speaking of it, "il corrig e par sa qualite stimulante les aînem fadas ou visqueux, reveille les facultés digestives; et donne aux temperament inertes un sentiment de force et d'alacrite.""

† Mr. Moon, in his valuable Catalogue of Ceylon Plants, informs us, that the Cyn- galese name of the capsicum frutescens is gas miris, and that there are three varieties of the plant in that island; a red, a yellow, and a black. See work, p. 16.
frutescens, there are two varieties, the red and yellow, termed in Bengalese *lall-lunka murich* and *kuldî-lunka murich*; the two last species have been scientifically examined by Dr. Roxburgh; of these the minimum is named in Hindooantia *dhan-murich*. The c. grossum bears a fruit as large as a small apple, which is called by the English in India *caffrie Chilie*; it is preferred for pickling, the skin being fleshy and tender; the seeds are previously taken out. Virey, in his "Histoire Naturelle des Medicaments," expresses a singular notion that it is owing to an abuse of this pickle that the inhabitants of hot climates suffer so much from liver complaints.

The Chilie plant is constantly found in its wild state in the Eastern Islands, though, from its being so commonly called Chilie, Rumphius argues its American origin. "It seldom rises higher than four feet, with a rough stem, and branches diffused, and often scented; the leaves are lanceolate, quite entire, waved, small, smooth, petioled, alternate or scattered; flowers axillary, small, white, and five or six-cleft."

Capsicum is supposed by the German physicians to be peculiarly injurious in gonorrhoea, "imo gestatum in linteo supra abdomen, gonorrhœum post octo menses resuscitavit" (Murray's Appar. Med. vol. i. p. 704.).

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**PEPPER, LONG.**

(From "Materia Indica," by Whitclaw Ainslie, M.D., M.R.A.S.)

*Tipilti* (Tam. and Cynog.) *Pipiloo* (Tel.) *Pipilie* (Duk.) *Pepe* (Hind.) *Pippal* also *Krishna* (Sans.) *Dar filîl* (Arab.) *Fîlîl daraz* (Pers.) *Tâbee* (Mal.) *Chabi-jawa* (Jav.) *Poiivre longue* (Fr.) *Langer pfeffer* (Ger.) *Pepe lungo* (It.) *Pimienta larga* (Span.)

**PIPER LONGUM (Lin.)**


This species of pepper, which is the *cay-lot* of the Cochin-Chinese, is produced in abundance in many parts of Upper as well as Lower Hindoostan. The berries are small, and lodged in a pulpy matter, like those of the black pepper; they are at first green, and become red when ripe. Having been found to be hottest in their immature state, they are then gathered and dried in the sun, when they change to a dark grey colour. It is imported to the entire spikes, which are about an inch and a half long, and indented on the surface.

Dr. Cullen is right, when he says, this pepper has the same qualities as the black, but in a weaker degree; the aromatic odour is rather faint, but its taste is pungent. The *Vytians* on the Coromandel coast prescribe it in infusion, mixed with a little honey, in catarrhal affections, when the chest is loaded with phlegm; the plant is the *cutte-tirpiti* of the Hort. Mal. (p. 27. t. 14.). It is a perennial, a native of India, and also of Nepaul and Java; its stem is smooth, branched, slender, and scented; leaves cordate, pointed, nervad, and of a deep green colour; the flowers are small, in short, dense, terminal spikes, nearly cylindrical.**

There is a large variety of it sometimes met with in Lower India, called in Tamool *ana tipilie* (or elephant pepper), in Telingboo it is *yeanigha pipaloo*, and in Sanscrit *gaja kunnie*.

The root of the long pepper is a favorite medicine of the Hindoos; it possesses the virtues of the berry, but in a weaker degree; and is prescribed by them in cases of palsy, tetanus, and apoplexy. It is termed in Sanscrit *granthika* and *pipati-mula*; in Tamool by the various names of *bengala modie*, *kandam-tipili*, and *tipili mooolum*, in Hindoostane it is *peplamool*, in Persian *bekh deruah fili druz*, and in Arabic *filî mooh*.

The Arabians consider it as cardiac.

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* See the work, p. 182.
‡ Loureiro speaks highly of the medicinal virtues of long pepper: "ca'efaciens, stimulans, deobstruens" (Vide Flora Cochin-China, vol. i. p. 32.)
§ See the London Dispensatory.
|| See Kirkpatrick's Account of Nepaul. p. 205.
|| An expost from that island to Surat. See Sketches Civil and Military of Java, p. 206.
** The Arabians, in the days of Avicenna, thought very highly of this medicine; he said of it, "concoquit digestique cibum, et ventriculum robustum: libidinem coconutat, zingiberis equat efficacitatem." Canon, Med. lib. ii. tract ii. p. 106.
Pepper is one of the most wholesome and useful of the spices. With persons in ordinary health it has the effect of stimulating the stomach greatly to the performance of its functions, and is peculiarly serviceable to persons who are of cold habit, or who suffer from a weak digestion. Used in moderation, pepper decidedly promotes the appetite and digestion; but its excessive use tends to vitiate the gastric juice and injure the stomach, besides provoking inordinate thirst; and this remark applies generally to all spices.

Many of the natives of India esteem pepper as a stomachic, and drink a strong infusion of it in water by way of creating an appetite. They have also a method of making a fiery spirit of fermented fresh pepper with water which they use for the same purpose.

The varieties of pepper which enter into commerce are Pinang and Singapore, Tellicherry, Sumatra, Malabar, Trang, Siam, and Cochin.

The empire of Acheen is the chief producing country for pepper. It is, however, cultivated in various parts of the island of Sumatra and at Bantam. The Malay Peninsula, where the pepper vine was introduced from Java, and which produced at one time about 4,000,000 lbs., now grows none. The culture, as far as quantity is concerned, may be said to be almost restricted, at present, to the east and west coasts of Sumatra; the production, which used to reach nearly 40,000,000 lbs. annually, has, however, greatly declined of late years, but it is probable that when the civil wars are suppressed it will again recover.

It is impossible to arrive at any precise data with regard to the crops. In 1872, 142,000 piculs were shipped to Pinang; in 1873, 105,000; and in 1874, 96,000. The blockade of the Acheen ports by the Dutch cannot alone have been the cause of this decrease, else the quantity shipped in 1874 would have been larger than in 1873. Besides the shipments to Pinang, there used to be sent, before the war, about 2,000,000 lbs. direct to Mediterranean ports. In estimating the entire produce now at about 22,600,000 lbs. we are not far wrong, which is more than 17,000,000 lbs. below the former production.

The pepper that comes to the Batavia market is received from the Lampong islands off the Sumatra shores; the quantity produced there is estimated at about 23,000 piculs annually. The crop is plucked in September and following months, therefore up to the end of January about 2,000 piculs reach the Batavia market monthly, while from February to August the monthly receipts hardly reach 500 piculs. The exports of pepper from Java in 1870 were 21,039 piculs.

The pepper produced in the Lampong district in 1871 was 14,000 piculs; in 1872, 20,537 piculs. In 1872 the shipments consisted of 24,256 piculs of white and 30,695 of black pepper.

The imports of pepper into China were, in

<table>
<thead>
<tr>
<th>Piculs</th>
<th>Piculs</th>
</tr>
</thead>
<tbody>
<tr>
<td>1868</td>
<td>40,160</td>
</tr>
<tr>
<td>1869</td>
<td>42,866</td>
</tr>
<tr>
<td>1870</td>
<td>24,485</td>
</tr>
</tbody>
</table>

In 1867 the export of pepper from Siam, all to China, was 18,947 piculs, valued at 22,500L. This was not more than half the usual crop, owing to severe drought in the pepper districts on the east coast of the Gulf of Siam. In 1870 the export was 25,544 piculs, valued at $174,881. Pepper is also grown to some extent in Cochin China, as 4,308 piculs were shipped from thence in 1871. An export trade in this article was early fostered by the French authorities; the home administration, patriarchal ever towards its offshoots, determined to aid the development of its promising eastern colony, and, among other things, to induce a greater effort to be made in the production of pepper. For this purpose the duties levied in French ports upon the importation of pepper were entirely remitted in the case of Cochin China produce, or what was the same thing, so far as the home authorities could judge, Sagoon-prepared pepper. The differential duties thus created were very great, so considerable that it was found much more profitable to send pepper up to Saigon, to be there shipped to France as of Cochin China growth, than to send it on at much less expense and much smaller freight direct from the Straits. Now, however, a change has been made, and certificates of origin are required upon all pepper allowed to be exported to France, and none but such as is declared on shipment to be of Cochin China origin, is admitted duty free on arrival in France.
PEPPER.

The importation of pepper into the port of Marseilles has been as follows, in tons, from

<table>
<thead>
<tr>
<th>Year</th>
<th>British India</th>
<th>Dutch India</th>
<th>Other Countries</th>
</tr>
</thead>
<tbody>
<tr>
<td>1872</td>
<td>240</td>
<td>849</td>
<td>393</td>
</tr>
<tr>
<td>1873</td>
<td>753</td>
<td>87</td>
<td>336</td>
</tr>
<tr>
<td>1874</td>
<td>1,357</td>
<td>1,139</td>
<td>375</td>
</tr>
<tr>
<td>1875</td>
<td>1,928</td>
<td>297</td>
<td>899</td>
</tr>
</tbody>
</table>

Of this there was taken for consumption in 1874, 416,975 kilogrammes, and in 1875, 647,228 kilogrammes.

In 1855 there were reported to be in Singapore 1,054,715 pepper vines in bearing, and 553,771 young vines. The exports were about 68,000 piculs annually; of this 50,000 piculs were produced in Singapore, and the balance imported from the Johore territory and Sumatra, &c. From Pinang, between 1857 and 1860 there were shipped on the average 50,000 piculs annually. In 1867 there was exported from the Straits Settlements 4,831,375 lbs., valued at 285,145/-.

Our direct imports of pepper from Singapore in the last five years have been as follows:

<table>
<thead>
<tr>
<th>Year</th>
<th>Quantity</th>
<th>Value</th>
<th>Year</th>
<th>Quantity</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>lbs.</td>
<td>£</td>
<td></td>
<td>lbs.</td>
<td>£</td>
</tr>
<tr>
<td>1871</td>
<td>21,820,600</td>
<td>478,665</td>
<td>1874</td>
<td>17,503,343</td>
<td>507,790</td>
</tr>
<tr>
<td>1872</td>
<td>25,009,813</td>
<td>661,569</td>
<td>1875</td>
<td>27,677,719</td>
<td>622,865</td>
</tr>
<tr>
<td>1873</td>
<td>24,629,444</td>
<td>769,191</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The pepper vine (Piper nigrum) is indigenous to the forests of Malabar and Travancore. For centuries pepper has been an article of exportation to European countries from the western coast of India. Although a product of many countries in the east, that which comes from Malabar is acknowledged to be the best. In 1874 there were 23,179 pepper vines scattered over the territory of French India.

Its cultivation is very simple, and is effected by cuttings or suckers put down before the commencement of the rains in June, in a rich and tolerably moist soil. In three years it begins to bear, each plant yielding on an average 2 lbs. of pepper per annum up to fifteen or twenty years, after which they begin to decline. The crop is gathered in March or April, the fruit is plucked when not quite ripe, and usually dried on mats in the open air. White pepper differs from black only in being deprived of the outer skin by a short maceration in pure water and subsequent gentle rubbing; it is somewhat smaller, of a greyish white colour, and with a less aromatic taste.

The small round berry-like fruit grows somewhat loosely, to the number of twenty to thirty, on a common pendulous fruit-stalk. They are at first green, then become red, and if allowed to ripen, yellow; but they are gathered before complete maturity, and by drying in that state turn blackish-grey or brown. When one or two berries at the base of the spike begin to turn red the whole spike is pinched off. Next day the berries are rubbed off with the hands, picked clean and dried for three days in the sun, or in bamboo baskets near a gentle fire.

The plant is capable of growing to a height of 20 or 30 feet, but for the sake of convenience it is usually kept low, and is often trained on poles. In places where no vines occur naturally, the plant is propagated by setting slips near the roots of the trees on which it is to climb. An acre of land will bear 2,500 plants, and as they require but little care, the cost of cultivating and bringing into bearing one acre does not exceed 4l. at the most, and as the annual yield when the plants come into bearing is worth upwards of 80l., the investment is a very profitable one.

The pepper vine is hardy and easily cultivated, and as its produce is of such great commercial importance, it may be well worth trying whether it could not be successfully grown in other localities under congenial conditions of climate and soil. The choice of a proper site for the plantation is a consideration of the first importance. Level ground lying along the banks of rivers and rivulets is to be preferred, both on account of the vegetable mould commonly found in soil so situated, as well as on account of the facilities of
water-carriage which such a situation generally affords. But the land should never be so low as to be liable to inundation. Declivities, unless very gentle, are to be avoided, because the soil loosened by culture is liable to be washed away by heavy rain. Plains, whether naked or covered with long grass, will not answer, unless broken up well with the plough and enriched by manure. Above all, the pepper-vine loves a moist climate.

In Malabar the pepper-vine is often raised from seed, and experienced men have been known to express a decided preference for this mode of propagation, because the vine so raised bears for fourteen years. On the other hand, though the cuttings yield for only seven years, or just half the period, the crops they give are greater, and the berries are both of larger size and of superior quality. It is for this reason, therefore, that in Malabar the cultivation is practised with cuttings or suckers, which are put down into the ground before the rain sets in, in June. The soil must be rich, but it should also be free from any accumulation of moisture below, or the young plants are apt to rot. The cuttings are usually planted at the foot of trees with rough bark, on which the vine as it grows finds a support. The creeper will climb up about 20 or 30 feet, but it is purposely kept lower for facility of collecting the berry. During its growth every sucker is removed, and it is pruned, as also kept clear of weeds. In three years the vine begins to bear. After the berries have been gathered, they are dried on mats by exposure to the sun, when they change colour from red to black. Much experience is required as to the proper time for gathering. The trees which are generally selected in Malabar to support and shade the pepper-vine are the jack, the mango, cashew-nut, and other similar trees; so that the pepper is an additional crop which the cultivator gathers from his orchard lands, even while they also are bearing.

Although the quality of the pepper grown in Malabar is considered to be better, the largest quantity of the spice is produced in Sumatra, where the method of cultivation is somewhat different. In that island the pepper-vine is raised in plantations regularly laid out. The ground is previously cleared of wood, ploughed up, and sown with rice, among which the cuttings are put down at a distance of five feet from each other in every direction, with the green sapling of some tree of quick growth and rough or prickly bark, which soon takes root and affords support and shade to the vine as it grows. It grows most luxuriously in moist rich soils, provided it obtains good shade. Like most other vegetable productions in hot climates, it requires but little trouble or attention after it has once been planted, other than watching the proper season for collecting the berry. In Sumatra, the layers or cuttings are put down in September. The plant is afterwards left to itself for twelve or eighteen months, it is then buried with all its branches, so as to leave only a small arch of the stem above ground. From this arch new shoots sprout out, three or four of which are allowed to climb up the tree, and are expected to produce flowers and fruit in a year after. It is inferred that, by this practice, the strength and vigour of the plant are so much increased by the multiplication of its organs of nourishment, namely, the roots, that it will not only yield a larger crop of flowers, but also bring out its fruit in the greatest perfection. The neglect of this precaution might seriously affect the out-turn of a crop, both in quantity and quality.

The vine produces fruit in two seasons of the year. The flowers of the principal crop appear in September, with the rains of the first monsoon. In the latter end of December the berries begin to ripen, and are gathered in January, as they get to maturity. The finest berries in the second stage towards maturity are selected for making white pepper. The process in Sumatra consists in steeping these berries for three or four days in running water, and then drying them well in the sun. The flowers of the second crop appear in March and April with the rains of the little monsoon; and the fruit ripens and is gathered about July and August; it is probably to the want of moisture at the time the fruit is setting, that the inferior quality and scanty out-turn of this crop is to be attributed. One thousand vines are estimated to yield about \( \frac{1}{2} \) cwt. of pepper in the course of a year; so that each vine may be reckoned upon as producing \( \frac{1}{2} \) lb. of the spice.

The black berries of Embelia Ribes, Burm., are often used to adulterate it in parts of India, as they so much resemble pepper as to render it impossible to distinguish them by sight or by any other means, and they are, withal, somewhat spicy. Although there is a very heavy penalty on adulteration in this country, ground pepper is frequently sold sophisticated with starch, mustard husks, linseed and capsicum.
From 1811 to 1824 the duty imposed ranged from 2s. to 2s. 6d. per pound. Up to 1826 it was 1s.; it was then reduced to 6d., and finally abolished.

The following have been the imports of pepper into the United Kingdom since the year 1840 as given in the Board of Trade returns:

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<tr>
<td>1840</td>
<td></td>
<td>5,027,959</td>
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<td>5,906,586</td>
<td>1865</td>
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<td>1847</td>
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<td>4,669,930</td>
<td>1866</td>
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<td>6,480,005</td>
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<td>10,810,398</td>
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<td>5,463,738</td>
<td>1876</td>
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<td>1858</td>
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<td>12,337,508</td>
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The value of the pepper imported in 1875 was stated at 670,175l.

There would seem to be extraordinary fluctuations in the quantity of pepper taken for consumption here and stocks held, for if we take the last five years, deducting the re-exports from the imports, the following were apparently the quantities taken for consumption and held in stock in the United Kingdom:

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<td>1871</td>
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<td>4,193,510</td>
<td>1874</td>
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<td>1872</td>
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<td>9,685,090</td>
<td>1875</td>
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<tr>
<td>1873</td>
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<td>13,938,350</td>
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The average consumption of pepper in the United Kingdom from 1848 to 1862, when there was a duty levied, was from 3,500,000 lbs. to 4,000,000 lbs. per annum.

A pepperwort, the small red carpels of which inclose black shining seeds of an aromatic odour, and a peculiar pungent flavour, with an acrid after-taste, being stimulant, stomachic, and astringent, are used for seasoning purposes in China. They are brought from the Szechuan province to Ning-po, and are worth 50 8 a picul.

PEPPER.

(From the "Treasury of Botany," by John Lindley and Thomas Moore.)

Piper.—This name was employed by the Romans to designate the Pepper- plants, and was derived by them from the Greek word peperi. The Greeks, in their turn, must have derived it from the Hindoos. Botanically, it is applied to the typical genus of Piperaceae, the species of which are for the most part climbing shrubs, with alternate stalked leaves; stipules adherent to the leafstalk or opposite and deciduous; spikes solitary stalked, pendulous, opposite the leaves, with dioecious or perfect flowers, protected by oblong deciduous bracts. The species are indigenous in India, the islands of the Indian Ocean, the Sandwich Islands, &c., and some of them are abundantly cultivated in the tropical countries of the New as well as of the Old World.

P. nigrum yields the Pepper of commerce, a condiment that has been held in high esteem from the earliest times. It is frequently mentioned by Roman writers of the Augustan age, and it is related that in the fifth century Attila demanded, among other things, 3,000 lbs. of pepper in ransom for the city of Rome. Pepper is cultivated in the East and West Indies, Sumatra, Java, &c., but that which comes from Malabar is held in the highest esteem. The peppervine will, if left to itself, attain a height of twenty or more feet, but in cultivation it is found more convenient not to allow it to exceed the height of
twelve feet. The plants are placed at the base of trees that have rough or prickly bark, in order that they may the more readily attach themselves to the trunk. In three years they produce their spikes of fruits, and continue to do so for some seven or eight years, after which time they become less productive. The fruit when ripe is of a red colour; it is gathered before it is fully ripe, and spread on mats in the sun, when it loses its red colour and becomes black and shrivelled, as we see it in the peppercorns of the shops: this is black Pepper. White Pepper is the same fruit, freed from its outer skin by maceration in water and subsequent rubbing; occasionally it is rendered of a yet paler colour by being submitted to the action of chlorine.

Sir John Mandeville, who travelled in the years 1322 to 1356, has given us an account of the Pepper, which, with some exceptions, applies as well now as then. ‘The Pepper groweth,’ he writes, ‘in manner as doth a wylde vine, that is planted fast by the trees of the wodee for to susteyneth it by, as doth the vyne, and the fruyt thereof hangethe in manerbe as Reysinges: and the tree is so thikke charged, that it semeth that it wolde breke: and when—it is ripe it is all grene, as it were ivy berryes; and then men kyttyn hem as men doe the vynes and than thei putten it upon an owven, and ther it waxeth blak and crisp.’

Pepper is imported into this country in enormous quantities, and is used as a condiment. Medicinally it is employed as an acrid stimulant in cases of weak digestion, and it has also been recommended in cases of ague to ward off the paroxysm, a practice recommended by Celsius. Pepper is also sometimes employed externally. Pepper on chemical analysis is found to contain a hot acrid resin, and a volatile oil, as well as a tasteless crystalline substance called piperin, which has been recommended as a substitute for quinine. This piperin is especially contained in some large coloured cells in the interior of the fruit. Ground Pepper is frequently adulterated, according to Dr. Hassall, with linseed, mustard-seed, wheat-flour, pea-flour, and ground rice: sago has also been mentioned as being employed for this purpose. All such admixtures can be readily detected by the microscope. At one time, when a very heavy duty was levied on this substance, factitious peppercorns were manufactured of oilcake, clay, and a small portion of cayenne. Pepper-dust, known in the trade as P. D. or H. P. D. (hot pepper-dust), consists of the sweepings of the floors of the warehouses wherein pepper is stored, or of the siftings of the pepper. It is used to mix with genuine ground pepper, also for pickling. The root of the Pepper-plant is employed by the natives of India as a tonic stimulant and cordial.

P. triocatum, a nearly allied species to P. nigrum, yields also some little of the Pepper of commerce. Dr. Roxburgh, who first cultivated this plant, observed that the pepper of the female vines did not ripen properly, but dropped when green, and was deficient in pungency; but the pepper of those plants which had hermaphrodite and female flowers mixed on the same spike was very pungent, and reckoned by the merchants as equal to the best Malabar Pepper.

Long pepper is the produce of Chaumica Roxburghii. The Betel Pepper-leaf is also the produce of another species of Chaumica, C. Betle; while Cubebs, another fruit formerly referred, like the two last-mentioned, to the genus Piper, is now considered to form a distinct genus, Cubeba.

PEPPER FROM THE WEST COAST OF INDIA.

Pepper, it seems, is all native grown, but it is possible that the culture may pay the few Europeans in Ceylon who have taken it up, in view of the fact that warfare in Achin seems to have revived and is likely to be indefinitely protracted. The possession of the chief pepper grounds in the world have cost and are likely to cost our Dutch neighbours more lives and money than they are worth. But prestige has also to be sustained. Curiously enough, the transaction between the British and Dutch Governments, by which, in exchange for a small Dutch colony in Western Africa, we gave up the grand island of Sumatra entirely to the Dutch, involved both nations in little wars. Ours against Ashantee was speedily concluded by the man who is now the hero of Egypt. General after General, on the contrary, has returned with a shattered reputation from the war in "Atjeh," as the Dutch call Achin. Governor Louden sent too small a force to begin with and an officer, whom he commissioned for the doing of what the officer pleaded was impossible, got himself removed from the Army "with honour," for the insubordination of deserting without taking to the hand which the Governor-General extended to him on landing at Batavia. He gave a formal military salute instead and got shelved. Such are the consequences due to pepper and the mental idiosyncracy to which the spice gives the name of "peppery!"
PEPPER.

PEPPER; CUBEBS, &c.

(From "Ferguson's Ceylon Handbook and Directory for 1887-88.")

In 1590, it was reported that the "Pepper grown in Ceylon was sold at a higher price than that produced elsewhere." Governor van Imhoff, in 1740, considered pepper "a far more important article" than cardamoms, and he added that "unlike coffee! it is not probable that the demand will be lessened by a change of opinion as to its salubrity, or by its being overgrown in other places, as all grounds are not able to produce it." In 1739, the Dutch exported 465,000 lb. of pepper, the greater portion from the Kandy provinces, where the harvest began in December and ended in April. Bertolacci blames the indolence of the natives for not greatly extending the cultivation of the pepper vine, which will grow on almost any soil, and has everywhere forest-trees to spread over. The fruit itself, when gathered, requires no further care than having it well dried. In 1813, the export of pepper was 190,237 candies, valued at about £12,000, and the average for seven years was then 200 candies, or about 1,000 cwt. The site of the former Dutch pepper garden at Madampe has long been under coconuts. Bennett, in 1843, declared that the District of Kalutara alone ought to produce more pepper than the whole of the island did.

The late Dr. Thwaites in his annual reports frequently called attention to the advantage of cultivating the black pepper vine; and its cultivation of recent years has been extending in the planting districts round Kandy. Dr. Trimen in his Report for 1882 had the following paragraph:

"Pepper.—As the cultivation of this condiment is attracting some attention in the Southern Province, I have been at the pains to obtain from Singapore some roots of the best sort there grown. These only arrived towards the end of the year. They are growing vigorously, and will be cultivated in the Singapore manner. Erythrina stumps have been planted for the support of the "vines." The foliage of these plants appears at present to show considerable differences from any of the peppers grown by the natives here."

The Erythrina stumps were, we believe, eaten up by white-ants. In his report for 1887, Dr. Trimen says:

"Pepper (Piper nigrum).—The plants received from Singapore two years ago are now making good growth, and appear to be of a more vigorous and better variety than any of the native ones so much grown for local sale. It is remarkable that the cultivation of this product on a large scale for export has never been seriously taken up in Ceylon."

Nearly all the pepper so far produced in Ceylon has been consumed locally, and for many years back the only export returns have been a few bags: thus in 1880 we had 18 lb. worth Rs 30; 1887 gave 1,578 lb. Ceylon pepper exported worth Rs 318. Our Directory returns show only 50 acres under the pepper vine in the planting districts; but there must in reality be a good deal more, especially in the Matale districts. Experiments made at Udugama by Mr. Dobree did not turn out very well, owing to white-ants eating up the artificial supports given to the vines; where however, the natural forest trees were left and utilized, the cultivation did better. In the Straits they prefer cultivating in the open, using teak posts which defy the white-ants as supports. There cannot be the least doubt that a great deal more than at present might be done in Ceylon with pepper by both native and European planters.

Pepper is grown in Java for the Dutch Government under the same system as coffee; the creeper is cultivated in rows trained over trellis-work or posts not unlike the vine in France. Rows of pepper creepers and coffee trees frequently alternate. The culture is being begun in North Borneo. In Burmah 225 vines on trees to the acre after 4 years, yield 1 lb. pepper per tree.

The world's production of pepper is put down at 70 millions of lb.; Java 60 million; Sumatra (including Acheen) 28; Malacca, Penang, &c., 8; Borneo 4; Siam 5; and India and Ceylon 10 millions. Travancore exports nearly Rs 400,000 worth or 1,200 candies annually, some of it to Ceylon. The import into England increased from 4 million lb. in 1851 to 26 millions in 1876, and must now be over 30 million, the consumption being about 12 millions. From Singapore and Penang the export in 1885 was equal to 32 million lb., of which three-fourths went to the United Kingdom. Of white pepper, 64 million lb. were exported.

From Dr. Trimen's latest Report (1887) we quote, with reference to an allied culture:

* The "Lampong" crop of 1882 which constitutes the bulk of so-called Batavia Pepper, was about 53,000 piculs or 6 million lb., double the average of previous two years.—Consular Report. [In 1887 it was 54 million lb.]
"Cubeba.—The high price at which this drug has been lately selling in the home market has led to several inquiries as to the possibility of its cultivation in Ceylon and the means to obtain plants. A few remarks may be therefore offered on the subject.

"Piper Cubeba is a pepper, and, like the majority of its congeners, is a climbing plant. It is considered to be native in Java, Sumatra, and Borneo, but can scarcely be said to be known wild.* The cultivation of Cubebas as a commercial pursuit appears to be carried on only in certain parts of Java and Sumatra, and the business to be almost entirely in the hands of the natives. The dried fruits, which form the Cubebas of commerce, come into trade through Singapore. No details are known of the mode of cultivation, which, however, appears to be merely that of ordinary pepper, the stems being allowed to climb over the trunks of trees, and the fruits plucked before they are quite ripe, and carefully dried. There is no reason to doubt that it could be easily carried on in the moist low-country of Ceylon, and it is perhaps remarkable that it has not been practised by our native population who grow other kinds of pepper so largely. It is, however, by no means easy to obtain the true P. Cubeba, which is a plant very little known, and indeed imperfectly understood even by botanists. Several other species approach it very closely, and even at Kew the cultivated plant, hitherto believed to be P. Cubeba, and figured by me under that name in 1877 (‘Medicinal Plants’ III, t. 243), has since been determined to be another species; and there is nothing now there to represent the Cubebas plant.† The botany of the subject is still greatly involved, and in trade also numerous spurious and false Cubebas are met with, the fruits of allied species.

"One of the difficulties in the way of commencing the cultivation of Cubebas is due to the plant being dioecious, with the male and female flowers borne on different plants. On several occasions I have succeeded in getting plants for the Gardens, and at present I have some fifteen young plants at Hanaratgoda, obtained by propagating from a single one from Singapore. Unhappily, on flowering this proved to be a male, as has been the case with each of the other plants I have been able at different times to obtain. Either sex is, of course, useless alone, and I am now attempting to get ripe seed from Java. But it appears to be difficult to obtain this from the natives. The crop is said to be a somewhat uncertain one, and this may account for the irregular supply of the market and the great fluctuations in price.”

Cubeb plants got in a wardian case from Java through the late Mr. Cantlay of the Singapore Gardens are now being carefully cultivated by a Matale planter.

NOTES ON PEPPER CULTIVATION.

(By an Old Planter in the "Ceylon Observer.")

Seven or eight years ago I discovered that branches of the pepper vine, sometimes under favourable conditions, struck root and became plants; but that such plants never threw out running vines was an after discovery. Still it did not strike me, that this could be turned to account in cultivation, till about a year ago, when one of those branch plants came into bearing, and produced a very decent crop. It then occurred to me that to cultivate the plant in the form of a low bush, would be more convenient than any of the methods in common use. In growing the plant on living trees you can only put a plant where there is a tree, at irregular distances, not more than about 100 to the acre, fighting with the old established tree that supports it for a share of the plant food, and suffering from too much shade. Again, if posts be set up for the vine to run on, they are in the first place expensive, and in the second the most durable only last for a few years, when the whole affair tumbles down, and is not easily set up again. The branch plants can be put out at regular distances, say 6 x 6 feet, they can be easily cultivated and manured, can be pruned back as required, and the only other work needed is a few pegs and a piece of coir yarn to keep the branches from trailing on the ground. The chief difficulty is at the beginning to get the branch to strike root, but that can no doubt be overcome by proper arrangements to be taught by experience, even the vine is by no means a ready rooter.

* The plant lately recorded as Cubebas in one of the local newspapers as found in the south of Ceylon was doubtless one of our wild peppers, of which we possess a dozen species.

† See Kew Bulletin for December 1887, where will be found a figure, taken from a dried specimen from Java, of the true plant. A more complete illustration is given in two folio plates in Miguel’s treatise “De Vera Pipere Cubeba” (1888), of which there is a copy in the Peradeniya Library.
That pepper requires shade is a common error; I have found it much more fruitful in the open than in the shade, but in or out of shade its cultivation will only be satisfactory on tolerably good soil. I understand that many of both natives and Europeans are trying this plant. It is one of the things that will pay, and pay well under proper conditions of soil, climate, and cultivation, and I wish them all success.

[A modification of the bush system might be tried after the viticulture which we saw in the neighbourhood of Stutgardt. One or two branches of a vine were allowed to grow, and all the strength of the plant went into these. When the branches had attained the length desired and the proper season had arrived, they were curled round so as to resemble a hoop and then tied so as to compel them to retain this position. Those who understand the physiological laws of plants will understand how the branches, with the flow of their juices thus checked, put forth blossom and fruit at every pore. What gave the maximum of fruit in the case of grape vines might be equally successful in the case of pepper vines.—COMPIERES.]

Another practical planter reporting for a small clearing writes:—

PEPPER.—It was, I believe, decided to plant the remaining forest land, about 12 acres, with this product; all the undergrowth and small trees should be cut down so as to admit abundance of light, at the same time affording a moderate degree of shade. Trees to support from 250 to 300 vines to the acre should be retained. The stuff cut should, before becoming too dry, be piled in small heaps and burnt, care being taken to do as little harm as possible to the standing trees. This work can be done in January and February, and in the meantime a space of about one acre should at once be cleared in the above way, the ground dug about a mammotie deep and all small and fibrous roots removed; stumps need not be touched. In this space pepper cuttings should be laid down about an inch apart—12 inches buried under the soil and six inches exposed thus:

![Exosed
Buried]

The cuttings should be about 18 inches long and the branches cut from off the portions to be buried, but not from the portions exposed; for the 12 acres about 15,000 cuttings will be necessary. By May next year these should all have made roots and shoots, and be less liable to fail when planted out than if put out as simple cuttings; another consideration is that there will be no time lost in searching for vines, which might be the case where so many are required. After the undergrowth has been cut down and burnt, holes should be dug at the root of each tree close up to the stem: one on each side, if the tree is large in girth, but only one if small. The holes should be 18 inches long, 12 inches broad and 9 to 10 inches deep, all stones and roots removed and filled in with surface soil, any ashes near being mixed with it. In planting out all that portion that was underground in the nursery should be buried and the exposed portion laid close up to the stem of the tree; two cuttings should be placed in each hole, a few inches apart and about 4 inches deep and the earth firmly trodden down. If these directions are carefully attended to failures will be few. I cannot too strongly urge the necessity for trampling down all the soil round plants freshly planted and of beating down the soil over seeds as soon as sown; it is not necessary here to give the scientific reason for this; let it suffice that experience teaches that when this is not done many plants are sacrificed and much seed wasted.

PEPPER CULTIVATION IN JOHORE.

(From an Old Resident.)

Black pepper is grown in Johore by the Chinese gambier planters who utilise the spent gambier leaves to manure the pepper vines. Some Europeans are planting pepper in Johore. The high price now obtainable for this article has induced Chinese and Europeans in British North Borneo, Malacca, Perak, Selangor, Sungei Ujong and on the island of Singapore to plant extensively. A few years ago it could be bought for $7 per picul (133½ lb.), today it fetches $20 85-100ths per picul. It flourishes in Johore, both soil and climate seems to suit the plant excellently. In the year 1886, 98,074 piculs valued at $1,829,220
of black pepper was sent to Singapore from Johore and 313 piculs valued at $3,630 was also sent to that port. This value must be a mistake because the manufactured white pepper fetched nearly as much again as the natural black. At present it is $36 per picul. The above statistics are taken from the Straits Settlements Blue Book for 1886. Singapore Exchange Market Report states that in 1883, 89,936 piculs black and 25,955 piculs white were exported from that port and in the year 1888, 72,864 piculs of black and 19,172 piculs white were exported. As long as the war between the Dutch and the Atchinese lasts prices of pepper will keep up.—March 1889.

THE CLOVE AND PEPPER CROP OF ZANZIBAR.

The only products of the island of Zanzibar are cloves, peppers and coconuts. United States Consul Bachelder writes as follows:—

The clove crop last season, commencing in September and ending in June, can only be given from what my own knowledge enables me to say, as no statistics whatever are kept by the Sultan or any of his officers. From actual inspection, and information obtained from the natives, I estimate the last season’s crop at 1,400,000 pounds; which sold at an average of $9 per 35 pounds, or $36,000. This crop was the largest gathered since the hurricane in 1872; and each year now, for some years to come, the crop will continue to increase, as new trees are continually being planted and beginning to bear. In this estimate it must not be understood is included the entire quantity of cloves exported from this place, as the entire product of the island of Pemba is brought to this market for sale and export. This crop is much larger, and was estimated the last year at 3,500,000 pounds, valued at $900,000; so that the entire clove crop of this island and Pemba reached the large quantity of 4,900,000 pounds, and brought the good sum of $1,200,000. Of this quantity there were exported to the United States 1,206,120 pounds, valued at $344,541.

Pepper, owing to the great advance in price abroad, fully equaling 100 per cent., has received a great deal more attention than formerly, and in consequence a large crop has been grown, which I estimate at 315,000 pounds, valued at $36,000. Of this, 37,000 pounds were exported to the United States, valued at $3,251.

The coconut growth is not of much importance, and no statement can be given of the amount or value. None are exported to America, but most all go to France, and are used in making soap.

The revenue of the island is from the customs, which are farmed out to private parties, and which might be estimated at $500,000. From an extra tax on all cloves and rubber the Sultan obtains a further sum of about $400,000. This, with a moderate revenue derived from his own clove plantations, gives him an average income yearly of, probably, $1,200,000.—Oil and Drug News.

PRODUCTS OF THE STRAITS SETTLEMENTS.

Pepper Cultivation.—Black and white pepper grow on the same vine; the green pepper-berries, just before maturity, after gathering, turn black and make “black pepper,” while “white pepper” is obtained by gathering the berries—fire-red in colour—when fully ripe, and through long soaking in water and subsequent stirring and shaking, reliving the berries of the outer skin; after which, on being dried, they become “white.” In what country the pepper-vine originated, the writer is unable to say; but Eastern history says that the northern half of Sumatra, the once mighty old sultanate of Acheen, when the Portuguese, Dutch and British (in rotation) came to that country, was far famed for that spice, which drew, at Acheen Busar, in North Sumatra (near the entrance of the Straits of Malacca), the native traders from many Eastern countries and islands, who there exchanged the products of their countries or purchased for cash. After the British East India Company, during the last century, acquired the island of Penang from the Rajah of Qedah, a Siamese souzerain, so favourably situated for commercial purposes, and made it a very important factory and place of residence for a sub-governor, the great Acheen trade gradually drifted to Pulo-Penang (Prince of Wales Islands), and with it the pepper trade principally. At that time Singapore had not been acquired by the British, and not before 1819, when the island was covered with a dense trackless jungle. After the acquisition of Penang the natives on the peninsula
PEPPER.

of Malacca, especially in the province of Frang, a Siamese souzerain province, commenced to plant pepper, and with excellent success; and now it is extensively planted by Malays and Chinese in many places on the peninsula of Malacca, also in Siam, Cochin-China, and in Sarawak, Borneo. That grown in the southern part of the peninsula and on the island of Singapore, known in the market as “Singapore pepper,” is by far the best, commanding a higher price than Acheen pepper. Penang maintained the Acheen pepper trade until the Dutch commenced their war of conquest in Acheen in 1873, blockading the coast and preventing the exports of all Acheenese products. At that time, owing to the spread of wild rumours about the destruction of the pepper gardens in Acheen, etc., pepper reached the figure of 14 dollars per cwt. for a short time. It was feared the supplies from Acheen being cut off, that the spice would become scarce, and as a consequence many Chinese planters increased its cultivation; in fact, to such extent that the Acheen war was no longer looked upon as the cause of influence in prices. Later some of the chiefs of certain Acheenese provinces having submitted to Dutch rule, were allowed to send pepper to Penang on vessels having a permit from the Dutch Consul in Penang to supply them with rice and other needed goods. Then it appeared that some of the Rajahs who had submitted to the Dutch, after having been pretty well supplied with the necessaries of life, turned truant again, and, as a consequence, their coasts were again blockaded. The Dutch are now making efforts to make “Ole-Seh,” the old port of Acheen Bazar, in fact well protected by a fort and man-of-war, a trading port, and to export “Acheen pepper from Acheen” themselves. As to the pepper-vine it presents a very handsome appearance; a pepper garden at a distance looks like a “hop-yard.” Some planters, however, trellis the vine, and the writer thinks that is the best plan. It grows everywhere round about Singapore very easily and luxuriantly on fair upland soil, not liking low heavy soil, and, like the grape-vine, needs occasional pruning, weeding and fertilizing. With a little care and attention it yields abundantly and proves a good source of income. The quantity of pepper exported annually from the Malay peninsula and ports in Dutch India is simply immense, and is almost exclusively planted, gathered, and brought to market by natives, Malays and Chinamen chiefly.—Weekly Drug News.

THE PEPPER VINE.

(To the Editor “Ceylon Observer.”)

DEAR SIR,—As I find natives about here are taking a lot of pepper vine cuttings for sale to planters, I desire to warn planters to be careful from what vines they purchase cuttings, as there are three distinct species, of which there is only one good. The fruit of all, as far as appearance goes, is nearly alike, but the taste differs and there is a great difference in leaf-stock.

1st. Gammeeris in Colombo Sinhalese or Lannite Midde in Kandyan Sinhalese is the only good kind.

2nd. Malay Midde is common next; fruit is bitter.

3rd. Bakka Moona, a thick strong creeper, leaves thin. There is also Kottang Kolly, a pepper shrub. I now send you by this train a cutting of each kind with fruit on and leave you to give a full description of each species. When planters purchase pepper cuttings they should either purchase from some one they can depend on or send a trustworthy man who knows the proper kind to see the vine before the cuttings are taken. Natives cultivate the bad kinds, as they take the leaves for medicine and sell the fruit to traders who purchase the same for mixing.—Yours truly,

J. HOLLOWAY.

WHITE PEPPER.

The columns of our contemporary, the Grocer, have contained during the last few weeks quite a furious little discussion about white pepper. The editor opened the ball by alleging that a secret combination had been formed in the market to force the price of white pepper far above its real value. The evidence, so far as it is published, is scanty. The statistics of the pepper trade for the first thirty-seven weeks of the years are as follows:—

<table>
<thead>
<tr>
<th>Imports</th>
<th>Deliveries</th>
<th>Stocks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1882</td>
<td>1881</td>
<td>1880</td>
</tr>
<tr>
<td>Tons</td>
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<tr>
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<td>3,850</td>
<td>5,000</td>
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<tr>
<td></td>
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<td></td>
</tr>
<tr>
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<tr>
<td></td>
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<tr>
<td></td>
<td>1,330</td>
<td>710</td>
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<tr>
<td></td>
<td></td>
<td>1,825</td>
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</tbody>
</table>
PEPPER.

One point must be further noticed: “The stock of white pepper in London at the end of December 1881, was 1,402 tons, to which were added 90 tons landed in January, making together 1,492 tons; from this had to be deducted 261 tons returned as delivered, leaving 1,131 tons as the stock on January 31; but the official compilers of the stock gave it as only 931 tons. Still more surprising, the 360 tons referred to as having been cleared included 75 tons thrown in as a sort of make-weight, so that the stocks and deliveries during the first month of the year might be made to tally with each other. If this is not manipulation, it is something that does duty very well as a substitute.”

The exports of white pepper from the Straits during the last five years, according to Mr. W. R. Scott, have been 13,165 tons, or 2,637 tons a year. Up to September 15 of this year they have been only about 1,600 tons. According to the editor of the Grocer, on October 7, exports of white pepper from the Straits to all parts up to the end of August this year were 1,532 tons; ditto in September (as advised per cable), 240 tons; total 1,772 tons, against 1,759 tons in the corresponding period of 1881, and showing an actual excess of 13 tons over last year's crop. The present price of white pepper is 94d. a pound; in our prices current for September 15, 1882, it is quoted at 74d.

In spring, when the probable crop was not known, two or three firms made “bear” sales of at least 5,000 bags, or 350 tons of white pepper for delivery in October—December at 83d. to 84d. per lb. They have not covered their liabilities, and are now cornered according to an anonymous “Holder of White Pepper.”

At this juncture appeared in the market an artificial white pepper, made by decorticating by machinery good black pepper. The grains are rather smaller and more polished than those made in the East by “sweating-off” the black outer skin. The new article has been analysed by Dr. Sedgwick Saunders, who finds that it yields 176 per cent of ash against 250 of Penang white pepper; and by Mr. G. H. Ogston, F.I.C., who finds that in moisture, soluble ash, total ash, alcoholic and aqueous extract, there is remarkably little difference between the single samples of the two kinds examined. On September 20, 100 bags (of 14 cwt. each) were sold by auction, without reserve, and fetched 83d. to 84d. per lb. The coincidence of the new appearance with the rising prices and “bear” sales has set rumours afloat. The anonymous “Holder of White Pepper” says he is told that the idea of decorticating black pepper is thirty years old, and abandoned because it did not pay; and that one of the firms interested in bringing down prices has taken it up for that end.

According to Mr. W. R. Scott, of Fenchurch Avenue, overtures have been made to the “holders” by the “bears” to run the price up much higher if the latter’s forward sales are covered. These overtures Mr. Scott rejected.

The two facts that seem certain are that the price of white pepper has gone up, and that a new artificially, decorticated pepper has appeared in the market.—Chemist and Druggist.

THE PEPPER-GROWING INDUSTRY OF WESTERN INDIA: INFORMATION DESIRED.

Colombo, 23rd January 1883.

DEAR SIR,—If you, or any of your correspondents can give information respecting the cultivation of pepper, as pursued in the Calicut and Tellicherry districts of Southern India, you would, by publishing the same in the Observer, oblige some of your readers. Answer to these questions would be useful:—

1.—Is shade employed?
2.—If it is, is the shade light or heavy, and what are the most suitable shade trees?
3.—If shade is not employed, to what are the vines trained, and how far apart are the supports? (Mem: In Singapore and Johore pepper is not shaded, but trained to posts of wood stuck into cleared ground.)
4.—How high are the vines allowed to grow?
5.—How many cuttings or plants are placed at each support?
6.—How long after being planted do the vines take to bear?
7.—What is a fair average yield per acre?
8.—How is the fruit dried or cured?
9.—What are the most suitable soils?
10.—Is a climate with 150 inches of rainfall, well distributed, too wet?

Yours faithfully,

LOWCOUNTRY.
PEPPER.

[We trust some of our correspondents in Western India will send us an answer to our correspondent's queries; meantime, we may quote the following practical information on the subject of pepper cultivation from Porter's "Tropical Agriculturist":—"This plant thrives luxuriantly in most soils, and when once reared, requires comparatively little care and labour. The preference, in choosing a situation, is usually given to level grounds along the banks of rivers (provided they are not so low as to be inundated), on account of the rich vegetable mould found in those localities, and for the advantage of water carriage. Plantations of this tree are seldom made on rising ground, unless the ascent be very gentle; otherwise the soil is liable to be loosened and washed away from the roots of the vines. The goodness of pepper is considered to depend more upon the natural qualities of the soil than upon the care bestowed on its cultivation. It is a hardy tropical plant, and grows readily from cuttings or layers, rising in several knotted stems, which cling round any neighbouring support, and adhere to it by means of fibres that shoot from every joint at intervals of from six to ten inches, and through which it probably imbibles its nourishment. If left without any means of climbing upwards, the stalk, unable to support itself, creeps along the ground. The fibres at the joints then become roots, but in this situation the plant would never exhibit signs of fructification."

"Like ivy, it is encouraged by support to throw out bearing shoots. If left in its natural state it climbs to twenty or five-and-twenty feet high; but it is more fruitful when not allowed to attain this height. Restrained in its growth to from twelve to fifteen feet high, it bears both foliage and flowers within two feet of the ground; but, in the former case, it is entirely devoid of these.

"In order to give to the pepper-vines the support they require, it is usual to plant some other trees with them for that purpose. The Jacca tree—(*Artocarpus integrifolia*) is selected in Malabar thus to lend its support, since the same soil is equally well adapted to the growth of both plants. In Sumatra a thorny tree, called by the natives chinkkariang (*Erythrina coralloidendron*) is employed. In Borneo the vines are supported, like hops, by poles; but there is a great disadvantage attendant on this method, as the poles thus exposed decay at the end of two or three years, while the plants last many years, and they are much injured in the removal of the old poles, and the placing of new ones. Besides this, the use of poles has another disadvantage in the absence of foliage, which, during the dry season, is of service in sheltering the vines from the too ardent rays of the sun.

"When a piece of ground is to be converted into a pepper plantation, it is marked out by means of a line into regular squares, having their sides about six feet, the intervals at which the plants are intended to be placed from each other. The points of intersection are noted by slight stakes, and at each of these points a tree intended for the prop is planted; for this purpose cuttings of about two feet long are put into the ground a span deep; sometimes cuttings six feet long are used, but these often fail, are not so vigorous as shorter ones, and generally grow crooked."

"When the shoots of chinkkariang are twelve or fifteen feet high, a height they usually attain during the second year of their growth, they are topped, and not allowed to grow much beyond this altitude. The branches are lopped annually at the commencement of the rainy season in November, leaving little more than the stems, or otherwise the droppings from the leaves might injure the vines."

"The usual mode of propagating the pepper-plant, is by cuttings of a foot or two in length taken from the horizontal shoots, which spring forth from the foot of the old vines. One or two of these cuttings are planted close to the young chinkkariang-tree, sometimes as soon as the latter has taken root, but oftener after a lapse of six months from its first being planted—a few cultivators allow an interval of twelve months, fearful lest the growing vine should overpower its support; but in general, if this be a healthy and vigorous shoot, so long a period of priority is unnecessary for its thriving, as it advances in strength and growth in proportion as the vine requires its sustaining power. The vine rises about two feet in the first year, and four or five more in the second; at this time, or between the second and third year of its growth, it first begins to put forth blossoms. In the rainy season which succeeds the first promise of fruit, the entwining stem is uncoiled from its support, and placed in a spiral form into a hole dug in the ground for the purpose, close to its root, leaving only the top of the plant above ground; it soon re-ascends the chinkkariang-tree with renewed vigour, and in the ensuing season the plant, then eight or ten feet high, usually bears a full crop of fruit. If this operation be performed too soon, the vine will not be forwarded than those newly planted, and will not bear fruit until the third year. On the other

*Marson's Sumatra.*
hand, if delayed beyond the proper time for the sake of saving the first fruit, the produce is ultimately retarded, although the desire of a present good, in preference to a future greater advantage, sometimes incites the cultivator to adopt this plan, and to omit turning his plants down until he has gathered in a premature harvest. During three or four years after the first crop, the produce annually increases; a plantation of about seven or eight years' growth is then in its prime; it continues in this flourishing state from one to four years longer, according to the fitness of the soil, and then gradually declines for about the same period, till it is no longer worth the labour of keeping it in order. Fruit has been gathered from some plants of twenty years' growth, but that is a very uncommon circumstance. As soon as there is any appearance of decline in the crop, the plantation should be renewed, or rather another garden should have been planted to succeed it, so that it may come into full bearing at the time required. The vines sometimes grow up to the top, when they must be pruned or thinned by hand; the flexible stems generally entwine to the top of their support, and then bend downwards, having their extremeties, as well as their branches, loaded with fruit. In the early growth of the plant it is immaterial how many stalks grow to one root; but when it begins bearing fruit, then only one or two stems should be suffered to rise and cling to the prop; more would weaken the root, and cause it not to bear so abundantly. All suckers and side-shoots must be carefully removed. Some which are healthy and of vigorous growth are usefully employed; trenches are cut to the neighbouring props where the vines have failed, through these superfluous shoots are conducted, and thence soon ascend round the adjacent tree; otherwise they are at once separated from the parent root, and transplanted to other spots; by which means the plantation is of uniform growth, though many original vines may not have succeeded. These shoots may likewise go to the formation of new gardens."

"The ground is always kept well weeded. During June, July and August, the finer kind of grass is permitted to remain on the ground as a protection against the rays of the sun, and as the means of preserving and attracting the dews, which are then heavy. As the vines increase in size, less care is necessary in clearing the ground, since the shade prevents the weeds from growing."

"Plantations are divided into gardens containing from five hundred to one thousand plants. Industrious or opulent cultivators have sometimes gardens containing as many as two or three thousand vines. These gardens are commonly separated from each other by hedges of shrubs, and have an open border of twelve feet wide round every garden. The gardens are kept with scrupulous neatness: 'no rubbish, not so much as a stick or a straw, is to be found on the ground.' Their symmetry and neatness give to them an appearance of beauty, although this very symmetry deprives them of the picturesque appearance admired by lovers of nature. Should the season happen to be dry, the cultivators are indefatigable in giving to their plants the necessary moisture; nearly their whole subsistence depending on the success of their crop. In very dry weather the blossoms are liable to fall untimely, or to be shaken off by high winds, in which cases the crop fails. To guard against this latter accident, the gardens are usually placed in a sheltered situation. Long continued drought arrests the progress of vegetation, but does not destroy it. We learn in Marsden's History of Sumatra that in 1775 there were eight months of continually drought; no foliage appeared on the pepper plants, and their general destruction was expected; but when the rain at length came, the blossoms appeared in a profusion unknown before. Old gardens which had been unprofitable for one or two years, then put forth flowers and bore fruit, so that the crop of 1776-7 was unusually abundant."

"The customary time for gathering the principal crop is in September and October; another small crop is obtained in March and April. Sometimes the gathering continues at intervals the whole year round; sometimes only one crop is taken, the growth being irregular and dependent on the season. From the first appearance of the blossoms, a period of four months elapses before the berries arrive at maturity. But the blossoming is not simultaneous, and there are to be seen, growing together on the same vine, clusters of flowers, green fruit and berries already in a fit state for gathering. As soon as any of the berries begin to redden, and it is thought a favourable time for collecting them, they should be plucked, for if delayed too long they fall off. The natives make use of small triangular ladders made of bamboo, with which they go round the tree and reach all the fruit, which is collected in small baskets slung over the shoulder of the gatherer. It is then conveyed by women and children to a smooth level spot of clean hard ground, and there spread on mats to dry in the sun. The vicissitudes of the weather are not thought to injure it in this stage. As it dries it is occasionally rubbed with the hand to separate the stalks
from the berries, which soon become black and shrivelled, and assume the well-known appearance of the black pepper of commerce. When dry, they are winnowed in large round shallow sieves, and put under shelter into vessels made of bark, until all the crop is gathered in and dried, or until there is sufficient quantity to be carried to the factory. That gathered in the properest stage of maturity will shrivel the least; if taken off the tree too soon, it will, after being dried, quickly become mere dust.

The latest reference to pepper cultivation we have seen is in the Rangoon Gazette, as follows:—"An interesting experiment is going on in Sandoway, inaugurated we believe by Colonel Sladen, who found the pepper vine growing wild in this district. An area of 623 acres has been planted with cuttings in the hope that a new industry will be inaugurated thereby. The pepper vine takes three years to yield fruit, and then continues bearing for seven years. The cuttings when once put down require very little care or attention, and this produce therefore seems admirably adapted to Burmese laziness. In Mergui, under Captain Butler's care, both pepper and vanilla have succeeded, and there is therefore a good prospect of success for the experimental cultivation of the pepper vine at Sandoway. We should like to see cuttings supplied to other Government plantations at Pahpoon and Magwaye, whilst Mr. Petley, who has succeeded fairly well with tea, coffee and cinchona on the Toungoo hills would doubtless be glad to try his hand at pepper also if supplied with cuttings. A pepper garden, at a distance, looks something like a Kentish hop field. At Singapore and Penang pepper is found to grow well on a fair upland soil, the vines needing only occasional pruning and weeding. With manuring the yield is abundant, and proves a good source of income to the Chinen and Malays principally employed in its cultivation. Clove trees, which thrive so well in the Straits Settlements, might be profitably introduced into Burma. The tree is described as a lovely one which flowers freely. The bud of the flower, just before its opening constitutes the spice which is in such great demand for export. The buds, which are white in colour, resembling snow drops, are gathered by the young people of both sexes and dried in the sun which causes them to turn dark in colour and shrivel up. The gathering time lasts for a few days only as the bud after flowering loses much of its strength. —Ed."

PEPPER CULTIVATION IN THE SOUTHERN PROVINCE, CEYLON.

To the Editor, "Ceylon Observer."

Udugama, Feb. 8th, 1883.

DEAR SIR,—I send you herewith the notes I made on Pepper Cultivation at Singapore and Johore, and also the best means, as far as my experience goes, of cultivating it in Ceylon. I hope to see pepper cultivation largely taken up in Ceylon. I may say that I tested the amount of crop by getting a vine stripped and weighed. I took a fair average vine. Mr. W. Bailey, now in Johore, and Mr. Bagot, since returned to Ceylon, were present, and I had the benefit of Mr. Bailey's Chinese conductor to interpret my questions. The export of pepper, as you are aware, is a very valuable one from Singapore, and there are any number of situations in Ceylon where it can be grown, just as well as in Johore. I have on some of my vines ripe pepper at 18 months old, but these are only a few exceptional ones.

—I remain, yours faithfully,

T. S. DOBREE.

MR. DOBREE'S NOTES ON PEPPER CULTIVATION.

Line 7 x 7 feet; choose flat or slightly undulating land. If at all steed land is used, it should be terraced at once. Cut holes 2 feet square by 15 inches deep, and fill in with good soil free from all stones and roots. Don't heap up the earth when filling in the hole, but rather leave a hollow to catch all moisture. At the lower corner of the hole put in a post of split wood 12 feet long by 10 feet out of ground and about 8 x 8 inches square. This post must be of good hard wood, and have the end that goes into the ground cleaned and tarred. The vines at Singapore last for 20 or 30 years. I saw a garden said to be 30 years old, still bearing well, and the posts that had never been renewed were still standing.

These posts are the most expensive part of pepper planting, and I doubt, from what I know and what I have seen, whether they will be suitable for Ceylon, where white ants are much worse than in the Straits; they, no doubt, however, succeed admirably for the purpose in Singapore. When suitable posts

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*From R70 to R150 per acre—889 posts per acre.
cannot be obtained, I advise putting in cuttings 6 feet long of either "imbul" (cotton tree), "suriya," "eabudda," or "hikgas." I was told that the imbul or cotton tree is thought in Java to be the most suitable line tree to grow pepper on, and I find it the best down here. When the shoot from the cotton tree cutting or plant has grown to 10 feet from the ground, it should be topped and always kept as a pollard, both to prevent the pepper vine being shaded, and to keep the vine from running up too high. The cuttings must, of course, be put in wet weather.

I also tried jak trees, putting in two jak seeds in every pepper hole. I found, however, that the growth of jak trees varies very much: some of my trees grown from seed put in June 1881 were 5 or 6 feet in December 1881, others were 1½ foot. Monkeys also pull out the jak plants, and crickets nip off the tops. I therefore consider cuttings of the cotton are better, especially as they give something for the pepper vine to get hold of at once. Cotton tree plants can be used, and are easily raised from seed. When planting, put three cuttings or two good plants in each hole; both cuttings and plants should be 18 inches long when planted out. If plants are used, put their root end as far from the post as the hole will allow, and bury all the plant except the head and about 4 inches: this will cause the plant to throw out roots from all the buried points and increase its powers of absorbing manure. As the plant grows, keep it buried till it reaches the post or cutting it is to grow up

Plant the cutting or plants about 6 inches deep and shade well with fern—or some suitable and cheap substitute.

The Chinese make a small mound round each vine, but I think in Ceylon, where we have heavier downpours of rain, it is better to cut small drains mamoty wide and deep between every row (the usual 18-inch drains 1 chain apart must also be cut) both up the hill and across, so that every vine shall stand in its own space. The earth from these drains will form a slight mound round the holes, and into this hollow all manure should be put. The Chinese never dig in their manure but just lay it on the surface.

This work need not be done till the clearing is planted.
The Chinese commence manuring (with burnt earth chiefly) directly the cuttings are planted, and manure twice a year when they can afford it; once always. Burnt earth, cattle manure, fish and I think limes and punci would be the best. In some places, I believe in Sumatra, they let the vine run up to 5 feet, then take it off the post, and bury it in the ground, leaving the arch out of the ground, from which two or three suckers grow, and are trained up the post.

The Chinese in Singapore and Johore, who are said to be the best cultivators of pepper, do not do this, but plant their cuttings as I have described. They always use cuttings, and only the ends or tops of branches, which they put in a shaded nursery to root before planting out. I myself have found plants much more certain than cuttings and hardier, but I was not able to obtain cuttings of the ends of branches only. The vines commence to bear at 2½ years old. I saw a garden of this age in Singapore. The vines were about 6 feet up the post but bushy at the bottom, and had a maiden crop on them.

I can't estimate how much an acre, but I think it was about 600 lb. per acre.

From a good old average vine—said to be 30 years old—I saw 30 lb. of green pepper taken and weighed. I saw several gardens that I believe averaged as much as this vine.

As pepper dries down to one-fifth of its green weight, this would be 6 lb. of marketable pepper, or at 880 vines per acre $5.334 lb. per acre for the autumn crop, and the Chinese said they got as much more for the spring crop. I did not see any spring crop, so cannot vouch for the truth of this total: say 10,000 lb. per acre per annum. I don't believe this.

The Chinese never, as far as I saw, plant more than from 10 to 15 acres of pepper in one garden along a carefully selected basin, and they cultivate each vine very highly, so that there are no bad vines in the whole acreage, until the garden is old and worn out.

A good average crop of pepper, I have been told on reliable authority, is about 28 piculs an acre or say 33 cwt., or rather over 4 lb. of prepared pepper per vine. The price of pepper in Singapore now $15 per picul, is very high, and I was told that $10 was a safe price to calculate on. This would give 28 piculs at $10 = $280, or say about 800 per acre as the value of the crop, and putting down the cultivation at the extremest limit of $200 per acre per annum, leaves a profit of $400 per acre. This sounds almost too good to be true, but I feel certain these profits are made out of the pepper gardens in Singapore and Johore, and there is no doubt that the Chinese have made very large fortunes from this cultivation. The preparation is very simple. The Chinese use a very rough drying drier something like the ordinary Sinhalese lime-kilns with warahies on the top and matting on which the pepper is spread to dry with fire underneath. White pepper is made from the best and ripest berries. It is placed in heaps for several days to ferment and then trampled out and washed and dried very much in the same way as coffee. Pepper is sent to England in bags of 142 lb. each. It is taken at 16 cwt. to the ton for black pepper, and 18 cwt. for white. By using winnowing and sizing machines, I am sure we would very much improve on the samples of Singapore black pepper, especially by picking out the grey...
peppercorns, for which work labour is too dear in Singapore. One penny per lb. covers shipping, insurance, loss on weight (which is from 6 to 10 per cent), brokerage and freight. Pepper damages tea, and some ships refuse it. The lowest price it has ever been down to is $6 per picul many years ago. For the last 5 years it has averaged from $10 to $15 per picul.

A free rich soil is the best, and a continually wet climate. A long drought is said to cause the berries to fall off the branch before they are ripe. I could hear of no disease or blight that affected the vines, and certainly saw none on any of the many gardens I visited. The crop is picked with light step-ladders, the branches are picked whole, as soon as some of the berries begin to turn red and yellow. I don't think it possible to get all the berries on a branch ripe before it is picked; some would fall off before all were ripe. I consider good chena land, if not steep and washed, as better for pepper than virgin forest, unless all the logs and roots of the latter are cleared away, for it is extremely difficult to work up pepper as it should be done with the logs and roots on the ground. The vines that grow over the old stumps of large trees are always the finest, as they seem to derive nourishment from the rotting timber.

**PEPPER:—COST OF CULTIVATION.**

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The 4th year's crop should quite cover expenses, but I cannot state the cost of picking and curing. I believe that for such districts in Ceylon as those round Galle, Awisawella, Yatiyantota and in fact all the south-west of the island, pepper will be one of the most remunerative products, if care is taken in selecting suitable localities for planting it. All ridges should be left in jungle so as to have plenty of earth available on the spot for using as manure when burnt. The Chinese pepper gardens are all surrounded by forest which, for about 2 chains from the pepper, have the earth for a foot deep at least all carried off during the course of years as manure.

* The cost of item will depend on whether cuttings can be bought close at hand, or plants are raised from seed.
PEPPER.

I have forgotten to state that the vines should in no case be allowed to run up to the top of their post or pollard, until they have thickened out below. When the runner is 2 feet high the top should be nipped off to make it throw out laterals, and the vine should always be kept in the form of a sugar-loaf until it has got thick and bushy from the ground to the top of the pollard. If not stopped and made to thicken out, one single runner will get up to the top of the post or pollard in a year or 9 months' time and never become a good bearing vine.

We have now 130 acres of pepper planted at Udugama on 5 estates, all coming on well, and the land selected as nearly as possible in the same way as I saw done by the Chinese at Johore. T. S. DOBREE.

PEPPER CULTIVATION :—WANTED INFORMATION FROM THE MALABAR COAST.

To the Editor, "Ceylon Observer."

Colombo, 14th March 1883.

Dear Sir,—Many of your readers will have read with much attention Mr. Dobree's valuable "Notes on Pepper Cultivation." (See page 33.)

As the writer of the queries (see page 30), I beg to thank that gentleman for so disinterestedly placing the results of his study and observations before the public. And thanks are due to yourself for the very useful extracts appended to my communication of the abovementioned date.

The information afforded thus far is opposed to the idea, a prevalent one here, that pepper will thrive in the jungle. It was to elicit information on this point especially that induced me to address you. Knowing the practice of the Chinese in this respect, on their plantations in Singapore and Johore, I was desirous of learning whether a different method of cultivation was followed on the Malabar coast, for I have found, on making enquiries here, that, where any knowledge of the subject is professed at all, the belief is common that in clearing for pepper only the undergrowth should be removed.

If any of your correspondents on the west coast of Southern India will describe the system pursued there, they will much oblige, yours faithfully,

LOWCOUNTRY.

PEPPER CULTIVATION ON THE WEST COAST OF INDIA.

To the Editor, "Ceylon Observer."

[Beyapore, 20th April.—Referring to your enquiry re pepper cultivation sent to our Coimbatore friends, we have obtained the information we think you require, shewing how pepper is cultivated on this coast, and enclosed same.

—Stanes & Co.]

The Pepper should be Planted in Low, Firm Ground.

In the beginning of the month of June, when the rain falls incessantly, at the foot of a jack, mango, cajon, marcim, or any other trees whose bark is rough or prickly dig a hole one foot deep, the breadth and length six inches. Into this hole put a cutting from the extremity of one of the branches of a pepper vine, then fill it up with earth, taking care no water is therein, and that none may remain after planting. In the month of July roots will extend themselves in the ground and the sprouts will appear on the surface, when they are to be tied to a tree, and a circular bank of earth thrown up round them that they may enjoy the moisture of the water, which remains on the ground and sheltered from the heat that prevails from the month of July to October. When the rains cease, cover the root of the vines with fresh leaves, it matters not from what tree, so that they have the quality of cooling. If the ground is too dry, water the same morning and evening; but, if it is entirely cool, twice in eight days is sufficient. Then plant five or six sprigs at the foot of the same tree, taking particular care that they in no wise touch each other. Ten days after the rains set in, remove the leaves that cover the root of the vine, pull up the grass that may have grown near them, and demolish the circular bank of earth made to contain the water, that none may remain at the foot of the tree. In the month of August repeat the same. The vines are to be cherished in this manner for three years. It must be observed that the foot of the vines should be covered every year in the manner before-mentioned. If the vine is once smothered by the heat, it will begin to languish.
and produce no fruit, so it is necessary to follow the above instructions. The leaves ought likewise to be removed in the month of June, to prevent the white ants from reaching the root of the vine.

THE MANNER OF PLANTING IN THE MONTH OF FEBRUARY, WHEN THE GROUND IS LOW AND FIRM.

Having made holes ten inches from the tree, the depth thereof being fifteen inches, the length and breadth twelve inches each, take seven branches from the extremity of the vine, cut them thirty inches long, and put them into the hole; then fill it three quarters with earth, and the remainder with fresh leaves, observing to put water thereon. morning and evening, till the commencement of the rains, when fill the hole with earth, and throw up the bank as before directed. The time for planting these vines, in the rainy season, is in the month of June; and in the month of February in the dry season. If they are planted at any other time, they will not bear fruit. Trees planted for the support of pepper vines ought to be fifteen or sixteen feet as under. If closer, the branches will shade the vines from the sun, and they ought to receive a moderate amount of warmth.

MANNER OF PLANTING IN THE HIGHER SITUATIONS AND FIRM GROUND.

Make a square whole fifteen inches, the same distance from the tree, take ten branches from the extremity of the vine of seven inches length each, put them into the hole of a certain distance, filling it with earth and treating them as before directed. Two years after they are planted it is necessary to throw up a square bank of earth round every five plants that the rainwater may soak in and nourish the roots. If this is omitted during the rains, the vine will not subsist during the dry season, on account of the heat. This square is to be repaired every three years by which means the vine will live a long time and produce plenty of pepper; it ought to be done during the rains, in the month of July.

MANNER OF PLANTING IN VERY HIGH GROUND.

Make a square hole 2 1/2 feet deep, at the same distance from the tree, take 12 slips from the extremity of one of the vines, two feet nine inches long, put them into a hole at a certain distance, and cover them as before directed throwing up the square bank. It is necessary to plant these vines at the time before-mentioned. The reason for making the hole deeper is on account of the heat which prevails on high places. Vines planted in a strong soil will not produce any fruit, because the roots cannot extend themselves with facility.

A sandy soil is equally prejudicial to them because it is naturally hot; and the heat of the sun penetrates with more facility than in any other ground.

You may plant vines in a place where fresh water communicates itself in the same manner as in ground entirely low and firm; but I doubt very much if they will produce pepper. If they yield any I am certain the grapes will be of no great account, because of the continual moisture the plant will receive. I have already remarked it is absolutely necessary that the vines enjoy an equal degree of heat and moisture, if you think of gathering a good crop.

MANNER OF PLANTING THE PEPPER GRAIN.

Take ripe pepper and put into water for three days, at the end of which take off the skin, and, after you have mixed good red earth, with cowdung and water, put the pepper into it, exposing the same to the sun for three days, early in the morning and evening; it is necessary this mixture be neither too thick nor too thin. After this plant the same in an earthen pot, every grain at a certain distance, taking care to water them every day with a water pot, until the stalk has four leaves. Then dig a hole at the foot of a tree, two feet deep and nine inches long and broad, take cowdung and ashes of all sorts of firewood, put it into the hole, and mix the same with the ground dug out of it, taking care to fill it in such a manner that there only remains five inches of elevation. Fifteen days after, plant four pepper vines in every hole, cover them with earth two inches deep; during the summer water them every day, morning and evening, and cover during the rains. Likewise take care that no water remains at their feet by covering them with earth. As soon as the rains are over, throw up a circular bank of earth round them to contain the water they are watered with. In this manner they must be nourished for three
years; in the fourth year they will begin to give fruit. These instructions are to be followed every year. These proper plants are planted either in high or low ground, but it is necessary to be very firm.

MANNER OF PLANTING WHERE SALT WATER IS.

After having made a hole, thirteen inches square, at the foot of a tree, fill the same half up with good red earth without mixing it in the least with salt water; then plant therein ten slips of those vine, at a certain distance, and cover the same with good red earth. When the rains are over, throw again red earth at their feet, and make a circular bank round them, to form a conservatory, for watering them every other day, taking particular care to cover the feet of the branches with fresh leaves. In the beginning of the rains fill the conservatory and take away the leaves, observing to pull up the grass that sprouts at their feet, covering them with red earth, at the same time spreading same round about. They are to be nourished every year, as is pointed out at the beginning of these instructions.—Indian Agriculturist, September 1878.

(From "Dictionary of Economic Plants" by John Smith, A. L. S.)

Pepper Plants.—About 40 species, more or less natives of the same or of different countries, are called Pepper plants. They consist of herbs, shrubs, and trees, and all possess in more or less degree aromatic, pungent properties, throughout the whole, or some special part of the plant, and are used in their respective countries as stimulating food condiments, some forming considerable articles of trade. The most important in domestic use in this country are furnished by species of the genus Piper, the type of the family Piperaceae.

Pepper, the well-known condiment prepared from the fruits of Piper nigrum, an epiphytial plant climbing and clinging to trees, having heart-shaped leaves about the size of ivy leaves, and producing flowers in spikes, followed by berries like currants, that are at first green, but after being gathered and dried become black, and form the black Pepper of shops. White Pepper is the same berry divested of its skin by rubbing and washing. Being ground they form the well-known condiment Pepper. It appears to have been early known, as it is mentioned by Theophrastus, who flourished 300 years before the Christian era. Long Pepper of the shops is the immature flower-spikes of Piper longum. In habit like the preceding, it is a native of India, and is extensively cultivated, especially in Bengal. Long Pepper spikes possess the same stimulating property as Black Pepper. Cubeb, the berries of Piper cubeba, is a native of Java, and its berries are also stimulant. It is probable that the above Peppers are produced by other species than those named, of which there is evidence, especially as regards the plants that produce the Black Pepper of Jamaica, Trinidad, and Ceylon; examples have been grown at Kew, each of which was sufficiently distinct in appearance to warrant their being characterised as species.

Pepper, African (Xylopia aethiopica), a shrub or small tree of the Custard Apple family (Anonaceae), native of Western tropical Africa; its fruit consists of numerous carpels, about 2 inches in length, which when separate, forming a bunch; they are aromatic, and used by the natives as a stimulant; it is also known by the name of Guinea Pepper, Negro Pepper, and Piper aethiopicum.

GAMBIER AND PEPPER PLANTATIONS IN NORTH BORNEO.—In addition to the ordinary regulations under which lands are leased, it has been thought desirable to issue special regulations having reference to the cultivation of Gambier and Pepper, and with this view the court have ordered as follows, viz. :—that upon an application for land being approved for the purposes named a permit will be granted to the applicant to occupy such land rent free for three years, at the expiration of which period a rough survey of the land will be made and a lease will be issued for 99 years for so much of the land as shall have been under cultivation, and for the remaining acreage an extent not exceeding two-thirds of the cultivated portion the whole being subject to an annual quit-rent of 4d per acre. The Company reserve the right to impose an export duty on the produce of such lands. The sale of lands fell short of the estimate for 1884, principally in consequence of the nonpayment of certain large tracts alienated to Australian firms who however are expected to make good their liabilities during the current year (1885.)—North Borneo Herald.
PEPPER.

PLANTING IN THE LOW COUNTRY NEAR HENARATGODA. 16th Nov. 1883.

I have continued to plant out pepper, as I could get suitable slips. They attach themselves readily to the surface of the rocks, wherever there is scurf of vegetable matter, but very reluctantly to a bare washed surface. The most advanced plants are twelve feet high and well branched. As my progress in extending this cultivation is not so rapid as I could wish and the price of slips at the Government gardens is absurdly high, so I propose, as soon as I can get ripe seed to put down a nursery. It will take many thousands of plants to give all the rocks on the place a chance of becoming useful; and I have planted about 500 imbil plants, along the roads with the ultimate view of attaching a pepper plant to each, but even for their own produce, I am credibly informed, there is an inexhaustible market in Australia. [And now in Britain.—Ed.]

GROUND PEPPER.

The attention of the trade is being seriously directed to the fact that so-called ground black pepper is being freely offered at prices far below the cost of the lowest whole pepper, which is the more remarkable, as the cost of, and loss in, grinding is at least 4d. per lb. The chief explanation of this remarkable state of things is to be found in the following facts. White and black peppers are both, as is well known, the produce of the same vines, and the difference is simply due to the removal of the outer or darker portion of the corns in the former; white pepper being the same as black but less the dark skin. This envelope, or outer coating, used always to be removed abroad, and by a process which, if it be as is reported, was by no means an agreeable one to reflect upon. Some years back, owing to speculation, white pepper was driven up to famine prices. It was then found that black pepper could be husked here by suitable machinery, and that the resultant white pepper had a preferable colour, when ground, to that which was made abroad. Consequently the process known as "decorticating," that is, of removing the outer husk from black pepper, and of leaving only the central white portion of the corns, has become general here. The question then arose of what was to be done with the large proportion of black husks which were removed by decorticating, and it has been solved by simply grinding them up with whole black pepper, and selling the produce as ground black pepper. The white pepper prepared in England by decorticating fetches such a high price, that the refuse husks can be sold at an exceedingly low rate, and then mixed off, and used to reduce the selling price of ground Black Pepper far below the original cost of the raw materials.

The question whether such a practice is allowable is one of degree, for black pepper has always been ground with its husk, but the mixture, in the process of grinding of a larger proportion of husk than appertains to the pepper, might be carried on to a point, at which the product might be more rightly termed ground black pepper husks. Still, the practice could scarcely be called adulteration, as the husk has pungent qualities, serviceable for the uses to which pepper is put, and it is not proved that the inside of the grain is more useful than the outside. Indeed, a large number of persons much prefer black to white pepper. It is also to be said in favour of the husks in question, that decorticating cannot be well practised with the very lowest qualities of black pepper, so that the husks are from a superior quality of pepper to that which is often ground. Still, allowing all this, there is much to be said on the other side. A wheat miller may with perfect propriety sift his flour into various degrees of whiteness, and offer it as firsts, seconds, and thirds, mixing off a portion of the bran; but if he ground up his bran by some new process so as to make it resemble flour, for which he passed it off, he would be doing something more nearly resembling what has recently been done with pepper. The spice grinder, in the same way, may sort out his pepper into various degrees of fineness or colour, and offer them at proportionate prices. But if he exaggerated the operation, the question would certainly arise whether he would be justified in grinding the husks, and then, by implication, selling them as the produce of the entire peppercorn—for such ground black pepper is certainly supposed to be.

It is well to remember, if any public question arises as to these matters, that the whole consequences would fall, not upon the wholesale dealer, but upon the retail grocers. If the latter offer as pepper, that is, as the produce
of the entire corn, a material containing, say, 50 to 80 per cent. of the husks or shells, the fact is sure to be detected by the chemical tests now in vogue, especially as the proportion of dirt always contained in unscreened pepper, even of the fine pepper used for decorticating, is to be found entirely in the husks. The law would find out the misrepresentation, by discovering the differing proportions in the constituents of ground pepper and ground husks, and not improbably arrive at the conclusion that there was adulteration, when, strictly speaking, there was none. It is true that it is not believed that anyone has as yet gone so far, as to grind husks only and call them pepper, but, judging from the prices quoted, a good deal of progress has been made in that direction. Of course, pepper ground whole, as has been said above, must include some husks, and therefore all these points are questions of degree. The grocers, however, run a serious risk in buying very low-priced ground peppers, and considering the small importance of the trivial extra profit, even to those in a large way of business, it is surely to their interest to discourage to the utmost all such departures from an old-established practice. Already not only are husks very freely employed to "reduce" cost, but long pepper, a totally different commodity, is added to the product, to "improve" colour. In fact, owing to the demand caused b its being mixed in this way, long pepper has recently risen about 9s. per cwt. If the grocers wish to avoid another question between them and the analysts, like that of coffee and chicory, or that of mustard and sago flour, or other ingredients they should decline to buy any pepper but that ground from the whole corns; for the gain of the substitution of the one for the other would not be worth considering to any individual retailer. On the other hand, the wholesale spice grinder, if unscrupulous, would have a wide field opened to him by such commodities becoming current in the trade. At the present moment the lowest and dirtiest whole black pepper costs in the market 64d. per lb. The cost of grinding, the loss of weight, and putting into barrels, is at least 2d. per lb., so that real pepper cannot be sold, without any profit, under 64d. per lb. wholesale. Husks, of which 1,400 bags were disposed of last week at public sale, cost 24d. per lb. ready ground for, presumably, the commonest; and about 48d. for the roughly broken husks and pepper. The latter would cost, ground, about 45d. per lb., filled into barrels. Mixed half and half with pepper ground from the whole corn, the commonest of the above could be sold with a profit at 5d. per lb. Of course there can be no objection to husks being sold, either wholesale or retail, as "Ground Pepper Husks," since there is nothing that unites them for similar uses to pepper, and they certainly contain nothing injurious; but the grocers should be careful not to buy or sell them as simply ground pepper.—Produce Markets Review.

REPORT FROM A LOWCOUNTRY ESTATE NEAR HENARATGODA.

(To the Editor of the "Ceylon Observer.")

22nd January 1854.

The cotton trees grow with such rapidity, that I think each will be sufficiently advanced by May to support a pepper plant. I have ascertained that the price offered for this kind of cotton, by a Colombo firm, is 8s per cwt. including the seed, and only rejecting the outer husk; and each tree is at three years old good for twenty pounds. I would like to know what the Australian price is.

17th March 1854.

Out of about 1,000 pepper vines, planted during the N.-E. rains, and that seemed to have got a fair start, one-half or more are dead, and the survivors look seedy.——

"Pepper Dust."—Not long since, at the weekly spice sales in Mincing Lane 608 bags (30 tons) of black pepper dust were sold to a single firm of brokers in two lots at 2d. and 14d. per lb. respectively, the very worst pepper in the market being worth 42d. per lb and this in the face of a protest from Messrs. W. and D. Harvest, who had procured a laboratory analysis which showed the "dust" to be composed of sand and clay 44 2 per cent., leaves, husk, etc., moulcy and unsound 54 8 per cent and whole grains of pepper 1 per cent. When the question of the sale was put to the "room" only three hands were held up against it, and Mr. Harvest was threatened with legal proceedings for his disinterested interference. Where are the sanitary authorities?——Sanitary Record.
PEPPER.

CAVENV E PEPPER.

TO THE EDITOR OF THE "AMERICAN GROCER."1

Your remarks in last week’s American Grocer about breeding canaries and the use of cayenne pepper which change the color of their feathers and improve the song of the birds, I can confirm having seen the birds which had been so treated. I am a native of the country of Norfolk, of which Norwich is the capital. Messrs. Mackley Brothers have for years made the breeding of canaries a study, you will gain some idea of the success they, with other breeders in Norwich, have obtained by the following, which I clip from the Norwich Weekly Press of November 17, 1883:—We have received a telegram stating that Messrs. Mackley Bros. have won twenty-four prizes with twenty-seven entries. Mr. H. Howard has taken three-thirds and three-fourths, Mr. Spelman one-second, Mr. Andrews two-firsts and one-second. At Southampton Mr. Fred. Bullard won nineteen prizes on Tuesday. In conclusion would say I have known as much as $1.50 per pound to have been paid for cayenne for feeding canaries.—Respectfully,

Cawstora.

PEPPER ADULTERATIONS.

With the advancing market for all grades of pepper, the subject of adulteration is more prominently brought to the attention of those interested in this article. We were the past week shown the price list of a prominent grocery house in this city in which brown pepper was quoted from thirteen to twenty cents per pound, the latter presumably pure, but what could be the composition of the stuff offered three cents below the jobbing price of the crude article? Pepper dust, pepper shells and mustard hulls have long been used as adulterants, but the quantity of these obtainable is not sufficient to meet the demand, and recourse has latterly been had to other and more objectionable substances. We know of an instance where twenty-five tons of pepper dust and sweepings were purchased by one concern which pretends to sell nothing but pure ground pepper. This stuff has a market value of five cents per pound, and is little better than the ordinary dirt swept up from the floors of a spice mill. Coconut shells are also ground up and mixed with pepper, and it is asserted that ground segar boxes, which were used in Germany a few years since, and there prohibited by special legislation, has recently been used here as an adulterant. The law here prohibits the refilling of empty segar boxes, and these can be secured at a nominal price and are said to be more satisfactory to the adulterators by reason of the difficulty of detecting the adulteration and the pungency of the material. Segar boxes are acceptable articles when they contain fine-flavored Havanas, but ground up and mixed with pepper to be eaten is repugnant to a sensitive stomach. We would suggest the propriety of an investigation of the quality of the mixtures offered for sale as pepper to the authorities acting under our recently-enacted drug and food adulteration law. Coloring coffee to make it look better and sell more readily may be objectionable and should be prohibited, but while the Boards of Health and other authorities are directing their attention to this comparatively harmless deception and publishing their efforts in this direction with a great flourish, they are paying no attention to the greater and rapidly spreading evil of the adulteration of pepper.

Let the State analysts secure samples of ground pepper advertised to be sold at prices at or below the market value of the crude berry, and analyze the same, and we have no doubt they will find much more to condemn than they have yet discovered in the practice of coloring coffees or teas. We would further suggest that the names of the parties who adulterate pepper, as well as the substances used, be given to the public, that they may be held up to the just execration of a deceived people. In this way the practice of adulterating articles of food and of drugs can be checked much more effectively than by simply notifying the guilty parties or imposing a nominal fine. It is important that this matter of pepper adulteration receive prompt attention as it is a growing evil, and since the advance of the pure article, the practice has received a fresh impetus, and promises to grow to proportions not reached during the high war prices of twenty years ago, unless checked by exposure and proper punishment.—Independent Journal.

PEPPER CULTIVATION AT PONDICHERY.—Monsieur Reynaud, Professor of Agronomy at Pondicherry, has demonstrated the fact that Pepper can be grown with profit on the East coast. He has lately gathered a good crop from a small planting, and the quality is said to be equal to good Tellicherry. The chief considerations seem to be soil and suitable trees for climbing.—Madras Mail.
ENCOURAGEMENT TO GROW THE PEPPER-VINE.

There are not two articles in the spice trade, says the *Home and Colonial Mail*, now so dear as black and white pepper, and there are good reasons why the prices ruling should be comparatively high. For some time past, chiefly in consequence of diminished imports, stocks have been working down into a narrow compass, and as it is between the seasons now, two or three months must elapse before any material addition to the supply on offer, by fresh arrivals, can possibly take place. Even then the quantities on hand will require so much replenishing that large proportions of the quantities put forward will be quickly absorbed for that purpose, and still further heavy importations would be necessary to bring the value down to a more moderate level than it has stood at for years past. With few landed parcels offering, the bulk of the business done for several weeks running has been for January or "distant" shipment at stiffening rates, till Acheen, Penang, has fetched 7d, and Singapore black 7½d to 8d per lb. It is believed that on the Continent the same scarcity prevails, as at Havre, for instance, only about 8,300 bags are held by the importers, in contrast with 22,700 bags at this period in 1884; and the exports from hence are a much-needed supply drawn away from this side. The same remarks apply to white pepper, which is also very scarce, and is likely to be much dearer before the market is adequately supplied, as it is manufactured by the natives in the East is sure to be interfered with or delayed, while black descriptions of pepper command advanced prices such as those now existing. Indeed, if it were not for the London-made sorts of white pepper which are regularly produced, there would doubtless have been another and more considerable rise in value long ago; and as a sign that there has been no accumulation of supplies in the hands of sellers, we may mention that it is some months since anything of importance pertaining to this kind of pepper was offered for sale by public auction.

BLACK PEPPER.

Some of our readers wish to know more about the pepper, that is always on every American table that supports a castor, than the mere fact that it is a tropical product, and is grown chiefly on the spice islands south of the Asiatic peninsula. Well, we wish to please, as well as to instruct our readers.

Black pepper was for ages considered a very choice article. Like gold, silver and precious stones, it was for many generations found only on royal tables, and those of the rich and noble who aspired to rank with the rulers of the realm. Choice spices and rare gums were among the precious treasures of the kings of Egypt more than two thousand years before the Christian era. The trading Midianite caravans that purchased Joseph from his brothers and sold him into Egypt were bearers of "spicy and balm" for the Egyptian market. And when the sons of Jacob were making preparations to visit that land the second time, to propitiate the "Lord of the realm," their father said to them: "Take of the best fruits of the land, and carry down a little balm and a little honey, spices and myrrh, nuts and almonds." Indeed, during the palmy days of Egypt, when they embalmed all their distinguished dead, precious gums and fragrant, pungent spices were largely called into requisition. Even the Israelites, in their ritualistic worship, held in such high esteem many of these rare gums and oils that their law forbade their use for any other purpose.

It is not, therefore, surprising that during the first centuries of the Christian era even the common spice, which is known as black pepper, was prized as highly in the city of Rome as its weight in gold.

When this pepper was first discovered it was growing spontaneously as a kind of wild vine. It was found in narrow, well-wooded valleys, where the soil was rich and moist, the air hot and humid. Such conditions are found in Southern India, Java, Sumatra, Sierra Leone and Isle of France. It grows on vines—not unlike grapes, but much smaller, which creep along the ground, and frequently throw out new roots. It is most successfully cultivated under trees, which secure for the vine, shade and support. The vine may be cultivated and trained to ascend large trees, into whose rough bark it fastens its roots or tendrils. Where the soil is deep, rich and moist, these vines will often reach a height of 20 to 30 feet. Though for convenience of gathering, they are seldom permitted to grow much higher than a man's head. The leaves are oval and the blossoms white. When these fall the berries grow on the stem that is left, and this spike of a vigorous vine will bear from twenty to fifty berries. From green they turn to red, and when they attain a dark chocolate
PEPPER.

shade, they are deemed mature, and the spike is pinched off and placed on mats, or on hard, dry, smooth ground in the sun or in open baskets before a gentle fire a few days. They are then cleaned and ready to be placed in mats or sacks which are called piculs. Each of these, when well filled, is supposed to weigh 133½ pounds.

Spices of all kinds, like teas, coffee and fruits of every variety, are greatly improved by cultivation and wise, skilful attention. The migration of Chinese and Europeans to Southern Asia, Malacca and the Spice Islands, who have given special attention to the growth and cultivation of pepper have greatly increased its production and intrinsic value. Yet, at the same time, they have learned that it is possible to mix up with the pure berry the pepper-stems, pieces of the vine and other material, which, when pulverized, taste and smell so much like pepper, that none but an expert can intelligently affirm that the product is either impure or adulterated.

But conscientious and honorable men, who own and run mills for grinding pepper, as carefully screen the pure, round pepper berry from stems, vines, dirt and rubbish of all kinds, as a good miller does wheat and corn from smut, cobs and all foreign material, before they pour these grains into the hopper.—Independent Journal.

PEPPER PLANTING IN JOHORE.

I have seen in a Straits paper an extract from the Ceylon Observer giving an account of an interview with Mr. Wm. Hole, Private Secretary to H. H. the Maharajah of Johore. Mr. Hole rightly enough gives a very glowing account of the revenue derived from the Gambier and pepper industry, but I regret to see that he thinks the European planting enterprise of so little account; in fact, he thinks it has been the cause of great loss to the Maharajah through "the construction of roads and other facilities for them." Now, I have not the slightest intention of denying that the Maharajah has given great encouragement to the European planters, having already borne testimony to that effect, but I certainly think it is very unfair to saddle the European planters with the cost of road construction, whereas, as everyone here knows, the gambier and pepper planters derive more benefit from the roads that have been made than the coffee planters do; and in fact the roads would have been made although there had not been a coffee estate in the country. It is true enough that coffee Arabica, of which Mr. Watson was the pioneer, has proved a failure, but Liberian coffee has taken its place, and will ere long more than recoup all the losses incurred on the other.

No one has done more towards bringing this about than Mr. Watson has, and at the present time no one has a larger stake in the planting enterprise in Johore. While the Maharajah has given every encouragement to the European planters, he has given equal, if not greater, facilities to the Chinese gambier and pepper planters; who, while they swell the revenue of the country by the taxes on gambier, pepper, and opium, on the other hand are doing incalculable damage by the indiscriminate manner in which they carry on the cultivation. For miles on every side of Johore Bahru there is little or no forest to be seen now, where some 20 or 30 years ago there was nothing but heavy valuable timber. Now there is nothing but long stretches of lalang grass with patches of scrub and a few strips of jungle near the few gambier and pepper gardens left in this locality. Now all this is caused by the Gambier and Pepper cultivators who made off to fresh land further afield as soon as they found their gardens falling off in yield, instead of applying manure. From the top of any hill you will see innumerable park-like glades which are very pleasing to the eye at a distance, but on closer inspection they turn out to be cultivated and abandoned gambier and pepper gardens, the abandoned ones being overgrown with lalang grass, and are in the proportion of at least 2 to 1 of those in cultivation. To enable you to understand how this state of things comes out, I will try and explain the system pursued by the Chinese gambier and pepper planters. When a Chinaman wants to open a garden he generally goes off to one of his countrymen in Johore or Singapore, enters into an agreement with him to the effect that the merchant advances money, food, and opium to the planter from time to time, taking good care not to let his advances exceed, say, two-thirds the value of the garden. The planter for his part has to sell all the produce of his garden to the merchant at a fixed rate, which rate is always considerably below the real market value. You can, therefore, understand that the profits of the merchant are enormous, and that the planter is generally in debt. The gardens as a rule are from 8 to 10 acres, which are planted in the following proportions, viz., about 1 or 2 acres of pepper vines and the balance with gambier. The forest is felled and burned off as for coffee, the piece intended for pepper is dug
PEPPER.

45

up and prepared most carefully, pepper cuttings planted about 8 feet apart, and a jungle post about 10 feet high sunk in the ground beside each plant, to which it is eventually trained. The balance of the clearings has very small holes cut about 6 feet apart, in which young gambier plants are put and left to fight it out with the lalang grass, ferns, and other weeds, which soon spring up. In 18 months from planting, the gambier gives a return which helps the planter to pull along till his 1,000 or 2,000 pepper vines begin to give crop when 3 years old. On each side of a gambier and pepper garden here is a reserve of forest 8 chains wide, in which he has the right of cutting any timber he may want for posts for his vines, firewood for boiling down his gambier or for making burned earth, which with the refuse from the gambier boilers is the only manure applied to the pepper vines when the garden is any distance from a town. If a little more care was given to the gambier, there can be no doubt that, not only would the returns be greater, but the garden would last much longer—the gambier being generally worn out long before the pepper begins to fall. As soon as the planter finds that the pepper is giving out, he looks about him for another piece of forest and starts afresh. If this kind of cultivation is allowed to grow unchecked it is only a question of time, and that of no great length, before the whole of the valuable forest in this country will be destroyed. The rise in the price of pepper some months ago has given a great impetus to the opening up of gardens.—G.—Local "Times."

SUMATRA.

The report by Consul H. G. Kennedy on the trade and commerce of Acheen during the year 1884, with a notice of the Deli tobacco districts issued in the same volume, states:

The total quantity of pepper exported from Acheen (Oleleh and Edie together) in 1884 was about 73,000 piculs, of which nearly 68,000 piculs were sent from Edie. Comparing this total with the quantities for the preceding five years the result shows as follows:—1884, 73,000 piculs; 1883, 122,579; 1882, 106,255; 1881, 107,180 piculs.

The average price of pepper ruling in the Penang market during the past year has exceeded $17, and for a considerable period there was none at all offering for sale. The average price in 1882 was $14.71; in fact, pepper has continued to rise steadily in value since 1878, when a picul of Acheen pepper fetched $6.82 in Penang.

POISONOUS "PEPPER."—The following refers to the sale of a compound described as "black pepper dust," which since it was admitted to contain nearly 50 per cent of mineral matter, ought, in the public interest, never to have been placed in the market at all:—"Dowgate Upper Dock, Thames-street, E. C., January 24th.—Sir,—About 30 tons of an article described in the catalogue as 'pepper dust,' was offered at the public sales in Mason Lane a week since, when we ventured to call attention to the fact that the samples shown were flavourless and quite destitute of the pungent qualities of pepper. The selling brokers offered to withdraw the lots for the purpose of obtaining an analysis, and accordingly the same parcel was again submitted for competition at the weekly spice sales yesterday, the lots being marked 'without reserve,' with the following prefix:—'Copy of analysis made by Mr. Ogston.—Whole grains of pepper, 100; pepper leaves, husks, &c., 54.80; sand and clay, 44.20; total, 100.00.' The proportion of 'foreign mineral matter' appeared quite sufficient to condemn it as an article of food, and in the hope of arresting the evil at its source we proposed a resolution as at foot. It was put to the room by the selling brokers and carried. He joyfully remarked that the pepper dust could be used for chickens, and he should, therefore, proceed to sell it in spite of the resolution. The whole quantity was accordingly sold and realized an average price of about £17 10s per ton. Possibly the pepper dust may go to feed fowls, but should it reach the hands of unscrupulous dealers, we fear the public interests will suffer. It is only fair to mention that the representatives of all the leading spice houses expressed a strong feeling against the proposed sale.—Yours, W. and D. Harvest.—Proposed by Mr. Daniel Harvest (W. & D. Harvest), seconded by Mr. Bryne (Peek Brothers & Co.)—That, inasmuch as the 608 bags pepper dust contain 44 per cent. of sand and clay, and would, therefore, subject retail dealers in the same penalties under the adulteration of food act, I the buyers present protest against the proposed sale."—Home and Colonial Mail.
THE PEPPER-TREE.

Dr. Taylor, editor of "Science Gossip" has the following paragraph in the Australasian:—

South Australia had been panting and thirsting for rain for many weeks, and a few days before I landed the rain had at length descended. The hot and fertile earth had burst forth in grateful greenery, and the revived vegetation had broken out into a new spring. The gardens were full of flush, almost tropical growth. What surprised and pleased me was to see how almost all kinds of trees and shrubs grow comfortably and prosperously together upon Australian soil. Some of the larger gardens are like botanical parliaments, where representatives from all parts of the world meet side by side—"pepper" trees (Schinus molle) from the Brazils, drooping their graceful leaves and clusters of pink berries, palms from Africa and India, cactuses and aloes from America, pines from California and Norfolk Island, and a floral crowd of herbaceous plants of cosmopolitan distribution. Not even in their native countries do these several species grow more rapidly or luxuriantly than in Australia. Formerly it was imagined that the best way to account for one kind of plant being found in one country, and a different plant in another, was that they were placed where the soil, climate, &c., were best fitted for them. But horticulture has upset that idea by growing all sorts of plants together in the same spot. Consequently we know that the geographical distributions of plants—the reason why one kind grows in America, and a second in South Africa, and a third in Australia—is connected with the repeated physical changes which the surface of our old planet has been undergoing ever since vegetable life began. Hence we see how plants of high antiquity may become extinct in one place, so that the only evidence we have that they ever lived and grew there at all is from their being found in the fossil state.

Have we the pepper-tree in Ceylon? Is the Schinus molle the tree which grows on the border of the bay of Naples lining the Chiapa? The following is the reference in the *Treasury of Botany*:

**Schinus.**—The Greek name for mastic-tree, Pistacia Lentiscus, but now applied to a genus of Anacardiaceae, consisting of trees and shrubs, natives of tropical America, &c. The leaves are unequally pinnate, the terminal leaflet very long. The flowers are small white, in terminal or axillary panicles, dioecious; calyx five-parted, persistent stamens ten, inserted beneath a wavy fleshy disk; ovary solitary; styles three or four, terminal, very short; fruit succulent round the stone one-celled one-seeded, its outer surface traversed by six longitudinal channels filled with oil.

The leaves of some of the species are so filled with a resinous fluid, that the least degree of unusual repletion of the tissue causes it to be discharged; thus some of them fill the air with fragrance after rain; and *S. Molle* and some others expel their resin with such violence when immersed in water as to have the appearance of spontaneous motion, in consequence of the recoil. Botanical Register, t. 1506.

*S. Areira* is said to cause swellings in those who sleep under its shade. The fresh juicy bark of this shrub is used in Brazil for rubbing newly-made ropes, which it covers with a bright dark-brown varnish. The juice of this plant is used in diseases of the eyes. The root of *S. Molle* is used medicinally in Peru, while the resin that exudes from the tree is employed to asstringe the gums. From the fruits is prepared a kind of wine in Chili. The small twigs serve for toothpicks. The specific name *Molle* or *Mulli* is an adaptation of the Peruvian name for the shrub. [M. T. M.]

**AJI-AJI, THE PEPPER OF PEPPERS.**

Our contemporary the Saturday Review, in its issue for September 18, had an article under the mysterious heading of "Aji-Aji," which the writer at once proceeded to explain was a "compound Quichuan word" for Pepper of Peppers, and further informed his readers that "both word and thing are largely distributed over South America," that "it is the finest of all Peppers. No other Pepper in either hemisphere competes with it, neither the Piper nigrum, nor the Capsicum baccatum, nor the C. fruticosum, the C. annuum, nor yet the Eugenia pimenta. All these are varied merely in pungency, some being sharp and fiery, others caustic and stimulating, and some prickling and penetrating. But the refined and delicate Ají is persuasive and enticing, of not one flavour but many flavours; it never conceals, but, on the contrary, increases whatever of fragrance and sweetness of taste or smell it comes in contact with." The writer then proceeds to give a long list of its extraordinary virtues, and an enumeration of the articles of food it
PEPPER.

may be used to improve, from a new-laid egg to a Strawberry or a jug of mulled claret. It is said to prevent evil effects in a malarial atmosphere, and on this account we are told that "the War Department of the United States has secured a monopoly of all the Aji which is exported from South America," and further that "no Aji in these days finds its way to London, and that which we once enjoyed in the belief that it would never fail us has become nothing but a sigh and a regret. It remains to be seen," the writer continues, "whether the people who have acclimatised the Cinchona trees in the Neighherris, in Ceylon, in Jamaica, and in Fiji will allow themselves to be deprived of their delicious and inspiring Aji."

Perhaps the most interesting part of the Saturday Review's article is that which treats of the preparation of Aji, which is as follows:—"There are two kinds of Aji, but there is only one way of preparing it. The best is that which is made from the greatest variety of Peppers. The pods of these are taken when fresh, stripped of their seeds, and ground into a paste of the consistence of fresh spring butter. The paste is put into a small, well-dried Gourd, prepared on purpose, of the size and shape of a well-grown Orange. The Gourd, when thus charged, is then coated with a layer of well tempered clay, and placed in the sun to dry, or to ripen, as the simple people who prepare it say in their own tongue. By the time the clay is well baked the pulp or paste within has been dried into a fine yellow powder, and it is then fit for use. Many people, ignorant of this fine art of the Incas, have supposed quite naturally that these Aji-laden Gourds, with their exquisite flavour and refined taste, were some uncommon and little known natural fruits. The other method of preparing Aji is to grind the seeds with the pods, which simply adds great pungency to the Pepper, and is always used in the preparation of Maize or Indian Corn which is boiled in its own husk with so much Aji, and surpass in flavour and pleasantness any vegetable curry of the East. The Gourds of Aji when thoroughly ripe are cleansed of their coating of clay, tied up in suitable leaves, well secured by the fibre of the Aloe, and which much resembles when ready for market reeves of large onions, a dozen Gourds making up one reeve of Aji. The cost of these in the good old times was 15d. for a dozen Gourds; what the price may be now is only known on the Exchange." From the references made in the preceding passage to the pods and seeds being ground to constitute the Pepper, it will be readily guessed that it is the produce of a species of Capsicum, notwithstanding that the writer of the article says it is "not the Capsicum baccatum, nor the C. fruticosum, nor the C. annum." In the Kew Museum are numerous varieties of the fruits of Capsicum annum, all bearing the name of Aji, and the museum also contains specimens of the small Gourds filled with Capsicum Pepper as described by our contemporary; so that the "Aji-Aji" of the Saturday Review is clearly the produce of Capsicum annum.

—John R. Jackson, Curator, Museum, Royal Gardens, Kew.—Gardener's Chronicle

AMONG articles exported from India spices figure to the extent of 43,061,335 rupees, an augmentation of nearly 100 per cent during the last five years, notwithstanding the decline in the exports of pepper. The shipments of ginger are growing very rapidly. About 7 millions out of 103 millions lb. exported were sent to Europe, where a fine appetite for Indian ginger seems developing. Exports of Cardamoms are falling heavily, and no wonder, since Ceylon—which is not, of course, included in the report—has nearly supplanted India as a purveyor of that spice.—Chemist and Druggist.

CEYLON-GROWN PEPPER.—A specimen of "white pepper" grown on Lunugala estate, Rangala, has been sent to us, and two authorities pronounce it good. One writes as follows:—"The sample of white pepper is good, but the grains are small. All peppers, both white and black, have, during the last three or four years, advanced in prices very much—I think from exceptional causes such as the Acheen war. In June 1880, Singapore and Penang black was selling at about 32d to 4d per lb. in London, white at 54d to 6d per lb. In June 1881, prices had advanced to 5d to 54d for black, and 7d to 7½d for white. In June 1882, black was worth 54d and white 9d per lb. In June 1883, prices were the same as in the previous year. This year, the price of black advanced to about 64d and white 9½d to 10½d per lb. For several years prior to 1880, the normal values of Penang and Singapore black and white pepper were 3½d and 5d to 6d per lb. respectively." As there does not seem to be any immediate prospect of a cessation of the wretched conflict between the Dutch and Malays in Acheen (the point of Sumatra nearest Ceylon), we fancy the cultivation of pepper in Ceylon, if carefully conducted, might result in profit. Kapok trees are excellent supports for the vine.
PEPPER.

PEPPER VINE.

Colonel E. B. Sladen, Commissioner of Arakan, has very courteously placed at our disposal the following report from Captain C. A. Cresswell, Deputy Commissioner, Sandoway, on the results attending the experimental cultivation of the Pepper Vine, in the neighbourhood of the town of Sandoway. Before making any remarks on the cultivation of the pepper vine and its probable success, it would be as well perhaps, as this is the fourth year of the experiment, to give the actual position as regards number and size of plants as actually counted about the 14th February 1885, and which will be entered as 1884 and compared with those of 1883, counted in March 1884 and entered as 1883.

DODAUNG.

<table>
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<th>From one to two Feet</th>
<th>Over two Feet</th>
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<tr>
<td></td>
<td>1883.</td>
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<td>Block (1)</td>
<td>...</td>
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</tr>
<tr>
<td>Total</td>
<td>3485</td>
<td>2,342</td>
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* Of which 62 were over 4 feet.

KYAUDUNGA.—1884.

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<th>Under 1 ft.</th>
<th>From 1 to 2 ft.</th>
<th>From 2 to 4 ft.</th>
<th>Above 4 ft.</th>
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</thead>
<tbody>
<tr>
<td>188</td>
<td>73</td>
<td>30</td>
<td>289</td>
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</tr>
</tbody>
</table>

A great part of the Dodaung cultivation is now, I find, not fitted for the pepper vine. The original acreage taken up was 105 acres. The decrease in the number of plants is due to the fact that in March 1884, over 400 plants were destroyed by fire in Block 2, and further from Blocks 1, 2, and 3. I have now thrown out about 40 acres as ground upon which the vines is not likely to succeed. The ground will not be given up, but will be simply left to take care of itself; if the young cuttings at present existing struggle up, they can be looked after hereafter. The acreage, as at present looked after by the two gardeners in Dodaung, is 62 acres only, and in April and May I shall again inspect the whole of this ground, and finally decide what is worth keeping up.

Block (4) I intend to devote special attention to as the ground is good and the trees are doing capitally. I have taken on to Block (4) at the cost of five rupees, an old sugar-cane plantation of over 3 acres, and there I have put down one hundred cuttings of the _Erythrina Indica_, most of which have struck, and will be ready for the young vines to be planted at their feet next June. This is the method adopted on the Malabar coast, and is, I think, a far better plan than planting the trees in a jungle, where the ground is not of uniform quality, and the vines of course have to be spread over a large area. By this method (the Malabar plant), about 225 trees can be planted to an acre, and after four years an average crop of one lb. a tree might be expected. The yield in Sumatra is however very different; there an acre of first class vines will yield from 1,161 pounds of pepper. In Malabar the average yield from 1,000 plants is only put down at 450 lb. or less than 4 lb. a tree. From which is actually gathered from trees in Sandoway, I think I am justified in putting down 1 lb. for each tree. Seven pounds is looked upon in Malabar as a very high yield for one tree. Seven pounds is sometimes realized from the old and uncared for trees round Sandoway. The price at present here is R1-12-0 a viss. A valuable product in comparatively small bulk, and one which will bear the expenses of transport which paddy rarely does in the Sandoway District. In Dodaung I expect from 50 to 100 trees to fruit next year in February 1886. In Kyauung-daung from 200 to 250 in February 1886, or say a total in the two plantations of 300 trees and a produce of say 300 lb. of pepper, and taking the produce of the year at 8 annas a pound, 150 rupees ought to be realized to March 1885.

The allotment was in—

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<th>Year</th>
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<td>...</td>
<td>R500</td>
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<tr>
<td>1883-84</td>
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<td>&quot;500</td>
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<tr>
<td>1884-85</td>
<td>...</td>
<td>&quot;300</td>
</tr>
<tr>
<td>1885-86</td>
<td>...</td>
<td>&quot;200 (proposed)</td>
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</table>
PEPPER.

For 1885-86 I only propose to keep one gardener, and I propose to limit the expenditure to 200 rupees. This would give the receipts as 150 rupees on an expenditure of 1,500 rupees, or say roughly 10 per cent. In 1886-87 a far larger yield might be looked for, and the gardens should be, not only self-supporting, but should give a surplus over the expenditure for that year. I do hope that the gardens will be kept up till April 1886, and then Government will fairly able to form an opinion whether the experiment has been a practical success or not. Of course in an undertaking of this sort I had at first no practical experience. My first idea was that the expense was unnecessary, and that the soil was, comparatively speaking, a secondary consideration. The first place I fixed upon was Dodaung. This had been frequently worked as taungya, and consequently large shady trees were only to be found here and there. This led to the work being scattered over a large area. By the second and third year from the undergrowth being cleared away, &c., the trees had sprang up considerably, and more shade was obtained and more trees fit for planting. But still the vines only flourished in certain places, and that was in places where there was the best soil. Given good soil, shade seems to be an unimportant factor. In Malabar alluvial soil is said to be the best. As I have already said, I think the Malabar method is likely to be the most successful.

Cuttings of Erythrina Indica (Penli Kathet) are put down 14 feet apart in the dry weather, and by June next are ready for the pepper vine plants or cuttings. They are all planted in straight lines, and a plantation is easily watched and inspected. In four years the vines begin to fruit and last for 25 years in the case of cuttings; 40 in the case of seedlings. One of each is usually planted at the foot of each tree. This method of cultivation is somewhat similar to that adopted by the people for the betel vine, so that they will be more likely to take it up. There is no difficulty attached to the cultivation of the pepper vine. Cattle will not touch it nor even goats. In a healthy state, the vine has few enemies. I have only found two—snails and a long thin brown caterpillar-like grub, with a hornv head. Will the people take it up? I think they will; already it is being tried by them in different villages on a small scale, but not on any systematic plan. I am inducing people to visit the Government Plantations, and see for themselves. People are beginning to talk about it, and from what I can hear, a good many attempts will be made next rains. As regards Dodaung I have not gone into calculations, nor mentioned the percentage of deaths, and number of plants put down, simply because a great many were planted under conditions which, as we now know, were hopeless. Further, a good deal of ground, viz., about 43 acres, has been thrown out. In March 1884 there were in four blocks of Dodaung (105 acres) 3,709 plants alive, of which only 52 were over two feet high, and 400 of these were destroyed by fire in May. During the rains of 1884, 1,700 plants were put down in the reduced acreage of 67 acres, now of which 2,630 plants are alive, of which 235 are over two feet high (62 of them are over 4 feet high). I have also put down cuttings of Erythrina Indica, of which 100 are alive, and will be planted with vines in June 1885, and before the end of April, I hope to have another hundred down.

Kyaung-daung.

In March 1884 there were 430 plants alive in this small plantation of 3 acres; 250 plants were put down in the rains of 1884; and in February 1885, 580 were alive, showing a percentage of deaths of cuttings amounting to 33 per cent as against 35 per cent last year. No record of the height of these trees was made in March 1884; but in February 1885, out of a total of 580, over 289 were more than four feet, and 103 others between one and four feet high. Here the soil is remarkably good; more trees are springing up fit for planting, and next year probably 150 more over two feet can be put down, bringing up the total to 730 trees, which gives about 243 vines to the acre—rather more than the number per acre on the Malabar method of planting. Supposing all these vines in fruit, and allowing 1 lb. a tree, these three acres would give a production of 730 lb. of pepper, worth at least 365 rupees for three acres, or an average of say 120 rupees per acre. No comparison exists between this and the production of paddy, either as regards labor or profits. To any one, who can afford to wait and work up his ground, fruit trees can be used for growing the pepper vine with just as much success as any other tree, and with the double result of fruit from the tree and the vine. An easier or more paying cultivation does not exist. I think Kyaung-daung may be considered a thorough success. It is not, as if the fruiting of the vine were doubtful;
that is an ascertained fact. From some trees in Sandoway 5 to 7 lb. of pepper are gathered annually. I have done my best in travelling about the district to explain the advantages, method of culture, &c. As I have already noted, its cultivation is here and there being attempted. On the arrival of the Thugyis with the land Revenue rolls, I took the whole of them to visit the gardens and explained the principal points. A number of the inhabitants of Sandoway have also visited the spot.

Sandoway, with its network of creeks from Sandoway to Mai, wants nothing but a valuable production of this sort to bring it forward from its present backward position. Boat or canoe transport would cheaply bring the pepper to any central point at very little cost, and we might then hope to see a little more trade in the district. If Government should feel inclined to sell or lease Kyang-daung now that the vines are well established there, I think there would be plenty of applicants. I should then simply continue the experiment on the best part of Donaung, at the same time testing the Malabar method of planting in straight lines on cuttings of the Erythrina Indica.—Indian Agriculturist.

PEPPER ADULTERATION.

The various prosecutions in the spring for the sale of adulterated Pepper have had a very satisfactory effect upon the London deliveries, which for the first thirty-five weeks of this year were 5,442 tons, against 5,013 tons in 1886. These figures are for Black and White Peppers together, and indeed this is the proper way to regard the statistics of the trade, because, owing to decortication here, the use of the two kinds is now inextricably mixed up. It was pointed out that the retail Grocers would not knowingly have bought adulterated Peppers, and thus have compromised their good name for what yielded no appreciable profit. They were simply tempted by low prices, and did not know of the existence of the adulteration. They are now on their guard, however, and hence the improved demand for real Pepper. The wholesale houses are also taking steps in the direction of increased caution, by more careful selection, the rejection of doubtful samples, grinding their own Pepper, &c. It is particularly satisfactory to notice that the adulteration of White Pepper with Long Pepper appears to have received a very severe blow. Long Pepper has fallen 20s. per cwt., or about one-third of its then value, since the spring, owing undoubtedly to the prosecutions for its use with White Pepper. At the great fall that has taken place, its use with White Pepper would give a profit of 6d. for every pound of Long Pepper that could be mixed with White Pepper, so that the temptation to those fraudulently disposed is very great. Fortunately, however, the taste and smell of Long Pepper cannot be disguised, so that the adulteration is readily to be detected. As it is probable that the practice of adulterating Pepper is as yet only dormant, and might very readily be revived, the actual cost of the lowest ground samples which the Grocers could safely sell may be useful. The present market value of good heavy Penang, which is supposed to contain from 8 to 12 per cent of dust, is 63d to 7d per lb.; and adding 3d per lb. for the cost of grinding, this would bring its present first cost to 7d per lb. Those who bought a little time back, can, however, sell with a profit at that quotation. The lowest cost of ground common White Penang, taken in the same way, is 10d. In this case the market is lower than it has been. It is also satisfactory to notice that the demand for genuine Ground Ginger is increasing, since the recent prosecution for the use of spent Ginger for adulterating Pepper.—Produce Markets' Review.

PEPPER GROWING.

The cultivation of pepper though simple is an interesting one and affords ample scope for the application on intelligence of a higher order than we are generally ready to accord to the coolies employed in the work. The lines are laid out seven feet apart and the holes dug two feet square by over one foot deep, the centre of the holes being seven feet apart in line. At one corner of the hole a split post six or eight inches square is put in having about ten feet out of the ground. The post should be of such wood as will not be readily eaten by white ants and tarred to prevent decay, for this post performs a very important part in the cultivation. It is usual to put three cuttings eighteen inches long into each hole in the opposite corner to the post, burying the cutting about six inches deep and for over a foot in length; it then throws out lateral roots from all the joints that are under ground which gives it ample strength to
procure nourishment from the soil it is placed in. The cuttings are taken from
the tops of the vine and are usually put in the ground to root before being
planted out. The vines come into bearing in 2½ to 3 years and average half a
chatty to the vine for the first crop, increasing to three cutties in the fifth year.
A vine is in full bearing when 6 to 7 years old, but continues to increase year by
year if manured and not allowed to over-run or overbear itself in any one year.
A fair average crop I am told is 20 piculs to the acre and a good crop 25 piculs
to the acre. Of this product there are two crops a year. Black pepper is simply the
berries dried. The white comes from the ripest berries which are let lie in a heap
for some days to ferment, when the skins are removed by the coolies trampling
amongst them; they are then washed and dried upon an improvised drying apparatus
on which they are spread with a slow fire beneath. In order to make the vine
throw out laterals and spread, it is topped when about two feet high. Such
briefly is a sketch of the pepper culture, barring manuring, weeding and cost of
laying out a garden, which I believe all included for the first three years does not
exceed $100 per acre. The gambier is grown simultaneously with the pepper in
order that the refuse may be used as manure for the latter. Like the areca palm
and coconut of Muar, pepper and gambier are the staple products of this part of
Johore, but are not confined to this part of the territory, being grown, I believe, at
Sedillli the East and Batu Pahat on the west. But as showing the large quantity
now raised, I find that nearly two-thirds of the exports of these articles from
Singapore are produced in Johore.—Straits Times.

PEPPER AND CUBEBS.
(To the Editor "Ceylon Observer."

Upcountry, 23rd April 1887.

DEAR SIR,—I noticed a short time ago that you had collected in the
columns of the Observer a considerable amount of information on the subject of
Rubber Cultivation. You would, I think, confer a boon on owners of land at
a low and medium elevation if you would do the same for Pepper. This pro-
duct has one great advantage over rubber, that we know it has been successfully
cultivated in Ceylon. All the same, comparatively little seems to be known
about it now. I put out a good many plants two years ago under various con-
ditions as regards shade and soil, but their growth is not very encouraging and
this in land which I should have imagined was admirably suited to them and
is doing well in other products. I think it likely enough that I may have got
hold of an unsuitable variety as I have heard that some kinds do best in
damp and others in dry soil, while some succeed best in shade and others in
the open. Then of course one would wish to grow the most valuable sorts only.
Any information about "Cubebs" would also be of value. When so many pro-
ducts are suffering from low prices, I cannot help thinking that something might
be made of pepper were more information available. PLANTER.

PEPPER IN NETHERLANDS INDIA
(Translated for the Straits Times, 15th June.)

The Batavia Nieuwsblad states that the pepper plantation in the
Lampung districts in the Sumatra, have suffered so much from disease that experts,
consulted as to the best course to follow under the circumstances, have advised the
rooting out of all the diseased plants. The result is the more regrettable, from
the officials in that quarter having made strenuous exertions to push on this branch
of cultivation in the interest of the people.

Black coloured paddy is becoming extensively grown in the province of Malang
in Java. It is said to differ widely in taste and smell from the ordinary kind.

CEYLON PEPPER.—Pepper has been one of the oldest of Ceylon exports;
the Dutch paid attention to it, but since then, it has become of little importance,
since in its growth by natives for consumption in their local markets. Among "new
products," however, which have of late years been claiming the attention of
European planters is pepper, and we are glad to learn that a favourable
report has been obtained on the North-Matale-grown article which has been valued
in quantity at 8d to 8½d per lb. The report goes on to say:—"It is
highly charged with the natural oil, i. e. pepperine, on which account it would
be valuable for mixing purposes." Seeing that the treatment of the product
in preparation, in the case referred to, was that of beginners, the report should,
we think, be considered eminently satisfactory.
PEPPER GROWING.

In hard times like these, when planters' lines are far from being cast in pleasant places, and cultivating enterprise has to cope with so many difficulties and hindrances, it is worth their while to pay attention to a branch of cultivation too much overlooked by European produce-growers, and great deal too long left in the hands of natives and Chinese, heedless and reckless whether they exhaust the soil or not. The cultivation here meant is that of the pepper vine. Of all the kinds of produce grown within the tropics, hardly one can be pointed out which, as regards cheap upkeep and planting, quick growth and early and abundant yield, can be compared with pepper. It has in consequence, from time out of mind, been held in high repute throughout Sumatra, for instance, as a paying produce article. The Chinese, too, both here and in the neighbourhood, have readily turned to and taken every advantage of this branch of planting industry. Even with their primitive and unskilful way of working, pepper growing has proved highly remunerative. Undoubtedly it would turn out still more payable and more susceptible of heavier yields were Europeans to take up the cultivation and bring to bear upon it the greater scientific knowledge at their command. One indispensable condition for the success of pepper growing is good choice of ground, especially as regards the lie of the land. Flats or gently sloping land of sedimentary and plutonic formation have invariably been found most suitable for the purpose and to meet every requirement. Of any short supply of lands answering the demands of planters there need be no fear. In the neighbouring Native States, far reaching and fertile plains are available in any quantity. The consumption of pepper, not only in Europe and America, but also in China has, of late proved so steady and rapidly increasing, that the supply has utterly failed to overtake the demand. Last year, in particular, this has been marked the case to a very great extent, owing to Acheen, in former times the chief source of supply, nowadays not producing any quantities worth mentioning in market reports. Assuredly many years will pass away before that country regains its former high reputation as a pepper producer. These facts justify the conclusion that while many other branches of plantation enterprise show signs of falling off more or less, pepper growing on the contrary has before it an encouraging and bright future. The outlook is the more promising from there being no prospect of any fall for the present in the value of the article.

The only example within our knowledge of a European having set about starting a pepper plantation in this quarter, is that of Mr. Stevenson who some time ago took up land for that purpose in Klang. Planting operations there, though on a small scale, have turned out well, the outcome being encouraging enough to justify hopes of his enterprise prospering still more in years to come. Considering this satisfactory result it is surprising that other Europeans do not follow the path he has trod successfully so far. With pepper quotations steadily rising and no chance of a heavy fall for many a year, it would be indeed a pity were John Chinaman allowed to pocket most of the profit the article is sure to bring to both producers and sellers.—Strait Times.

BRITISH AND FOREIGN CONSULS' REPORTS.
SINGAPORE.

PEPPER CULTIVATION.—The unusually high pepper prices of recent years have caused a considerable extension in the cultivation of the plant in the Malay peninsula, especially by Chinese settlers. A few Europeans have also taken to pepper cultivation, but only experimentally, except on two plantations at Selangore, where the Chinese mode of cultivation is followed. Recently a company has been formed, most of the members being European residents of Singapore, to work a concession of 2,000 acres at Selangor on which pepper is to be the staple cultivation. The company are trying to raise a capital of 20,000£. The Chinese mode of pepper planting consists in planting the pepper vines from six to eight feet apart. Along with the young plants poles are placed in the ground, round which the growing plants are twined and tied. After having grown for eight or nine months, the plants are taken down from the poles and buried in the earth, all except the tops. The buried part takes root and strengthens the plant. Calcined earth (earth burnt with leaves) and rotten fish are used for manure. A well-drained, sloping hillside is best for pepper growing. As a rule the berries, which grow in bunches, are first gathered when the plants are three or four years old. The Chinese calculate the yield of a pepper vine to average from 4 to 7 lb. The cost of production cannot be ascertained, even approximately. The Chinese give widely varying estimates, and so far not one European plantation has attained maturity.
PERPPER AND ITS ADULTERANTS.

BY E. DAVIES, F. C. S., F. I. C.

(A Paper read at a Meeting of the Liverpool Chemists' Association.)

Mr. Davies said the plant which yielded the pepper of commerce was one of the Piperaceae, Piper nigrum being a climbing plant bearing its flowers in spikes. The flowers were un conspicuous, and were succeeded by green drupes which became red when ripe. They were gathered before ripening and dried, the fleshy portion becoming wrinkled and black. When white pepper was to be made the berries were soaked in water, sometimes, it was said, in cow's urine, and the outer layer rubbed off. Black pepper was manufactured by grinding the whole of the dried grain; white pepper, on the other hand, by grinding the decorticated berry. To meet the demand for an exceedingly light coloured pepper, the outer layers of the seed were sometimes ground off, and only the nearly white kernel used. As the starch of which the berry was largely composed was largest in proportion in the centre, the pepper so made was deficient in pungency and flavour, and it was a nice question whether such treatment was allowable under the Food and Drugs Act. Nothing was indeed added, but the removal of the most valuable portion of the berry was akin to skimming milk. One of the constituents of pepper was an essential oil, which could be obtained by distilling crushed pepper with water. Of this black pepper yielded 1:17 per cent., and white pepper 1:04 per cent., and it had the smell of pepper but not a strong taste. Its composition was akin to turpentine. The perfume of pepper being largely due to it, to obtain the best result the pepper should be fresh ground, or kept tightly closed. The custom of keeping pepper in castors with perforated tops was unscientific. Little mills by which the pepper could be ground when required was the best method of obtaining it pure and pungent. Other constituents were a resin soluble in caustic potash, and piperee, an alkaloid, the amount of which was very variable. In black pepper, from a recent analysis, the percentage was 7:14 to 6:62, and in white pepper 6:47. It was soluble in alcohol, and was said to be febrifugal, it being curious that its composition was identical with that of morphine. Other ingredients were starch, which in black pepper amounted to from 49 to 56 per cent., and in white pepper from 77 to 85 per cent., and cellulose, which in white pepper ranged from 12 to 14 per cent., and in black pepper from 21 to 26 per cent. Under the head of impurities, Mr. Davies dealt first with the mineral ingredients of the ash. In black pepper this was generally due to impurities adhering externally to the pepper seed, but except where sweepings had been added ought never to amount to more than 6 or 7 per cent. Of vegetable adulteration, the first to which he called attention was long pepper, made from the wild plant Chavica Roxburghii, which belonged to the same natural order as pepper, and also contained piperee, but in much smaller quantity. The essential oil yielded by it was stronger in smell, and there could be no doubt of the injury caused to pepper by the admixture of even a small quantity of this product. Rice was added to pepper for two reasons: first, to improve the colour by whitening it, and so gratifying the taste for white pepper; and secondly, to increase the bulk with cheap adulterant. Fortunately the angular starch grains of rice, being twice the diameter of pepper starch, rendered its detection easy. Spent ginger, which had also been used, was likewise easily detected for the same reason. They would be well acquainted with the history of the ingenious adulteration known as pepperette or poivrette. The discovery of it by Dr. Campbell-Brown, and the publication by him of a method for its detection, had stopped what might have been a very successful swindle. The great advantage of this adulterant was that it contained no starch granules, and the cells which composed it were almost identical in form with those of the cortical layers of pepper. Only by careful comparison of the two under ordinary polarized light could they be distinguished. The olive stones from which the adulterant was made possessed neither pungency nor flavour. Under the microscope the centre of the cells of bleached pepper was light coloured, like the centre of the cells of the ground olive stone; but when polarized light was used there was a difference in colour, the olive cells being light blush, and the pepper yellowish.—Pharmaceutical Journal.

PEPPER CULTIVATION ON ROCKS IN CEYلون.

In our notice of the effects of the recent drought, pepper was mentioned as growing luxuriantly up the faces of rocks on a place to the south of Henaragoda which we may as well indicate as Eliandhu. Wishing to extend this
cultivation, we wrote to ask Dr. Trimen as to the advisability of introducing foreign kinds. With his consent we publish his reply, as of general interest:—

"With regard to pepper, experiments in the lowcountry have shown that it is not a good plant to grow it over rocks, which in hot dry weather become much heated and shrivel up the plants. There are several varieties of black pepper in cultivation by the natives, and one is a superior sort, perhaps as good as any you could get, unless the choiceest Travancore or Malabar sorts. The conductor at Henaratgoda garden knows the peppers well, and could supply you with the right sort. We have tried the Singapore sort grown there so largely by the Chinese. It is less of a climber than any of our sorts, and though it does well here at Peradeniya, it did not succeed in the lower country. If you think of trying foreign sorts, I should recommend you to get some from the Malabar Coast.

"Cubeb is another matter. I doubt if you will succeed in obtaining seed of this from anyone, that is seed that will grow. Of course it is easy to go into the bazaar and buy it, but such seed is useless, and that is what is generally sent from Netherland India.

"As with ordinary pepper, cubeb is picked when full-grown, but before they are mature, hence even if fresh-gathered they are incapable of germination. "Ripe seed is very rare, I imagine, the plant being propagated by slips entirely, and no fruit allowed to ripen."

For the above information we and a good many of our readers will feel indebted to Dr. Trimen. At Eilandhu pepper vines are grown on trees, jak trees specially, besides those trained on rocks, and our observation during our recent visit led to conclusions the reverse of those stated by Dr. Trimen. There were more yellow leaves on the vines which had climbed up the trunks of the trees than on those which had spread over the surface of the rocks. The main reason no doubt was the existence of accumulations of deep rich soil in which the vines were rooted at the base of the rocks, this soil overshadowed by the rocks retaining moisture for a longer period than that in which the trees grew; which latter, moreover was drawn upon to feed the standard trees as well as the adherent vines. There are rocks and rocks too as well as different kinds of pepper, and we are satisfied that the red granite rocks on Eilandhu and the ridge on which it is situated are specially rich in felspar and other fertilizing constituents. The masses which remain of what was in past geologic ages an important range are often deeply striated from the decomposition and washing down of the softer parts, and we specially noticed that it was not on the pepper branches which had fixed to and spread themselves up and over the rocks, that yellow leaves were to be seen, but on branches which had struggled along the surface of the ground. It was not our opinion alone, but that of our two companions, both experienced planters, that the appearance of vegetation and fruit on the rock-borne pepper vines, at the conclusion of a severe drought, formed a full encouragement to extend the cultivation. The rocks, the shapes and arrangement of which in one part have suggested the idea of a "necropolis," look picturesque as they stand, some of them clasped by the long and numerous roots of Indian figs, but they will be still more beautiful when utilized as supporters of pepper vines with the specially luxuriant vegetation of those climbing and spreading planters.

DAMAGED PEPPER.—At the beginning of this month 2,000 bags of pepper (about 240,000 lb.) were sold in London by public auction. There is nothing wonderful, perhaps, in this, but it is a fact that the pepper, which had been recovered from a recent extensive fire at New Crane Wharf, was saturated with Thames water, which at this point in the river’s course is not precisely aqua pura, consisting as it does very largely of sewage. Consumers of pepper—possibly dealers, too—should take for their motto for some little time to come, "Caution, and plenty of it."—Druggist.

SIAM PEPPER GROWING.—The exports of pepper from Bangkok amounted to 1,436 tons (value 74,221l.) in 1885, and to 951 tons (value 56,646l.) in 1886. The profits of the growers have been increasing, and they have, moreover, been able to get rid, in a great measure, of middlemen. The chief source of the article is the province of Chantabon, on the east coast of the Gulf of Siam. The crop is necessarily a fluctuating one, as it depends upon the rainfall. Many new plantations have been started, and there will shortly be a considerable increase in the annual average output. The price is now nearly double what it was six years ago.—Chemist and Druggist.
PEPPER CULTURE.

Drumduan, Johore, May 2nd, 1888.

Dear Sir,—Seeing that some information about planting pepper has been asked for in the above publication, I take the liberty of sending you some notes on the same. I send them with the full knowledge of the Singapore Free Press, and trusting they will be of some use, I remain, yours faithfully,

J. R. WATSON.

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NOTES ON PEPPER CULTIVATION.

(By a Planter.)

Pepper.—(Nigrum). The plant affording black pepper is a perennial climbing shrub, indigenous to the forests of Travancore and Malabar, and cultivated also in Sumatra, Java, Borneo, the Malay Peninsula, Siam, the Philippines and the West Indies.

Cubeba (Piper Cubeba; Fr. Cubèbe; Ger. Cubeben; Cubeba officinalis). The fruit of the Cubebus is very widely used in the treatment of gonorrhœa. The plant, a member of the Pepper family, and a woody climber, is a native of Borneo, Java and Sumatra. The fruit is gathered when full grown, but before it has ripened; and is then dried. It has a strong aromatic and slightly acrid bitter flavour and a pleasant aromatic odour. The great similarity of the fruits of other species of Piper renders their confusion with the true drug an easy matter; they are principally P. Crassipes of Sumatra, P. Lowong of Java, P. Ritesoides, P. Caninum throughout the Malay Archipelago, and extends to Laurus Cubeba of S. China.—(From Sporn's Encyclopedia of Manufactures, etc.)

Climate.—A warm, moist climate, with an average rainfall of 80 to 100 inches annually, and evenly distributed, is most suitable for the succesful growth of pepper.

Lay of Land.—A nice gentle slope, well protected from winds and with an eastern aspect, should be chosen if possible, but as regards aspect I do not consider it an absolute necessity, as I have seen pepper growing with other aspects, and doing exceedingly well.

Soil.—Light sandy soil must be avoided, as pepper likes soil of a retentive nature. The majority of the soil in the Straits is of this description, being composed principally or disintegrated granite and ferruginous clay, with a free subsoil, and on top generally a few inches of vegetable mould. Pepper also grows well in well-drained swamps composed almost of pure vegetable matter. I have also seen it growing in magnificent volcanic soil, and the pepper, though very fine, showed clearly, both in wood and crop, that the soil was a little too free, and did not retain sufficient moisture during the hot weather.

Felling and Clearing.—This work if possible should be done on contract. The men commence by cutting down all the undergrowth and small trees and spreading these evenly over the ground. They then commence from the bottom of the clearing and work upwards, cutting all the trees half through. On the top of these they fell a "giant of the forest," and this brings down the trees immediately below and around it, and they in turn bring down the others. The men then proceed over the felled clearing, and lop off all branches, and if these latter are too large, cut them up also, all being spread out so as to cover the ground. When well dry, the clearing is fired. It is best to agree with the contractor to take the risk of the burn, as if it should turn out bad, he has to heap and burn again. Besides, if he takes the risk, he will be all the more likely do the work well.

Digging.—After the burn the clearing should be dug up entirely to the depth of one foot, all roots, twigs etc., being carefully heaped and all small logs over six feet in length kept for temporary posts; but if labour is abundant, I advise permanent posts being split at once, in which case the small (6 foot) logs can be added to the pile of the roots, etc I will, however, presume that the permanent posts cannot be split in time, so that temporary ones must be used.

Roads should be cut so as to give easy communication to every part of the estate. The gradient should not exceed one foot in twenty (i.e. a rise or fall of one foot in every twenty feet), as then the roads can eventually be turned into cart roads, making transport of manure cheap and easy. The extra outlay will eventually amply repay itself. Breadth of the road not less than 4 feet, and if it is to be eventually widened, the extra bit
required for the widening should not be planted. Having chosen the line
your road is to take, drive in a small peg (about 8" long) to the level
of the ground and beside it drive another peg (about 18" long) so as to
show where the level peg is. On the level peg place your tracer, after
having adjusted it to the proper gradient. A cooly with the sighting pole
should go on ahead about 25 feet or so, and when the gradient is found, a
small peg should be driven in to the level. Another sight should be taken
to see if all is correct, and another long peg driven in beside the level
peg. The tracer is then brought in to the second level peg, and the work
proceeds as before. When the road is cut a drain one foot deep and wide
should be cut on the inside, and the road should have a slight slope in the
direction.

Drains should be traced at the same gradient as the roads, but the
level peg is not needed. They should be a chain apart and 18 inches deep
and broad. Great care is needed in tracing drains, as if there be any
deviation in the trace, the drain is apt to burst during a heavy shower.
All drains should be led into the nearest ravine; but if that cannot be
done, or the drain be too long, outlet drains should be cut, and care should
be taken not to enter the cross drains in pairs, but alternately, and the
last few feet should have a steeper gradient, so as to save the sides of the
outlet drains.

Lining.—Pegs having been cut 18 inches long, a base line should be run
at right angles to the road, pegs being placed seven feet apart. Some plant
8' x 8', but I consider 7' x 7' the right distance. Having run the base line to
the end of the clearing, a cross line must be run at right angles to the base
line, and the pegs placed the same distance. A rope is then taken about 180'
long, and this is measured at regular intervals of 7' and is marked off by a
bit of coloured cloud. The rope should be remeasured 3 or 4 times a day,
and always after a shower. The two ends are then tied to two sticks, and a
cooly takes hold at each end. One man places the end rag on the rope at
his end, on the top of the cross line peg nearest the base line. A man at
the other end measures with a seven foot stick from and at right angles with
the base line, and puts in a peg at the end of the measure. The rope is then
pulled straight, and the pegs placed to correspond with the rags on the
rope. The subsequent work is the same. Beyond the look of the thing I see
no use in square lining, and a place looks just as well if lined as above.
Lining 7' x 7' gives 89 to the acre, 8' x 8' gives 681, a considerable
difference.

Holding.—At each peg a small whole should be cut, about a foot deep
and large enough to take the temporary post, which should be firmly fixed in
it. On the lower side of the post the soil should be dug up to a distance of
about 18 inches from it, and about 9 inches deep and in a heart shape, the
broader end being near the post. All rootlets etc., being removed, the earth
is piled up along the centre in a ridge leading from the post, leaving a hollow
on three sides. It is then ready to receive the cutting.

Nursery.—Cuttings should be bought, or if they are vines, cut two months
before they are required for planting. Each cutting should have not less than
seven root joints and two branches, but three are preferable. When
cut from the vine they should have all the branches cut off the seven joints
which are to form roots, the next two or three branches left, and all above
the top branch that is left should be cut off about half an inch above the
joint, all such cuts being clean ones. Cuttings should not be taken from
old vines, nor should old bark hardened cuttings be used, as in both cases
they grow very slowly and never make good vines. In choosing cuttings,
there is one kind which should always be rejected. It is difficult to tell it
from a good cutting. It has the roots like the other cuttings, and may
look healthy and probably does, but if carefully examined, an eye or even
two or three will be seen at the root joints, and all is round and smooth,
and the top and eyes will only keep on sending out branch shoots upwards
without roots and in clusters, and no amount of cutting down will change
its growth. Having chosen a flat site close to water for your nursery, have
it dug up to a depth of 15 to 18 inches, and all roots, etc., removed. Put
over this a covering about 5' 6" high, and thoroughly shade. Divide the
ground into beds 4 feet broad and any length, having paths between each
bed, paths being either on the same level, or even raised above the beds
slightly. Begin at one end of a bed, and cut a trench across deep enough
to take the cutting as far as the lowest branch. The top side of the trench
should have a slight slope, and against this slope the cuttings should be laid roots downwards, and about three inches from each other. The cuttings having been placed in the trench as described, against them a sloping bank of soil, about 4 inches broad, should be laid, and against this bank another layer of cuttings, which are again covered like the first row, the subsequent layers being placed the same way, so that cuttings will be 3" × 4" apart. Immediately after being planted they should be watered, and should have water regularly morning and evening and sufficient to thoroughly sink into the soil. Of good cuttings, about 5% die in the nursery. Care must be taken that the lowest fork formed by the stem and branch of the cutting should not be buried.

Burnt Earth.—It will be noticed that under the heading “Digging” I have recommended all roots, etc., to be heaped. Before the planting is taken in hand, all remaining timber not wanted lying in the clearing, should be added to these heaps, the latter should be carefully covered with soil and fired. Any green stuff added to the heap would be all the better as it would check too rapid burning. Should the earth be burnt red like a brick it is almost worthless. When the heap is burnt all charcoal and unconsumed wood must be raked or sifted out, and the heap left to cool.

Planting.—The clearing now being ready to receive the plants, directly the rains have well set in this work should begin. The cuttings should be carefully taken from the nursery and carried to the field in covered baskets. Never take too many cuttings at a time. Each man should have a mamotie and from 15 to 20 plants. He begins by opening up the ridge down the centre of the hole and from the post, to a depth of 9 inches or so and at a slope. In this the cutting is placed, roots downwards with the head (which by now should have from 2 to 3 shoots growing) well out of the ground and resting against the temporary post. The plant should be carefully covered, the soil being heaped as originally, and immediately and thoroughly shaded, too much of the latter being preferable to too little.

Application of Burnt Earth (the first).—Directly the plants have well started, about 40 lb. of burnt earth should be applied to each vine. In applying it should be put on the surface (the soil having previously been slightly loosened) and about 6 inches from the post.

Tying.—The shoots which grow from the fork, formed by the branch and stem, should be trained straight up the post. In no case would I allow more than two shoots to grow. These as they grow should be tied at every joint, but not too tight, and the material used for tying should be flat. Some allow all the branches to remain on until the vine is “let down.” I advise that, with the exception of 4 or 5 branches at the top of each vine, the others should be cut off during the tying process. Care should be taken that, if possible, the three upper branches should have no barren joint between them. My reason for cutting off the branches during growth is that the wound has time to heal, and no risk is run of the plant rotting at one of the freshly cut joints when “let down.” In tying, never tie any of the branches, but merely the stem, and below each joint.

Permanent Posts.—Splitting of permanent posts should commence directly after planting, as this is the slowest, hardest, and most expensive work of all. The posts should not exceed 13 feet in length, and should not be less than 6 inches in diameter. The hardest and best timbers should only be used. At the end will be found a list of timbers suitable for this purpose. For the work, each man will require an axe, a wedge-shaped axe, measuring about 12" × 2" × 2½", and two iron wedges measuring about 18" × 3" × 3", and a chisel 24" by 2'. Unless used immediately, spit posts should be laid flat on a raised scaffolding until required. This will keep white ants off. One good man will cut up and split, on an average, ten posts a day.

Letting Down.—When the vines have reached the top of the temporary post, they should be taken off and buried, otherwise called “let down.” This requires great care, and is done as follows:—The man begins first by removing with his mamotie all sand, stones and rubbish within a radius of two feet of the post. He then with a blunt pointed stick digs back on both sides of the part of vine which is in the ground (taking care not to break any of the large lateral roots) until it comes to the end of the original cutting, from which he will find from one to half-a-dozen of what may be called taproots growing. On reaching these latter he stops digging, but releases all the other lateral roots by digging along them until he reaches the end. However, should any of the lateral roots go beyond the radius of two feet I would not follow them to the end. The object in following the lateral roots is to find out in what direction they run, as otherwise they may be cut in two in digging the hole for the vine or permanent post. On no account loosen the tap root or roots. Having
laid bare the roots, the vine is next detached from the temporary post and laid flat on the ground, out of harm's way. The post is then pulled out of the ground, and in its place a hole is dug large enough to take a permanent post, and 30 inches deep. The permanent post is then firmly fixed in the hole. I have not tried it myself and do not know if others have; but I do not think it would hurt the vine if the lower end of the post were to be tarred. Having fixed the post the ground should be dug up and the soil pulverised within a circular area of two feet radius from the post, and to the depth of one foot, leaving a space of 4 to 6 inches directly round the post untouched. All bits of wood and rubbish must be carefully removed. The hole, or more properly trench, thus cut must be at the same level as the end of the original cutting from which the tap root starts, and this level must be carried all round. The vine is then laid, roots down, in a circle in the hole, and about 15 inches from the post, and the end where the branches are, must be tied to the post, care being taken that the fork of the lowest branch be not buried. Should there be a double vine, the odd one is carried away from the trench, and the head fixed on to a post placed slantingly in the ground, a stick being placed to mark where the two vines join. The vine or vines are now covered in, the soil being gently pressed down with the hands, and the space levelled. A hollow should not be left as water will collect in it, stagnate and rot the vine. Should any portion of the vine be damaged in letting down, that portion should not be covered, but left exposed until hardened, when it may be covered like the other portion. The portion of the vine above ground should be tied below every joint. The odd vine when well started can be cut off from the main stem and used as a supply which can be let down on a permanent post direct, thus saving at least six months. This latter I advise being done only in wet weather, and the supply thus put down must at once be thoroughly shaded, the shade not to be removed until the vine has got a good start, and even then the removal being only gradually effected. The other work can be done in almost any weather.

Application of Burnt Earth (the second.)—While the work of letting down is proceeding, men should be put on to make burnt earth. I advise it being made in jungle this time, as from the mould being added it is richer. As each vine is let down, 5 lbs. of burnt earth should be applied on the surface, and all round the vine, and about six inches away from the post, the soil being first gently loosened.

Pruning. Topping, Tying.—The vine having been let down, it should be allowed to grow about three feet up the post having been tied at each joint as it ascended. It should then be cut down to above the third or fourth branch, thus leaving three or four forks, and the cuttings either sold, should there be a sale for them, or put into the nursery for supplies or extension of cultivation. If cuttings are not wanted for supplies, sale or extension of cultivation, the vine can be topped above the third or fourth branch directly it is let down. From these forks either two, three or four shoots will be thrown out; in some cases, however, there may be only one. In the latter case, let the shoot grow to a foot or so, and again cut it down, when it is certain to throw out two or three other shoots. These shoots should be trained up the post on three sides, or if there be only two shoots, on two sides equidistant from each other. The material used for tying should be passed over the three shoots, provided of course they are all equal in growth and should be tied below joints. Each shoot, as it grows, will throw out branches alternately. Should however any of the shoots fail to do so, it should be immediately topped below the barren joint, provided cuttings are not required. In the latter case, allow the vine to grow to about two feet, and then top it below the barren joint. If cuttings are required, allow the vine to grow up to about 5 ft. feet, then cut it down to three feet, but if not wanted it can be topped when it reaches the height of three feet. The object in stopping the growth is to force the sap back, to allow the vine to spread out, and to strengthen it generally, as otherwise it will grow up long and scraggy. Attention to this operation will make a difference of at least 50 per cent in the crop. During its growth the vine will be constantly throwing out blossoms. which should be nipped off. On a ten feet post, the vine should be topped three times, the third time as it reaches the top, when the shoots composing the vine should be tied together and topped. As the vine is topped every three feet or so, that portion should be tied with some strong material, small unsplit rattan being used in the Straits. All subsequent handling consists in stopping the upward growth of the vine and keeping all suckers and shoots down. The vine should reach the top of the post in between 3 and 4 years,
according to soil and cultivation, I would not allow the vine to bear until it has reached the top of the post. The Chinese, however, begin to pick when the vine is from two to two and a half years old, but they allow it to bear gradually from the bottom upwards. A vine is fully matured when 5 years old.

Manuring and Manures. Manures, after letting down to the ground, should be manured at least once a year. From the time of coming into bearing, always twice a year. Time of manuring—in dry or showery weather. The Chinese use only burnt earth and fish manure, but chiefly the former; and there is no doubt that it has a wonderful effect. Besides the abovementioned manures, liquid cattle manure, applied during dry weather, has also a wonderful effect. Before using bulky manures they should be burnt with the addition of earth mould, the same way as burnt earth; otherwise they will attract whiteants and root-destroying insects of all sorts. I have seen castor-cake applied both to the surface and below the soil. The result in both cases was the death of the vine. In a dry climate or in dry weather, I strongly recommend thatching. Manures should be applied on the surface, but may be lightly covered with soil. Forking should not be done as the risk of injury to the roots is too great. As far as I am aware bones, poonac, lime (pure) or guano have never been tried.

_Crop, and Picking and Curing._—There are two crops a year, December—January, and July—August. When the bunches have turned a dark green colour, they are ready to be picked. This is done by nipping off the bunch whole. It is then dried (by the Chinese, mats placed about 6 feet above the gambier furnace) either by fire heat or sun heat, is then separated by rubbing on a rough surface such as a mat and is subsequently put through a fanner, packed in bags and is then ready for dispatch. This is Black Pepper. White Pepper is good by fermenting or, more properly speaking, soaking for several days the berries that have turned or are on the point of turning red. It is then stomped out with the feet to remove the outer skin, washed and dried in the sun. I have no doubt that with a drier, separator and fanner, better work and finer pepper than is obtained at present can be readily turned out. The following may be considered a safe estimate of crop per vine; for the 3rd year, 1 catty; 4th year, 1½ catty; 5th year, 3 to 3½ cattles; a catty being 1 pound.

_Buildings._—Should cattle-sheds be built, I strongly advise that the floor should be rendered as water-tight as possible so as to lose no urine. Near all collyie lines, too, there should be a covered-in pit, and tubs should be placed along the verandahs to receive waste rice and rice water, etc., as by these means an enormous amount of valuable manure can be collected. Should cattle be kept, I strongly advise a few pigs being kept also. For plans of buildings suitable for an estate I can recommend The Oeylon Planters' Association's Prize Essay on Buildings, by Messrs. Owen and Balladrie.

_Enemies of the Pepper Vine._—The Pepper Vine, like most other economic plants, is subject to disease and attacks from insects. Its chief enemies are white-ants, black-bug, white-bug, borer, mole-cricket, cinchona-caterpillar and a certain insect belonging, I think, to the Hemiptera.

_Cures and Preventive Measures._—A strong solution of Tuba root is quite sufficient to keep away whiteants. Tuba root is used by the Malays and Chinese to poison fish in rivers, and is common all over the Straits. Black and white bugs can be got rid of by applying a solution of Tuba root and the juice of common damaged tobacco. In mild cases, ashes, lime or sulphur and lime, applied early in the morning, will be found sufficient. Borer begins always by attacking the joints of the branches and its presence is known by the light yellowish colour of the bark. I know of no prevention, and provided it has not gone far, it can be easily caught. It always works round the joints, and when it has completed the circle, it commences to bore down the centre of the branch and sometimes but very seldom, the stem. The mole-cricket does for the roots, but does the least damage of all. If it has gone too far to dig out, I can only recommend the hole being plugged up as far as possible with clay. The green cinchona-caterpillar attacks the leaves only, but of these it is capable of devouring an enormous quantity. The only way to get rid of it is to send a cooly round to collect and destroy them. The last mentioned insect (Hemiptera) only appears in dry weather and sucks the juice from the young shoots and branches, generally killing the latter. It is to be found at the junction of the branch and stem. I fancy a weak solution of kerosine and water would clear them off, say a wine glass of oil to a bucket of water.

_Timbers._—In the Straits I would only recommend the following timbers to be used for permanent posts—

- Tampennis (Slatia sidereozylon). Red, very hard, close-grained.
- Krangce. (Ditum indicum). Dark red, hard, close-grained.
Panaga. *Adinandra Dumosa.* Bright red, hard, cross-grained.  
Tumboosoo. (*Fagraea Peregrina*). Very hard, close grained, long fibre.  
Billian. Hard, heavy, close grained (called Billian Wangy).  
Ballow. Colour dull gray.  
Kulim. Very like Ballow.  
Rassak. (*Vatica species*). Red is the best.  
Darroo. (*Apodytes species*). White, close grained, agreeable smell.  

- Tambaga; Damar Putib; Bawang, light yellow and smells like an onion.  
Kayu Kuning, I think, is another name for Kulim. Rungas (*Gluta velutinna*), a handsome wood used for furniture making, dark red with black veins. Lasts well. The above timber list is partly taken from the *Tropical Agriculturist.*

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**ESTIMATE OF EXPENDITURE.**

To these rough notes I append an estimate for opening and bringing into bearing 10 acres of Pepper. Rate of pay 30 cts. of a $ per cooly.

<table>
<thead>
<tr>
<th>Description</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Felling, Clearing and Burning (Contractor taking risk)</td>
<td>70</td>
</tr>
<tr>
<td>Digging one foot deep, heaping all roots for burnt earth and keeping</td>
<td></td>
</tr>
<tr>
<td>trees for posts</td>
<td>300</td>
</tr>
<tr>
<td>Lining, Cutting pegs, etc.</td>
<td></td>
</tr>
<tr>
<td>Roads 4 feet</td>
<td>20</td>
</tr>
<tr>
<td>Drains 18 inches</td>
<td>20</td>
</tr>
<tr>
<td>Temporary posts with carriage</td>
<td>200</td>
</tr>
<tr>
<td>Holing, fixing temporary posts</td>
<td>10</td>
</tr>
<tr>
<td>Nursery plants $120; cost of nursery and watering $70</td>
<td>190</td>
</tr>
<tr>
<td>Planting and Shading</td>
<td>25</td>
</tr>
<tr>
<td>Burnt earth</td>
<td>150</td>
</tr>
<tr>
<td>Tools, contingencies</td>
<td></td>
</tr>
<tr>
<td>Weeding for six months at 40 cts. per acre</td>
<td>24</td>
</tr>
<tr>
<td>Application ½ pic. burnt earth</td>
<td>30</td>
</tr>
<tr>
<td>Tying, one man, 1,500 vines</td>
<td>54</td>
</tr>
<tr>
<td>Nursery—plants $17. Cooly $27; vacancies 15%</td>
<td>44</td>
</tr>
<tr>
<td>Supplying and Shading</td>
<td>10</td>
</tr>
<tr>
<td>Upkeep Roads and Drains</td>
<td>30</td>
</tr>
<tr>
<td>Contingencies</td>
<td>50</td>
</tr>
<tr>
<td>Expenditure (Total) Pepper 6 months old</td>
<td>1,333</td>
</tr>
<tr>
<td>Permanent posts 889; says 890 to the acre</td>
<td>360</td>
</tr>
<tr>
<td>Letting down</td>
<td>340</td>
</tr>
<tr>
<td>Transport of posts (this depends on distance)</td>
<td>400</td>
</tr>
<tr>
<td>and application of burnt earth 1 Picul. Burning and applying</td>
<td>170</td>
</tr>
<tr>
<td>Supplying and Nursery</td>
<td>57</td>
</tr>
<tr>
<td>Upkeep Roads and Drains</td>
<td>54</td>
</tr>
<tr>
<td>One man tying 1,500 vines for 6 months $54. One man tying 500</td>
<td></td>
</tr>
<tr>
<td>vines for 6 months $162</td>
<td>216</td>
</tr>
<tr>
<td>Weeding at 45c. per acre</td>
<td>54</td>
</tr>
<tr>
<td>Contingencies, purchase of ladders, etc.</td>
<td>100</td>
</tr>
<tr>
<td>Total expenditure Pepper 18 months old</td>
<td>3,074</td>
</tr>
<tr>
<td>Tying, one man, 500 vines</td>
<td>324</td>
</tr>
<tr>
<td>3rd application of burnt earth, burning and applying</td>
<td>340</td>
</tr>
<tr>
<td>Nursery</td>
<td>54</td>
</tr>
<tr>
<td>Supplying, shading</td>
<td>15</td>
</tr>
<tr>
<td>Weeding at 50c. per acre</td>
<td>60</td>
</tr>
<tr>
<td>Building a small store</td>
<td>300</td>
</tr>
<tr>
<td>Purchase of small dryer, fanner</td>
<td>120</td>
</tr>
<tr>
<td>Curing and transport of 45 Picles Pepper</td>
<td>45</td>
</tr>
<tr>
<td>Contingencies, Tools, Sacking</td>
<td>150</td>
</tr>
<tr>
<td>Total for Pepper 2½ years old</td>
<td>4,482</td>
</tr>
<tr>
<td>“ “ (one year) 3½</td>
<td>1,000</td>
</tr>
<tr>
<td>“ “ (” ”) 4½</td>
<td>1,200</td>
</tr>
<tr>
<td>Total</td>
<td>$6,682</td>
</tr>
</tbody>
</table>
PEPPER.

CROP:

Sale of 50,000 rooted cuttings in 2 years, $15 per 1,000 ... 750
Sale of 45 Piculs Pepper off 24 years old vines ... 675
Sale of 134 Piculs Pepper off 32 years old vines at 14 catt. ... 2,010
Sale of 267 Piculs Pepper off 45 years old vines at 3 catt. ... 4,005
Profit off 10 acres Pepper 49 years old ... 758

I have put down $15 per picul as value of Pepper. I have further made no allowance or salary, bungalows, lines, etc., nor for purchase of land and interest, as I fancy, beyond my own district, the estimate of expenditure may not be of any great use, owing to cost of labour.

PLANTER.

PEPPER IN THE STRAITS SETTLEMENTS.

REPORT OF CONSUL A. C. STUDER AT SINGAPORE.

Black pepper takes the lead in exports, with a vastly increased cultivation on the peninsula of Malacca, in Sumatra, Siam, Borneo, and in localities where formerly little or no pepper was planted. It is now about 85 per cent higher, $20.50 per picul, than it was during the first years of my residence here, and not so long ago it was up to $24. For the benefit of the masses of our people who consume more or less of this spice, I would say that, as I understand it, there is in reality no need for such high prices. With due allowance to the plantation laborers for the depreciation of their wages, paid to them in Japanese silver dollars (which allowance they do not receive, but their Chinese "towkay" pockets, when selling his crop), I call this spice, in view of its vastly increased cultivation, (like three to four to one in 1871 to 1875), very dear (not losing sight of the immense stock held by speculators) at $14 silver per picul (133 1-3 pounds). This wild speculation in pepper originated essentially in Europe. Pepper, unlike many articles of colonial produce, is one that will keep for a very long time without any discoverable deterioration, if not handled much. The United States' pro rata of population as compared with other countries in Europe, consumes more spices of pepper, nutmegs and mace especially, than any of them, and as to pepper, large quantities of it are used in curing meats on an extensive scale in meat-packing establishments and on the farms in our Western States in addition to household consumption. This consumption of spices, any kind, pro rata of population by any country, is pretty well known here in the country of production among exporters after long experience, and as most of the latter have branch firms in London chiefly, it is of course well known there as well.

I feel pretty certain that if our Consuls in England and the Continent of Europe were forbidden to grant their certificates to invoices of this spice (and any other Asiatic produce, for that matter), it would come down from its high horse pretty soon—reduce wild speculation; actual consumption more than speculation would fix the price of it—a reasonable one.

Singapore and Penang are the principal pepper exporting places in the East (Padang, in Sumatra, and Ports in Java export some), and only to satisfy speculation in Europe. I cannot see why not all of it should be exported directly to the United States instead of in this roundabout way by way of ports in England and Europe (keep the profits at home). This would give at the same time more employment to American vessels than they now have at wretched figures (with much loss of time), in view of the immense seafaring competition, steam and sail.

To give a fair idea of the importance of the pepper trade here, in the country of production, and in other countries in 1884 and 1885, I will quote the exports, first from the records of this Consulate to the United States, and next from the colonial trade statistics to countries in Europe, taking Singapore first, and giving only the value not the quantity. (The average value per picul for the two years was about $18, Mexican.)

To the United States from Singapore, as per declared exports in this Consulate in 1884, $554,099; in 1885 $195,788 as per trade statistics.

Countries.

<table>
<thead>
<tr>
<th>Country</th>
<th>1884</th>
<th>1885</th>
</tr>
</thead>
<tbody>
<tr>
<td>Austria</td>
<td>$159,147</td>
<td>$224,918</td>
</tr>
<tr>
<td>France</td>
<td>185,203</td>
<td>149,247</td>
</tr>
<tr>
<td>Germany</td>
<td>168,203</td>
<td>249,218</td>
</tr>
<tr>
<td>Italy</td>
<td>13,127</td>
<td>274,753</td>
</tr>
<tr>
<td>Russia</td>
<td>38,610</td>
<td>55,408</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>1,391,566</td>
<td>1,598,358</td>
</tr>
</tbody>
</table>
As to Penang and declared exports thence to the United States, I have not at hand the figures from the Consular Agency for 1884 and 1885, and only for the years ending September 30, 1885 and 1886 (sent with my first part of this report), and must, therefore, quote from the colonial statistics, which, in this instance, I believe to be approximately correct, viz:—

From Penang.

<table>
<thead>
<tr>
<th>Country</th>
<th>1884</th>
<th>1885</th>
</tr>
</thead>
<tbody>
<tr>
<td>United States</td>
<td>$34,895</td>
<td>$59,393</td>
</tr>
<tr>
<td>Austria</td>
<td></td>
<td>265</td>
</tr>
<tr>
<td>France</td>
<td>19,984</td>
<td>33,616</td>
</tr>
<tr>
<td>Germany</td>
<td>66,300</td>
<td>75,878</td>
</tr>
<tr>
<td>Italy</td>
<td>18,786</td>
<td>8,660</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>1,209,199</td>
<td>1,612,352</td>
</tr>
</tbody>
</table>

Holland does not appear in the pepper export statistics, because, no doubt, this spice was exported from her ports in Netherlands India to Holland direct, and I have no means of knowing how much. But the figures above shown speak for themselves. I think that Italy received less pepper in 1884 than she consumed, and much more in 1885, and that some of the latter was probably shipped via Genoa to countries north of Italy. I think that Russia is credited with less than she consumed, and received supplies from British, Dutch, or Hanseatic German ports (as also the Scandinavian States, which are not mentioned at all in the statistics.) Reviewing the exports, as above, to the United States and to the United Kingdom, we find that the former, with a population of about 60,000,000 received only $844,085,61 worth, while the United Kingdom, with about five-eighths to three-fourths of the former's population, received, $5,811,475 worth for the same period, i. e., 1884 and 1885. Now, I don't believe that one-half of that amount was consumed in the United Kingdom; but supposing it was, the question remains, "what became of the other half?" Granted that some of the latter was re-exported to different parts of Europe, I firmly believe that the largest portion of it was sold and shipped to the United States, and this belief I base upon what I heard here from reliable sources. For the rest, our own trade statistics of imports from the United Kingdom and other ports of Europe will give decisive information in the premises.

As to white pepper, though its export is much smaller (about one-fourth of the black), because much dearer, the same remarks hold good, and perhaps, with regard to shipments from English ports to our own, were more so. I will only mention the exports of it from this colony in 1884 and 1885 to the United States and the United Kingdom, leaving out countries in Europe and quoting from the same authorities as in black pepper, viz:—

From Singapore to

<table>
<thead>
<tr>
<th>Country</th>
<th>1884</th>
<th>1885</th>
</tr>
</thead>
<tbody>
<tr>
<td>United States</td>
<td>$18,758</td>
<td>$6,666</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>496,608</td>
<td>492,670</td>
</tr>
</tbody>
</table>

From Penang to

<table>
<thead>
<tr>
<th>Country</th>
<th>1884</th>
<th>1885</th>
</tr>
</thead>
<tbody>
<tr>
<td>United States</td>
<td>$3,100</td>
<td>$17,200</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>253,594</td>
<td>345,608</td>
</tr>
</tbody>
</table>

I would mention here that the trade statistics of Singapore as to this spice do not agree by great odds with those of this consulate, based upon declared exports. This, I hardly think, is the fault of the statistician, but of the parties engaged in the said exports by not reporting in accordance with actual facts (deception in trade or strategy arising from trade jealousy among themselves).

My statistics as above       $18,758  $6,666
Port statistics             17,865   13,644
Less                        893     65
Over                        —       6,974

As a merchant exports here on ship to his agent in London, and instructs him to try the markets of England and the United States, to sell in that which pays the most, such discrepancies are easily counted for, but could not occur if any counsel there refused his certificate. At the same time this tends to mislead other exporters here as to actual shipments to America and England. The exports, as actually or not actually intended (a port of destination must be shown, but not under oath or solemn declaration), are reported to the port export office, and by the latter to the Chamber of Commerce, for general information in its market report. The Consul has no remedy to prevent such deception, as he can only certify to the invoices presented to him. There his jurisdiction in the premises practically ends. It is only after the publication
of the port statistics by the local government that he can discover and expose such deception or "differences."

There are not deceptions, in his commercial report. I have often had inquiries, "Did such a firm ship such goods by such a steamer via London to America?" but I never yet answered them in a single instance, and instead told them to find out at the export office or chamber of commerce. The trade statistics nowhere agree with my own statistics—based upon duly declared exports in this consulate—and no one, before their official publication, ever came to ask me whether they agreed.

As I have been reporting on white pepper, I would briefly say that it is produced from fully ripe berries (light crimson in color and in size about the same as an average currant), from the same vine that yields black pepper, the latter being plucked green, before maturity.—Oil, Paint and Drug Reporter.

PEPPER FOR THE NATIVES OF CEYLON.

I want to attempt to show the great advantage resulting from the cultivation of this important commodity of commerce to the agricultural community in general, and to the rice cultivator in particular, who, from the precarious nature of the cultivation owing to the interference of the middleman, may be said to be in a state of pauperism. I might here state that pepper is no new commodity to the Sinhalese cultivator. Ceylon, in former times, was one of the greatest emporiums of pepper trade. Owing to the strict monopoly established by the Dutch, and the consequent poor return to the cultivator, other countries that had better advantages took the lead, and Ceylon, at present, instead of exporting, imports a large quantity for home consumption. On referring to the Ceylon Directory, I find that during the Dutch period, "pepper grown in Ceylon was sold at higher price than that produced elsewhere. In 1739 the Dutch exported 405,000 lb of pepper, the greater portion from the Kandyen provinces, where the harvest began in December and ended in April......In 1813, the export of pepper was 195 and odd cantiés valued at about 12,000 francs." Since then according to the Directory, there was very little export of pepper, although, here and there, pepper is still grown for home-consumption to a very limited extent. Even in the hey-days of pepper trade in Ceylon, we see Bertolaccì blaming the indolence of the natives for not greatly extending the cultivation of the vine, which, according to him, will grow on almost any soil, and has everywhere deal forest trees to spread over it, forgetting that his own people contributed a great to the indolent habits of the cultivator.—MALABARICUS.—Local "Independent."

PEPPER CULTIVATION.

On the foregoing pages 55 to 61, is published an excellent article on the cultivation of pepper. But, there are some practical difficulties in adopting the system advocated by "A Planter," The first and foremost of them being the selection of posts for the support of the vine. Permanent posts of timber as advocated by "A Planter" will not serve in Ceylon where the attacks of white ants are too notorious to be dealt with in this article. Besides, the expenses of "splitting of permanent posts" will be something enormous, I give below the system of cultivation adopted in Malabar which is pre-eminently the pepper-producing country in the world.

There are two systems prevalent in Malabar, the one, by the ordinary cultivator who owns a small area of ground, and the other, by "gentlemen farmers" who own extensive grounds, and who can command a capital.

To begin with the first:—a red gravelly soil capable of retaining moisture, with a goodly number of mango and jak trees growing on it, is preferred. The mango tree is reckoned the best for the purpose. A mango tree ought to be at least twenty years old before any pepper vines are put on it; for it is believed that a younger tree will produce less fruit when there is vine on it than it would otherwise do. At the commencement of the rainy season, which is the South-West monsoon in Malabar, the soil round the tree is dug, and a small bank, at a cubit distance from the root is formed to confine water. Then from 8 to 12 shoots of the vine, according to the size of the tree, are laid down within the bank with three inches of the vine slanting up against the tree. The shoots are about a cubit long. They are then covered with fine mould and earth. As the vines grow they must be tied up to the tree. In the hot season they require watering. At the commencement of the next rainy season, leaves, ashes,
dung, &c., must be put near their roots and fresh earth thrown up. The pepper vine begins to bear at five years of age. In four years more it is in full bearing. An ordinary tree will produce 20 lb. of pepper, and a good one 30 lb.

The second method, i.e., of opening large plantations, is as follows:—A hill-side with an eastern aspect and gentle slope is selected. The land is cleared of its jungle about April, and burnt. The ground is then hoed, and steep slopes are converted into terraces which is very essential to keep the surface soil from being washed off by rain. After a few freshes, just before the regular monsoon begins, hill-rice, dholl, and cotton are sown broadcast. About the middle of June, set in plantain trees at a distance of 8 feet apart, and plant Erythrina branches at a distance of about 15 ft. apart, or, say at the rate of 200 trees to an acre. Sometimes 300 trees are also planted, but it is believed that pepper vines would not bear well when planted close together. The Erythrina branches should be from 6 to 12 ft. long. During summer these trees must be watered, if they have not taken sufficient hold in the soil to take care of themselves. When the monsoon has fully set in, preparations should commence for regular planting of the vine. There are two ways adopted by the planters. Some people take 6 or 7 cuttings, each a cubit in length, and put them in a basket with their upper end sloping towards the tree. The basket is then filled with earth, and buried in the ground at the foot of the tree. Between the middle of October and the beginning of November, round the basket is dug; and, as a manure, dry leaves, grass, and cow-dung are put round the vines. Some people plant the cuttings without a basket. It has been found by experience that the "basket-system" prevents many accidents to which the young shoots are liable. Between October and November the vines must be manured, and tied up to the tree until they are six feet high, after which they are able to support themselves. After the third year the plantations are dug up; and twice a year, at the beginning of the S.-W. and N.-E. monsoon the whole plantations must be hoed, and dried leaves and grasses put as manure. In four or five years the vines begin to bear pepper. In the sixth year they yield a full crop, and continue to do so for 16 or 20 years, when the Erythrina dies, and must be replaced by a new branch and new vines. The pepper vine is liable to be killed by droughts, especially when the N.-E. monsoon fails. Attacks by grubs and insects are seldom heard of in Malabar; between May and June the vines flower, and by January the fruit is fit for gathering. There is only one harvest in Malabar. The men who collect the crop go up by ladders, and with their fingers twist off the amenta. The fruit is collected in baskets, and after placing them on the ground, rubbed with the feet to separate the berries. Pepper is dried on mats, or, on a piece of ground purposely made smooth by washing with cow-dung and clay. For three days they are spread out to the sun, but every night are gathered and taken into the house. It is believed that the drying on mats is by far the best manner. A man can daily pick, according to the abundance of the crops from 20 to 30 lb. The rubbing and drying is generally performed by women and children. It is estimated that the expenses of harvest curing, &c., cannot possibly exceed one-twelth of the value of pepper. The vines, on an Erythrina tree, 6 to 8 years old, will yield from 5 to 10 lb. of pepper. Attempts have been made, with complete success, to grow vines against every tree found growing in forests where a moist soil is met with.—Malabaricus,—Local "Independent."

Pepper Adulteration.—A. Hilger, in the Archiv der Pharmacie, states that adulteration of ground pepper by means of broken pepper has lately been very frequent. A sample of broken pepper was taken, and on careful inspection was found to contain an admixture of broken pericarps of chillies. The microscope proved that pressed seeds of the oil palm (Elaeis quinensis, Jacq.) were also present. Complete analysis showed the so-called "broken pepper" to consist of:—

<table>
<thead>
<tr>
<th>Component</th>
<th>Per Cent.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shells of pepper</td>
<td>50</td>
</tr>
<tr>
<td>Flour of oil-palm seeds</td>
<td>30</td>
</tr>
<tr>
<td>Dust of pepper</td>
<td>15</td>
</tr>
<tr>
<td>Mineral substances</td>
<td>4</td>
</tr>
<tr>
<td>Pericarps of chillies</td>
<td>1</td>
</tr>
</tbody>
</table>

—Chemist and Druggist.
PEPPER.

THE PROMOTION OF NATIVE INDUSTRIES IN CEYLON:

PEPPER.

Take a very important industry—that of PEPPER—which affects this same district, but still more the adjacent division of Kegalla—what has been done to promote and extend Pepper growing in Kegalla? How much does the district export? Why the export for the whole island last year was only 14 cwt. against 136,000 cwt. from the Malabar coast opposite; and yet pepper-growing was par excellence a native and a Sinhalese industry from time immemorial, and the very centre of cultivation from a period dating 300 years back has been the country between Hanwell, Kegalla and Ratnapura. Pepper was esteemed by the Dutch as perhaps the most suitable and most profitable of Ceylon products. In 1740 Governor Van Imhoff considered pepper better of worthiness than coffee or cardamoms, the export being then 465,000 lb. per annum, and Bertolacci at the beginning of the present century, declared that native indolence alone was to blame for the cultivation not being greatly extended, as "the pepper vine will grow on almost any soil and has everywhere forest trees to grow over." This opinion as to soil may not be quite reliable, but there can be no doubt that if the servants of Government had interested themselves with their headman and people to urge the cultivation of pepper in the middle and lower Kandy districts, this specially suitable industry would have brought more wealth to the Sinhalese than all the extensions of paddy-growing of the last half century. There is no single irrigation vote in the list for 1859, we feel sure, which would benefit so many people as the same amount judiciously distributed in the Kandy districts as "bounties" on the cultivation of certain areas with the pepper vine, in order to revive this important industry.

PEPPER-VINE GROWING IN CEYLON.

Of course, now that European planters are giving their attention to the matter, not in one district, but in several districts from sea-level to an altitude of 2,000 or more feet, all obstacles in connection with an extended cultivation of pepper will be certainly overcome. In addition to Mr. Martin at Ambalangoda, Mr. Blackett in Dolosbage has a good deal of pepper successfully fruiting, and he will be sending his first sample hundredweight away this year. It must not be forgotten that the Tropical Botanic Garden (Henaratgoda) has for some time been offering cuttings of good kinds at reasonable rates.

Remembering what a lively scene of pepper culture the Kegalla and adjoining districts must have been a hundred years and even two centuries ago, it is difficult to understand how the industry was ever allowed to collapse. "Wild pepper" we are told is growing everywhere; but if we are to believe Dutch official reports, undoubtedly Ceylon produced first-class pepper at one time. A correspondent who takes a different view says:—

"Pepper has failed so far, though tried at Udugama, under the best auspices. I think you are mistaken as to the Dutch export; you must have overlooked the fact stated in a paper published in your 'Literary Supplement' that most of what went from Ceylon came from India, besides did not the word 'peppers' include much besides what we know as pepper?"

But here is what we take to be a reliable statement as embodied in the Agricultural Review in our Handbook, and we do not see how the authorities quoted can be gainsaid:—

"In 1650, it was reported that 'Pepper grown in Ceylon was sold at a higher price than that produced elsewhere.' Governor van Imhoff, in 1740, considered pepper 'a far more important article' than cardamoms, and he added that 'unlike coffee (!) it is not probable that the demand will be lessened by a change of opinion as to its salubrity, or by its being overgrown in other places, as all grounds are not able to produce it.' In 1739, the Dutch exported 465,000 lb. of pepper, the greater portion from the Kandy provinces, where the harvest began in December and ended in April. Bertolacci blames the indolence of the natives for not greatly extending the cultivation of the pepper vine, which will grow on almost any soil, and has everywhere forest-trees to spread over. The fruit itself, when gathered, requires no further care than having it well dried. In 1813, the export of pepper was 1906 candies, valued at about £12,000, and the average for seven years was then 200 candies, or about 1,000 cwt. The site of the forage Dutch pepper gardens at Madampe has long been under coconuts. Bennett, in 1843 declared that the District of Kalutara alone, ought to produce more pepper than the whole of the island did."
We trust Mr. Price will look up the old Kandyans of his district and get them to resume the cultivation: we suspect that so long as it was a case of Rajakariya—so many thousands of lb. of pepper to be delivered annually "willy-nilly"—the people looked after their vines and the industry flourished; but when they had no longer a forced tax in pepper to pay, they allowed the culture to collapse.

PEPPER CULTIVATION IN CEYLON: SUCCESS OF THE MALABAR VINES.

We tender our best thanks to Mr. Martin for his interesting contribution to the history of what we feel confident will yet be an important enterprise in Ceylon. The experience which Mr. Martin records is common to all industrial pioneers. Pepper with jak and other trees, in addition to rocks on which the vines are supported, was all that remained to the writer hereof, cacao, Liberian coffee, cassava and other products had to be superseded by tea (now a very satisfactory success) on a lowcountry estate near Henaragoda. Our pepper vines there look well and are growing and bearing satisfactorily; and thus encouraged we have been intending for the best kinds. Recently we heard that cuttings prepared to be despatched from Singapore had perished, and the same fate befell several pounds of seed put into a nursery on the estate. The seed is supposed to have been rotted by over-abundant monsoon rains, a cause which will not operate again for several months. Next month or early in March we hope to receive half-a-dozen pounds of seed of best Malabar vines from Messrs. Hinde & Co of Calcutt, and we trust a fair proportion at least may be successful. Was seed tried on Eden estate? and, if not, why not? We suppose cuttings are more certain to grow, and they, of course, yield quicker returns. Cubets it seems very difficult, if not impossible, to obtain. If they once get established in Ceylon, there can be little doubt the price will speedily be reduced as was the case with cinchona bark. For the ordinary spice, black pepper and white (the latter being merely the former bleached in preparation,) the demand in the markets of the world is large and is likely to increase to the level of production even if peace should be restored to Achin. The consumption of pepper in the United States is very large. We are glad to see Mr. Martin mentioning the jak in the forefront of trees good as supports for pepper vines. This tree, the value of which European planters do not properly appreciate, or so many would not have been in recent years destroyed, is the support for native pepper in Ceylon, and both supporting tree and climbing vine seem to thrive simultaneously. Should the vines wear out and there should be no desire to renew them, the tree is valuable as a fruit bearer and ultimately as one of the very best timber which can be used for furniture, or for house or boat building. We do not see how the system described by Mr. Watson, as pursued in the Straits of Malacca, of putting down large numbers of timber posts to support the vines, can pay. In our own case, we find that the pepper vines do well on the sides and over the tops of rocks and boulders, and thus grown amongst tea, there is no necessity for the presence amidst the tea of supporting trees to the detriment of the staple plant. Our correspondent "W. B. L." has gone further and dispenses with all support, growing his vines "gooseberry bush fashion." He is to report progress, and we see no reason why pepper vines so grown should not flourish and yield fruit as well as do grape vines. But whatever mode of culture is adopted it is important that the best variety of vine should be available for culture, and Mr. Martin's letter shows that, after much disappointment and expense, this is now the case on Eden estate, Ambalangaoda.

PEPPER-GROWING IN THE AMBALANGODA DISTRICT.

To the Editor of the "Ceylon Observer."

Eden Estate, Ambalangaoda, Jan. 10th, 1889.

DEAR SIR,—I send you herewith a few cuttings from the pepper vines growing on this estate, to show what can be done in growing pepper of the right variety in Ceylon. The pepper on this estate was started from cuttings brought from the Malabar Coast, and, although in some of our importations only ten cuttings out of ten thousand reached the island alive, we have now a magnificent cover of pepper as fine as the best grown in any part of the Malabar Coast. This is without doubt the only successful and satisfactory attempt to grow this spice here. As support for the vines the jak tree has proved our best ally,
while the goraka, which is also growing plentifully here, will be the next valuable aid. Other trees such as godapara, diyapara, mililla, are also being utilized.

We started the cultivation of pepper on this estate by clearing all the small jungle, leaving the larger trees including the above-mentioned for support. The vine cuttings, after many importations from the Coast, several of the shipments being total failures, were planted three to a tree; and the result is now a luxuriant growth, of which the cuttings herewith are ordinary specimens.

More jak has been planted, and on these which are making excellent progress the young vines thrive remarkably, well growing up together with the supporting trees. Success being now assured, large nurseries were laid down, and we are now about to plant on a large scale. I trust the specimens of a product which may become of importance in many of other parts of the island as well as here will interest you.

The above information I contribute in continuation of the notice which pepper has already attracted in the columns of the local papers; and if I can give any further information to intending cultivators, I shall be glad.—Yours faithfully,

J. MARTIN.

PEPPER GROWING.

To the Editor of the “Ceylon Observer.”

Liskilien, Neboda, 15th Jan.

Dear Sir,—I was glad to read Mr. Martin's interesting letter on pepper. During my visit to Perak and Province Wellesley I visited several pepper gardens cultivated by Achinese who had left their country on account of the war, and had obtained free grants of land from the Straits Government.

They grow their vines on the dadap tree planted about 8 to 10 feet apart.

This tree stands any amount of hacking, and they can therefore regulate the shading. This tree grows all about this district, and is used by the Sinhalese for fencing their gardens. It is very easily propagated from seed or cuttings. This may prove useful to some of your readers. I tried very hard to buy good [pepper] cuttings from the Achinese, but they would not sell at any price. They offered any amount of runners; these seem to keep on growing in a single shoot and won't bear.

They do not manure their vines; the reason they give is they run all leaf.—

Yours faithfully,

PRIOR S. PALMER.

PEPPER CUTTINGS.

Messrs. J. P. William & Brothers of Heneratgoda write as follows:—

"We send you by this post pepper cuttings of the best Malabar variety from imported plants; you will find that some leaves are 8 by 6 to 8½ by 6½. We have already booked several orders for the next monsoon. We find according to our experience the best tree for pepper support is the Kapok for the low-country. Nava, Halamba, and E. Indica also answer well for the purpose."

We submitted the above letter to Mr. W. O. Wambeek, who now writes:—

"Samples of pepper from William & Bros. duly to hand. The leaves have a fine large healthy appearance, and the pepper is a really good kind. The fruit clusters are large and full. I had 3,000 cuttings of this variety from them in October last which were put out and are doing well."

ON THE PEPPER CULTIVATION.

(From Royle's Productive Resources of India.)

With regard to the Pepper Cultivation, we have seen that complete success was not attained; in fact, as far as a profitable culture was concerned, the Pepper Plantation at Samulcottah was a failure. Every thing, however, appeared favourable, for the Pepper of the Hills was pronounced by dealers to be of excellent quality: the Garden was established close to where the plant was indigenus; and Dr. Roxburgh was a most careful, and at the same time skilful Superintendent; but at that time, never having seen the true Pepper plant, he mistook for it a nearly allied species, yielding excellent Pepper, but which for the reasons stated was more difficult of culture. Dr. Heyne, however, (v. infra), has given a different reason for the want of success in the culture. He succeeded Dr. Roxburgh in the charge of the Pepper Plantations, and, having afterwards an opportunity of visiting Benoelen, he made particular inquiries respecting the culture of Pepper in Sumatra. He learnt that the Malays plant the Pepper vine at distances of five cubits in every direction, and support it on pieces of the Mootchy tree (Erythrina, sp.) that the Pepper grew luxu-
rianly where it had much moisture, and hence the valleys were the most favourable situations for Pepper gardens. After the first planting in September the vine required but little attention, being left to its fate for twelve or eighteen months, when it received a peculiar treatment, which Dr. Heyne thinks, is the cause of its great fertility. The whole plant, with all its branches, being then buried in such a way "that only a small arch of the stem remains above ground." From this arch new shoots soon sprout out, three or four of which are allowed to climb up the prop tree, and are expected to produce flowers and fruit in a year after this operation. Dr. Heyne supposes, that by this practice the strength and vigour of the plant,—by the multiplication of its organs of nourishment, the roots—being so much increased, it cannot only produce large crops of flowers, but bring the fruit also to its greatest perfection. The omission of this practice, Dr. Heyne supposes, was the cause of failure at Samulcottah, as he says, "the plants that were raised from cuttings seemed indeed to thrive well, and soon produced blossoms; but such as had male flowers only. To account for this circumstance, we supposed that the hermaphrodite plant had been withheld by the people who sent us cuttings from their hills, where pepper is cultivated to a small extent, when, in fact, we had starved our plants into celibacy. (Tracts, p. 402.)" It would be an interesting and very useful experiment, as well as one easily put into execution, what is done of the Botanic or Horticultural Gardens favourably situated in India, to ascertain whether the Malayian treatment applied to the Pepper Vine of the Northern Circars would make it more fruitful.

PEPPER, which is an old acquaintance, is in the running to be a new favourite. When you have the proper tree to grow it on, it does not give much trouble, and is an admirable auxiliary in a cacao garden or anywhere else where shade is needed. I don't know if 151 a bushel is a big figure or not for such a spice, but I have heard of a first crop having been disposed of at that figure in the Central Province, and the grower is perfectly satisfied. Those who intend to cultivate it, and who think of starting with seed, should know that beginning at that end means five years to wait for returns, whereas by cuttings three years is the time. There is also a great deal in the tree on which it is grown, and those who have a right to speak with authority say, let the tree be deciduous. Nothing better than dadap, which loses much its leaves in the hot weather, and exposes the vine to the tropical winter. Then when the monsoon rains come in there is a fine rush of blossom, and a good crop. On the jak, pepper does well, but for want of the wintering is too apt to run into leaf.* Like most plants in Ceylon it responds wonderfully to manure, and repays the outlay thereon in a speedy and handsome way. Keeping the vine down to eight feet makes the gathering of the spice simple and easy.

PEPPER CULTIVATION.—Mr. Prior Palmer's letter (page 67) is interesting as showing that trees of the variety of Erythrina indica, which the Dutch called dadap, are used in the Eastern Archipelago as supports for pepper vines, a use for which we should take them to be better suited than as shade trees for coffee. The madre de cacao tree, however, which Mr. Fraser of Warriapola obtained from Trinidad and cultivates as shade for his cacao, is a far superior tree in beauty of stem and branches and luxuriance of foliage to the shabby dadap trees we saw in Java. Adverting to Mr. Martin's letter anent the Malabar pepper cultivated by him, we quote the report by Mr. W. O. Wambeck, of Elandhush estate, Henaratgoda, on the specimens which Mr. Martin sent us:—

"The pepper cuttings from Eden estate you sent were received this morning. The case contained about half-a-dozen cuttings with fruit, and I think they were more sound as specimens of the variety than for planting out. Although they are slightly dried up, I will put them out in a nice shady place close to my bungalow, and will give them my personal attention. By the leaves I conclude they are the Malabar of a better variety than that I previously procured. I have beds ready with water close by, which could be utilized if you order any cuttings of this variety, and if they were planted out now in beds, carefully watered and shaded, they would be fit for transplanting for the S.-W. rains, and would come up better than putting out simple cuttings at that time as they would then be with root and throwing out new shoots. The largest leaf in the case is 9" x 6 1/2." A thousand cuttings have been consequently ordered, which we trust may turn out well and yield thousands of cuttings in their turn.

*Does that apply so much to the lowcountry, as to altitudes varying from 1,000 to 2,500 feet?—Es.
PEPPER.

PEPPER CUTTINGS V. SEED.

To the Editor of the "Ceylon Observer."

Dear Sir,—In re pepper cuttings v. pepper seedlings, I cannot be content with Mr. Martin's opinion, which is evidently founded on theory rather than practice. I don't want to know what "must be," but what is. However, Ceylon has learned too little from India and taught it too much to greatly appreciate what "friends on the Coast" say. So far as my limited experience goes I have found that when the climate is not of the best for planting, that seedlings age for age are more certain than cuttings, while I have read that though the seedling takes longer to come into bearing, yet when it does begin, it continues to bear much longer than will a cutting. I have also read that seedlings are extensively planted in Borneo and other lands thereabouts.

Surely Dr. Trimen at Peradeniya could settle the point.—Yours truly, B. [Dr. Trimen ought certainly to be able to give valuable information from the experience gained at Henaragoda and elsewhere. Meantime, we believe that the practice in the Straits, Java and Sumatra as well as on the Malabar Coast is to grow the pepper vine from cuttings.—ED.]

THE SPICE TRADE OF NEW YORK.

The trade in ginger is very large. The importations here last year were 18,855 bags of Calcutta, 8,880 bags of African. 6,246 bags of white Cochin and 3,535 barrels of Jamaica. These figures are given in detail because they are not generally known, even among importers. The total was 4,286,160 pounds. The ginger plant is a native of India and Southern China, but is extensively cultivated in tropical America and West Africa, as well as in its native soil. Most of the ginger of commerce comes from Calcutta, but is also exported considerably from Jamaica. There are likewise large exports of preserved ginger from China and the East and West Indies. This consists of the young roots preserved in sugar after being boiled. What is known as black ginger is first scalded and then dried; it is scalded to prevent sprouting, since it is only the root of the plant which is used as a spice. White ginger is the root scraped and washed, and sometimes bleached with chloride of lime. White and black ginger are merely relative terms; the white is not perfectly so, nor is the black perfectly black. The ginger plant either lasts two years or else considerably longer, according to the particular species. It is herbaceous, with creeping and somewhat tuberous roots, and is generally three or four feet high, with smooth, arrow-shaped leaves, and flowers about the size of a man's thumb, of a whitish color, with the tip streaked with purple. In a suitable climate it is an easy plant to cultivate, and is seen at an altitude of 5,000 feet in moist soil on the Himalaya Mountains of India. Ginger is used as a flavoring for food and medicines; it has valuable medicinal properties. It generally reaches the consumer in a powdered state, and said to be considerably adulterated. Various compounds are prepared from it. For example, essence of ginger, much used for flavoring; syrup of ginger used chiefly by druggists; ginger tea, and infusion of ginger in boiling water, a domestic remedy for flatulence; ginger beer, a far-famed beverage, which, like another famous plant of Asia, "cheers but not inebriates;" lastly, there is ginger wine, a cheap liquor, to which alcohol is often added. Ginger comes to New York in bags holding from 110 to 120 pounds, and in barrels containing 130 pounds. Vessels regularly engaged in the West India trade bring Jamaica ginger to New York. English steamers bring the other kinds.

Many of the spice vessels stop at Calcutta on the way to New York, and there they take on what is termed in the trade "Calcutta" ginger. It is a great city of the East Indies, with a population of nearly 900,000. In a single year 658 sailing vessels and 301 steamers have arrived in its harbor. Its exports are numerous and large, and the city is the headquarters of the Governor-General of India. The name is derived from two words, Kali-Ghotta, signifying the landing-place of the Goddess Kali. It has had an eventful history and is identified with the rise of the British East India Trading Company and the establishment of British supremacy over a wide tract of India. It is sometimes called the "City of Palaces," because it has so many fine buildings. The Government edifices are especially imposing. The dwellings of the English residents are spacious and attractive, but most of the large native population live in houses built of mud or bamboo.

Last year, mace was imported to the extent of 175,890 pounds, in boxes containing sixty-six pounds each. Mace is obtained from the fleshy part which
envelopes the nutmeg. It is the second coat or aril, a thin, yellow substance, of waxlike texture, which covers the nutmeg, and is very fragrant and aromatic, and has a strong but agreeable taste. It is raised mostly in the Spice Islands, but Penang and Singapore are the largest shipping markets. It comes to New York on the ships bringing general cargoes of East Indian merchandise. Part of our supply of mace comes from the Banda Isles, a group in the Molucca Archipelago. The Moluccas, or Spice Islands, as they are generally called, are of volcanic formation and very fertile. They produce cloves, nutmegs, mace and other spices, not to mention sago, decorative woods and fruits, while the pearl and trepang fisheries have long been well known. The Banda Isles were produced by some fearful convulsion of nature, perhaps ages before man appeared on the globe, and are among the loftiest of the group. The Island of Goonong-Apee rises 7,880 feet above the sea. The four larger of these fruitful volcanic isles are devoted to the production of nutmegs and mace. The group is in constant danger of earthquakes, and the lofty island already mentioned is known as one of the most active volcanoes in the Archipelago. The islands are little more than an open conservatory bearing odorous spices, with volcanic heat to stimulate the growth of the wonderful vegetation. The houses are mostly of wood, roofed with leaves, owing to the danger of earthquakes. Spices from the Banda Isles often find their way to New York by way of London, whence they are shipped on the regular steamers.

Mustard is a popular condiment, and has been known for many centuries. California raises a large crop. The mustard tree of the Scriptures still abounds in the East, and though the seed has no aromatic pungency, it is used like ordinary mustard. The most important spices known to commerce are black mustard and white mustard. The plants are natives of all parts of Europe, and are also cultivated in gardens. The white and the black seeds are ground together. Mustard is not only useful as a condiment, but is valuable as a medicine. It has stimulating properties, known to every household, and it is beneficial in some cases of indigestion. In England, white mustard, in the seed leaf, is sometimes used as a small salad, having an agreeable pungency. In India, the oil of mustard-seed is much used for lamps. In China, a species is cultivated as greens for the table, as we use spinach.

The bran of ordinary European and American seed is used in making French mustard, which is very popular. The finest mustard-seed is the black, or, as the brokers term it, the brown, which is received from Trieste. The next in point of quality is the English brown, and then comes the Dutch seed, though of the two last-named descriptions very little is received here. Large quantities of the white, or more properly, yellow, California seed, are used annually by the spice-mills of New York. It is cheap, and it makes itself felt. The Trieste sells at 7 to 8 cents a pound at wholesale, and the English and Dutch from 5½ to 6 cents, but the California is obtainable at 48 to 42½ cents. When there is an especially brisk market, the California seed is sent overland by rail to New York, but usually it comes in sailing vessels that go round Cape Horn, as in the "good old days" before regular mail steamers to the Isthmus and the Panama railroad were ever dreamt of on the Pacific Coast. It takes from 80 to 150 days for these ships to make the Cape Horn voyage, according to the wind, and, besides mustard-seed, they bring wool, raw sugar, wine, and the salmon of the Oregon, which assuredly hears something besides its own dashings in these days of feverish activity in trade and commerce. The foreign seed is often sent from the Mediterranean to London, and then transshipped to New York, though it also comes direct from Sicily. Some comes from Bombay. The fruit-steamers from Sicily bring considerable quantities.

Curry-powder is a preparation borrowed from India. It is composed of turmeric and various spices. In India and elsewhere it is largely used as a seasoning for a large variety of dishes. It often consists of turmeric powder, coriander-seed powder, black pepper, fenugreek, ginger, Cayenne pepper and cumin-seed. Sometimes the recipes include scorched mustard, mace, cinnamon and cardamons. This agreeably stimulating preparation is largely manufactured by the various spice companies of New York.

Sweet marjoram is extensively used as a seasoning in cookery. The plant is a native of Greece and the East. Thyme is a half-shrubby plant long known as a flavoring for various dishes. The garden thyme is the most fragrant. It grows in all parts of Europe and in the north of Asia, but is not indigenous in this country, "I know a bank where the wild thyme grows" is a familiar line from Shakespeare. It is an humble plant, but grateful to the smell and the taste. Wholesale houses here sell it in powdered form in boxes and barrels. Savory is largely sold here. The plant has lilac or white flowers. It has a
strong and agreeable aromatic taste and smell, and is used for flavoring dishes. Winter savory and summer savory are used for the same purposes. Sage in powdered form flavors not a few dishes, and it is also used in the leaf. It grows wild, and is also cultivated. The whole plant has an aromatic smell, penetrating and peculiar, somewhat like that of camphor; and it has also an aromatic taste, rather bitter, but nevertheless agreeable, and is more generally known in the household kitchen than other sweet herbs. It is much used in flavoring meats and sauces. Italian sage is sold here by the bale.

Pickles are really a condiment, and are therefore worth a word in passing. If used judiciously, they stimulate the appetite; properly made, they are not unwholesome, and are often, indeed, decidedly agreeable additions to the table. There is the celebrated Spanish pickle; it is a mixture of the red cabbage and slices of the large Spanish onion. Gherkins are very young cucumbers prepared with especial care to preserve their green color. Sometimes in cabbage pickles, in which the red vegetable is always employed, a few slices of beet-root are added. Cochineal is sometimes used to improve the color, and ginger, mace and white and black peppercorns are used as spices. French beans, onions, eschalots, walnuts, mushrooms, nasturtiums, cauliflowers, capers and other vegetables and fruits are extensively used in pickling, and the trade requires large quantities of spices annually. Pickles are sometimes colored by boiling the vinegar in copper vessels, and thus forming the green-coloured acetate of copper, or even by directly adding that poison—a fact that has led to serious results; but this baneful practice is believed to be much less prevalent than formerly.

Capers are the delight of the gourmand, and have long been used as a condiment and as an ingredient in sauces. It is more particularly used with boiled mutton, though also employed with other meats. They are simply the pickled flowers of the caper-bush, of a slightly bitter and yet agreeably pungent taste. The caper-bush is a native of Southern Europe and of other countries near the Mediterranean Sea. It is found on Mount Sinai. It decorates ancient ruins, clothing them in a trailing garment of green as beautiful as the English ivy. It is a rambling shrub, in other words, that flourishes most in dry places and it is often found growing on rocks and the walls of ruins. It flowers from early summer till winter. The caper, which contributes so much to the satisfaction of the epicure, is simply the half-opened buds of the caper-bush. They are gathered every morning, and at once put into vinegar and salt. At the end of the season they are sorted according to their size and color. The larger buds are packed in small barrels, but the smaller and greener, being the most prized, are sent to market in bottles after having again been put in vinegar. The fruit of the bush is a small berry, and that is also pickled in some parts of Italy. Sometimes acetate of copper has been used to change the grayish-green color of the pickled capers to a brighter or more emerald-like hue, and this, of course, makes them dangerous. The presence of copper in a jar of capers can be detected by thrusting a polished iron rod into the vessel. If copper is present the rod will soon become coated with it. The English and French steamers annually bring large quantities of various spices, condiments and sweet herbs to New York to gladden the epicure and satisfy the popular demand for stimulants, which is unquestionably very great in a nation of such restless energy as ours.

Olives are a condiment highly esteemed after a taste for them has been acquired, but at first they are not especially agreeable. Large quantities are imported every year. The consumption in New York is large, partly by reason of the cosmopolitan population. The olive-tree is indissolubly connected with sacred history. The Mount of Olives is a name as familiar as that of Jerusalem. The tree itself is so hardy that the olives now standing in what is termed the Garden of Gethsemane at Jerusalem are alleged to be identical with those named in tax-rolls as existing a thousand years ago, and there is a tradition—regarded by many as not altogether improbable—which makes them date back to the time of Christ. The tradition as to the extreme longevity of these trees still to be seen in the neatly-kept Garden of Gethsemane, and carefully watched by a sacred Order, is undoubtedly based on the well-known fact that the olive-tree is the hardiest fruit trees that grows. It survives the severest frosts, even sharp scourching by fire, and almost any degree of mutilation. It sprouts from the roots if everything else is dead. It is known to survive for centuries after the heart and all but the outer layer of young wood are gone. Often a large trunk is not only hollow but split lengthwise into several distinct stems, all healthy and bearing fruit. Olive oil was known to the writers of the Old Testament, in whose time it was used for sacrificial libations, for illumination, for food and for anointing the hair.
and body. Homer mentions the olive-tree. It was conspicuous in Roman agricultural literature. The Romans used olive oil in the kitchen and at the table instead of butter, which was scarcely used in the Roman cuisine.

In Palestine, and in some of the Mediterranean islands, the olive tree is as lofty as the tallest oak, but in Europe it does not often exceed twenty feet in height, being kept down by pruning for the sake of convenience in gathering the fruit. It grows in Asia Minor, Syria, Northern Africa, Southern Europe, the Greek Islands, Spain, Portugal France, Italy, California, and even to some extent in the Crimea. Olive trees are planted from fifteen to twenty-five feet apart, and with careful husbandry, will bear every year. Italy produces an enormous supply of olives and olive oil, and the crop in California is steadily increasing. The Olives are gathered when fully grown but still green; they are first steeped for a day in weak limewater or lye of wood ashes; then in fresh water changed every day for four or five days, or until they have lost their bitter flavor. Then they are salted or pickled in a strong brine. This is the practice when the harvest is simply for the olives themselves. When it is for olive oil, the fruit is allowed to remain on the tree until it is of a dark wine color. Then the olives are dried a little, and then compressed for the oil. The best oil is from unground fruit, but it is also ground and subjected to repeated pressure, sometimes with the aid of hot water.

Olive oil is adulterated with lard oil and cottonseed oil. There are large exports of the American oils mentioned, and they come back from Europe, notably from Marseilles, travelling under the disguise of the best oil of Italy or Provence, really being largely an extract of American lard and cotton-seed, which unscrupulous French and Italian merchants foist upon us with smirking complacency. In the fiscal year ending June 30, 1887, no less than 744,766 gallons of olive oil, valued at $662,197, were imported into the United States, mostly at New York. Olives and olive oil come to this port in the English, French and Italian steamers.

The total importations of spices into the United States in the fiscal year ended June 30th, 1887, were 30,980,725 pounds, valued at $3,681,412. Pepper is the most extensively used of any of these spices known to commerce, and nearly $2,000,000 worth is consumed in this country every year. Spices are admitted free of duty except when ground.

But it is well known that spices are much adulterated. Burnt crackers, buckwheat and ground cocoa-shells are used to adulterate pepper. Ground almond shells are mixed with cassia and cinnamon. Flour is mixed with mace. Meal and starch help to make full weight and good measure of ginger. Pimento is too cheap to make adulteration profitable. Nutmegs have never been adulterated except in Connecticut, where a very successful imitation is said to have been made many years ago by some of the thrifty deacons who happened to keep country stores.

There are no wooden nutmegs now in market. Cloves are adulterated with clove-stems, which are very cheap. At one time they cost only one and a-half cents a pound at wholesale. Mustard is adulterated with flour and turmeric, which is yellow in color, and gives it its pungent taste. Turmeric itself is the root of a plant found in the East Indies and in Cochin China. It is sold in the form of dried root or powder, and besides being used so extensively in coloring mustard, it is employed in the dyeing of silks and wool, as well as in medicine and chemical analyses. As originally used in Europe, mustard was simply the finely-ground seed, but in time a demand arose for an improved yellow color, the natural tint being rather dull and unattractive, and then the flour of mustard was introduced, this merely being the interior portion of the seed, the bran being rejected as in the case of wheat in making flour. The result was a loss of the pungent taste peculiar to mustard, which is largely due to the presence of a bitterish oil in the husk of the seed, and to supply this deficiency the next step was to introduce turmeric, Cayenne pepper and other foreign ingredients, with wheat flour to increase the bulk and lightness of color. There is little or no pure mustard to be had anywhere; it is practically a druggist's compound, and in New York mustard-seed is sold by drug brokers.

But the shipping element of the mighty commerce of New York is always more interesting than its formal array of statistics. Here at a wharf on the East River, near old Rutgers Slip, is a ship with big tan colored spars and a brave array of rigging, pulleys, ratlines, cordage, chains and white decks. Her sides are barked and rusty with the long voyage from Hong Kong. A companion way is lowered to the wharf, and a notice close by announces that there is no admittance to the ship, though this warning is but slightly regarded. A queer little floating house on one side of the ship contains the steam winch,
by which the cargo is hoisted from the depths of the sombre hold to a slanting skid, down which the merchandise is sent to a platform supported by wooden horses. From the platform the men take the bales of rich goods and pile them up, according to their marks, further along the wharf, or else put them on trucks to be taken to various parts of the city. On the dusty and splintered wharf are bales of cassia, bags of ginger, boxes of preserves, chinaware rattans and curios, bales of straw braid and rolls of matting, bearing such bales as “Kee Ning” “Hong Kong Fancy” and “Mandarin,” packed in bales of native grass. These are boxes of soyas, a kind of sauce or flavoring made in China from a small native bean; there are cases of lacquerware, such as cups, saucers, trays, pots and dishes. The cargo contains no less than 500 cases of native preserves, and nearly 5,000 pounds of ginger. There is chinaware consigned to a Chinese firm in New York, Lin, Fong & Co. besides rattan chairs. In all, the big ship will yield up more than 18,000 rolls of the matting, which is so much neater and better than carpets for certain rooms of the dwelling, and so much superior to the cheaper carpets or the chilling oilcloth for halls. Big red trucks are being loaded with this merchandise from the far East, and every few minutes a team of stout horses, with flanks and harness glistening in the afternoon sun, rumble along the wharf out into noisy South street, where the stout lunged driver is speedily reveling in wordy and profane warfare with the driver of a horsecar, whose observations on the truckman’s parentage, physical apperance and mental characteristics call forth a vituperative deluge in response from that maligned but fluent individual. Truckmen, as a class, are probably the same all the world over, as profane and abusive at times as parrots with a bad "bringing up."

Most of the steamers in the East Indian trade take their cargoes to London or Liverpool, and consignments for America are there transhipped in the regular steamers plying to New York. A new line of steamers between New York and Calcutta was established some months ago, and cargoes of East Indian merchandise are now more frequently brought hither direct. Some of these steamers also go to Bombay, Madras and Colombo in Ceylon. They bring cinnamon, ginger, coffee, indigo, jute, cinchona bark and other products. Seven steamers of 4000 tons each are in the trade. They usually make the trip from Calcutta to New York in about thirty-five days, though occasionally it takes longer. The steamers have a great advantage in this trade, as they always go and come by way of the Suez Canal, that wonderful engineering feat that connects the Red Sea with the Mediterranean, whereas the sailing vessels, by reason of the high tills on the canal, are obliged to go around by the Cape of Good Hope—certainly a commercial misnomer in this case. Every Anchor Line steamer pays four hundred pounds sterling or two thousand dollars, to go through the India, and the same amount coming back, making four thousand dollars in canal tills for the round trip. The famous Peninsula and Oriental pay even more—four thousand dollars each way.

"There is one interesting fact about the spice trade," said a large importer, "and that is, the consumption of spices is increasing in this country out of all proportion to the increase of population. This is true not only of the staple spices, but of all kinds of fancy condiments. The increasing wealth of the country accounts for the enormous demand. Another thing: it would be a very important matter to us if the Prohibitionists should be more generally successful. In States where Prohibitionists have the strongest hold, it is a curious fact that the consumption of spices is proportionately the largest. There is a certain class of persons who are determined to have some to warm them up."—Frank Leslie's Popular Monthly.

PEPPER.—As regards pepper, I once had a rock most magnificently covered with a fine bearing vine, but the dry season two years ago quite killed it out, while those on trees escaped. There is nothing like a dead tree for pepper to secure vigorous growth and crop; but, of course, it does not last. Growing on the ground without support I found the vines had a reluctance to bear.
CULTIVATION OF PEPPER AT 1,400 FEET ATTITUDE IN CEYLON.

[By a Practical Ceylon Planter.]


Matale East, the district of my residence since 1879. I always thought to be about the best for the cultivation of pepper, seeing how freely it grew in the villages round about; but I could not make a beginning till 1884 when the management of Crystal Hill estate was handed over to me. Before my time pepper had been planted on the place by the proprietor, Mr. A. G. K. Borron, and by my time many of the vines were in full bearing. These were all under shade trees among the cacao; and encouraged by the progress they had made, it was resolved to plant pepper under all other trees, especially arecanuts with which we had about 30 acres planted 10×10 feet and 6 to 8 years old. The S.-W. monsoon was then just setting in and a start had to be made at once. This gave us no time to consider about raising plants in a nursery; in fact, we attached no importance to such considerations as cuttings from old vines were supposed to be all that was required and these could have been got in any quantity from the immediate neighborhood. Accordingly, as was the custom in the country (a practice evidently introduced by some planters) coolies were sent to purchase cuttings. These were usually 18 inches in length and cost from R5 to R10 per 1,000; and anything that came to hand in the shape of a pepper cutting was readily dibbled into the ground. About 20,000 plants were put out in this manner and the weather being all that could be desired, these were all of course expected to grow up satisfactorily. About a month elapsed and we were still being favoured with occasional showers; but what was my disappointment to find, after all that trouble and expense, about 50% of my plants completely destroyed—some rotted and some dried—and even out of those that were still keeping fresh only a few growing. A week or so after this, the weather had changed to a series of dry hot days, and fancy the magnitude of my horror when I beheld day after day that even those that were growing succumb to what we thought to be the effect of the rays of the sun. As the only remedy to save even those that were still remaining, resort was at once had to shading the plants with leaves. To a certain extent this proved to be successful. But notwithstanding all that shade and constant looking after, I made out about 80% of my plants to have failed before the next rainy season had set in.
It is not necessary to dwell on the various theories that had been advanced to account for the failures of our first attempt as the facts connected with our second attempt to supply those failures will show what they were.

Long before the N.-E. monsoon set in arrangements were made to get cuttings and have them kept in a nursery so as to be in readiness for planting out with the first rains. Nursery beds were prepared where water was easily accessible and cuttings obtained from the villages as before. But in obtaining these cuttings this time I had to be more cautious, for I found only when it was too late that a good many of the plants of my first planting were of a kind what we call wild pepper which use to grow in the jungles. The best method of detecting these whenever an attempt is made to palm them off as genuine, is to compare the leaves of both species: the leaf of the wild one is somewhat pubescent, while the other is glossy. By this means the best cuttings were collected, but a difficulty arose when they were to be put in the nursery: Which is the best way to place the cuttings in the bed? No one could say exactly, but still the differences of opinions on the subject were many. The inexhaustible Tropical Agriculturist which I consulted first could not help me at all. My native neighbours could tell me only how they planted a vine long ago, but did not know how to raise a nursery as they never heard of one. At last commonsense had to be relied upon, and one of our theories was (1) that, as they grew from every joint, the longer cuttings should be bent into a bow and both ends buried in the ground at least 6 inches deep; another (2) was to bury the middle of the cutting and have both ends jutting out a few inches above the ground; (3) cuttings which were shorter than 12 inches were put about three inches apart in the ordinary way six inches deep. All the beds were shaded with branches of trees except one bed which was sown with seeds, and were watered as was found to be necessary. But, alas, what was the result? When the time came for planting them out, hardly one-half of the cuttings were alive! Theory No. 1 was a complete failure, No. 2 partly so, but No. 3 so far a success, at least not so disappointing. On the whole, as the saying is, after many failures comes success, I was not discouraged by the failure of this experiment, for herein I conceived the idea how to raise a pepper nursery with any description of cuttings successfully. Here I must remark that by whomsoever the system had been introduced, a great blunder had been committed in regard to the manner pepper cuttings are bought and sold now-a-days. As the branch cuttings when grown do not prove to be good climbers but rather inclined to grow into a bush for some time and then die off, the cuttings from the root, or shoots growing out from the parent vine and creep on the ground are always preferred for raising plants. These shoots are usually several yards in length with roots hanging down from almost every joint. The native style of planting was to pull out the whole of one of these shoots and bury it round a tree in two or three coils; they must therefore count each shoot as a plant. But according to the rule in vogue at present, a shoot will be cut into a dozen lengths and sold as a dozen plants. It does not concern us as to whether it is the practice in India or in the Straits Settlements: we should adhere to the rule which was in force here from time immemorial.

But to return to my cultivation. As might be expected we planted out all the surviving plants and made up the difference for supplying our failures by buying fresh lots of cuttings from the villages, but this time I insisted on getting and planting only the cuttings that had plenty of roots in them, as I
found these to grow better than those without roots. The cuttings that came without roots, I cut into pieces of 9 inches in length so as to have three or more joints in each piece, and put them into a nursery over which I had a thatched roof, 6 feet high, so as to prevent the rays of the sun falling on its beds, but which at the same time gave it plenty of airy room and plenty of light. I felt that these two conditions were absolutely necessary for raising pepper plants in a nursery either from seed or cuttings. These plants I expected to leave in the nursery for at least 6 months before the next planting season. I am now of opinion that to leave them in the nursery for a whole year, 6 months under shade and 6 months exposed to the sun by removing the roof, would be so much the better for them as the sequel will show. The supplying of my first season’s failures having been done during the first week of the regular N.-E. rains, the plants I put out from the nursery, as well as the rooted cuttings I so carefully selected and planted, had plenty of time to grow. The rains that year continued from October to January, and so far as my observation went, I found not a single failure for four months among any of my second season’s planting. The dry season began in February and the heat was intense in March, and although I took the precaution to have all my plants shaded in good time, the drought at an elevation of 1,400 feet above the mean sea level was too much for even the growing plants to withstand, and consequently a large percentage died out again. It was very strange to observe the different conditions in which the plants that survived the drought had been placed; and when I compare them with the conditions of those that had succumbed were placed, my bewilderment became still greater. If one were to suppose that sufficient shade would keep a pepper plant alive in any dry weather, here then is an instance to prove the contrary, for I could have counted hundreds of them under trees with abundance of foliage which afforded them the best natural shelter, all dead, while in another more open situation hundreds might be seen to be growing satisfactorily. Here again is an open patch where the best plants had been put out, but now hardly one to be seen; while a few yards farther is a clump of shady trees under whose sombre foliage they are growing like common ferns. This strange anomaly as might be expected led me to the conclusion that there were different varieties of pepper growing in the island, and that of these some grew under shade and some exposed. If this was the case, surely cuttings can be chosen and planted according to the suitability of each locality. But the theory does not reconcile with the results of my nursery experiments where under a given condition all the plants thrive, till they are removed and planted out. If any of these plants had been of the variety that did not grow under shade there would have been a perceptible number of failures. But such was not the case, and so the failures outside could not be attributed to such a cause. Being then but a beginner as I was, my next impression was that the soil which had been an abandoned field of coffee was old and exhausted, and though some old vines growing thereon were growing luxuriantly and bear good crops, they had been planted when the soil was still fertile and new, but now the plants would not grow as the soil had lost its fertility. But I do not believe in this theory with the experience I have gained up to the present day, as I have reason to believe that pepper could be cultivated in any poor soil provided only the rules necessary to encourage its propensities be strictly observed; that is to say, we must allow the plant to grow as it will, when it will grow as we want.
Since beginning the cultivation I had two seasons for planting, both of which were taken advantage of as already stated. The survivors of the first season were now 12 months old, while those of the second were 6 months. The scarcity of rain still continued and by about the middle of April the drought had done its worst. What with soil, climate and elevation, here was the saddest picture to behold! So much money and labour absorbed and not a single plant of either the first or the second season to be seen alive! All hopes blasted and gone! Even the older vines that looked so lovely with their rich foliage and a promising crop were now quite bare and looked as if they were about to go off. This afforded me an opportunity to observe the influence which the trees on which the vines grew exercised over the vines. Those that grew on any deciduous trees as the Inga Saman, dadap or erabodda, kapok, &c. were the worse for it; while those which grew on jak, arecanut, kekuna, and such other trees which were not deciduous, were still holding on. Even these latter would doubtless have passed off like their companions of the vegetable world, but for the timely rains of the month of May and once more the drooping hearts of the poor Matale planters were cheered! June followed with more rain, and the ravages of the drought were to a considerable extent repaired. And it was then that I found out the advantage of having a plethora of roots in the pepper cutting or plants, before it is planted out and allowed to take care of itself; for wherever this had been the case I found the plant which was given up for dead during the drought, immediately after the rains spring up in beautiful suckers and those that sprang up in this manner were not a few, but thousands. Here then is one of the secrets of the pepper plant—if cuttings without roots are planted out, they die immediately, those with a little root hold on for some time, and rot in the ground, but those with more root grow during the rains, and though a drought may follow and destroy all that is of the plant above, they keep alive under the surface, and spring up again. The advantage of planting well-rooted plants will now be quite obvious; and to get plants of this description as I have said before, it would be necessary to allow them to remain in the nursery for 12 months, treated in the same way as we did with cinchona under thatched roofs. These hints apply only to plants raised from cuttings. Where plants have been raised from seed (sown when fresh and ripe 5 or 6 inches apart) they should be kept in the nursery for at least 18 months, and then put out. I do not think there is any difference in longevity between plants raised from seed and plants from cuttings, and neither do I believe as to there being any difference in their fecundity or crop-producing powers. In fact, from thousands of old vines now flourishing in the district I cannot get anyone to point out which one has been grown from a cutting and which from a seed. It is said that seed plants take longer to bear; but I have not yet found an example, and neither an authority for supposing that it is true. I have already mentioned that branch cuttings are not much sought after for raising plants as they do not grow up the tree as a climber, but rather grow into a bush and so on die off. I have some plants of this description now four years old with a few bunches of crop on each. One of these is just beginning to throw out shoots which are all climbing up an arecanut palm! So it would appear that after a time branch cuttings do grow up a tree. But, from this would again appear that its power of producing foliage and gaining new roots is really very slow, and that this is the cause of its short existence. The slightest drought deprives
PEPPER.

it of its nourishment owing to the paucity of its feeding roots. I do not therefore think that it is quite safe to try the experiment of growing pepper gooseberry fashion into small bushes by plants raised from branch cuttings, as has been suggested by some correspondents in the local newspapers recently. Hitherto it was thought sufficient simply to dibble the ground with a fork and put in a cutting. But since it is of paramount importance to afford the plant every facility for the development of its roots within the shortest space of time, I think the holes should be made large and freed from stones and other roots. For putting 12 months' old nursery plants the holes should be at least 9 x 12 inches. When planting out care will have to be taken not to allow the roots to bend upward; it would therefore be more advisable not to pull out the plant from the nursery with a ball of earth, but rather to thoroughly loosen the bed and then pick up the plants one by one doing as little injury to the small rootlets as possible and avoiding all chances of crushing or breaking the tender leaf-bud of the growing shoot.

The preceding remarks whether or not of practical interest to those who are about to embark in the cultivation of pepper under circumstances similar to those in which I was placed, refer only to experiences gained during a period of two successive planting seasons; and it must be mentioned that were I to enter into the details of going over more ground, as the cultivation was extended during several seasons, it would be simply repeating the same story again. But it would be expected from me to place on record any observations I may have made during my progress for the last five years; but in this I fear I would only qualify myself very poorly. Two years back when my oldest plant may be said to have been three years of age, and was only from 12 to 18 inches from the ground, where it happened to creep in a single shoot over an arecanut or a jak tree, or where it was spreading on the ground in several shoots round the trees, it was supposed that a top dressing or pruning would induce it to throw out more shoots and grow more vigorously, and this was accordingly done over a small area. But it may be remarked that the experiment was not a success; for about 12 months after when I expected to see them greatly improved, they were no better than they were before. It is therefore conclusive that the system is unsuitable to this climate. Instead of pruning, I have so found out that it is a greater help to the plant to train it up the tree by tying it with some bark of trees or soft strings as soon as the plants begin to grow, and great care should be taken to leave them unmolested till they have thrown out tendrils and taken hold of the tree. But there are great drawbacks to this being achieved. Jak trees bear fruit and the coolies are apt to climb upon them to pick, and thereby trample or otherwise injure the vine by breaking the shoots which retard its growth materially. Those growing on arecanut trees also share the same fate; it is however not the case with vines growing on other jungle trees. I have already stated that pepper can be grown on any poor soil, and will now go a step further and add that it can also be grown in any kind of climate within the tropics. When my oldest plants were four years (an age at which pepper usually begins to crop) the bulk of them were only from two to three feet from the ground, while the others had grown up from ten to fifteen feet high. At first it was supposed that the latter grew on richer soil than the former; but having found some of them to be growing on comparatively poor soil as well, the secret of their success still remained a mystery. Just about this time there appeared a notice in the local papers advertising pepper plants for sale at Lower Haloya estate near Peradeniya, the property of Mr. R. J. Farquharson, and it being desirable to try a
change of cuttings, as agriculturists always try a change of seed, I visited that place about twenty months ago, and endeavoured to obtain some cuttings from some of the best pepper vines that I have seen growing in the Central Province. These I have now in a nursery which of itself is a thing of beauty to see. What impressed my mind most at Haloya was to see the ground shoots of the vines growing on rocks and bearing crop; and then the parent vines which were twelve months old would bear any of 8 years of age in Matale. With an elevation of 2,000 feet, the climate more moist; the pepper seems to have here just what it wants. But when Mr. Farquharson told me that he got his cuttings originally from Negombo in the Western Province, I had to look more about me to know the secrets of his success. I must therefore leave climate and elevation aside and look elsewhere for its cause; and I think I have got it—a secret which is very little thought of in this country, although the greatest importance is attached to it by cultivators in the Straits Settlements and countries about it. For growing pepper the Chinese and Malays always select a piece of land which faces the east and is sheltered from the west. If there was any virtue in this selection, it must be, I suspect, that the morning sun is more essential to the plant than the hot afternoons. The situation of Haloya favours this idea; and when I say that most of the best growing plants on Crystal Hill are also to be found in situations facing the east, it would appear that there is some truth in the theory. On a recent visit to Colombo I was greatly interested with a pepper vine shown to me in his garden by Mr. John Garth, which was then only 18 months old, but in height 10 feet from the ground with a fair promise of crop. The climate of Colombo with an elevation of perhaps 100 feet above the mean sea level, is, I think, more moist than it is in Matale, and its proximity to the sea in the west which is only five miles distant, always brings to it the frequent showers of rain which arise from the sea, but which as they reach higher regions is dispersed and carried away by different currents of wind. The soil of Colombo is the same as what may be seen in all parts of Colombo—cabook and red clay, and as Mr. Garth's property must have been cleared and planted with coconuts more than 15 years ago, I should think the best of its good qualities must by this time have been exhausted; and I cannot therefore admit that any special richness of the soil, combined with its more favourable rainfall to be the cause of the wonderful growth of the vine I had seen with hardly any attention paid to it, than the full exposure of the field where it grew to the morning sun, and its protection from the heat of the rest of the day. Now compare these facts with what has been said of pepper grown successfully at one time in Batticaloa in the Eastern Province, and the conclusion will be irresistible that it was chiefly due to its exposure to the east and shelter from the west. By advancing this theory of an "eastern situation" I do not mean to say that pepper would not grow in any other aspect of land, for I have seen vines growing without any trouble at all in diverse positions in native villages as well as in cultivated estates. But even then these are only few and far between and should be considered as exceptions. But then these exceptions will not fail to strike even a casual observer as to there being a certain tendency in the smallest plant as well as in the largest vine to incline all its growing powers to a point from whence it gets the most light, and a further glance will show that this light which exercises such a great influence over it, is not of the afternoon, but of the morning. The best specimen of a vine might be seen to be growing over a half decayed jak tree which is fully
exposed to the sun blazing from the west; but if one would only examine as to which was the side it had originally struck root, crept along its support and covered itself with the richest foliage, it would invariably be seen that all this was done from the first of the four cardinal points. Now having said this much to the point under discussion, I arrive at the conclusion that where the plant is not afforded natural shelter, it would be always of some advantage to provide artificial shade from the side it gets the afternoon sun. This could always be obtained by putting out the plant always to the eastern side of the tree on which it is intended to grow, but where it could not be had other remedies will have to be adopted.

Unlike some other products of agriculture, I think, we must pay more attention to change of seed in pepper cultivation than to anything else. This should not be understood as if I am recommending the adoption of any distinct variety of pepper; in fact I do not believe that even where one could be distinguished from the other, any one variety would grow and bear better than another. If, however, any of my brother planters prefer the "Malabar variety," bought at such exorbitant prices as those recently advertised in the local newspapers, over what could be obtained in the country, they would do well to first see what has been the result of similar experiments with other products and satisfied that the money thus given away would be returned by larger crops, than the native indigenous variety is capable of producing. In my humble opinion any variety would grow in this country only if it could be made to grow, and be it exotic or indigenous, under careful cultivation it would bear crops as good as those of any other parts of the world. It should also be carefully noted that cuttings, plants or seeds for planting should always be procured from a district whose elevation is either higher or lower than that of the district in which it is intended to be planted. There is also another point which should not be lost sight of. History tells us that pepper was an item of fiscal revenue of the island more than four hundred years ago; and if we only consider the length of time the indigenous variety had been growing, multiplying its species up to this day throughout the island, the fact must be patent to every one, that by this time it must have greatly degenerated, and that it does not produce so much crop now as it did before. This is supposed to be also the case with paddy and other grains which in former times turned out from the same extent of land from sixty to seventy fold more crop than they do at the present day. With regard to the latter product we know that several attempts had been made to introduce seed paddy from foreign countries; but the results obtained when compared with those of the native sort, there was hardly any encouraging difference to be found. I think it was the same with coffee. Now all these facts tend to show that it is very unlikely that any foreign variety of pepper would ever supersede the native product; but at the same time I am inclined to believe in the theory that the introduction of a more robust stranger into the existing native family, would improve the blood and give new vigour to the latter; and on that consideration only would I recommend any of the so-called new varieties of pepper, but not as producers of larger crops in which I do not believe. At the Agri-Horticultural Show in Kegalle last year I saw some pepper corns of the Malabar variety exhibited, each grain about the size of a seed of the Jalapa Merabilles (4 o'clock flower). To the taste it was not so strong as our puny little native grain. The Indian variety of the Long Pepper (Tippily) also produce beans three or four times larger than those produced by our native creeper; but for medicinal purposes the latter is more sought after than the former.

In conclusion I must apologise for the disconnected style in which this essay is presented to the readers of "All About Pepper." A planter who is occupied with his work from the gray morn to the dewy eve can hardly be expected to give much time to writing—may therefore some indulgence be allowed him not as a privilege but as his right!

A. VAN STARREX.
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PEPPER CULTURE IN CEYLON: REMARKS ON MR. VAN STARREX'S PAPER.

An experienced lowcountry planter remarks on Mr. Van Starreg's paper as follows:—"The record of his experiments and failures is interesting and amusing enough, but might have been condensed greatly. A résumé stating shortly how he would recommend that pepper should be grown would have been useful and might have been somewhat as follows:—'To sum up. Do not plant unrooted cuttings in situ; a very large proportion fails. Raise cuttings in nurseries, the cuttings to be a foot long and from the stem (branch cuttings useless), six inches to be buried; shade and water according to circumstances; allow the plants to remain in the nurseries a year before transplanting; harden off by gradually removing shade. In suitable weather remove carefully without earth to the roots, but taking care not to injure those. Plant in holes at least a foot wide by nine inches deep, and when the vines begin to creep, train them till they adhere to the stem of the tree. For supports select trees that are not deciduous. Plants raised from seed should be allowed to remain in the nursery till they are 18 months old. For planting, by preference, select localities with an eastern aspect, as observation teaches that the vines grow and crop best in such situations. The ordinary native pepper is well suited to Ceylon and is a good bearer. Before adopting largely any new varieties recommended, ascertain whether they have been proved a success, and are known to possess qualities better than our country variety. In raising nurseries of either cuttings or seed do not use those to be procured in your own district, but get them from some other district, at either a higher or lower elevation by attending to this the resultant vines will be strong and good croppers.'

"This I take to be the pith of Mr. Van Starre's essay, and upon the whole the advice given is good.

"My own experience of planting pepper cuttings at the roots of the trees where they are intended to grow is not so unfortunate as his. I usually succeed in getting 60 to 70 per cent. to grow and thrive. Planting in situ where successful gives an advantage in time of quite 6 months if not more, as in transplanting from nurseries all growth, with the exception of a few inches, has to be cut away. Where time is no object certainly raising plants in nurseries is the preferable and safest plan, as plantings out are sure to be more successful even in unfavourable weather. Where unrooted cuttings are planted out in the spot where they are intended to grow, two should be planted in each hole, the cuttings being 18 inches long, 12 inches of which are buried, and the soil very firmly trodden round them; if weather should turn dry, shade with leaves or branches.

ALLSPICE, PIMENTO, OR JAMAICA PEPPER.

(Myrtus Pimenta—Eugenia Pimenta—Pimenta vulgaris.—Myrtaceae.)

(From "Cultural Industries for Queensland" by Lewis Adolphus Beruys, F.I., F.R.G.S.)

A native of South America and of the West Indies, especially of Jamaica, whence the principal supplies of allspice are derived. The Eugenia Pimenta is an exceedingly handsome tree, attaining under suitable conditions of climate a height of at least thirty feet. It has a smooth trunk with shiny green leaves something like those of the "Bay." The foliage is very luxuriant, and as the tree branches equally all round, the effect is very handsome, especially in the contrast presented between its profusion of small white flowers and rich green leaves. It is exceedingly hardy and will grow on barren land, and for any other cultivation. Porter instances a fine specimen standing on the ridge of a rock about twenty feet in circumference, and eight feet from the surface of the ground, the roots encompassing the whole surface of the rock, and finding their way down to the soil whence the tree derived its nourishment.

The pimento is said to be very impatient of all attempts at entirely artificial cultivation where the tree does not grow spontaneously, very few of the efforts made to propagate young plants, and grow them into trees by the ordinary methods of cultivation, having been successful. Experience of the tree in Queensland is very limited; the only specimen known to the writer being one on a hill-side in the Brisbane Botanic Gardens. This tree is some fifteen years old, and about twenty feet high. I cannot learn how long it has been bearing; but last season it yielded a small crop of sound healthy berries—a fact sufficiently encouraging to induce attempts at cultivating so useful a tree. The following is the principal method of cultivating the Pimento-tree in Jamaica:—A selection is made of land where the natural vegetation is
interspersed with these trees, or in the immediate vicinity of an old plantation. The whole of the other timber and undergrowth is cut down and left to decay, the Pimento-trees alone being allowed to remain intact; among the ruins of the other timber, the young Pimento plants spring up in profusion where the seed has either fallen or been deposited by birds; the prostrate branches of the felled trees affording a valuable protection to the tender plants. In due course these are thinned out; and, when in two years' time the dead timber and rubbish is cleared away, the young trees are free to grow to maturity, and the plantation thus curiously created, is thenceforth tended in the usual way, the trees arriving at maturity in about seven years.

The Pimento flowers twice, but only bears a regular crop once a year. The fruit is a small berry, somewhat larger than a peppercorn, and containing two seeds, and when ripe is succulent and of a black or dark-purple colour. The produce is variable in quantity, but a good tree, under favourable conditions of season, will give a hundredweight of the dried spice; the loss in drying being about one-third of the weight of the freshly gathered berries.

If the berries are left to ripen they become moist and glutinous, difficult to cure, and not only lose their pungency and delicate aroma, but acquire a different flavour somewhat resembling juniper berries. The fruit is, therefore, gathered while still green, and is either sun-dried on mats or terraced floors, or cured by a more rapid process in kilns. Curing in the sun takes, under favourable circumstances, about seven or eight days. During the process the heaps are frequently turned and winnowed; great care being taken to preserve them from either rain or dew. Drying constitutes the sole process of preparation for market; and when this has been properly done, the article is ready for packing and export. It will happen that some of the ripe berries get mixed with the unripe, but this is avoided as much as possible; and for the reason that, in exact proportion as this occurs, the value of the commodity is injured, the berries are gathered nearly as soon as they are formed, and before they have begun to mature. When sufficiently cured they present a rough exterior and a dark brown colour, and the seeds rattle inside.

The common name “All pice” is derived from the idea that Pimento combines the flavour of cloves, cinnamon, nutmeg, and pepper.

The aromatic properties of the fruit are contained in a volatile oil, the dissipation of which, as the fruit matures, accounts for the necessity for securing the crop while still green. The aromatic and pungent qualities reside principally in the external skin of the berry; but the same properties, in less degree, are found in every part of the plant. Alcohol extracts the entire virtues of the berry; but the aroma, and some part of the astringent and pungent principles, are extracted by water. The chief use of allspice is in cookery. In medicine, however, it is found in various forms of heavy and light “oil of pimento,” in “spirit of pimento,” and “pimento water.” Its medicinal properties are very similar to those of cloves, being a warm aromatic stimulant and carminative, relieving flatulence, stimulating and giving tone to the stomach, and promoting digestion. It is also used in common with some other of the spices, as a cover for medicines of unpleasant flavour, and to prevent the griping of purgatives.

The oil, obtained by distillation with water, when coloured with Alkanet root (Anchusa tinctoria) is commonly sold as oil of cloves, although by no means possessing the full properties of the latter.

Simmonds states that Pimento is also used in tanning, and that a patent has been taken out in Jamaica for employing the leaves as a tanning material; but this is not supported, and, if true, possesses little interest in Queensland, where superior tannin-producing material is so abundant. One other use of the tree remains to be enumerated—namely, that of being convertible into good walking-sticks and umbrella-handles.

According to the Scientific American, the umbrella trade threatens the existence of the Pimento plantations of Jamaica. It was shown by an official estimate made at Kingston, last autumn, that more than half a million of umbrella-sticks were then awaiting export to England and the United States. These sticks were almost without exception Pimento, and it is not surprising that owners and lessees of Pimento walks are becoming alarmed at the growth of a trade which threatens to uproot a few years all the young trees. The export returns for the last five years show an average of 2,000 bundles of sticks sent out from Jamaica annually; and the returns for the first three quarters of 1881 show an export of over 4,500 bundles, valued at 15,000 dollars. Each bundle contains from 500 to 800 sticks, each of which represents a young, bearing Pimento-tree.

But, apart altogether from its commercial value, the Pimento-tree is a very desirable addition to our gardens. Even as a shrub it is beautiful for its orna-
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mentaL, bright foliage; and when planted in a clump, the slightest breeze will fill the air with a delicious perfume exhaled from the leaves. These latter when bruised yield an aromatic odour nearly as strong as that of the fruit; and, judiciously used by the cook, and in connection with the domestic medicile chest, may serve many of the purposes of the spice, and render the possessor of a tree, o far as his household is concerned, independent of its fruiting.

Edwards, in his history of the British West Indies, says:—"I do not believe there is in all the vegetable creation a tree of greater beauty than a young Pimento. The trees from the most delicious groves that can possibly be imagined, filling the air with fragrance, and giving reality, though in a very distant part of the globe, to our great poet's description of those balmy gales which convey to the delighted voyager—"

"Satie odours from the spicy shore
Of Araby the blest—
Cheered with the grateful smell, old Ocean miles."

The seeds of the Pimento-tree are very perishable, and have proved difficult to import; and the number of plants brought to Queensland has been hitherto small. As, however, the seeds borne by the specimen in the Brisbane Botanic Gardens germinate freely, plants will be available henceforth without the risk and trouble of importation.

THE NARCOTICS AND SPICES OF INDIA.

At the monthly meeting of the Anthropological Society, Bombay, which was held on the 24th April 1889, Dr. Tyndock read the following paper upon "The Spices and Drugs of the East."

The history of the various narcotics used by man goes back to the remotest periods of antiquity, and is lost in fable. In India the principal narcotics are:—fermented liquors obtained from plants containing sugar, the various preparations of the hemp plant, opium, the areca-nut, and tobacco. Of these opium and tobacco have been introduced, and fermented liquors are common to all countries, thus leaving two articles, the use of which is peculiar to India and the East. Of these two the areca-nut is by far the most important, being used by more than one hundred millions of the human race. The areca or betel-nut palm is supposed to be a native of the Malayan Peninsula and Islands, but is now only met with in a cultivated state. Some idea of the consumption of betel-nut in India may be formed from the fact, that in addition to her own produce India imports about 30,000,000 pounds of the nut from Ceylon, the Straits Settlements, and Sumatra. The exports are under 500,000 lb., which go to Eastern countries frequented by Indians, such as Zanzibar, Mauritius, Aden, China, &c. Bombay is the chief centre of the export trade. It has long been known in the East that the fresh nuts have intoxicating properties and produce giddiness, and that the nuts from certain trees possess these properties to an unusual extent, and even retain them when dry, the produce of such trees being known as marjara supari or intoxicating betel-nut. Ordinary betel-nuts have undoubtedly a stimulating and exhilarating effect upon the system, and are supposed to be aphrodisiacal. Marjari Supari are produced by a small number of trees in most betel plantations. These trees cannot be distinguished from the others until they bear"fruit, so that not unfrequently accidents happen, from the nuts becoming mixed with the produce of the plantation before their presence has been detected. The intoxicating properties of the betel-nut are greatly diminished by heat, and consequently many people only use the red nuts of commerce, which have undergone a process of cooking. The only account of the Marjari Supari in European works appears to be that of Humphries, which agrees in every respect with the particulars related by betel farmers in the neighbourhood of Bombay. He says:—"Many of the fresh nuts have the property of intoxicating and making giddy those who eat them, affecting them much as tobacco does those who are not used to it. Some of the old nuts also cause, in those not addicted to their use, great oppression on the chest and a sense of strangulation. These are called Pinanga-Mabarok, 'intoxicating pinanga,' and are chiefly produced by the black variety of areca, which some consider a distinct species. Intoxicating nuts may be known by the central portion being of a red colour when cut open. I have already observed that I do not consider this black areca to be a distinct species, but a variety of the two species described by me, and found here and there amongst other trees—although some trees certainly occur in all the nuts of which are intoxicating, especially among those belonging to this
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third variety," Rumphius adds that when these nuts have been eaten by mistake, either lime juice or acid pickle are the best remedies. The above facts seem to indicate the return of a few plants to an original wild form now extinct, especially as the unripe pickles of the best trees produce similar effects in a less degree. The betel-nut, in Sanskrit gurukka, puja and kramuka, in the vernaculars supra, when wrapped in the leaves of the Piper betle or pan, along with lime and spices forms the bira or vira, which is so much used in the civilities of all parts of India, and is commonly presented by one to another in token of civility or affection. It is also given in confirmation of a pledge, promise, or betrothal, and among the Rajpoots is sometimes exchanged as a challenge: thus the expression bira uthana signifies "to take up the gauntlet," or take upon oneself any enterprise; bira dalna, "to propose a premium," for the performance of a task: the phrase originated in a custom that prevailed of throwing a bira into the midst of an assembly, in token of an invitation to undertake some difficult affair, for instance, in the first story of the "Vetalapanchavinhati," the King, when he sends the courtesan to seduce the penitent who was suspended from a tree nourishing himself with smoke, gives her a bira. Bira dana signifies "to dismiss" either in a courteous sense or otherwise. A bira is sometimes the cover of a bribe, and a bira of seven leaves (sat pañ ka bira) is sent by the father of the bride to the bridegroom as a sign of betrothal. At marriages the bride or bridegroom places a Vīri or cigarette-shaped vira between the teeth, for the other party to partake of by biting off the projecting half; one of the tricks played on such occasions is to conceal a small piece of stick in this vira, so the bridegroom in this case is not an easy matter. The nut is also a constant offering to the gods at Hindoo temples, and on grand occasions the bira is covered with gold or silver leaf.

According to the "Hitopadesa" the betel-leaf so constantly used with the nut has thirteen properties: it is sour, bitter, heating, sweet, salt, astringent, it expels flatulence (vatagha), phlegm (kaphanasaana,) worms (krimihaara), it removes bad odours, beautifies the mouth, and excites desire. Betel-nuts and leaves were known to the Greeks, the former as Hestiatoris or "the convivial nut," which appears to be a rendering of the Sanskrit names in Greek; the latter was doubtless the Malabathron or "Indian leaf," sometimes called simply (pañ), and sold in rolls in a dried state. Dioscorides speaks of their being threaded on strings to dry, a practice still common in Bombay among the Indian traders, who send the leaves to their friends in Arabia, Persia, and elsewhere. The passage in Dioscorides is probably corrupt, and should be—as suggested by M. Vergilius, a reading which he found in one manuscript. As regards the fabulous growth of Malabathron recorded by Dioscorides, it was probably the tale of some traveller who had seen the practice of burning the jute on the west coast of India, whence the Malabathron or not a cinnamon leaf is, I think, proved by Dioscorides in his chapter on Cassia, describing its leaves as like those of the pepper plant. Until very recently the betel-nut was considered by European medical writers to be simply astringent, and the intoxicating properties of the bira were supposed to be due to the spices and leaf; but the rapid progress of organic chemistry and physiology during the last few years has led to the discovery of intoxicating properties in the nut, while Dr. Kleinstuck has shown that the essential oils of betel leaves are of much use in catarrhal affections, inflammations of the throat, larynx, and bronchi, exerting an antiseptic action, and has also used them with advantage in diphtheria. The juice of four fresh leaves diluted may be given as a dose when the oils are not readily obtainable.

In 1886 Herr E. Bombelon announced that the betel-nut contained a liquid volatile alkaloid, but did not describe its composition and properties. As it seemed probable that the physiologically active constituent was to be looked for in this alkaloid, Herr Jahns was induced to investigate the subject more closely, and has reported the results recently to the Berlin Chemical Society. He found in the nut three alkaloids, Aecoline C\textsubscript{2} H\textsubscript{11} NO\textsubscript{2} + H\textsubscript{2}O; the third alkaloid could not be closely examined, as the quantity obtained was very small.

Of these alkaloids, arecoline is undoubtedly the active principle of the betel-nut. It was found that full-grown rabbits died within a few minutes after the subcutaneous injection of twenty-five to five milligrams of the hydrobromide and hydrochloride, cats succumbed after the injection of ten to twenty milligrams. The most dangerous action of arecoline consists in the slowing of the heart's action by small doses, or even its stoppage, just as takes place with muscarine. Simultaneously with the heart's action the respiration is also affected, causing a feeling of suffocation; and purging may take place when given in
poisonous doses: a strong contraction of the pupil of the eye was observed. Atropine was found to counteract the poisonous effects of the alkaloid, so that the addition of a seed or two of dhatura to the vira, as sometimes practised in India, is really antidotal. It was also found during the experiments on animals, that the organism may become gradually tolerant to the poison of the arecanut, as in the case of smoking and chewing tobacco.

The second great narcotic of India is the hemp plant. In Hindoo mythology the plant is said to have been produced, while the gods were churning the ocean with Mount Mandaro. It is called Vijaya, "giving success," and the favourite drink of Indra is said to be prepared from it. The Brahmins sell sherbet prepared with bhang at the temples, and religious mendicants collect together and smoke ganja. Shops for the sale of preparations of hemp are to be found in every town, and are much resorted to by the idle and vicious. The Mahometans early became addicted to the use of this narcotic, in spite of the severe ordinances passed against it by their rulers. In Europe the use of hemp has never spread, though from the following passage in Pliny it would appear to have been known to the ancients. He says:—

"The gelotophyllis (laughing leaf) is a plant found in Bactriano, and on the banks of the Borysthenes. Taken internally with myrrh and wine, all sorts of visionary forms present themselves, and excite the most improper laughter, which can only be put an end to by tucking kernels of the pine-nut with pepper and honey, in palm wine." (Hist. Nat. 24:102.) The properties of hemp arc described by Meer Mahomed Hussain as cold and dry in the third degree—that is, stimulant and sedative, imparting at first a gentle reviving heat, and then a refrigerant effect, the drug at first exhilarates, improves the complexion, excites the imagination, increases the appetite, and acts as an aphrodisiac; afterwards its sedative effects are observed—if its use is persisted in, it leads to indigestion, wasting of the body, cough, melancholy, impotency, and dropsy. The seductive influences of ganja have led to the most extravagant praise of the drug by those addicted to its use. "When the ganja pipe begins to draw, cares from the mind at once withdraw." The smoker is a king, he is carried away into realms of infinite bliss, but when the effects of the narcotic pass away his pains and troubles return only to be expelled by a fresh resort to the pipe. After a time he becomes an outcast from society, and his career terminates in crime, insanity, or idiocy.

Ganja pie gurghan ghati, aur ghati tan andar ka,
Khokat, khokat dam nice, mukh dekho jaiwa bandarka,

Who ganja smoke do knowledge lack, the heart burns constantly,
The breath with coughing goes, the face as monkey's pale you see.

Much might be said about the other narcotics used in India, but as they are not peculiar to the country, it is not necessary for me to notice them; still a few words upon the subject of alcoholic liquors may not be out of place. Unfortunately, in India, we have no statistics to show whether there is an increase in diseases caused by intemperance, but there appears to be a general impression that there has been an increase in the consumption of liquor of late years, and if this is correct there must necessarily be an increase in the diseases caused by intemperance, especially as the processes of fermentation and distillation as conducted in India insure the production of the most unwholesome kinds of liquor.

In Europe the statistics collected by Mr. V. Turquan show that in France the production of alcohol which was 420,000 hectolitres in 1836 had risen to 1,884,000 in 1888. In 1836 the number of suicides from drink were 137: In 1885 the number had risen to 856. The total number of suicides and accidental deaths for the same years were 363 and 1,106, and this increase is not due to an increasing population, as that of France is notoriously stationary. In England the average consumption of pure alcohol which was 2'15 litres in 1862 and 3'16 litres in 1878, has now fallen to 2'49 litres, owing to the increasing use of tea, coffee, wine, and beer instead of spirits. The duty on alcohol in England, which is three times as high as it is in France, has probably influenced the consumption favourably, whilst the spread of temperance societies has also had much to do with it. The statistics show 21'4 per cent. of insanity from alcohol amongst men of the working classes, and 7'3 per cent. amongst women of the same class. Amongst the wealthier classes the percentage is 16'10 per cent. for men and 6'9 per cent. for women.

In Austria, where the consumption of pure alcohol averages 3'50 litres, the increase in the number of deaths from alcoholism amongst the insane is very marked. In 1872 it was in the asylums of Vienna 17'4 per cent. for men, and 1'5 for women. In 1882 these numbers had risen to 28 per cent. for men, and
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3 per cent. for women. In Spain, Portugal, and Italy the average consumption of pure alcohol does not exceed 1 per cent., and in the latter country the number of cases of alcoholic poisoning treated in the hospitals was a little over 1 per cent., and the deaths only 47 in 100,000 of the population. In Sweden, where there are more than a hundred temperance societies, the decrease of intemperance and of deaths arising from it is very marked. The number of alcoholic insanes, which was 10,914 per cent. in 1873, had fallen to 6,412 per cent. in 1886, and the proportion of suicides owing to intemperance from 26 to 14 per cent. In Norway the activity of the temperance societies and the severe penalties inflicted upon drunkards along with the restrictions which are imposed upon the sale of liquor is producing a similar result. These statistics though imperfect indicate the benefit to be derived from a heavy duty upon narcotics, the institution of temperance societies, and the imposition of severe penalties for intemperance, whether arising from the use of opium, ganja, or alcohol. We will now turn to the more agreeable subject of condiments and spices, for the production of which India has always been pre-eminent: her ports having been resorted to by the nations of the West, from prehistoric times, in search of these commodities. Beginning at the bottom of the vegetable kingdom, we find the important order of Scitamineae affording us ginger, turmeric, the different kinds of zedoary, galangal, and cardamoms. Ginger, though not now known in a wild state, is probably a native of China or Southern India. It is largely cultivated in these countries, and has been introduced into many parts of the world. In Sanskrit it is called Adraka and Shringavera or "Antler-shape," from the resemblance of its rhizome to the branched horns of a stag. The Greeks and Romans early became acquainted with it, and the Greek name is evidently derived from the Sanskrit. From the Sanskrit we get the Hindi Adrak, and the Bengali Ada, while the vernacular names of Southern and Western India, Inji (Tamil), Attam (Telugu), and Atten (Marathi), are probably of native origin. The name for dry ginger (south) in use all over India is a modification of the Sanskrit, a word derived from Shunth "to become dry." The Arabs appear to have introduced ginger into Arabia at a very early period, as the Greeks and Romans supposed it to be a native of that country. The Arabian name Zanjabil is, I think, a corruption of the Sanskrit, the letter G in Arabic changing into J and L into R, whilst the Z represents the Sanskrit. The appearance and the method of cultivation of the ginger plant in India was made known in Europe by the old Italian travellers, Marco Polo, Montecorvino, and Conti—who observed its production in this country. Ginger was introduced into the West Indies by Francisco de Mendoya, and began to be exported from St. Domingo as early as 1583. About the middle of the 14th century the best ginger was known in Europe as "Colombino," or "Quilon ginger." The "Cochin ginger" of modern commerce, At the present time the ginger most esteemed in Europe is known as Jamaica ginger, but the Cochin kind still holds the second place in the market. As a seasoning to food, the fresh rhizomes are used all over India, and their juice is a well-known domestic remedy for coughs and colds. Dry ginger is one of the three acrids (trikatu) of Sanskrit medical writers, the other two being black pepper and long pepper. Turmeric is a native of Southern Asia, and is largely cultivated in the East. It is more used as a condiment in India than ginger, but in the West it is only valued for its yellow dye. In Sanskrit it bears the name of Haridra derived from Hari, "yellow," whence the vernacular names Hatad and Haldi. The Southern Indian names manjal (Tamil), Pasupu (Tel.), are probably of native origin, and also mean "yellow." We can hardly suppose that turmeric was unknown to the ancients, though they do not appear to have paid much attention to it. Dioscorides mentions an Indian plant as a kind of kupeiros, resembling ginger, but having, when chewed, a yellow colour and bitter taste. This may have been turmeric. In India turmeric is an essential ingredient in most dishes, and is considered to be cordial and stomachic; it is also one of the best known domestic remedies, being used as an application to bruises, sprains, wounds, &c. Boiled in milk and sweetened it is the popular remedy for colds. As a dye yellow is considered a most auspicious colour, and the clothes of the bride and bridegroom are coloured with turmeric and alum, whence the reproach to those who neglect the ceremonies and expenses of a marriage:—

Haldi lagi na phitkari, patakk bahu an pari!

"Neither turmeric or alum, and lo! a daughter-in-law in the house."

The different kinds of zedoary resemble turmeric and ginger in their properties, with the addition of a camphoraceous odour and taste, which precludes their use as condiments; but they are supposed to possess valuable medicinal
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properties, and in former days were much sought for in Europe as alexipharmics. The word "zedoary" is Persian, and signifies "the great purifier or antidote." It was adopted by the later Greek and Latin writers, such as Neophtyes and Macer Floridus, and seems to have been applied sometimes to the juice of a Curcuma, and sometimes to that of an Aconite. Macer says:—

"Adprimmē sumptūs zedoarīs obstare venenis Affirmant:"

At the present time Zadwar, or Jadwar, signifies in India the tuber of a non-poisonous Aconite.

The different kinds of zedoary are:—

Curcuma Zedoaria (Roscoee), Shathī (Sanskrit), Kachura in the vernaculars; used internally as a carminative and stimulant.

Curcuma aromatica (Salisb), Vanaharidra (Sanskrit), Banhalad, Ranhalad, or Vedhalad in the vernaculars, sometimes used internally, but more commonly as an external application to reduce swellings and remove pain.

Curcuma caesia (Roxb), Nilakantha (Sanskrit), Narkachura Kali-haldi, in the vernaculars, used for the same purposes as C. aromatica.

Closely allied to the zedoaries is Galangal, the rhizome of Alpinia officinarum (Hance), a plant cultivated extensively in China for exportation to India and Europe. The Chinese call it "Liang-kiang," or "mild-ginger," and the Arabs who appear to have introduced it into India, "Khulijan." It is an aromatic stimulant like ginger, and is chiefly consumed in Russia, where it is used for flavouring the liquor called nastroika, and also to impart a pungent flavour to vinegar. As a popular medicine and spice it is much used in Livonia, Estonia, and the Central Russian, and is taken by the Tartars with tea. Galangal is mentioned by Ibn Khurdadbeh, A. D. 869-885, as an export from China, also by Edrisi, A. D. 1154, and by the Arabian physicians of the 10th and 11th centuries mention it, and the Crusaders met with it in Palestine about the same time, and introduced it into Western Europe. In India it is known as Khulijan and Pan-ki-jar, from its having a taste not unlike that of the leaves of piper betle, and is chiefly used as a stomachic tonic. According to Irvine it is added to native liquor in Northern India.

The rhizomes of Hedychium spicatum (Ham.), Kapurakachai (Sans.), Kapur-kachri and Sittarrayee in the vernaculars, may be classed with galangal: they are the principal ingredients in the three kinds of abir used by the Hindoos in worship, and as a perfume. This spice is produced in China and India, it much resembles galangal in appearance, but has a powerful camphoraceous odour.

Cardamoms (in Sanskrit Ela) are mentioned by Susruta, and must have been in use in a very remote period in India. Dioscorides speaks of them very shortly, probably from their being too well known to require much description; they appear to have first reached the West through Persia and Arabia, the oldest trade route. The cardamom plant grows abundantly, both wild and cultivated in Southern India and Ceylon, and another species, A. subulatum, produces the large or Bengal cardamom in Eastern India. Besides these, several species of cardamoms are grown in China, and the large or nutmeg cardamom is brought from Central Africa. By far the largest consumption of cardamoms as a spice is in India, where ilachi is a household word. They are an essential constituent of the bira or packet of pan supari, and Mahomedan women send cardamoms, betel leaf and sugar to their female relatives when they invite them to a marriage, whence the phrase ilachi bantua, "to invite." Ilachi-dana is a cardamom seed coated with sugar, and is applied as a term of affection to intelligent children and juvenile singers and dancers. Ilacha is a kind of cloth woven of silk and thread, to represent cardamoms, much in favour as a trousseau stuff amongst Mahomedans. The seeds are also much used for flavouring spirituous liquors and stimulating broths. The Arabic name Hil is evidently a corruption of the Sanskrit Ela. The order, Iridaceae, furnishes one important spice, which, though not originally an Indian product, has been introduced into the country, and is now equally valued by all classes of the community. The saffron plant is a native of Southern Europe, and perhaps Persia, and yields one of the oldest condiments known—the Karkom of Solomon and the Crocus of the Greeks and Romans. Saffron was one of the earliest exports from Europe to the western coast of India. It is mentioned by the more recent Sanskrit writers under the name of Kumkum, a corruption of the Hebrew Karkom, and Saurabha, which signifies "fragrance." It was employed by the ancients for seasoning food, and to make an essence with wine and water which was used as a perfume in theatres and for anointing the hair. Saffron was cultivated at Derbend and Ispahan in the 10th century,
and was introduced by the Mahomedans into Cashmere and China. In India, as was formerly the case in Europe, it is considered to have valuable medicinal properties, and to be invigorating and preservative of the humours of the body. It is used by the Hindoos in religious rites and for colouring and flavouring food. A peculiar preference for it as a condiment also exists in Austria, Germany, some parts of Switzerland and Cornwall, where the use of saffron for colouring cakes is still common. During the Middle Ages in Europe the severest penalties were imposed upon those who adulterated saffron; in 1444 Jobst Findeker was burnt alive along with his adulterated saffron; in 1455 a man and woman implicated in falsifying saffron were buried alive. As with the ancients, the Hindoos and Mahomedans use Késár and Zaaferán as proper names. The Arabs have a superstition that if the spice be in a house, the lizard called Sammabras will not enter it. In Persia pregnant women wear a ball of saffron at the pit of the stomach equivalent to the well-known saffron bag of our forefathers.

The Piperaceae or pepperworts afford us three of the most important spices—black pepper, long pepper, and betel leaves. The last of these has been already noticed in connection with the betel-nut. Black pepper is one of the earliest spices used by mankind, and was for many ages the staple article of trade between India and Europe. Two thousand three hundred years ago it was known to the Greeks as piperi or peperi, a name evidently derived from the Sanskrit Pippali, the name for long pepper. Pliny discussing on pepper 1800 years ago says:—"It is quite surprising that the use of pepper has come so much into fashion, seeing that in other substances which we use, it is sometimes their sweetness, and sometimes their appearance that has attracted our notice; whereas, pepper has nothing in it that can plead as a recommendation to either of hit or berry, its only desirable quality being a certain pungency; and yet it is for this that we import it all the way from India! Who was the first to make trial of it as an article of food, and who, I wonder, was the man that was not content to prepare himself, by hunger only, for the satisfying of a greedy appetite?"

In Europe, during the Middle Ages, tribute was levied in pepper, and the ransom demanded from the city of Rome by Alaric, King of the Goths, A. D. 408, included, among other things, 3,000 pounds of pepper. Peppercorns, an obligation imposed upon a tenant to pay a certain portion of his rent in pepper, prevalent during the Middle Ages, show how great value was attached to this spice. In the reign of Henry II. a guild of Pepperers or Pepper merchants existed in London. In 1370 a pound of pepper was worth in France 21 f. 30 c. of the present currency, and it was chiefly a desire to obtain pepper which led the Portuguese to seek for a passage to India round the Cape. The spice was heavily taxed in those days, the import amounting to 5s. per lb. in England in 1623, and even down to 1823 it was 2s. 6d. The Sanskrit name for pepper is Maricha or Marichça, which means a "pungent berry." It is derived from Marichi, a "particle of the body," and is applied to have been first applied to the aromatic berries known as Kakkoia, it now signifies black and red pepper, and in the vernacular form of Mirch or Mirchi, is a household word in India. Long pepper (in Sanskrit "Pippali," is an old-established article of the Hindoo Materia Medica; the root Pippali-mula, is also extensively used, and is found in every druggist's shop throughout the country. It was known to the Greeks and Romans, and is more used as a spice in Europe than in the East, where it is chiefly valued as a medicine. Its properties are similar to those of black pepper, but it has a somewhat different flavour: it is chiefly interesting as furnishing the various forms of the word pepper; from the Sanskrit pippali we derive the Greek piperi, the Persian pili, the Arabic filif, and the Latin piper. The order Lauraceae furnishes cinnamon and cassia, two closely-allied spices, more valued than any others by the ancients. Both cinnamon and cassia are mentioned by the early Hebrew and Greek writers as precious odouriferous substances. Pliny in his 12th Book relates the fabulous tales which were current among the ancients concerning the source of these spices, and says they have evidently been invented by the merchants for the purpose of enhancing their price. A bale of the cinnamon of the ancients was obtained from Ceylon, but was the Chinese spice which we now call cassia, and their cassia appears to have been the coarser kinds of cinnamon which grow in India. The similarity of these two spices is proved by the remark of Galen, that the finest cassia differs so little from the lowest quality of cinnamon, that the one may be substituted for the other. Cinnamon, or rather cassia, is essentially a Chinese spice, being mentioned in the earliest Chinese herbal, said to have been written 2700 B. C. It was certainly known in the West 1700 B. C., whither it was brought by the Arabs who appear
to have held the trade in their own hands; their name for it Kifrat-ed-daršini or bark of Chinese wood, being still current in the East in the modified form of dâchini or dâlchini. On the Western Coast of India, which was an ancient centre of commerce, the term kirfah, or “the bark” in the corrupted form of kalfah, is still applied to the coarser kinds of cassia. In India under the names of taj and tajapat the bark and leaves of some of the indigenous species of cinnamon have long been used as an essential ingredient in Hindoo cookery. The vernacular taj is derived from the Sanskrit tvacha, signifying “bark” and cinnamon appears to have been considered “the bark par excellence,” and the leaves to have been called tvaka-pattra, or bark leaves.

The Myristicaceae afford us nutmegs and mace. It appears to be uncertain when these spices were first known in India. They appear to have been introduced into the country by the Arabians, and thence to have passed into Western countries. The Sanskrit name jati, now applied to them, originally signified a species of jasmine, and may perhaps also have been applied to the wild nutmeg of India, the mace of which is sold in the bazaars as rampatri. Nutmegs are narcotic and are often eaten with pan supari. The aromatic herbs belonging to the Labiatae are little used in Indian cookery. Mint, marjoram and a few others have been introduced into the plains of India by the Mahomedans and Europeans, and the former is to some extent used in the preparation of chutnies and pickles. In the germs Solanaceae we have perhaps the most important Indian spice, and, strange to say, it is of foreign origin; all the species of capsicum are American, and no ancient Chinese or Sanskrit name for the genus is known. Clusius tells us that capsicums were brought from India to Pernambuco by the Portuguese; from India they were introduced into Germany, and finally reached England in about 1595. The Spaniards were acquainted with the spice as early as 1494.

Chanca, physician to the fleet of Columbus in his second voyage to the West Indies, notices it among the productions of Hispaniola as a condiment used by the natives under the name of Agi, which is still the common name for it in Spanish. In English it was formerly known as Guinea pepper, and the Portuguese call it Pimenta de Guiné. Chili is the Mexican name. The Indian vernaculars have no special name for it, although it is an indispensable ingredient in almost every dish. The Umbelliferae yield dill, caraways, coriander, cumin, fennel, anise, and ajwan or Bishop's weed.

Dill or anethum is a native of Southern Europe and the Caucasus, and appears to have been confounded by the ancients with anise. Many Greek writers speak of anethon and anison as one and the same plant, but the later Greeks, such as Alexis, distinguish them; in modern Greek the name anethon is applied to Carum ridolfia, a plant of very similar appearance. The Sanskrit name misrya also seems to imply that the notions of the Hindoos were rather mixed with regard to this spice. In this part of India the fruit is known as suva, and is much used in India in cookery, but in Europe its use is almost entirely medicinal.

The caraway is also a Western spice and little known in India, but a species of it, the Carum nigrum, a native of Persia, has been introduced by the Mahomedans, and is now used to some extent by the Mahtrattas. It is called kalun-jirun in Gujrat, and is also known as sajira, a corruption of the Persian name Siyah-zirah or “black cumin.” The fruit has a flavour of cumin, which is not present in the European caraway. Coriander is apparently a native of Southern Europe and the Caucasus, though not now known in a wild state. It is mentioned in the Old Testament, and appears to have been used in pre-historic times in Egypt. It must have been introduced into India at a very early date, as it is mentioned by old Sanskrit writers under the name anastubhum, from which we derive the modern name kotmuri. The fruit is known as dhanyak, and in the vernaculars as dhanya or dhana. The husks from their resemblance to a skull cap are called dhanye ki khopri, whence the saying “Dhanye ki khopri men pani palana,” to starve one by inches. The green plant in spite of its peculiar odour which reminds one of the bug (in Greek Kópia), is much valued in India as a condiment, and appears to have been used by the ancients, as Pliny remarks that coriander is possessed of very cooling and refreshing properties when green. The fruit is also considered cooling in the dry state. The old European physicians say, Coriandrum siccum frangit coitum, et erectionem virgis impediet. In India it enters into the composition of numerous cooling and carminative medicines, is much used as a spice, and is sometimes eaten with betel leaves and nut in the bîra.

Cumin, indigenous to the upper regions of the Nile, was carried at an early period by cultivation to Arabia, India, and China. It is mentioned by early Hebrew and Greek writers as a spice. Theophrastus states that it was the custom to utter curses when sowing cumin, probably to avert the Evil Eye,
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and Mannhardt (Baumkultus der Germanen) says that bread is spiced with cumin to protect it from demons. In Italy also bread is spiced with it, as it is supposed to have retentive powers, and is given to domestic animals to keep from straying, and by girls to their sweethearts for the same reason. During the Middle Ages it was much more used in Europe than at present. Now its chief use is in veterinary medicine. In India cumin is still a favourite spice and an essential ingredient in curries and masalás. It is called jira or "digestive," a word said to be derived from ju or jri, to incite.

Fennel and anise are also Western spices, which have been carried by cultivation into the East. From their similarity in taste and properties they are often confounded by Eastern writers. The fennel plant is used as a vegetable in India, and is the shepu of our markets. The fruits are much valued for their medicinal properties as they formerly were in Europe, and the root is also used. Macer Floridus sums up the virtues of fennel in the following lines:

Omnino comestis obstat hsec herba venenis;
Hec morsa, serpens oculos caligine pungat,
Indeque compertum est humanis posse mederi
Illam luminumbus, atque experiendo probatum.
—Uriasa purgat et menstrua sumpta resolvit,
Vei si trita super peoten hsec herba ligetur.
—Tradunt austores ejus juvenescere gustu
Serpentes, et ob hsec senibus prodesse putatur.

The ajowan or Bishop's weed is another spice, which was probably introduced into India at the time of the Aryan invasion, its native country being now unknown. Under the names of yamānika, yamāṇi, and yavānika, it is noticed by early Sanskrit writers, such as Panini, and to the present day is one of the most popular domestic remedies of the country.

The myrtle order affords us cloves, which appear to have been known to the Chinese as early as 266 B.C., as they are mentioned by several writers in the time of the Han dynasty, during which period it was customary for courtiers to hold cloves in their mouth to perfume the breath. It is difficult to say when they were first introduced into India, but they are noticed by Charaka, who is considered to be the oldest Sanskrit medical writer under the name of Lavanga, a name by which they are still known in many parts of India. I think it is probable that they were known to the Greeks and Romans, and that the name Karuophullon also written garoumphoul, karpouphoul and garaphala is a corruption of the Arabic Karanfal, which in its turn is evidently derived from the languages of Southern India, vis., kirambu (Tamil), Karampu (Malay), karambu (Cingalese). Pliny speaks of caraphyllon as resembling pepper, but longer and more brittle, and imported for the sake of its odour, and the later Greek physicians, such as Paulus Ægineta, were certainly acquainted with the spice. Cloves are much used in Hindu and Mahomedan medicine, and are one of the spices eaten with the bira, the packet of pan supari being not unfrequently closed by sticking a clove through it.

The order Cruciferae affords us mustard, which appears to have been considered by the ancients as more medicinal than dietetic; but from an edict of Diocletian, A.D. 301, in which it is mentioned along with alimentary substances, we must suppose that it was then regarded as a condiment, at least in the eastern parts of the Roman Empire. During the Middle Ages it certainly was a valued accompaniment to food, especially to the salted meat which constituted a large portion of the diet of our ancestors during the winter. Red mustard, in Sanskrit rajika, is chiefly used in India as an ingredient in pickles and rayete, and is not made into a paste as in Europe; but powdered mustard is used medicinally along with other drugs in dyspepsia, and the whole seeds are burnt in the fire to exorcise evil spirits (rai utama). Lastly, the Ranunculaceous order gives us one spice in the seeds of Nigella sativa, which are supposed to have been the black cumin of the Hebrews, the melanthion of Hippocrates, and the girth of Pliny, who speaks of the seeds as a most agreeable seasoning for bread, much used by bakers. It must have been introduced into India at an early date, as it bears the Sanskrit name of krishnajiraka, and probably by the Mahomedans who sprinkle it over the surface of bread along with sesamum seeds. It is the hab-es-souda and sheniz or shoonez of the Arabs, who have a tradition that it is a remedy for every disease except death. I cannot conclude this paper without acknowledging how much my labour has been lightened by the invaluable researches of the authors of the Pharmacographia.
THE CHEMISTRY OF PEPPER.

We briefly referred in November last (vol. 33 page 723) to Dr. William Johnstone's discovery of piperidine in pepper, remarking that he did not state "how he separated the alkaloid piperidine, and it would be of importance to know if means were taken to prevent the hydrolysis of piperine." The information is now supplied in a paper communicated since to the Society of Franklin. This paper really deals with the chemistry of pepper as a whole, and as such is an important contribution to chemical literature. Nine samples of black pepper, comprising the different commercial varieties, as well as three specimens of white pepper, were obtained from Messrs. Lewis & Peat. It is interesting to note the difference in the weights of these. Taking the average of three weighings of 100 peppercorns they were found to be, for the black—Acheen, 5'1976 grammes; Alleppy, 3'8438; Kampooot, 4'4540; Lampong, 3'5410; Penang, 3'9028; Siam, 4'2776; Singapore, 4'5338; Telliercherry, 4'4421; and Trang, 4'8101. The white varieties were, on the whole, heavier, viz.—Penang, 4'9360 grammes; Siam, 5'1441; and Singapore, 4'6936. Of the analytical factors the only one which, Dr. Johnstone considers of value, from the analyst's point of view, are the figures for ash, which varied from 3'51 to 4'66 per cent. in black pepper, 1'07 to 2'47 per cent. in white; 7'57 per cent. was given by long pepper, and 16'34 per cent. by black pepper husks. Apparently, therefore, the presence of long pepper and an undue amount of husk in ground black pepper may be conjectured by a determination of the percentage of ash. Essential oil was found to vary from 0'086 per cent. in the Penang black pepper, to 1'87 per cent. in the Allepey. A very low figure, 0'53 per cent. was shown by the Penang white, the other two giving 1'41 and 1'14 per cent. respectively; thus corroborating previous observations. The spirit soluble matter was far from constant in the different varieties, and coming to the alkaloids we find equal want of constancy. Thus of piperine Acheen yielded 12'21 per cent., Alleppy 13'03 per cent., and Lampong 11'05 per cent. All the others gave less than 9 per cent., the lowest being Trang, 5'21. The white varieties showed greater uniformity, Penang giving 8'87, Siam 7'79, and Singapore 8'66 per cent. The alkaloid was determined by hydrolysing with an alcoholic solution of potash, whereby the piperine is converted into piperidine and piperic acid. The hydrolysed solution being distilled gave a distillate containing the piperidine, which was quantitatively determined by titration with decinormal sulphuric acid. The method gave excellent results in blank experiments with pure piperine. As to the piperidine existing as such in the pepper, the percentages are what have already been given. The average for black pepper is 5'6 per cent. (husks 7'5 per cent.), and for white 3'2 per cent. The results were obtained by distilling the piperine with water, and titrating the distillate. Volatilisation of the alkaloid in the dry way gave only one-third of the yield obtained when water was used, thus favouring the correctness of our suggestion that the piperidine may be the result of the hydrolysis of piperine. Dr. Johnstone says, however, that this is not the case, for if pure piperine is boiled with water no piperidine is obtained; but he is "disposed to the theory that there may be a particular ferment contained in the pepper capable of producing the hydrolysis of piperine when boiled with water, or it may be due to the existence of another alkaid more easily hydrolysed than piperine." In his previous note Dr. Johnstone attributed the variable pungency of pepper to the difference in the piperidine content, and in a latter, which will be found on another page, he again refers to this matter. It is evident from the results recorded in the paper under notice that his assertion has a very slender basis. Pepper contains a resinous principle which all authorities are agreed is the source of its pungency. Dr. Johnstone made no precise determination of the resin in the peppers which he examined, and has not even proved that piperidine is so pungent a body as to impart, in minute quantity, this peculiar property to pepper. It would be unwise, therefore, to accept the conclusions which he arrived at on this point in the November note without further experiment.—Chemist and Druggist.

Pepper at Bundoo is yielding well. The export for the year is estimated to have been about 300 piculs (about 6,000 dol. worth), about four times as much as for the previous year, and the cultivation is being extended. At Sandakan a pepper garden is being started, while up the Kinabatangan the East Borneo Company proposes pepper planting on a somewhat large scale under the direction of Mr. Mitchelson, a well-known Johore planter.
CULTIVATION OF RED PEPPER IN TURKEY.

The *Journal de la Chambre de Commerce de Constantinople* says that the cultivation of the red pepper plant occupies a very important place among the several branches of cultivation practised in Turkey. This cultivation is chiefly making progress in the cantons of Karadja Abad, in the districts of Vardar Yenidje and of Védine, vilaiyet of Salonica. Formerly the production of red pepper was unimportant, for it was limited to the requirements of local consumption in the vilaiyet, but since foreign contries have bought these peppers, cultivation has rapidly extended. The plant itself prefers a sandy and humid soil, where it grows sometimes almost in the water. It is estimated that the plant produces from 120 to 400 okes (oke = 284 lb.) of pepper per deunum (deunum = 40 square paces), according to quality. On an average the expenses do not exceed 300 gold piastres for the cultivation of each deunum, and the oke of this pepper costs from 30 paras up to 54 piastres, according to quality. The profit realised on the average is from 300 to 350 piastres per deunum. Harvesting only commences when the plants are entirely red. The produce of the first gathering is of superior quality, but that of the last is bad, as the pepper plant reddens imperfectly in the autumn. This year the yield of red pepper has reached in the canton of Yenidje Karadja Abad, the figure of 350,000 okes, and in that of Vedine Karadja Abad, about the same amount. Of this yield 45 per cent. is exported to Europe, 30 per cent. to Bulgaria, Servia, and Austria-Hungary, the remainder being sent to different parts of the Turkish Empire.

PEPPER.

*(From "Tea Planting in Ceylon," by "Eastward-Ho.")*

If you have a rich soil and a moist and warm climate (the moister and hotter the better) a more paying cultivation, and one likely to continue so in the face of any extensions that can be attempted, does not exist; and returns may be expected in the 3rd to 4th year or about as soon as from Coffee or Tea. The two chief sources of supply are the Straits Settlements and the Malabar Coast. In the former "John Chinaman" holds a monopoly of the industry, and one I fancy it is useless for outsiders to attempt to break through there, for he has wads and means of his own of making another man's estate "not profitable"; but though it has been ascertained that the actual annual returns amount to £80 to £100 per acre owing, to custom, and the Chinese system of loans, the crop passes through so many different hands—each employing his broker—that by the time it comes to the merchant for shipment the unfortunate cultivator finds himself the smallest gainer of all. But as profits accumulate, he in turn becomes lender; and so it goes on, each smiling a bland smile. Their system of cultivation is to grow in rows (7 x 7) against split posts about 6 inches in diameter, and 10 feet high, in the open, great care being taken to make the vines spread out thick at the base and gradually taper upwards, assuming the form of a pyramid. The vines average annually (two crops) about 5 lb. of cured pepper on a well-kept garden. On the Malabar Coast the system of cultivation differs: it being usual to grow against trees with branching heads kept freed of a certain portion of their foliage. The returns I cannot exactly state; but not less than at the Straits! In Ceylon though several species of pepper are indigenous and two or more varieties may be said to be semi-cultivated by the natives—that is to say they stick in a cutting against a Jak tree, and if it grows, in due course collect the produce—it is only within the last two years the industry can be said to have attracted the attention of planters. The first among us to attempt it was Mr. T. S. Dobree, after a visit to the Straits to satisfy himself as to probable profits, and ascertain in detail the Chinese system of cultivation. His attempts have been confined to Udugama, and there is now in the district a considerable acreage, on a number of estates, planted up with pepper; the only deviation from the Straits' system being the substitution of imbool (cotton tree) or Jak plants (to be kept dwarfed) in place of posts, as the latter have been found subject to the attack of white ants, and in consequence not sufficiently permanent.

There are several cultivated varieties, evidently, of the pepper vine, as Dr. Trimen, the Director of the Ceylon Botanical Gardens, has noted the Straits species to differ from any kind grown here, and that this must hold good as regards the Indian coast would seem equally evident, for there is a property (though why only one I do not know) there, that whilst the best white and very carefully ripened and cured pepper from the Straits fetches only 1s. per
PEPPER.

lb., its produce is quoted regularly at as high as 2s. 6d. per lb. A fabulous difference! I believe myself, by permitting shade, the vines should be found to yield profusely in certain parts of North Queensland. The cultivation, no doubt, will receive attention largely in Borneo later on amongst both Europeans and Chinese, as good (and useful) friend John I don’t think will be allowed to have quite his own way there; though as the chief source of the labor supply, he will hardly ever make it as peaceful a “planters refuge” as Ceylon. Plants can be raised readily from seed, which should be sown in shaded beds composed of rich compost, and regularly watered in dry weather. They should be allowed to remain in the nursery till a foot or so long. If cuttings are used, they ought not to remain less than two feet. In either case two at least should be planted at each post or tree. After having grown some length the vine should be turned down and buried in a shallow trench around the support, 5 to 6 inches only of the tip showing above ground, being careful to cover lightly with rich, soft loam and that the work be done in the wet season. The object of the above is to secure a stronger root growth, new shoots and roots striking out from the buried segment: but I am convinced that if not actually killed, the plant often is much weakened and its growth checked (probably equivalent to the loss of a season) either by being buried too deep; not enough at the tip left uncovered; stiff earth laid on; or if the work be done out of season. Pepper growing, in the first instance, requires a little practical understanding, to be fully successful, and a good deal of after care and attention. Burnt earth is said to be the best manure; its value though much depends of course on the chemical properties of the raw material. Thanks are due to Mr. Dobree for the letter appended.

MR. DOBREE’S NOTES ON PEPPER CULTIVATION.

Line 7×7 feet; choose flat or slightly undulating land. If at all steep land is used, it should be terraced at once. Cut holes 2 feet square by 15 inches deep, and fill in with good soil free from all stones and roots. Don’t heap up the earth when filling in the hole, but rather leave a hollow to catch all moisture. At the lower corner of the hole put in a post of split wood 12 feet long by 10 feet out of ground and about 8×8 inches square. This post must be of good hard wood, and have the end that goes into the ground cleaned and tarred. The vines at Singapore last for 20 or 30 years. I saw a garden said to be 30 years old, still bearing well, and the posts that had never been renewed were still standing.

These posts are the most expensive part of pepper planting, and I doubt, from what I know and what I have seen whether they will be suitable for Ceylon, where white-ants are much worse than in the Straits; they no doubt, however, succeed admirably for the purpose in Singapore. When suitable posts cannot be obtained, I advise putting in cuttings 6 feet long of either “imbul” (cotton tree), “suriya,” “enabudda,” or “hikgas.” I was told that the imbul or cotton tree is thought in Java to be the most suitable line tree to grow pepper on, and I find it the best down here. When the shoot from the cotton tree cutting or plant has grown to 10 feet from the ground, it should be topped and always kept as a pollard, both to prevent the pepper vine being shaded, and to keep the vine from running up too high. The cuttings must, of course, be put in in wet weather.

I also tried jak trees, putting in two jak seeds in every pepper hole. I found, however, that the growth of jak trees varies very much: some of my trees grown from seed put in in June 1881 were 5 or 6 feet high in December 1881, others were 1½ foot. Monkeys also pull out the jak plants, and crickets nip off the tops. I therefore consider cutting of the cotton are better, especially as they give something for the pepper vine to get hold off at once. Cotton tree plants can be used, and are easily raised from seed. When planting, put three cuttings or two good plants in each hole; both cuttings and plants should be 18 inches long when planted out. If plants are used, put their root end as far from the post as the hole will allow, and bury all the plant except the head and about 4 inches: this will cause the plant to throw out roots from all buried points and increase its powers of absorbing manure. As the plant grows, keep it buried till it reaches the post or cutting it is to grow up.

* From R70 to R150 per acre—889 posts per acre.
Plant the cutting or plants about 6 inches deep and shade well with fern—or some suitable and cheap substitute.

The Chinese make a small mound round each vine, but I think in Ceylon, where we have heavier downpours of rain, it is better to cut small drains 1 mamoty wide and deep between every row (the usual 18 inch drains 1 chain apart must also be cut) both up the hill and across, so that every vine shall stand in its own space. The earth from these drains will form a slight mound round the holes, and into this hollow all manure should be put. The Chinese never dig in their manure but just lay it on the surface.

This work need not be done till the clearing is planted.

The Chinese commence manuring (with burnt earth chiefly) directly the cuttings are planted, and manure twice a year when they can afford it; once always. Burnt earth, cattle manure, fish and I think lime and poonac would be the best. In some places, I believe in Sumatra, they let the vine run up to 5 feet, then take it off the post, and bury it in the ground, leaving the arch out of the ground, from which two or three suckers grow, and are trained up the post.

The Chinese in Singapore and Johore, who are said to be the best cultivators of pepper, do not do this, but plant their cuttings as I have described. They always use cuttings and only the ends or tops of branches, which they put in a Chinese nursery to root before planting out. I myself have found plants much more certain than cuttings and harder, but I was not able to obtain cuttings of the ends of branches only. The vines commence to bear at 4 or 5 years old. I saw a garden of this age in Singapore. The vines were about 6 feet up the post but bushy at the bottom, and had a maiden crop on them. I can't estimate how much an acre, but I think it was about 600 lb. per acre.

From a good old average vine—said to be 30 years old—I saw 30 lb. of green pepper taken and weighed. I saw several gardens that I believe averaged as much as this vine.

As pepper dries down to one-fifth of its green weight, this would be 6 lb. of marketable pepper, or at 889 vines per acre 5,334 lb. per acre for the autumn crop, and the Chinese said they got as much more for the spring crop. I did not see any spring crop, so cannot vouch for the truth of this total: say 10,000 lb. per acre per annum. I don't believe this.

The Chinese never, as far as I saw, plant more than from 10 to 15 acres of pepper in one garden along a carefully selected basin, and they cultivate each vine very highly, so that there are no bad vines in the whole acreage, until the garden is old and worn out.

A good average crop of pepper I have been told on reliable authority is about 28 piculs an acre or say 33 cwt., or rather over 4 lb. of prepared pepper per vine. The price of pepper in Singapore now $15 per picul, is very high and I was told that $10 was a safe price to calculate on. This would give 28 piculs at $10=$280, or say about $600 per acre as the value of the crop, and putting down the cultivation at the extreme limit of $200 per acre per annum, leaves a profit of $400 per acre. This sounds almost too good to be true, but I feel certain these profits are made out of the pepper gardens in Singapore and Johore, and there is no doubt that the Chinese have made very large fortunes from this cultivation. The preparation is very simple. The Chinese use a very rough drying drier something like the ordinary Sinhalese lime-kilns with warachies on the top and matting on which the pepper is spread to dry with fire underneath. White pepper is made from the best and uppest berries. It is placed in heaps for several days to ferment and then trampled out and washed and dried very much in the same way. Pepper is sold in England in bags of 14 lb. each. It is taken at 16 cwt. to the ton for black pepper, and 18 cwt. for white. By using winnowing and sizing machines, I am sure we would very much improve on the samples of Singapore black pepper, especially by picking out the grey peppercorns, for which work labour is too dear in Singapore. One penny per lb. covers shipping, insurance, loss on weight (which is from 6 to 10 per cent) brokerage and freight. Pepper damages tea, and some ships refuse it. The lowest price it has ever been down to is $6 per picul many years ago. For the last five years it has averaged from $10 to $15 per picul.

A free, rich soil is the best, and a continually wet climate. A long drought is said to cause the berries to fall off the branch before they are ripe. I could hear of no disease or blight that affected the vines, and certainly saw none on any of the many gardens I visited. The crop is picked with light step-ladders, the branches are picked whole, as soon as some of the berries begin to turn red and yellow. I don't think it possible to get all the berries
on a branch ripe before it is picked; some would fall off before all were ripe. I consider good chena land, if not steep and washed, as better for pepper than virgin forest, unless all the logs and roots of the latter are cleared away, for it is extremely difficult to work up pepper as it should be done with the logs and roots on the ground. The vines that grow over the old stumps of large trees are always the finest, as they seem to derive nourishment from the rotting timber.

The 4th year's crop should quite cover expenses, but I cannot state the cost of picking and curing. I believe that for such districts in Ceylon as those round Galle, Awisawella, Yatiyantota, and in fact all the south-west of the island, pepper will be one of the most remunerative products, if care is taken in selecting suitable localities for planting it. All ridges should be left in jungle so as to have plenty of earth available on the spot for using as manure when burnt. The Chinese pepper gardens are all surrounded by forest which, for about 2 chains from the pepper, have the earth for a foot deep at least all carried off during the course of years as manure.

I have forgotten to state that the vines should in no case be allowed to run up to the top of their post or pollard, until they have thickened out below. When the runner is 2 feet high the top should be nipped off to make it throw out laterals, and the vine should always be kept in the form of a sugar-loaf until it has got thick and bushy from the ground to the top of the pollard. If not stopped and made to thicken out, one single runner will get up to the top of the post or pollard in a year or 9 months' time and never become a good bearing vine.

T. S. DOBREE.
ALL ABOUT NUTMEGS.
ALL ABOUT NUTMEGS.

NUTMEGS.

The culture of Nutmeg, Clove, and West India Ginger, has been noticed from time to time in the Reports of the late and present Director of the Ceylon Royal Botanic Gardens. The estate of Aniyakanda near Jela, more than thirty-five years ago when the property of Mr. Anstruther, Colonial Secretary, was the scene of long-continued and expensive efforts on his part to make the cultivation of nutmegs and cloves successful in this country, but the attempt failed there as in other places, notably at Mount Attidiya, near Mount Lavinia. The district of Nilambe is another part of the country where nutmegs have been cultivated on a large scale. About 25 acres were planted with this spice on General Sir John Wilson’s estate, and the trees kept up in high cultivation for many years; but, these being unproductive, coffee was planted between the rows of nutmeg trees. The nuts produced were few in number and of inferior quality, notwithstanding that every necessary care was bestowed on their cultivation. There is a nice grove of nutmegs on Roseneath estate near Kandy. In the Directory a very few acres of nutmegs are now returned from the planting districts shewing apparent neglect or abandonment; for in 1883, as much as 250 acres of Nutmegs were returned as cultivated.

Some of the finest Nutmeg trees now in the island are to be found in the grounds of the Ratnapura resthouse, planted about 30 years ago and these are bearing heavily. Mr. C. Shand has begun planting nutmegs freely on his Rakwana estates, and we also hear of planting on an estate near Bentota.—Further information respecting the cultivation in Ceylon will be found farther on.

NUTMEGS.

(From the “Encyclopædia Britannica,”—1884 Edition.)

The spice known in commerce under this name is the kernel of the seed of Myristica fragrans, Houtt., a dioecious evergreen tree, about 50 to 60 feet high, found wild in the Banda Islands and a few of the neighbouring Islands, extending to New Guinea but not to the Philippines. Nutmeg and Mace are almost exclusively obtained from the Banda Islands, although the cultivation has been attempted with varying success in Singapore, Penang, Bengal, Réunion, Brazil, French Guiana, and the West Indies. The trees yield fruit in eight years after sowing the seed,
reach their prime in twenty-five years, and bear for sixty years or longer. Almost the whole surface of the Banda Islands is planted with nutmeg trees, which thrive under the shade of the lofty Canarium commune. The light volcanic soil, shade, and excessive moisture of these islands, where it rains more or less during the whole year, seem exactly to suit the requirements of the nutmeg tree. In Bencoolen these trees bear all the year round, but the chief harvest takes place in the latter months of the year, and a smaller one in April, May, and June. In the Banda Islands the fruits are collected in small neatly-made oval baskets at the end of a bamboo, which prevents bruising, the baskets being open for half their length on one side and furnished with a couple of small prongs projecting from the top, by which the fruit-stalk is broken, the fruit falling into the basket. The ripe fruit is about 2 inches in diameter, of a rounded pear-shape, and when mature splits into two halves, exposing a crimson arillus surrounding a single seed. When the fruit is collected the pericarp is first removed; then the arillus is carefully stripped off and dried, in which state it forms the mace of commerce. The seed consists of a thin hard testa or shell enclosing a kernel, which, when dried, is the nutmeg. To prepare the nutmegs for use, the seed enclosing the kernel is dried at a gentle heat in a drying-house over a smouldering fire for about two months, the seeds being turned every second or third day. When thoroughly dried the shells are broken with a wooden mallet or flat board and the nutmegs picked out and sorted, the smaller and inferior ones being reserved for the expression of the fixed oil which they contain, and which forms the so-called oil of mace.

The dried nutmegs are then rubbed over with dry sifted lime. The process of liming, which originated at the time when the Dutch held a monopoly of the trade, was commenced with the view of preventing the germination of the seeds, which were formerly immersed for three months in milk of lime for this purpose, and a preference is still manifested in some countries for nutmegs so prepared. It has, however, been shown that this treatment is by no means necessary, since exposure to the sun for a week destroys the vitality of the kernel. Nor is the dry liming process needful, for nutmegs keep well in their natural shell, in which form they are usually exported to China. The weight of the shells, however, adds one-third to the cost of freight, hence this plan is not generally adopted. Penang nutmegs are never limed. The entire fruit preserved in syrup is used as a sweetmeat in the Dutch East Indies.

"Oil of mace," or nutmeg butter, is a solid fatty substance of a reddish-brown colour, obtained by grinding the refuse nutmegs to a fine powder, enclosing it in bags and steaming it over large cauldrons for five or six hours, and then compressing it while still warm between powerful wedges, the brownish fluid which flows out being afterwards allowed to solidify. Nutmegs yield about one-fourth of their weight of this substance. It is partly dissolved by cold alcohol, the remainder being soluble in ether. The latter portion, about 10 per cent. of the weight of the nutmegs, consists chiefly of myristin, which is a compound of myristic acid, C14H29O2, with glycerine. The fat which is soluble in alcohol appears to consist, according to Schmidt and Roemer (Arch. Pharm. [3], xxi. pp. 34-48), of free myristic and stearic acids; the brown colouring matter has not been satisfactorily investigated. Nutmeg butter yields on distillation with water a volatile oil to the extent of about 6 per cent., consisting almost entirely of a hydrocarbon called myristicene, C16H30, boiling at 165° C. It is accompanied by a small quantity of an oxygenated oil, myristicol, isomeric with carvol, but differing from it in not forming a crystalline compound with hydrosulphuric acid. Mace contains a similar volatile oil, maceene, boiling at 160° C., which is said by Cloez to differ from that of nutmegs in yielding a solid compound when treated with hydrochloric acid gas.

The annual imports of nutmegs to the United Kingdom amount to from 400,000 to 800,000 lb., each lb. consisting of about 110 fair-sized nutmegs, and of mace from 60,000 to 80,000 lb. per annum. The former are valued at from three to five shillings per lb., and mace at from one to three shillings per lb.*

Long, wild, or male nutmegs, the production of M. tomentosa and M. fatua, are sometimes imported in small quantities. Several species of Myristica yield fatty oils, which form commercial products, but none of these are remarkable for fragrance.

The name nutmeg is also applied to other fruits or seeds in different countries. The Jamaica or calabash nutmeg is derived from Monodora Myristica, the Brazilian from Cryptocarya moschata, the Peruvian from Laurelia sempervivens, the New Holland or plum nutmeg from Atherosperma moschata, the Madagascar or

* This spice seems to be an especial favourite with the people of the United States, since the export to that country exceeds that to all Europe combined.
clove nutmeg from *Agathophyllum aromaticum*, and the Californian or stinking nutmeg from *Torreya myristica*. The cotyledons of *Nectandra Puchury* were at one time offered in England as nutmegs.


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**NUTMEGS AND MACE.**

(From "Spon's Encyclopædia.")

(FR., *Muscades et Macis*; GER., *Muskatnüsse und Muskathütte*).—The fruit of *Myristica fragrans* [moschata, officinalis], somewhat resembling a small round pear, contains a single seed, the kernel or nucleus of which forms the "nutmeg" of commerce, while its fleshy crimson envelope (orillis) is called "mace." The tree is a bushy evergreen of 40-50 ft., found wild in the Banda Islands, Damma, Amboina, Ceram, Bouro, Gilolo (Halmahera), the W. peninsula of New Guinea, and in many neighboring islands, but not indigenous westward of these, nor to the Philippines. It has been introduced with varying success into Bengoolen (W. Sumatra), Malacca, Bengal, Singapore, Penang, Brazil, the W. Indies, French Guiana, and Réunion; but the Banda Isles remain the chief nutmeg-garden of the world. Of these islands, three are planted with the trees, viz. the Great Banda or Longhoir, Banda Neira, and Pulo Aai. There are in all 34 parks, containing 319,804 bearing trees. The total produce from these yearly is about 4,000 piculs (of 139 lb.) of nutmegs, and 1,000 of mace; this gives little more than 14 cnts. (of 139 lb.) of spice for each tree per annum, but then a very large proportion of the produce is lost from the following causes: much cannot be collected from the height of the trees, and the inaccessible places in which hundreds of them are placed, and much is lost by wind-falls; a large pigeon called *walnut* feeds extensively upon the fruit, and ejects it after digesting the mace; besides these, field-rats eat the nuts. The distribution amongst the islands is in the following proportions: Great Banda, 25 parks; Neira, 3 parks; Pulo Aai, 6 parks. The chief labour is performed by convicts furnished by the Dutch Government, there being no indigenous population in Banda.

The only attempt at cultivation is the cutting close with long knives the ferns and grass below the trees. There does not appear to be that tendency to the growth of weeds and underwood that exists so strongly in the Straits, to the great detriment of the planters. No manure or artificial stimulus is used; the plants deposited abundantly by the pigeons are merely taken up and stuck in wherever a vacancy occurs, therefore no regularity is observed. In some places clumps of trees are growing together not more than 10-12 ft. apart, all growing without exception under the shade of the *canari* (*Ganarium commune*). The nutmeg cannot be said to be cultivated in Banda; it is merely collected. It has occupied a prominent position there from time immemorial.

With regard to the differences that exist between the Banda trees and those of the Straits, the first remarkable feature is their respective heights. The tree of the Straits is a mere shrub compared with that of Banda, where 50—60 ft. is no uncommon size. It would appear that the shading is overdone in the Straits, at the same time, owing to the strong winds that constantly prevail, the tree needs shelter of some description. The tree as a genetal rule does not bear fruit before the 8th or 9th year, and is not considered in its prime until about 25 years old; it is said to bear well up to 60 years, and even longer. The male tree is much shorter lived than the fruit-bearing one. The parkineers in the Bandas do not estimate the proportion of males above 2 per cent.; if this be the case, there are far too great a number in the Straits plantations. With respect to the proportion of males and females yielded by a given number of planted seeds, the parkineers say they never get more than 30 per cent. of males, and seldom so many; this again is far better than Straits planters can boast of. The Banda fruit hangs upon longer and more slender stalks than the Straits, the skin is more free from all blemish, more thin relatively to the fruit, and of more uniform proportion. The black spot or gangrene of the outer covering exists among the Banda plantations, but the slight a degree that but little account is taken of it. It is caused by an insect depositing its larvæ in the husk; they feed on the saccharine matter of the outer covering, until it bursts, when they make their way into the soft nut itself, and become the small weevil so well known to all planters. The Banda
NUTMEGS.

nuts frequently split before maturity, as in the Straits; this is produced by similar causes,—cold, damp weather, and sudden changes of temperature. The Banda trees bear more or less every month throughout the year, but there are four months in which the crop is four or five times its usual quantity; these are May, June, September, and October. The Banda method of collecting the fruit is far better than that adopted in the Straits. They use neatly made oval baskets of Bamboo, open for half their length on the upper side, with a couple of prongs projecting from the top; these seize the fruit-stalk, and, by a gentle pull, the nut falls into the basket, which is capable of containing three or four nutmegs. Thus the mace is not spoiled or bruised by falling on the ground, and there is no searching about the grass for the escaped nut.

The Banda manner of breaking them when dried is also superior. This is done by spreading them on a sort of drumhead, and striking them with flat pieces of board. Several are cracked at each stroke, swept off, and resupplied as fast by a man standing alongside. One man in this way will break more nuts without injury than half a dozen men after the Straits fashion. Women and children are employed in the collection of the produce, which is brought in twice a day. The mace is removed by scraping with large knives from the bone, and is probably not a little injured by the operation. The operation of removing it by the hand from the apex is decidedly preferable, as the interlacings of the mace are thus freed, and the blade is better expanded. In Banda, the mace is dried in the sun, and delivered monthly at the Government godowns; the nuts are smoked in the usual Straits fashion, by slow wood fires, for three months, and delivered quarterly. The mace, when received, is divided into three qualities, and packed in casks containing about 280 lb.; in packing, very slight pressure is used, such as a man standing in the cask and treading down the spice as it is filled in. The nuts, when broken, are packed in wooden bins, filled up with lime and water to the consistency of mortar, where they are allowed to remain for three months, the bins being carefully closed and marked. At the expiration of three months, they are taken out, sorted into three qualities, and packed in casks similar to those used for the mace; these casks are all made of the best Java teak. The refuse nuts are ground down to a fine powder, and converted into "nutmeg butter," by steaming them over large caldrons for 5 or 6 hours, and compressing the warm mass, packed in bags, between powerful wedges, when a brownish-coloured fluid runs out. This on cooling becomes a saponaceous appearance and consistency, and is the "nutmeg-butter" or "mace-oil" of commerce.

It should be observed that the Banda method of breaking and liming the nuts, which originated with the Dutch policy of monopolizing the culture by destroying the vitality of the exported nuts, is still widely persisted in, and even necessary to suit the prejudices of certain markets. But our planters in Bencoolen adopted a much simpler plan, and one which did not entail the spoiling of a large proportion of the nuts. It consists in exposing the nuts on frames to the gentle heat of a smouldering fire, with proper ventilation, for 2 months, turning them every 2nd or 3rd day; the shells are then cracked by a wooden mallet, and the assorted nuts are rubbed over with dry lime. Even dry liming is said to be unnecessary, as the nuts keep well in their shells, and are thus imported into Chinese markets; but the weight of the shells adds a third to the cost of freight, which is important in long transport.

The Banda Isles remain the chief source of nutmegs and mace, despite all attempts to establish the culture elsewhere, and the figures show a continuous increase in the exports. The shipments from Java of Banda produce in 1878-9 were:—Nutmegs, 10,475 "piculs" (of 133 lb.) and 7 cases to Holland, 266 "piculs" to America, 302 "piculs" to Singapore, 78 "piculs" and 11 cases to Port Said, 54 "piculs" to France, 9 "piculs" to England; mace: 2,832 "piculs" and 26 cases to Holland, 18 "piculs" to England, 14 "piculs" to Singapore, 10 "piculs" and 6 cases to Port Said. In 1879-80, the figures were:—Nutmegs: 5,216 "piculs" to Holland, 61 to France, 1,130 to America, 31 to Australia, 777 to Singapore, total, 7,215; mace: 1,902 "piculs" to Holland, 103 to America, 4 to Australia, 23 to Singapore, total 2,032. The exports from Penang in decennial periods were:—1840, 598 "piculs" (of 133 lb.) nutmegs, 159 of mace; 1850, 2,086 of nutmegs, 656 of mace; 1860, 6,421 of nutmegs, 2,094 of mace. Penang nutmegs have never been limed. Singapore, in 1848, had 1,190 acres under nutmegs, containing 71,400 trees, and producing 624 cwt. of nutmegs and 156 of mace. The whole export from the Straits in 1867 was 485,123 cwt. nutmegs, 50,559l., and 5,416 cwt. mace, 7,354l.; the combined total in 1877 was 5,333 "piculs" (of 133 lb.). In later years, the figures include all spieces except pepper. The nutmeg parks
of the Straits have never recovered from the disastrous effects of a blight which attacked them in 1857. The exports from Sumatra were 1,952 piculs of nutmegs and 403 of mace in 1872; and 2,237 of nutmegs and 568 of mace in 1873. The port of Padang alone shipped 284 piculs of nutmegs and 26 of mace in 1874; and a total of 2,766 piculs in 1871. The French island of Réunion exported 5,000 lb. of nutmegs and 900 of mace in 1864, and more in 1871, but the culture is declining. The tree succeeds well in the W. Indies, and numbers are to be found under semi-cultivation in Jamaica, Dominica, and Grenada.

Our annual imports of nutmegs amount to 400,000—800,000 lb.; and of mace, 60,000—80,000 lb. The London market values of nutmegs vary with their size, as follows:—7s.60—7s.60 a lb.; 90—80, 2s.10d.—3s. 7d.; 13s.2s. 8d.—2s. 11d. The approximate price of mace is 1s.—3s. a lb. for 1st quality, and 1s.—1s. 8d. for 2nd and inferior.

Other so-called "nutmegs" which figure very rarely or not at all in commerce are as follows:—American, Jamaican, or calabash (Monodora Myristica); Brazilian (Cryptocarya moschata); Californian or stinking (Torreya Myristica); Madagascar or Clove (Agathophyllum aromaticum); long, male, or wild (Myristica tomentosa and M. fatua), sometimes imported; Peruvian (Laurelia sempervirens), used as a spice in Peru; plume (Atherosperma moschata); Santa Fé (Myristica Otoba), edible.

AMERICAN NUTMEG-OIL. (Fr., Suif de Virola).—The "American nutmeg" called Virola sebifera Myristica sebifera, known as jejomadon to the Creoles, and as malaguetto de montana in Panama, is common in the forests of Guiana and N. Brazil, and extends as far as Panama. The seeds are there bruised, and macerated in boiling water, when a fatty substance separates from them, floats on the water, and solidifies by cooling. This solid fat is transported to Europe in the form of bricks, and has been received in considerable quantities. The yield from the seeds is stated at 26 per cent. The fat is completely soluble in alcohol, ether, and potash lye; its fusing-point is 44° (111° F.); it forms a hard soap, and is admirably adapted for making candles, which burn with a pleasant aromatic odour.

NUTMEG-BUTTER OR MACE-OIL. (Fr., Beurre de Muscade; Ger., Muskatbutter, Muskatsausöl).—The fixed or fatty oil obtained from the nutmeg must not be confused with the essential oil, which is described in another section. The fixed oil or butter is extracted from refuse nuts, by powdering, heating in a water-bath, and pressing while still hot. The yield is about 28 per cent. The fat is a solid unctuous substance, with an orange-brown colour of varying intensity, and presenting a mottled appearance; it has a pleasant odour, and fatty, aromatic flavour; its sp. gr. is 1.010—1.018; it melts at 45° (113° F.); and dissolves perfectly in 2 parts of warm ether, or 4 of warm alcohol at 0°800 sp. gr. It contains a large proportion of myristine, among other glycerines, and about 6 per cent. of the essential oil before mentioned. We import the article chiefly from Singapore, in oblong blocks measuring about 10 in. by 2 in. sq. wrapped in palm-leaves.

MACE AND NUTMEG-OILS. Besides the fatty oils afforded by mace and nutmegs, they yield essential oils by aqueous distillation. That from mace is thin, yellowish, with a strong odour of mace, burning aromatic flavour, deposits no solid at—12° (103° F.) begins to boil at 160° (320° F.), the temperature rising to 180° (356° F.). Nutmeg-oil is thin, nearly colourless, with strong odour and flavour of the seeds, sp. gr. 0°850, deposits no sediment at—7° (19° F.), commences to boil at 160° (320° F.), the temperature rising to above 200° (392° F.). These oils are used for scented soap.

NUTMEGS AND MACE.

(From Simmonde's "Commercial Products of the Vegetable Kingdom").

The tree which produces these spices is the Myristica moschata, Thunberg; M. fragrans. Houttuyen; M. aromaticum, Lam.; M. officinalis Lin.; a native of the Moluccas. The tree attains a height of 20 to 30 feet and greatly resembles our pear tree. The fruit, which is singularly beautiful is pear-shaped, about the size of an apricot. As it ripens, the pulp, which is nearly half-an-inch thick, and of a whitish colour, opens and displays the nutmeg in its black and shining shell, encircled by a network of mace.

The tree begins to bear when ten years old, and goes on improving during the space of a century. The fruit is gathered two or three times a
Nutmegs.

year. Three sorts of nutmegs are distinguished, namely, the male or barren, the royal, and the queen. The last, which are small and round, are preferred to the others, which are large and oval.

In 1830 the duty on nutmegs was 2s. 6d. per lb. on British grown, and 3s. 6d. on foreign, and the consumption was 121,260 lbs., which had increased in 1837 to 134,115 lbs. In 1836, wild nutmegs were admitted at 1s. duty. In 1846, the rates for British and foreign were equalized to 2s. 6d., and for wild lowered to 3d. per lb. In 1847, a distinction was made between wild in the shell and wild "not in the shell," the former being charged 3d. and the latter 5d. per lb. The home consumption in 1859 was 205,783 lbs. The duty on all spices has long since been abolished. The following figures give the Imports of nutmegs into the United Kingdom for a series of years; but they have not been separately specified in the Board of Trade returns for the last six years:

<table>
<thead>
<tr>
<th>Year</th>
<th>Quantity</th>
<th>Value</th>
<th>Year</th>
<th>Quantity</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>lb.</td>
<td>£</td>
<td></td>
<td>lb.</td>
<td>£</td>
</tr>
<tr>
<td>1856</td>
<td>462,600</td>
<td>54,602</td>
<td>1864</td>
<td>809,095</td>
<td>48,864</td>
</tr>
<tr>
<td>1857</td>
<td>462,972</td>
<td>51,738</td>
<td>1865</td>
<td>771,971</td>
<td>42,621</td>
</tr>
<tr>
<td>1858</td>
<td>421,715</td>
<td>39,695</td>
<td>1866</td>
<td>563,855</td>
<td>31,788</td>
</tr>
<tr>
<td>1859</td>
<td>451,561</td>
<td>39,120</td>
<td>1867</td>
<td>370,193</td>
<td>23,417</td>
</tr>
<tr>
<td>1860</td>
<td>532,208</td>
<td>42,157</td>
<td>1868</td>
<td>682,139</td>
<td>43,245</td>
</tr>
<tr>
<td>1861</td>
<td>574,164</td>
<td>33,440</td>
<td>1869</td>
<td>809,589</td>
<td>57,818</td>
</tr>
<tr>
<td>1862</td>
<td>511,023</td>
<td>32,223</td>
<td>1870</td>
<td>537,978</td>
<td>32,513</td>
</tr>
<tr>
<td>1863</td>
<td>551,577</td>
<td>27,160</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The nutmeg is propagated from fresh seeds (nutmegs) and these vary greatly in size and shape, just as apples and pears do raised from seeds. There can hardly be a more profitable crop than the nutmeg at present prices. The annual yield of a good tree of sixteen or eighteen years' growth, and covering about 600 square feet surface, is about 10 lbs., which, at an average of 2s. per lb., gives a value of produce per acre, per annum, of over 70l., exclusive of the yield of mace, 1 lb. each tree, which at 4s. is equal to 10l. more. The fruit of the nutmeg takes nine months to mature.

In the year 1619, the Dutch took possession of the Spice Islands, and while encouraging to the utmost of their power the culture of the nutmeg tree in a few of them, ruthlessly destroyed all the trees in the surrounding islands. Two years after the occupation of the Moluccas by the British in 1796, the nutmeg tree was planted at Bencoolen, in Sumatra, and shortly afterwards the culture was undertaken in the Straits Settlements.

The Banda islands, where nutmeg culture is carried on by the Dutch, are Great Banda or Lonthoir, Neira and Ay. The annual production there in the fifteen years ending 1854, was 579,321 lbs. of nutmegs, and 137,392 lbs. of mace. There are about thirty-four nutmeg gardens there. These differ in size, the number of trees varying from 4000 to 28,000, and the produce is from 5,000 to 32,000 of nutmegs. These are classed into medium, inferior, and broken nuts, and the mace into good and chips. As the consumption would seem to be increasing, and the production does not keep pace, the value is likely to rise, although the price has doubled in the last two years. In 1863, the combined shipments of nutmegs and mace from Java were 900,000 lbs. In 1870 the shipments of nutmegs alone was 5,931 piculs; and in 1871, 8,107 piculs, of which more than a fourth went to the United States.

The British production in the Straits Settlements twenty years ago exceeded the Dutch crop, the total yield of the Bandas in 1855, being but 4,032 piculs.
of nutmegs and 1,000 of mace. The production of Pinang alone (exclusive of Singapore) was as follows, for ten years:—

<table>
<thead>
<tr>
<th>Year</th>
<th>Nutmegs</th>
<th>Mace</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1846-47</td>
<td>1,519</td>
<td>477</td>
<td>1,996</td>
</tr>
<tr>
<td>1847-48</td>
<td>2,077</td>
<td>661</td>
<td>2,738</td>
</tr>
<tr>
<td>1848-49</td>
<td>2,178</td>
<td>666</td>
<td>2,844</td>
</tr>
<tr>
<td>1849-50</td>
<td>2,086</td>
<td>656</td>
<td>2,742</td>
</tr>
<tr>
<td>1850-51</td>
<td>2,564</td>
<td>751</td>
<td>3,315</td>
</tr>
<tr>
<td>1851-52</td>
<td>2,625</td>
<td>886</td>
<td>3,511</td>
</tr>
<tr>
<td>1852-53</td>
<td>3,020</td>
<td>781</td>
<td>3,801</td>
</tr>
<tr>
<td>1853-54</td>
<td>2,768</td>
<td>887</td>
<td>3,655</td>
</tr>
<tr>
<td>1854-55</td>
<td>3,294</td>
<td>898</td>
<td>4,192</td>
</tr>
<tr>
<td>1855-56</td>
<td>4,624</td>
<td>1,130</td>
<td>5,754</td>
</tr>
<tr>
<td>Total</td>
<td>26,755</td>
<td>8,003</td>
<td>34,758</td>
</tr>
</tbody>
</table>

The following shows the decennial progress of the exports from Pinang, in piculs:

<table>
<thead>
<tr>
<th>Year</th>
<th>Nutmegs</th>
<th>Mace</th>
</tr>
</thead>
<tbody>
<tr>
<td>1840</td>
<td>598</td>
<td>159</td>
</tr>
<tr>
<td>1850</td>
<td>2,086</td>
<td>656</td>
</tr>
<tr>
<td>1860</td>
<td>6,421</td>
<td>2,094</td>
</tr>
</tbody>
</table>

There were, in 1860, 14,502 acres under culture with spices of all kinds, namely, 13,153 in Pinang, and 1,349 in Province Wellesley. Pinang nutmegs are always shipped in the natural state, and not limed.

In 1848, there were 1,190 acres under nutmeg trees in Singapore, containing 71,400 trees, which produced 624 cwt. of nutmegs and 156 cwt. of mace. In 1855, there were 2,639 nutmeg trees bearing, and 34,000 young trees. The production was but 89,379 nutmegs, which were then valued at 3½ dollars per 1,000.

The island plantations in Singapore and Pinang have never recovered the severe blight which, in 1857, destroyed nearly every nutmeg tree then in existence. The plantations at that time were yielding at the rate of 30l to 40l. per acre. The lands formerly in nutmeg cultivation are now planted with coconut and other fruit trees, which, although not so valuable as the nutmeg, yield a fair return for the capital and labour expended. The Chinese have, however, lately commenced to replant the nutmeg tree, and with every prospect of success.

In 1867, 485,123 cwt. of nutmegs valued at 50½59l. and 5,416 cwt. of mace, valued at 7,354l., were shipped from the Straits Settlements.

Our imports of unenumerated spices from Singapore in the last five years (exclusive of pepper) are stated below; Singapore is, however, the entrepôt of the Eastern Archipelago, and receives large quantities from Sumatra and Borneo:

<table>
<thead>
<tr>
<th>Year</th>
<th>Quantity</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1871</td>
<td>640,544</td>
<td>45,821</td>
</tr>
<tr>
<td>1872</td>
<td>1,282,066</td>
<td>112,424</td>
</tr>
<tr>
<td>1873</td>
<td>552,719</td>
<td>48,867</td>
</tr>
<tr>
<td>1874</td>
<td>336,882</td>
<td>45,327</td>
</tr>
<tr>
<td>1875</td>
<td>432,992</td>
<td>54,056</td>
</tr>
</tbody>
</table>

From the west coast of Sumatra there was shipped in 1872, 1,953 piculs of nutmegs, and 403 piculs of mace; in 1873, 2,937 piculs of nutmegs and 568 of mace. In 1874, from the southern division of Padang alone, 284 piculs of nutmegs and 28 of mace; 130 piculs of the nutmegs were sent to Pinang.
The cultivation of nutmegs is much in favour in Jamaica just now, and 2,000 plants are under propagation in the Government Botanic Garden for distribution. A fine nutmeg tree there is stated to have had upwards of 4,000 unusually large fruit upon it. The value, calculating ninety nuts to the pound, would be 44 lb., worth at least 3s., or in all 6l. 12s.

The Island Botanist reports as follows on the culture of the nutmeg:—

"This plant, I consider, is the most generally prized, as it is undoubtedly the most frequently applied for of all that are under cultivation. Notwithstanding this, and that the plant has been introduced into this island some forty or fifty years, and has yielded thousands of fruits annually during the greater part of that time, there are, as nearly as I am enabled to judge, not more than probably fifty bearing trees in the whole island; and this, too, in a country where the tree yields fruit of the finest quality, and in the utmost profusion. The great majority of the bearing trees are in the immediate vicinity of Bath. In my recent tour throughout a great part of the island I found that nutmegs were unknown to cultivation, although large tracts through which I passed are admirably adapted for their growth. I consider that the cultivation of this tree deserves the utmost encouragement, especially amongst the peasantry, as I am strongly inclined to think that as a remunerative industry even coffee would find in it a very formidable rival.

"The nutmeg trees at Castleton are now beginning to bear, and about 150 plants have been recently planted, and this number will soon be augmented. I expect that one acre of plants will be shortly set out. I have also made arrangements at the Bath Garden for bedding all the seeds obtainable there, and these will probably amount to 3,000 plants a year, which I purpose offering for sale at a moderate rate per hundred. This tree succeeds best in a rich, deep, friable soil, over a gravelly subsoil forming a natural drainage. The form of the ground ought to be undulating, to assist the running off of all superfluous water, as there is no one thing more injurious to the plant than water lodging around its roots; although, in order to thrive well, it requires an atmosphere of the most humid kind. This tree begins to bear about the seventh year; and a few years after the average annual yield from each tree may be calculated at from 1,000 to 5,000 fruit."

Nutmegs are valued a good deal according to size, the largest being the best; thus, those of 68 to the lb. will fetch 4s. 6d.; while very small, 120 to the lb., will be worth but only half that price.

The shape of the nutmeg varies a good deal, being spherical, oblong and egg-shaped, but the nearer they approach sphericity of figure the more highly are they prized. Those of good quality ought to be nearly round, and the largest and finest weigh on the average about a quarter of an ounce each. They should have an agreeable flavour, but rather bitter, and when pierced exude an oily juice.

It was at one time thought, for a few years, that the culture would receive a great development in French Guiana, but at last, either from want of proper care, or public infatuation giving way to complete indifference, the nutmeg plantation were gradually given up. Notwithstanding repeated trials in various colonies in the Indian Ocean, West Indies, and America, the nutmeg does not seem to thrive well, and succeeds only in the localities of the Indian Archipelago.

In 1864, there was a small export of 5,000 lbs. of nutmegs and 900 lb. of mace from Reunion, and in 1871 the shipments were rather larger, but the production has declined altogether.

A fraud is often practised in disguising worm-eaten nuts by filling up the holes with mastix. They are also often first deprived of their essential oil by distillation, or steeping in alcohol. Nutmegs yield when distilled with water a volatile or essential oil of nutmegs, in the proportion of about 2 per cent., and mace an oil of nearly similar properties. A concrete oil, known as nutmeg butter, is also imported from the Moluccas; it is prepared by heating nutmegs and afterwards submitting them to pressure. The Myristica sebifera, of South America, also yields an oil by expression.

Wild nutmegs of a longer shape are the produce of Myristica fatua or tomentosa, and are often imported. Lieut. Cameron states that in his explorations in Central Africa he met with large groves of wild nutmeg trees. A wild nutmeg is also yielded by a Brazilian tree, Cryptocarya mosehata. A false nutmeg, called in Guiana the Ackawa nutmeg, is the fruit of Aerodictodium Camara. Another kind has occasionally been imported on the Continent from Madagascar and Bourbon under the name of clove nutmegs, or ravensara nuts; they are the produce of Agathophyllum aromaticum.
There are several other kinds of nutmegs derived from different species of *Myristica*, which are in use in various parts of the world, but as they are much inferior in their qualities, and are not found in commerce, it is unnecessary to describe them here.

Mace is the reticulated scarlet arillus enveloping the thin, dark brown, glossy, oval shell which covers the nutmeg. When dry, the mace becomes yellow, brown and brittle. In preparing it, it is said to be first steeped in a weak salt solution, which renders it supple and preserves the aromatic principle.

In 1830, the duty on mace was higher than on nutmegs, being 32. 6d. per lb. on British produce, and 42. 6d. on foreign; the home consumption then was 12,600 lb. In 1835, it had increased to 18,835 lb. The duty was then fixed at 26. 6d. for all descriptions, and in 1852 the consumption was 21,485 lbs. In 1853, the duty was lowered to 18. per lb., and the consumption had increased in 1859 to 34,714 lbs.

The following figures show the imports of mace as far as they have been officially recorded by the Board of Trade:

<table>
<thead>
<tr>
<th>Year</th>
<th>lb.</th>
<th>Year</th>
<th>lb.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1862</td>
<td>81,689</td>
<td>1867</td>
<td>26,269</td>
</tr>
<tr>
<td>1863</td>
<td>48,649</td>
<td>1868</td>
<td>88,996</td>
</tr>
<tr>
<td>1864</td>
<td>55,175</td>
<td>1869</td>
<td>75,922</td>
</tr>
<tr>
<td>1865</td>
<td>63,563</td>
<td>1870</td>
<td>60,869</td>
</tr>
<tr>
<td>1866</td>
<td>110,789</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The shipments of mace from Java in 1871 were 2,101 piculs, and from Padang, in Sumatra, 457 piculs.

Nutmegs and mace are employed chiefly as condiments for ordinary purposes, for which they are admirably suited by their agreeable taste and stimulating properties. As remedial agents they owe their activity to the volatile oil which they contain, and when administered in moderate quantities, produce the usual effect of the other spices. Their use requires caution in those subject to apoplexy and other cerebral affections, as they possess narcotic properties. Taken in small quantities these spices assist digestion, dispel flatulence, strengthen the viscera, and stop dysentery.

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**NUTMEGS.**

*(From Porter’s "Tropical Agriculturist."*)

The Nutmeg-tree—*Myristica Moschata*, a genus of plants belonging to the class *Dioecia*, and order *Syngenesia*, and of the natural order *Lauri*.

This spice is likewise the produce of the Moluccas, and its history is exactly similar to that of the clove. In this case, the more certainly to retain the whole of the trade within their own hands, the Dutch confined the cultivation of the nutmeg tree to the island of Banda, where a system of oppression was practised on the unfortunate natives, which occasioned almost their total destruction. Even when under the temporary sway of the English, the same system was pursued, inimical alike to the principles of sound policy and of humanity. Sir Thomas Raffles, writing in 1815, makes the following observations on this subject:

"Nutmegs, which ought to be as cheap as betel-nuts, and cloves no dearer than pepper, are, by the present system, confined to the consumption of the rich alone. But this is not the main evil; did the unfortunate people, by whose industry these spices are produced, and on whose soil they grow, benefit in any way by this high price, an excuse might be found. But, to the disgrace of humanity, the original inhabitants of these miserable islands are nearly extinct; the wretched remains are in a state of the most object poverty. The gardens of Banda, where all the nutmegs are produced, are worked by *slaves*, and the public duties carried on through by forced services. The inhabitants of these remote islands as yet know nothing of British government; and the British government knows still less of its unfortunate and suffering subjects. If, on commercial principles, it may be deemed advisable that these spices shall be collected into few hands, let the gardens or their produce be farmed out. Let the East India Company, or any association of Europeans, enter into the speculation, but let the British government preside."

It proved a vain endeavour to confine the growth of the nutmeg-tree wholly to the island of Banda. It is said that the wood-pigeon, which feeds on the fruit, has often been the means of disseminating the plant beyond the narrow limits to which the selfish policy of man would confine it; and that...
it has, in consequence, been found growing naturally through a much wider range than the clove.

Forrest ascertained that the nutmeg-tree grew in New Guinea, and thence transplanted it to the Philippine Isles. The French, as already stated, at an early period cultivated the nutmeg as well as the clove in the Isle of France, and thence extended its cultivation to their Western dependency, Cayenne. In Sumatra it has likewise been cultivated with success. We learn from Sir T. Raffles that, in 1820, there was a plantation at Bencoolen of one hundred thousand nutmeg-trees, one-fourth of which were in full bearing. Their growth and produce in this island are equal, in luxuriance and abundance, to those of the Moluccas, but their culture is considered more expensive.

During the short peace of Amiens, the tree was first introduced into the British West Indies, two plants having been then imported from Cayenne to the Island of St. Vincent. One of these plants died, and the other, proving to be a male-tree, it was aided by two others which had been conveyed from India to Trinidad in 1806. These were cultivated successfully, and from this stock plants proceeded. A few of these, when about five years of age, were transplanted into the Botanical Garden at Trinidad in 1820; and, three or four years after, fifty more plants were procured from St. Vincent. Thirty-two out of these were female, or fruit-bearing trees, from which, in the summer of 1830, more than twenty pounds of nutmegs were obtained, and transmitted to the Society for the Encouragement of Arts, &c. for their approval. These nutmegs were submitted by the society to the inspection of the most experienced spice merchants, who declared that most of them were equal to the Eastern produce, and would command an equal price in the market: the gold medal of the society was in consequence awarded to the successful cultivator.

It appears that preparations have been made for the cultivation of this plant in Trinidad, on a very extensive scale. Plants have been raised, both from seeds and layers, sufficient to occupy one hundred acres of land. In 1828, thirteen hundred perfect nutmegs were gathered from one of the trees planted in 1820, and in 1830, some of the trees planted in 1824 were equally productive. The persons engaged in the cultivation are sanguine as to its success, and consider it an object every way worthy of the attention of government, “as this cultivation is singularly adapted to the occupation of white persons of all ages and both sexes.”

It is computed that each female tree, when at full maturity, will yield, under careful culture, ten pounds of nutmegs and about one pound of mace annually.

The nutmeg-tree is of larger growth than the clove, and has its leaves broader in proportion to their length, the upper surface of these is of a fine-green, the lower of a grey-colour. It is a diocious plant, that is, having male or barren flowers upon one tree, and female or fertile flowers upon another. Both are little bell-shaped flowers of a white colour, and without a calyx. The embryo fruit is to be discerned at the bottom of the female flower, in the form of a little reddish knob. The female flowers come forth from the extremities of the branches and grow two or three together upon slender footstalks, but it is seldom that more than one of these is fruitful.

Soon after the fecundation of the embryo, the female flower drops off and the little knob expands, gradually increasing until, at about the end of nine or ten months, it attains to the size and has the appearance of a small peach, somewhat pointed at each end. The outer coat is about half an inch thick and of a rather hard and fibrous substance. When arrived at maturity, this part bursts, and a membranous covering of a fine red colour is disclosed beneath, which, when dry, is known as the mace of commerce; this envelopes a thin black shell which encloses the kernel or nutmeg.

The plant is propagated both by seeds and layers. In the formation of a plantation, the trees should be set from twenty-five to thirty feet apart from each other. A strong, rich, and rather moist loam is the soil most favourable to their growth; when planted on a sandy soil they are not nearly so productive. The tree seldom bears fruit till it has attained the age of nine years.

When arrived at maturity, the crop is gathered and divested of its outer covering. The mace, which resembles a leafy network, is then collected and spread in the shade to dry. This is rather a nice operation, and it requires some experience to ascertain the exact point at which the spice is sufficiently desiccated, if too dry, part of the flower exhales, and, being more brittle, it is more liable to break in packing. On the other hand, if it be too little dried, it is apt, when packed, to ferment or to breed worms. It is packed for exportation by being pressed very closely in bags.

The shell of the nutmeg is harder than that of a filbert, and could not be broken when the fruit is first gathered, without injuring the kernel. It is, therefore, first subjected to the action of the sun and then to that of fire heat.
The kernel, in consequence of this treatment shrivels up, which is ascertained by its rattling in the shell. In this state the kernel may be easily divested of its covering without being broken.

Nutmegs are usually soaked in lime and sea-water and then laid in a heap, in which situation they become heated and their moisture is evaporated. This process is pursued in order to destroy the vegetative power of the kernel, while it is considered to preserve the flavour of the spice. The nutmegs brought from Trinidad were simply dried without immersion in lime-water.

Unless perfectly well cured, nutmegs are liable to be attacked by worms, which, in a short time, multiply so rapidly that the whole stock of a warehouse or cargo of a ship, may soon be infected and entirely lost. It is, therefore, highly necessary to examine the nutmegs carefully before packing, in order to separate such as have worms from the rest. This scrutiny is called garbling. Those kernels from which the worm has escaped, are readily discovered by the hole which it has made, but it requires some knowledge and an experienced eye to find out the nuts in which the worm is at its destructive work. The base of the nutmeg, where it has been attached to the shell, must be examined; should this be found more than usually depressed, the opposite point will be raised or swelled a little; the outer pellicle will then readily come off by application of the nail, and discover the lurking-place of the enemy.

Nutmegs are divided into two varieties, the royal and the green. The former is of a larger size and has its mace longer than the nut, which, in the latter, is not entirely enveloped by the leafy net-work. Good nutmegs are distinguished by being large, round, and heavy, finely-marbled, and of a light grey colour.

A fixed oil is abundantly obtained by pressure from the broken kernels, a pound of which usually yields about three ounces of oil. The result of Neumann’s experiments gives this oil in a much greater proportion, being, according to it, one-third of the weight of the kernel. This oleaginous matter is of the consistence of tallow, of an agreeable smell, and of a yellow colour. It is improperly termed oil of mace, by which name it is known in commerce.

A transparent volatile oil may likewise be obtained by distillation, but only in a very small proportion, being about one thirty-second part by weight of the nutmegs used. This is the nutmeg oil of commerce.

Our principal supply of nutmegs is obtained from the East India Company’s territories and Ceylon, but a large quantity likewise comes to us through Holland. If imported direct from that country they are liable to a duty of 3s. 6d. per pound when cleared for home consumption, but they are admitted to entry under bond for re-exportation, without payment of duty. This leads to a curious mercantile transaction. From London, nutmegs are shipped to the Cape of Good Hope, and are thence re-imported into this country. As coming from a British colony they are then only charged with a duty of 2s. 6d. per pound, and a saving of 7d. or 8d. per pound is made by this proceeding, as the whole expenses of freight, insurance, &c. from London to the Cape and back again, do not exceed 4d. or 5d. per pound.

It is reckoned that the present average monthly home consumption of nutmegs, is fifty casks or about 10,000 pounds.

Quantities of Mace retained for Home Consumption, from 1814 to 1818, and from 1825 to 1831 inclusive.

<table>
<thead>
<tr>
<th>Year</th>
<th>lb.</th>
<th>lb.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1814</td>
<td>5,490</td>
<td>1825</td>
</tr>
<tr>
<td>1815</td>
<td>7,834</td>
<td>1826</td>
</tr>
<tr>
<td>1816</td>
<td>6,499</td>
<td>Duty, 9s. 2d. per lb.</td>
</tr>
<tr>
<td>1817</td>
<td>8,642</td>
<td>1828</td>
</tr>
<tr>
<td>1818</td>
<td>10,836</td>
<td>Duty, 9s. 6d. per lb.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Drawback, 3s. 2d. per lb.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Quantities of Mace imported and exported, and Amount of Revenue arising from the Duty on Mace, from 1827 to 1831 inclusive.

<table>
<thead>
<tr>
<th>Year</th>
<th>Imported</th>
<th>Exported</th>
<th>Revenue</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>lb.</td>
<td>lb.</td>
<td></td>
</tr>
<tr>
<td>1827</td>
<td>23,133</td>
<td>31,768</td>
<td>2,962</td>
</tr>
<tr>
<td>1828</td>
<td>42,134</td>
<td>37,783</td>
<td>2,829</td>
</tr>
<tr>
<td>1829</td>
<td>6,841</td>
<td>20,106</td>
<td>2,549</td>
</tr>
<tr>
<td>1830</td>
<td>15,789</td>
<td>14,596</td>
<td>2,205</td>
</tr>
<tr>
<td>1831</td>
<td>41,287</td>
<td>63,795</td>
<td>3,206</td>
</tr>
</tbody>
</table>
NUTMEGS.

Quantities of Nutmegs retained for Home Consumption from 1814 to 1818, and from 1825 to 1831 inclusive.

<table>
<thead>
<tr>
<th>Year</th>
<th>Quantity (lb.)</th>
<th>Duty, 5s. 5d. per lb.</th>
<th>Duty, 2s. 6d. British possessions.</th>
<th>Drawback, 2s. 3d.</th>
<th>Duty, 3s. 6d.</th>
<th>Drawback, 3s. 2d</th>
</tr>
</thead>
<tbody>
<tr>
<td>1814</td>
<td>43,160</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1815</td>
<td>54,839</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1816</td>
<td>54,677</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1817</td>
<td>65,747</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1818</td>
<td>66,255</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Quantities of Nutmegs imported and exported, and the Revenue arising from the Duty, from 1827 to 1831 inclusive.

<table>
<thead>
<tr>
<th>Year</th>
<th>Imported (lb.)</th>
<th>Exported (lb.)</th>
<th>Revenue (£)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1827</td>
<td>74,854</td>
<td>35,389</td>
<td>15,707</td>
</tr>
<tr>
<td>1828</td>
<td>58,685</td>
<td>32,518</td>
<td>17,514</td>
</tr>
<tr>
<td>1829</td>
<td>38,868</td>
<td>47,913</td>
<td>14,114</td>
</tr>
<tr>
<td>1830</td>
<td>247,912</td>
<td>163,045</td>
<td>15,158</td>
</tr>
<tr>
<td>1831</td>
<td>210,363</td>
<td>88,352</td>
<td>19,025</td>
</tr>
</tbody>
</table>

The price of mace is, at the present time (Nov. 1832), from 4s. 9d. to 5s. 9d. per lb. dependent on the quality, and exclusive of duty. Nutmegs are from 3s. 9d. to 4s. per lb. exclusive of duty.

NUTMEGS.

(From "Materia Indica," by Whitelaw Ainslie, M.D., M.R. A.S.)

Jadícæi (Tam. Jaephal (Hind.) Jatiphala (Sans.) Jayaphala (Beng.) Jatipullum, also Sadikka (Cyn.) Japhul (Duk.) Jous bewa (Pers.) Jozaliteb (Arab.) Japhul (Hindooic) Buah-pala (Mal.) Woh-pala (Jav.) Bu-vah-pa (Bali) Jajikaia (Tel.) Gsorì (Ternat.) Muskaatnoten (Dut.) Noz moscada (Port.) Noiz muscade (Fr.) Muscatenumusse (Ger.) Japhul (Mah.) Noce Muscada (It.)

MYRISTICA MOSCHATA (Woodv.)


Nutmeg, which is the kernel of the fruit of the myristica moschata, has a fragrant agreeable spicy odour, and warm aromatic taste andunctuous feel; it is considered by the natives of India as one of their most valuable medicines in dyspeptic complaints, and in all cases requiring cardiacs, and corroboreants; they likewise prescribe it to such puny children as appear to suffer much in weaning. The nutmeg tree is a native of the Molucca islands, but is principally cultivated at Banda, and of late years at Batavia, Sumatra, and Penang. There is an inferior and long-shaped kind of nutmeg, common on Borneo, and an export from Passier* to India, and there is a wild sort (cut jadical), frequently to be met with in some of the woods of Southern India, especially in Canara, which Dr. Buchanan thinks might be greatly improved by cultivation. The true nutmeg tree now grows to a tolerable size, in certain sheltered situations in the Timnevally district, especially at Courtalum, and bears pretty good fruit; it would also appear by Mr. Moon's valuable Catalogue of Ceylon Plants, to grow in that fine island, and has got the Cyngealese name of sadikka. Three other species of myristica grow in that country.

The cultivation of nutmegs was introduced into Sumatra, by the excellent Mr. J. Lumsdaine's account, in 1798, as we learn by his valuable Memoir, published in 1821, in the Proceedings of the Agricultural Society of Sumatra: this attempt however, was not very successful; but it was tried again by Dr. Roxburgh, 1803, and with great success; that gentleman, carried with him no less than 20,000 vigorous nutmeg plants from Amboyna to Sumatra.

Nutmeg, like mace, taken in large quantity, is apt to produce stupor and drowsiness. Cullen cautions us against its use in subjects disposed to apoplexy, and Dr. Pearson thinks that in over-doses it has a narcotic effect.

* See Elmore's Directory to the Trade of the Indian Seas, p. 531.
similar to that of camphor. Rumphius, who has given the scientific appellation of *nux myristica*, sive *pala*, to the nutmeg tree (Rumph. Amb. ii. p. 14 t. 4.) tells us, that the juice of the green nutmeg mixed with water, is used in Amboyna as a wash in aphthous affections. Mr. Crawford, in his History of the Indian Archipelago, informs us, that there are no less than eight cultivated varieties of the tree in the Indian islands (vol. i. p. 505.), and according to De Comyn,* two sorts grow in the Philippine islands, one shaped like a pigeon's egg, the other perfectly spherical.

I perceive by Avicenna (1.8), that the Arabs, besides the Arabic name already mentioned, give nutmeg the appellation of bissababissa. They place it amongst their *Mokewyat kabit* (Hepatica), and *Mokewyat meoadeh* (Tonica). The volatile oil of nutmeg, which possesses the odour and taste of the nutmeg, in a concentrated degree, is occasionally used as an external stimulant. The expressed oil, (which is improperly called oil of mace, and which Dr. Thomson conceives to be a kind of vegetable cerate, or a triple compound of fixed oil, volatile oil, and wax) is rarely prescribed, but as an external application; it is called in Tamool *jadipurtie-tylum*, and in Dukhanie *jawatrie-kastail*; it is of a very stimulating nature, and is brought to India from Banda, where it is chiefly employed in preparing liniments for palsy and chronic rheumatism. The dose of nutmeg may be from three or four grains to a scruple, that of the volatile oil from two drops to eight. The nutmeg tree was unknown to Linneus, and was first well described by Thunberg, in the Stockholm Acta for 1782. It is a large tree with erect branches, and a smooth ash-coloured bark; but the inner bark is red, leaves petioled, elliptical, pointed alternate, quite entire, shining, pale underneath, nervet, and have a delightful aromatic taste. The flowers are present at the same time with the fruit; they are minute, and without odour, and male and female are on the same and on separate trees. Willdenow, in speaking of the myristica moschata, says, habitat in Moluccis; but it will appear by the following passage, that it is also a native of America. “Le muscadier, m’écrit Zea, se trouve dans les lieux les plus chauds du royaume de la Nouvelle Grenade, surtout à Mariguita, le long du grand fleuve de la Magdeleine;” and we know, that Ruiz and Pavon found it in Peru, and Swartz in the American islands.† By Beckman’s account in his “Voyage to Borneo,” the nutmeg tree grows in the island of Celebes, and is an export from Macasser. *Malao, bhanhahorac, bashi, and barabee,* are the names of different wild nutmeg trees growing on Madagascar; an oil got from the fruit of the last is an excellent stomachic (See Copeland’s History of Madagascar.)

**MYRISTICA.**

*(From the "Treasury of Botany," by John Lindley and Thomas Moore.)*

A genus of plants remarkable as furnishing the Nutmeg and Mace of commerce. It belongs to the Myristicaceae, and consists of lofty trees or shrubs, natives of tropical countries, and specially of India. They are most of them aromatic, and abound in a reddish acrid juice. The leaves are entire; the flowers dioecious, very small, clustered in the axils of the leaves, or sometimes in panicles. The perianth consists of three or four segments, more or less united together, and enclosing a variable number of stamens, which are united into one parcel below. The ovary is free, with a single inverted ovule. The fruit is fleshy, but divides when ripe into two pieces, disclosing the seed covered by the arillode or mace.

*M. moschata,* or *M. officinalis,* is largely cultivated in the Molucca islands, Java, Sumatra, Bengal, &c. It is a tree of twenty to twenty-five feet in height, with oblong aromatic leaves, and fruit very much like a peach, having a longitudinal groove on one side, and bursting into two pieces, when the enclosed seed, covered by the false aril or arillode, which constitutes the substance known as Mace, is exposed. The seed itself has a thick hard outer shell, which may be removed when dry, and which encloses the nucleus of the seed, the Nutmeg of the shops. The nutmeg consists of the albumen or perisperm, with the embryo at one end, and is covered by a thin membrane, which adheres closely to its surface, and projects into the substance of the albumen, thereby giving it the mottled appearance for which it is so remarkable.

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† See Alibert’s *Nouveau Éléments de Thérapeutic*, vol. ii. p. 219.
‡ See same work, vol. and page.
NUTMEGS.

In the Banda isles, the principal seat of the cultivation of the Nutmeg, the mace are gathered at three seasons,—July, November, and March or April. The mace, which at first is of a beautiful crimson colour, is dried in the sun, or by artificial heat if the weather be unfavourable, when it speedily assumes a golden-yellow colour. The nutmegs are dried, and then the outer shell of the seed is removed. Occasionally they are imported in the shell, a procedure which prevents the ravages of the nutmeg insect, but on the other hand adds considerably to the weight and to the waste. The nuts are sometimes washed over with lime to protect them from the attacks of the insect just mentioned. Several kinds of nutmegs are met with in commerce, perhaps the produce of as many different species. The most esteemed are those of Penang, which are about an inch in length, of the shape of a damson, pale-brown and furrowed on the exterior, internally grey with red veins, the odour and taste aromatic. Penang mace is also considered better than that from Java or Singapore, and is of a pale cinnamon colour when dry. Maces and nutmegs are in large use as spices, and medicinally as stimulants and carminatives; in large doses they have narcotic properties.

At one time the culture of nutmegs was almost entirely in the hands of the Dutch, who took every means to monopolise the growth of the plants, in which they were in a measure defeated by a kind of pigeon, which, extracting the nutmeg from its pulp covering, digests the mace, and voids the nutmeg uninjured. It is related that the Dutch used to burn nutmegs when the crops were too abundant, in order to keep up high prices. Old ladies in the country, to this day, keep a nutmeg in their pocket, as was customary in their younger days, when the effects of the war with France, and of the Dutch monopoly, rendered all spices very expensive. M. fatua, Otoha, tomentosa, spuria, acuminate, and other species, yield nutmegs in Brazil, in the Philippine islands, and in Madagascar. The produce of some of these, especially of M. fatua, finds its way into the English market under the name of Long or Wild Nutmegs; they are longer and more pointed and of inferior quality to the true Penang nutmeg. Nutmegs contain both a fixed and a volatile oil; the former is extracted by pressure, and forms what is called butter of mace; the latter is obtained by distillation. Nutmegs are occasionally sent into the market after the oil has been distilled from them, and in a comparatively valueless condition. The French are said to have various ingenious methods of dressing up inferior nutmegs to resemble good ones, and even to fabricate artificial nutmegs of bran, clay, and the powder of nutmegs.

M. T. M.

MYRISTICA.—NUTMEGS.

(From Henderson's "Handbook of Plants."


M. moschata, a beautiful branching tree, growing about thirty feet high, produces the Mace and Nutmegs of commerce. It is principally grown in the Banda Isles, though common in Java and the Molucca Islands. The male and female flowers are on different trees. The flowers of both are small, white, bell-shaped, and without any calyx; the embryo fruit appearing at the bottom of the female flower in the form of a little reddish knob. The female flowers grow on slender peduncles, two or three together, but it is rare that more than one flower in each bunch comes to maturity and produces fruit; this resembles in size a small peach, but it is rather more pointed at both ends. The outer coat is about half an inch thick when ripe, at which time it bursts at the side and discloses the spices. These, are the Mace, having the appearance of a leafy net-work of a fine red color, which seems the brighter by being contrasted with the shining black of the shell that it surrounds. This is laid to dry in the shade for a short time; but if dried too much, a great part of its flavor is lost by evaporation. On the other hand, if packed too moist, it either ferments or breeds worms. The Nutmeg is contained in a shell somewhat harder than that of the fibert, and could not, in the state in which it is gathered, be broken without injuring the nut. On that account the nuts are successively dried in the sun, and then by fire heat, till the kernel shrinks so much as to rattle in the shell, which is then easily broken, and the nutmeg released. After this process they are several times soaked in sea-water and lime, and then laid in a heap, where they heat and get rid of their superfluous moisture by evaporation. This process is pursued to preserve the substance of the nut, as well as to destroy its vegetative power. When perfectly cured they are packed in dry slacked lime, and sent to market.
NUTMEGS.—(*Myristica fragrans—Myristicaceae.*).

(From "Cultural Industries for Queensland," by Lewis Adolphus Bernays, F.L.S., F.R.G.S.)

The name of *Myristica* is founded upon the Greek word for 4' Myrrh,' and was given to the genus on account of the odour of its fruit, in which regard, however, there is a material difference in the several species. The odour is most intense in that under review. The commercial value of the fruit depends upon the degree in which the essential oil producing this perfume is present. There are more than thirty species, chiefly natives of tropical India and Acreica, and of the Malayan Archipelago, one being common in sub-tropical Queensland. The true nutmeg of commerce is confined to the Moluccas and neighbouring islands, although it has spread by naturalisation to the western coast of India, to Java, Sumatra, Penang, Mauritius, Bourbon, Cayenne, Martinique, and some of the West India Islands. It is also grown in the province of Canton, in China; but is seldom used as a spice by the Chinese, being employed medicinally as an astringent, anti-spasmodic, stomachic, and anti-vinous remedy.

It spread has in some measure been extended through the agency of fruit-eating pigeons, which, after divesting the fruit of its fleshy covering, swallow the nut with its mace, and digesting the latter void the nutmeg in its shell. These falling on congenial soil, in a warm, moist climate, readily germinate, and either grow to maturity and produce where they are thus sown, or are removed in a young state to take a place in regular plantations.

There are a number of other fruits bearing the designation of nutmeg, which are the produce of tree of wholly distinct orders, but they have no important commercial value. The so-called nutmeg-wood is the timber of the Palmira Palm.

The true nutmeg is a handsome straight-stemmed tree, attaining under favourable conditions a height of 40 to 50 feet, with a much branching head. The bark is smooth, and externally of a dull ash-colour, interspersed with green. Internally the bark is red and succulent; if wounded, emitting an acid viscid juice of a blood-red colour, which leaves an indelible stain on linen. The leaves, which are highly aromatic, are 3 to 6 inches long, resembling those of a Pear-tree, dark-green, and glossy on the upper surface, but of a pale-grey colour beneath. As an almost invariable rule, the male, and the female or fertile, flowers are produced on different individuals, creating necessary special features in the method of cultivation; although it happens occasionally that both forms of flower are found on one tree. The flowers, which are bell-shaped but insignificant, are of a yellowish-white colour, and are found on footstalks at the axils of the leaves. The tree bears throughout the year, the same individual having flowers and fruit in every stage.

The fruit, which takes nine months to mature, has then the appearance of a small peach, somewhat pointed at the end. All round longitudinally it is marked with a furrow. Externally the fruit is smooth, green when young, but at maturity, like the peach, acquiring more or less of a red tinge. When ripe it opens at the furrow, displaying the nut in its black shell, covered with a bright crimson leafy network which constitutes the familiar mace; so tightly does the mace cling as to leave its impression on the surface of the nut. The fruit at this stage is extremely beautiful; our native nutmeg, pretty as it is, affording but a faint idea of the charms of the head of the family. The fleshy part of the fruit is about half an inch thick, yellowish-white inside and very astringent.

The unripe fruit, as well as the fleshy covering of the mature fruit, is often preserved in sugar in the East; but before doing so it is necessary to deprive it of its acrid properties by soaking in spirits.

The nutmeg is propagated for the formation of plantations, or "parks," as they are called, by seed or layers, but principally by seed. As already stated, the young plants which grow from the sowings of the birds are largely availed of, being transplanted usually about the third year; but the nutmeg is a manageable tree in the matter of transplanting, and with care may be removed at a much older stage. In making a nursery, well-ripened selected nuts are sown a foot apart in rows, being only lightly covered with soil. They take from 20 to 60 days to germinate, shade and moderate watering being essential elements of success. When from 3 to 4 feet high they are removed to the plantations, where they are set from 25 to 30 feet apart. In dry weather

*Myristica insipida* a fine tree of 60 to 70 feet or more, found from as far south as Rockhampton, along the entire coast, to the Gulf of Carpentaria.
the trees are watered, and they benefit immensely by the surface of the ground especially over their roots, being mulched with any material which can afterwards be advantageously turned in.

A strong, rich, and rather moist loamy soil is best suited to the nutmeg. Poorer soils are used in connection with an unwholesome system of repeatedly applying stimulating manure in immediate contact with the roots; a system which forces the tree into a condition of abnormal growth and productiveness, but ultimately weakens its constitution and results in premature death. In Singapore for upward of twenty years the cultivation of the Nutmeg was carried on extensively and with most profitable results. The soil of the island being naturally poor, the planters forced their trees into an unnatural luxuriance by digging trenches round them a foot deep and wide, and filling with cowdung. During that period plantations changed hands at high prices and much money was made in connection with the industry. "In the year 1860, however," says a writer in the Linnean Society's Journal, "a sudden destruction came upon the trees, from an unknown quarter. To the dismay of the planters there appeared among the trees (which up to that time had yielded magnificently) a blight whose destructive effects could not be arrested, while the source of it defied all inquiry. In the night a tree would be attacked, and the morning light would show its topmost branches withered; the leaves fell off; the disease slowly spread downwards, chiefly on one side of the tree; and, in spite of every attempt to check it (the lower portion often being for a long time green and bushy), the tree became an unsightly mass of bare and whitened twigs. Most trees were entirely stripped in time, and became mere skeletons. Large outlay was expended in the endeavours to arrest the destruction, but it was all thrown away. No situation was exempt from its ravages, hills and valleys alike suffered, nor could any principle be traced in its promiscuous attacks. Upon a close examination of diseased parts it is found that the formative layer inside the bark dries up and turns black. The leaves then wither and fall off, and soon the bark is found to be full of small perforations, but no insect of any kind has ever been discovered in connection with the disease, nor has any fungus been charged with the destruction. Its nature has been a mystery and a puzzle to the planters, who have, for the most part in vain, sought for a cause, either near or remote, and whose efforts to arrest it have proved entirely availing. I have heard various suggestions offered, some of them of the wildest character, to account for the disease. That which my friend M. José d' Almeida purposes is by far the most reasonable, and in fact commends itself to the judgment of the vegetable physiologist. It is that the trees had long been unnaturally forced by digging trenches too closely around their spigotios, and by too rich and long-continued manuring, by which heavy crops, it is true, were for a time obtained, but which at last exhausted the tree, so that the premature decay thus brought on by inflexible physiological laws was incapable of being arrested by any after treatment."

When it was found that, in spite of care and lavish expenditure, the trees surely died, a reaction took place. The planters abandoned the plantations in disgust, in many cases while there were still numerous healthy trees, and the land reverted to the Government. Many planters, both English and Chinese, whose whole estates were invested in nutmeg plantations, were thus reduced to ruin and became absolutely penniless, and distress and disappointment everywhere prevailed. It is a curious fact that many of these abandoned trees, around which has now sprung up a thick jungle undergrowth, have, since they have been thus neglected and left to themselves, recovered, and relieve the generally dismal prospect of bare branches and skeleton trees. I have myself seen these dark-green healthy trees in many situations where they are quite uncared for, even among the oldest plantations in the island, and this fact seems decidedly corroborative of the idea that the disease was one of exhaustion and decay, arising from unnatural forcing. Another fact is significant, viz., that at Penang, where this cultivation as described was carried on with the greatest vigour and the greatest expenditure, the destruction has been most complete and marked, while at Malacca, where the people were not so rich and could not afford to manure the trees so highly, they have not suffered so severely as at Penang and Singapore."

"At the present moment there is no such thing as nutmeg cultivation at Penang or Singapore, nor does it seem probable that the experiment will be again tried. Planters are now persuaded that neither the soil nor climate are favourable for their production, and other crops have fared but little
better. The trees which still exist are neglected and abandoned by their owners, though they still yield nutmegs. These are gathered by any Chinese or Malays who take the trouble to do so, and the few nutmegs, insignificant in quantity, which now find their way into the Singapore market are obtained in this way—a clear gain to those who carry them there. Screening the trees from extreme heat and from violent winds is essential. This is done by allowing a sufficient number of the natural trees to remain, or by the regular planting of shade trees, as in the case of the Cacao and sometimes of the Coffee tree.

The circumstance that the male and female flowers are produced on separate individuals renders it difficult to create plantations the whole of the trees of which shall be productive. The plan adopted in the best arranged plantations is to head down all the plants at about two years old, and to graft them with scions from healthy female trees, leaving a very small proportion of male trees for fecundation. At the earliest the nutmeg does not flower, and the sexes cannot therefore be distinguished, before the sixth year; and where the method of grafting is not adopted the superabundant males are then removed, and other seedlings or layers from female trees are substituted until the entire plantation consists of productive specimens. The trees which bear latest are considered the best, and skilled growers do not allow their trees to bear before the ninth year, which is, in fact, about the time at which, as a rule, they show a disposition to fruit. The produce is variable. The average on the Straits probably does not exceed 1,000 nuts per tree, although exceptional trees, forced with manures, will bear ten times as many. It is computed (says Porter) that each female tree, when at full maturity, will yield, under careful culture, 10 pounds of nutmegs and about 1 pound of mace annually. The trees continue productive for seventy or eighty years.

As has been said, the Nutmeg tree bears all the year round, but some months more plentifully than others. The crop is gathered three times, the periods varying under the different conditions of climate and season. In the Moluccas one harvest is gathered in April, one about July or August, and a third in November. The first is stated by Crawfurd to afford the best fruit, the second the largest quantity, the third being a sort of supplement to the second.

The ripe fruit is gathered by means of a barb attached to a long stick. The indications of maturity are the blush acquired by the external covering which at same time splits open and displays the nut in its gorgeous crimson net. The fruit being divested of its pulpy cover, the mace is then removed, and either flattened by the hand in single layers or tied in double blades. The only preparation which the mace undergoes is drying in the sun, or, in rainy weather, by artificial heat; some experience being required to determine the exact point at which the spice is sufficiently desiccated. If over-dried it loses flavour, becomes brittle, and breaks in packing; while, if not dry enough, it is apt to become mouldy, and, the vitality of the eggs of the insect to which it is subject not having been destroyed, the worms breed, and the spice is rendered unmarketable. The Dutch sprinkle the mace with salt water prior to packing it, as an additional preventive against insects.

The shell of the nutmeg is very hard, and cannot be broken in the fresh state without injury to the nut. For this reason, to secure shrinkage of the nut from the shell, as well as thoroughly to destroy the germs of insect life, the nutmegs are subjected to a long process of desiccation. For the first few days they are exposed to sun heat; after which they are taken to the drying-house and spread on a kind of basket-work stage, at a height of about 10 feet from the ground, and submitted to the action of the heat and smoke of a smouldering fire. The heat must be gentle, not exceeding 140° Fahrenheit, and the nuts are turned every day or two. After from two to three months of this treatment the nuts have shrunk from the shell sufficiently to admit of the latter being cracked by a wooden mallet and thrown away. The next stage is a very important one, consisting of a careful examination of each nut and sorting out those which are shrivelled or worm-eaten. Unless great care is taken with this process, nuts containing the germs of the insect to which the spice is so subject may be left and contaminate the lot. So rapidly does the worm multiply that the whole stock of a warehouse or the cargo of a ship may be infected and entirely lost. After undergoing this process of sorting, technically called garbling, the nuts are dipped in a thick mixture of lime and water, again dried in the sun and cleaned off; or by some growers are instead dusted with well-sifted dry lime. This is intended as a final protection against the insect, and the nutmegs are then packed in tight casks or in chests which have been smoked and lime-washed inside.
The true nutmeg in commerce is found in two varieties, the “royal” and the “green.” The former is the largest, and its mace is longer than the nut which in the latter is not entirely enveloped by the mace. The most valuable of the crop are those which are regularly gathered from the trees as they ripen, and are subjected to the several stages of preparation before described. The inferior nuts, which are more or less injured in flavour and appearance by lying on the ground, are sent to inferior markets or crushed for their oil. A good nutmeg should be large, round, and heavy, of a light grey colour, and strongly marbled in the cross section.

As there are several species of nutmegs, growing wild, which are inferior in those qualities which constitute the true value of the spices, nutmeg and mace, it is not surprising that these are often mixed with the true nutmeg. To the inexperienced eye they are not readily distinguishable, but their insipidity when compared with the fruit of Myristica fragrans readily discloses their presence when put to the test of taste. But fraud goes further than in the admixture of inferior species; the true nutmeg before being sent to market being frequently sweated for its essential oil, the orifices created by the boiling being filled up with powdered sassafras. Sweated nutmegs can, however, be detected by their lightness.

There is no necessity to dwell upon the well-known culinary uses of the mace and nutmeg. From both of them, but chiefly from the nut, is obtained, by simple distillation in water, a volatile oil; the maximum yield of this product being only 1/3 part of the weight of the nut. It is of a pale straw colour, possessing in a concentrated form all the properties of the nutmeg. It is used in medicine both externally and internally as a stimulant. Taken internally it is useful in atonic diarrhoea and in some forms of dyspepsia; and, diluted with a bland oil, is a useful application in rheumatism, paralysis, and sprains. It is soluble in alcohol and ether, has a pungent taste, and a strong nutmeg odour.

Another and larger product is a fatty fixed-oil, known in commerce as Butter of Nutmegs. This is obtained by expression; the ordinary yield being about 20 per cent. of the total weight of the nut, although Professor Neuman's, by exact experiment, obtained as much as one-third of the gross weight. To obtain this product the nutmegs are beaten to a paste, which is then put into bags and steamed, afterwards pressed between two hot metal plates for expression of the oil. The refuse and damaged nuts are chiefly used for this purpose. This product is of the consistency of tallow and of a yellowish colour. It is commonly but erroneously known in the shops as “expressed oil of mace.” Its consistency is firm and it has a fragrant odour of nutmeg. In commerce it is met with in cakes and also in small earthen pots. “Butter of nutmegs” is employed as an external application in rheumatism and palsy, and forms an ingredient of pitch-plaster. It has a certain amount of acidity, and if used as a liniment will blister the skin after being rubbed in for some time. A fraudulent imitation of Butter of Nutmegs is made by an admixture of animal fat or spermacetti boiled with powdered nutmegs and flavoured with sassafras. A specimen may, however, be relied on as pure if it dissolve in four times its weight of strong boiling alcohol or half that quantity of ether.

Another species, native of South America Myristica sebufera produces a very large percentage of fixed oil, which is useful in soap and candle making, but does not possess the fragrance of that from M. fragrans:

In their physiological effects the activity both of nutmegs and mace depends upon the quantity of volatile oil contained. In moderate quantities they produce the carminative and stimulating effect of other spices; but food highly seasoned with nutmeg may prove injurious in cerebral affections. In large doses they are narcotic, cause giddiness, delirium, sleepiness, and actual stupor. A case is given by Pereira in which two drachms of powdered nutmeg produced drowsiness, which gradually increased to complete stupor and insensibility. In mild cases of diarrhoea it is a good substitute for opium, and may be taken in hot brandy and water, unless the use of spirits be contra-indicated.

It must not be supposed, says Lindley, that the insipid nutmegs are inert. It is stated that in New Guinea, where these * are common, persons who ate as many as only two were soon after attacked with violent diarrhoea and disturbance of the stomach. A single fruit produced nausea, a sensation of fulness and wind.

Actual experiment, says Dr. Royle, has often proved that a plant of commercial value will thrive in a climate not wholly similar to that of its natural

* Probably identical with M. insipida of Queensland, referred to before.
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habit. So in the case of the Nutmeg, the early efforts of the East India Company to extend its area of production to Sumatra were discouraged by old planters until the success of Mr. Cole, a Civil Servant at Bencoolen, when the sceptics were convinced that the spice did not only grow well, but produced in the greatest perfection.

The healthy growth of the true Nutmeg, in Northern Queensland affords fair ground for expectation that this valuable tree may prove commercially productive on our warm coast lands. The effect of grafting *M. fragrans* on our native species is worth trying.

NUTMEGS IN TRINIDAD.

(From the "Royal Asiatic Society's Journal."

Mr. Prestoe gives some notes on the cultivation of the nutmeg, from which the following facts are gathered. Regarding the effects of manure, he says that the whole of the trees have been treated with cattle-pen manure, so arranged on the slope to have its fertilising properties conveyed directly to the roots by the rain. The good effect was most marked, especially to the young trees, which at once produced leaves twice the size of those which preceded them on the branches. Mr. Prestoe says he cannot too strongly recommend the use of cattle-pen manure for pushing on young nutmeg trees. "The planting out," he says, "of successional nutmeg trees, during the last few years, has enabled me to determine the sexes in seedling plants under a foot high by characters presented in the leaf form, and with sufficient accuracy for all practical purposes; as also the proportion of male trees and female usually raised from seeds. These points having been determined by direct experiment with two sets of nine and eleven pairs of young nutmeg trees, respectively kept under observation in the one case for nine, and the other for five years, from the seeds.

"Male trees occur more numerously than females to the extent often to fifteen per cent. At the same time a walk or plantation of nutmeg trees would be effectively fertilised by male trees, standing at the rate of one to every eight or ten female trees. It is not to be recommended, however, that the definition of the sexes in the young trees be exercised for planting the male and female trees merely in this proportion, but for setting the trees in pairs of male and female as regularly as practicable.

"These pairs—the plants being 3 feet apart—should be planted at intervals where they are to be permanent, of about 25 feet or 30 feet, and when they have grown up to produce flowers—fourth or fifth year to show the sexes with certainty—the excess males (over 10 or 12 per cent.) can be removed. That is, one of each pair will be removed in a manner to leave one male to eight or ten females. In doing this, four or five feet lengths of the stem of the cut away, should be left to keep alive and serve as a support to the standing tree, as also to prevent the development of fungoid growths that would be likely to occur by sudden decay of the tree stumps.

"In order then to have the young nutmeg tree in pairs as regularly as possible, male and female, the form of the leaf and direction of the veins must be observed, the female leaf being the most perfectly elliptical with the straighter primary veins; the male leaf is broader towards the point than at the middle; that is, of obovate shape, and furnished with a point much longer than that of the female; the veins are curved in towards the point much more roundly than in the female."

A large stock of nutmeg trees, it seems, is always in stock at the Trinidad gardens, and they are disposed of at a low rate, so that the system of double planting to ensure proper fertilisation is always practicable.

NUTMEG CULTIVATION IN THE STRAITS.

Udagama, Jan. 15th, 1882.

(Dear Sir,—I have sent a pamphlet to Dr. Trimen, on nutmeg cultivation, which was given to me by Mr. W. H. Reade of Singapore. It was written very many years ago, and describes the introduction of the spice from Ambon into Sumatra and the Straits, and has a very practical description of the manner of cultivating that spice, and cloves. I have desired Dr. Trimen to forward it to you, as you may like to publish it in the *Tropical Agriculturist*. I have now planted and well established in this district over 4,000 young nutmeg plants. In 1882 this number will be doubled, which, judging from the trees in the surrounding villages, will, when they come into bearing, give very large returns.—I remain, yours faithfully,

T. S. DOBREE.
NUTMEG CULTIVATION.

Dr. Trimen writes from Peradeniya:—

"Mr. Dobree sent me the enclosed MS. some time back, and asked me when I had read it to send it on to you that you might use it for your Tropical Agriculturist if you pleased.

"It refers to the cultivation of nutmegs and cloves in South Sumatra (Bencoolen) at a time when that district was part of the British Empire (1819-20); and contains much interesting and valuable information as to the first introduction and early culture of these spices.

"I am, however, under the impression that part or the whole has been already published: I think in the Pharmaceutical Journal for 1852. Is there a file of that journal in Colombo?

"Lumsdaine’s remarks on the proportions of the sexes are important, and his expressions very amusing. The influence of the Linnaean system of classification was then supreme, and writers did not hesitate to write above the sexes of plants in terms as warm as those he uses. I have not noticed any monocious trees myself, nor do I recall any notice of them; but in other dioecious plants, notably the hop, such an admixture of the flowers of both sexes on the same plant is not very unusual.

"The first two pages are beyond my powers of restoration, and all the paper is very brittle. Should you print it, great care will be needed."

REPORT ON THE CULTIVATION OF SPICES AT BENC OOLEN.

By J. LUMSDAINE in 1819-1820.

[The first leaf with the introductory portion of this report has fallen to pieces, parts of which have been lost, so that we must perforce begin at paragraph 3, but nothing of any material consequence is lost.—Ed.]

3. The geographical position of this Island, its local adaptations, and the general influence of its sky and climate on the vegetable kingdom, but above all, the similarity of the latter to that of the Moluccas, induced a belief that the spice trees would thrive as prosperously in these districts as in their native clime. Accordingly, the Deputy Governor in Council of Port Marlborough despatched in 1796 a small vessel to Amboyna for the purpose of throwing in supplies into that garrison, and returning with spice plants, owing, however, to some untoward accident on the voyage, it was necessary to bear away for Prince of Wales’s Island, where the vessel was declared not seaworthy, and thus the object of the mission was frustrated. It was nevertheless re-attempted and accomplished in 1798 by the ship “Phoenix,” which landed 346 nutmeg and 66 clove plants at Port Marlborough, the whole of the former and two-thirds of the latter being in a vigorous healthy condition. These were distributed to such of the gentlemen of the Settlement and natives as engaged to take care of them, and a few were sent to the out Settlements, in order to ascertain the soil most favourable to their culture. A considerable share fell to the lot of Mr. Edward Coles, by whom they were planted out at Pannatang Ballam in virgin forest land, where the most forward of the nutmeg trees blossomed and perfected its fruit towards the close of the year 1803. The cloves pined and dropped off in rapid succession. Out of the whole number, four only arrived at maturity, one of which flowered in 1803, and the most vigorous of them did not survive the 18th year. Numbers of these trees perished from neglect and improper management, for, unfortunately, Mr. Jones, Commercial Resident at Amboyna, stated in his letter to this Government under date the 5th June 1798, that the spice trees required little or no care in their cultivation.

4. Notwithstanding the indifferent success attending this first essay from the loss of numbers of the plants, the general result was satisfactory and inspired a belief that these valuable exotics might by perseverance and increased attention become naturalized to the soil. An opportunity of putting this to the test of further experiment accordingly presented itself in 1803, in which year the late Mr. William Roxburgh reached the Settlement with a supply of upwards of 22,000 vigorous nutmeg plants, and between 6 and 7,000 clove plants from Amboyna, which were put under charge of the late Mr. Charles Campbell for general distribution; but the applications for plants were so urgent, that they greatly overbalanced the stock imported.

5. The Settlement now assumed the resemblance of a busy agricultural community connected by one common link of reciprocal interest; the operations of commerce slackened for a while, and discussions on the properties of the soil were the daily topics of conversation. Unfortunately for agriculture,
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this, with the exception of the alluvial tracts, had suffered a sweeping verdict of condemnation, founded on a few unsuccessful attempts conducted by men perhaps who had neither sufficient leisure to attend to the subject, nor the inclination to go to the necessary expense to ensure a favourable result.

6. The soil throughout the plantations generally is a red mould with stony fragments or pebbles frequently intermixed with it, the surface of it in the forest alluvial and low lands being of a chocolate colour, varying in depth from 3 to 10 or 12 inches. In the former this is occasioned by the gradual spontaneous decomposition of vegetable matter, and in the latter by deposition of the finer parts of the mould of the mountainous and elevated slopes. After a long duration of dry weather, this brick-like mould, as it has been termed, is frequently found to be so stiff and unyielding as to require a good deal of labour to effect a mechanical division of its particles, so as to befit it for the purposes of agriculture; for it is doubtless true, that the texture or organization of the soil has a considerable influence on the growth of vegetables, be they herbaceous or ligneous. It is susceptible however of very great amelioration by means of tillage and appropriate composites, and indeed the soil of Ceylon, in which the cinnamon tree thrives so luxuriantly, is of the same description. The lowlands and swamps are highly productive, in proof of which it is sufficient to mention that the lowlands at Benturin were at one time under a course of culture for 20 years without a fallow. A marly-looking soapy soil is met with at the distance of 10 or 12 feet from the surface, which at a still greater depth is considerably indurated by the action of the waters that percolate through the ground in all directions, and in combination with sand forms the substance called napal.

7. The mode of culture adopted in the different plantations is nearly the same. The beds of the trees are kept free from grass and noxious weeds by the hoe, and the plough is occasionally run along the interjacent spaces for the purpose of eradicating the lallang (Andropogon Caricorum) which proves greatly obtrusive to the operations of agriculture. The trees are generally manured with cow dung and burnt earth once a year in the rainy season, but the preparation of suitable composites and their mode of application are but imperfectly understood. The pruning knife is too sparingly used; very few of the planters lop off the lower vertices of the nutmeg trees or thin them of the unproductive and straggling branches.

8. The site of a plantation is an object of primary importance, and doubtless the alluvial grounds are entitled to preference from the acknowledged fertility of their soil and its appropriate organization and capability of retaining moisture, independent of the advantage of water carriage. Several of the nutmeg trees of the importation of 1798 at Moco Moco are placed in soil of this description; although never manured they are in the highest state of luxuriance and bear abundantly; and I have been informed by a gentleman recently arrived from that station, that the stem of one of them measures 38 inches in circumference. Some of the trees in my own experimental garden corroborate the truth of this assertion; one of these blossomed at the early stage of two years nine months and a half, a degree of precocity ascribable solely to its proximity to the lake which forms the southern boundary. This was the first tree that blossomed of the importation of 1803, which consisted of upwards of 20,000 nutmegs plants. Next to the alluvial deposits, virgin forest land claim pre-eminence, their surface being clothed with a dark coloured carbonized mould formed by the slow decay of falling leaves and mouldering trunks of trees; and next to these are to be ranked the open plains. Declivities are objectionable from the risk of the precipitation of the mould and manure into the subsequent ravines by the heavy torrents of rain that occasionally deluge the country. Above all, the plantation must be protected from the southerly and northerly winds by a skirting of lofty trees, and if nature has not already made this provision, no time should be lost in belting the ground with a double row of the casuarina littorea and cerbera manghas, which are well adapted for this purpose. This precautionary measure will not only secure the planter against eventual loss from the falling-off of the blossom and young fruit in heavy gales, but will prevent the uprooting of the trees, a contingency to which they are liable from the slender hold their roots have in the soil. If the plantation is extensive, subsidiary rows of these trees may be planted at convenient distances. No large trees whatever should be suffered to grow among the spice trees, for these exclude the vivifying rays of the sun, and arrest the descent of the salutary night dews, both of which are essential to the quality and quantity of the produce. They further rob the soil of its fecundity, and intermingle their roots with those of the spice trees. It is true that by the
protection they afford they prevent frequently the premature bursting of the husk occasioned by the sudden action of a hot sun upon it when saturated with rain; but the loss sustained in this way is not equal to the damage that spice trees suffer from these intruders. Extensive tracts of land are to be met with in the interior of the country well adapted for the cultivation of the nutmegs and cloves, and to these undoubted preference is due.

9. In originating a nutmeg plantation, the first care of the cultivator is to select ripe nuts and to set them at the distance of a foot apart in a rich soil, merely covering them very lightly with mould. They are to be protected from the heat of the sun. Occasionally weeded, and watered in dry weather every other day. The seedlings may be expected to appear in from 30 to 60 days, and when four feet high, the healthiest and most luxuriant, consisting of 3 or 4 vertices are to be removed in the commencement of the rains to the plantation previously cleared of trees and underwood by burning and grubbing up their roots, and placed in holes dug for their reception at the distance of 30 feet from each other, screening them from the heat of the sun and violence of the winds. It is a matter of essential importance that the ground be well opened and its cohesion broken, in order to admit of the free expansion of the roots of the tender plants, and that it be intimately mixed with burnt earth and cow manure, in the proportion of two-thirds of the former to one-third of the latter. The plants are to be set in rows as well for the sake of regularity, as for the more convenient traversing of the plough, which is now to be employed in clearing the intermediate spaces of lallang and other noxious grasses, carefully avoiding to trespass on the beds of the trees. They must be watered every other day in sultry weather, manured annually during the rains with four garden baskets full of the abovementioned composts to each tree, and protected from the sun until they attain the age of five years. They will now be sufficiently hardy to bear the sun, and from that age until their fifteenth year, the compost should consist of equal parts of cowdung and burnt earth, and from 8 to 12 baskets full will be required for each bearing tree, a lesser proportion being distributed to the males. From the power of habit the trees will after the 15th year require a more stimulating nutrimient; the dung ought not therefore to be more than two or three months old, and the mixture should consist of two parts of it to one of burnt earth, of which the suitable proportion will be from 12 to 16 baskets to each tree biennially. In all cases the prepared compost must be spread out in the sun for 3 or 4 days previously to its application, in order to destroy grubs and worms that may have lodged in it, and which might injure the roots of the plants.

10. In all plantations, whether situated in forest land or in the plains, the necessity of manuring at stated intervals has not been found indispensable, and is indeed identified with their prosperity. The proper mode of applying it is in a circular furrow in immediate contract with the extremities of the fibrous roots which may be called the absorbents of the plant. Where there is a scarcity of dung recourse may be had to the dregs remaining after the preparation of the oil from the fruit of the Arachis Hypogora in mixture with burnt earth, which is a very stimulating manure; or composts may be formed from the decomposition of leaves or vegetable matter of any description. A very fertilizing and highly animalized liquid nutrimient for plants is obtained by macerating human ordure in water in proper pits for 4 or 5 months, and applying the fluid to the radical absorbents of the plants. Seaweeds and many other articles may also be resorted to, which will readily occur to the intelligent agriculturist.

11. During the progressive growth of the plantation, the beds of the trees are to be regularly weeded and the roots kept properly covered with the mould for these have a constant tendency to seek the surface; the growth of the lateral branches alone to be encouraged, and all suckers or dead and unproductive branches are to be removed by the pruning knife, so as to thin the trees considerably, and to admit of the descent of the night dews which are greatly contributive to their well being, especially during the dry and sultry weather; creepers are to be dislodged, and the lower vertices lopped off, with the view of establishing an unimpeded circulation of air. The conclusion of the great annual harvest is the fittest time for pruning the trees. After the eradication of the lallang, the growth of innocuous grasses is to be encouraged in the intervals between the trees, which will give the plantation the appearance of a park, and the plough is now to be abandoned.

12. The nutmeg tree is monocious as well as dioecious, but no means of discovering the sexes before the period of inflorescence are as yet known. The
relative proportion of male and female trees to each other is also undefined, and is indeed the result of chance. Setting aside however all pretensions to mathematical precision, the number of productive trees may be roundly estimated at two-thirds of the whole cultivation. However presumptuous it may appear to arraign the operations of nature, I cannot but think that, with reference to the genus *Myristica*, she has made a most unnecessary provision in the creation of so many male trees, since the monoecious plants are fully as susceptible of the rapturous impulse of connubial bliss, and equally competent for the purposes of ardent and successful love. The number of male trees therefore necessary to be retained will depend entirely on that of the monoecious kind; all above this number being considered as superfluous should be cut down, and other trees planted in their stead. Were I indeed to originate a nutmeg plantation now, I should either attempt to procure grafts on male stocks from such trees as produce the largest and best fruit, by the process of inarching, notwithstanding the speculative hypothesis of the graft partaking of the gradual and progressive decay of the parent tree, leaving a branch or two of the stock for the purpose of establishing a regular polygamy, by which means the plantation would consist of monoecious trees only, or I should place the young plants in the nursery at the distance of four feet from each other, and force them to an early discovery of their sex, by lifting them out of their beds once a year and replacing them in the same spot, so as to check the growth of wood and viviparous branches. The sex might thus be ascertained on an average within the fourth year, and the trees removed to the plantation and systematically arranged, whereas in the usual mode of proceeding it is not ascertainable before the 7th year in general.

13. Upon an average the nutmeg tree fruits at the age of 7 years, and increases in produce till the 15th year, when it is at its greatest productiveness. It is said to continue prolific for 70 or 80 years in the Moluccas, but our experience carries us no further than 22 years and a half, all the trees of which age that have been properly managed, are still in the highest degree of vigour and fecundity; and for this reason no term for planting a succession of trees can as yet be fixed upon. Seven months in general elapse between the appearance of the blossom and ripening of the fruit, and the produce of one bearing tree with another under good cultivation may in the fifteenth year of the plantation be calculated at five pounds of nutmegs, and a pound and a quarter of mace. I have observed however that some trees produce every year a great quantity of fruit, whilst others constantly give very little. It bears all the year round, but more plentifully in some months than in others. The great harvest may generally be looked for in the months of September, October, November and December, and a small one in April, May and June. Like other fruit trees on this portion of Sumatra, I have remarked that it yields most abundantly every other year. The fruit having ripened, the outer integument bursts spontaneously, and is gathered by means of a hook attached to a long stick, and the mace being cautiously stripped off, and flattened by the hands, in single layers, is placed on mats for 3 or 4 days in the sun to dry. Some planters cut off the heels and dry the mace in double blades, from an opinion that the insect is apt to breed in or about the heels, and that the double blade gives a better and more substantial appearance to the mace. The former idea is entirely groundless, for if the article be properly cured, kept in tight packages, in a dry situation and exposed to the sun for 5 or 6 hours once a fortnight, there need be no apprehension of the insect; and if it is not, it will assuredly be attacked by it whether the heels be cut off or not; again, the insect is much more likely to nestle within the fold of the double blade, and the fancied superiority of appearance has so little weight with the purchaser as not to counterbalance the risk of probable deterioration and eventual loss. In damp and rainy weather the mace should be dried by the heat of a charcoal fire carefully conducted, so as not to smoke it or blacken its surface.

14. The nuts liberated from their macy envelope are transported to the drying house, and deposited on an elevated stage of split neebongs placed at a sufficient distance from each other to admit of the heat from a smouldering fire beneath without suffering even the smallest nuts to pass through. The heat should not exceed 140° of Fahrenheit, for a sudden inordinate degree of heat dries up the kernels of the nuts too rapidly, and its continued application produces fissures in them; or a fermentation is excited in them, which increases their volume so greatly as to fill up the whole cavity of the shell, and to prevent them from rattling when put to this criterion of due preparation. The fire is lighted in the evening and kept up for the whole of the night. The smoking house is a brick building of a suitable size with a terraced
roof, and the stage is placed at an elevation of ten feet from the ground, having three divisions in it for the produce of different months. The nuts must be turned every second or third day, that they may all partake equally of the heat, and such as have undergone the smoking process for the period of two complete months and rattle freely in the shell, are to be cracked with wooden mallets, the worm-eaten and shrivelled ones thrown out, and the good ones rubbed over simply with recently-prepared well-sifted dry lime. They are now to be regarbed, and finally packed for transportation in tight casks, the insides of which have been smoked, cleaned, and covered with a coating of fresh water and lime. If packed in chests, the seams must be hammered to prevent the absorption of air or water. There is no necessity for sorting them, as previously to their sale, they are classed into sizes in the Company’s Warehouses in London.

15. The mode generally practised in preparing nutmegs for the market, is to dip them in a mixture of salt water and lime, and to spread them out on mats for 4 or 5 days in the shade to dry. I am however convinced from much experience that this is a pernicious practice, not only from the quantity of moisture imbibed in this process encouraging the breeding of insects and rendering the nuts liable to early decay, but from the heating quality of the mixture producing lissures and occasioning a great loss in the outturn: whereas by liming them simply in the dry way as I have recommended, the loss ought not to exceed 8 per cent. In May 1816, I made some experiments on this subject. I cracked a quantity of nutmegs that had been smoke-dried for two months, and distributed them into four equal portions. I prepared the nuts of one parcel with a mixture of lime and salt water; those of the second were rubbed over merely with five well-dried shell lime, such as the natives use with their betel, although I have no doubt but that recently-prepared and well-sifted common lime would answer equally well; those of the third parcel were mixed, unlimited with one-third of their weight of whole black pepper; and those of the fourth also unlimited with the same proportion of cloves. They were then put into separate boxes with sliding tops, and numbered 1, 2, 3 and 4, in the order I have mentioned them. At the expiration of the first year they were all sound. After that of the second, I found three worm-eaten nuts in No. 1, and two in No. 3, but those in Nos. 2 and 4 remained untouched. The injured nuts were allowed to remain, and after the lapse of the third year, five worm-eaten ones were discovered in No. 1, three in No. 3, and 2 in No. 4, those in No. 2 being in their original state. Four years and four months have now elapsed since the commencement of these experiments, and upon examining the several parcels the other day, the number of decayed nuts has not increased in Nos. 1, 3, and 4, those in No. 2 are as good as the day they were put into the box. These experiments not only prove the superiority of liming in the dry way, but also the fact that the progress to general decay in a heap of nutmegs, once after the insect has established itself, must be a matter of years. In the shell they will keep for a great length of time. I have myself kept them in this state for six years, and when cracked they were found perfectly sound.

From the report of the London brokers, however, they will not answer in Europe on account of the heavy allowance for shells, which is one-third of the weight; but the Chinese merchants are in the daily habit of exporting them to Penang and China, where they are in request. It is stated on the best authority, that unlimited or brown nutmegs as the home dealers call them, mixed with cloves as in experiment No. 4 are highly esteemed in England, and even preferred by some to the limed produce; most probably from the greater facility of detecting the flaws in them in their naked state.

16. Although the clove tree attains great perfection in the red mould of these districts, it is more partial to a less tenacious soil. Its cultivation has been established for many years in the West Indies and at Bourbon, and is of secondary importance only. The mother cloves are planted in rich mould at the distance of 12 inches from each other, screened from the sun and duly watered. They germinate within five weeks, and when four feet high are to be transplanted at intervals of 30 feet, with a small admixture of sand with the red mould, so as to reduce its tenacity, and are to be cultivated in the same way as the nutmegs, only that when full grown they require less manure in the proportion of one-third. They yield generally at the age of 6 years, and at that of 12 are in their highest state of bearing, when the average produce may be estimated at 6 or 7 pounds of marketable fruit each tree during the harvest, which takes place in the rainy months, but with us they have hitherto borne two crops in three years only. The fruit is terminal, and when of a reddish hue is plucked by the hand, so that the process of gathering
NUTMEGS.

17. With reference to the number of labourers, cattle and ploughs necessary for a plantation of 1,000 nutmeg or clove trees, after the ground has been thoroughly cleared of underwood and stumps of trees, I consider that 7 Chinese or Bengalee labourers, 50 head of cattle and 2 ploughs would be sufficient for all the purposes of the cultivation, with the exception of collecting the clove harvest, which being a very tedious process would require an extra number of hands, and indeed the best plan would be to gather it in by contract.

18. If the stamp of civilization is truly due to a nation only in proportion to its progress in agricultural improvements, this portion of Sumatra may justly be said to rank very low in the scale of civilized society. The causes of this backwardness are neither occult nor of difficult solution. They may be traced to the fostering of a spirit of commercial enterprise among the people, and to the facilities afforded them of purchasing supplies of grain at all times from the Company's Granary without subjecting themselves to the labours of the field in raising it. The general cultivation of rice, inasmuch as it leads to an increase of population, and to a reduction in the price of labour, is so intimately associated with the interests of the spice plantations, as to be inseparable from them; whilst it is the first step towards the amelioration of the country and the prosperity and happiness of its inhabitants. In order however to place the anticipated results of such laudable exertions beyond the risk of dubious issue, it becomes a measure of paramount policy to transfer the dispensation of the laws from the native chiefs to the British administration, to which the people ought to be tutored to look up as the fount of mercy, justice, and provident wisdom.

19. I have very great satisfaction in affording my individual testimony of the energy and zeal which actuate the great body of the planters, and of the correspondent improvement of their respective plantations; but in a report of this description it would be as invidious to record the names of such as have been foremost in the race of emulation, as it would be unjust to particularize those, who acting under the restrictive orders of their constituents, have been compelled to yield the palm of their more successful competitors. Suffice it to say, that the plantations generally exhibit tokens of progressive amelioration, and that such of the trees of the importation of 1795 as have been duly cultured, are in the highest degree of health, vigour and productiveness.

20. It would be unreasonable to expect that such felicitous results could have been realized without proportionate sacrifices. In the first era of the speculation, the cultivators had to contend on the one hand with nature in exploring and eliciting the latent properties of a soil notable only for its supposed indomitable sterility; whilst on the other the problem was, if it could be at all understood, taking and extent of capital requisite to conduct it to a prosperous issue, involved considerations of no trivial importance. It is to their industry, spirit and perseverance that we owe the naturalization of these valuable exotics, the established reputation of their produce both in Europe and India, which is equal, if not in some respects superior, to that of the Moluccas, the abolition of the odious monopoly and exclusive pretensions of the Dutch to this trade, and finally the assured possession to Great Britain of this promised scene of national and colonial wealth. I consider that I am within bounds in estimating the total amount of European and private capital in this speculation at 436,000 dollars and of native at 35,000 dollars from the first commencement of the plantations until the trees respectively came into bearing, but of this a considerable portion has been redeemed in produce.

21. The difficulty of hiring efficient labourers, the high price of labour, the want of capital, the length of time which must elapse before the cultivator reaps his produce, and the impracticability of obtaining a ready sale on the spot for it, in consequence of the depressed state of commerce, are the principal obstacles that have hitherto impeded, and still continue to impede the further extension of the plantations. If, however, the exigencies of the public service would admit of the transfer of Bengal convicts to the planters at such rate as would indemnify the company against any loss on this account; if Government would advance money to adventurers of good and steady character, secured on
the lands, and payable in produce, if it would offer a fair equitable price for produce payable on the spot, or in Bengal, agreeably to the option of the cultivator; and if it would interpose its influence in obtaining a remission of the duties in England as has been effected in India through the exertions of the Honorable the Lieut.-Governor, there is every reason to believe, that the cultivation of the species might eventually be carried to double its present extent.

22. Having at length arrived at the conclusion of my labours and imparted all the information that at present occurs to me as worthy of record, I have to offer an apology for the prolixity into which I have been led from the interesting nature of the subject, and for the minuteness of detail into which I have judged it necessary to enter in some places, in order to prevent a misapprehension of my meaning. Both in cultivating and curing the spices, I have differed materially from the mode adopted by the Dutch, from a conviction of its inexpediency, but I have not recommended any plan in substitution, the superior utility of which is not sanctioned by my own personal observation and experience, or founded on solid and substantial data.

I have the honor to be, Sir,
Your most obedient servant,

Fort Marlborough, 2nd Sept. 1820. (Signed) J. LUMSDAINE.


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<th>Above 20 years of age</th>
<th>Between 10 and 20 years of age</th>
<th>Between 5 and 10 years of age</th>
<th>Total under 5 years of age including plants in the nurseries</th>
<th>Total number of trees in cultivation</th>
<th>Buffaloes</th>
<th>Head of cattle</th>
<th>Number of labourers employed</th>
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REMARKS.—The great decrease in the number of nutmeg trees this season has occurred in the plantations of Europeans, and is owing partly to the extirpation of the unprofitable male trees. Numbers of plants have also been suffered to perish in the nurseries in consequence of a want of demand for them.

THE NUTMEG IN TRINIDAD.

The Nutmeg trees, always a striking and beautiful feature in the Gardens, have conspicuously benefited by the mild character of the last dry season, and the younger trees planted in 1873 and 1874 developed rapidly into the fruiting stage. The yield per tree, net in the market, of those in bearing, has again been over twenty pounds of prepared nutmegs, with an average price of two shillings and two pence per pound during the year. This gives a surprising return per acre per annum. For instance, trees at the (ultimate) distance of 30 feet would stand 50 to the acre. Allowing only 30 of these to be female or fruiting trees, the value of the yield would be £60 per acre per annum. It is somewhat remarkable that there has not been any considerable fluctuation in price during the last 15 years, but on the whole, the price has risen, That
the nutmeg tree is perfectly at home in Trinidad needs no further confirmation. It might be desirable however for persons contemplating the planting of Nutmegs to examine the trees at the Gardens carefully, as also account-sales at my office. It might further be mentioned that a batch of young trees planted in August 1878—25 inches high—from bamboo pots, are now live feet high and stoutly branched.—Report on Trinidad Gardens.

NUTMEGS.

To the Editor of the "Ceylon Observer.")

DEAR SIR,—Anyone experienced in the cultivation of nutmegs will, I daresay, be able to explain the reason why some trees only blossom and do not set at all. I have twenty-six trees, all but ten bearing; the latter blossom magnificently and never set.

They are somewhat closely planted, or rather the spreading branches touch each other and I believe they are about 10 feet apart, and I would be thankful to any one who will let me know if by any artificial means these ten trees could be made to bear.—Yours faithfully.

MALIGAKANDA.

28th July, 1882.

DEAR SIR,—Referring to "Maligakanda"'s enquiry in your paper of 27th inst., respecting above, he will, I think, find that his non-bearing trees are male ones. *Myristica fragrans* is dioecious (staminate and pistillate flowers on different plants) and Simmonds speaks of there being "three sorts of nutmegs, namely, the male or barren, the royal, and the queen, the last being preferred." I expect your correspondent's best plan would be to coppice, say half of his unprofitable trees, and try grafting (by the crown or cleft graft), but "W. F." is better able to advise upon this point than yours truly,

TASTE AND TRY.

P. S.—Your correspondent should read the *Tropical Agriculturist*, as in the February No. page 738, his question is anticipated and answered fully, in paragraph 12th of Lumsdale's report.

THE NUTMEG IN PERADENIYA GARDENS.

This dates further back than the existence of the Gardens, but it is included in the sale list for 1845—the seed offered at 2s. a dozen, and plants at 1s. a dozen. Within the last two years there has been a revived demand for this; and as the Gardens possess a number of trees in full bearing, large orders can be met. During this year and the last, between 14,000 and 15,000 seeds have been distributed to the newly-opened lowcountry estates.—Dr. Trimen's Report.

THE NUTMEG: a beautiful tree in a garden, and although of long infancy, is the most remunerative of all on attaining maturity. It should be planted only on rich soils, well drained by a shifting drain between the rows; now opened nearer to one row, and in due time filled in with manure and covered; and then opened nearer the corresponding row, and in due time also filled in with manure and covered. And between these shifting drains—which help to winter the roots of the tree and rest it after producing a smaller growth—coves, &c., might be introduced without injury to the larger cultivation. The planting distance will have to be regulated by the richness of the soil: the intervals being say about 8 or 9 or 10 feet, and calculating upon an annual production of 1,200 feet upwards, per full grown tree, and the average weight of the kernels or nuts go to 100 per lb., there will be obtained from a tree of 1,200 fruit over 12 lb. nutmegs average value R1.50 ... ... ... R18

4 " mace ... ... ... 75 ... ... ... 3

being very rich remuneration indeed for any amount of care bestowed on the cultivation. Of the pulp of the fruit has been prepared one of the richest composites we have ever tasted, but the pulp generally as well as the leaves should be returned to the soil by incendment in the drains or otherwise. Many years ago the nutmeg was planted somewhat extensively in the neighbourhood of Galle and failed; for instead of the plant being put into permeable rich soil, it was struck into the hard carbon of the undulating hills near Wakwella; and recently we have discovered the death from want of care of some splendid trees grown not far from Colombo. The property had changed hands from European to Native, and the trees died for want of continued attention, so that unless would-be growers of the nutmeg select a rich soil, and bestow unremitting care in the growth, they cannot reasonably hope to obtain the rich returns now yielded by the cultivation in other countries.—Ceylon Examiner.
NUTMEGS.

Nutmegs and Mace.—Nutmegs and mace belong together, the latter being the inner covering of the nut. This most interesting, and in its natural fresh state, lovely spice, seems to be an especial favourite with the American people, since the export thereof of the nut especially to the United States exceeds that to all Europe combined. The home of the nutmeg in reality is New Guinea (Papua), where it grows wild, and it is possible that in times past (and now) the famous and daring Bugis traders, who alone obtained the most noted products by way of barter with the extremely barbarous and hostile inhabitants, brought away certain quantities thereof. The most reliable place of production of obtaining them, agreeably with the demands of the market, has ever been the island of Banda and probably other islands, and not or near the Moluccas, while the island of Penang and the Straits Settlement furnishes also their quota, the quantity increasing gradually. The nutmeg thrives well also with a little care on certain parts of the peninsula, and if the Colonial Government had given to hitherto a little more fostering care to its cultivation, a much larger quantity might have been produced. In Deli, Sumatra, nearly opposite Penang, where the tobacco planters labour under the idea that their rich soil, after having produced one crop of tobacco will not produce a second sufficiently good to pay, and that the land must lie fallow for six years (grow up in jungle again), some of them a few years ago became happily possessed of the idea whether during those six long years the tobacco lands might not possibly produce something else "that would pay," and a few of these intelligent tropical husbandmen concluded to plant nutmegs. Six good coolies, at 20 cents wages per day each, with a hand cart, could soon plant a large piece of fallow tobacco lands in nutmegs. In the meantime, the tobacco planters who looked upon this as an experiment that would not cost them much, and paying little attention to it, went on tobacco planting looking upon that as their object and actual source of profit, as it takes about five years until the nutmeg trees commenced to bear. Some of the planters had crops of fine nutmegs to send to market at the end of that time, in addition to all the tobacco they produced and shipped during the same period. The nutmegs being good and large could enter the market as "Penang nutmegs"—an innocent, cheap enterprise that turned out well, the nutmegs being worth about 70 dollars per picul, unselected, and mace, if slowly and neatly dried, not scorched, about from 40 dollars to 50 dollars per picul. It takes 110 fair-sized nutmegs to make one pound (1 picul = 1334 pounds at 80 dollars) worth 60 cents; and since a good full-grown nutmeg tree in full bearing can produce several bushels of nuts with the hulls on, it can be easily seen that the "experiment" turned out well. Such of the planters as had their wits about them, the price of Deli tobacco having fallen during the last two or three years nearly 50 per cent against former years, and yielding little or no profit at the present time, can now stop tobacco planting and find old tobacco prices in their nutmeg groves until the price of tobacco rises again. The number of the "successful," however, is not large, but will, after such a demonstration, become larger, it is supposed. The nutmeg tree will grow well on the coast of Borneo and adjacent islands, as well as in the Malay States and the Malayan peninsula, under British and Siamese rule; and as we have very advantageous treaties with both countries, the United States buying more nutmegs than the whole of Europe taken together, some of our enterprising young men might perhaps spend some time profitably in reflecting upon this.—Weekly Drug News.

MANURING NUTMEGS IN CEYLON.

In the culture of nutmegs there is little else to be done than keeping the trees free from parasites, a pest to which they are very liable. To manure nutmegs has been considered as the next thing to killing them. "That is how they died out in the Straits," has for many years been the closer to all further inquiry in the matter. A final word on the subject. We live however and learn; and I have to record a successful experiment in nutmeg manuring, with the result of a very much increased yield. The Chinese who killed the trees in the Straits had for a system of manuring digging a trench round the tree, just outside the furthest reach of the branches, and although not many roots were destroyed, still such damage was done as to lead to the disastrous results we have all heard of. The new style, which I am assured is a success, means a surface manuring underneath the boughs, and close up to the tree. The ground is slightly pricked all over not to disturb or injure the close net work of roots, and the manure is scattered over it, and allowed to find its way in through the action of the rains, and other natural means.—Peppercorn, May 1889.
THE NUTMEG.

Of immense commercial importance is the Nutmeg tree, Myristica moschata, or M. aromatic. It is also ornamental by its clusters of berries or fruit. The plant is not commonly met with in this country, and it is seldom grown except in botanical or official collections. Its cultivation, however, is not difficult. It thrives in a sandy loam and brisk heat, and cuttings strike freely inserted in sand and placed in heat under a bell-glass. Of the Nutmeg tree Dr. Hogg has written as follows in his "Vegetable Kingdom":—"It is a native of the Moluccas and neighbouring islands, but is now cultivated in Java, Sumatra, Penang, the Isle of Bourbon, Mauritius, and other parts of the East, and in Cayenne, Martinique, and some of the West India islands. It attains the height of 30 feet, with a straight stem and a branching head. The leaves are oblong-oval, glossy on the upper surface and whitish beneath, and with an aromatic taste. The flowers are male and female on different trees, insignificant, and of a yellowish colour. The fruit is round or oval, about the size of a small Peach, with a smooth surface, green at first, but becoming yellow when ripe. The external covering, which may be called a husk, is thick and fleshy, containing an austere astringent juice; becoming dry by maturity, it opens in two valves, and discovers the nut covered with its aril, or mace, which is of a beautiful blood-red colour; beneath the mace is a brown shining shell containing the kernel or Nutmeg.

A plantation of Nutmeg trees is always made from seed, and it is not till the eighth or ninth year that the trees produce flowers. The sexes being on different trees, after the plants are two years old there are all headed down and grafted with scions taken from the female tree, reserving only one male stock for fecundation. The natives of the Moluccas gather the fruit by hand, strip off and reject the pulpy husk, detach the mace carefully, and expose it to the sun, which soon changes its beautiful blood-red colour to a light brown; it is then sprinkled with sea water to render it flexible and preserve it. The nuts are first sun-dried and then smoked, until the kernels rattle against the shell. This shell being removed, the kernels are dipped twice or thrice in lime water, laid in heaps for two or three days, wiped, and packed in bales or barrels. The unripe fruit of the Nutmeg is frequently preserved in sugar in the East; and before doing so it is necessary to deprive it of its acrid properties by soaking it in spirits."—Journal of Horticulture.

POISONING BY NUTMEG.—A case of poisoning by nutmeg is recorded in the British Medical Journal (p. 1,085), in which one nutmeg had been eaten by a patient as a cure for diarrhoea. It caused him to become giddy, stupid and very drowsy till next day. The narcotic properties of these seeds, and of others of the same natural order, do not appear to be generally known, and seem worthy of investigation.—Pharmaceutical Journal.

NUTMEG CULTIVATION.—We have received from Mr. W. Ferguson a copy of the "Journal of the Indian Archipelago" for October 1848, containing a paper called "Some Account of the Nutmeg Cultivation, by Thos. Oxley, Esq., A.R.L.S., Surgeon of the Straits Settlements." This appears to be a full and thorough practical essay. One paragraph we may copy here:—"The nutmeg tree shows flower about the 7th year, but the longer it is before doing so, the better and stronger will it be. I cannot refrain from a smile when a sanguine planter informs me with exultation that he has obtained a nut from a tree only 3 or 4 years planted out,—so much the worse for his chance of success, too great precocity being incompatible with strength and longevity. The best trees do not shew flower before the 9th year, and one such is worth a score of the others. This will be evident when it is stated that I have seen several trees yield more than ten thousand nuts each in one year, whereas I do not believe that there is a plantation in the Straits that averages 1,000 from every tree. This very great disparity of bearing shews plainly that the cultivation of the plant is not yet thoroughly understood, or greater uniformity would prevail, and I think it clearly enough points out that a higher degree of cultivation would meet its reward. It is not quite safe to cut down the male plants upon first showing flower, as they many times show perfectly female flowers the following year, and in that case are generally the strongest and finest trees. But there is some indication of this in the first mode of flowering. When the racemes are many times divided and have numerous flowers, there is no chance of its becoming entirely female, but where there are only two or three flowers on a raceme there is a fair prospect of its doing so. The tree has not been introduced into the Straits sufficiently long to determine its longevity, but those introduced and planted in the beginning of the present century as yet shew no symptoms of decay."
This spice, at least experienced only slight fluctuations during the last two years, being at times as low, if not a little lower, than during the first few years of my residence here, and at times a little higher, and now they are again at about normal quotations. The size of the nut has much to do with market quotations, the smaller the nut the lower the price. Between largest and smallest, if in sound condition, there is a margin of from $15 to $20 per picul, those of $110 to the English pound being the highest priced. Those exported from Singapore come essentially from the Moluccas (Banda Islands, Amboyna, and even from New Guinea, where the nutmeg grows wild). Those exported from Penang are the actual product of Penang Island and immediate vicinity on the main land, where the nutmeg tree largely cultivated, with increasing tendency and does well. During my long residence here. I have by close observation and statistics discovered what may not be generally known.

Our country buys and consequently consumes more nutmegs than the whole continent of Europe taken together, and before the repeal by our Government of the 10 per cent. discriminating duty on Eastern goods imported from places west of the Cape of Good Hope (referred to in my part), the colonial statistics showed that far fewer nutmegs were exported to the United Kingdom than to our country. Since the repeal of said act, the tables have turned, and judging from the same statistics and my own, which I quote below, it would seem that the British have become enormous nutmeg consumers, beating us badly. But that is not it. I have no doubt that they are shipped from here to our country, the same as pepper, tin, and other Straits produce upon consular invoice certificates obtained there, and I opine that they are a remunerative article of commerce with a margin of 15 to 20 per cent., depending on the sizes of the nuts, with speculation thrown in.

I quote from the same authorities, as in pepper, the exports of nutmegs in 1884 and 1885 from Singapore and Penang to our country and the United Kingdom, viz:

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<th></th>
<th>To United States.</th>
<th>To United Kingdom.</th>
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<tr>
<td></td>
<td>1884.</td>
<td>1885.</td>
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<td>Singapore ...</td>
<td>$150,611 61</td>
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<td>Penang ...</td>
<td>43,295 00</td>
<td>49,185 00</td>
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<td><strong>Total ...</strong></td>
<td><strong>193,906 61</strong></td>
<td><strong>221,954 19</strong></td>
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There was an increase in 1885 to the United States and a decrease to the United Kingdom, but it will be found hereafter that in 1886 the reverse was the case. None of the nutmegs (or any other Straits produce) exported hence to England were carried in American bottoms and those exported to the United States were largely carried by foreign vessels, prominently British Steamers.

The nutmeg cultivation is on the increase not only at Penang but in various parts of the Straits Settlements and adjacents Malay states under British protection.—Oil, Paint and Drug Reporter.

NUTMEGS.—There is a slight decrease on our stock at the beginning of the year. The island of Banda (one of the Molucca group, north-east of Java) was visited by storms of great violence on January 1 and 10. The island is the centre of the nutmeg production, and large numbers of trees have been uprooted, while from others the unripe fruits have fallen. For the next six months not even a moderate crop can therefore be looked for.—Chemist and Druggist.

NUTMEGS.—The Macassar Handelsblad reports that the nutmeg crop this year in Menado is considerable. During the last five years, since a long continued drought in 1877, nutmeg cultivation has, however, suffered greatly there from a disease, hitherto unknown, chiefly among the trees in bearing. On estates containing 4,000 to 5,000 nutmeg trees, about twenty or more of the latter die regularly every month. No remedy has yet been suggested for this disease, the roots being the part first affected. Their decay is followed by the trees withering away and dying more or less rapidly.—Straits Times.

How Nutmegs Grow.—Nutmegs grow on little trees which look like small pear trees, and which are generally not over twenty feet high. The flowers are very much like the lily of the valley. They are pale and very fragrant. The nutmeg is the seed of the fruit, and mace is the thin covering over the seed. The fruit is about the size of a peach. When ripe it breaks open and shows a little nut inside. The trees grow on the islands of Asia and tropical America. They bear fruit seventy or eighty years, and have ripe fruit upon them all the season. A tree in Jamaica has over four thousand nutmegs on it every year.
THE NUTMEG.—Of immense commercial importance is the nutmeg tree, *Myristica moschata* or *M. aromatica*. It is also ornamental by its clusters of berries or fruit. The plant is not commonly met with in this country, and it is seldom grown except in botanical or offical collections. Its cultivation, however, is not difficult. It thrives in a sandy loam and brisk heat, and cuttings strike freely inserted in sand and placed in heat under a bell-glass. Of the Nutmeg tree Dr. Hogg has written as follows in his "Vegetable Kingdom": "It is a native of the Moluccas and neighbouring islands, but it is now cultivated in Java, Sumatra, Penang, the Isle of Bourbon, Mauritius, and other parts of the East, and in Cayenne, Martinique, and some of the West Indian islands. It attains the height of thirty feet, with a straight stem and a branching head. The leaves are oblong-oval, glossy on the upper surface and whitish beneath, and with an aromatic taste. The flowers are male and female on different trees, insignificant, and of a yellowish colour. The fruit is round or oval, about the size of a small peach, with a smooth surface, green at first, but becoming yellow when ripe. The external covering, which may be called a husk, is thick and fleshy, containing an austere astringent juice; becoming dry by maturity, it opens in two valves, and discovers the nut covered with its aril, or mace, which is of a beautiful blood-red colour; beneath the mace is a brown shining shell containing the kernel or Nutmeg. A plantation of Nutmeg trees is always made from seed, and it not till the eighth or ninth year that the trees produce flowers. The sexes being on different trees, after the plants are two years old they are headed down and grafted with scions taken from the female tree, reserving only one male stock for fecundation. The natives of the Moluccas gather the fruit by hand, strip off and reject the pulpy husk, detach the mace carefully, and expose it to the sun, which soon changes its beautiful blood-red colour to a light brown; it is then sprinkled with sea water to tender it flexible and preserve it. The nuts are first sun-dried and then smoked, until the kernels rattle against the shell. This shell being removed, the kernels are dipped twice or thrice in lime water, laid in heaps for two or three days, wiped, and packed in bales or barrels. The unripe fruit of the Nutmeg is frequently preserved in sugar in the East; and before doing so it is necessary to deprive it of its acrid properties by soaking it in spirits."—*Journal of Horticulture*.

TORREYA CALIFORNICA:

THE STINKING CEDAR OR CALIFORNIAN NUTMEG.

This is described as a tree 60 to 80 feet high, with a trunk attaining 3 feet in diameter, and inhabiting the western slopes of the Sierra Nevada of California, from the Mendocino County to Zulata County. During my visit to California I had not the good fortune to see a good specimen of this most interesting tree. The only place in which I remember to have met with it was in the gorge of the Yosemite Valley by the rocky stream, some miles below the hotels, where it formed a scraggy tree 20 feet high, or thereabouts, growing interspersed with Pinus contorta and various deciduous shrubs. The colour of the foliage was bright green, and the large green Plumlike fruits, produced in abundance, had a very singular appearance. The wood is described as light, soft, not very strong, very close grained, compact, susceptible of a fine polish, and very durable in contact with the soil. It had all the appearance of a slow growing tree, and this is its character in cultivation at Kew. The genus is one of the most interesting amongst Conifers, on account of the rarity and remarkable distribution of the few species it is known to contain. There are, besides the Californian, the *T. taxifolia*, Arnott (Savin or Stinking Cedar of Florida), confined to swamps in the neighbourhood of Bristol in Western Florida, and very rare there; *T. Grandis*, Fortune, of North China; and *T. nucifera*, Seibold and Zuccarini, of Japan.—J. D. Hooker.—*Gardener's Chronicle*,

15
ALL ABOUT CLOVES.
ALL ABOUT CLOVES.

CLOVES IN CEYLON.

ACE and Cloves are generally exhibited at the Agri-Horticultural Shows in Colombo, and of the latter a few acres are returned from the planting districts. There is no entry for nutmegs, cloves or mace in the Ceylon Customs accounts; but under the head "Spices" (which of course does not include any cinnamon or cardamoms, these being separately recorded) we have an export worth R17,000 in 1882; R12,000 in 1883; and no less than R31,260 for 5 packages and 16,050 lb. in 1884. In 1885 there were R1,280 for 1 package, 2,418 lb; in 1886 R3,150 for 3 packages, 6,894 lb; in 1887, for 12 packages, 4,888 lb. R1,356 are put down; for 1888, the entries are R3,313 for 3 packages, 6,984 lb. The Government Agents' return, in the Agricultural Statistics—as a rule very untrustworthy—give as many as 3,050 acres under "spices" in Ceylon; but it is impossible to say exactly what is meant.

CLOVES.

(From the "Encyclopaedia Britannica.")

Cloves are the unexpanded flower-buds of Caryophyllus aromaticus, a tree belonging to the natural order Myrtaceae. They are so named from the French word clou, on account of their resemblance to a nail. The clove tree is a beautiful evergreen which grows to a height of from 30 to 40 feet, having large oblong leaves and crimson flowers in numerous groups of terminal cymes. The flower-buds are at first of a pale colour and gradually become green, after which they develop into a bright red, when they are ready for collecting. Cloves are rather more than half an inch in length, and consist of a long cylindrical calyx, terminating in four spreading sepals, and four unopened petals which form a small ball in the centre. The tree is a native of the small group of islands in the Indian Archipelago called the Moluccas or Spice Islands; but it was long cultivated by the Dutch in Amboyna and two or three small neighbouring islands. Cloves were one of the principal Oriental spices which early excited the cupidity of Western commercial communities, having been the basis of a rich and lucrative trade from an early part of the Christian era. The Portuguese, by doubling the Cape of Good Hope, obtained possession of the principal portion of the clove trade, which they continued to hold for nearly a century, when in 1605, they were expelled from the Moluccas by the Dutch. That power exerted great and inhuman efforts to obtain a complete monopoly
of the trade, attempting to extirpate all the clove trees growing in their native islands, and to concentrate the whole production in the Amboyna islands. With great difficulty the French succeeded in introducing the clove tree into Mauritius in the year 1770; subsequently the cultivation was introduced into Guiana, and at the end of the century the trees were planted at Zanzibar. The chief commercial sources of supply are now Zanzibar and its neighbouring island Pemba on the East African coast, and Amboyna. Cloves are also grown in Java, Sumatra, Réunion, Guiana, and the West India Islands.

Clove as they come into the market have a deep brown colour, a powerfully fragrant odour, and a taste too hot and acrid to be pleasant. When pressed with the nail they exude a volatile oil with which they are charged to the unusual proportion of about 18 per cent. The oil is obtained as a commercial product by submitting the cloves with water to repeated distillation. It is, when new and properly prepared, a pale yellow or almost colourless fluid, becoming after some time of a brown colour; and it possesses the odour and taste peculiar to cloves. The essential oil of cloves is a mixture of two oils—one a hydrocarbon isomeric with oil of turpentine, and the other an oxygenated oil, eugenol or eugenic acid, which possesses the taste and odour of cloves. Cloves are employed principally as a condiment in culinary operations, in confectionery, and in the preparation of liqueurs. In medicine they are tonic and carminative, but they are little used except as adjuncts to other substances on account of their flavour, or with purgatives to prevent nausea and gripping. The essential oil forms a convenient medium for using cloves for flavouring or medicinal purposes, and it also is frequently employed to relieve toothache.

CLOVES.
(From "Spon’s Enyclopaedia."

Clove (Fr., Girafles, Clous de Girafles; Ger., Gewürzelken).—The name cloves is applied to the dried flower-buds or calyces of Eugenia Caryophyllata [Caryophyllus aromaticus], an evergreen tree of 30-40 ft., indigenous only in the five small islands constituting the Moluccas proper (Tarnati, Tidor, Mortir, Makian, and Bachian), but introduced at various times into, and more or less widely cultivated in, Amboina, Haruku, Saparua, Nussial, Sumatra, Penang, Malacca, Mascarene Islands, Réunion, Mauritius, Zanzibar, Pemba, Jamaica, Dominica, and French Guiana.

In cultivating cloves, the mother-cloves (fruits) are planted in rich mould about 12 in. apart, screened from the sun, and duly watered. They germinate within 5 weeks, and, when 4 ft. high, are transplanted at distances of 30 ft. There should be a certain amount of sand in the soil to reduce its tenacity, and less manure is required than for nutmegs. The tree naturally selects a volcanic soil, and a sloping position. The yield commences at about the 6th year, and is at its maximum in the 12th year, when the average annual produce may be estimated at 6-7 lb. of marketable fruit from each tree. There is usually a crop every year, but in Sumatra, the trees often bear only twice in 3 years. When past its prime, the tree has a ragged appearance. Its existence in Sumatra is supposed to be limited to a duration of about 20 years, except in very superior soil, when it may perhaps last 24 years; yet in Ambon, it does not bear till the 12th-15th year, and continues prolific to the age of 75-150 years. Hence, it is necessary to plant a succession of seedlings when the old trees have attained their 8th year, this octennial system being adhered to throughout. The slight hold which the trees have upon the soil, renders it very desirable that they should be provided with shelter from strong winds. With this object, the plantations in Sumatra are belted with a double row of Casuarina littorea and Cerbera Manghas. Similar precautions in Zanzibar and Réunion would probably have mitigated the havoc recently created by hurricanes among their clove-gardens. The harvesting of the flower-buds (cloves) commences immediately they assume a bright red colour. The best and most usual plan is to pluck them singly by hand, movable stages facilitating the operation in the case of the upper branches. Sometimes, however, they are beaten off by long bambooos, and caught in cloths spread below. The plucked cloves undergo a process of drying, which confers a brown hue, and prepares them for packing. In Sumatra, simple exposure to the sun for several days on mats is the common method; but elsewhere they are occasionally also smoked on hurdles covered with mattering near a slow wood fire; and very rarely they are scalded in hot water before smoking. They are ready for packing when they break easily between the fingers.
The production of cloves fluctuates enormously. The Moluccas, or rather the four of them where the tree is cultivated (Ambonia, Haruku, Saparua, and Nusalant), produced 869,727 Amsterdam lb. (of 2:2 lb.) in 1836, but only 89,923 in 1849; in 1854, Nusalant harvested 120,283 Amsterdam lb. from 13,042 trees (an average of 9 lb. a tree), Saparua 181,137 from 29,732 trees, Haruku 38,803, Ambonina 170,689; total, 510,612 Amsterdam lb. Java exported only 92 piceula (of 133 lb.) in 1870-80; but in 1878-9, the figures were 1,614 to Holland, 5 to Sweden, 3 to America, and 1,237 to Singapore, total 2,849 piceula. Of late years, the islands of Zanzibar and Pemba on the E. African coast, have been the chief producers of cloves, yielding a maximum annual crop of 104 million lb. before the disastrous hurricane of 1872. The clove gardens of Pemba, situated mostly on the W. side of the island, escaped the destruction which befell the larger island. The exports from these two islands go largely to Bombay, also direct to America and Hamburg, smaller quantities reaching the Red Sea ports by native craft. For European and American markets, the packages used are mat bags made of split coconut leaves; for native ports, simply raw hides. The Bombay imports were 45,642 cwt. in 1869-70, 20,968 in 1870-1, 43,891 in 1871-2, 25,185 in 1872-3. Reunion in 1825-49 produced yearly as much as 800,000 kilo. (of 2.2 lb.), but has recently suffered much from hurricanes; the crop of 1879 was destroyed by a cyclone, and the exports for 1879 (8,777 kilo.) were merely re-exports from St. Marie de Madagascar. In Jamaica and Dominica, cloves flourish remarkably, and are eminently suited for cultivation with nutmegs by small proprietors on the hills. Our imports in 1870 were 1,086,659 lb., 16,374 cwt.; there are no specific returns since. We received 3,271 cwt. from Bombay in 1872-3. Hankow, in 1879, imported 263,456 piculs (of 133 lb.) of cloves, 4,0561; and 30 piculs of mother-cloves, 4381. The cloves of commerce vary in plumpness, brightness of tint, and yield of essential oil. The values of the chief kinds met with in the London market are: — Penang, 20-29d. a lb.; Ambonina, 16-23d.; Zanzibar, 14-19d.

Clove-stalks, the vikunia of the natives, are largely shipped from Zanzibar, and used in the manufacture of mixed spice and for adulterating ground cloves. They yield 4-64 per cent. of volatile oil. Mother-cloves or fruits are also exported, probably for a similar purpose. In one drug sale in 1873, 4,200 packages of the former were sold at 3-4d. a lb. and 1,050 bags of the latter at 2-3d. a lb. The microscope will reveal the stone-cells of the stalks and the large starch-granules of the fruit, as well as both stone-cells and starch-granules if pimento has been fraudulently added.

The essential oil of cloves is described on p. 1420.

In Brazil, the flower-buds of Discyphllum Caryophyllatum, whose bark furnishes clove cassia, are used as substitutes for true cloves.

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(From Simmonds's "Commercial Products of the Vegetable Kingdom.")

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CLOVES.

Clove trees arrive sparingly from Amboyna, the shipments from Java in 1870 were 1,226 piculs, 3,200 piculs in 1872, and 5,000 piculs in 1874. In 1874 there were 290,000 clove trees, of which 161,260 were in bearing. In Ternate the number of clove trees on the average of the three years ending 1874 was 8,000.

In Brazil the cloves of *D. Caryophyllatum*, which are remarkable for their fine aroma, are largely employed in domestic and medicinal use. The following figures give the import of cloves into the United Kingdom:

<table>
<thead>
<tr>
<th>Year</th>
<th>Quantity</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1845</td>
<td>414,485</td>
<td>981,308</td>
</tr>
<tr>
<td>1850</td>
<td>749,645</td>
<td>3,339,184</td>
</tr>
<tr>
<td>1855</td>
<td>804,339</td>
<td>1,089,667</td>
</tr>
</tbody>
</table>

In 1870, the last year for which there are distinct accounts, the following were our sources of supply:

<table>
<thead>
<tr>
<th>Source</th>
<th>Quantity</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Holland (Eastern Possessions)</td>
<td>83,623</td>
<td>1,918</td>
</tr>
<tr>
<td>Egypt</td>
<td>1,159,390</td>
<td>9,845</td>
</tr>
<tr>
<td>Zanzibar</td>
<td>75,345</td>
<td>970</td>
</tr>
<tr>
<td>British India</td>
<td>33,689</td>
<td>1,848</td>
</tr>
<tr>
<td>Straits Settlements</td>
<td>24,331</td>
<td>407</td>
</tr>
<tr>
<td>Other parts</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>1,089,667</td>
<td>16,374</td>
</tr>
</tbody>
</table>

CLOVES. (From Porter's "Tropical Agriculturist."

The clove-tree—*Caryophyllata*—is a genus belonging to the class and order *Polyandra monogyna*.—Nat. Ord. Hesperide, Linn. Myrti, Jussieu.

This spice, it is supposed, was well known to the ancients, and certainly formed an article of commerce during the middle ages, when Aleppo was the grand mart of eastern trade.

The country of its production was not, however, ascertained until the discovery of the Molucca islands by the Portuguese, about 300 years ago. Previous to that period it was conveyed to Europe from ports in the Mediterranean, whither it was brought by the Arabs, Persians, and Egyptians.

The Portuguese found the clove-tree growing in abundance at the Moluccas, and first obtained the spice direct from its native soil; but the Dutch did not long allow them to retain this exclusive privilege un molested, and soon wrested from the original discoverers the reward of their enterprise. The history of this trade would furnish another example of the grasping, monopolizing policy of the Dutch; but this has been already sufficiently noticed in the account of the cinnamon-tree, and it is needless to repeat the same unpleasing story of injustice and oppression. With the desire of keeping the cultivation of the clove-tree completely within their own power, it is said that the new settlers in the Moluccas caused all the clove-trees to be destroyed on every island except Amboyna, where they watched over its careful cultivation, obliging each of the natives to rear a certain number of plants. The more certainly to insure its destruction elsewhere, they paid an annual tribute to the kings of Ternate, Tidor, and Bantam, to permit and assist in the extirpation of the tree which abounded in the Archipelago of which they were masters. Meanwhile, in the one favoured isle the land was divided into four thousand allotments; each of which divisions was expected to afford sufficient space for the growth of one hundred and twenty-five trees, and it was ordered that this number should always be cultivated. In 1720 a law was passed rendering it compulsory on the natives to make up the full complement. Accordingly, 500,000 clove-trees flourished within the limits of this small island. Their annual produce averaged rather more than two pounds of cloves per tree, making the annual aggregate amount to more than a million of pounds of cloves. The Dutch in vain, however, sought to extirpate the tree from all other parts, and to confine its culture to this spot exclusively. It still flourished in some of the smaller islands which had not yet been visited by the Dutch; from Guebi, one of these, the French obtained the clove and the nutmeg-trees, and successfully transplanted them into the Isle of France. This was effected by M. Poivre in two expeditions made in the years 1769, and 1771; and in there were already between ten and eleven thousand clove-trees growing...
CLOVES.

in the island. From the Isle of France several plants were conveyed to Cayenne; and in 1789 the culture of the clove was introduced into Dominica. Subsequently plants were obtained at Martinico, whence, in the year 1797, 3200000 of clove in the year following 300 pounds. At St. Kitt's, likewise, the plant was cultivated, and a quantity of its produce imported into England. At a later period some clove-trees were removed from Martinico to St. Vincents; and in 1800, cloves produced in that island were transmitted to the Society of Arts by Dr. Anderson. Some samples of cloves, as well as nutmegs, have been recently sent home from Trinidad for the approbation of the same Society.

The clove-tree is extremely handsome, of a noble height, beautiful form, and luxuriant foliage. It has a thin, smooth bark, enclosing a trunk of exceedingly hard wood. When it has reached to about a foot in height, it spreads into several branches; these are furnished with leaves growing opposite to each other, and which are smooth, narrow, pointed, indented round the edges, and of a thick consistence. The colour of the upper surface, and of the footstalk, is inclining to red; that of the under surface is green. The flowers grow in small bunches, upon branched peduncles, at the extremities of the boughs; they are of a delicate peach-blossom colour, and come forth in the rainy season. The calyx is elongated, and forms the seed-vessel. As soon as the blooms begin to fade, the calyx changes from red to yellow, and then to red. It, together with the embryonic seed, is at this stage of its growth the clove of commerce. If it suffered to remain on the tree after this period, the calyx gradually swells somewhat in the same manner as that of a rose; the seed enlarges, and the pungent properties of the clove are in great part dissipated. In this state it entirely loses its value as a spice, and is then called a mother-clove, which is only valuable as seed for propagating the plant. One seed, which attains to a considerable size, is contained in each calyx. The whole tree is strongly aromatic, and the petioles of the leaves have nearly the same pungency as the calyces of the flowers. The leaves themselves partake strongly of the qualities of the cloves, and do not lose their aroma when dried; they may, therefore, form a good substitute in cookery. The clove-tree is propagated either by seed or layers; if by seed, holes are made from eight to ten feet apart, and a seed is dropped into each hole. On its first vegetation the plant appears like a small, straight, red dart; when it attains to the height of about two inches, two small red leaves shoot forth at the top. If the young branches are laid down, and the ground is kept moist, they usually take root in six months. The plant thrives best on a strong compact soil, whether of a gravelly or clayey nature; a damp situation is decidedly adverse to its growth.

The clove-tree seldom arrives at sufficient maturity for producing fruit till eight or nine years after sowing. In the Moluccas the trees are generally topped and kept within eight or nine feet high, for the greater convenience of gathering the produce; but if left to nature they attain to a much greater height. As the cloves become in a fit state they are taken from the tree; if allowed to remain for one gathering alone, a part only would be of any value, and the rest would be either in a too forward or too backward state to be used as spice. At the time of gathering, cloths are spread on the ground, and the cloves are beat down with reeds. They are then placed on hurdles, covered with large leaves, and subjected to the action of smoke; after this fumigation they are dried in the sun, and are then fit for exportation.

A particular account of the clove-tree at Dominica and St. Vincent will, perhaps, prove more useful than an enlarged description of its culture in the Moluccas; since this will show how it may be successfully transplanted into other parts of the tropical regions. M. Buée, the first cultivator of the clove-tree in Dominica, obtained for his commencing essay only one young plant about half a foot high, having no more than six or eight leaves. Pursuing the directions received with it, he planted it in rich soil, and in the shade of other trees. It did not, however, thrive, and he had the mortification of seeing it wither and soon die away. He then procured two other plants from Cayenne, and planted these near the house for the convenience of watching them, but the soil here was very poor. Fourteen more plants were subsequently obtained, and M. Buée planted these in various situations and soils. He found that the plant grew with sufficient luxuriance in a sterile soil, composed of a yellowish or reddish stiff clay, such as that in which the pimento nourishes, but which, for the generality of crops, is scarcely fit for cultivation. Sixteen hundred trees were afterwards raised from seed, which, in a year from the first sowing, were transplanted.
CLOVES.

The following is the manner in which the cultivation of this plant was most successfully pursued by M. Bué at Dominica:—The seeds were sown at about six inches apart from each other in beds. Over these beds small frames were erected about three feet from the ground, and plantain-leaves were spread on the top in order to shelter the young plants from the sun. The leaves were allowed generally to decay and, at the end of nine months, the young plants, which by that time were strong, were allowed to receive the benefit of the sun; but if not protected from it when very young, they were found to droop and die.

When transplanted, the trees were placed at sixteen feet apart from each other. They grew very luxuriantly, and at the end of fifteen months after their removal, attained the height of from three to four feet. The ground wherein they were planted had been a coffee plantation during forty years. The coffee-trees had decayed, and an attempt had been made to replace them; but they refused to grow; whereas the clove-plants flourished, as if on congenial soil, and a crop was gathered from some of them when they were not more than six years old, which period is two or three years earlier than the usual time for gathering.

The cloves sent from St. Vincent's to England in 1800 were obtained from trees eight feet high, having a stem only two inches in diameter. Trial was made in this island of the relative growth of the plant on different soils. It grew sickly on land which was not manured; but on land which had received this preparation, it flourished. It should be planted in a situation where it is not exposed to high winds. The manner of collecting the cloves in this island by one or two at a time, as they become fit for gathering, is so extremely tedious, that if so pursued it is scarcely possible this should ever become a profitable branch of commerce. Indeed, it appears from the testimony of persons well acquainted with the subject, that at Trinidad the same objection exists, and that more economy of labour must be used in this respect in the West Indies before the clove cultivation of the West can be brought in any way to compete with that of the East.

The clove is very rich in essential oil, containing a greater proportions than any other plants or parts of plants. Neumann obtained, by distillation, two ounces and two drams from sixteen ounces of cloves. When newly gathered, cloves will yield oil on pressure. It is said that this method is sometimes fraudulently practised; and that cloves, partially robbed of their oil, are mixed with others for sale. They are, however, to be detected by their pale colour, shrivelled appearance, and want of pungency. Oil of cloves is of greater specific gravity than water. This oil, combined with the resinous matter of the spice, gives to it all its pungency. The tree may, however, flourish and bear fruit, having these qualities elaborated in a very small degree; and, therefore, the art of the cultivator is required for placing it in the most favourable situation for the development of its valuable properties. It is supposed that it can be made to flourish only within a very small range of the tropical region. It has indeed been asserted that its successful culture is wholly confined to the Moluccas; but this has been fully disproved.

The plant attracts so much moisture, that no herbage will grow beneath its branches; and the produce, when newly prepared, has so great an affinity to water, that if it be placed in a vessel near to a heap of cloves, they imbibe, in the course of twelve hours, so much humidity as considerably to increase their weight. It is said that their traders in cloves sometimes avail themselves of the knowledge of this fact, in order to give an undue value to their property.

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Quantity of Cloves retained for Home Consumption from 1814 to 1818 inclusive, and from 1825 to 1831 inclusive.

<table>
<thead>
<tr>
<th>Year</th>
<th>Duty 5s. 7d. per lb.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1814</td>
<td>31.975</td>
</tr>
<tr>
<td>1815</td>
<td>50.462</td>
</tr>
<tr>
<td>1816</td>
<td>16.470</td>
</tr>
<tr>
<td>1817</td>
<td></td>
</tr>
<tr>
<td>1818</td>
<td></td>
</tr>
<tr>
<td>1819</td>
<td></td>
</tr>
</tbody>
</table>

Duty: 2s. British plantation and 3s. Foreign.

<table>
<thead>
<tr>
<th>Year</th>
<th>Duty</th>
</tr>
</thead>
<tbody>
<tr>
<td>1825</td>
<td>45.261</td>
</tr>
<tr>
<td>1826</td>
<td>52.701</td>
</tr>
<tr>
<td>1827</td>
<td>85.990</td>
</tr>
<tr>
<td>1828</td>
<td>61.216</td>
</tr>
</tbody>
</table>

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Duty: 3s. Foreign.
CLOVES.

Quantities imported and exported, with the Revenue arising from the Duty on Cloves, from 1827 to 1831 inclusive.

<table>
<thead>
<tr>
<th>Year</th>
<th>Imported.</th>
<th>Exported.</th>
<th>Revenue.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1827</td>
<td>... 253,000</td>
<td>... 27,812</td>
<td>... 8,602</td>
</tr>
<tr>
<td>1828</td>
<td>... 484,368</td>
<td>... 152,687</td>
<td>... 6,149</td>
</tr>
<tr>
<td>1829</td>
<td>... 36,071</td>
<td>... 57,904</td>
<td>... 4,876</td>
</tr>
<tr>
<td>1830</td>
<td>... 158,006</td>
<td>... 39,576</td>
<td>... 6,661</td>
</tr>
<tr>
<td>1831</td>
<td>... 128,223</td>
<td>... 81,912</td>
<td>... 8,374</td>
</tr>
</tbody>
</table>

The price of cloves in bond at the present time (Nov. 1832) is, Amboyna cloves, from 11d. to 1s. 6d., Bourbon, 8d. to 11d. and Cayenne 11d.

CLOVES,

(From “Materia Indica,” by Whetelaw Ainslie, M. D., M. R. A. S.)

Clove. (Craunbooo (Tam.), Laong (Duk. and Hind.) Warrala (Cyngh.) Lavanga (Sans.) Chankée (Malay.) also Buah lawang (Malay.) Lawangum (Tel.) Kerenful (Arab.) Mykhelé (Pers.) Cravos da India (Port.) Kruid nagelten (Dut.) Thenghio (Chinese.) Wokkayu lawang (Jav.) Bu-wah-lawang (Bali.) Clouz de girofle (Fr.)

EUGENIA CARYOPHYLLATA (Lin.)


Cloves, which are the unexpanded flowers of the tree quickly dried, are brought to India chiefly from Amboyna, Honimoa, and Moussalaut; they are also a produce of the island of Celebes,* but those of Amboyna are reckoned the best; though small and black, they have a strong fragrant, aromatic odour, and a warm acrid and aromatic taste. The cultivation of the clove was introduced into Sumatra, by Mr. I. Lumsdaine's Account, in 1778; but it would not appear to be well adapted to that island. (See Asiatic Journal for November, 1823.)

The native doctors of India employ cloves in such cases as require stimulating aromatics, in doses of from three to twelve grains. The clove tree, which was originally confined to the Molucca Islands, is now cultivated in many of the western parts of the Archipelago of India, where, according to Mr. Crawford, five varieties are distinguished. Rumphius, in speaking of the clove tree, says, "it appears to me to be the most beautiful and precious of all known trees," in form it resembles somewhat the laurel, with a smooth bark like the beech, and straight trunk; he adds, that it is not partial to large islands, and does not answer well at Geolo, Oeram, and Celebes. Cloves, within the last fifty years have grown at the Mauritius, but of an inferior quality. The Eugenia caryophyllata is now thriving in the botanical garden of Calcutta; its Bengalie name is chota Jamb. Twenty-seven other species of Eugenia are in the same garden.

* The Arabians place cloves amongst their Mokweyt-meodeh or tonics. European practitioners occasionally order cloves in dyspeptic complaints, particularly in habits requiring a more than ordinary degree of stimulus. The clove is an article of the famous electuarium gingivale of the French Pharmacopoeia for preserving the gums and teeth.

AGATHOPHYLLUM.

(From the "Treasury of Botany," by John Lindley and Thomas Moore.)

A name intended to express the good qualities of the leaves of the plants to which it is applied. The genus belongs to the Laurel family, among which it may be known by its persistent calyx enclosing the fruit, and by its possessing nine stamens in three rows. The innermost stamens have, on either side of their base, a sessile awl-shaped gland or abortive stamen. The anthers are four-celled. One species, A. aromaticum, grows in Madagascar, where the natives use the leaves for a condiment. The fruit is aromatic, but encloses a k-res of an acrid caustic taste, known as Madagascar Clove Nutmegs. [M.T.M.]

* See Beckman's Voyage to Borneo.
† Herbarium Amboi, tom. ii. p. L.
CLOVES.

EUGENIA.

A genus of Myrtaceae, comprising several trees or shrubs, for the most part natives of tropical America and the West Indies. The flowers are placed in the axils of the leaves, white, with a four-parted calyx, four petals, and numerous stamens. The berry is crowned by the calyx, one or two-celled, and contains one or two seeds.

The most important species is E. Pimenta, which furnishes Allspice. This consists of the fruits gathered before they are quite ripe, and dried in the sun. The Allspice tree is cultivated in the West Indies and Jamaica, where the trees are planted in rows called pimento walks; the produce is sometimes very large. The Allspice or Pimento berries of commerce are of the size of a small pea, of a dark colour, and surmounted by the remains of the calyx. The colour and flavour are supposed to resemble a combination of those of cinnamon, cloves, and nutmeg, hence the name allspice; they are due to a volatile oil, which is obtained by distillation. Allspice is largely used for flavouring purposes, being cheap. The oil is occasionally employed as a carminative.

Many of the species yield agreeably tasting fruits, such as E. cauliflora, which furnishes the Jaboticaba fruits of Brazil, described as being of the size of a greengage, and very refreshing; it is cultivated in some parts of Brazil. The Rose Apples of the East are the produce of E. malaecensis and E. Jambos. E. Ugni, a native of Chili, has lately been introduced into English gardens, where it is at least as hardy as its near ally, the myrtle. Its fruit is highly esteemed in Chili. Those grown in this country are glossy black when ripe, and have an agreeable flavour and perfume. Numerous other species are grown either for their handsome foliage or for their flowers. E. Luna is one of the most beautiful of these.

[M. T. M.]

CARYOPHYLLUS.

One of the genera of Myrtaceae, characterised by a long cylindrical calyx, whose limb is four-cleft; four petals adherent at their points; stamens numerous in four parcels; berry oblong, one or two-celled, and as many seeded.

The tree producing the well-known spice called Cloves (C. aromaticus) is a handsome evergreen, rising to from fifteen to thirty feet, with large elliptic leaves and purplish flowers arranged in corymbs on short-jointed stalks. The Cloves of commerce are the unexpanded flower-buds, and derive their name from the French word clou, a nail, in allusion to the shape of the bud with its long calyx tube, and the round knob or head of petals at the top. These buds are collected by hand, or by beating the tree with sticks, when the buds, from the jointed character of their stalks, readily fall, and are received on sheets spread for the purpose. The Cloves are then dried by the sun. For many years the Dutch exercised a strict monopoly in the growth of this spice, by restricting its cultivation to the island of Amboyna, and even there extirpating all but a limited number of the trees; but they are now extensively grown in the West Indies and elsewhere. All parts of the plant are aromatic, from the presence of a volatile oil, but especially the flower-buds, hence its use for culinary purposes. The oil is occasionally used in toothache with the effect of lulling the pain, and as a carminative in medicine.

[M. T. M.]

CLOVE BARK.—The bark of Cinnamomum Cutilawon.
CLOVE NUTMEG.—The fruit of Agathos phyllum aromaticum.
CLOVE TREE.—Caryophyllus aromaticus. The cloves of commerce are the dried aromatic flower-buds— WILD. Eugenia acris.

NEW PRODUCTS VS. CEYLON CLOVES SELLING WELL.

(To the Editor of the "Ceylon Observer.")

Colombo, 14th March 1882.

DEAR SIR,—At the suggestion of Mr. Peter Moir, we beg to hand you copy of a letter addressed to him by Messrs. Brookes & Faith, London, with respect to the sale of a parcel of Ceylon-grown cloves. Mr. Moir thinks the communication may perhaps be found suitable for insertion in the Tropical Agriculturist.—We are, dear sir, yours faithfully, GEO. STEUART & Co.

(Copy.)


Peter Moir, Esq.,

Dear Sir,—We beg to advise that at today's sale the first parcel of cloves grown in Ceylon was offered, and consisted of 8 cases fine bright heads
and short stems, bearing a great resemblance to Penang and sold with strong competition at 2s 6d to 2s 1d per lb. This, we believe, is the first shipment that has taken place to any port, and we are given to understand that the trees have been imported from Penang, from which place we receive the best quality.

We think the prices realised must be very encouraging and remunerative to planters, and as the supply from Penang is at all times small, we think, there is plenty of room for moderate shipments.—Your obedient servants,

(Signed) Brookes & Faith.

CEYLON CLOVES AND OTHER NEW PRODUCTS FOR COFFEE LAND.

(To the Editor of the "Ceylon Observer.")

March 21st, 1882.

My Dear Sir,—A short time since, about a fortnight ago, I saw a sale of Ceylon cloves which quite topped the market, and ever since then I have felt somewhat curious to know where these were grown. Possibly, through the medium of your paper, the public might be informed, and more particulars of this agreeable surprise may be placed at the disposal of all. From what I can see in my travels, every plant which pays deserves a trial, especially in coffee land.—Yours truly,

W. Forbes Laurie.

[Mr. F. Moir has been written to, to say where the parcel of Ceylon cloves which sold so well, was produced.—Ed.]

PRODUCTS OF THE STRAITS SETTLEMENTS.

CLOVES.

Clove and the Clove Tree.—People that labour under the opinion that cloves do well only in the Moluccas and on the island of Zanzibar are simply mistaken. It thrives splendidly in the Straits Settlement—this wonderful, lovely tree. Many years ago enterprising men on the island of Penang introduced and cultivated the clove tree, and it proved a decided success. It is to be found in some of the gardens of Europeans and wealthy Chinese in the Straits Settlements, producing flowers liberally; and it is a subject for wonder why no one cultivates it more largely, nor to serve as an ornament only, but to derive benefit from it. In Penang it was planted for that purpose, and "Penang cloves" have the reputation, like the nutmegs, to be the best in the market, commanding a higher price than Ambon (Moluccas) and Zanzibar cloves. But the consumption of this spice among the natives throughout the colony (and all India and the East in fact) is so large that the quantity left for export is very limited. It is the bud of the flower just before opening that constitutes the spice, and in this lies the difficulty that prevents many from planting cloves for export. One having a quantity of trees will find himself busy about the time the buds (white in colour, and strongly resembling snowdrops) begin to make their appearance. It must not be gathered before it, the bud, is well formed, just before opening; and as on a full-grown tree the number of buds is exceedingly large, the planter must have plenty of hands ready to gather them as quickly as possible, because the bud after opening—becoming a flower—loses much of its strength. Boys and girls from ten to fourteen years old answer best for this purpose. The bud-gathering time lasts a few days only, and whoever does not "make hay while the sun shines" will lose his crop of buds. The buds after being gathered are spread on large sieves or mats of loose texture, and dried under the shade of trees, or in sheds with palm-leaf covered roofs, and are then ready for the market. To dry them in the sun causes them to dry black and shrivelled, and to evaporate much of their strength. A properly dried clove is of light brown or tan colour. The shipments of cloves from Singapore to the United States have, last year excepted, never amounted to much, and supplies were obtained chiefly from Amboyna.

Several Bags of Cloves received in London lately from Zanzibar were actually found on arrival to contain artificial cloves neatly manufactured by machinery instead of the real spice. These cloves were made of soft deal, stained a dark colour, and soaked in a solution of essence of cloves to give them the required scent. They were traced as having been imported into Zanzibar from America.—Madras Mail.
PLANTING IN THE LOWCOUNTRY NEAR HENARATGODA.

16th Nov.: 1883.

I have recently planted out 150 cloves as an experiment, and their appearance is encouraging, where the plants were well-grown and healthy to begin with, but unfortunately some of the plants had been injured by water in the seed-bed.

22nd Jan. 1884.

The nutmegs continue to thrive, but only a small proportion of the cloves have survived. If the bearing of the pepper should be such as the vigorous growth of the plants indicate, it will become an important item in balance sheet by-and-by.

THE CLOVE TREE.

The clove tree (Caryophyllus aromaticus) says Rumphius "appears to me the most beautiful, the most elegant, and the most precious of all known trees." In form, it commonly resembles the laurel, and sometimes the beech. Generally of the height of an ordinary cherry tree, its trunk is straight, and rises to four or five feet before it throws out branches. The bark is smooth, thin, and adheres closely to the wood, which is hard and strong, but of an ugly grey colour, and, therefore, not suited for cabinet work. In the commencement of the wet season, which is the month of May in the native country of the clove, the tree throws out a profusion of new leaves. Soon after, the germs of the fruit are discovered at the extremities of the young shoots, and in the four following months the cloves are completely formed. The fruit, at first of a green colour, assumes in time a pale yellow, and then becomes of a blood-red colour, if of the most ordinary variety. It is at this period that the clove is fit to be used as a spice, and of course, this is the period of the clove harvest. It is not, however, the period of the full maturity of the fruit, which requires three weeks longer to perfect itself, and serve for the purposes of propagation. In this short period the fruit swells to an extraordinary size, loses much of its spicy quality, and contains a hard nucleus like the seed of the bay. This state of the fruit is what Europeans call the mother clove, and the natives poleng.

There appears to be five varieties of the clove, viz., the ordinary cultivated clove, the clove called the female clove by the natives, which has a pale stem—the keri, or loopy clove, the royal clove, which is very scarce, and the wild clove. The three first are equally valuable as spices, the female being considered fittest for the distillation of essential oil. The wild clove has hardly any aromatic flavour, and is, of course, of no value.

Of all useful plants the clove has perhaps the most limited geographical distributions. It was originally confined to the five Moluccas islands, and chiefly to Machian. From these places it was conveyed to Amboyna a very short time only before the arrival of the Portuguese. The portion of Amboyna called Leytimeer, and the Uliasser islands produced no cloves until the arrival of the Dutch, by whom the cultivation was restricted to Amboyna, every effort being made to extirpate the plant elsewhere. To what distance from the parent country the culture might be successfully extended, there has been no opportunity of ascertaining.

Rumphius informs us, that the plant is not partial to large islands, and does not answer well in Gilolo, Ceram, Bueroe, or Celebes. It is probable that Beuroe and the Xula isles are the utmost western limit of the successful culture of the clove. The same writer adds that the Javanese and Maccassars, when they were the carriers in the spice trade to the western emporia of the Archipelago, conveyed to their own country, with great care, young clove plants and mother cloves, from which trees were reared that produced no fruit. Through the speculative enterprise of Europeans the clove has in latter times been cultivated so as to bear fruit in some of the western parts of the Archipelago, in the Mauritius, and in the West Indies. They have been cultivated for nearly fifty years in the Mauritius, where they bear fruit, of inferior quality and high price. The fact seems to be, that like the grape, but in a much higher degree, the clove may be raised at a heavy expense, and of inferior quality, in soils and climate little suited to it. How wonderfully restricted the soil and climate of the clove is may be gathered from this well-known fact, that, in the parent islands, the tree yields fruit in the seventh and eighth year of its growth, and grows almost spontaneously without care, or culture; whereas, at Amboyna, where it is an exotic, it does not bear until the tenth and twelfth year, and demands very considerable attention.
CLOVES.

The clove neither thrives well near the sea, where it suffers from the spray, nor in the higher mountains, where it suffers from the cold. The soil which suits it, is a dark loam, having underneath a layer of dusky yellow earth, intermixed with gravel. A sandy soil, a hardy clay, and the wet ground in which sedges grow are to be avoided. The tree may be propagated either directly from the mother clove, or by transplanting the young plants found in the clove gradens from the natural propagation of the seed. The plants raised by the first method grow luxuriantly, but are alleged to yield more leaves than fruit, and growing remarkably straight, to be difficult to climb for the purpose of reaping the harvest. The trees propagated by the latter method are preferred, but the culture is laborious, and the success of the operation uncertain until the plants have attained the height of five or six feet. The young plants at first require the shade of other trees, and must therefore be planted among them. As they grow up the other plants must be removed, leaving here and there a few fruit trees, such as the Kanari and the coconut, &c.; the neighbourhood of which, it has been discovered, is favourable to the clove. The clove trees must themselves be kept pruned, and care be taken that they are not choked with weeds, or by too many of the fruit trees just mentioned, in failure of which attention the plants will languish or degenerate into wild cloves.

Such is the culture requisite in Amboyna, a soil and climate foreign to the plant, where comparatively much care and attention are required. In its native country, on the contrary the clove grows luxuriantly and almost spontaneously, being propagated and coming to perfection with hardly any culture. In its native country, the clove tree as already mentioned begins to yield fruit in the seventh or eighth year, but at Amboyna not until the tenth or twelfth. Examples are given of clove trees living to the age of one hundred and fifty years, but the ordinary duration of its life in Amboyna does not average above seventy-five. Much depends upon the nature of the soil and ground in which the tree has taken root.

The clove, though generally a hardy plant, suffers from excessive drought, and is apt to be destroyed by the depredations of a worm which insinuates itself into the wood and kills the tree. In particular seasons thousands perish from this cause.

The reaping of the clove harvest is perfectly simple. When the fruit begins to grow red, the reaping is begun. The ground underneath the tree is clean swept. The nearest clusters are taken of with the hand, and the more distant with the assistance of crooked sticks. Great care is necessary that the trees in this operation should not be rudely handled, as an injury offered to them in this way would prevent them from bearing for years. The curing of the cloves consists in placing them for some days on hurdles, where they are smoked by a slow wood fire, which gives them a brown colour, and afterwards drying them in the sun, when they turn black, as we see them in the article of commerce. In some places they are scaled in hot water, before being cured, but this practice is not common. Such cloves as casually fall on the ground, and are picked up in small quantities, the cultivators do not think it worth while to subject to the process of smoking, and they are merely dried in the sun; they are discoverable by their shrivelled appearance, and are of inferior value. The period of harvest is from October to December.

Of the fecundity of the clove it is not very easy to speak distinctly. The produce from one year to another is very unequal. At intervals of from three to six years they usually yield one extraordinary crop, but then a year now and then intervenes when they do not bear at all. At other times, again, they will give a double harvest. Some extraordinary instances of fecundity in particular trees are quoted. Rumphius and Valentyne speak of a remarkable tree, a hundred and thirty years old, which one year gave the enormous crop of eleven hundred pounds and another year half this quantity. About the proportion of two-thirds of a clove cultivation is considered to be bearing trees, the remaining third being allowed for barren and young trees. According to the present mode of culture, perhaps, it would not be safe to average the production of all trees of above five pounds.

According to the data, the produce to an acre will be 375 lb. avoidupois, and deducting one-eighth for young trees under ten years, 328 lb. By a free culture, as in the case of pepper, a much larger produce than is here stated would, no doubt, be obtained.—Indian Agriculturist.

CLOVE.—The history of this is very similar to the last, but the revival of its cultivation is less marked than in the case of nutmeg, and our supply exceeds the demand.—Dr. Trimen's Annual Report.
CONSULS' REPORTS: MADAGASCAR.

Spices.—Clove and cinnamon can also be cultivated with success, but as they are of very slow growth, their cultivation is discouraging to foreign planters, and the natives have not the means to plant extensively.—Chemist and Druggist.

Clove Oil.—Until now only small shipments have come to hand of the clove oil distilled in Maturitis from green cloves. This oil, though it is said to answer the requirements of a good quality of clove oil, is of a very low specific gravity (1.048 at 18° C), against 1.060 s.g. at the same temperature for clove oil distilled by Schimmel & Co.—Schimmel & Co.'s Half-yearly Report.

Ceylon Cloves.—We call attention to the interesting report on page 124 from Messrs. Brookes & Faith on a parcel of locally produced cloves: it is satisfactory once more to see that whatever we grow and ship from Ceylon is sure to be about the best of its kind. We wish the pioneers in cloves all success.

The Cultivation of Cloves.—The Equilibrium says:—"Cultivators of cloves in Grenada would do well to heed the remarks of Messrs. T. Duncan & Son, who, referring in a recent market report to the great difference between the prices of our product and those of the article sent from Penang, recommend that greater attention be paid by the Grenada cultivator to the time of picking and method of curing. Whilst Grenada cloves fetch 4d. to 5d. in London, Penang bring 1s. 4d. to 1s. 5d. Let our planters reflect on it, and set to work in their own interests."—Colonies and India.
ALL ABOUT GINGER.
ALL ABOUT GINGER.

GINGER.

GINGER tried on Kahawatta estate, Matale West, in Ceylon, by Messrs. Massey and Hill proved a failure owing to unsuitable soil. The nutmeg and clove have been and are still freely cultivated on some lowcountry cinnamon estates, but without proving a commercial success. At Udugama, near Galle, these and other products were planted under the direction of Mr. T. S. Dobree, but as usual with the European planter some one staple like tea demands full attention, and minor products are apt to be lost sight of. The new Government Garden at Henaratgoda has been the scene of experiments with several of these minor products. In 1882, 144 bags Ceylon ginger valued at Rs. 572 were exported; in 1883 the export was 198 bags worth Rs. 595; in 1884 it is given as 319 packages worth Rs. 1,327; in 1885 the export is given at 793 cwt. worth Rs. 3,475; in 1886 1,732 cwt. worth Rs. 7,802; in 1887, at 388 cwt. worth Rs. 1,841; and in 1888, 276 cwt. valued at Rs. 1,440. Only a few acres of ginger are returned in the Directory for the planting districts.

The Eastern Archipelago is, of course, the home of the nutmeg and allied species, and the cultivation is attempted by Europeans in Penang and Java, but it is generally described as a poor paying crop: Java exported in 1887 cloves, 82,000 lb.; mace, 10,000 lb.; nutmegs, 260,000. Dry ginger is exported from Travancore to the value of from Rs. 250,000 to Rs. 320,000 per annum.

GINGER.

(From the "Encyclopædia Britannica").

(French, Gingembre; German, Ingwer), the rhizome or underground stem of Zingiber officinale, Roscoe, a perennial reed-like plant growing from 3 to 4 feet high. The flowers and leaves are borne on separate stems, those of the former being shorter than those of the latter, and averaging from 6 to 12 inches. The flowers themselves are borne at the apex of the stems in dense ovate oblong cone-like spikes from 2 to 3 inches long, composed of obtuse strongly-imbricated bracts with membranous margins, each bract enclosing a single small sessile flower. The leaves are alternate, bright green, smooth, tapering at both ends, with very short petioles. The plant, though unknown in a wild state, is considered with very good reason to be a native of the warmer parts of Asia, over which it has been cultivated from an early period, and the rhizome imported into England. From Asia the plant has spread into the West Indies, South America, Western Tropical Africa, and Australia.
The use of ginger as a spice has been known from very early times; it was supposed by the Greeks and Romans to be a product of Southern Arabia, and was received by them by way of the Red Sea; in India it has also been known from a very remote period, the Greek and Latin names being derived from the Sanskrit. Flückiger and Hanbury, in their *Pharmacoepoedia*, give the following notes on the history of ginger. On the authority of Vincent's *Commerce and Navigation of the Ancients*, it is stated that in the list of imports from the Red Sea into Alexandria, which in the second century of our era were there liable to the Roman fiscal duty, ginger occurs among other Indian spices. So frequent is the mention of ginger in similar lists during the Middle Ages, that it evidently constituted an important item in the commerce between Europe and the East. It thus appears in the tariff of duties levied at Acre in Palestine about 1173, in that of Barcelona in 1221, Marseilles in 1228, and Paris in 1296. Ginger seems to have been well known in England even before the Norman Conquest, being often referred to in the Anglo-Saxon leech-books of the 11th century. It was very common in the 13th and 14th centuries, ranking next in value to pepper, which was then the commonest of all spices, and costing on an average about 1s. 7d. per lb. Three kinds of ginger were known among the merchants of Italy about the middle of the 14th century:—(1) *Belladì* or *Baladi*, an Arabic name, which, as applied to ginger, would signify country or wild, and denotes common ginger; (2) *Colombino*, which refers to Columbum, Kolam, or Quilon, a port in Travancore, frequently mentioned in the Middle Ages; and (3) *Micchino*, a name which denoted that the spice had been brought from or by way of Mecca. Marco Polo seems to have seen the ginger plant both in India and China between 1280 and 1290. John of Montecorvino, a missionary friar who visited India about 1292, gives a description of the plant, and refers to the fact of the root being dug up and transported. Nicolo di Conto, a Venetian merchant in the early part of the 15th century, also describes the plant and the collection of the root, as seen by him in India. Though the Venetians received ginger by way of Egypt, some of the superior kinds were taken from India overland by the Black Sea. The spice is said to have been introduced into America by Francisco de Mendoza, who took it from the East Indies to New Spain. It seems to have been shipped for commercial purposes from San Domingo as early as 1585, and from Barbados in 1654; so early as 1547 considerable quantities were sent from the West Indies to Spain.

Ginger is known in commerce in two distinct forms, termed respectively coated and uncoated ginger, as having or wanting the epidermis. For the first, the pieces, which are called "races" or "hands," from their irregular palmate form, are washed and simply dried in the sun. In this form ginger presents a brown, more or less irregularly wrinkled or striated surface, and when broken shows a dark brownish fracture, hard, and sometimes horny and resinous. To produce uncoated ginger the rhizomes are washed, scraped, and sun-dried, and are often subjected to a system of bleaching, either from the fumes of burning sulphur or by immersion for a short time in a solution of chlorinated lime. The whitewashed appearance that much of the ginger has, as seen in the shops, is due to the fact of its being washed in whiting and water, or even coated with sulphate of lime. This artificial coating is supposed by some to give the ginger a better appearance; it often, however, covers an inferior quality, and can readily be detected by the ease with which it rubs off, or by its leaving a white powdery substance at the bottom of the jar in which it is contained. Uncoated ginger, as seen in trade, varies from single joints an inch or less in length to flattish irregularly branched pieces of several joints, the "races" or "hands," and from 3 to 4 inches long; each branch has a depression at its summit showing the former attachment of a leafy stem. The colour, when not whitewashed, is a pale buff; it is somewhat rough or fibrous, breaking with a short mealy fracture, and presenting on the surfaces of the broken parts numerous short bristly fibres.

The British market derives its supply of ginger from various parts of the world. The principal sorts, however, or those most commonly found in commerce, are Jamaica, Cochin, Bengal, and African, though each of these in its turn has its several varieties and qualities. The best or most valued kind of all is the Jamaica, and next to it the Cochin. For ordinary purposes uncoated ginger is considered the best; the largest and finest pieces, of a pale buff colour both outside and inside, and cutting softly and evenly, are considered the most valuable. The chief sources of supply are the East and West Indies, Sierra Leone, and Egypt.

The principal constituents of ginger are starch, volatile oil (to which the characteristic odour of the spice is due), 1-1 'resin (to which is attributed its
GINGER.

(From "Spott's Encyclopædia.")

Ginger (Fr., Gingembre; Ger., Ingwer)—Ginger is the dried rhizome, either scraped or unscraped, of Zingiber officinale [Aframomum Zingiber], a reed-like plant indigenous to Asia, and universally cultivated in the warmer parts, but not known wild; now to be found also in the W. Indies, S. America, Tropical W. Africa, and Queensland.

In Jamaica, propagation is effected by division of the root, the pieces being placed in well cleared and trenched land in March-April, flowering in September, and fading towards the end of the year; when the stems are quite withered, generally about January, the roots are dug up, picked, cleaned, gradually scalded in boiling water, sun-dried for several days, and packed, forming "hands" or "races" of so-called "coated" (i.e. not deprived of epidermis) ginger. Jamaica had 227 acres under this crop in 1875-6, and 144 in 1877-8. The exports from the island were 1,261,873 lb. in 1869, only 590,766 in 1871-2, 1,613,764 in 1875-6, and 908,603 in 1877-8. The London market values of Jamaica ginger are approximately 44-12½. a cwt. for fine, and 24-54. for ordinary to good. Formerly Barbados and Hayti used to grow ginger in considerable quantity; but the latter now exports none, and the shipments of green ginger from the former were valued at only 56½. in 1877, and 41½. in 1878. Our imports from the British W. Indies were 15,594 cwt. in 1876.

Little is known about the production of ginger in Sierra Leone. In 1868, the value of the export was 18,917£.; in 1869, 14,008£. Our direct imports were 6,612 cwt. in 1878, and 11,951 in 1879. About half the produce comes to England, and the other half goes to America. The London market value of African ginger is only about 18-25. a cwt.

The cultivation of ginger in India extends from the Himalayas to Cape Comorin. In the Hill States, the best "races" of the previous year are smeared with cow-dung and placed in a corner where they will not dry up. After the first rain, the land is ploughed 2-3 times, and divided into little beds which will shed the water readily. Root-sections are then planted 3 in. deep and 9 in. apart, and covered with dead leaves and 2 in. of manure. Watering is resorted to in the dries. When the plants are about 2 ft. high, the rhizomes are dug up, buried for a month, sun dried for a day, and are ready for use. To get it into the market, or keeping condition, the fresh rhizomes are shaken in a basket for 2 hours daily for 3 days, then sun dried for 8 days, and again shaken. Thus the outer skin is removed, and 2 days' further drying finish it for the market. In Paccac, the natives cleanse the roots by boiling lime-water. In Mysore, a red soil free from stones is considered best; between 11 April and 11 May, the ground is hoed, and made into ridges 18 in. broad, 18 in. high, and 18 in. apart, with perpendicular sides; two rows of cuttings are put into each ridge, slightly covered with earth, and protected by a screen of bushes. Between mid-June and mid-July, the shoots appear, and to days later the bushes are replaced by small twigs, and weeding is done by hand. About mid-December to mid-January, the roots are fit for pulling. Those intended for replanting are mixed with a little red mud, and immediately buried in a pit; those intended for sale are deprived of the outer skin by scraping with a knife, sprinkled with the ashes of burnt cow dung, and dried on mats for 8-10 days. Our imports of E. Indian ginger were 7,472 cwt. from Bombay and Sind in 1877, increased to 25,781 cwt. in 1879; 7,202 cwt. from Madras in 1877; 16,470 cwt. from Bengal in 1878. The London market values are about 16-22s. a cwt. for Bengal, and 23 12s. for Cochin.

Much ginger is grown in China, and considerable quantities of the young succulent rhizomes preserved in syrup are sent to this country. Our imports were 9,372 cwt., 25,722l., in 1872, and 6,996 cwt., 19,894l., in 1875.
Venezuelan port of Ciudad Bolivar shipped 450 lb. to New York in 1878; and Panama exported 98t. worth to the United States in 1879.

"Scraped" or "uncoated" (decorticated) ginger is often bleached by subjection to the fumes of burning sulphur, or by immersion in chlorides of lime solution, while much is washed over with either sulphate or carbonate of lime. Our total imports in 1880 were from:—Bombay and Sind, 23,249 cwt., 45,828l.; Madras, 12,402 cwt., 25,460l.; British W. Indies, 5,639 cwt., 28,624l.; Bengal and Burma, 3,617 cwt., 3,713l.; W. Africa, 3,142 cwt., 3,000l.; other countries, 1,823 cwt., 2,920l.; total, 49,662 cwt., 109,545l. The total figure for 1876 was 62,164 cwt. Our re-exports in 1880 were 18,086 cwt., 32,152l., chiefly to Germany, the United States, and Australia.

GINGER.

(From "Simmond's Tropical Agriculture.")

After pepper, ginger probably ranks next in importance for the quantity produced and consumed, and the aggregate value of that which we receive. The declared value of all the spices we import averages about 1,200,000$, of which pepper stands for nearly one-half. Cinnamon is valued at about 125,000$, whilst ground ginger has now reached beyond 169,000$, besides about 20,000$ more for preserved ginger, and this is all consumed here. According to Hanbury, ginger must have been tolerably well known in England even prior to the Norman Conquest. The plant affording it was known to Marco Polo, who speaks of observing it both in China and India.

The root-like stem of Zingiber officinale, Rosc., is cultivated in very many of the warmer parts of the world for local use, but only in a few localities on an extensive scale for shipment to supply European wants. Of this well-known flavouring condiment several varieties are known in trade, distinguished by their quality, place of growth, &c. Gingers are either "coated" with the shrivelled rind, or "scraped" by having it run over. Ginger is sometimes bleached by chloride of lime, or whitewashed with lime and water. This spice is but little used on the Continent compared with England.

The varieties of ginger which enter into commerce are Jamaica, Cochin, Brazil, and Africa. The first three are scraped gingers, the last-named is coated ginger—that is to say, it still retains its epidermis. Jamaica ginger is the sort most esteemed, and next to it the Cochin.

The following shows our sources of supply in 1875:—

<table>
<thead>
<tr>
<th>From</th>
<th>Quantity</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>British West Africa</td>
<td>9,900</td>
<td>19,887</td>
</tr>
<tr>
<td>Bombay</td>
<td>10,459</td>
<td>31,418</td>
</tr>
<tr>
<td>Madras</td>
<td>11,653</td>
<td>37,888</td>
</tr>
<tr>
<td>Bengal</td>
<td>8,995</td>
<td>16,068</td>
</tr>
<tr>
<td>British West India Isles</td>
<td>15,215</td>
<td>54,955</td>
</tr>
<tr>
<td>Other Countries</td>
<td>1,481</td>
<td>3,586</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>56,903</strong></td>
<td><strong>163,812</strong></td>
</tr>
</tbody>
</table>

Ginger is received chiefly from three quarters, the East and West Indies (Cochin and Jamaica) and the West Coast of Africa—Sierra Leone. Our imports of Ginger into the United Kingdom have been as follows:—

<table>
<thead>
<tr>
<th>Year</th>
<th>Quantity</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>cwt.</td>
<td>$</td>
</tr>
<tr>
<td>1867</td>
<td>42,834</td>
<td>95,398</td>
</tr>
<tr>
<td>1868</td>
<td>52,194</td>
<td>101,456</td>
</tr>
<tr>
<td>1869</td>
<td>34,535</td>
<td>59,982</td>
</tr>
<tr>
<td>1870</td>
<td>33,854</td>
<td>60,973</td>
</tr>
<tr>
<td>1871</td>
<td>32,723</td>
<td>70,884</td>
</tr>
<tr>
<td>1872</td>
<td>32,174</td>
<td>72,139</td>
</tr>
<tr>
<td>1873</td>
<td>36,363</td>
<td>97,548</td>
</tr>
<tr>
<td>1874</td>
<td>38,750</td>
<td>117,997</td>
</tr>
<tr>
<td>1875</td>
<td>56,880</td>
<td>163,951</td>
</tr>
<tr>
<td>1876</td>
<td>62,164</td>
<td>169,252</td>
</tr>
</tbody>
</table>

Several of the West Indian Islands used to grow ginger, especially Barbados, Hayti and Jamaica, but the cultivation for export is chiefly now confined to Jamaica.

In Jamaica it is propagated by division of the root, the smaller pieces or protuberances being set, each of which throws up two different stems. The first bears the leaves, and rises sometimes to the height of three feet or more, though its usual growth seldom exceeds 16 or 18 inches; when this spreads its leaves
and grows to full perfection, the second stalk springs up, which is also simple and furnished only with a few scales below, but at the top is adorned with a roundish squamose flower-spike, and seldom rises above two-thirds of the height of the others. The land having been well cleared and trenched, the ginger is planted about March or April. It rises to its height and flowers about September, and fades again towards the end of the year. When the stalks are wholly withered, the root is thought to be full-grown, and fit to dry, which is generally done in January and February following. When these are dug up, they are picked and cleaned, and scalced gradually in boiling water. After this, they are spread out in the sun to dry, from day to day, until sufficiently aired for packing. The larger spreading roots are generally called "hands" in Jamaica, and will occasionally weigh half-a-pound; they are also termed "races."

In 1874 there were 185 acres under culture with ginger in Jamaica. The crops seems to vary a good deal, since we find over 18,000 cwt. shipped in 1868, and not much more than 5,000 cwt. in 1872, recovering again to 10,551 cwt. in 1874, valued at 21,000£, but the average for many years may be taken at 1,000,000 lb. to 1,500,000 lb. The following have been the exports of ginger from Jamaica of late years:—

<table>
<thead>
<tr>
<th>Year</th>
<th>lb</th>
<th>Year</th>
<th>lb</th>
</tr>
</thead>
<tbody>
<tr>
<td>1866</td>
<td>1,550,166</td>
<td>1871</td>
<td>632,031</td>
</tr>
<tr>
<td>1867</td>
<td>1,728,075</td>
<td>1872</td>
<td>599,766</td>
</tr>
<tr>
<td>1868</td>
<td>2,036,921</td>
<td>1873</td>
<td>815,659</td>
</tr>
<tr>
<td>1869</td>
<td>1,461,873</td>
<td>1874</td>
<td>1,181,780</td>
</tr>
<tr>
<td>1870</td>
<td>680,492</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The ginger plant is extensively cultivated in India, from the Himalayas to Cape Comorin. It is not exactly known to what country the plant is indigenous, though Ainslie states it to be a native of China, while Joebel asserts that it is a native of Guinea. In the Himalayas it is successfully reared at elevations of 4,000 or 5,000 feet, requiring a moist soil. The Malabar ginger, exported from Calicut, is the produce of the district of Shernaad, situated to the south of Calicut.

In the Dacca district the natives cleanse the roots in boiling lime water, which probably injures much of the fragrant pungency; whereas in the West Indies they use simply plain water. The leaves and shoots of the broad-leaved ginger (Z. Zerumbet) are used as greens in Bengali. It grows wild in the Concan, and in the woods about Calcutta. The underground stem of this species resembles that of ginger, but is bitter as well as aromatic. The root-stocks of Alpinia Galanga, A. racemosa, A. Allughas, have somewhat similar aromatic and pungent properties, and are frequently used as substitutes for ginger.

In India the cultivation is carried on in the Hill States as follows:—The best “races” of the previous year’s crops are selected and placed in a corner of the house, and smeared over and covered with cow dung to prevent them becoming dry.

When the first rain falls, the land is ploughed two or three times, and then divided off into beds with a little raised edge round each bed, taking care to make openings to let superfluous water run off; for if water lodges on the crop, the roots will rot. Little pieces of the roots are then buried 3 inches deep in the soil at intervals of 9 inches. The field is covered with the leaves of trees to keep the soil moist, and over these manure is spread to the depth of half an inch. When it rains, the water, impregnated with manure, filters through the leaves to the roots. Artificial irrigation is given after the rains. When the plants are about 2 feet high, to every shoot there will be found about eight rhizomes, or parts of the root. These are dug up, exposed to the sun for a day, and are fit for use. A beech of land requires eight mounds of ginger to plant, and yields thirty-two mounds for a first-rate crop. Ginger, fit for planting, sells at 8 to 10 seers for the rupee; that for use, 24 to 32 seers the rupee. In order to dry ginger into “sorth,” or for keeping, the fresh roots are put into a basket, which is suspended by a rope, and then two men, one on each side, pull it to and fro between them by a cord attached, and thus shake the roots in the basket; this process is carried on for two hours every day for three days. After this the roots are dried in the sun for eight days, and again shaken in the basket. The object of the shaking is to take off the outer scales and skin of the roots. Two days’ further drying completes the process, and the “sorth” sells for 3 to 4 seers the rupee. Turmeric is cultivated in the same manner; when ready it is dug up, steeped in hot water a day and a night, and then dried.
The following have been the exports from India:

<table>
<thead>
<tr>
<th>Year</th>
<th>Quantity (cwt.)</th>
<th>Value (L)</th>
<th>Year</th>
<th>Quantity (cwt.)</th>
<th>Value (L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1869</td>
<td>11,835</td>
<td>11,380</td>
<td>1873</td>
<td>7,655</td>
<td>16,383</td>
</tr>
<tr>
<td>1870</td>
<td>15,313</td>
<td>8,999</td>
<td>1874</td>
<td>8,813</td>
<td>20,908</td>
</tr>
<tr>
<td>1871</td>
<td>13,014</td>
<td>5,540</td>
<td>1875</td>
<td>9,843</td>
<td>19,752</td>
</tr>
<tr>
<td>1872</td>
<td>13,310</td>
<td>9,980</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The African ginger is grown in Sierra Leone; about half that produced comes to England, and the other half goes to America. In 1868 the value of the ginger exported from Sierra Leone was 18,917L, and in 1869, 14,008L. Our direct imports from Sierra Leone have been as follows:

<table>
<thead>
<tr>
<th>Year</th>
<th>Quantity (cwt.)</th>
<th>Value (L)</th>
<th>Year</th>
<th>Quantity (cwt.)</th>
<th>Value (L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1869</td>
<td>9,566</td>
<td>11,380</td>
<td>1873</td>
<td>7,655</td>
<td>16,383</td>
</tr>
<tr>
<td>1870</td>
<td>6,855</td>
<td>8,999</td>
<td>1874</td>
<td>8,813</td>
<td>20,908</td>
</tr>
<tr>
<td>1871</td>
<td>5,948</td>
<td>5,540</td>
<td>1875</td>
<td>9,843</td>
<td>19,752</td>
</tr>
<tr>
<td>1872</td>
<td>6,167</td>
<td>9,980</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Ginger is a good deal grown in China, and largely used in its fresh state as a condiment, and in medicine. Some small quantity is exported dried, but it is black and hard, and not much appreciated in commerce.

Ginger also appears in European commerce as a succade, the young shoots of the rhizome being peeled and preserved in syrup. For this purpose the rhizomes are lifted while they are yet tender and full of sap, before they have become hard or woody; the roots are carefully picked and washed, and afterwards slashed till they become tender enough for the purpose; they are then put into cold water, and scraped and peeled gradually. This operation may last three or four days, the water on the roots being changed frequently. When thus prepared, they are put into jars and covered with the syrup, and this is changed two or three times, when they are ready for shipment. The imports of preserved ginger are principally from China, from whence we have received of late years the following quantities:

<table>
<thead>
<tr>
<th>Year</th>
<th>Quantity (cwt.)</th>
<th>Value (L)</th>
<th>Year</th>
<th>Quantity (cwt.)</th>
<th>Value (L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1867</td>
<td>4,249</td>
<td>23,799</td>
<td>1872</td>
<td>9,372</td>
<td>25,722</td>
</tr>
<tr>
<td>1868</td>
<td>4,972</td>
<td>21,177</td>
<td>1873</td>
<td>4,327</td>
<td>16,319</td>
</tr>
<tr>
<td>1869</td>
<td>2,677</td>
<td>9,753</td>
<td>1874</td>
<td>7,681</td>
<td>21,949</td>
</tr>
<tr>
<td>1870</td>
<td>3,701</td>
<td>12,731</td>
<td>1875</td>
<td>6,996</td>
<td>19,894</td>
</tr>
<tr>
<td>1871</td>
<td>3,366</td>
<td>13,405</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

GINGER.

(From "Porter’s Tropical Agriculturist.")

_Amonhum Zingiber—a genus of the Monandria monogynia class and order. Nat. order, Scitamineae._

Ginger is much more extended as regards the countries of its growth than the spices already described. It is a native of the south-east of Asia and the adjacent isles, and is found growing in great plenty on the coast of Malabar. It is conjectured that ginger was known to the ancients, but it is matter of dispute whether the _amonhum_ which Pliny describes as being brought from Arabia, is identical with the ginger of modern times. Some writers affirm that this plant is indigenous to America; indeed it is recorded that Pinzon, the discoverer of Brazil, brought home, on his first voyage, cinnamon and ginger from thence, thus apparently establishing without a doubt, that these were native to the Western Hemisphere.* On the other hand, it is stated by other authorities, that ginger was early naturalized in America from the East,

* Southey likewise adds in a note, “Vieyra in his letters mentions a received tradition that Emanuel ordered all the spice plants to be rooted up, lest the Indian trade should be injured, and that ginger was the only spice which escaped, because it was under ground. He does not appear to have recalled the impossibility of carrying such an order into effect upon a continent.”—Southey’s History of Brazil, vol. i. p. 32.
but that it was not found there by the first settlers. According to Acosta, it was first transplanted into New Spain from Malabar, by one Francisco de Mendoza, and its cultivation was so quickly extended, that as early as the year 1547, twenty-two thousand and fifty-three hundredweight were exported thence to Europe. Ginger soon became an article of extensive commerce in the West India islands, especially in Jamaica. The latter place alone exported, in 1738, twenty thousand nine hundred and thirty-three bags of one hundredweight each, and eight thousand eight hundred and sixty-four pounds in casks, This branch of commerce did not, however, long continue to be thus extensive, as when Edwards wrote, at the close of the last century, the average quantity exported annually from the whole of the West Indies was only ten thousand bags, and the average importation into England for the last two or three years has been only 2,453 cwt. from the West, and 7,064 cwt. from the East Indies. The ginger obtained from the British Colonies of the west is of a superior quality to that from the east, and we therefore import the larger proportion from those places. In 1830, 1,268 cwt. were imported into this country from the East, and 4,105 cwt. from the West Indies.

Ginger is distinguished into several species: the narrow-leaved, the broad-leaved, the Japanese and the red-leaved.

The narrow-leaved is the best known and most esteemed. It has a perennial root and annual stems. The roots are knotty and creeping, extending and increasing under ground in joints, from each of which a slender stem shoots forth in the spring of the year, attaining to the height of from two feet to two feet and a half. The stem, like the reed, is embraced by successive leaves growing opposite to each other, gradually diverging from the plant as they grow up, till they become nearly horizontal; they are lanceolate and about seven or eight inches in length. The flowers stand on a distinct stalk growing out from the root, about a foot high. This stalk terminates in a scaly spike, from each of which scales a single blue flower appears. The whole plant has an agreeable fragrance. The root, taken up when arrived at maturity, that is, just after the annual stalks are withered, is the ginger of commerce.

This plant is cultivated with little trouble in tropical regions, very much in the same manner as potatoes are propagated in England.

After the ground has been well cleansed and trenched, the planting commences in March or April. Holes are made about four inches deep and six inches asunder, into each of which a small piece of the root is put and then covered over with earth. In a few months the whole ground will be overspread with the plant. The stalks begin to wither in the January or February following, and then the roots are in a fit state for being dug up. A sandy soil, and land not having being previously cultivated, are unfavourable to this crop, but under propitious circumstances ginger yields a very large return.

The ginger of commerce is distinguished into black and white, but both are the same root, and their dissimilarity arises only from a difference in the mode of management. In preparing the black description, the roots, after being divested of their fibril stalks, either by means of a knife or by the hand, are washed in pure water, and then put, about one hundred pounds at a time, in a basket. This basket is then placed in a cauldron of water, and boiled for a quarter of an hour. After undergoing this process, the ginger is merely dried in the sun, and is then in a fit state for exportation. All the dark-coloured external part of the root is scraped off in preparing the white ginger, and the inner part is carefully dried without having been previously subjected to scalding. The best and soundest roots are always selected for this purpose, and therefore, independent of the manner of preparation, the white ginger is superior to the black. It is sold at a much higher price and is every way preferable. Good ginger is distinguishable by being hard and not easily broken, and by having the yellow hue within rather more inclining to green than to brown.

The roots are fibrous when arrived at maturity, but just before they have begun to put out any portion of the stem they are succulent. In this state, or when the young stalks are not more than five or six inches long, the roots are used for making the well-known preserve of ginger. When intended for this purpose, as soon as the young tubers are dug up, they are scalded, washed in cold water, and then entirely peeled. This operation requires three or four days for its completion, the water being frequently changed during that time. The roots being cleansed, are now placed in jars and covered with a weak syrup, in which they are allowed to remain for two days, at the end of which period this is poured off and replaced by a stronger syrup. This operation is repeated two or three times, at each time the syrup being made stronger,
until it becomes of a rich and thick consistency, and the ginger appears bright and nearly transparent. The removed syrups are not wasted; these are made into a pleasant beverage which is known in the West Indies under the name of "cool drink."

Quantities of Ginger imported, exported, and retained for Home Consumption, from the year 1827 to 1831 inclusive; together with the Amount of Revenue obtained.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>cwt.</td>
<td>cwt.</td>
<td>cwt.</td>
<td>£</td>
</tr>
<tr>
<td>1827</td>
<td>12,253</td>
<td>6,504</td>
<td>12,383</td>
<td>7,121</td>
</tr>
<tr>
<td>1828</td>
<td>14,600</td>
<td>6,930</td>
<td>7,374</td>
<td>4,335</td>
</tr>
<tr>
<td>1829</td>
<td>11,007</td>
<td>11,209</td>
<td>5,947</td>
<td>3,403</td>
</tr>
<tr>
<td>1830</td>
<td>5,491</td>
<td>4,515</td>
<td>6,284</td>
<td>3,560</td>
</tr>
<tr>
<td>1831</td>
<td>5,315</td>
<td>6,092</td>
<td>4,816</td>
<td>2,800</td>
</tr>
</tbody>
</table>

Rate of duty—British plantation, 11s. 6d.; Drawback, 10s.; Foreign, 53s. per cwt.

Present price of ginger—

<table>
<thead>
<tr>
<th>Bengal, in bond, from</th>
<th>£</th>
<th>s.</th>
<th>£</th>
<th>s.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Malabar ditto</td>
<td>2</td>
<td>8</td>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td>White Jamaica, duty paid</td>
<td>6</td>
<td>0</td>
<td>2</td>
<td>12</td>
</tr>
<tr>
<td>Barbadoes</td>
<td>3</td>
<td>15</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

GINGER.

(From "Materia Indica," by Whitelaw Ainslie, M. D., M. R. A. S.)

Ginger, Dry. Sookoo (Tam.) Sont (Duk. and Hind.) Inghuroo (Cyngh.)
Alia (Malay.) Jai-aking (Jav.) Jatetukh (Bal.) Sonti (Tel.) Zungeebeel (Pers.)
Sonty (Can.) Gengibre (Span.) Wooraka (Ternat.) Gora (Tidor.) Swive (Amb.)
Sohi (Band.) Cynthi (Sans.) Zensero. (It.) Gingembre (Fr.)

Ginger, Green. Inje (Tam.) Ammoo Inghuroo (Cyngh.) Udruck (Duk. and Hind.)
Ulhum (Tel.) Artrakoo (Sans.) Zungeebeel rab (Arab.) Docey (Jav.)
Zungeebeel tur (Pers.) Gingembre (Fr.) Ingwer (Ger.) Zenaero (It.) Ada (Beng.)

AMOMUM ZINGIBER (Lin.)


The ginger plant is a native of many eastern countries, but is no where
to be found of a finer quality than on the coast of Malabar, it is the ichti
of the Hort. Mal. (II. p. 21. t. 12.) and the zingib. majus, Rumph. (Amb. 5.
p. 156. t. 66. f. 1.)

The root is too well known to require particular description here; it has a
pleasant aromatic odour, biting taste, and is considered by the native doctors
as a valuable carminative and stimulant; they also recommend it as an external
application, mixed with arrack, in paralytic and rheumatic affections; it besides
forms an almost constant ingredient in the custisiums (decoctions), which they
prescribe for arresting the progress of intermittent fever: dose from g. x. to
3 ss. Europeans in India, of delicate nerves, frequently use an infusion of ginger
in place of common tea; this is either prepared with dry ginger or the green
root, cut into thin slices; our article with many other species are growing in
the botanical garden of Calcutta.

The Greek name for ginger was, in all probability, nay certainly,
taken from its Persian appellation. It is indigenous in China, and
Mr. Phillips* imagines, as it is common at Gingi in that country, that hence
may be its name ginger.

In Sir J. Sinclair’s Code of Health. (vol. i. p. 233), we are informed of
the virtues which ginger possesses in keeping off the gout, as instanced in the
case of Lord Rivers, who took it in large doses for more than thirty years
with the happiest effects. The Arabian set a high value on ginger, as do the
Persians, supposing it to have the property of clearing the brain; they consequently,
in all their works on the Materia Medica, place it amongst their cephalica.

Much dry ginger is sent to the Coromandel Coast from Cochín and Bengal;
it is also an export from Nepal. (See Kirkpatrick’s account of that country,
p. 205.)

GINGER.

(From "Treasury of Botany," by John Lindley and Thomas Moore.)

Ginger. Zingiber officinale. The ginger of the shops is the dried rhizomes of this plant; black or East Indian ginger is the unscraped rhizome prepared by 'scalding;' white or Jamaica is the scraped rhizome dried in the sun. — Amada Curcuma Amada. — Cape. Colocasia esculenta. — Indian. Acorus canadensis. — Mango. Curcuma Amada. — Red. The same as East Indian ginger. — Wild Acorus canadense. — Wood. An old name for Anemone ranunculoides.

ZINGIBER.

(From Henderson's "Handbook of Plants.")


The most important species of this genus is Z. officinale, the roots or rhizomes of which furnish the well-known Ginger of commerce. This plant is believed to be a native of Asia. It was naturalized in the West Indies soon after their discovery by the Spaniards; indeed, at so early a period that it is scarcely believed to be an exotic, and is supposed to have been found indigenous on the islands. Acosta relates that a person named Francisco de Mendoza first transplanted it from the East Indies into New Spain, where its cultivation was diligently pursued by the Spanish Americans to a considerable extent, as, from the testimony of the same author, 22,053 cwt, were exported thence to Europe in 1547. This plant is now extensively cultivated in the West Indies, especially in Jamaica, from whence we receive our main supply. There are several varieties of Ginger known in commerce; they are, however, of the same species, as the white and black Ginger simply indicates a different method of preparation. Ginger is also largely grown in the East Indies and Africa, but not of so good a quality as that of the West Indies.

GINGER.

(Zingiber officinale.—Zingiberaceae.)

(From "Cultural Industries for Queensland," by Lewis Adolphus Bernays, F. L. S., F. R. G. S.)

It is difficult to fix the original habitat of the Ginger plant, although it is known to be indigenous both to the East and West Indies. The root is tuberous, of a somewhat flattened roundish form, marked with rings; when young, it is externally of a white colour, internally soft and of greenish colour. When it gets older it becomes grey outside and reddish internally, while the texture becomes fibrous. The best ginger is the white, and should be of firm texture, free from wormholes, and heavy; that which is light and friable is bad. The so-called "black" is less aromatic, its properties being impaired by its being prepared by scalding in boiling water.

Ginger is largely produced for the market in many warm countries, the West Indies (British and French), the East Indies, and the west coast of Africa all being large exporters of this staple product; China and Japan also produce large crops for home consumption. The white varieties most in demand are Jamaica white, Barbadoes, African, and East Indian. The best "black"—which by the way is a misnomer, the colour being in fact a dirty stone—is "Jamaica Black," and "Malabar Dark."

There are sundry varieties of the plant in question, distinguished by the breadth of leaf, size of tuber, and height of growth; and there are other plants to which it is not necessary to refer, the roots of which have similar properties, and which are more or less used for the same purposes as ginger.

The crop is simple of cultivation, and no one in localities where it will grow need be without his ginger patch for home use. The soil should be good and heavy, light sandy soil being unsuitable. Land which has been previously cultivated for a green crop, and is in good heart, answers well for ginger.

In the early spring the ground must be trenched, and beds from three to four feet wide be prepared. It is all the better if the land has been manured for a previous crop, as in the case of potatoes. In these beds small holes are opened about twelve inches apart, and are filled with well-rotted manure. Good clean sets of ginger root, free from decay, and from one to two inches long, are then placed in the holes; at a depth of not more than three inches; and the whole bed is covered up with a thick layer of leaf, which answers the double purpose of keeping off the wet in case of unusual rain, and of
manure. In this country suitable leaves may not be available, and rotted dung will answer well. This is a point, however, which the intelligent grower, knowing the object to be attained, will soon settle for himself. Care must be taken that the material used is not a breeder of worms, which, if abundant, interfere much with the success of the crop. Although ginger insists upon moisture during its growth, it is impatient of the lodgment of water; and care must therefore be taken that the drainage is good. For a large crop it may be necessary, should the rainfall be insufficient, to resort to some method of irrigation; but upon the small scale for domestic use, the watering-pot can easily supply the necessary moisture, as the superincumbent layer of manure or other vegetable matter prevents rapid evaporation.

A good crop yields four times the weight of the sets planted, and takes about six months to mature. When the leaves and stalks die down the crop is fit to dig. In the Himalayas it is successfully grown at an elevation of from 4,000 to 5,000 feet.

Black ginger consists of the mature roots, without selection, scalded and dried. For making white ginger the best roots are selected, and this form is therefore superior, apart from the method of preparation. They are carefully scraped, without being scalded, and are dried, being often subjected to a further process of bleaching with chloride of lime.

Oil of Ginger is obtained from the tubers by aqueous distillation. It is yellowish, very thin, smells strongly of ginger, and tastes burning and aromatic.

For converting into a preserve, the roots are taken up as soon as they are formed, when still young and tender. This will vary somewhat according to the season which follows planting, but will be at somewhere about two months old, when the stalks are not more than five or six inches high. The tubers in this state are scalded, washed in cold water, and peeled clean. The water in which they are washed is frequently changed, and this process lasts three or four days. A syrup is then made of a pound of sugar to a pint of water, into which the beaten whites of two eggs are gradually stirred. This syrup is then boiled, and carefully skimmed, and, when quite cold, it is poured on to the tubers. After two or three days the syrup is poured off, re-boiled and skimmed, and when cold poured over again, and the whole is left for three or four days. The next process is to reboil and reclarify the syrup, which is then for the first time applied hot. If necessary the process is repeated until the syrup has well penetrated the ginger, which is evidenced by the taste and transparency of the tuber, and until the syrup becomes very thick and rich. The syrup must not be applied hot in the first instance or the ginger will shrink and shrivel. In India the weak syrups after being poured off are not used again, but are fermented and make a pleasant drink.

The process of candying is simply that of drying the ginger, preserved as above, a little dry powdered sugar being used to aid the drying.

The following is the specification of a Melbourne patent for "Ginger Champagne":—To manufacture sixty gallons, there are first placed fifty-eight gallons of cold water in a copper boiler, to which are added one hundred and fifty-eight pounds of the finest raw sugar and five pounds of bruised ginger. The mixture is then heated and allowed to boil gently for about half-an-hour, during which time the scum rising from the surface must be taken off. After this has been done the liquor must be drawn out of the boiler and placed in coolers, and after the temperature has been reduced to about blood-heat, it is placed in casks in which the following articles have been previously put—namely, thirty-six pounds of raisins cut into small pieces, six dozen of oranges, and six dozen of lemons, sliced thin. There must then be added to the liquor in the casks one quart of yeast, which with the liquor is allowed to ferment. After the fermentation has ceased, there is added to the liquor one gallon and a-half of proof spirits and six ounces of isinglass. For the purpose of fining the liquor eggs may be substituted for the isinglass, which, however, is preferable. The whole is then mixed well together, and the cask fastened up for about one month, when it is racked off into another cask, and bottled, being then ready for the market.

The following receipt for making "ginger-beer" has high medical authority as yielding a very superior beverage, and one which will keep many months:—White sugar, 20 lb.; lemon or lime juice, 18 fl. oz.; honey, 1 lb.; bruised ginger, 22 oz.; water 18 gals. Boil the ginger in three gallons of water for half-an-hour, then add the sugar, the juice, and the honey with the remainder of the water, and strain through a cloth. When cold add the white of one egg and 1 fl. oz. of essence of lemon; after standing four days, bottle. The bottles are to be laid on their sides in a cellar, and the beer is ready
GINGER.  

for use in about three weeks. If a little yeast be used the beer is ready in a day or two; but in this case it does not keep well.

Ginger-beer powders are made as follows, viz.:—White sugar, 2 oz.; bicarbonate of soda, 26 grs.; powdered ginger, 5 grs.; essence of lemon, 1 drop; mix and put in white paper; in blue paper put ½ oz. of tartaric acid. In drinking use in exactly the same way as a sedilizit powder.

Ground ginger is the subject of adulteration to a large extent; wheat flour, ground rice, potato flour, sagu, turmeric, mustard husk, and cayenne pepper being all used for the purpose of fraudulently cheapening the article for the vendor, and proportionately reducing the value for the consumer. The microscope, however, lays bare the fraud, and with its aid there is little difficulty to the practised microscopist to discover which of the adulterants have been used, and to what extent.

As the value of ginger for medicinal and flavouring purposes is greatly reduced by these admixtures, it is of course best to use the root in all cases; pounding in a mortar, grating or macerating as may suit the purpose in hand.

Pereira describes the physiological effects and uses of ginger as follows:—Ginger is one of the aromatic stimulants which possess considerable pungency or acridity. Its dust applied to the mucous membrane of the nostrils acts as an irritant and provokes sneezing. The rhizome chewed powerfully increases the flow of saliva. The powder mixed with hot water and applied to the skin causes a sensation of intense heat and tingling and slight redness. When taken into the stomach ginger operates as a stimulant—first, to the alimentary canal; secondly, to the body generally, but especially to the organs of respiration. Like some other spices (the peppers, for instance), it acts as an excitant to the genital organs. Furthermore, it has been said to increase the energy of the cerebral functions. It is less acrid than pepper.

"Its principal consumption is as a condiment. Its powers in this way are considerable, while its flavour is by no means disagreeable, and its acridity scarcely sufficient to enable it, when taken with food, to irritate or inflame. 

"As a stomachic and internal stimulant it serves several important purposes. In enfeebled and relaxed habits, especially of old and gouty individuals, it promotes digestion, and relieves flatulence and spasm of the stomach and bowels. It checks or prevents nausea and griping, which are apt to be produced by some drastic purgatives. It covers the nauseous flavour of many medicines, and communicates cordial and carminative qualities to tonic and other agents. As a promoter of saliva, it is sometimes chewed to relieve toothache, relaxed uvula, and paralytic affection of the tongue. As a counter-irritant, I have frequently known a ginger plaster (prepared by mixing together powdered ginger and warm water, and spreading the paste on paper or cloth) relieve violent headache when applied to the forehead. Powdered ginger may be administered in doses of from ten grains to a scruple, or more, in the form of a pill. Made into a paste with hot water it may be applied as a plaster, as already mentioned. Preserved ginger (Conditum zingiberis), though commonly used as a sweetmeat, may be taken with advantage as a medicine to stimulate the stomach. Ginger lozenges and ginger pears, commonly termed ginger seeds and ginger pipe, are useful articles of confectionary, which are frequently of benefit in dyspepsia accompanied with flatulence."

Ginger tea has been recommended in gouty cases. Begin with a heaped teaspoonful, taken in boiling milk, either for supper or breakfast. The quantity may be increased to two or even three drachms. Sir Joseph Banks gave the following account of its effects upon himself in 1784:—"I have taken two teaspoonfuls heaped up, of ginger powder, in a pint of milk, boiled with brand, and sweetened with sugar, for breakfast, for more than a year past. The weight of the ginger is between two and three drachms. At first, this quantity was difficult to swallow, if the ginger was good. I was guided in the quantity by the effect it had on my stomach; if it made me hiccough the dose was too large. I found occasionally that it produced ardor urinae; but this went off without any ill consequences whatever. I have not yet found it necessary to increase the dose; but I use rather a coarser powder than I did at first, which mixes more easily with the milk, and probably produces rather more effect than fine. The late Lord Rivers took ginger in large doses for more than thirty years; and at eighty was an upright and healthy old man. I have, since I used the ginger, had one fit of the gout; but it was confined entirely to my extremities, and never assailed either my head, my loins, or my stomach and lasted only seventeen or eighteen days; but the last fit I had, before I took the ginger, affected my head, my stomach, and my loins, and lasted with intervals from the end of October to January."
"In estimating the quality of ginger," says Hassall, "a variety of particulars have to be taken into consideration as to whether the rhizomes are coated or uncoated, their form, colour, and consistence. The rhizomes of ginger of good quality have no epidermis, are plump, of a whitish or faint straw colour, soft and mealy in texture, with a short fracture, exhibiting a reddish, resinous zone round the circumference; the taste should be hot, biting, but aromatic. The rhizomes of ginger of inferior quality are frequently coated with the epidermis, are less full and plump, often contracted and shrivelled; of a darker colour, being of a brownish-yellow; of harder texture (termed flinty,) and more fibrous; while the taste is inferior and less aromatic."

**GINGER BEER PLANT.**

The Editor of the *Gardeners' Chronicle* has several times been requisitioned by correspondents (mostly anonymous) for a scientific description of the "Ginger Beer Plant." The correspondents wants to know its botanical name and native country. The writer of this note has also been tormented weekly, almost daily, on the same subject for two or three years. Every one has been asking him for the "regular Latin or Greek name" of the "Ginger Beer Plant." Benevolent old ladies, clergymen and officers of the Blue Ribbon Army, have called upon him, or written for a scientific explanation, hoping to make the "Ginger Beer Plant" a boon for the poor. One person wished to feed paupers with it; another hoped by its means to knock all the publicans on the head; a third to send it in barrels for the army in the Soudan. When such persons have been told it is merely a form of German yeast they have turned away disappointed and disgusted. Something more must evidently be done for this rum shrub, of which I have recently had applications for slips, rooted cuttings, and seeds.

The last letter sent to the *Gardeners' Chronicle* was to this effect:—"I cannot learn anything more about it than that it is an American plant. Cannot find out where it is procured—only how to make it. Empty the contents of the small bottle into the wine-bottle. Bruise about half an ounce of ginger, two table-spoonfuls of white sugar, put in a jug, pour boiling water over it, let it stand till nearly cold, then put the plant in the bottle of ginger, sugar, and water. Cork it tight, and when it begins to ferment the cork will fly out. The plant will grow if fed every day, and soon be enough for two bottles. It is best to empty it once a week into a pan and wash it with cold water, then put it in the bottle again."

To the unaided eye the Ginger Beer Plant looks like a lump of paste, and when placed under the microscope it is seen to consist of more than one of the Yeast fungi, in a mucilaginous medium. It belongs to the group of fungi termed Saccharomyces, of which there are many species, the one used for beer being *S. cerevisiae*. Mr. Berkeley, Mr. Hoffmann, Mr. Huxley, and many other gentlemen, British and foreign, have written about yeast in its different forms and conditions.

The "Ginger Beer Plant" like all other yeast fungi, excites fermentation in sweet solutions and sets free carbonic acid gas. The carbonic acid gas formed in the process of fermentation at length causes the cork of the ginger beer bottle to fly out as a sign of maturity.

As all the correspondents insist on this "American plant" being a new species, I propose to humour them by calling it *Zingiberophora spumacephala*! —W. G. SMITH. [Mr. Smith favours us with a Latin description which, to avoid possible perplexity, we omit.—Ed.—*Gardeners' Chronicle*.

**GINGER OIL.**—Cheap ginger for distilling purposes has been obtainable in abundance, African ginger especially being frequently obtainable at very advantageous rates in Liverpool and Hamburg. In China, whence hitherto only preserved ginger has been exported, a company has recently been formed which treats the root by special machinery and dries it for export. It is said that no less than 90 per cent. of the weight of the fresh root is extracted in the form of water and starch, while the remaining 10 per cent., which is obtained in a powdered form, contains the valuable aromatic part of the root. A sample of the powder proved far superior in aroma to all known varieties of root, and the first large trial shipments of this powdered root are looked forward to with much interest.—Schimmel & Co's Half-yearly Circular.
**GINGER CULTIVATION 1 ACRE.**

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<tr>
<td><strong>Total two years' expenditure</strong></td>
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By sale of two years' crop, say 8,000 lb. dry ginger at 15c per lb.  

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Nawalapitiya, 12th August 1884.

DEAR Sir,—If you require further information, I can let you or any other person have it. I am sorry that you rather throw cold water on the cultivation of arrowroot, but I only hope some person will make a trial of both it and ginger. This estimate is expressed in $ not R. as the last letter of mine.—Yours faithfully,

W. M. P.

**SIAM GINGER.**

In the *Botanical Magazine* for July of the present year, t. 6944, Sir Joseph Hooker describes a new species of Alpinia under the name of *A. zingiberina*, the history of which is interesting, as much, or even more, from an economic, as from a botanical point of view. This plant was first noticed in the *Gardeners' Chronicle* for July 31, 1886, p. 150, having been raised from rhizomes exhibited at the Health Exhibition in 1884.

The fine collection of fruits exhibited by the Siamese Commission at the above Exhibition were at its close presented to the Museum of the Royal Gardens, and in the course of preparing the specimens for exhibition in the cases at Kew, I at once saw that a sample of a rhizome labelled “Ginger” was very different from the ordinary commercial ginger, being much thicker, and more cylindrical, longer, and not so much branched. Upon breaking off a piece of the rhizome the odour was more delicately aromatic than common ginger, and the taste not so pungent. As the rhizome still retained life in it, a piece was sent to the propagating-pits, and from it the plant now figured in the *Botanical Magazine* was raised. As Sir Joseph Hooker points out, “We are still in ignorance as to whether it is a wild or cultivated plant; and if the latter, whether it is cultivated (as *A. gallocha* is in Siam) for its seeds, or, like the true Ginger, for its rhizomes.”

From the fleshy nature of the rhizome, as well as from its delicate aromatic taste and smell, the plant would seem to be worth cultivating for the sake of preserving the rhizome in syrup, if not for drying and using as a condiment in the ordinary way. It is well known that the Chinese preserved ginger is of a more agreeable aromatic flavour than that of the West Indies, and is mostly preferred for table use; in consequence of this it has been suspected that some other plant than Zingiber officinale may furnish some, at least, of the Chinese ginger; up to the present time, however, there is no proof of this. Mr. Charles Ford, of the Hong Kong Botanic Garden, referring to this subject in a recent report, says:—“Some doubt has existed as to whether the Chinese use not one or more kinds of plants in use as ginger that are unknown
elsewhere. I have taken steps for collecting together and cultivating all the kinds of plants generally included by the Chinese as Ginger, with the hope that when in cultivation they can be studied and observed in such a manner as to secure all possible information in connection with this subject. While at San-Ui I was fortunate in being able to obtain from cultivated plants good flowering specimens. These I dried, and together with specimens of the roots (properly rhizomes) forwarded to the Director of Kew Gardens for a study of them to be made there, when they can be compared with other kinds, or with specimens of the same kind from other places. The specimens which I procured were, without doubt, Zingiber officinale, the species commonly in cultivation in other parts of the world.

"It is, however, possible that some other plant, which is not a true Ginger, may be used in making the celebrated Canton preserved ginger, but all the information which I have yet obtained points to the species Zingiber officinale as the only kind which the Chinese use for this purpose. The Ginger cultivated in the Lo-Fan Mountains has a wide reputation amongst the Chinese as being of unusual efficacy in medicine; this superior quality may, however, be derived merely from peculiarity of soil or climate which communicate to the plant exceptional properties.

The specimens here alluded to by Mr. Ford have been examined by Professor Oliver, and prove to be those of Ginger (Zingiber officinale, Rose).—John R. Jackson, Museum, Kew.—Gardeners' Chronicle.

WHAT IS GINGER?

As usually seen ginger is in the form of a grayish-yellow powder, but if you go to a drug-store and ask for "race" ginger, you will be served with the article unground, and you will see that it is the dried root-stock (often called root) of some plant. Race—as applied to whole ginger in commerce—is from the Spanish raíz, "a root." The botanical name of the ginger plant, Zingiber, is from a very similar old Sanskrit name. It was formerly placed in the same family with the banana, but botanists at present give it a family by itself. The fleshy root-stock throws up reed-like stems three or four feet high; these bear long and narrow leaves. The flowers are borne upon a separate, leafless stem. This bears a cone-like spike, between the scales of which the flowers appear. The flowers are yellowish-white in colour, with purple markings. Ginger is supposed to be a native of Asia, in the warmer parts of which it is generally cultivated, but it is not known in the wild state. It has been introduced and is now cultivated in nearly every warm country, especially in the West Indies, from which ginger was exported to Europe as early as 1547.

In cities there is sold, in autumn, at drug and grocery stores, fresh or green ginger root. This is the root-stock, just as it comes from the ground, and is used for flavouring preserves. The pieces have one or more green buds attached to them, and if planted in a pot and kept in a sufficiently warm place, will grow. But a very small share of the crop is sold in this state; the ginger, after it is dug, is washed and then exposed to the sun until perfectly dry. This is the ordinary "race ginger" of commerce, and is the kind ground for use. What is called Jamaica ginger is prepared by scraping the rhizome when fresh to remove the outer portion; these are then bleached by placing them in a solution of chloride of lime. Considerable lime adheres to the surface, and the pieces look as if they had been whitewashed. On account of its nicer appearance Jamaica ginger is preferred for medicinal uses, and is used by some families. There is still another form in which ginger is imported—preserved ginger—which comes from China in porcelain jars. The young and tender "roots" are preserved in sugar.—American Agriculturist.

GINGER IN JAMAICA.—It is stated in authoritative quarters that the cultivation of ginger in Jamaica is diminishing very notably. An official report says that the decrease during the past five years has averaged about one-third of the former crop. The cause is said to be constant planting on the same soil year after year.—Monthly Prices Current.

GINGER.—The British Trade Journal says:—"The cultivation of Ginger in Jamaica is said to be dying out, on account of the persistent cultivation of the same plant on the same land for a long series of years. Only the richest and best lands are suitable for the cultivation of Ginger, and as it is a very exhausting crop, the production of the article in the island depends on the reserve of good land still available where it is cultivated."
GINGER-BEER POWDERS.—Mix 1 oz. of bruised ginger, 1 oz. cream of tartar, and 4 drops of essence of lemon with as much powdered sugar as will make the packet a presentable size. Direct that the powder be added to 1 gallon of boiling water, containing 1 lb. of lump sugar. When nearly cold float a piece of toast on the liquid, on which place 2 or 3 tablespoonfuls of good yeast, and set in a moderately warm place to ferment for a day or two; strain and bottle.—Chemist and Druggist.

GINGER.—As a rule, spices grow above ground, but this is not the case with ginger. This product is a root, and grows beneath the surface. It is one of the most valuable spices, and its uses are more numerous and varied than anyone of the others. Ginger was first found near the Red Sea, and very early found its way to Greece and Rome. Like many other commodities, it was first used as a medicine, and held in high esteem. Soon after the discovery of America the plant was transferred from Asia to the West Indies and the tropical regions of the Spanish possessions of the new world. It is now cultivated as an article of commerce in Cochin, Bengal, Africa and Jamaica. It can probably be successfully cultivated wherever the coffee tree grows luxuriantly. The ginger of Jamaica has gained so high a reputation that the impression is made on many credulous minds that more ginger is grown, cultivated and exported from that island than from any other part of the world. In 1876 there were exported from Jamaica more than 1,600,000 pounds, valued at $144,000 or nine cents per pound; but the reports of exports vary so greatly that it is not easy to believe them correct. In 1867 the exports of ginger from Jamaica were exported at 1,728,675 pounds; in 1872, five years later, they fell off to 599,786 pounds, and then four years later, 1879, they again run up to 1,603,764 pounds.—Grocer and Canner.

GINGER AND TURMERIC.—Both of these tubers, if well cultivated, highly manured and treated with care in the preparation for market, can be grown at considerable profit. Each is reared in a desultory manner in almost every village, but so little care is bestowed upon the culture and drying that the minimum price is obtained in the local bazaars, and wholesale dealers would hardly take notice of them. Generally speaking, the roots when taken up receive but a superficial washing, are then smeared with fresh cowdung and hung in baskets or spread on trays among the rafters of the native huts, the ever-ascending smoke doing the rest. The result is that the outturn presents a most uninviting aspect, dirty, shrivelled, and, despite the almost constant smoke, the dried tubers are invariably riddled with the bamboo-borer insect. If on being dug out the tubers of ginger are thoroughly well scrubbed in water with a hard brush until every earthy particle is removed and then steeped for a night in a pretty strong solution of lime water (one ounce of unslacked lime to the gallon), then well rinsed in clean water and dried slowly in a brick oven at a temperature of 140° to 160°, it will command a price closely approximating the best Jamaica ginger; this was ascertained some twenty years ago in the case of some samples so treated on one of the Sylhet plantations. Though ginger may be had, as stock, from almost any village, the best is procurable from the bazaars frequented by the hill tribes under the foot of the hills. As ginger is a bulky article it might be worth while to consider the advisability of extracting the essence and confining dealings in it to that.—Pharmaceutical Journal.
ALL ABOUT VANILLA.
ALL ABOUT VANILLA.

VANILLA IN CEYLON.

This is described as one of the most profitable and least troublesome cultures of humid tropical climates. It ought therefore to be specially suitable for Ceylon, and in his Administration Reports on the Royal Botanic Garden the late Dr. Thwaites frequently pointed out the great value of the vanilla pods, and the ready way in which they can be grown with ordinary care. He mentioned one year that one pound (about 55 pods) was worth from 6s. to 10s. Unfortunately the native villagers show no disposition to pay attention to it, although it would give them very little trouble to cultivate. However, a good deal is now growing on the plantations of Europeans in a few districts, notably in Pallekelly, Dumbara, where a native gardener chiefly attends to a small enclosure of vanilla, yielding £100 to £150 a year. Mr. Prestoe, Government Botanist, Trinidad, considers vanilla cultivation "a highly intellectual occupation," so little physical effort is required, while the intelligent management of the plant and preparation of the fruit are important.

Vanilla is a native of Eastern Mexico which has given as much as 70,000 lb. of the finest; £156,000 was the value of a year's export a few years ago; in 1887, the export is said to be 67 million pods from one district Papantla, chiefly to the United States, and from Vera Cruz the annual export is valued at close on £100,000;* the actual export for all Mexico to United States was 157,479 lb. in 1887. Vanilla is found throughout Central, and tropical South, America, but not much attention is given to it in Brazil or the West Indies, save in the French colony of Guadaloupe. In the forests of Venezuela it grows wild, however as much as 350,000 lb. being exported in 1886 chiefly to the United States which imported altogether 315,000 lb. in 1886. More seems to be done in cultivation in the East. In the French colony of Réunion or Bourbon, the development of the vanilla trade is adding greatly to the wealth of the people. In one season, more than 20,000 kilogrammes of vanilla, valued at 2,210,000 fr., were obtained at an outlay of 552,500 fr., thus giving

* Here however are rather different figures in the Consular report for 1887 from Vera Cruz on vanilla in Mexico:—"The vanilla bean grows wild in the cantons of Misantla and Papantla, and it is also cultivated there, in a primitive manner, by the Indians. It is prepared for market by the cultivators and collectors, and often before it is quite ripe. This is especially the case with the wild vanilla, one family taking it early lest another family should get it when quite ripe for harvest. The systematic and rational cultivation of the plant in the cantons just mentioned would certainly be a remunerative business. At present the quantity produced is about 8,000 mils (one mil=1,000 pods), worth about 3½ to 3½ 10s. per mil."
the net value of the crop as 1,657,500 fr., or about £66,300 for 44,000 lb. of vanilla. In 1874, the crop was 100,000 lb. valued at £165,000; in 1886 it was 135,000 lb. The cultivation is also now freely carried on in Mauritius (70,000 lb. export nearly all to France), in Madagascar* and in Java. The London prices now range from 2s 3d to 10s 6d per lb.

The imports into the United Kingdom are about 10,000 lb. per annum, the consumption is said to be 4,000 lb. and the average price 7s per lb., but much larger quantities go to Spain and France, the chief use being to flavour perfumery and confectionery, especially chocolate. One American report runs as follows:

"Twenty years ago the entire crop of beans cultivated and marketed amounted to from 500,000 to 700,000 yearly, and the prices received ranged from $250 downwards per pound. Now the annual production is 5,000,000 lb., and the present price from $8 to $14 per pound. Strange as it may seem, it is yet true that thousands of people really believe vanilla to be a product of the tonka, or "snuff bean," and multitudes use flavoring extracts made from this article sold to them under the name of vanilla. A yearly consumption of 50,000,000 vanilla beans would not suffice to color even the various decoctions which are sold under the name of vanilla extracts and flavourings, yet, as shewn above, less than 5,000,000 are raised for general supply."

Mr. W. H. Wright, when resident in Turret Road, Colombo, was a very successful local cultivator of vanilla. We notice that 8 packages valued at Rs 245 were sent from Ceylon to England and Australia in 1884. Since then the exports have been: 1885, 3 packages, 284 lb. worth Rs 3,270; 1886, 333 lb. worth Rs 1,715; 1887, 130 lb. worth Rs 310; and 1888, 1,300 lb. worth Rs 4,710.

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**VANILLA.**

*(From the "Encyclopedia Britannica.")*

Vanilla, a flavouring agent largely used in the manufacture of chocolate, in confectionery, and in perfumery. It consists of the fermented and dried pods of several species of orchids belonging to the genus Vanilla.† The great bulk of the commercial article is the produce of _V. planifolia_, Andrews, a native of eastern Mexico, but now largely cultivated in several tropical countries, especially in Réunion, the Seychelles, and Java. The plant has a long fleshy stem and attaches itself by its aerial rootlets to trees, and appears to be little dependent on the soil for nourishment. The leaves are alternate, oval-lanceolate, and fleshy; and the greenish white flowers from axillary spikes. The fruit is a pod from 6 to 12 inches long, and when mature about half an inch in diameter. The wild plants yield a smaller and less aromatic fruit, distinguished in Mexico as _Baynilla cimaronae_, the cultivated vanilla being known as _B. corriente_. Mexican vanilla is regarded as the best. It is principally consumed in the United States, which import about 100,000 lb. of it annually. Réunion produces about the same quantity, which is sent to Bourdeaux, the chief centre of the trade in France. Its odour is said to differ from the Mexican variety in having a suggesting of tonka bean. Guadaloupe produces about 5,000 lb. per annum, which is likewise shipped to Bourdeaux. Mauritius exported 20,481 lb. in 1887. The Seychelles have lately produced large quantities of exceedingly fine quality; the produce of these islands goes chiefly to the London market. The Java vanilla, grown chiefly in Krawang and the Preanger Regencies, is shipped to Holland. The amount exported from the East Indian Archipelago to Holland in 1876 amounted to about 5,000 lb. The best varieties of vanilla pods are of a dark chocolate brown or nearly black colour, and are covered with a crystalline efflorescence technically known as _givre_, the presence of which is taken as a criterion of quality. The peculiar fragrance of vanilla is due to vanillin, C₆H₃O₃, which forms this efflorescence. Chemically speaking, it is the aldehyde of methyl-propanoic acid. It is not naturally present

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* The latest Consular report on Madagascar runs: "The principal vanilla cultivating district lies between Vatomanjy, Mahanoro, and Mahala. In 1886 the port of Mahanoro shipped nearly 2,350 lb. at an average value of 10s per lb. New plantations have been started on the coast near Tamatsy, Vatomanjy, and Mahanoro. The war has interrupted these experiments, which seemed to promise well. The first fruits were sold at about five times the European market prices to start fresh plantations."

† _Span. vanilla, dim. of vaina, a pod._
in the fleshy exterior of the pod, but is secreted by hair-like papillae lining its three internal angles, and ultimately become diffused through the viscid oily liquid surrounding the seeds. The amount of vanillin varies according to the kind: Mexican vanilla yields 169, Bourbon or Réunion 19 to 248, and Java, 275 per cent. Besides vanillin, the pods contain vanillic acid (which is odourless) about 11 per cent. of fixed oil, 23 per cent. of soft resin, sugar, gum, and oxalate of lime.

Vanillin forms crystalline needles, fusible at 81° C., and soluble in alcohol and ether, hardly soluble in cold, but more so in boiling water. Like other aldehydes, it forms a compound with the alkaline bisulphites, and can by this means be extracted from bodies containing it. Vanillin has been found in Siam benzoin and in raw sugar, and has been prepared artificially from coniferin, a substance found in the sapwood of fir-trees, from asafætida, and from a constituent of oil of cloves named eugenol. It is from the last-named that vanillin is now prepared on a commercial scale, chiefly in Germany. Vanillin does not appear to have any physiological action on human beings when taken in small doses, as much as 10 to 15 grains having been administered without noxious results. On small animals, however, such as frogs, it appears to act as a convulsive. It has been suggested as a stimulant of an excitomotor character in atonic dyspepsia. The poisonous effects that have on several occasions followed from eating ices flavoured with vanilla are not to be attributed to the vanilla, but probably to the presence of *Pyrotoxicon* (*Pharm. Journ.* [3], xvii. p. 150), a poison found in milk which has undergone coagulation. This poison may be producing choleraic effects, or perhaps to the presence of microscopic fungi in the vanilla, the plantations being liable to the attack of *Bacterium putredinis*. Workmen handling the beans in the Bordeaux factories are subject to itching of the hands and face; but this is caused by an *Acarus* which occupies the end of the pod. In some cases, however, symptoms of dizziness, weariness, and malaise, with muscular pains, have been felt, due probably to the absorption of the oily juice by the hands of the workmen. These symptoms have been attributed to the variety of vanilla known as vanillon, but it seems equally probable that they are due to idiosyncrasy.

The method of cultivation and preparation of vanilla for the market varies somewhat in different countries. In Mexico a clearing is made in the forest, where a few young trees, 12 or 15 feet apart, are left to serve as a support for the climbing stems of the vanilla plant. Close to each tree two cuttings, 3 to 5 feet in length, are inserted in the soil to the depth of about a foot, the upper part being tied to the tree. The cuttings become rooted in about a month, but do not bear fruit until the third year. They continue to bear for about thirty years. In Réunion, Mauritius, and the Seychelles, the young plants are supported by a rude trellis made between the trunks of trees. Although the plants are probably fertilized by insects in their native country, in Réunion and elsewhere fertilization has to be promoted by hand. Only the finest flowers of each spike are fertilized, or the plants would die of exhaustion. The pods are cut off separately as they ripen since, if over-ripe, they are apt to split in drying, and if unripe the product will be of inferior colour and fragrance. The pods take a month to arrive at full size and six months longer to ripen. The exact time for collecting is judged by the cracking of the pod when pinched between the fingers. The aroma of vanilla is developed by fermentation, and is said not to pre-exist in the ripe fruit.

In Mexico the pods, after they are gathered, are placed in heaps under a shed until they begin to shrivel, and are then submitted to a sweating process. They are next wrapped in a woollen cloth and exposed to the sun during the day, or heated in an oven to 140° Fahr. if the weather is cloudy, and then enclosed in air-tight boxes at night to sweat. In twenty-four to thirty-six hours, according to size, the pods have acquired a fine chestnut-brown colour. They are then spread in the sun for about two months to dry, and are subsequently tied up into small packets of uniform length. In Réunion the pods are sorted into lengths and scalded in boiling water, the long pods being immersed ten seconds, those of a medium size fifteen seconds, and the short ones for fully one minute. They are next exposed to the sun between woollen blankets for about a week, until they assume the characteristic brown colour. They are then spread out under zinc-roofed sheds and turned frequently to ensure equal drying. When the beans can be twisted round the finger without cracking, the "smoothing process" is commenced. This consists in passing the beans between the fingers frequently, apparently to distribute equally the unctuous liquid which exudes as the fermentation proceeds, and to which the lustre and suppleness of the bean are due. When dry they are tied up in bundles of uniform length. These
VANILLA.

are divided into three commercial sorts,—(1) those which are nearly black and glossy and which soon become frosted; (2) those which are lighter in colour, more or less spotted with grey, and not so glossy; (3) those which are gathered in an unripe condition and become little, if at all, frosted over with crystals. In Guiana, where an inferior quality is prepared, the beans are placed on ashes and left until they begin to shrivel; they are then wiped, rubbed over with oil, and, the lower end of the pod having been tied, are hung up in the air to dry.

* Other Varieties.—In Brazil, Peru, and other parts of South America a broad and fleshy vanilla is prepared, which has an inferior odour. It is believed to be obtained from V. pompona, Schiede, which has been found to contain, besides from 4 to 7 per cent. of vanillin, another ingredient, benzaldehyde, by which the odour of vanilla is modified. This variety is often distinguished as vanillon in commerce. It is destitute of giare. Rio vanilla is collected on the banks of the 1arayha river in the province of Rio de Janeiro, Brazil, and is obtained from V. palmarum, Lindl. It has been found to yield 103 per cent. of vanillin. It is of inferior quality, but might be improved if more attention were paid to the curing process. Guiana vanilla is a coarse variety obtained from V. guianensis, Spltberger. The pods are short, thick, and frequently split open, and of inferior fragrance. None of the South-American vanillas appear to be used in Great Britain for flavouring purposes, but solely for perfumery.

E. M. H.

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VANILLA.

(From "Spon's Encyclopædia."")

Vanilla (Fr., Vanille; Ger., Vanille).—This name is applied to the pods of one or more species of Vanilla, the bulk of the commercial article being probably derived from V. planifolia [sativa, Myrobroma fragrans], a native of Mexico, now largely cultivated in many tropical countries, as will be presently described. Other species said to afford the spice are:—V. sylvestris, in Mexico, perhaps identical with V. planifolia; V. Pompona, in Mexico; V. guianensis, in British and Dutch Guiana; V. palmarum, in Bahia; V. aromatica, in Brazil and Peru.

The culture and preparation of vanilla are subject to some variation in different localities. In Mexico, plantations are established in virgin forests or open fields. In the former, all shrubs, climbers, and trees causing an excess of shade are cut down, leaving only young trees to serve as supports for the climbing stems of the vanilla plant. Preference is given to those containing a milky sap, as the plant attaches itself to the bark by means of aerial roots, produced from the nodes, and constituting its true organs of nutrition, for the subterranean roots are quite insignificant, and often suffer gradual decay. Close to each supporting tree, two vanilla cuttings are planted side by side in the following manner: the cutting is embedded in a trench 1½ in. deep and 15-20 in. long, as far as joints or eyes, the 3 leaves have been first stripped off, and then covered with dead leaves, humus, coarse sand, brushwood, &c., the bed being slightly raised above the surrounding level, to prevent stagnation of water around the plant. The remainder of the cutting, 3-4 ft. long, is tied up to the tree. The trees should be 12-15 ft. apart, to allow room for the rapid growth of the plants. After 1 month, the cuttings will have taken root, and need to be carefully freed from weeds and underwood; in the 3rd year, they bear fruit. When planting a field or open level ground, the land is first ploughed up and sown with maize. Meantime a number of young laticescent trees of the fig tribe spring up all over the field, and, in 12-18 months, are capable of supporting the vanilla-plants, which are then set out as already described. The finest product is obtained in this way.

In Réunion (Bourbon), where artificial fecundation is practised, the plants are not allowed to grow out of reach. When starting a plantation in a forest, the cuttings are set at the feet of the trees, whose trunks are connected transversely by a rude trellis; the trees are never lopped, as vanilla requires humidity, and protection from the direct rays of the sun. In making a plantation in an open field, the first care is to grow supports for the plants. Mangoes and fig-trees are employed for this purpose, though, preference is given to Curcas purpurea [Jatropha Curcas], the physic-nut, which strikes readily from cuttings, is of rapid growth, and furnishes abundance of milky juice as sustenance for the vanilla-plant; but Holmes has indicated the possible danger of the acid matter contained in the juice of this tree (see Nuts, p. 1359; Oils, p. 1410) being absorbed by the vanilla-plant. When the young supporting trees have attained
sufficient growth to shade the vanilla, cuttings of the latter are planted as follows:—A trench 8 in. deep is dug between the trees and along the lines in which they grow; the cuttings are set in it, and covered with a little humus, dead leaves, and straw. The rainy season is selected for the operation. When the young shoots begin to grow, it is only necessary to guide them along the trellises, and allow the aerial roots to rejoin the trench between the supporting trees; in 2 years, the plantation is in full bearing.

In India, where the cultivation would doubtless be attended with great success and profit, all trees are good protectors except those which change their book; the best are the mango (Mangifera indica), jack (Artocarpus integrifolia), ouatter (Bombax malabaricum), and physic-nut (Curcas purgans [Jatropha Curcas]). The last must not be planted alone, as it sheds its leaves when the vanilla is in full bearing. Perhaps none is better than Erythrina indica, already widely utilized as a shade tree in Eastern agriculture. The best planting-season is March-May. The most suitable trees are the leaves of the vacoua (Pandanus utilis), which will have rotted and fallen off by the time that the plants are able to dispense with them.

Spontaneous fecundation of the plant is comparatively rare, as the labellum or upper lip of the stigmatic orifice completely covers the female organ, and the anther rests on that valve of the stigma. In countries where the plant is left to itself, a length of 12-20 in. of vine only produces one pod, though the number of flowers in that length may be 40. All may be artificially fecundated by slipping away the labellum from beneath the anther, and so bringing that organ into direct contact with the stigma; but only the finest flowers (about 1/2 doz.) on each bunch should be fecundated, or the plant would die of exhaustion. Fecundation is known to be assured when the flower is persistent and dries at the end of the fruit. The remaining buds should be cut off.

As already observed, the fecundated flower decays at the extremity of the ovary, and, after some days, falls off, leaving the persistent gynostem attached to the fruit, which continues to grow for a month, but must be left on the stem for 6 months longer to allow it to ripen. Each pod should then be cut off separately, as it matures, instead of detaching the entire bunch, as is done in some countries. The only certain indication of maturity is the cracking produced when the pod is pinched between the fingers; the apple-green or greenish-yellow colour is not a sufficiently reliable sign. It is quite as important to avoid gathering the pods too soon as too late. If unripe, the product will lack fragrance, colour, &c.; if over-ripe, the pod will be yellow at the end, and, if not already split, is apt to become so in curing.

The odour of vanilla does not pre-exist in the ripe fruit, but is developed by fermentation. When a pod is allowed to remain on the plant, it splits into two unequal parts, becoming first yellow, then brown, and finally black. While it is drying, it exudes an unctuous liquid of dark-red colour called "balsam of vanilla," and when quite dry, becomes brittle and devoid of all perfume. The following are the various processes for curing vanilla. In Guiana, the beans are placed in ashes, and there left until they begin to shrivel; they are then wiped, rubbed over with olive-oil, and, their lower end having been tied, are hung in the open air to dry. In Peru, they are dipped into boiling water, tied at the end, and hung in the open air for 20 days to dry; they are then lightly smeared over with castor-oil, and a few days later are tied up in bundles. In Mexico, as soon as gathered, the beans are placed in heaps under a shed, protected from sun and rain, and, in a few days, when they begin to shrivel, are submitted to the "sweating" process. This is carried on in two different ways, according to the state of the weather. If it happens to be warm and fine, the beans are spread out in the early morning on a woollen blanket, and exposed to the direct rays of the sun. At about noon or 1 P.M., the blanket is folded around the beans, and the bundle is left in the sun for the remainder of the day. In the evening, all the vanilla is enclosed in air-tight boxes, so that it may sweat the whole night. The next day, the beans are again exposed to the direct action of the sun. They then acquire a dark coffee-colour, the tint being deeper in proportion to the success of the sweating operation. Should the weather be cloudy, the vanilla is made into bundles, and a number of these are packed together into a small bale, which is first wrapped in a woollen cloth, then in a coating of banana leaves, and the whole, enclosed in a mat, is firmly bound, and sprinkled with water. The bales containing the largest beans are now placed in an oven heated to 60° (140° F.). When the temperature of the oven has fallen to 45° (113° F.), the smaller beans are introduced, and the oven is closed
tightly. In 24 hours, the smaller beans are taken out; and 12 hours later the larger ones. During this process, the vanilla has "sweated," and acquired a fine chestnut colour. The delicate operation of drying has now to be commenced. The beans are spread on matting, and exposed to the sun every day for about two months. When the drying is nearly complete, sun-heat is no longer needed, and they are spread out in a dry place until the necessary degree of dessication is arrived at; they are then tied up in small packets. In the Réunion process, the beans are sorted according to length, to be scalded. The long ones are steeped in water heated to 90° (194° F.) during 10 seconds, the medium size during 15 seconds, and the short ones fully a minute. They are then exposed to the sun between two woollen blankets until they acquire the characteristic chestnut colour. After this exposure, which may last 6-8 days, the beans are spread out under sheds to dry gradually. The sheds in this colony being roofed with zinc, they really constitute drying-stoves, through which a current of hot air continually circulates. This dessication takes about a month, during which time the only care necessary is to turn the beans frequently, so that they dry evenly. At the moment when it is found that the beans may be twisted easily round the finger without cracking—that is to say, when they have acquired a degree of dryness which can be known only by experience—the operation requiring the most minute and vigilant care commences: this is termed the "smoothing" process. The operator must pass every bean between his fingers, and repeat this frequently, for, on drying, the beans exude from their entire surface a natural fatty oil. It is to this oil, which exudes as the fermentation proceeds, that the lustre and suppleness of the bean is due. When sufficiently dry, they are tied up in bundles of uniform length. In this manner, the three commercial sorts are obtained:—(1) "Fine": 8-11 in. long, nearly black, unctuous, glossy and clean looking; these soon become covered with frost-like crystals. (2) "Woody": 6-8 in. long, lighter in colour, more or less spotted with grey, not glossy; these are the pods gathered in an unripe condition; they crystallize very little, if at all. (3) "Vanillons," of which there are two sorts, those obtained from short but ripe fruit, which are excellent, and frost well; and those from abortive and unripe fruit, whose perfume is simply the result of absorption from the fine beans with which they have so long been in contact.

The main centres of vanilla-production are as follows:—Mexico: the slopes of the Cordillera, N. W. of Vera Cruz, concentrated about Jicaltepec, near Nautla; the bayonillales on the W. declivity, in Oaxaca State; the States of Tabasco, Chiapas, and Yucatan. E Mexico exported about 20,000 kilo. (of 22 lb.) in 1864, via Vera Cruz and Tampico, mostly to Bordeaux; the French importations had declined to 6,896 kilo. in 1871, and 1,938 in 1872. Réunion (Bourbon): exported 3 kilo. in 1849, and 30,973 kilo. in 1877; the crop 1878-9 was 31,615 kilo. The plantations are much injured by periodical cyclones, and by microscopic fungi (chiefly Bacterium putredinis), but careful pruning and manuring (phosphoric acid and potash principally, also lime and magnesia) have done much to counteract these evils. Mauritius: this island shipped 7,139 lb. in 1872, and 20,481 lb. in 1877; the value was 299,510 rupees (of 28s.) in 1874, but only 169,966 in 1878. Among other countries, it may be mentioned that the culture is much extending in the Seychelles, and in Ceylon; while the plant is abundant (wild) in Honduras, and grows successfully in Madagascar. Also Panama exported 646,96 l. worth to the United States in 1870; and Guatemala, 49 quintals to California in the same year. Tahiti exported 1,719 lb., 575l., in 1878, and 1,426 lb., 570l., in 1879. Very large quantities are grown in Java. The approximate London market values of "salt" pods are 15-40s. a lb. for good to fine, and 8s.-37s. 6d. for inferior.

Unenumerated.—Our imports of unenumerated spices in 1880 were from:—China, 7,180,961 lb., 143,476l.; British W. Indies, 5,108,601 lb., 104,494l.; British E. Indies, 1,781,451 lb., 128,440l.; British S. Africa, 1,757,652 lb., 157,504l.; Aden, 1,099,733 lb., 68,568l.; Native States E. Africa, 723,320 lb., 43,061l.; Holland, 414,965 lb., 38,414l.; Germany, 213,866 lb., 3,542l.; other countries, 379,925 lb., 16,806l.; total 18,657,626 lb., 654,305l. The total in 1876 was only 7,553,326 lb. The re-imports in 1880 were 12,687,818 lb., 408,623l., chiefly to Germany, the United States, Holland, and Russia. Our imports of unenumerated sauces and condiments in 1880 were from:—China, 893,425 lb., 12,198l.; British E. Indies, 314,000 lb., 10,476l.; France, 165,040 lb., 4,309l.; other countries, 112,685 lb., 5,168l.; total, 1,485,139 lb., 32,154l.; Brittish guayaba.—A. Delteil, "Étude sur la Vanille" (Paris: 1874); J. E. O'Connor, 'Vanilla: its Cultivation in India' (Calcutta: 1875); A. H. Hassall, 'Food' (London: 1875); P. L. Simmonds, 'Tropical Agriculture' (London: 1877);

VANILLA.

(From Simmond's "Tropical Agriculture.")

One of the most profitable and least troublesome cultures of humid tropical climates, is certainly that of the Vanilla orchid, of which there are several species, as the true vanilla (Vanilla plantifolia, And., V. sativa, Scheede), V. aromatic; the wild or simaroma, (V. sylvestris,) a variety of V. plantifolia, and the pompona (V. Pompona). This orchid is indigenous to the hot regions of Eastern Mexico, but grows from thence to Peru, on the American continent, and has been diffused by cultivation through the West Indies, the Indian and Pacific Islands. The plant, which is rather fleshy, and has large green inodorous flowers, grows in moist and shady forests, climbing the trees by means of its aerial roots.

Mexico.—The finest vanilla is the Mexican. The chief seats of production are the coast regions of the State of Vera Cruz, the centre of the culture being Jicaiatepec, in the vicinity of Nantla. It is likewise obtained on the western declivity of the Cordilleras, in the State of Oaxaca, and in lesser quantity in those of Tabasco, Cheapas, and Yucatan. The eastern parts of Mexico exported in 1864, by way of Vera Cruz and Tampico, about 44,000 lb. of vanilla, chiefly to Bordeaux. Since then the production seems to have much declined, the importation into France having been only 15,112 lb. in 1871, and 4,363 lb. in 1872. Papautta, Vera Cruz, produces excellent vanilla. The value of the export of vanilla from Mexico in 1873 was 473,038 $.

The culture is very simple. Shoots about 3 feet long having been fastened to trees on the approach of the rainy season, and scarcely touching the ground, soon strike roots attached to the bark, and form plants which commence to fruit in three years, and remain productive for thirty or forty. The plantations are cleared once a year from weeds and undergrowth.

Several varieties are recognised by the growers. One, the "vanille de cochon," is so called from emitting an offensive smell whilst drying. The harvest begins about December, when the fruit becomes yellowish-green, as it is not allowed to arrive at maturity. There are two ways of preparing it for the market. In one method the fruit is allowed to dry until the pod loses its green colour. Straw mats covered with woollen blankets are spread on the ground, and when these are warmed through, the fruits are spread on them and exposed to the sun. After a time they are wrapped in blankets, and placed in boxes covered with cloth, after which they are again exposed. In about twelve hours the fruits should become of a coffee colour, but if they do not the process is repeated. After about two months' daily exposure they are tied up in bundles of fifty, and packed in tin boxes. Five qualities of vanilla pods are known: the best is the primera, the pods of which are twenty-four centimetres long, and proportionally thick. The second quality is called chicha prima, the pods are shorter, and two count as one; the third sacate, and the fourth vesacate, are still smaller, four of the latter being reckoned for one; they are gathered before they are ripe. The fifth and poorest quality is called basura; the fruit is very small, spotted, and much cut or broken about.

The following is another method of preparing vanilla for the market: About 12,000 of the pods are strung together by their lower end, as near as possible to the footstalk; "the whole are plunged for an instant into boiling water to Blanch them; they are then hung up in the open air and exposed to the sun for a few hours. By some they are wrapped in woollen cloths to sweat. Next day they are lightly smeared with oil by means of a feather or the fingers, and are surrounded with oiled cotton to prevent the valves from opening. As they become dry, on inverting their upper end, they discharge a viscid liquor from it, and they are pressed several times with oiled fingers to promote its flow. The dried pods, like the berries of pepper, change colour under the drying operation, grow brown, wrinkled, soft, and shrink to one-fourth of their original size. In this state they are touched a second time with oil, but very sparingly, because with too much oil they would lose some of their delicious perfume."

In Guatemala the Indians of Vera Paz collect a good deal of vanilla growing wild in the woods along the banks of the river Polochic, and in the forests to
the north-west of Coban, and this orchid is also found growing on the coast of Suchitepequez. In 1874, 431 lb. were shipped from Guatemala.

It appears somewhat remarkable that the cultivation of vanilla in the British West Indies has not been largely undertaken, as its would be attended with little difficulty, and might be made a source of much profit to the inhabitant. But even in Caraccas and Guiana, where the plant grows profusely in a wild state, it is almost entirely neglected. It has been attempted in Jamaica.

Guadeloupe. Some small attention has been given to the production in this French island. In 1869, 250 kilos were gathered there; in 1871, 149 kilos were shipped to France; in 1872, 1,497 kilos were raised; and in 1874, 598 kilos.

Brazil. Vanilla is very badly prepared in Brazil; in fact, no attention is given to the culture—the wild pods are merely collected in the woods as they ripen. These vary in length in different districts. The Brazilian pods are in general much larger than those grown in Mexico. Those of the province of Sergipe are 3 to 10 inches long by 6 to 12 lines broad; those of Minaes are 6 to 9 inches long by 4 to 6 lines broad. The ordinary pods found in British Commerce are from 3 to 8 inches long by a third to half an inch wide. The large Pomposa pods are known as vanillons in France. The name vanilla is a diminutive of the Spanish vaina, a pod.

The imports of vanilla into the United Kingdom in the years when a record was kept by the board of Trade, were as follows:

<table>
<thead>
<tr>
<th>Year</th>
<th>Quantity</th>
<th>Value</th>
<th>Year</th>
<th>Quantity</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1867</td>
<td>8,178</td>
<td>2,864</td>
<td>1869</td>
<td>4,805</td>
<td>3,748</td>
</tr>
<tr>
<td>1868</td>
<td>6,846</td>
<td>2,164</td>
<td>1870</td>
<td>10,785</td>
<td>9,726</td>
</tr>
</tbody>
</table>

The chief use of vanilla is in flavouring perfumery and confectionery, ices, creams, and especially chocolate. One pod is sufficient to flavour a pound and a half of chocolate, being ground with sugar for that purpose. The fragrance is said to act upon the system as an aromatic stimulant, exhilarating the mind and increasing the energy of the animal system. It is occasionally employed on the Continent in cases of hysteria, and is used by the Spanish physicians in America as an antidote to poison and to the bite of venomous animals, as well as in other cases. A liquid used in Peru, where it is known as Baume de vanilla, exudes from the open pods at perfect maturity. The fruits in time become covered with an efflorescence of fine needle-like crystals, which possess properties similar to those of benzoic acid; when viewed through a microscope with polarized light they are very beautiful objects.

In the 'Medical Flora,' it is stated that vanilla exercises a powerful action on the animal economy, and justifies the attributes of tonic, stimulant, and comforting, which are accorded to it. The truly active and strong impression which it makes on the nervous system by its fragrant aroma, and on the stomach when taken internally, is rapidly and sympathetically transmitted to all the organs, the functions of which it more or less accelerates. Hence, when the system is lowered, vanilla facilitates digestion and nutrition, augments the cutaneous transpiration, increases the secretion of urine, and acts as a tonic in various other ways. It is recommended in cases of dyspepsia, melancholy, hypochondria, and chlorosis, where the digestive functions are sluggish or torpid.

It is much employed by the Spaniards in South America to cure various maladies, being reckoned stimulant and stomachic.

Besides the large consumption of vanilla as a flavouring essence, it is also used to a small extent in scenting tobacco, snuff, and cigars, and as a perfume; and more recently a new demand for vanilla has arisen, especially in Germany, the pod having been found to yield a fine brown colour.

The quantitative determination of vanillin in vanilla shows that the percentage of this aromatic principle varies between 1.5 and 2.5 per cent. Mexican vanilla of prime quality was found to contain 1.69 per cent; Bourbon vanilla, 1.91 and 2.45 per cent, and Java vanilla, 2.75 per cent. The vanillin in the Bourbon and Java vanillas is associated with an unpleasantly odorous volatile oil, for which reason the Mexican variety, notwithstanding its inferiority in the quantity of the aromatic principle, is preferred, and commands a better price.

The pods as received in Europe are made up in packets containing fifty each, and should be fresh, unctuous and very aromatic. The gathering commences towards the end of September. The pods, after they have been plunged for a moment in a vessel of boiling water, to blanch them, are then hung up in an airy place, and at this stage there exudes from them a viscous liquid which must be removed. The removal is facilitated by light pressure repeated two or three times a day. This desication is a difficult operation, and must proceed slowly. The pods are frequently oiled with mahogany-oil to render them
VANILLA.

Supple and preserve them from insects; they are also tied up with cotton thread to keep them from opening. These are delicate operations, and the rareness of complete success explains the high price of vanilla of the first quality. As soon as the pods are ready, no time is lost in wrapping them in oiled paper and packing them in tin boxes; exposed to air they would speedily lose their aroma. The vanilla, when covered with the brilliant silvery efflorescence, caused by the essential oil contained by the fruit working its way out, is called vanille givre, and is preferred to all others. This efflorescence sometimes makes its appearance on a pod two or three years after its preparation for market; kept in a hermetically closed box it will retain its perfume for many years. Vanilla is despatched in tin boxes weighing generally from 17 to 18 kilogrammes (or about 37 to 39 lb.). The buyer should assure himself that the packets in the box are entire, and that the pods are of the same length. Frauds are often practised in the retail sale of vanilla. Some unscrupulous persons impart a perfume by means of oil of benzoin to old dried-up pods, soak them in a mixture of oil of sweet almonds and balm of Peru to restore their softness, and dust them with salt to give them the desired crystalline efflorescence.

Réunion.—The introduction of the culture in this island dates from about a quarter of a century ago, having been taken up after the failure of the sugar-cane between 1850 and 1856. In 1857, 1,917 kilos were exported to France; in 1858, 2,841 kilos; and in 1861, nearly 40,000 lb. were exported, amounting in value to nearly 100,000 francs. As the plants not only yields fine return pecuniarily, but is an ornament to the garden, a very large proportion of the population are engaged in its cultivation—plants being found in every garden—and this fine industry is now with coffee the mainstay of the island.

A good deal of attention has been of late given to vanilla production here. In 1871, the number of hectares under culture with manilla was 593, and the produce 56,203 lb., of the approximate value of 153,282 francs, raised at the cost of little more than 5,100 francs. In 1874, the produce was 44,000 kilos, valued at 4,098,600 francs.

The gradual progress made is shown by the following figures:

<table>
<thead>
<tr>
<th>Year</th>
<th>Hectares</th>
<th>Produce</th>
<th>Year</th>
<th>Hectares</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>kilos.</td>
<td></td>
<td></td>
<td>kilos.</td>
</tr>
<tr>
<td>1864</td>
<td>13,412</td>
<td></td>
<td>1870</td>
<td>334</td>
</tr>
<tr>
<td>1866</td>
<td>223</td>
<td>15,494</td>
<td>1871</td>
<td>593</td>
</tr>
<tr>
<td>1867</td>
<td>218</td>
<td>16,162</td>
<td>1872</td>
<td>1,582</td>
</tr>
<tr>
<td>1868</td>
<td>230</td>
<td>15,041</td>
<td>1873</td>
<td>671</td>
</tr>
<tr>
<td>1869</td>
<td>303</td>
<td>19,063</td>
<td>1874</td>
<td>1,663</td>
</tr>
</tbody>
</table>

The hectare is nearly 1/2 English acre, and the kilo. a little more than 2 lb. avoidipous.

In Réunion, vanilla is prepared in two ways with boiling water according to local practice, and by drying in a furnace in the Mexican style. Bourbon vanilla is generally shorter and less intense in colour than Mexican, and commands a lower price.

The British Consul at Réunion, in his report dated May 1, 1875, states, "The great demand for this perfume latterly in the markets of Europe has brought large profits to the planters of it, and the plantations have multiplied on all sides to such a degree that the next crop will double that which had appeared in the market towards the month of August next is calculated at about 40,000 kilos. Unless circumstances arise which are at present unforeseen, and also by reason of the newness of some of the plantations, the colony can produce in two or three years from 50,000 to 60,000 kilos. of vanilla. I learn that this cultivation is also extensively carried on in Madagascar and Mauritius, and it is feared by persons interested that this extended cultivation will create a supply too great for the demand, or, in other words, that prices will go down."

Vanilla is cultivated more particularly by the small proprietors than by the great. Its produce assists a part of the population who are averse to work, and the small extent of whose lands has not allowed them hitherto to think of attempting a cultivation like that of the sugar-cane, maize, manioc, or coffee, which would require the assistance of labourers or field-hands. Provided the soil be fertile, moist, and shaded, it needs but a small space to accommodate thousands of vanilla plants, and the produce, being of considerable value, yields to the cultivator a profit which no other plant on the island can give. The crop of Réunion in 1864 sold at an average of 50s. the pound, therefore a sum of 74,000 francs was circulated, principally among the small planters and coloured population. It would be rash to expect such prices in future, even admitting a reduction to 30s. the pound, it would still be advantageous to continue this cultivation.
For exportation in good condition, vanilla should be packed in tins well soldered, in quantities of about 10 lb.

In December, 1868, when the market was glutted, vanilla realised but 6s. a pound; subsequently it went up at a bound. It was 15s. per lb. in March, 1869; 28s. per lb. in August, 1871; 45s. in August, 1873; 57s. to 60s. in 1875; and now it is quoted at 20s. to 40s.

Mauritius.—It was from Réunion that the vanilla orchid was carried to Mauritius. I have not the returns of the exports for the last few years, but the shipments from that island up to 1874, with the declared values, were as follows:

<table>
<thead>
<tr>
<th>Year</th>
<th>Quantity</th>
<th>Value</th>
<th>Year</th>
<th>Quantity</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1865</td>
<td>5,025</td>
<td>1,520</td>
<td>1870</td>
<td>4,986</td>
<td>2,860</td>
</tr>
<tr>
<td>1866</td>
<td>4,427</td>
<td>1,455</td>
<td>1871</td>
<td>4,919</td>
<td>3,435</td>
</tr>
<tr>
<td>1867</td>
<td>5,184</td>
<td>1,488</td>
<td>1872</td>
<td>7,563</td>
<td>10,560</td>
</tr>
<tr>
<td>1868</td>
<td>5,014</td>
<td>964</td>
<td>1873</td>
<td>5,540</td>
<td>12,216</td>
</tr>
<tr>
<td>1869</td>
<td>5,351</td>
<td>2,004</td>
<td>1874</td>
<td>13,415</td>
<td>33,061</td>
</tr>
</tbody>
</table>

A small quantity of that shipped is not raised in the island, but is imported produce.

There is a somewhat extensive cultivation of vanilla in Java. The culture on a systematic basis was introduced in 1841 by M. Teysmann, Director of the Botanic Gardens at Buitenzorg. He introduced the artificial process of fertilization with beneficial results.

There were 264 hectares under culture with vanilla in Tahiti in 1874, the produce being 2,040 kilos., valued at 102,200 francs.

Among the vegetable odours assimilating somewhat to vanilla are the Tahitian leaves of Mauritius, from another orchid, *Angrecum fragrans*, which somewhat resembles the perfume of vanilla and Tonquin beans. The leaves of a few other orchids, such as *Orchis fusca*, dried carefully, also possess the odour of those of the Fahr.

**VANILLA**

*(From Porter's "Tropical Agriculturist."")*

*Epidendrum Vanilla*—one of a genus belonging to the class *Gynandra*, and order *Dianthera* of Linneaus, and ranking in the natural order in the family of *Orchidaceae*.

At the conquest of Mexico by the Spaniards, this plant was found in use among the Aztecs, by whom it was known under the name of Tiliocochitl. The only use to which it then was and still is applied, was as a flavouring ingredient in the making of chocolate. It is rather a curious circumstance, that while Europeans, who then adopted the practice, have continued it to the present time, the inhabitants of Mexico have long ceased to employ it for their own consumption. The plant is still, indeed, cultivated by them, but only for the purpose of exportation, as they have adopted an impression, that it possesses properties which cause it to act injuriously upon the nervous system.

It is matter of surprise, that the high price always obtainable for Vanilla in Europe, should not long since have stimulated some at least among the planters in our tropical colonies, to attempt its cultivation, since it requires little or no capital or labour for its production; and it will grow almost unfailing wherever heat, shade, and moisture are to be found, a circumstance which seems particularly to point out our settlements in Guiana as favourable to its propagation.

The great increase which may be looked for in the consumption of chocolate, in consequence of the reduction in the duty on cacao, coupled with the abatement also made in the duty on vanilla, form additional reasons for calling the attention of our colonists to the subject. By the same act, 2 and 3 W. 4, cap. 84, which reduced the duty on cacao from six-pence to two-pence per pound, the impost on vanilla was also lowered in an equal proportion, or from six shillings and eight-pence, to five shillings per pound.

The greater part of all the vanilla which finds its way for sale to Europe grows in Mexico, and is shipped at the port of Vera Cruz. The plant is, indeed, raised in Brazil, and its fruit is exported thence; but the quality is so far inferior to the Mexican produce, that it sells for about one-third of the price obtained for the best vanilla from Vera Cruz. Small quantities of this fruit were once produced in Saint Domingo; but the present possessors of that island have long ceased to bestow any attention upon its cultivation.
Vanilla is a parasitical plant, and may be grown successfully upon uncleared land. All that it is necessary for the cultivator to do towards its success, is to dig the ground a little at the foot of a tree, and to insert therein two slips of the plant, about ten or twelve inches long; the stalk will then climb up the tree with little further care or trouble, and in the third year the plant will bear fruit. In ordinary seasons, each plant will yield from forty to fifty pods annually, and it will continue to bear thus for thirty or forty years.

The only labour attending this species of cultivation, with the exception of that required for gathering and preparing the fruit for market, is to keep the trees, around which these plants cling, free from all other parasitical plants which might otherwise check their growth. It is not even necessary that the slips should be inserted in the ground in order to their growing. It will be sufficient to this end, if they are tied to the trunk of the tree, up and around which they are intended to grow. At every joint the vanilla plant puts forth small fibres or roots, by means of which it draws its nourishment.

The leaves are ovate, oblong, and larger than those of the common laurel, but not so thick. Opposite to each of these leaves, on the lower part of the stalk, a long winding tendril is thrown out, by means of which it attaches itself to the branches or bark of the tree. When the growth of the plant is such that it reaches the top of the tree, these tendrils are no longer of use; they decay, and the place of each is supplied by a fellow leaf. The flowers, which are large, are of a greenish yellow colour, mixed with white and stripes of red; they give out a powerful odour. These flowers are succeeded by pods growing in pairs; each of them is six or seven inches long, and about three-eighths of an inch diameter; they are green at first, then yellowish, and as they approach to maturity the colour becomes brown.

The plant comes into flower in February and March, and at this time moderate weather is desirable. If cold winds, accompanied by rain, should be experienced, the flowers will drop without being succeeded by any fruit; and on the other hand, extreme drought is equally hurtful. The harvest sometimes commences as early as March, or the beginning of April, and continues at intervals until the end of June; the fruit is not exposed to the ravages of insects. The plants yield only one crop during the year.

The cavity of the vanilla pod contains numerous small seeds, together with a black, oily, and balsamic substance, which, when recently gathered, is moist. To prepare them for shipment, the pods are carefully dried, by exposing them on cloths to the sun's rays; while warm, they are wrapped in woollen, which promotes evaporation, and at the same time absorbs the moisture. When thus treated, the pods blacken and put on a silvery lustre. On this appearing, they must be again exposed to the sun, and thoroughly dried; about eighty of the pods will then weigh a pound.

It will sometimes happen, that the weather proves wet at the time when the pods require exposure to the sun. The only plan, then, to be pursued, is to dry them by artificial heat, until the black colour and silvery spots appear. The manner in which this operation is performed by the Mexican cultivators, is to construct a frame of small reeds, which they cover with a woollen cloth, and on this they spread the pods. A fire is then made at a considerable distance below the frame, which is suspended by cords for that purpose. During the time that they are thus exposed to the modified heat of the fire, the frames must be gently agitated, that the drying may proceed gradually and uniformly. This operation requires a very great degree of care and skill for its successful accomplishment; even when best performed, it will prove an unsatisfactory substitute for the more natural method of drying, the loss from damaged pods being considerably increased where artificial heat is employed. If a due degree of heat could be artificially employed, by any one of those contrivances which science has suggested for the accomplishment of similar delicate operations in this country, any increased degree of damage might probably be avoided. Apparatus for such purposes, however, is mostly expensive, and few planters will think it advisable to come under any considerable outlay of money in order to provide against only a possible evil, such a continuance of rainy weather as would render it necessary to have recourse to artificial heating, being rarely experienced within the tropics, at the season when the vanilla crop is gathered.

When the curing process has been accomplished, the pods must be carefully examined and sorted, and then packed according to their qualities. Attention to this object is the more necessary, as the accidental presence of one damaged or tainted pod has been known to spoil the entire contents of a chest on its passage to Europe.
VANILLA.

(From the "Treasury of Botany," by John Lindley and Thomas Moore.)

VANILLA.—A small genus of climbing orchids belonging to the Arifthoea, natives of Tropical Asia and America. Their leaves are oblong, somewhat succulent, cordate at the base, and articulated with the stem; and their flowers are thick, fleshy and dull-coloured, the sepals and petals being nearly equal spreading, and the lip entire, attached to the column, and bearded. The fruit is linear-oblong and fleshy. The climbing habit of this genus is sufficient to distinguish it from most others.

This is, perhaps, the most important genus of the whole family, and the only one which possesses any economical value. The fruit of several species is largely employed by confectioners to flavour chocolates, creams and liqueurs, under the name by which it is botanically known. The best Vanilla is the produce of V. planifolia, a native of Mexico, but several other South American species are also used. About five or six cwt. are annually imported into this country. See Plate 14, fig b.

W. B. H.

VANILLA.—The thin pod-like capsule of Vanilla planifolia and other species, much used for flavouring purposes. —, Chica. The Panama name for the fruit of a species of Sobralia. —, Cuba, Gritonia Dalea.

VANILLOES.—A sort of bastard Vanilla obtained from Vanilla pompona.

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VANILLA.

(From Henderson's "Handbook of Plants").

VANILLA—An alteration of Vaynilla, which is a diminutive of Vaina, a Spanish word, signifying a sheath; in reference to the cylindrical pod being like the sheath of a knife. Linn. Gynandria-Monandria. Nat. Ord. Orchidaceae.

A small genus of tropical, climbing Orchids, one of the most important of the whole family, not because of its flowers, but for the commercial value of the fruit, which is universally used in the preparation of extracts for flavouring. The best Vanilla is the produce of V. planifolia, a native of Mexico, but several other South American species are also used. The flowers of this genus are white striped with red, and quite insignificant; these flowers are succeeded by pods about six inches in length an one-fourth of an inch in diameter. The pod contains, besides its numerous seeds, a substance which is black, oily, and balsamic; and when recently gathered this is humid, and its odour is said to produce intoxication. The pods are gathered during the last three months of the year, and are carefully dried by exposure to the sun's rays until they are made warn, in which state they are wrapped in woolen cloths to promote and absorb evaporation. When thoroughly cured, they are ready for shipment. The extract is obtained by cutting the pods in small pieces, and pulverizing in a mortar containing about four parts of fine glass to one of Vanilla. It requires a great amount of labor to get the Vanilla fine enough for the dilute alcohol to act upon it in a manner that will secure the whole. After the pulverized mass has been in alcohol for several days, it is filtered through paper, and is fit for use.

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VANILLA.

(Vanilla aromatica; V. planifolia.—Orchidaceae.)

(From "Cultural Industries for Queensland," by Lewis Adolphus Bernays, F. L. S., F. R. G. S.)

This is a climbing orchid, of exceedingly handsome habit, a native of the warm regions of Central and Southern America, but flourishes in various other countries with similar climates, into which it has been introduced. Heat and moisture are essential to its vigorous growth, and shade also, provided that it be not too dense. The plant is of epiphytal habit, attaching itself to trees, but while it will grow under these conditions, it is necessary for fruitfulness that its main root should be in the soil.

The principal supply of the vanilla of commerce is derived from the two species named above, namely, V. aromatica and V. planifolia; but there are other species, differing in the size, shape, and degree of fragrance of their pods, which probably contribute to supply the markets of the world. Of these V. Guianensis, V. palmarum, V. pompona, V. sativa, and V. sylvestris are the chief; the two latter being probably only varieties of V. planifolia. There are other species of no commercial value;* of these V. Moorei, peculiar to
VANILLA.

Ceylon, resembles *V. aromatica* so closely in all respects, except that the pods are not aromatic, as to be liable to deceive the casual observer. Another species, *V. Walkeri*, is almost leafless, but has beautiful white flowers, said to resemble polished silver.

Only the two subjects of this paper have been introduced into Queensland; and being the sources of the best vanilla of commerce, we need not concern ourselves with the others.

Mr. Prestoe, the Government Botanist of Trinidad, one of the most experienced of tropical cultivators of the day, speaking of *V. plantifolia*, says: *“Nothing can be easier than the cultivation of this interesting and valuable plant, its few special requirements being simple and inexpensive. Much misleading matter has been written on this plant, especially as relates to its cultivation. It has been recommended to be grown on large-growing trees. It would certainly thrive, but it would not flower on a large densely-leaved tree till it had attained to light and free air in the upper branches, where it would be out of reach for artificial impregnation, gathering of the pods, and protection of the fruit from vermin. Such a tree would be even less practicable in the pollard form. In Trinidad the most perfect examples possible of vanilla growth occur on such trees as the calabash-tree* *(Crescentia cujete)*, the Physic-nut *(Jatropha curcas)*, and one of the coral trees *(Erythrina corallo-dendron)*. Such trees ably support the vanilla plant, and at the same time by their habit early exposing the growths to light and air, these become shortened and fruitful. The extremities—wreathed in flowers in their season—projecting beyond the larger branches of the supporting tree, hang down within reach. Such a manner of growth and support offer the most ready means for manipulating both flowers and fruit—a most important point in vanilla culture; as also for the necessary attention to the roots which remain near the surface, and require dressings of leaf-mould once or twice a year. The trees mentioned all root from stout cuttings, and while they are attaining their growth, temporary trellises of strong bamboo can be used as intermediary supports. Special attention is required in respect of soil and dressing for the roots, as well as of occasional watering in dry weather. For Queensland, however, I doubt the trellis system. Even under the most favourable conditions of climate which we can secure, vanilla will have quite enough to contend with; and the nearer, therefore, we follow its natural habit the better.

I can speak from personal observation upon its insistence on light to enable it to flower. A plant in one of the glass-houses at Bowen Park was there for years without flowering, which it did for the first time last season, after it had been allowed to sprawl as it liked along the glass roof in the fullest exposure to the light, there being no flowers except when the plant had secured for itself that condition.

The experience of countries, in which the vanilla is an introduced plant and its successful cultivation has been the result of careful experiment, will be the best for the Queensland pioneer in this interesting product to follow, and I have therefore preferred to use for the purpose of this paper the results of such experience in India and the French West Indies. Every kind of trees for this climate must necessarily be the subject of experiment. Those found to suit in India, Bourbon, and Reunion are small-growing and not too densely-foliaged trees, such as those mentioned before, and the Mango, Acacia Lebbek, the Jack-tree, the Silk Cotton tree, etc. Probably our native Bat’s-wing Coral-tree *(Erythrina vespertilio)* would also be suitable. The trees are planted close, 6 feet by 6 feet and even less, and should give shade enough before the vanilla plants are placed against them. These are in the form of cuttings with from three to five knots. If the cutting has three knots, one is put in the ground, leaving two above; these proportions being maintained if the cuttings are longer. The cuttings are planted on the shady side of the tree, and kept firmly in their places by soft flat ties of any vegetable fibre, until the cuttings emit roots which attach themselves to the bark of the tree.

Animal manures are to be avoided, but the soil must be kept in condition by the free application of good mould or well-decomposed vegetable manure. The spring of the year, when the cold nights have permanently taken their departure, is the proper time for planting, and if the soil be dry the plants must be watered. Watering from time to time afterwards in dry weather is also essential.

* The only example of this tree that I know of in this part of the colony is to be seen under shelter of the sideence at the Enoggera Reservoir; but as plants were at one time largely distributed, there are probably others on our northern coast. The specimen referred to flowers freely, but has never fruited.
The young roots are delicate and will not submit to stagnant moisture; a non-retentive subsoil is therefore an element of success.

The proper degree of shade is much that of a well-managed "bush-house"—a chequered light, consisting of as much sun as shade, with a leaning, if anything, to excess of sun. What is really required is a broken and not an excluded sunshine. This being once understood, cultivators will have no difficulty in so reducing excess of branches and foliage in the supporting trees, as to permit them to exactly fulfil this requirement.

* The plants are allowed to spread from tree to tree, and where necessary, intervening supports are placed to break the force of the wind upon the festoons.

For reasons before explained the plants should be kept within reach, and with this object ambitious shoots should be brought back and trained at a proper height. In drier this any tendency of the vines to agglomerate at certain points can be remedied. In planting, however, upon a large scale, the vines are considered within reach if attainable by means of light ladders.

It is recommended to protect the leaf-mould or vegetable manure, applied to the surface of the roots, with stones, both for the purpose of keeping it in place, and keeping the roots cool and moist.

The vanilla has succeeded well in the Government Gardens at Calcutta, where many of the tropical fruits have found the climate too dry. The plants were trained to thin stone pillars seven feet high and three feet apart, with cross pieces at top, which was found a very convenient method upon the small scale required for an example, but there was not supposed to be any special virtue in stone as a support.

Ordinary cuttings may be expected under favourable conditions to produce flowers in the third year from planting.

A peculiarity in the vanilla is the rarity with which the flowers are naturally fecundated, and produce fruit. The flowers are in clusters of fifteen to twenty, and are of a greenish-white colour. The pistil of the flower is protected by a membrane which prevents the pollen from finding its way inside, unless some insect or other accidental agent happens to rupture the skin. To fertilise the flower artificially, this skin must be gently raised with an instrument (of wood or bamboo) 3 or 4 inches long, and made thin and rounded at one end. The pollen can then be introduced, or the organs brought together by a light pressure of the thumb and forefinger, and the covering then let down. The best time for the operation is between 8 and 10 in the morning. A little practice makes the work easy, but it requires care to ensure its proper performance, and to avoid injury to the organs. Only a small proportion of the whole number of flowers should be fertilized, to prevent exhaustion of the plant by causing it to bear too heavy a crop of pods.

When the pods begin to turn yellow, and before they split open, is the time to gather them; and, as the bunches do not mature together, it is necessary to go over the plants every two or three days. To gather the pod, it is held by the butt end, and is detached from the bunch by a peculiar twist.

The pods which are too much shaded are long, soft, thin, and difficult to ripen; those, on the contrary, which are sufficiently exposed to the light, are plump, firm, and better flavoured.

The preparation of the pods varies in different countries. In the Island of Réunion, they are put in a bucket and plunged for about 20 seconds in hot, but not boiling, water, after which they are spread on dry grass or mats to drain. They are then exposed to the sun for six or eight days, or longer according to the weather, on tables with woollen coverings, until the pods become brown. Every evening they are placed in chests lined with woollen cloths to steam. After they have become brown and withered by this process, they are spread in the shade in an airy locality in order to dry them and prevent their getting mouldy, as well as to render them friable, although dry.

During the process of exposure to the sun, and while the pods are hot and limp, they are manipulated with the fingers in order to flatten them, and to distribute more regularly through the pod the essential oil and seed, which are in greatest abundance at the lower end. As the pods dry in the shade, which is evidenced by their becoming a chocolate colour, and by the butt end, which always dries last, showing no moisture, they are put into tin boxes, and are ultimately tied up in bundles of 50 each, care being taken that the pods in a bundle are of equal length.

After the pods have been for some time packed a brilliant white crystal efflorescence, referable to Benzoic acid, appears on the surface. In some markets this "frosted" vanilla is very much in request.
VANILLA.

By another method the pods are prepared by piling in small heaps to ferment for two or three days, and then exposing to sun-heat. When half dry they are flattened out by the hand and rubbed over with castor, coconut or mahogany oil, exposed once more to the sun, and then again rubbed over with oil, after which they are made up into small bundles in leaves or paper. The object of the oil is to prevent the pods from drying too fast and bursting open, and also to make them supple.

In Jamaica a process of preparation is described as having been practised at one time, but which it is to be hoped has fallen into disuse: this was to immerse the pods, before putting them in the sun, in a scalding liquor composed of three-parts strong brine and one-part chamber lye, together with a small quantity of quicklime. In Mexico, failing the sun, the artificial heat of ovens is employed; and this is probably the case elsewhere, although not so described.

The best vanilla-pods are dark, shining brown, plump, heavy, pliant, and soft, with a fine fragrant odour, the crystallised condition being preferred.

The loss of weight in drying is about one-fifth of the original weight of the pod. The crop is an exhausting one, and hence the necessity for the frequent periodical dressings of the roots with well-rotted vegetable manure or fresh leaf-mould.

It is difficult to give an average of the yield of a plant dependent so much upon the method of treatment and the skill of the grower; but there is no doubt that it is a very profitable crop to grow. Some of the statements of profit made in the French West Indies are evidently either much exaggerated or are made in error. Mr. John Horne, Director of the Botanical Gardens of Mauritius, a gentleman of very large experience in the culture of tropical products, and a cautious and reliable writer, gives the net profit per acre in the Seychelles, upon the agriculture of which he made a special report to the Government of Mauritius, at £250 per acre. Accepting this figure as correct for that part of the world, there is a very ample margin indeed for growers elsewhere, whose early operations might be defective for want of experience and practice.

In the year 1874 a discovery was alleged to have been made by two German chemists of a substitute for vanilla in a kind of "glucose" found in the cammy secretion between the bark and the wood of certain species of the genus Pinus. This, when treated with certain chemical agents, the nature of which was not disclosed, was said to present the same composition as the aromatic principle of vanilla. The discovery was at the time the subject of much writing and talking, and had temporarily a disconcerting effect upon vanilla-growers, and interfered with the progress of the industry. The invention, however, died a natural death, and is heard of no more. This article was sold in the form of an alcoholic tincture; and there is little doubt that much of the so-called vanilla flavouring sold in this form is pure imitation wholly wanting in the true essence. There is, however, no more necessity for the consumer to be imposed upon in vanilla than in coffee, as the vanilla-pods can be bought in bundles from the wholesale druggists; and, where the flavouring is much used, this is by far the most economical plan to adopt.

There is another plant, called in the vernacular the "herb vanilla," growing on the Swiss mountains. Its botanical name is Narcissus angustifolia, and it derives its common name from the fact that on hot days it emits a powerful scent similar to that of vanilla. There is, however, no extract of similar properties obtainable from it.

"The nature of the wevy principle of vanilla," says Pereira, "has not been satisfactorily made out. An odour more or less allied to that of vanilla is common to other vegetable substances." From the short life of the alleged discovery referred to above, it would appear in that case to have proved less rather than more; and that, so far as science has yet gone, vanilla as a staple product has nothing to fear.

The physiological effect of vanilla are those of an aromatic stimulant. It is considered to have an exhilarating effect on the mental functions, to prevent sleep, to increase the energy of the muscular system, and to act as an aphrodisiac. On the continent of Europe it has been used in hysteria, melancholia, impotency, and rheumatism.

VANILLA.

Near Henaratgoda, 12th June 1882.

The rupee's worth of vanilla cuttings I put down, six weeks ago are getting on, and I would put down more, if I did not grudge a cent an inch for a plant that grows so freely.
CULTURE AND PREPARATION OF VANILLA.

Cultivation of Vanilla—Fecundity of Flowers—Crop—Preparation of the Pods—Rime or Hoarfrost.

(From "Manual of Indian Agriculture," by John Shortt.)

Vanilla planifolia and Claviculata, a genus of Monocotyledonous plants belonging to the Natural Order, Orchidaceae, the name of which is derived from the Spanish word "Vaynilla," a knife or scissors' case, the fruit having the appearance of the sheath of a knife of which there are five varieties,—whilst the Epidendrum Vanilla, the fruit of which is believed to be the Vanilla of Commerce.

Vanilla is a creeper and flourishes in hot and moist climates. There are two kinds in the country easily distinguished. The small vanilla is generally met with and come originally from Mexico; it is the best kind, the large vanilla with large thick leaves, is an inferior kind, the pods of which fall off before reaching maturity.

Vanilla sets its suckers at the base of trees which serves it as a support or protectors, or at the foot of walls and fences. The sucker ought to have at least 3 joints or nodes and some 4, 5 and even more according to the kind of supports they cling to.

A plantation of 2,400 suckers, growing at my place last year in the month of May, reached the height of 10 and 12 feet and fruited the same year and are now very healthy, but I should mention, that the vines were cultivated and attended to, immediately after shooting out.

Any tree is good as a protector with the exception of those which shed their barks; the best are the mango, the black wood, the dragomer, &c.

The pignon d'Inde for exception cannot be grown alone as on account of its wintering and losing its leaves at the time the vanilla is in bearing, the sun striking just at that time upon the vanilla pods, dry and wither them very much; therefore, it is better to plant other trees amidst the pignon d'Inde, so that their leaves may help to afford shade, when the vanilla has no leaf protection from its own stem. Trees used as supports, ought to be planted 5 feet by 4 east and west, or 6 by 5, according to the space of land one possesses. They might even be planted 6 x 6 to give more air and ventilation.

The system of 5 by 4 which I adopt in my new plantations of long dragon's trees, is the one I prefer; it is essential to make the cables or vines go from east to west, to prevent too great crowding and 'knotting together on the same tree or support, and it is well to place a stake or fence between the trees to allow the vines to creep from one tree to another, thus avoiding the shaking of branches and falling off leaves upon the vines; this shaking of branches can be avoided also by pruning often.

For vanilleries already formed and of which the supports are already far apart, the vines must be made to descend when they climb out of reach; they should be rolled over their own forks or prongs, to the height of a man or better still, put strong hooks into the trees to hold the vines, within reach, to facilitate the fruitfulness and crop. Even then with all care, it happens that these hooks are too high and ladders have to be used. The best months in the plantation are March, April and May, but one can also take advantage of October, November and December taking care to water the plants if the weather be dry. The trees ought to give enough shade, but if not, it is necessary to put artificial shade and to water them more frequently than if they had their natural shade. They ought to be planted on the opposite side to the sun to escape its heat. The longer the sucker, the more joints or nodes ought to be placed in the earth.

A node, when the vine has 3 of them, 2 when it has 4 and 4 to 5 when you plant a long vine.

These vines ought to be laid down in the ground, the base at the side of the tree, well fastened with one, two or several ligatures, according to its

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8 This Essay was originally translated for the late "Neligherry Excelsior," and subsequently submitted to the Agri-Horticultural Society, Madras, and published in theirProceedings of the 3rd March 1875, page 17. This paper is a fresh translation of M. De Floris (of the Isle of Réunion), Pamphlet on Vanilla, by Mrs. A. J. H. Shortt, with Notes by the Editor.

† Mangifera, indica.

† Albioria, latifolia.

♯ Dracaena-draeco.

Indian Pine apple.
length; avoid using twine as it ends by strangling the plant. The string or fibre of *vacca* is the best to use. If the sun is very hot or moderate, it is good to use a moule in making a plantation. Farmyard manure is prejudicial, unless well rotted. Young plants with roots may be planted in farmyard soil provided it is well rotted and composted of leaves and grasses is very good, even preferable, but it must be well rotted, as vanilla roots especially the young ones are very tender and delicate; watering must be seen for the first few days after planting, especially in dry localities.

Plants planted in winter, pine away, lose heart and often perish. The earth is trodden down over each plant after being well watered to avoid the action of the air which is very injurious. In a plantation of vanilla the growth of shelter trees is so contrived, that the plants get as much even more sun than shade. The pods, that have too much shade, become long, thin and ripen with difficulty, whereas, those that have sufficient sun are large, round, firm and contain plenty of aroma. It is preferable that vanilla be not exposed to wind and that it receives heat. A wall of stones or rocks must be placed round each tree, which serves as a support to retain the manure, which is covered with pieces of flat rock to prevent the escape of the manure, to keep the roots moist and to prevent the rain exposing the roots and to keep animals away. Manure placed under the rock is renewed once a year, a little white before flowering.

The seeds may be placed in seed plots, in prepared soil a little shaded, at a distance of 5 to 6 inches one from the other by the side of fences upon which the new shoots readily climb.

*Fecundity of Flowers.*—In the vanilla flower, the male organ is separated from the female organ by a cuticle, which prevents the natural fecundity—it is necessary then when the flower is completely in bloom, to remove with a small instrument this cuticle, and by a gentle pressure of the thumb and index finger to help the communication of the two organs.

The operation of fecundity takes place from 8 to 9 o'clock in the morning to 3 o'clock in the afternoon, or even be prolonged to 4 or 5 o'clock; but the pods produced thus do not acquire the size and length of those produced during a reasonable time. The instrument used for this operation is ordinarily 3 or 4 inches long, thin and rounded at one end, not trangular or it will wound the organs of the flower and cause the pollen (colored dust in the anther) to fall and sometimes cut the male organ in two. The cotont or nices (the terms used by us) of the palm, the latimer and the cocotier, is the best for the instrument used; after using and to find it again every morning, run it through a vanilla leaf. Ladders are used to get at the flowers out of one's reach to produce fecundity. The organs of the flower ought not to be too much pressed, and this operation ought to be skilfully performed by an experienced person.

Vanilla flowers in June and the pods form in September. In elevated and cold regions, the plant flowers, and the pod grows more slowly. It is best to produce fecundity with the first bloom and to pick off the later flowers when those have well fecundated and produced 5 to 6 pods.

To obtain good fruit, leave 5 to 6 pods on each cluster. When the vanilla is loaded with flowers, not sometimes a fine vine has only a very few clusters, in that case one can bring together 8, 10 or even 12 flowers, the tree can easily nourish as many.

*Crop.*—The vanilla crop begins, when the pods are mature, they turn out a yellow color, a sure sign that they are ready for plucking. When the pods are gathered green, they dry with difficulty, get mouldy and often rot in damp weather. They even (the very green ones) become white and of no use. It is necessary to watch for the proper time and get the crop picked by intelligent people. The crop is picked every 2 or 3 days to prevent the more advanced pods from cracking. Sometimes some pods are overlooked or hidden by leaves; these are soon found out by the scent they give. The cracked pods are usually the finest and best, but it is necessary to close them again by a simple operation; the parts split is soaked in lukewarm water and tied up with bands of cloth tightly; some people gather vanilla by taking the pods in the middle or by the tail and dragging them off; thus the vanilla is damaged and often the entire cluster pulled off, green pods and all. Others pick off the pod.

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*The sor.w pine or Pandanus Odoratissimus.*—Ed.
† A piece of bamboo.—Ed.
‡ Cotton is down.
§ American palm.
∥ Cocoa tree.
with their nails, but then the pistil is damaged and the uniformity of the parcel is done away with, and there is difficulty in selling the pods. Near the end of crop, if the last pods ripen altogether, the whole cluster can be taken off.

Preparation of the Pods.—At each gathering the pods are detached from the clusters and put in a basket; this basket is plunged into hot water, not boiling from 18 to 30 seconds; to ascertain, if the water is hot enough, one can put in one’s finger and feel or wait till the smoke arises and the water makes a little noise, this is just before it begins to boil.

Take the pods in the basket, and put them out on dry grass or mats to drain; a quarter of an hour after they are exposed to the sun for 6 or 8 hours or even for some days. Upon tables covered with wool, till they become faded and brown; place them every evening in chests lined with wool, that they may ferment or stew. Becoming faded and brown after being exposed to the sun, they are kept in the shade, in an airy locality on shelves, covered with wool to hasten the drying; prevent moisture above all, to preserve them when dry, supple and fit for sale.

They are kept on these shelves till quite cured and ready for the market; whilst in the sun, in the afternoon, and whilst still hot, it is necessary to press them firmly between the fingers to make them spread out a little and to distribute equally all over the pod, the essential oil and seed which is more abundant in the lower part of pod, to render them glossy and supple and ready for the purchaser; this takes place for some days during their exposure to the sun, when they become withered and put by to dry. One can easily find out when the pods are dry, as they become black or rather chocolate-coloured, and there is no humidity remaining, even in the pistil which always dries the last; the dry pods are chosen and put into white iron boxes, where they remain dry and supple. This work is executed every two or three days or even oftener, according to the number of men employed and especially towards end of crop. They are then put up in packages of the same length, containing 50 pods each and tied in the centre or even a little nearer the end or tail which is apt to open, without this precaution; dry string, supple and strong is used for tying the packets.

Packing up.—Packing is done in white iron boxes, the length of the pods and height of the packages which they are to hold; each box contains 60 packets or 6 rows of 10 packets. This packing is similar to that done in Mexico and is insisted upon in the trade. The iron boxes have a placcard on each, indicating the number of parcels, length of pods, their net weight and the weight of the boxes. They then (if sent to France) are put into a wooden box, large enough to hold them, and to prevent the iron boxes from rusting, they have to be covered with sawdust.

Rime or Hoorfrost.—The rime (white and sparkling or benzoic acid) forms upon the pods, when they are shut up in closed vessels, after being packed three or four months. Several purchasers demand vanilla, like this, in preference; others don’t like it; some demand that it should arrive quite fresh in France: the only way to do this is to make it rimed before exposing it for sale.

It does not concern us, I think, to judge this delicate question or to prevent the rime from forming eventually, unless it interferes in any way with the beauty of the pods and their perfume.

For those who grow large quantities of vanilla, it is necessary to have fixed tables with light posts, so that when the pods are exposed to the sun, in case of rain, they might be quickly spread over with water-proof or tarpaulin. Vanilla yields after being dried about the 50th part. A vanillery which produces 500 kilos, can be carried on by six workmen who will also suffice for fertilizing the flowers; during the slack months they can be put to other work.

Vanilleries are renewed every eight or ten years; this depends on the strength of the suckers planted and also the locality where they are placed.

There are still other details which we have observed, but I think, I can dispense with them as these notes contain the essential knowledge to obtain good results.

Note.—In 1873 the late Mr. New, of the Lal Bagh, Bangalore, showed me some well-grown vanilla plants in the Government Gardens: they were grown in leaf mould and sand and trained to thin stone pillars, placed 3 feet apart and 7 feet in height with cross pieces at the top to form a latticework for the plants to cling to, and there were at the time several large bunches of vanilla pods on them, approaching a state of maturity. The vanilla is a shade-loving plant, but sickens readily when exposed to the direct effects of the sun. Mr. New succeeded in growing a fair crop.
VANILLA.

(From the Kew Bulletin of Miscellaneous Information.)

The cultivation of Vanilla has been attempted in numerous tropical Colonies, but, with the sole exception of Mauritius and the Seychelles, it does not appear to have assumed an important position in any British Colony. This is due to a variety of circumstances. In some Colonies the climate may be unsuited to the successful growth of the plant, owing to seasons of extreme severity in droughts or heavy rains. In others, the soil may be too retentive. In most of them, the need which exists for artificially fertilizing the flowers of Vanilla, and the care necessary to properly cure the pods have, no doubt, contributed to retard the cultivation. There are, however, no valid reasons why the cultivation of Vanilla in certain portions, at least, of the West Indian Colonies, of British Honduras, of the West African Settlements, of India, Ceylon, and the Straits Settlements should not be successfully pursued. With that view, plants of Vanilla have been forwarded from Kew to certain Colonies where they did not previously exist, and it is proposed now to give very briefly the chief points bearing upon the industry.

The vanilla plant is an orchid of climbing habit, of which there are probably several species under cultivation. The more common plant appears to be *Vanilla planifolia*, Andr. (V. elaeagniflora, Sw.) Other species under cultivation are *V. ambiata*, Sw. and *V. grandiflora*, Eich. The botany of the plants yielding Vanilla requires to be carefully investigated. The specimens in the herbarium of this establishment in their present state throw little light on the subject. Hence, a good series of leaves, flowers, and fruits of plants yielding Vanilla, carefully dried, or preserved in spirit, would be a valuable addition to the collections.

It appears that *Selengidium Chica*, Rchb. f. (Xenia Orchidaceae, Vol. I., p. 3, t. 2) yields Vanilla on the Isthmus of Panama, which is described by Seeman (Botany of Herald, p. 215) as follows:

"The fruit of this plant is highly esteemed as an aromatic by the inhabitants of the Isthmus [Panama], and used for all purposes for which real Vanilla is commonly used. It is termed 'Vanilla Chica,' or 'Little Vanilla,' because its fruit is very much smaller than that of any of the genus Vanilla found in the Isthmus."

*Cultivation.*—As regards starting a Vanilla plantation, it is important to bear in mind that the plants, being climbers, it is necessary to provide them with support of some kind, and generally, for this purpose, rough-barked trees, trellis-work, stone pillars, or stone walls are utilized. Living stems of rough-bark trees are probably the best supports for vanilla. In Mauritius, the Seychelles, and Réunion, the stems of *Jatropha Curcas* are largely used. In addition to support, the Vanilla plants require a certain amount of shade. This, however, should not exceed what is called half shade (semi jorr). A certain amount of sun is, however, essential to the proper ripening of the pods. Whatever the support or nature of the shade may be, it is important to bear in mind that the Vanilla plants should be kept within easy reach of the cultivator, and not allowed to climb high up amongst the branches.

The ground around the support should be prepared by deep trenching to the depth of a foot or 18 inches. The drainage of the bed should be perfect. The most favourable soil consists of fine rich loam, mixed with equal parts of sand and leaf mould. Rich animal manure, or manure of any kind, is not a desirable addition. To renovate the soil at the end of the season, add some well-rotted vegetable mould or humus mixed with sand. Raise the bed about six inches above the surrounding surface, and support by means of stones or rockwork. Where obtainable, the cuttings should consist of portions of stems about two or three feet long, but all the better if four or five feet long. The leaves are first removed from the lower part, and three joints are laid under the soil and covered to a depth of two or three inches. The upper part of the stem is trained against the support in the position in which it is intended to grow. A single tree will carry several Vanilla plants, depending upon its size. The surface of the bed should be kept moist by being covered with leaves or "mulching," and, in very dry weather, it should be regularly watered.

Thus started, Vanilla cuttings readily take root, and the stem will grow and flourish. Depending upon the size of the cuttings, the plants begin to flower in the second year after planting. They do not, however, flower freely until the third and fourth years.

*Fertilization of the Flowers.*—The first duty of the cultivator when the plants are in flower is to attend to the duty of fertilization which, in countries where
EXPLANATION OF PLATE (ON FOLLOWING PAGE):

Fig. 1.—Portion of stem of Vanilla plant, with leaf, aerial root, and cluster of flowers; a, front view of Vanilla flower; b, side view; c, aerial root, with root hairs.

Fig. 2.—Single flower of Vanilla, exhibiting the first stage in the process of artificial fertilization. The operator, provided with a finely-pointed piece of bamboo, divides the lip or labellum medially, so that the central lobe is separated from the two side lobes. This exposes the column and organs of fecundation. The instrument is represented as placed against the column, ready to press upwards the anther a, and bring the pollinia in contact with the stigma b.

Fig. 3.—Single flower of Vanilla, exhibiting the second stage in the process of artificial fertilization; b shows position of column exposed by division of the lip [the middle lobe of lip is pulled forward and curled upon itself to show the position of the column; the side lobes of lip, separated as shown in Fig. 2, are represented at back of the column]; a, the position of pollen masses, taken from the anther and placed on the stigma.

Fig. 4.—Enlarged front view of top of the column; a, the anther.

Fig. 5.—Enlarged side view of top of the column; a, the anther; b, the stigma, or viscid surface on which the pollen masses must be placed to ensure fertilization.

Fig. 6.—Enlarged section through top of the column; a, one of the pollen masses in situ; b, the stigmatic cavity.

Fig. 7.—Enlarged section through top of the column; a, the pollen masses, having been transferred from a, Fig. 6, are now represented in contact with the stigmatic surface. [Although diagrammatically shown, these figures give a tolerably good idea of what is actually necessary in order to produce fertilization in a Vanilla flower.]
the Vanilla is not a native, will require to be done artificially. The flower of the Vanilla, as in most orchids, is a very highly differentiated organ, the parts of which can be best studied by a reference to the engraving given on page 160. In the wild state, the pollen is carried to the stigma of the Vanilla flower by means of the agency of insects. Where these particular insects are absent, their work must be performed by the cultivator, or no vanilla pods will be produced.

It is recommended that the work of fertilization should take place in the morning. It is advisable that all the flowers in a cluster be fertilized as they open; but of those that are successfully fertilized, only a certain number, depending on the age and strength of the vine, should be allowed to remain. If too many pods are retained at first, the vine is apt to be weakened, and the quality of the produce lowered.

The process of fertilization will be better understood by a reference to the engraving given herewith. The only instrument necessary is a small piece of bamboo or sharpened stick, the thickness of a lead pencil, about four or five inches long.

When the flower is opened, it will be noticed that there are three outer and three inner floral parts, which are sometimes designated the sepals and the petals respectively. One of the latter is so much altered and so distinct in form and colour, that it is usually spoken of as the lip. Inside, and immediately hanging over the free part of the lip, is a process which is a continuation of the axis of the flower. This is called the column (see b, fig. 2). The end of the column enlarged, front view, is shown at fig. 4. At a, fig. 5, is represented the anther, containing the pollen masses, and at b, the stigma or viscid surface, on which the pollen must be placed in order to ensure the act of fertilization. At fig. 6 is represented a section through the top of the column showing the position of the pollen masses a, and the stigma b. It will be noticed that the stigma is separated from the pollen masses by an upper lip projecting over the stigma. In the work of fertilization it is necessary to lift up or tear away this lip, and transfer the pollen masses from the anther at a to the stigma at b, as shown in fig. 7. The mode of using the instrument is shown at figs. 2 and 3.

The work of fertilization, when once understood, may be carried on with great rapidity. An expert person will, it is said, fertilize as many as a thousand flowers in one forenoon. The simplest mode is to seize the flower with the left hand between the thumb and middle finger, and support the column at the back with the forefinger. Then, with the sharpened instrument in the right hand, the hood at the top of the column is removed, so as to expose the anther and stigma. The upper lip of the stigma is then pressed upwards, and the anthers brought down and placed in contact with stigmatic surface, as shown in figs. 3 and 7. The explanations given to the figures in the engraving will clearly show the operations here described. When the flowers have been fertilized they will begin to wither about the third day. By the end of the first month the fruit attains nearly its full size, although it is not fully developed until it is six or seven months old.

Curing the Pods.—The pods are left on the vine until they begin to show a slight yellow tinge at one end. They are then gathered from day to day, care being taken not to injure those not yet fit to gather. When the day's gathering is completed, the pods are placed in a basket, and, according to one method of preparation, they are plunged for about half a minute in very hot, but not actually boiling, water. Directly after this operation the pods are spread out on mats to drain. For the next six or eight days they are exposed on woollen cloths or blankets in the sun, while each night they are kept in a closed box, where they undergo a certain amount of fermentation. When they have become soft and brown, the pods are placed to dry in the shade, they are carefully and regularly pressed between the fingers, slightly anointed with oil, and rendered supple and lustrous. When quite cured, the pods are of a rich dark chocolate colour, pliable in texture and perfectly free from moisture. The whole process of curing extends over several weeks.

In packing for the market, the pods are sorted according to length, and put up in packets of 50 pods each; they are tied in the middle, and also near each end. These packets are then carefully put up in closely fitting tin boxes. When Vanilla pods are in good condition, they become covered with an efflorescence of needle-like crystals of Vanillic acid. The interior of the bean is then soft, unctuous, and balsamic.

Those who wish to carefully study the various modes of growing and curing Vanilla, cannot do better than consult *Vanilla, its cultivation in India*, by J. E.
O'Connor, Calcutta, 1881; and *La Vanille, sa Culture et sa Préparation* par A. Delteil, Paris, Challamel Ainé, 2, Rue Jacob, 1884.

Vanilla plants have been frequently grown and fruited in this country at Kew, at Sion House, and other establishments. In 1878, some bunches at Sion House contained as many as fifteen pods, each of which measured nine inches in length.

Mr Piesse gives the following interesting information respecting the use of Vanilla pods for perfumery purposes:

"In order to obtain the perfume or essence, 1 lb. of such pods are cut up small, and put into one gallon of pure alcohol, of a strength known as 60° proof; given the whole a shake up daily. The ingredients must remain together for, say, four weeks, at which time all that is worth extracting will be found in the spirit, which may then be strained off quite clear and bright. It is then suitable as a flavouring agent, or, when blended with other scents it makes delicious perfumery. Those sold under the titles of clematis, heliotrope, wall-flower, &c., mostly contain about one-half in bulk of Vanilla extract. About two centuries ago, Vanilla may be said to have been unknown in this country; it is, however, stated that Morgan, an apothecary, showed to Queen Elizabeth a sample but he knew something more about it than that, it was brought from abroad by some Spanish merchants. At the present time the total annual average crop of all the varieties of Vanilla from the several countries which produce it may be estimated at 8,000 lb., representing a value of not less than 150,000."

CULTIVATION OF VANILLA.

The high price of vanilla should encourage the cultivation of this plant in many of our Colonies, which are well adapted to its growth—e.g. Ceylon, Queensland, New South Wales, the West Indies, British Guiana and Honduras, Fiji, and parts of New Zealand. Some portions of South Africa and many districts in India would no doubt also prove capable of yielding an abundant supply of excellent vanilla. Mauritius is at present our only Colony where the cultivation of this plant is systematically carried on, though small experiments have been made, with encouraging results, in Jamaica.

As it requires special treatment, a few remarks upon its cultivation may be of interest to those who may be tempted to make the experiment.

In Mexico, vanilla is planted either in a forest or in a field. In the former case the underbrush, climbers, and large trees are cut down and removed, and young saplings only preserved to serve as supports to the vanilla plant, preference being given to trees having a milky sap; near each tree two cuttings of the vanilla plant are placed side by side in a shallow trench 1½ inch deep, and sixteen inches long, three knots of the stem being laid in this trench and covered with dead leaves, brush, &c. The rest of the cutting to the extent of three or four feet is placed against the tree and tied to it. The supporting trees should not be nearer than twelve or fifteen feet apart, to give sufficient room for the development of the plant. After a month the cutting will have taken root and must be carefully kept free from weeds and briars of all kinds. In the third year the plant begins to bear fruit which it continues to yield for many years.

When the vanilla is cultivated in a field the Mexicans first plough the ground thoroughly and raise on it a crop of maize. In the protection afforded by this plant a number of young milk-bearing trees of the fig family grow, which in about twelve or eighteen months are large enough to answer the purpose of supports to the vanilla plants which are then placed as above described. In Mexico and Guiana the plant is allowed to climb up the trees, the fertilisation of the flowers is left to nature, and a large number of flowers consequently remain unfertilised and the yield of vanilla is small. In a few days after fecundation the flower falls off and the fruit continues to grow till the end of the first month: it takes, however, another five months before it is completely ripe. Each pod must be gathered separately, and not the whole cluster at once, the time to gather them being indicated by the pod cracking when pressed with the fingers. If too ripe the pods split in drying, changing in colour from yellow to brown and black. If not ripe enough the fruit will lack fragrancy and proper colour. The ripe fruit has no odour at first, the agreeable odour of vanilla being developed by a process of curing. While the fruit is drying, an unctuous dark red liquid, called balsam of vanilla, exudes.
In Mexico the pods are collected and placed in heaps in a shed to protect them from rain and sunshine, and left there for a few days; they are then, if the weather is warm and clear, spread early in the morning on a woollen blanket and exposed to the direct rays of the sun; at about midday the blanket is folded round the beans, and the bundle left in the sun for the remainder of the day. In the evening it is enclosed in tight boxes in “sweat” all the night. The next day the same treatment is adopted, and the beans, after exposure to the sun, acquire a dark coffee colour, the shade being deeper in proportion to the success of the “sweating” operation.

If the weather is cloudy, the vanilla is collected into bundles, a number of which are packed together into a small bale. which is first wrapped with a woollen cloth, then with banana leaves, and finally with a stout matting, which is firmly bound and sprinkled with water. An oven is then heated to 140° F (60° C), and the bales containing the larger beans are placed in it. When the temperature has fallen to 113° F (45° C) the smaller beans are introduced and the oven closed tightly. Twenty-four hours afterwards the smaller beans are taken out, and twelve hours later the larger ones. The vanilla has then acquired a fine maroon colour.

The drying operation then commences. The beans are spread on matting and exposed to the sun every day for about two months. When the drying is nearly complete it is finished in the shade in a dry place, and the pods are then tied up in small bundles for sale.

In the Island of Réunion, a different method is adopted.

In the first place the vanilla plant is never allowed to grow out of human reach, the different trees on which it is supported being connected by pieces of bamboo or other wood, placed horizontally, so as to form a kind of lattice, on which the vanilla can spread freely. As the vanilla loves a moist soil, and will not bear a burning sun, the trees are never cut down. If grown in a field the support chosen is usually the physic nut (Jatropha Curcas) on account of its rapid growth and abundant milky juice.

When the trees are of sufficient size to shelter the plant, the cuttings are set between the trees in a trench, eight inches deep, and covered with dry leaves, straw and a little soil. This is generally done in the rainy season, as the cutting requires frequent watering while it is taking root. The shoots are trained on the lattices when they have begun to grow freely, and in two years are in full bearing. A length of stem of twelve to twenty-six inches in a state of nature, although it may produce more than forty flowers, rarely yields more than one pod—the flowers being only capable of fertilisation by the aid of insects.

A man named Edmund Albins, a former slave in Réunion, discovered that if the pollen of one flower was made by artificial means to fertilise the stigma of another flower, it was possible to obtain more than 3,500 pods from a single plant, although this would cause the death of the plant before they could ripen. The method adopted, therefore, is to choose on each cluster the finest flowers, and only fertilise those presenting a large and fleshy peduncle. These are known to be success-failly fecundated, if the flower, instead of dropping off, remains and dries on the top of the fruit. When this is observed the rest of the flowers are cut off.

When ripe, the pods are sorted according to length, and scalced. The long ones are dipped into water at 104° F. (90° C) during ten seconds, the medium ones fifteen seconds, and the shorter ones, one minute, or longer. They are then exposed to the sun between woollen blankets until they acquire the characteristic maroon colour, which occurs in about six or eight days. The pods are then spread on hurdles, and placed in garrets to dry gradually. As in this Colony the roofs are flat, and covered with tin, the garrets are in reality drying closets with a stream of warm air continually circulating through them. When the drying has proceeded so far as to allow the pod to be twisted easily round the finger, the operation called “smoothing” begins; and this requires great care, as every bean must be passed through the fingers from time to time, so as to spread the oil which exudes on the whole length of the bean, as the fermentation proceeds, for the lustre and

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* How far the irritating property of vanilla, which is sometimes manifested in vanilla lozenges, i.e. may be due to the growth of vanilla on an acid rhizomaceous plant may be worthy of enquiry. The use of fig-trees, as in Mexico, would seem at all events to be safer and more judicious.
supleness of the vanilla depend upon this treatment. The beans are also
turned frequently, so as to ensure their drying equally on both sides. In
a month the pods are dry, and are then sorted according to their length,
and into the three following varieties: 1st. Fine vanilla, from eight to eleven
inches long, glossy, dark brown, and unctuous, and soon covered with minute,
frost-like crystals, technically known as \textit{givre}. 2nd. Woody \textit{vanilla}, from
six to eight inches long, lighter in colour, not glossy, presenting grey spots
on their surface and having very little \textit{givre}. These generally come from
pods not quite ripe 3rd. \textit{Vanillon}, consisting of two varieties, both of
which are short. The best are obtained from ripe fruit and are covered
with white crystalline efflorescence; the inferior are obtained from abortive
or unripe fruits, and owe any odour they possess to having been in contact
with those of better quality.

A slightly different method of drying is adopted in other vanilla-growing
countries. In Guiana the pods are placed in ashes and left there till
they begin to shrivel. They are then wiped, rubbed with olive oil, tied
at their lower end, and hung up to dry in the open air. In Peru the vanilla
is dipped into boiling water tied at the end, and hung in the open air;
after twenty days the pods are rubbed over with castor oil, and a few
days later are pressed into bunches.---\textit{Colonies and India.}

\textbf{VANILLA.}

\textit{(From the Monthly Magazine.)}

The genus vanilla, says Mr. G. W. Septimus Piesse, is indigenous to
Peru, Brazil, and Mexico, and some of the species have been successfully
cultivated in the West India Islands, Ceylon, and Mauritius. From the last-named,
marvellous specimens were sent to our Intercolonial Exhibition of 1862, for
which the jurors awarded a gold medal.

The vanilla will produce saleable pods the third or fourth year after
propagation, and they may then be gathered annually in September in in-
creasing quantities for thirty or even forty years. Two good specimens of
the plant may be seen in the Orchid House at Kew.

When the pods are gathered, which should be done before they are
quite ripe, it is most important that they be properly cured, otherwise they
rapidly become mouldy and lose their scent. Parcels in this condition may
often be found in the Mincing Lane drug auctions. The curing of the pods
is best effected by drying them in a moderate heat, pressing them with
the thumb and finger from end to end, and then brushing them over with
an oil that does not itself become rancid, such as that of cocoa or cashew
nut. It is at the apex of the pod that the mouldy parasite first appears,
the pods then quickly become soft and flabby, or dry and chippy. On the
other hand, when vanilla pods are in good condition, they become covered
with an efflorescence of needle like crystals of vanilliac acid; the interior
of the bean is then soft, unctuous, and balsamic. These crystals may be
sublimed by heat of a sand bath. Few objects are more beautiful than this
when viewed by a microscope with the aid of polarised light.

I F. H. Johnston states that the fruit of this plant when ripe is said
to yield from two to six drops of a liquid which has an exquisite odour,
and bears the name of "balsam of vanilla." This balsam is, however, never
seen in Europe; consequently it has never appeared commercially in the
market. The pods are dried in the sun and afterwards slightly fermented
for the purpose of developing their odour; when fresh, they are said to
have no perfume. Physiologically, the fragrance of the vanilla acts upon
the system as an aromatic stimulant, exhilarating the mental functions, and
increasing generally the energy of the animal system. About two centuries
ago vanilla may be said to have been unknown in this country; it is how-
ever stated, that Morgan, apothecary to Queen Elizabeth, showed Her Majesty
a sample, but he knew nothing more about it than that "it was brought
from abroad by some Spanish merchants."

A few years back the average importation of this article was about
five or six hundredweight, which arrived, from some unknown cause, very
irregularly, and as a consequence caused great fluctuations in the price.
At the present time the total annual average crop of all the varieties of
vanilla from the several countries which produce it may be estimated at
80,000 lb., representing a value of not less than \$150,000.
In order to obtain the perfume or essence, half a pound of the pods are slit from end to end, so as to lay open the interior; then cut them up in lengths of about a quarter of an inch, and put into one gallon of pure alcohol of 60° over proof, and macerated with occasional agitation for about a month, at which time all that is worth extracting will be found in the spirit, which may then be strained off quite clear and bright. It is then suitable as a flavoring agent, or when blended with other scents it makes compound odours or bouquets. Those sold under the titles of clematis, heliotrope, wall-flower, &c., mostly contain about one-half of vanilla extract.

The following gives a good

**ESSENCE OF WALLFLOWER.**

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fleur d'orange</td>
<td>1 pint</td>
</tr>
<tr>
<td>vanilla</td>
<td>½ pint</td>
</tr>
<tr>
<td>Espirit de rose</td>
<td>1 pint</td>
</tr>
<tr>
<td>Extract of orris</td>
<td>½ pint</td>
</tr>
<tr>
<td>Cassic</td>
<td>½ pint</td>
</tr>
<tr>
<td>Essential oil of almonds</td>
<td>5 drops</td>
</tr>
</tbody>
</table>

This should be prepared for two or three weeks prior to putting up for sale.

The odour of heliotrope resembles a mixture of vanilla and almonds, and is well imitated thus:

**EXTRACT OF HELIOTROPE.**

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spirituous extract of vanilla</td>
<td>1 pint</td>
</tr>
<tr>
<td>French rose pomatum</td>
<td>½ pint</td>
</tr>
<tr>
<td>Orange flower</td>
<td>2 ounces</td>
</tr>
<tr>
<td>Ambergris</td>
<td>1 ounce</td>
</tr>
<tr>
<td>Essential oil of almonds</td>
<td>5 drops</td>
</tr>
</tbody>
</table>

**THE WILD VANILLA.**

Theobroma, Mirigama, 24th Jan. 1882.

Dear Sir,—Walking through the jungle here, I cam across an orchid, which, to my unscientific eye, looks very like vanilla. I send you by rail a few cuttings, I have been unable to procure the flower or fruit. The pod, as described by a Sinhalese man, exactly resembles the vanilla.—I am, yours faithfully,

R. H. L.

[W. F. furnishes the following note:—"The plant sent by your correspondent is the Vanilla Moonii, Thw. It was long ago discovered by Moon; and included in his Catalogue of 1824, as the Vanilla aromatica? Moon, p. 60. It is quite a common plant in various parts of the Western Province, and flowers and fruits freely, every part bearing a strong resemblance to that of the cultivated vanilla, but the fruits are not aromatic. It festoons trees profusely with its pendant stems, and is so like the cultivated vanilla plants that a person not aware of the existence of this indigenous species is liable to be deceived by it. It is peculiar to Ceylon, and Dr. Thwaites has named it after Mr. Moon, the first discoverer of it. Another species, Vanilla Walkeriae, Wight, almost leafless, and having beautiful white flowers, resembling polished silver, with stems and fruits resembling those of the vanilla, is equally common in the Western Province."]

**Vanilla (Vanilla planifolia. var.)**—The cultivation of Vanilla continues to be one of the most profitable pursued. It is moreover of a nature to require so little physical effort that the proprietor may be regardless of the condition of the labour market, and however limited the cultivation, it may be regarded correctly as a highly intellectual occupation—for intelligence is specially required both in the management of the plant and the proper preparation of its fruit—or Vanilla. The value of the produce of Vanilla from a few square yards is so considerable, that the rental of any house may be realised by Vanilla culture in the courtyard, provided there be means for, 1, maintaining a chequered shade or a diminished sunlight—to one-third of that it usually is: 2, a few hard wood posts and bamboo laths for horizontal trellises, and such vegetable matter or rubbish as is usually met with in yard or street—including, specially, horse droppings; the trellising being of course for support, and the rubbish—mixed with the surface soil—being the compost for the nourishment of the roots, and through them the sustenance of the plant. Fortunately Trinidad possesses in her forests a variety of Vanilla of the very best kind, both as to size and flavour, and of this plants can be obtained in quantity to meet all possible requirements.
CHEAP EXTRACT OF VANILLA.

C. A. McG., Jeanerette La.—Will you please be kind enough to give formula for making extract of vanilla from tonka beans and oblige?

Answer.—Extract of vanilla cannot be made from tonka beans, but an imitation vanilla extract, which we suppose is what you mean, may be made as follows:—

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tonka beans</td>
<td>7 ounces</td>
</tr>
<tr>
<td>Brown sugar</td>
<td>2 do.</td>
</tr>
<tr>
<td>Water</td>
<td>24 do.</td>
</tr>
<tr>
<td>Alcohol, 95 per cent.</td>
<td>40 do.</td>
</tr>
<tr>
<td>Caramel</td>
<td>q. s. to color</td>
</tr>
</tbody>
</table>

Cut the beans up fine and mix them with the sugar, bruise in an iron mortar together; then add one pound of pure white sand. When thoroughly incorporated, transfer to a percolator, and after mixing the alcohol and water pour it gradually on. An extract that will give better satisfaction, and that ought to be cheap enough at the present price of vanilla beans, may be made of the following ingredients, treated in the same manner as the former:—

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vanilla beans</td>
<td>1½ ounces</td>
</tr>
<tr>
<td>Tonka beans</td>
<td>4 do.</td>
</tr>
<tr>
<td>Brown sugar</td>
<td>2 do.</td>
</tr>
<tr>
<td>Water</td>
<td>24 do.</td>
</tr>
<tr>
<td>Alcohol, 95 per cent.</td>
<td>40 do.</td>
</tr>
<tr>
<td>Coloring</td>
<td>q. s.</td>
</tr>
</tbody>
</table>

—Oil and Drug News.

EXTRACT OF VANILLA.

BY GEORGE W. KENNEDY.

The object of the writer is to present a reliable formula, which has, in his hands, proved very satisfactory during the past eight or ten years that it has been used. Prior to that time I had experimented considerably with menstruums of various alcoholic strength, and also with mixtures containing glycerine. I obtained good results from some, but the formula I have adopted I prefer to all others, and am satisfied that even the inexperienced can manufacture a good preparation, provided they use a good quality of bean and carry out the manipulation properly. The formula does not differ materially from the many in general use, both as to alcoholic strength and the quantity of bean used, although some pharmacists use less than one ounce to the pint; but to insure uniformity throughout the country, I think that the strength indicated should be generally adopted.

For exhausting the vanilla, various writers have suggested simple percolation, repetition of digestion—both with a cold and warm menstruum and either for a limited or an unlimited period—and prolonged maceration followed by percolation. The writer prefers simple percolation, which, of course, requires to be skillfully managed. Some writers have recommended strong alcohol as a menstruum. This, I believe is necessary, as it is a waste of alcohol, making the preparation more expensive without obtaining better results. I have found 50 per cent alcohol to answer the purpose admirably, and as vanillin, to which the odour is due, is soluble in this menstruum, it is, in my judgment, the most desirable one to use.

As there are many varieties of vanilla in the market, attention should be given as to its selection. A good quality, although perhaps decidedly more expensive at the outset, will be the cheapest in the end for preparing the extract. There is an inferior kind of Mexican vanilla sent into the market, cut up into small pieces of an inch or a little more in length, which consists of beans unfit to be bundled up, and is offered at the low price of $5 per pound. It is unwise to purchase vanilla in a broken condition. In the manufacture of an extract only a good quantity of Mexican bean should be used, which has a peculiar, agreeable, characteristic odour of its own, whilst some of the other kinds have an odour resembling that of tonka, which, in my judgment, makes those varieties decidedly objectionable. You might almost as well use a certain percentage of tonka bean as the lower kinds of vanilla for the purpose of making a cheap flavouring extract. A preparation should be sold for what it is, and nothing else. If it contains tonka call it, say, compound extract of vanilla for flavouring, or any other suitable name, but, above all, do not throw it upon the market as extract
of vanilla. There are those people perhaps, though very few, who prefer the odor of tonka, which is due to coumarin, but for their use an extract of tonka could easily be prepared.

A short time ago I was offered, by a travelling salesman, a bean at $4 per pound. He stated for extract purposes it was just the thing, and was largely sold to ice-cream makers and others. They were about six inches long, bright brown in colour, quite dry and brittle, void of odour, and would remind one of a bean that had laid in alcohol for weeks, taken out and dried. Cheap and worthless extracts of vanilla appear to be largely sold, and perhaps mainly by grocers.

The formula proposed is as follows:—

Take of Good Mexican Vanilla.................4 oz.
Sugar (granulated)...........................4 oz.
Alcohol, water, of each a sufficient quantity.

Cut the bean transversely into small pieces, place the sugar and the cut bean into an iron mortar of convenient size, and reduce to as fine a condition as practical, after which moisten the powder with a mixture of alcohol and water in proper proportion, so as to obtain a menstruum containing not less than fifty (50) per cent of alcohol; then carefully pack the moistened powder in a cylindrical percolator, close the lower orifice with a cork, pour on more menstruum of the same strength (sufficient to cover the surface of the powder), cover the top of the percolator, and allow it remain undisturbed for twenty-four hours; then remove the cork and permit percolation to proceed, not faster than at the rate of 40 drops per minute, and continue until four pints have passed, when the preparation is completed.

—American Journal of Pharmacy.

VANILLA PLANTING IN TAHITI.

The most precious crop here is the vanilla, which is both pretty and lucrative, being worth about $4 a pound. It is a luxuriant creeper, and grows so freely that a branch broken off and falling on the ground takes root of its own accord; and it climbs all over the tall Coffee shrubs; the Palms, Avocado Pear, and Orange trees, and everything that comes in its way growing best on living wood, the tendrils thence deriving sustenance. It also flourishes best in unweeded grounds, the roots being thereby kept cool.

So the steep-wooded hillside is densely matted with this fragrant spice, which scents the whole air, indeed the atmosphere of the house is redolent of Vanilla. It is like living in a spice-box, as the pods are laid to dry in every available corner. They must be gathered ripe, and dried in a moist, warm place; sometimes they are packed under layers of quilts to prevent them from bursting, and so losing their fragrant essences.

All this sounds very pleasant, and only suggests light work, yet in truth this cultivation involves most exhausting toil. The plant is an exotic; it lives in these isles by the will of the planter, not by nature's law. In its native home, exquisite humming birds hover over its blossoms, therein darting their long bills in search of honey, and drawing them forth, clogged with the golden pollen, which they carry to the next flower, thus doing nature's work of fertilization.

Here the flowers have no such dainty wooers, and the Vanilla bears no fruit unless fertilized by human hand. So M. and Madame Valles and their son divide the steep hillside into three sections, and each morning they patiently and wearily toil up and down, up and down, again and again and again, in order to manipulate each blossom that has expanded during the night. "Faire je mange des fleurs," as Madame Valles describes her daily task, is no sinecure; it must be done during the hottest hours of the day, when any exertion is most exhausting. It needs a keen eye to detect each fresh blossom, and any neglected flower withers and drops. Each day the ripening pods must be gathered, and in dry weather the plants require frequent watering—an indescribable toil.

This morning Madame Valles let me accompany her on her morning rounds, whereby I realised that toil and hardship are to be found even in Paradise.—*A Lady's Cruise in a French Man-of-War, by Miss Gordon Cumming.*

The Vanilla Plant has been found growing on the borders of the Everglades of Florida.—*American Grocer.*
CULTURE OF VANILLA.

The gentleman who sends us the notes by an experienced vanilla planter in Mauritius, of which the following is a translation, says:—“The writer of the notes had the finest vanilla in the island when I was there.”

1. The first thing to do, in the formation of a vanilla plantation, is to divide the land, if this is possible, into beds about five feet apart.

2. Each bed should be about five and a-half feet wide, and dug to a depth of about one foot, to form a sort of drainage and prevent the water lodging too long at the foot of the vanilla plants.

3. The beds formed and dug, they must be raised if possible six inches above the soil, by means of smaller rocks, or rubble arranged on both sides of each bed, and, if necessary, take the earth found in the space between the two beds to make the necessary elevation for planting the creepers.

4. Do not mix this prepared earth with strong animal manure; if possible, add to it a little compost formed of leaves and detritus of all sorts.

5. The vanilla creepers should be chosen good and intact; carefully avoid getting sickly creepers or those having already a yellowish color; if possible always plant creepers four or five feet long: the return is quicker and the result more certain.

6. To plant the vanilla creepers supports are necessary, and if you have not natural supports such as trees, or high walls, the plant which we prefer to employ is the *pignon d’Inde*, a milky shrub, the foliage of which is rather dense during summer: the leaves fall in winter, just when the vanilla ripens.

7. To proceed with the planting of the vanilla cuttings you must first cut with a penknife the first leaves at the extremity of the cutting which is to be put into the earth, but not cut them too close to the woody stem. This operation completed, you bury the three joints of the cutting which have had the leaves all off, and that not too deep, about two inches, in the earth; the long creepers are then raised on their support either natural or artificial.

8. The planting finished, you must always take care to put straw or dried grass on all the beds to maintain a constant humidity about the roots which will be thrown out in a short time and which will always tend to rise to the surface of the soil. If there is the means, do not fail to water in dry seasons; it is a plant which asks for continual moisture without, however, being inundated, and on this account a good drainage is recommended in the preparation of the beds.

9. When the creepers have rooted and begin to grow never take away the suckers which give them new life if the foot be dead; and when the creeper has attained a certain length you may cut it down to the soil and operate as if for layering, bury it about two inches deep, at the same time cutting off the leaves which will be under the earth, to stimulate the root to put forth.

10. The fertilization must always take place in the morning until 10 o’clock at the latest, and above all do not retain too many pods on the same cluster: three or four are more than enough; nevertheless it is necessary to fertilize all the flowers that appear, in order to be more certain of the complete success later on of removing the pods if all the flowers have been successfully fertilized.

11. The gathering finished it is well to take down the creepers which are too long and also in order to cut off the new creepers to increase the plantation.

12. Never fertilize too much the flowers which appear during the first year of planting; you will weaken your vanilla, and your plants will run the risk of sickening. Your cropping must not begin until the second or third year, if you have planted creepers four or five feet in length; otherwise you must wait much longer.

13. Every year after the cropping add a little earth to the compost on the plantation to cover the roots which have come to the surface of the soil and always put a covering of straw over all, in case of drought.

These are the first principles to follow in order to have a good vanilla plantation.—Tropical Agriculturist.

VANILLA.—According to Mr. Horne, vanilla of excellent quality is grown in the Seychelles Islands, an acre yielding about 250 lb. of vanilla, which realizes a net profit of 2,500 rupees. Seychelles vanilla obtained the first prize at the Paris Exhibition.—Pharmaceutical Journal.

* The *Jatropha Curcas* is called *pignon d’Inde* or *medicinier*, in Mauritius.
VANILLA.

As much as 36,539 pounds of vanilla have been imported to this country in a single year, and there is scarcely any odour or flavour with which we are more familiar. Perhaps the pungent peppermint might claim precedence, but even this is doubtful, since the order of the fragrant bean rises from a large proportion of those popular articles of consumption which are furnished by cooks, confectioners and tobacco-dealers.

The vanilla plant is indigenous to the hot and moist woods of Eastern Mexico, and is cultivated by fastening shoots to trees just near the ground. The shoots soon strike root, begin to produce fruit in about three years and bear for about thirty years. From Mexico the plant has been transported to the West Indies, several of the East Indian islands, Bourbon and Madagascar. It is a long, dark, shining bean, and shaped like that of the Catalpa tree, which we still see in our streets, only the vanilla bean is not smooth, but corrugated. The name vanilla is derived from the Spanish word vaniglia, the diminutive of vagma, a pod.

When the green color of the fruit begins to change, and before it has become ripe, the beans or pods are gathered and prepared for the market. Sometimes they are steeped in hot water or partly sun-dried, and then wrapped up in blankets until moisture exudes, when the process is repeated. This is supposed to cause fermentation in some portions of the fruit and develop the aroma. After treatment the pods are packed into bundles of fifty, the bundles being sometimes enveloped in tin foil, and they are then ready for exportation. Workmen who handle vanilla are exposed to certain accidents which arise from its dust and emanations. They suffer from soreness of the eyes, and the arms and face swell and become the seat of annoying eruptions. They are also liable to headache, dizziness, nervousness and pallor.

When the Spanish conquerors came to Mexico they found that vanilla was in common use by the natives for flavoring chocolate, and this alliance has met the approval of all succeeding years. One suggests the other as ice-cream also suggests the odorous bean. Although there are the Bourbon, Costa Rican and Venezuelan vanillas, as well as those of Brazil, Peru and Spain, the Mexican vanilla still ranks as the best. The Venezuelan has a flavor of the tonka bean. The odor of the tonka bean just referred to, as well as that of the mellilotus or sweet clover, resembles vanilla somewhat, and is owing to the presence of a certain substance called coumarin which these plants contain. This substance will produce poisonous effects, and thirty to sixty grains have caused nausea, depression and drowsiness. The poisonous results which have at times followed the use of vanilla ices have been said to be owing to the presence of cardol, or the oil of the cashew nut, since that is occasionally used to improve the appearance of vanilla. These cases are distinct from those in which the poisoning has been caused by the admixture of dangerous metallic substances.

A plant, the flavor of which is connected with so many of the simple enjoyments of life, as well as the grandest festivities, may justly call for a passing notice from those who "mind the why and wherefore."—(American) Hour.

VANILLA.—From 1853, or earlier, the Director of the Gardens has not ceased to push the cultivation of this, and at one time a large quantity was grown at Peradeniya, 64 lb. of the pods being sent home for experimental sale in 1866. A few estates now grow this in considerable quantity, and the Gardens continue to keep up a moderate supply. Of other perfumes, the Gardens contain Ilang-ilang; Patchouli, Cuscus grass and Lemon grass.—Dr. Trimen's Annual Report, October 1881.

VANILLA FROM OATS.—It is well known that the German chemists, Thiemann and Harmann, some time ago succeeded in preparing artificial vanillin from the sap of pine trees. A French chemist, M. Eugene Scrullat, has discovered a way of producing the same compound from common oats. The hull of the oats contains a principle which is very soluble in boiling water, and to which M. Scrullat has given the name of Aveneine. This principle is isolated from the residues of manufacture of oat meal, is oxidized, and becomes converted into the characteristic perfume of vanilla. Whether it has all the properties of vanillin, as made from the bean and the sap of the pine, remains to be determined.—Oil and Drug News.
POISONOUS VANILLA.

The manifestation of symptoms of poisoning in upwards of one hundred residents in Brooklyn (Lancet, September 6, p. 441) after eating ice-cream flavoured with natural vanilla recalls a similar occurrence in Vienna in 1873, the report upon which by Dr. Rosenthal (Pharm. Journ., 3, iv., 838, 852), although it presented no satisfactory conclusion, may be advantageously referred to. The symptoms observed in Brooklyn were practically the same as those in the Vienna cases, consisting in severe pains in the hypogastric and epigastric regions, with violent vomiting and purging and in many cases serious collapse, accompanied by blueness, coldness and shrinking of the skin, like that observed in cholera. At first the blame was thrown upon copper derived from the vessels in which the cream had been prepared, but an examination of these showed that the tinning was continuous, whilst no metallic or other poison was detected upon chemical examination. Dr. Sizer, who reports the case, evidently suspects a formation of "ptomaines," consequent upon the decomposition of the cream before freezing, principally on the ground that a fetid odour was noticed during the analysis. But the cream used for the noxious product had come from two out of twenty-seven packages, none of the remainder of which is known to have produced injurious effects. In Vienna the same suspicion was at first entertained, but was put out of court by the fact that several persons who suffered had not partaken of a cream compound at all, but of a farinaceous dish flavoured with vanilla. Moreover, the cream theory is hardly consistent with the experience that these poisoning epidemics, of which there have now been several, do not occur in connection with the eating of cream ices other than those flavoured with vanilla. On the other hand, rightly or wrongly, vanilla pods are widely credited with occasionally possessing poisonous properties. Dr. Rosenthal mentions a case where a confectioner in Altona, having been compelled to give up his business in consequence of some persons being poisoned by vanilla cream ice supplied by him, disposed of his stock of vanilla to a confectioner in Bergen, where the ice made with the pods also proved to be poisonous. In the paper on "vanillism," occurring among persons employed in handling vanilla, Journ. Pharm. Chim. (5), x., 35, which has already been referred to (before, vol. xiv., p. 425), Dr. Layet avers that vanilla ingested into the system sometimes acts as a true poison, and he associates this character with an inferior variety called "vanillon," the pods of which are free from rime, soft, viscous and nearly always open. He also gives reasons for believing that the mould occurring on the pods is sometimes poisonous. The unfavourable reputation of vanilla has also made its way into the text-books, where the steeping in cashew-nut oil and the methods of drying have been variously credited with the mischief. It may be added that according to M. Jaillot, in the island of Réunion, the tree yielding the "purging nut" (Jatropha Curcas) is frequently used to support vanilla creepers, and it has been pointed out in this Journal (xi., 430) that there is nothing improbable in the occasional absorption of the acid juice of this euphorbiaceous plant to an extent sufficient to affect the vanilla.—Pharmaceutical Journal.

NEW VARIETIES OF VANILLA.

A small trial shipment of vanilla pods of a kind not hitherto seen on our market, arrived in London a few days ago, and was placed in the show-room of a firm of Mincing Lane drug-brokers for inspection. The pods are from four to eight inches in length and from one to two inches in width, deep brown in colour and of a rather disagreeable rancid odour, possibly caused by the oil in which they have been steeped. The vanilla does not belong to the plantifolia species, which is the sort generally met with on this market, but may be the fruit of the Vanilla palmbrum or V. aromatica varieties which are known to flourish in Brazil, from which country the shipment in question is said to have been imported. The pods are entirely devoid of "frost," and it is very unlikely that, in the condition in which they are offered at present, they will at all secure a favourable reception. But it is by no means impossible that the growers may improve their product by paying greater attention to its cultivation and preparation for the European market, and in that case the ungraciously-looking sample now offered to our buyers may prove to be the predecessor of regular and marketable supplies.
The pods somewhat resemble a specimen described some years ago by Mr. Charbonnier, in the *Repertoire de Pharmacie* as the product of Gaudeloupe, in which island it had been cultivated for several years, and whence consignments varying from 150 to 2,000 kilos. per annum have been shipped to French ports, where it sold at about one-half the price of Bourbon vanilla. Shipments of Brazilian vanilla have also been received in France from time to time, but the quality gave no satisfaction, and the supplies have also been of a spasmodic character. Most of the so-called vanillon sold on the French markets is also said to be a Brazilian product. Its use is almost confined to perfumery purposes.

It would certainly seem that there is room for an extension of the sources of supply of vanilla, provided the cultivation of the plant be conducted with care, and the fruit prepared in a manner suitable to the taste of the European market. The planters of Réunion and Mauritius have contrived to do this, with the result that a thriving vanilla industry has been created in these islands, the former of which now produces perhaps 100,000 lb. vanilla per annum, and the latter more than half that quantity. Mexican vanilla, the best variety known, is mostly consumed in the United States, which country imports nearly 100,000 lb. of vanilla yearly. In Java, Ceylon, and several of the Polynesian Islands, vanilla is to some extent successfully cultivated; but it will probably be a long time before the yield of these islands becomes an appreciable factor in the trade. The eastern coast of Madagascar appears to possess a soil eminently suitable for vanilla cultivation, but capital and skilled labour are required to develop the industry. As yet no particular effort has been made to create a trade in the product, but it is said that in some parts of the island the cultivation of the plant is increasing rapidly.

The extension of vanilla cultivation in various foreign countries should be beneficial to the London market. Hitherto trial shipments of new vanillas have generally been directed to Bordeaux, but the French Government, in the protective mood which at present distinguishes them, have just laid before the Chamber of Deputies a Bill imposing an additional duty of 415f. per 100 kilos. (about 15 6d. per lb.) on all foreign vanillas, irrespective of the duty of 415f. per 100 kilos. which is already levied upon all vanillas alike. Of course the doubling of the import duty on the foreign article is intended to secure to the vanilla-growers in Réunion (or Bourbon), which is a French colony, the monopoly of the market in the mother country. The result of the new impost will probably be to direct to London such consignments of Mauritius, and, perhaps, Mexican vanilla as have hitherto found their way to Bordeaux. And if the vanilla cultivation in Madagascar should increase the produce from that island, which has not as yet been incorporated in the territories of the French Republic, it will probably also be shipped to London, and to this port also shipments from Brazil and the Australasian islands will eventually find their way. So far as we are concerned there is, therefore, no cause for grumbling. It should be added that the French Government, to do the thing thoroughly, propose to place a duty of 104f. per kilo. (about 36s. per lb.) on vanillin or artificial vanilla made in France, and 208f. per kilo. on foreign vanillin. The present market value of vanillin, which is mostly imported from Germany, is about 900f. per kilo. (10s. per oz.).—Chemist and Druggist.

### NOTES ON ARTICLES CONTRIBUTED TO THE MUSEUMS
#### OF THE ROYAL GARDENS, KEW, FROM THE
#### COLONIAL AND INDIAN EXHIBITION, 1886.

**Vanilla.**—The pod-like fruits of *Vanilla planifolia*, a climbing Orchidaceous plant, native of Mexico, where also now it is extensively cultivated as well as in Mauritius, Bourbon, Madagascar, and Java. The pods after gathering are carefully dried by alternate exposure to the sun and air, and wrapping in woollen cloths sometimes steeped in oil. The vanilla of commerce is obtained from Mexico, Bourbon, Mauritius, Java, Honduras, Brazil, &c.

### VANILLA IN FIJI.

We are indebted to the courtesy of Mr. Kerr, Colonial Manager of the Mortgage and Agency Company of Australasia, Ld., for the following copy of a report on the Fiji Vanilla Pod. This is dated 1st October last, and is from their London brokers, Messrs. Wilson, Smithett & Co. The striking
difference observable in price quotations, and which arises from the value attaching to the article when prepared by experts, and the indifference with which it is evidently regarded when it is imperfectly cured, cannot fail to impress those interested in its growth and preparation here. The lesson it is calculated to convey will no doubt be utilised. The pod in question was grown near Suva, and it is evident from the report that an important addition to the industries of the colony may be made if, care be but taken and proper appliances brought into use. The brokers say:—"The bean is well-grown and the perfume good; but it is imperfectly prepared and the appearance as foxy, which is very detrimental and depreciates its value. The market price today would be about 35 per lb., a similar sized bean well prepared and dark in color would be worth 18s. to 18s. per lb."—Fiji Times.

CURING VANILLA.*

The process of curing vanilla in Mexico, a writer in the San Francisco Chronicle says, is a delicate one, requiring, as it does, not merely drying, but that the pods shall retain certain softness, that they shall lose little in weight, that they shall develop all possible fragrance, and that the active principle shall be brought out to coat the surface in the form of crystals, producing the effect familiarly known as "the silverying of the vanilla." For these purposes, the pods are spread in layers upon gratings of sticks or twigs, arranged in tiers for convenience of inspection. These gratings are arranged in an ample room, dry and well-ventilated. After twenty-four hours, the pods are picked over, and the green and the damaged rejected. If any show signs of opening, they are gently rubbed between the fingers wet in castor oil. The following day the pods are placed in the sun, spread upon dark-coloured blankets. Before sunset, they must be collected and stowed in a box or case wrapped in a blanket previously well sunned to expel possible dampness, and the pods carefully arranged in layers to preserve them in good shape. If this manipulation be properly conducted, the vanilla takes on, in sixteen or twenty hours, a very dark brown colour. It is again placed in the sun, if the weather be fine; if not, spread on the gratings. This process is followed for from twenty to thirty days, which is the time necessary for crystallization to take place, and during which it is sweated three or four times. If the weather be bad during the first important days of curing, or if the crop be very large, ovens are employed for drying, with a temperature ranging from 95° to 120°. For ovens, five hundred or six hundred capsules of vanilla are wrapped in a blanket, then in a petate or rush mat, and securely corded. The vanilla is left in the oven eighteen or twenty hours, as determined by inspection. The oven must be followed by twenty or thirty days of sunning and sweating, as in sun-curing. These processes over, the vanilla is assorted by grades tied up in bundles of fifty pods each, and packed for shipping in tin cans, or cases not dissimilar to coal-oil cans, and, I shrewdly suspect, evolved from that article.

Vanilla.—The new crop vanilla has not yet appeared in the market; we have therefore no quotations to give. We do not of course make any mention of a few small lots of which the preparation was not even completed. The gathering of the pods is going on slowly, the ripening being somewhat later this year in the elevated regions of the island, from which we now receive the greater part of our vanilla. Gradually as the gathering goes on, it becomes apparent that the falling of the pods has been more serious than was anticipated at the commencement. We cannot however pronounce with any certainty on the probable amount of our crop for 1882-83.

Vanilla.—The vanilla bean grows wild in the cantons of Misantha and Papantla, and it is also cultivated there in a primitive manner by the Indians. It is prepared for market by the cultivators and collectors, and often before it is quite ripe. This is especially the case with the wild Vanilla, one family taking it early lest another family should get it when quite ripe for harvest. The systematic and rational cultivators of Vanilla in the cantons just mentioned would certainly be a remunerative business. At present the quantity produced is about 8,000 pods (i.e., 1,000 pods), worth about £3 to £3 10s. per mill.—Gardener's Chronicle.

* From the American Druggist, March.
vanilla Cultivation in Colombo.—Although the cultivation of vanilla and the curing of the produce have succeeded fairly well at the Peradeniya Gardens, all attempts to rear this valuable product in Colombo have hitherto, so far as we know, been unsuccessful. A visit to the well-cultivated grounds of "Wilhelm's Ruhe" has, however, shown us that this delicate plant can be cultivated and made to fruit with complete success within the limits of the town. Mr. W. H. Wright, who has for a number of years devoted his attention to horticulture, has brought a number of vanilla plants into active bearing, and in the fullest vigor of vegetable life. In other garden products, as well as in the bearing of a variety of fruit trees, Mr. Wright has been very successful, and his grounds will amply repay a visit.—Local "Times."

vanilla.—The terrestrial orchid that yields the aromatic pods of this spice, though better grown at 1,000 feet or 2,000 feet above sea-level, may, with care and attention to keeping the young roots clear of ants and other insects, be successfully raised in the plains and trained on the stems of the areca. When once it obtains a firm hold, little attention is needed, but should inclination to spread laterally be indicated, such should be encouraged and bamboos hung by loops from palm-stem to palm-stem, will afford quite enough support for the ramifying tendrils. The bamboos must not be firmly lashed to the palm-stem, as the areca sways in response to the slightest breeze; thus a certain amount of play must be allowed for. The vanilla will bear well the third year, and the pods must be gathered as soon as they begin to change colour, or they will burst, then dried under an open shed, and are better exported in cases. Each should be wrapped in a piece of clean paper, but those who deem such a proceeding too elaborate may omit it.—Pharmaceutical Journal.

Vanilla Growers' Troubles.—A correspondence is now proceeding in the Mauritian journals on the serious depredations to which the vanilla plantations on the island are exposed. The fruit-bearing plants, when the pods begin to ripen, are torn off in hundreds by midnight marauders, who recommence their robberies every season, and pursue them apparently unchecked. The thefts have increased to such an extent this year that the planters protest that they will have to give up the growing of vanilla and turn their attention to crops less liable to theft unless stringent measures are taken to stop the nuisance; for not only do they lose a proportion of their crop so large as to nearly equal their margin of profit, but the thieves, who have to cure the stolen fruit hurriedly and secretly, are spoiling the reputation of the Mauritian vanilla by throwing quantities of ill-cured and imperfectly ripened beans upon the markets. The planters suggest that the Government should prohibit the transport of vanilla beans by night or without a pass, and they say that in the neighbouring island of Bourbon, where a similar measure was adopted, the thefts have almost entirely ceased.—Chemist and Druggist.

vanilla Cultivation.—Mr. W. H. Wright's culture of vanilla—an orchid be it remembered—is likely to be most successful. On his two brick-work circles of trellis work at Wilhelmruhe, Turret Road, Colombo, Mr. Wright has up to date artificially fertilised no less than 3,000 flowers. He is also trying experiments with gum arabic and with ants in modes of fructification. It must be remembered that to Mr. Wright—in the old Peradeniya days of 30 years ago—belongs the credit of being perhaps the first in Ceylon to cultivate Vanilla for the European market. Some pods sent by Mr. Wright to an Exhibition in Sir Henry Ward's time were valued at 5 guineas the pound. [A portion of the same Vanilla was sold at that rate in London through Messrs. Baring Brothers.] On that occasion the Committee, (Messrs. Rawdon Power, Layard, &c.) red-tape-like, decided that Mr. Wright's small assortment could not be sent on. So also said other big-wig officials when applied to. Mr. Wright asked to see the Governor. Mr. John Bailey and others in attendance said: "Impossible—Sir Henry is deeply engaged with the mail." But Mr. Wright persisted and finally got an interview, with the result that like the hearty manly English gentleman he was, Sir Henry entered into the Peradeniya Assistant's experiment with the greatest interest. "Stop the mail" was the Governor's cry;—but it was too late;—"Well, then, send immediate expenses at once" was the order, and all this for Mr. Wright's Vanilla! No wonder though Sir Henry Ward endeared himself at every turn in his Government of Ceylon.—Mr. Wright's experiment at Wilhelmruhe is merely preliminary to cultivation at Mirigame, where about 10 acres are being devoted to Vanilla.—Dr. Trimen has pronounced Mr. Wright's garden vanilla the finest he has ever seen.
VANILLA.

VANILLA BEANS.—These are the fruits of an orchid,—*Vanilla planifolia*, a native of Mexico, but which extends north to the borders of the United States. Though the writer has seen it under culture for nearly half a century, he does not remember ever seeing a seed vessel produced under these circumstances. Most orchids only seed when under the attention of insects, and perhaps this is why it yields its “beans” or seed vessels so freely in a wild state. The island of Tahiti sends out about 2,000 or 3,000 pounds annually.—Gardeners’ Monthly.

As Vanilla beans were never so cheap as at the present time, it is probable that those who are fond of ice-cream will this year learn the true flavor of vanilla. Heretofore all sorts of abominable mixtures of tonka and other flavorings have been palmed off on manufactures of ice-cream as true extract of vanilla, and the consumers, not being a judge, and perhaps never having tasted the delicately pleasant flavour of the genuine article, were satisfied. There is now no excuse for adulteration when prime beans can be purchased for one-third the price asked three years ago.—Oil and Drug News.

VANILLA CULTURE IN MEXICO.—Our contemporary, the Chemist and Druggist, quoting from a St. Louis paper, gives some details on the cultivation of Vanilla in Mexico, from which it seems that the plant flourishes in two places, namely, Papantla, in the State of Vera Cruz, and Misantla; the first place, however, is the most important. It is a town of about 10,000 inhabitants, and is in the land of the Tocanaco Indians: an extremely indolent and improvident race. The Vanilla plant is found in the forests. The fruits ripen in November or December, when they are gathered and put into sacks and brought into Papantla to market. The buyers are Spaniards or Americans, and the competition is described as similar to what “is to be seen in a street where second-hand stores prevail. The old women are generally in the lead, half naked, and with haggard faces begrimed with dirt. Then come the children, equally pitiable in appearance; and finally the old men bring up the rear, with long stiff hair, matted and dirty, sometimes standing out 12 inches, while their beards, filthy and long, lend a finish to a picture that is most revolting.” The Vanilla pods are purchased by middlemen at the rate of 42s. to 50s. per 1,000, taken as they are put up by the natives. The average weight of 1,000 good-sized green Vanilla pods is about 60 lb., which, when dried do not exceed 10 lb. The first fine morning after the pods are gathered they are arranged on planks, covered with quilts and exposed partially to the air, this being repeated seven times before the water has all evaporated, and they have become sufficiently dry. This is known as the sweating process, after which the pods are slightly heated and placed on shelves to dry, when they are assorted into lots, each containing fifty beans, and graded according to length. In fine weather the curing process takes three weeks, but such weather rarely prevails, and the curing sometimes takes from four to five months. Last year the beans sold for 58s. per 100, which was about a pound; but owing to a heavy crop this year, and the growing competition in the business, the best beans only bring 50s. a pound or 100, and the inferior from 30s. to 42s. The principal markets for Vanilla beans are New York, St. Louis, and Chicago. They are bought chiefly by wholesale druggists and fine confectioners, and are becoming an important article of Mexican commerce. Last year, from the vicinity of Papantla alone, 60,000,000 beans were exported.—Gardeners’ Chronicle.

VANILLA.

Read an abstract in *The Times* of 28th January, 1889, of a recent report by the United States Consul at Bordeaux on the Vanilla trade at that port. One of the most interesting and delicate articles of trade in the Bordeaux market is vanilla, which is imported from the coast of Vera Cruz, the west slope of the Cordilleras, Java, Mauritius, Tahiti, the West Indies, and other places. Vanilla belongs to the orchid family, and is a sarmentose plant, furnished with thick, oblong, glaucous green leaves. The vine sometimes attain a height of 45 ft. It begins to bear the third year after planting and continues bearing 20 years. Each vine annually produces from 40 to 55 capsules or seed pods, which are gathered before reaching complete maturity between April and June. For one method of preparation they are gathered after they have lost their green tint, and are then exposed to the sun in woollen sheets which have previously been thoroughly heated. They are then put into boxes covered with a cloth, and are
again heated in the sun, 12 to 15 hours, after which they assume a coffee colour. If this is not obtained, they must again be covered and again exposed, the whole process lasting about two months, after which they are packed securely, 50 each, in tin boxes. By the second method about a thousand pods are tied together, and plunged into boiling water to bleach them, after which they are exposed to the sun, and then coated with oil or wrapped in oiled cotton to prevent them from bursting. During the drying process the pods exudes a sticky liquid, which is expedited by gentle pressure two or three times a day. By this process the pod loses about a quarter of its original size. The best quality pods are seven to nine inches in length, and large in proportion, and possess in great abundance the characteristic and agreeable perfume which gives vanilla its value. The vine is sometimes covered with a silvery efflorescence producing an essential salt similar to that found in the pod, and this is diffused on the outside of the capsule. It is called vanilla rime, and is in great demand in the Bordeaux market. Vanilla is used in perfumery, and in flavouring confectionery and cordials. It is supposed to possess powers similar to valerian, while it is much more grateful. Its production in Réunion has increased in the past 40 years from a few pounds to nearly half a million, and that colony is now the principal rival and competitor of Mexico. The total import into France rose from about 200,000 pounds in 1880 to about 260,000 in 1886, but the annual import fluctuates considerably.—Proceedings of the A.-H. Society of Madras.
ALL ABOUT PIMENTO.
ALL ABOUT PIMENTO.

PIMENTO.

(From the "Encyclopædia Britannica").

PIMENTO, also called ALLSPICE (from a supposed combination of various flavours) and JAMAICA PEPPER, is the dried immature fruit of Eugenia Pimenta or Pimenta officinalis, an evergreen tree about 30 feet high belonging to the natural order Myrtaceae. It is indigenous in the West India Islands, growing on limestone hills near the sea. The spice derives its name from pimenta, the Spanish word for pepper, which was given to it by the early explorers of the New World from its resemblance to peppercorns. The allspice of commerce is furnished wholly by the island of Jamaica; and all attempts to cultivate the tree where it is not found growing spontaneously have hitherto failed. The so-called pimento walks or natural plantations from which the pimento is collected are formed by cutting down other growth upon land where the tree grows naturally, and thus allowing it to multiply freely. The berries are gathered in July and August, when of full size, but still unripe,—the small branches bearing fruit being broken off and dried in the sun and air for some days, when the stalks are removed and the berries are ready for packing. These owe their aromatic properties to an essential oil, of which they yield on distillation from 3 to 4½ per cent. This oil has a specific gravity of 1'057, deflects the ray of polarized light 2° to the left when examined in a column of 50 millimetres, and has substantially the same composition as oil of cloves, although differing in flavour. The berries also contain a tannin (giving a black colour with ferric salts), starch, and a minute quantity of an alkaloid which, according to Dragendorff, has somewhat the odour of conia. The chief use of pimento is as a spice. The oil and distilled water are used to a limited extent in medicine to disguise the taste of nauseous drugs, and the oil is also used in perfuming soaps. The yield of some trees is said to reach as much as 150 lb. of fresh or 112 lb. of dried berries. The highest export reached of late years was 6,857,830 lb. in 1870-71, valued at £28,574. In 1877-78 it was 6,195,109 lb. About two-thirds of the produce goes to England, and one-third to the United States. The value in the London market is about 4d. to 6d. per lb.

The fruit of an allied species, Pimenta acrius, Wight, distinguished by the calyx being crowned with teeth, is sometimes met with in commerce. The bay rum so much used as a toilet article in the United States is a tincture flavoured with the oil of the fruit and leaves of P. acrius, which is commonly known as the bayberry tree.
PIMENTO.

(From "Spon’s Encyclopedia.")

Pimento, Allspice, or Jamaica Pepper (Fr., Piment des Anglais, Toute-épice, Poivre de la Jamaïque; Ger., Nelkenpfeffer, Nelkenköpfe, Neugewürz.)—These names are applied to the immature fruits of Pimenta officinalis [Myrtus, Eugenia Pimento], an evergreen tree of 30 ft., found in some of the W. Indies. The so-called “walks” of these trees, which afford the whole of the spice found in commerce, occupy the limestone hills on the north side of Jamaica. The range of the tree is curiously limited, nearly all attempts to grow it where it is not found spontaneously fail completely. The only way of forming a new walk is to cut down the other growth found upon land where pimento-trees are growing naturally, thus giving scope for their multiplication. The harvest or “breaking” takes place in July-August, the branches bearing clusters of the fruit being broken off by hand, and the berries subsequently sun-dried, stalked, fanned, and bagged for export. The breaking of the branches serves as a rude kind of pruning. The yield of some trees reaches 150 lb. raw, or 1 cwt. dry. There are curious fluctuations in the returns of the acreages under pimento: thus 7,178 acres in 1871, 1,392 in 1874, 2,363 in 1875-5,966 in 1877-8 exclusive of trees growing wild on the pasture-lands. The highest export reached was 6,857,830 lb., 28,574 cwt., in 1870-1; in 1877-8, it was 6,195,109 lb. About $ come to England, and $ goes to the United States. The London market value is about 44-6d. a lb. for middling to good, and 4s-34d. for ordinary.

PIMENTO, OR ALLSPICE.

(From Simmonds’s “Tropical Agriculture.”)

This spice, of large consumption, is a West Indian product. The fruit of a beautiful lofty evergreen tree, the Pimenta officinalis, Lindley, Myrtus Pimenta, Linn., Eugenia Pimento, Dec. Jamaica enjoys the monopoly of supplying the markets of the world. Every attempt to carry the seeds to San Domingo and Cuba and to propagate it there has failed, and though the tree is found in Yucatan, the fruit is not exported thence.

The Pimento walks are situated in the mountains on the north side of the Island, where the trees grow in hundreds. It is a white-trunked shapely tree, not unlike in form and growth an English apple tree, but with a thicker, richer foliage, and dark glistening leaves, aromatic like its fruit, and resembling those of the myrtle, to which family it belongs. The trunk is white, because every year the bark strips. Nature seems to have intended that some useful purpose should be served by the bark, but hitherto it has not been made available commercially. The tree blossoms twice, but only bears once a year. The blossom that holds and sets to fruit appears in April. The tree grows spontaneously, and seems to mock all the labours of man in his endeavours to extend or improve its growth; not one attempt in fifty to propagate the young plants or to raise them from the seeds, in parts of the country where it is not found growing spontaneously, having succeeded. The usual method of forming a new Pimento plantation (in Jamaica it is called a “walk”) is nothing more than to appropriate a piece of woodland in the neighbourhood of a plantation already existing, or in a district where the scattered trees are found in a native state, the woods of which being felled, the trees are suffered to remain on the ground till they become rotten, and perish. In the course of twelve months after the first season, abundance of young Pimento plants will be found growing vigorously in all parts of the land, being, without doubt, produced from ripe berries scattered there by the birds, while the fallen trees, &c., afford them both shelter and shade. At the end of two years it will be proper to give the land a thorough cleaning, leaving such only of the Pimento trees as have a good appearance; these will then soon form groves, and, except for the first four or five years, require very little subsequent attention. In July and August, soon after the trees are in blossom, the berries become fit for gathering, the fruit not being suffered to ripen on the tree, as the pulp in that state, being moist and gelatinous, is difficult to cure, and when dry becomes black and tasteless. It is impossible, however, to prevent some of the ripe berries from mixing with the rest, and if the proportion of them be great, the price of the commodity is considerably injured. It is gathered by the hand. One labourer on the tree employed in gathering the small twigs bearing the branches, will give employment to three
below (who are generally women and children) in picking the berries, and an industrious picker will fill a bag of 70 lb. in the day. It is then spread on a terrace and exposed to the sun and air for some days, in the course of which it loses its green colour and becomes of a reddish-brown; when perfectly dry the stalks are removed, it is passed through a fanner, bagged, and is ready for shipment. The term sometimes used to denote the in-gathering of the crop is not picking, but "breaking" because, with each cluster of berries a portion of the branch is broken off, the tree thriving all the better for the spoliation. The returns from a Pimento walk in a favourable season are prodigious. A single tree has been known to yield 150 lb. of the raw fruit, or 1 cwt. of the dried spice, there being commonly a loss in weight of one-third in curing; but this, like many other of the minor productions, is exceedingly uncertain, and perhaps a very plenteous crop occurs but once in five years.

Before the war with Russia, there was a large demand for Pimento in that country for use in spiced bread; but of which the bread was found that a tree growing on the banks of the Amoor yielded a bark which, when grated, was pungent enough to yield a spice, and the Russian market was thus lost.

The acreage under Pimento seems to vary. In 1871 it was returned at 6,902 acres, in 1874 it was only 1,392 acres. Between 1830 and 1850 the crops ranged from 3,000,000 lb. to 5,500,000 lb. The following have been the exports from Jamaica:

<table>
<thead>
<tr>
<th>Year</th>
<th>1866</th>
<th>1867</th>
<th>1868</th>
<th>1869</th>
<th>1870</th>
</tr>
</thead>
<tbody>
<tr>
<td>lb.</td>
<td>4,866,239</td>
<td>7,595,800</td>
<td>4,373,259</td>
<td>6,575,249</td>
<td>5,243,109</td>
</tr>
<tr>
<td>lb.</td>
<td>6,857,830</td>
<td>5,140,898</td>
<td>6,024,551</td>
<td>5,762,256</td>
<td>5,262,797</td>
</tr>
</tbody>
</table>

The United States takes about one-third of the Jamaica crop.

In 1859, Browne, in his 'History of Jamaica,' stated the export of Pimento to be 438,000 lb., valued at 22,000. In 1865, our imports were 2,257,000 lb., the duty paid on which was 35,063. In 1866 we imported 2,000,000 lb. The crops and shipments fluctuate with the seasons, and according to the price obtainable. This has frequently fallen as low as 1½d. per pound, making it scarcely worth the expense of picking. In 1870, the imports into the United Kingdom were 42,023 tons; in 1871, 2,007 tons; and of which 1,200 tons were re-exported; in 1880, the imports were 1,000 tons; in 1895, 1,279 tons; and in 1895, 2,350 tons.

The following shows the imports more in detail for a series of years, as far as the Board of Trade returns officially particularise this spice:

<table>
<thead>
<tr>
<th>Year</th>
<th>1882</th>
<th>1883</th>
<th>1884</th>
<th>1885</th>
<th>1886</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cwt.</td>
<td>30,018</td>
<td>29,268</td>
<td>42,340</td>
<td>25,454</td>
<td>19,864</td>
</tr>
<tr>
<td>Cwt.</td>
<td>46,798</td>
<td>16,279</td>
<td>29,557</td>
<td>20,401</td>
<td></td>
</tr>
</tbody>
</table>

In 1870 there would seem to have been no re-exports. A quarter of a century ago we only consumed here about 400,000 lb. of Pimento per annum; now about half the imports are used at home, and the remainder shipped to the Continent. The duty of 5s. per cwt. levied on this spice was repealed in 1860.

The berry of Allspice is globose, one-seeded, black, rather variable in size, but commonly the size of a pea, from two-tenths to three tenths of an inch in diameter. All the plant, especially the unripe fruit, abounds in an essential oil (2 to 4 per cent.) which is a powerful irritant, and is often used, like oil of cloves, to allay toothache. The bruised berries are carminative, stimulating the stomach, promoting digestion, and relieving flatulence. The chief use of Pimento is as a culinary spice for which it is largely employed both in Europe and America. It has an agreeable pungent spicy flavour, much resembling that of cloves, for which, when ground, it is often sold. The berries have a similarity in smell and taste to cloves, juniper berries, cinnamon and pepper or rather a peculiar mixture of all combined, whence the name of Allspice or Jamaica pepper.

The Mexican spice called "Pimienta do Tabasco," coming from Tampico, is probably the "Piment Tabago" of Guibourt; it is somewhat larger and less aromatic than the Jamaica Allspice, and is believed to be derived from a variety of the Jamaica species (P. officinalis). The wild clove tree Eugenia (Pimenta) acris, Wright and Arnott, and P. Pimento, Griseb, afford analogous aromatic products, but do not appear much in commerce. A Pimento plantation was tried in Tobago, but it was abandoned for sugarcane.
Oil of Pimento has substantially the same composition as oil of cloves. Pimento is used in tanning, striking with a persalt of iron, an inky black, and a patent has recently been taken out in Jamaica for the employment of the leaves as a tanning material. The tree furnishes walking-sticks and umbrella handles that are in great request in Europe.

PIMENTO.

(From Porter's "Tropical Agriculturist.")

Myrtus Pimenta—class and order Icacinæa Monogynta.

The pimento-tree is a native of the western hemisphere, and is found growing in South America and the West Indies, more particularly in the Island of Jamaica, on the northern side of which it flourishes spontaneously in great abundance.

It is a very handsome tree, rising to about the height of thirty feet. The smooth brown trunk is about five or six inches in diameter, and from this, branches spread on all sides. These branches are garnished with a profusion of smooth shining leaves, of a deep-green colour, and of several sizes, the largest of which are four or five inches long and two or three broad in the middle, whence they decrease to both extremes, ending in a point and standing on petioles of about an inch in length. The flowers appear in July and August, and grow in clusters from numerous foot-stalks about two inches long; they are provided with many greenish-white stamina, standing within four very small petals reflected downwards, and these are succeeded by berries, which are the pimento of commerce. When unripe, they are of a greenish hue, but when arrived at maturity are black, smooth, and shining, containing two seeds embedded in a soft pulp.

The numerous white blossoms mixing with the dark foliage assist in giving to this tree a beautiful appearance, which is rarely equalled in the vegetable world. It is rich in fragrance, which is diffused far around; the slightest breeze that agitates the branches conveys the grateful odour. Nothing, it is said, can be more delicious than the perfume of the walks in which the trees are planted, particularly when they are in blossom. The bruised leaf emits a fine aromatic odour nearly as powerful as that of the spice itself.

This tree flourishes on barren land where little else would grow, and though apparently of easy cultivation, is yet mostly confined to certain localities, and a plantation will rarely succeed, except in those parts where it has been found in its native state. Buee gives a remarkable instance of the growth of a pimento-tree, under apparently the most unfavourable circumstances and in a soil where little else would have grown. "A pimento-tree," says he, "which I left growing as a curiosity, and which is from thirty to forty feet and exceedingly straight, stands on the ridge of a rock, which is about twenty feet in circumference and is near eight feet above the surface of the ground, and pointed at the top; on this top stands the body of the tree, from the trunk of which the roots, encompassing the whole circumference of the rock, go down to the earth whence the tree receives its nutrition."

In the formation of a plantation, no regular sowing of seeds or planting of shoots is requisite. The mode usually practised in Jamaica is to select a piece of ground in the vicinity of another plantation, or in an hitherto uncultivated district where the plant is of spontaneous production. All other species of trees which are growing on the land, except the pimento-trees, are then cut down and left in the places where they fall, to decay and perish there. In the course of a year, young pimento plants are found growing on all parts of the land. These, it is supposed, are produced through the agency of birds which scatter the seeds around. The ground is left untouched during another year, when it is thoroughly cleared, only those plants being left which give evidence of vigour and health. In about seven years from the first clearing of the ground the trees come to maturity.

The berries are collected soon after the falling of the blossom; if allowed to ripen, they lose their pungency and peculiar aroma, and acquire a less pleasing flavour, somewhat resembling that of the juniper. Care is therefore taken that few, or none, of the berries be allowed to ripen. It is impossible, however, to prevent some of the ripe berries from being mixed with the rest; but if the proportion of them be great, the value of the commodity is considerably injured.

When in a proper state for gathering, a person climbing the tree breaks off the small bunches of fruit; these are transferred to other pickers, generally women and children, who take off the berries from the stalks. Usually the man
on the tree thus furnishes a supply, which gives full provision for three pair of hands. An industrious picker will fill a bag of seventy pounds in the day.

As soon as the berries are gathered, they are laid on cloths, spread out on terraced floors under the influence of the sun for about seven or eight days. During the first and second days they are often turned, and afterwards, when they begin to dry, frequently winnowed; they are covered with cloths to preserve them from rain and dew, still being exposed to the action of the sun every day, and removed under shelter every evening until sufficiently dry. In about twelve days they usually arrive at this state, which is known by the darkness of their colour and the rattling of their seeds. At this period they have assumed a wrinkled appearance, and are of a very dark brown hue. After being thus made sufficiently dry, without undergoing any other process, they are stowed in bags or casks, and are ready for exportation.

It is reckoned that they lose a third of their weight in the process of desiccation.

Some planters use artificial heat, and employ kilns in the drying of the berries. This appears the most eligible method, when from abundance of the crop, dispatch, and security against rain are very essential. The berries are esteemed good in proportion to their odoriferous qualities, the smallest are generally the best.

The produce of a pimento plantation is very dependent on the season; at times the crop is extremely abundant, but this rarely occurs above once in five years. Edwards states that a single tree, under favourable circumstances, has been known to yield one hundred and fifty pounds of the raw fruit, or one hundred weight of the dried spice.

From pimento, distilled with water, a delicate odoriferous essential oil is obtained. Like oil of cloves it is of greater specific gravity than water, and resembles it so much in other respects, that it is said, when coloured with alkanet root, this oil is sold all over Europe as that of cloves.

Quantities of Pimento imported, exported, and retained for Home Consumption; together with the amount of Revenue arising from the Import Duty, from 1827 to 1831 inclusive.

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>lb.</td>
<td>lb.</td>
<td>lb.</td>
<td>£</td>
</tr>
<tr>
<td>1827</td>
<td>2,235,350</td>
<td>2,005,252</td>
<td>319,667</td>
</tr>
<tr>
<td>1828</td>
<td>2,290,545</td>
<td>1,677,922</td>
<td>310,182</td>
</tr>
<tr>
<td>1829</td>
<td>3,599,286</td>
<td>2,732,493</td>
<td>339,013</td>
</tr>
<tr>
<td>1830</td>
<td>3,28,104</td>
<td>2,262,951</td>
<td>348,525</td>
</tr>
<tr>
<td>1831</td>
<td>1,810,616</td>
<td>1,815,537</td>
<td>304,400</td>
</tr>
</tbody>
</table>

The price of pimento at the present time is from 4½d. to 5½d. per lb. exclusive of duty, which is 5d. per lb. on that coming from British possessions; other sorts are charged 1s. 3d. duty per lb.

PIMENTO.

(From the "Treasury of Botany," by John Lindley and Thomas Moore.)

PIMENTO.—The dried berries of the West Indian Eugenia Pimenta and E. acris.

EUGENIA.—A genus of Myrtaceæ, comprising several trees or shrubs, for the most part natives of tropical America and the West Indies. The flowers are placed in the axils of the leaves, white, with a four-parted calyx, four petals, and numerous stamens. The berry is crowned by the calyx, one or two-celled, and contains one or two seeds.

The most important species is E. Pimenta, which furnishes Allspice. This consists of the fruit gathered before they are quite ripe, and dried in the sun. The Allspice tree is cultivated in the West Indies and Jamaica, where the trees are planted in rows called pimento walks; the produce is sometimes very large. The Allspice or Pimento berries of commerce are of the size of a small pea, of a dark colour and surmounted by the remains of the calyx. The odour and flavour are supposed to resemble a combination of those of cinnamon, cloves, and nutmeg, hence the name allspice; they are due to a volatile oil, which is obtained by distillation. Allspice is largely used for flavouring purposes, being cheap. The oil is occasionally employed as a carminative.

Many of the species yield agreeably tasting fruits, such as E. cauliflora, which furnishes the Jabuticaba fruits of Brazil, described as being of the size of a greengage, and very refreshing; it is cultivated in some parts of Brazil.
The Rose Apples of the East are the produce of *E. malaccensis* and *E. Jambos. E. Umfi*, a native of Chili. has lately been introduced into English gardens, where it is at least as hardy as its near ally, the myrtle. Its fruit is highly esteemed in Chili. Those grown in this country are glossy black when ripe, and have an agreeable flavour and perfume. Numerous other species are grown either for their handsome foliage or for their flowers. *E. Luma* is one of the most beautiful of these.

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**PIMENTA.**

*(From Henderson’s “Handbook of Plants.”)*


*P. vulgaris,* the only species, is an extremely handsome tree, a native of South America and the West Indies, especially of the island of Jamaica, whence the berries or Pimento of commerce are exported in large quantities. This tree grows to the height of about thirty feet, with a smooth brown trunk and shining green leaves, resembling those of the Bay; the branches coming out on all sides, the trees are clothed in the most luxuriant foliage. The great profusion of white flowers contrasts pleasingly with the dark green leaves, the whole forming an object of vegetable beauty rarely surpassed; while the rich perfume which the flowers exhale renders an assemblage of these trees one of the most delicious plantations of even a tropical clime. The Pimento tree grows spontaneously in many parts of Jamaica, but abounds more particularly on the northern side of the island, in elevated spots near the coast. When a new plantation is to be formed, no regular planting or sowing takes place. It is usual to appropriate a piece of land either in the neighbourhood of a plantation already formed, or in a part of the woodlands where these trees are scattered in a native state. The land is then cleared of all wood except these trees, which are left standing, and the felled timber is allowed to remain, where it falls to decay. In the course of a year young Pimento plants are found springing up in all parts of the land. At the end of two years the land is thoroughly cleared, only those plants being left that promise a vigorous growth; these arrive at maturity in from five to seven years. Plantations are thus formed with apparently little trouble; this, however, can only be done in those parts where the tree is of spontaneous growth. This tree is purely a child of Nature, and seems to mock all the labors of man in his endeavours to extend or improve its growth: not one attempt in fifty to propagate the young plants or to raise them from the seed, in parts of the country where it is not found growing spontaneously, having succeeded. The berries have to be gathered very soon after the flowers fade; if left to ripen on the tree they lose their pungency, and become valueless. When picked they are spread out thinly on floors, exposed to the full heat of the sun, for about a week, or until fit for exportation.

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**ALLSPICE. PIMENTO, OR JAMAICA PEPPER.**

*(Myrtus Pimenta—Eugenia Pimenta—Pimenta Vulgaris.—Myrtaceae.)*


A native of South America and of the West Indies, especially of Jamaica, whence the principal supplies of allspice are derived. The *Eugenia Pimenta* is an exceedingly handsome tree, attaining under suitable conditions of climate a height of at least thirty feet. It has a smooth trunk with shiny green leaves something like those of the “Bay.” The foliage is very luxuriant, and as the tree branches equally all round the effect is very handsome, especially in the contrast presented between its profusion of small white flowers and rich green leaves. It affects hilly situations, and will grow on barren land unfit for any other cultivation. Porter instances a fine specimen standing on the ridge of a rock about twenty feet in circumference, and eight feet from the surface of the ground, the roots encompassing the whole surface of the rock, and finding their way down to the soil whence the tree derived its nourishment.

The Pimento is said to be very impatient of all attempts at entirely artificial cultivation where the tree does not grow spontaneously, very few of the efforts made to propagate young plants, and grow them into trees by the ordinary methods of cultivation, having been successful. Experience of the tree in
Queensland is very limited; the only specimen known to the writer being one on a hill-side in the Brisbane Botanic Gardens. This tree is some fifteen years old, and about twenty feet high. I cannot learn how long it has been bearing; but last season it yielded a small crop of sound healthy berries—a fact sufficiently encouraging to induce attempts at cultivating so useful a tree. The following is the principal method of cultivating the Pimento-tree in Jamaica:—A selection is made of land where the natural vegetation is interspersed with these trees, or in the immediate vicinity of an old plantation. The whole of the other timber and undergrowth is cut down and left to decay, the Pimento-trees alone being allowed to remain intact; among the ruins of the other timber, the young Pimento plants spring up in profusion where the seed has either fallen or been deposited by birds; the prostrate branches of the felled trees affording a valuable protection to the tender plants. In due course these are thinned out; and, when in two years' time the dead timber and rubbish is cleared away, the young trees are free to grow to maturity, and the plantation, thus curiously created, is thenceforth tended in the usual way, the trees arriving at maturity in about seven years.

The Pimento flowers twice, but only bears a regular crop once a year. The fruit is a small berry, somewhat larger than a peppercorn, and containing two seeds, and when ripe is succulent and of a black or dark-purple colour. The produce is variable in quantity, but a good tree, under favourable conditions of season, will give a hundredweight of the dried spice; the loss in drying being about one-third of the weight of the fresh-gathered berries.

If the berries are left to ripen they become moist and glutinous, difficult to cure, and not only lose their pungency and delicate aroma, but acquire a different flavour somewhat resembling juniper berries. The fruit is, therefore, gathered when still green, and is either sun-dried on mats or terraced floors, or cured by a more rapid process in kilns. Curing in the sun takes, under favourable circumstances, about seven or eight days. During the process the heaps are frequently turned and winnowed; great care being taken to preserve them from either rain or dew. Drying constitutes the sole process of preparation for market; and when this has been properly done, the article is ready for packing and export. It will happen that some of the ripe berries get mixed with the unripe, but this is avoided as much as possible; and for the reason that, in exact proportion as this occurs, the value of the commodity is injured, the berries are gathered nearly as soon as they are formed, and before they have begun to mature. When sufficiently cured they present a rough exterior and a dark-brown colour, and the seeds rattle inside.

The common name "Allspice" is derived from the idea that Pimento combines the flavour of cloves, cinnamon, nutmeg, and pepper.

The aromatic properties of the fruit are contained in a volatile oil, the dissipation of which accounts for the necessity for securing the crop while still green. The aromatic and pungent qualities reside principally in the external skin of the berry; but the same properties, in less degree, are found in every part of the plant. Alcohol extracts the entire virtues of the berry; but the aroma, and some part of the astringent and pungent principles, are extracted by water. The chief use of allspice is in cookery. In medicine, however, it is found in various forms of heavy and light "oil of pimento," in "spirit of pimento," and "pimento water." Its medicinal properties are very similar to those of cloves, being a warm aromatic stimulant and carminative, relieving flatulency, stimulating and giving tone to the stomach, and promoting digestion. It is also used, in common with some other of the spices, as a cover for medicines of unpleasant flavour, and to prevent the gripping of purgatives.

The oil, obtained by distillation with water, when coloured with Alkanet root (Anchusa tinctoria) is commonly sold as oil of cloves, although by no means possessing the full properties of the latter.

Simmonds states that Pimento is also used in tanning, and that a patent has been taken out in Jamaica for employing the leaves as a tanning material; but this is not supported, and, if true, possesses little interest in Queensland, where superior tanning-producing material is so abundant. One other use of the tree remains to be enumerated—namely, that of being convertible into good walking-sticks and umbrella-handles.

According to the Scientific American, the umbrella trade threatens the existence of the pimento plantations of Jamaica. It was shown by an official estimate made at Kingston, last autumn, that more than half-a-million of umbrella-sticks were then awaiting export to England and the United States. These sticks were almost without exception Pimento, and it is not surprising that
owners and lessees of Pimento walks are becoming alarmed at the growth of a trade which threatens to uproot in a few years all the young trees. The export returns for the last five years show an average of 2,000 bundles of sticks sent out from Jamaica annually; and the returns for the first three quarters of 1881 show an export of over 4,500 bundles, valued at $15,000 dollars. Each bundle contains from 500 to 800 sticks, each of which represents a young bearing Pimento-tree.

But, apart altogether from its commercial value, the Pimento-tree is a very desirable addition to our gardens. Even as a shrub it is beautiful for its ornamental, bright foliage; and when planted in a clump, the slightest breeze will fill the air with a delicious perfume exhaled from the leaves. These latter when bruised yield an aromatic odour nearly as strong as that of the fruit; and, judiciously used by the cook, and in connection with the domestic medicine chest, may serve many of the purposes of the spice, and render the possessor of a tree, so far as his household is concerned, independent of its fruiting.

Edwards, in his history of the British West Indies says:—"I do not believe there is in all the vegetable creation a tree of greater beauty than a young Pimento. The trees form the most delicious groves that can possibly be imagined filling the air will fragrance, and giving reality, though in a very distant part of the globe, to our great poet's description of those balmy gales, which convey to the delighted voyager—"

"Sabean odours from the spicy shore
Of Araby the blest—
Cheered with the grateful smell, old Ocean smiles."

The seeds of the Pimento-tree are very perishable and have proved difficult to import; and the number of plants brought to Queensland has been hitherto small. As, however, the seeds borne by the specimen in the Brisbane Botanic Gardens germinate freely, plants will be available henceforth without the risk and trouble of importation.

PIMENTO.

(Extract from a Lecture by W. Bancroft Esq., F. L. S., on the Timbers of Jamaica.)

Not long ago I brought to the notice of the Government the destruction caused by the uprooting of Pimento saplings for export, as walking-sticks. I know a case in which some 200 acres of land were underwooded, in order to allow the young Pimento to grow and form a Pimento walk. Sometime after the land was cleared, the young plantation was practically destroyed by stick gatherers, who uprooted thousands of young trees, many of which, being found unsuited for "sticks," were left to rot on ground. If this practice prevails generally and continues, the Pimento exports are to fall off; and if the damage done to the fruit bearing Pimento trees, by the hurricane, is as great as represented, it seems to me that now is the time to take steps to safeguard the trees.

An extraordinary idea prevails that Pimento seed will not germinate, unless it is bird-sown. I have heard this stated, as a fact, a dozen times, and yet I know it to be an outright nonsense and altogether untrue. I have sown Pimento seed and found it germinate quite as freely as many other seeds. Here are some young Pimento seedlings grow, in the Botanical Gardens, from seed. In the face of this ocular demonstration I hope no one will hereafter repeat the nonsensical story that Pimento cannot be raised from seed like other plants. If it pays to ship Pimento saplings as walking-sticks, and I have no doubt it does, the proper and best way to obtain them is to grow them in regular plantations, and to attend to them in the same way that Osiers are cultivated in England. It is quite easy to grow Pimento walking-sticks in any quantity, in suitable localities, and I estimate an acre would yield some £200 in 5 years. It is only necessary to dig the soil, in order to loosen it and remove old stumps and roots, to lay, say an inch of leafy mould and sand, in equal parts, on the surface, water it well if the weather is dry, and scatter, not bury, the ripe fresh gathered Pimento berries and cover the land with straw, or some other shade-yielding material, and keep it moist. In a very short time, three or four weeks, thousands of young seedlings will make their appearance. These should be thinned out (the surplus seedlings can be transplanted on other land suitably prepared,) to say one foot each way, and care must be taken not to remove the shade stuff suddenly, but gradually so as to harden off the young plants. At the end of five years all these seedlings will have been disposed of as walking-sticks. Certainly at less cost and greater profit than any now gathered, and without the injury and loss of trees which now results. How
many young men could, with little labour besides their own, establish small plantations of Pimento for walking-sticks, and doing so obtain present employment and certain profit? A lot of land 100 feet square would yield something like 10,000 walking-sticks, and in a well cared for plantation, few, if any, would be unfit for use and sale. I earnestly hope that this hint will be acted on, and that before long I shall hear of "walking-stick plantations." If I had not so much on my hands, and so little time to spare, I would certainly practice what I preach; and if, as I hope, my work gets lighter, and I can make the necessary time, before long I hope to see one such plantation under cultivation. If Government would take it up, on even a small scale, it would be an excellent way of testing the matter and the experiment would no doubt lead to useful results.

NEW PRODUCTS: PIMENTO IN CEYLON.

To the Editor of the "Ceylon Observer."

DEAR SIR,—I am glad to see the seed of a "new product," pimento, or allspice, being advertised in Colombo. It yields a very valuable spice, and the branches are largely used for walking-sticks and umbrella-handles, and it ought to be very valuable. I believe there are one or two trees in Ceylon, and that they have thriven well. Can you kindly give me any further information on the subject?—Yours truly,

PLANTER.

12th January, 1882.

PIMENTO.—Out of 1 lb. of Pimento seed, I have possibly one plant, but am by no means certain.

PIMENTO OR ALLSPICE.

To the Editor of the "Ceylon Observer."

Nella Oolla, Madawalatenna, 15th Dec. 1881.

DEAR SIR,—Perhaps the following, with regard to "pimento," may interest your correspondent who signs himself "Planter," in your issue of the 13th Inst.

The allspice is a native of the West Indies, and is cultivated particularly in the hilly parts of the country. It begins to bear fruit when three years of age, and arrives at maturity in seven years. The berries are collected before they are ripe, at which time the essential oil, to which they owe their pungency, is most abundant. They are spread out, exposed to the sun, and often turned. In about a week they lose their green colour, and acquire that reddish brown tint, which renders them marketable; they are then packed in bags and casks for exportation. When dried the berries are rather larger than a pepper-corn. Some plantations kiln-dry them, which expedites the process very considerably. The plant itself is a handsome evergreen with a straight trunk about 30 feet high, covered with a smooth grey bark. In Jamaica, "pimento walks" are talked of, and as the tree is a large one they cannot be planted very close together.

If you think the above information will be of any use to "Planter," kindly insert it and oblige, yours faithfully,

ALLSPICE.

WALKING-STICK PLANTATIONS IN JAMAICA.

To the Editor of "The Colonies and India."

SIR,—It appears to me that the article on "Umbrellas and Sticks," in your paper of October 22 last, is subject to correction.

1. I think it will be found that the number of sticks in a bundle should be taken as 50, not as 500 to 800.

2. And the value of the crop of pimento, taken as 50,000l. annually, is half a million for the ten years. The value of a stick may be taken as from £2 to £3, so that 4,500 bundles of 50 sticks each, say at £3, would be £2,000; while if the bundles had 50 sticks each, the value should have been 20,000.

The average crop of pimento may be taken as 40,000 to 60,000 bags, and the value at from 20s. to 25s. per bag; thus 50,000 bags at 1l. = 50,000l. annually, not 500,000l.
PIMENTO.

The sticks are usually shipped in small bundles which are cut loose on board for stowage, but are made into larger bundles on arrival in the dock, say of 25 to 50 sticks in a bundle.—Yours faithfully, W. F. R.


[We are obliged to our correspondent for his figures. It is difficult in a matter of this kind to arrive at an exact basis of calculation. Our "Note" was founded on some figures published in the Jamaica Gleaner, while our correspondent takes different figures for his calculation. According to the information at our disposal, the number of sticks in a bundle appears to vary from about 50 in the case of the larger selected sticks, to over 800 in the case of smaller, ill-assorted sticks. The best sticks are valued in Jamaica at a merely nominal figure, certainly not exceeding that placed upon them by our correspondent, while the small sticks are not valued singly, but at twopence or thereupon a dozen.

The official returns show that the value of pimento exported from Jamaica was 14,6000l in 1880, and these returns are admitted not to include large quantities exported from some of the smaller ports, which would probably bring the value of the gross produce of pimento up to 200,000l. Our Note gave it as half a million—a figure nearly as much too high as our correspondent's estimate of 50,000l is too low. If these last-named figures were correct, it would really afford the strongest argument in favour of the restriction of the "walking-stick" trade.—Ed. C. & F.]

"NEW PRODUCTS": ALLSPICE OR PIMENTO.

To the Editor of the "Ceylon Observer,"

Colombo, 28th December 1881.

Dear Sir,—The allspice or pimento trees can scarcely be considered new products in Ceylon. In 1747, Linnaeus devoted nearly the whole of page 83 of his Flora Zeylanica, No 186, to a description of, and notes on, the plant identical with the long narrow-leaved Allspice, now the Eugenia Pimenta, D. C.; but strange to say, there is no reference to Hermann's collection of plants made in Ceylon, as regards this one, though it is most likely the pimento was introduced to Ceylon by the Portuguese or Dutch long before Hermann's visit to Ceylon (Q. J.). The Eugenia (Myrtus) Pimenta is included in Moom's Catalogue of Ceylon plants, p. 39, and was therefore here before 1824. In 1856, the Rev. William Ellis, the eminent Polynesian and Madagascar Missionary, paid a visit to Ceylon, and, in the course of a botanical trip I had the pleasure of making with him in the direction of Mutwal, we called at Elie House, and found a fine tree of the broad-leaved allspice there in full fruit. This is the Eugenia acris, W. & A., and must also have been introduced into India and Ceylon many years ago.

The pepper called allspice or pimento is the dried fruit of Eugenia acris, and E. Pimenta. Many years ago, on visiting at Lake House, Colombo, when occupied by the Hon'ble Judge Stewart, I was asked to name some old foreign trees growing in the grounds, and amongst them were trees of the Eugenia acris and Pimenta. About a fortnight ago, I went to see these trees, in reference to the correspondence in your columns on the subject of introducing Pimento to Ceylon, and found several trees of E. acris, and one of E. Pimenta, but no fruits or flowers on them; and Mr. Auwardt, who now occupies the house, says he has not seen them in flower lately. There is no lack of information in books on the subject of pimento, but to everyone who wants full information on this or any other useful plant, I beg strongly to refer them to Bentley and Trimen's magnificent work, consisting of 4 quarto volumes of coloured plates from the living plants or authentic specimens, with every information, scientific as well as familiar, and reference to every author of any consequence who preceded them, and who had written on the plants figured and described in this work, the title of which briefly is Bentley and Trimen's Medicinal Plants. I notice that the Planters' Association intend getting up a library of useful books of reference, and this work should be one of the first selected.—Yours truly,

W. FERGUSON.

[Our readers must, of course, understand that we do not confine the term "New Products" to new introductions into Ceylon: in that case, strictly speaking, very few of what are popularly known as new products could be so designated: tea having been produced and manufactured here by the Brothers Worms forty years ago, and old trees of cocoa growing in Ceylon for a generation back. We called Pimento a new product in the sense of European planters in Ceylon, beginning for the first time now to pay attention to it for its commercial value.—Ed.]
PIMENTO OIL.—It is suggested whether this oil might not to some extent replace the dearer clove oil in perfumery, since it consists chiefly of eugenol, and the two oils are not distinguishable chemically from one another.

JAMAICA.—The Gleaner complains that the export of walking-sticks threatens the extinction of the pimento, from which such canes are cut, the negroes stealing them from the pimento walks.—Colonies and India.

PIMENTO.—The preliminary drying might well be done in the Machine, and it would probably much improve its appearance. It would be generally advantageous if those who have tried the Machine with the curing of Cacao or in any other way would communicate with the Director, Cinchona, Gordon Town P. 0.—Bulletin of the Jamaica Botanical Garden.

THE CAPSICUM which yields the cayenne pepper alluded to, is Capsicum tetragonum, called by the Spaniards “Pimento,” under which name it has often been imported from Spain. This large and handsome capsicum, often as large as a good-sized tomato, is of two colours, scarlet and golden-yellow. Its appearance is familiar to all who have visited the vegetable markets of Southern Europe at the season when it is ripe. It is largely used in salads, and the large heaps exposed for sale are very conspicuous by the beauty of their colours. When ground the pods are both used for a peculiar fresh flavour which they possess, and also for colouring some dishes.—Pharmaceutical Journal.

UMBRELLAS AND PIMENTO.—The Umbrella trade, according to the Scientific American, threatens the existence of the Pimento (Pepper) plantations of Jamaica. It was shown by an official estimate made at Kingston, last autumn, that more than half a million umbrella-sticks were then awaiting export to England and the United States. These sticks were almost without exception Pimento, and it is not surprizing that owners and lessees of Pimento walks are becoming alarmed at the growth of trade which threatens to uproot in a few years all the young trees. The export returns for the last five years show an average of 2,000 bundles of sticks sent out from Jamaica annually, and the returns for the first three quarters of 1881 show an export of over 4,500 bundles, valued at 15,000 dollars. Each bundle contains from 500 to 800 sticks, each of which represents a young, bearing Pimento tree.—Nature.
ALL ABOUT CINNAMON.

CINNAMON IN CEYLON.

Whatever doubt there may be of other products, such as coconut and palmyra palms, there can be none about cinnamon being indigenous to Ceylon, for large trees are scattered through the oldest forests of the interior, and these blaze out at certain seasons of the year in every shade of pink, from faint rose to blood-red; nowhere else too does this cultivated shrub grow so well as in Ceylon. The island has been famous for its spice from the dawn of historical records, * and all through the Portuguese and Dutch periods cinnamon is referred to as a principal source of wealth.† The Dutch, under Governor Falck, first commenced the systematic cultivation of cinnamon in 1767-70 against the advice of the Sinhalese Headmen, who said regular cultivation would ruin the tree, crops and quality! (See Bennett.) The Dutch restricted the cultivation of cinnamon to Ceylon, of the clove to the Moluccas, and of the nutmeg to the Banda islands. Before 1767, they depended on the supply of jungle spice from the territories of the Kandyan King. They then formed the Kadirana, Ekela and Maradana Gardens between Colombo and Negombo as well as the Moratuwa and Beruwala Gardens, covering altogether 15,000 acres, together with gardens near Galle and Matara from 15 to 20 miles in circumference. Between that time and 1832 the cinnamon trade was a monopoly of the Dutch and British Governments, but the cultivation and trade have now for about 50 years been free. Cinnamon was the leading article of the export trade even in British times until forty years ago, when it was deposed from this pre-eminence by coffee and coconut oil.

* The Romans communicated with India once a year in the time of Augustus, investing the equivalent of £403,000 sterling in the trade, and calculating the profit at 100 per cent each voyage. Goods were carried up the Nile in ships, thence across the desert on camels for the Red Sea, then across to a port of Arabia where Indian merchants were met and exchange took place. The most important article from India was cinnamon, which (according to a writer in the Asiatic Journal) sold for £3 sterling per lb. in Rome. The "odour" of the far-famed cinnamon spice came by a poetical liberty to be associated with "Araby the blest" through the system of transit by caravans being arranged overland through Arabia. Tennent throws some doubt on even Cinnamon being indigenous, speaking of it as being introduced from Africa and not being mentioned in early native records.

† In 1506, the Portuguese found cinnamon only in its wild state, but the Sinhalese king who lived at Cotta contracted to pay an annual tribute of 250,000 lb. of cinnamon in return for the protection of the Portuguese; 3,000 lb. of pepper and cinnamon was the present sent by the Kandyan King to the King of Holland in A. D. 1602.
CINNAMON.

In the old days of the monopoly and high export duties (2s to 3s per lb. in 1832; 2s to 2s 6d in 1844; 1s in 1846; 4d in 1848; 2d in 1853; free in 1866) the quantities supplied by Ceylon of the fragrant bark for the world's consumption seldom reached half-a-million of lb.* In early British times 320,000 lb. were annually exported, costing £40,000, leaving a profit of £9,000. In competition with the Cassia lignea of China and the true cinnamon (coarser than Ceylon, superior to Malabar) grown in Java (the cultivation of which by the Dutch, who commenced it in 1825, our monopoly and export duty policy had fostered), the trade was slipping away from us, until in 1842 the export went down to 121,000 lb. With the selling of the Government gardens and the adoption of a different policy in free trade, there was then a great rebound, and the round million pounds was for the first time attained (and exceeded by 57,000 lb.) in 1844. This export was too much for the consuming market, and the old average of about half-a-million pounds prevailed for the next ten years. The average then ranged about 500,000 lb. until, in 1867, it seems to have been discovered that it would be profitable to export the chips which had hitherto been used for the distillation of cinnamon oil. There was then a regular rush into the trade, until, in season 1868-69, what with chips and baled spice, the enormous quantity of 2,818,326 lb. was exported. This was the culminating point. The rubbish which was sent from the Island brought the chips into disfavour, but after that, for a time the tendency was downwards in the quantity sent away. The exports in fact diminished, until the average, instead of being 1,864,000 lb. (the figures for the five years ended 30th September 1873) was only 1,350,000 between 1873 and 1878, but in the latter year the export rose again until in 1881 it was over 1,800,000 lb., and in 1882 close at the 2 million lb., a figure which is thought beyond what can be safely counted on for profitable consumption. The consequence is that the price has gone down until the Cinnamon cultivators, nearly all Ceylonese, declare there is no margin of profit, and yet their exports still go on increasing, more particularly of "chips," although a native representative Association agreed in 1883-4, that the preparation and export of chips should be given up! Another grievance of the Ceylon exporters was found in the London quarterly sales, and these were accordingly made monthly, but no improvement in prices took place; on the contrary, the average price per lb. now is far below what it was a short time ago. Quarterly sales in London have been resumed.

**Local Customs value.**

<table>
<thead>
<tr>
<th>Exports in the calendar year</th>
<th>1850</th>
<th>665,000 lb.</th>
<th>£64,500</th>
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<tbody>
<tr>
<td>Do</td>
<td>1873</td>
<td>1,160,754</td>
<td>58,037</td>
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<tr>
<td>Do</td>
<td>1876</td>
<td>1,336,901</td>
<td>67,848</td>
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<tr>
<td>Do</td>
<td>1882</td>
<td>1,992,604</td>
<td>99,630</td>
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<tr>
<td>Do</td>
<td>1883</td>
<td>2,236,431</td>
<td>111,821</td>
</tr>
<tr>
<td>Do</td>
<td>1884</td>
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</tr>
<tr>
<td>Do</td>
<td>1885</td>
<td>2,145,257</td>
<td>107,261</td>
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<td>Do</td>
<td>1886</td>
<td>2,365,038</td>
<td>118,252</td>
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<td>Do</td>
<td>1887</td>
<td>2,046,123</td>
<td>102,307</td>
</tr>
<tr>
<td>Do</td>
<td>1888</td>
<td>2,040,589</td>
<td>102,029</td>
</tr>
</tbody>
</table>

In the commercial season 1st October 1884 to 30th September 1885, the export was 1,574,022 lb. in bales, and 628,914 lb. of chips, or a total of 2,202,936 lb. Of chips this is the largest export made for many years. In season 1885-6, the export was 1,629,548 lb. in bales and 548,037 lb. in chips. In season 1886-7, the export rose in bales to 1,793,893 lb., while chips fell to 505,951 lb. In season 1887-8 the export in bales fell to 1,657,424 lb., and the chips to 496,887 lb.

If there were only a profitable demand, the export from Ceylon could easily be kept at about 2 million lb. of baled cinnamon; but in their own interests the Ceylon cultivators should cease to ship "chips" (rather utilizing them to distil cinnamon oil from them), for if the export were kept down to 1½ million lb. of good bark, the price would be much better. Probably the unsettled and not very prosperous state of Spain for some time has had to do with the poor prices for cinnamon, for Spain is the great manufacturer and consumer of chocolate creams in which cinnamon spice is largely used, as also for incense.

* In 1738 the Dutch, however exported 600,000 lb. to India, Persia and Europe, the value being from 8s 4d to 17s 6d per lb.
† The Colombo Customs valuation is 20 cents or less than 1s. per lb.
in the cathedrals and churches of all Roman Catholic countries especially.* There is practically no limit, except that of profitable demand, to the quantity which this Island could supply. The best plantations, formed on a soil composed mainly (up to 90 per cent of pure silica) of snowy white siliceous sand (deposited, probably, from freshwater lakes), are near the sea-coast a little south of Colombo, around the city, and northwards to Negombo. But bark of a fair quality is got from jungle bushes in the hill forests, and some years ago when the price was better, cinnamon was planted not only by the native Kandyans but by coffee planters in Dumbara, Hantane, Nilambure, Dolosbage, Matale, Laggala, and other districts. It was believed that exhausted coffee land could be utilized for this culture, at elevations up to 2,500 feet or so, and the return of about £3 to £5 an acre was always useful as an addition to the income from coffee, while the appearance of plantations was improved by occupying unsightly blanks: there are still 1,523 acres included in our planting district returns as under cinnamon, but chiefly in lowcountry divisions. Other and more profitable products are now available in such cases. In the lowcountry Europeans have generally withdrawn from the cultivation, only about 2,000 acres out of a total of perhaps 35,000 acres of cultivated cinnamon, being held by them, while the natives have bought fresh land and extended cultivation. Up to 1860 cinnamon proprietors could barely hold their own against competition from Java, but a few years later a great turn came, and an estate, which in 1861 could be got for £2,000, in 1873 sold for £9,500; another bought for £6,000 in 1867, was sold for £17,000 in 1870, all owing to the rise in the price of cinnamon by 50 per cent in 1868. Since then, properties have fallen in value. Cinnamon bushes 100 years old in Ceylon still bear where cultivated as good crops as ever, and the same soil has yielded cinnamon for perhaps 2,000 years. The average yield is from 100 to 125 lb. per acre. Really fine cinnamon, such as Ceylon only can produce in perfection,† still commands the highest price;‡ but cinnamon, after all, is only a luxury, not an absolutely necessary food like coffee, or even such an economical value as the product which is as yet the second great staple (value being considered), coconut oil. The local consumption of cinnamon is comparatively trifling, certainly not more than 100,000 lb.

Many of the Chaliyas (Sinhalese caste of cinnamon-peelers) from the neighbourhood of Galle were accustomed, while prices were good, to migrate at a certain period of the year to the Central Province to cut cinnamon in the forests.

* Inferior cinnamon chips especially are used freely in condiments and in the preparation of such manufactures as Thorley's food for cattle, &c. It has been pointed out that "cinnamon freights" from Colombo are not regulated fairly. A press correspondent writes:—"At present the producer has to pay for 800 lb. as a shipping ton. This was all very well in the old days when small quantities of the spice were taken as cabin freight, but nowadays, when thousands of bales are shipped, often by one steamer, it is time for an alteration. Eight bales of cinnamon make 100 shipping tons, measuring some 3,000, or at the outside, 3,500 feet if stowed in bulk, while 100 shipping tons of coffee measure over 6,000 feet, and even after allowing for broken stowage, over 5,500 feet. As the difference in freight between cinnamon and coffee is only 5s a ton, say that 100 shipping tons of coffee occupying 5,500 feet, are taken at 55s. per ton, the total freight is only £275, against £350 paid for only 3,000 to 3,500 feet occupied by the 100 tons of cinnamon. Again, cinnamon chips are put on the same tonnage footing as if they were cabin freight, viz., 800 lb. to the shipping ton, although they are always used as broken stowage." The Ceylon Chamber of Commerce published a new Tonnage Scale about three years ago in which certain changes were made for cinnamon, 1,200 lb. being allowed to the ton for steamer cargo, and nearly all Ceylon exports go by steamers nowadays.

† In Ceylon the principal and only cultivated species is distinguished above all others, by the Sinhalese name of Panne or Rassé Kuroonde, which signifies honey or sweet cinnamon; the second variety is called Naga Kuroonde or black cinnamon; the third Kappuru Kuroonde, or camphor cinnamon; the fourth, Kabatté Kuroonde, or astrin gent cinnamon; the fifth, Sewel Kuroonde, or mucilaginous cinnamon; the sixth, Dowool Kuroonde, or flat or drum cinnamon; the seventh Nika Kuroonde, or wild cinnamon, whose leaf resembles that of the nicosal, or Vitex Nayoondo; the eighth, Mal Kuroonde, or bloom or flower cinnamon; and the ninth, Timpat K, or trefoil cinnamon. But only the first four are strictly varieties of the Cinnamomum Zeylanicum Bent., "Ceylon cinnamon" and the Ceylon csninnamon.

‡ The average price in London gradually fell from 8s in 1820 to 5s 1d in 1841, to 1s 6d in 1875, rising to 2s 2d in 1878, but down again in 1883 and on to 1885 and 1888 to little more than 1s 8d per lb., at which rate the cost of cultivation and careful preparation is scarcely covered.
generally contracting with the planters for the produce where growing on private properties. It was expected that the same class of people would be found very serviceable for the barking of cinchona, but they proved unwilling to work as day labourers save at exorbitant rates of wages.

Cinnamon in some of its varieties, probably a kind of Cassia, is said to be indigenous in Cochin China, and a good deal is exported, but the preparation is not equal to that of the Ceylon spice. A great deal of Cassia is produced in China, about 11 million lb. being annually exported, chiefly to Britain, for re-exportation however to the Continent. Money says that the Dutch derive little profit from cinnamon in Java: the bark is peeled and dried by natives and sold to Government; four Residents supervise the gardens. We find cinnamon growing besides on the Malabar coast of India, Sumatra, Manila, and the Eastern Archipelago generally, Cayenne, Leeward Islands, Bourbon, and in small quantities in Brazil and the West Indies. It was lately mentioned in the Indian papers that samples of very good cinnamon growing on the Kachyen Hills near Bhamo in Burma had been sent to Rangoon, and that the tree is also growing luxuriantly in the Kyouk Padang range of hills in Arakan; but no doubt this refers to wild cinnamon or more probably an inferior cassia. Cinnamon is being tried with some success in Northern Queensland. The use of inferior cassia imported from China and the Eastern Archipelago has much interfered with the demand for Ceylon cinnamon.

Dr. Trimen, in his Report for 1882, refers as follows to the Cassia of China—a rival of Ceylon Cinnamon, though inferior in the bark:—"Chinese Cassia lignea."—To Mr. Ford (Superintendent of the Botanic Garden of Hongkong) the Gardens are indebted for sending (with the consent of the Secretary of State and the Government of Hongkong), a Wardian case of young plants of Cinnamomum Cassia, the plant affording the Cassia lignea of commerce. Eighteen of these have been planted at Péradeniya, and some sent to Hakgala for trial. The plants seem very hardy. These were collected by Mr. Ford himself from the plantations on the West River in the province of Kwangtung, South China, where an immense cultivation is carried on. Like our Ceylon cinnamon, the precise plant is not known wild, but is probably a cultivated race of some common wild species. By this visit Mr. Ford has satisfactorily determined that this is the sole source of 'Cassia lignea,' which has been hitherto supposed to be derived from a number of species of Cinnamomum. The export of this product from Canton in 1878 reached the enormous quantity of 38,313 piculs; it is, however, of far less value than cinnamon in the market. The spice has been brought from South China since the earliest dawn of history, and is doubtless the original cinnamon of the Mosaic and other early writings. The scent of the leaves is far more pleasant than that of Ceylon cinnamon."

A good deal of cinnamon is imported into the South American States, notably Peru, for incense and flavouring purposes, although there is a wild cinnamon found in the forests of Peru and British Guiana. The great market for cinnamon is, however, found in Southern Europe, chiefly in Spain and Italy. In all Roman Catholic countries, a good deal is used for incense purposes, while still more is worked up in the manufacture of chocolate, for which Spain is specially famous. We suppose the world's production and consumption of true cultivated cinnamon does not exceed 2½ to 3 million lb., Java and Malabar supplementing the Ceylon supply. Of cassia perhaps 3 to 4 million lb. more are collected chiefly in China, Siam, Sumatra and the Eastern Archipelago. The consumption in the United Kingdom is only 150,000 lb. of true cinnamon and perhaps 250,000 of cassia. In Spain, France and Italy nearly a million lb. are used up.

CINNAMON-PLANTING IN CEYLON:
THE CULTIVATION AND PREPARATION OF CINNAMON:

(Specially written by an experienced Ceylon Cinnamon Planter.)

It was in or about 1765 that cinnamon was first cultivated in Ceylon; previous to that time the supply was obtained from the forest and chenas, chiefly within the territories of the Kandyen King. The grasping character of Dutch traffic, however, involved that people in a chronic state of dispute, if not of absolute warfare with the Kandyen Government, so that it frequently happened that the supply to which those uncompromising monopolists restricted the consumption of the world could not be got, and it was decided that the plant should be cultivated to the necessary extent, within their own territory.
CINNAMON.

It was no doubt after carefully conducted experiments, that the site of the cultivation was selected, and the sandy plains of Maradana, Moratuwa, Kadirana, and Ekala planted in rapid succession, to an aggregate extent of perhaps 15,000 acres; which has ever since been the principal source of supply.

While the Dutch retained possession of the maritime provinces, the law that protected the monopoly were of the most stingent character, and are said to have been executed with determined ferocity. When the English got possession of the Island, the monopoly was retained, but the spirit of trade was not so all-pervading as among their predecessors. The desire of profit did not reign in the minds of the statesmen into whose hands the destinies of the Island fell, to the exclusion of all nobler sentiments and the performance of all higher duties. The monopoly therefore became a minor consideration and the department became the refuge for such members of the Service as displayed no talent for the higher walks of administration. Any man was good enough for a planter—so that what with the restraints of red-tape and the genteel imbeciles employed, the Government after a trial of about forty years, admitted that cultivation was not its forte, and it was decided to sell the gardens—forests had been the more appropriate name. This decision was put in execution in regard to the out-fields of Moratuwa, Ekala, and Kadirana, and about R10 per acre was realized. In giving up the monopoly, however, Government had no fancy for surrendering any of its profits; an export duty was accordingly imposed, sufficient to recoup all it lost. Long before this the Dutch, braving their own unenforced law, which awarded death as the penalty of removing seed from the Island, had introduced the cultivation into Java, and with an inferior article successfully competed with the Ceylon spice, having the full amount of the export duty in their favour. The private purchasers had therefore hard enough times. The duty becoming less and less productive year by year, and the proprietors rooting out their cinnamon where the land was fit for coconuts, the tax was at length abandoned and the trade left free, but it had a hard fight of nearly twenty years before Ceylon could finally close up the Dutch shop. Before this happened, however, a flood of cassia was let loose on the market and was said to have in a great measure supplanted cinnamon. Be that as it may, the fact is certain that during the first twenty-five years of free cultivation, the proprietors could do little more than make ends meet, and some of them did not succeed even in that. Originally over 5,000 acres were held by Europeans, but many of them sold out in the bad times; others as soon as they mended, and now only about 2,000 acres are held by Europeans, and probably in a few years the whole will be in native hands. The present value is from R250 to R300 per acre. It is only within the last seven years however that they have gone up. In 1861 an estate could have been purchased for R20,000 that in 1873 sold for R5,000; one was purchased for R67 for R60,000, and sold in 1870 for R170,000. All this was owing to a rise of 50 per cent in the price of cinnamon in the European market, which took place in 1868 and still continues. To European management is due all those improvements, by which the lands have been made to quadruple their produce, acre for acre, since the days of the Government monopoly, and the workman-like finish that has been given to the prepared spice.

The old lands in Kadirana and Ekala have been under cultivation for a century or more, and though some bushes die whenever there is a protracted drought, and the difficulty of getting up young plants on the old land almost amounts to impossibility, the crops are as large now as they ever were. Improved cultivation has made up for natural decay; and even native proprietors, after European example, keep their estates in a much higher state of cultivation than they ever were kept in till very recently.

Habitat.—Cinnamon is not found growing wild to any great extent in the drier parts of the low country. Whatever may have led the Dutch authorities to choose sandy plains for its cultivation, such lands are certainly not its natural habitat. It is most commonly found as a forest tree at from 1,000 to 2,500 feet above sea-level, and in those angles of the mountain zone that face the monsoons. It is said to have been found growing as high as 5,000 feet,* but it is not common at that height. As the plant has hitherto only been cultivated to any considerable extent on the sandy

* We have seen plants at 7,000 feet altitude, the clove odour in the leaves pungent enough, but the bark having scarcely a tinge of the true cinnamon character.—Compilers.
plain of the Western Province, sand has of course acquired the name of yielding the finest spice; the only other land on which it is cultivated being the common cabook gravel of the lowcountry on which it grows more rapidly but produces a coarser article than on the sand. Whether a fine spice can be produced in a wetter and colder climate by cultivation remains to be tested by experiment. Till this is done we must continue to believe that the best cinnamon is grown on the poorest sand, where there is an average temperature of 85° and an average rainfall of an inch for every degree. This is about the climate of fifty miles of the coast of the Western Province; further south we do not find the sandy plains, and further north we get into too dry a climate, so that a practical monopoly of the finer sorts will probably remain with the Ekala and Kadirana proprietors. Since the prices went up, much cinnamon has been planted in the villages near the coast, but the most of the land is not well suited for the purpose, being merely ovita or even denyat land, either of which produces an inferior quality, with a great deal of waste wood.

Consumption.—This is not an article that enters into the daily habits of the millions of humanity; the present consumption of the world is not one pound to 10,000 inhabitants; the consumption increases not with low prices, nor diminishes with high; it is therefore an article that may be very easily overdone. When some years ago the price went suddenly up 50 per cent., the jungles were ransacked all over the Island, and the growers of cinnamon were much troubled; the use made at that time of the jungle article by native proprietors appeared when one of the brokers saw it advisable to publish the only marks that were found genuine, and by implication all that were adulterated. On the one side in this list stood all the properties owned and managed by Europeans; on the other, with hardly an exception, all those owned and managed by Sinhalese; much of the trash by which some scores of Sinhalese dealers that were not previously worth a cent made fortunes, was not saleable at any price, to the heavy loss of the Colombo agents, or their constituents.

Planting-out.—When the cinnamon forests came into private hands, and were cleared, it was found that, exclusive of the low lands called deniyas, about one-fourth of the space was vacant; great and persistent efforts have been made to fill those gaps, and many millions of plants have been put out, without in any material degree diminishing their extent. Bundles of from twenty to fifty plants, with a ball of clay six inches cube, put out on the sand, long exposed and thoroughly exhausted, shaded but not watered, die in one month without rain; and in a drought of from six to nine months, even plants four years old and three feet high are snuffed out. It is easy to say “Water,” but in those long droughts water becomes too precious to be so used. In fact the game is not worth the candle: it will not pay.

The usual practice in making Nurseries is to form the soil into beds three feet wide: these are lined six inches apart, and at every six inches along the line half-a-handful of seed is dropped, and covered an inch deep. Over the beds a stage of jungle sticks is erected, to support a shade of kajjans. The beds are watered from time to time in dry weather, and in twelve months the plants are ready to transplant.

The idea of sowing a number of seeds in one spot has probably risen from the difficulty of getting young plants up in the vacancies, and it was supposed that the chances of success were multiplied by multiplying the plants. In planting new land, however, in a climate not subject to such long droughts, there is no occasion to perpetuate this practice. Perhaps the best mode of procedure would be, to prepare the land exactly as for coffee, then line six feet apart, but instead of pegging and holing as for coffee, dig a continuous strip of a foot to eighteen inches wide, along each line, and dibble in one or two seeds at one foot apart along the line. By adopting this plan the plants would probably thrive better than if planted in bundles, and the planter would be enabled to take out the useless kinds, as they asserted themselves, and there would be a supply of plants for thin or vacant parts of the lines, during the first two years. There are several kinds of cinnamon that are next to useless for the purposes of cultivation; the korahedi and the velli are the most common of those varieties; they are more or less to be found on all the estates, and on some they amount to a serious evil, tending greatly to the diminution of the crops. The korahedi is distinguished by quick growth, but long before the sticks are old enough for peeling, the bark becomes rough and scaly, the.

* High lands only cultivable, so far as rice is concerned, by means of rain.—Compilers.
† Low lands, more or less subject to floods, suited to rice cultivation.—Compilers.
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Cuticle thickens, becomes corky, and splits down to the inner bark or true cinnamon. It is very difficult to deal with, even when it is peetable, and the chalysas will not cut a stick of it as long as there is anything else to cut. The veli grows quicker than any other kind of cinnamon, being often at two years' growth four or five inches in girth, and eight or ten feet in height, but it can very seldom be peeled, and only makes a very coarse spice, the least valuable kind of chips. It takes its name from sand, because it grits under the teeth, and the bark is often so hard that it will turn the edge of a cattie. As these two kinds of cinnamon are oftener left to go to seed than the good kind, there is great difficulty in getting proper seed, and even when the greatest care is taken, there is much of their seed sown in every nursery; it would be easy to eradicate them if the plants were put out single, but where a bush is mixed they must be allowed to stand.

Those who planted the cinnamon gardens displayed a lofty contempt for all order and arrangement, for there is not the most remote symptom of lines which very greatly enhances the difficulty of working them; for now, in cutting, pruning, and weeding alike, every man does very much as he likes, and goes where he will. In cutting, there are pieces marked off for each day's cuttings, which it is an offence to go out of; but within the limits, every man ranges as far as he can, that he may get as many as possible of the best sticks. One hundred and fifty men dashing into a ten-acre field agitate it as if a tempest were passing over it, but by the end of a quarter of an hour, all the best sticks are cut and appropriated, and they settle down to steady work, testing every stick before cutting. If the wood is in fair peeling, about two hours is allowed for cutting, or a longer time according to the peeling condition, when they are called off, and it is an offence to cut a stick after the signal of recall. The tops and branches are lopped off and left on the ground, and the sticks collected, dressed, tied in bundles, and carried to the wadí or peeling shed.

Peeling is performed with a small-round-pointed knife, having a projecting point on one side for ripping. The peeler sitting down on the ground beside his bundle of sticks, takes one in his left hand, draws a longitudinal slit from end to end, and works the knife between the bark and the wood till he has raised it about half an inch wide; he then turns the stick and draws another slit parallel to the former and working the knife on that side detaches the slip and so proceeds, rubbing such sticks as do not peel freely with a piece of hard wood. From time to time, as the work proceeds, the slips are packed, the convex side of one to the concave side of another, till about eight or nine inches wide, and about a foot and a half long; these packs are then piled in a small enclosure made by sticks driven into the ground, and when the day's work is finished, the heap is covered with scrapings and a mat is bound round it. This is called fermenting by some people, but it hardly amounts to a fermentation. The object is to keep in the moisture and soften the cuticle for the next operation.

Piping.—On the morning of the second day three sticks are driven into the ground at such an angle that they will cross each other about a foot high; they are tied firmly at the point of crossing and used for supporting the end of a fourth stick, the other end of which rests on the ground. The operator sits down on the ground before this fabric, and taking a slip of the bark places it on the stick, and holding the upper end firm, he then turns with his foot on the board. The tube maker is furnished with a board, about three and a half feet long, a measuring stick and a pair of scissors. He takes a bundle of the prepared slips, and sorts them into the various qualities; he then selects a slip suitable for the outer cover of the pipe, trims it and cuts the ends square with the scissors; then placing it on the board he proceeds to pack within it as many of the smaller pieces as will close over when dry; this done he pushes it along the board, adds another slip, till he has got the proper length, when he removes the pipe from the board and goes on with another. When the day's work is finished the pipes are arranged on parallel lines stretched across the shed, where they are left till they are firm enough for handling.

Handling is the final finish and consists of pressing in the edges of the outside pieces where necessary, and dressing the ends, after which they are spread on stages in the sun and covered with mats or kadjanis, as the direct action of the sun is apt to warp them. A well-made cinnamon pipe will be of

* This answers the question we put (p. 514) in regard to a statement in one of the quoted articles. What we doubted was exposure to the direct rays of the sun.—Compilars.
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uniform thickness, colour and quality; the edges will be neatly joined in a straight line from end to end; the joints of the various pieces that compose the cover will be close and neat; the ends will resemble a tight roll of paper, and the whole structure will feel firm and compact under the pressure of the finger and thumb. The size of the pipes will be according to the quality of the spice; the finer sorts will run from fifteen to twenty to the pound, and the inferior will range from ten to fifteen; the very coarse is generally stuck together with little regard to appearance.

The peeling seasons are supposed to begin in May and November, but are often later according to the rains; the flush follows the first rains of the season, and continues a longer or shorter time according to the quantity that falls. As the flush or young red leaf assumes the normal dark green, the sap begins to circulate between the wood and the bark, to form a fresh layer of the former; and while this circulation continues, the sticks peel freely, and these are the periods that must be seized for making the crop. It is well if the whole of the crop can be got out in one cutting over, but this is not often the case; if the season is not a good one it may have to be cut over two or even three times, and after all a good deal of the proper age be left. After every cutting one or more young shoots spring from every stump, and as the cuttings take place twice a year, there is consequently a succession of young wood of different age on the same wood. The bulk of the crop is grown in the second year, but if all the two years' growth is not cut in consequence of a bad season or an insufficient supply of labour, those sticks that promise to peel at next cutting are left, but in the operation of pruning every stick older than two years is cut out, peeling or not peeling; they are collected and carried to a depot, where they are sorted into peelleable and unpeelleable: the former are used for making coarse cinnamon, and the latter for chips. The pruning should follow the cutting as early as possible, and consists in cutting out all wood of more than two years' old, of reducing all stumps left too high, and removing all weak and crooked shoots and all superfluous branches.

Weeding should immediately follow pruning, and is done by digging a hole with the mamotie, of sufficient size to hold all the leaves, branches and weed for a space of about forty superficial feet more or less, collecting all this rubbish, treading it well down and covering it up; then putting the earth up round the stocks, as it was before, but never higher. Earthing up cinnamon stocks was a mistake of the first cultivators, which has entailed much otherwise useless labour on their successors. The roots of the plant run well under the surface, and travel far but with a mound of earth raised round the stock, and maintained for a long series of years, they are forced against their bias to throw roots into it, and when they have done so the practice may not be discontinued without injury; but anyone planting a new field should avoid perpetuating the error. The error of treating a plant near the stem is not confined to cinnamon, but may be seen in many other cultivations. The truth is that if any plant needs to have the soil it occupies broken up, or if it is to be manured, it is the digging done or the manure applied at the extreme ends of the roots that is most immediately beneficial.

If Sir Samuel Baker had ever seen a hole in which the weeds and leaves are buried turned up at the end of six months, and observed the matting of rootlets that bind it like a turf, he would hardly have ventured to assert that cinnamon did not need manure. He might fairly have said that in practice it got no manure, beyond the refuse of the land it grew on, and such a statement would be nearly as true this day as it was twenty-five years ago, but like most other plants cinnamon grows quicker and stronger where there is plenty of organic matter, than where there is but little or none. How a very rich soil or rich manure may affect the quality of the spice has not been proved, but Mr. Gabriel Croos declares that he has doubled the produce by the application of coconot poonac.

There can be no doubt that cinnamon will grow well under cultivation where it is found growing wild; the only question is the quality of the spice, and on those who undertake the cultivation will rest the risk. There is no question about the very low quality of the jungle article; cultivation will improve it, but the extent of improvement remains to be proved. It is just possible that it may take a place beside the old marks, and compete with them in the market, but it seems more probable, that cinnamon so produced will command a much lower position than Kadiraana and Ekala. It seems as if nature had granted to a limited region of Ceylon the monopoly of producing this article in perfection; all attempts to cultivate it in other countries have been failures; the Java gardens would never have paid the Dutch E. I. C. for a single year, had it not been for the Ceylon export duty. A French gentleman on the Malabar Coast long
carried on the cultivation and preparation—perhaps does so yet—and bestowed the greatest care, but never could get for his produce above one-half of the Ceylon prices; indeed, no cultivation of the plant outside or inside the Island has hitherto shaken the footing of the Alutkur Kurale in the market. The natural end and object in every plant is to produce seed, and where this is the object of the cultivator, he can do no better than cultivate in the chosen habitat of his plant, in the wild state, but cinnamon is not cultivated for its seed, and it is by no means inconsistent with other natural phenomena that the soil and climate that produce a strong seed-bearing tree may not be favourable for the secretion of a subtle essential oil lodged in the inner layer of the bark. This is, however, merely a priori reasoning, and except for the purpose of hypothesis has no place in a purely experimental science such as the cultivation of a plant for any particular purpose. The strong point for experimental cultivation within the natural habitat of the cinnamon plant is that such cultivation has never been tried and nothing but trial can decide the point of success or failure. The cinnamon laurel is just as hardy a plant as the coffee laurel, and a treatment that suits the one will suit the other, in the same climate. The reason why the former is difficult to rear is that the rainfall is less, the heat greater, and the soil less retentive of moisture. Take cinnamon to a climate where the temperature is ten degrees less and the rainfall twenty or thirty inches more, plant it in soil that a fortnight’s sun will not denude of moisture to the depth of a foot, and it will require no greater care than any other indigenous plant.*

It has been already said that the sticks are cut at two years’ growth, and that the bulk of the crops are obtained from wood of that age. In the low country new land gives a small cutting in the third year, and in a more moist climate the growth will probably be still quicker, and in the third year at all events some crops may be obtained.

Like most other plants cinnamon needs to be kept clean to make the most of it. The system of weeding already described is only applicable on a level surface and soil in which sand so greatly predominates that in the driest weather it remains loose and easily wrought; where those conditions are not, the planter will have to adopt a system suited to the circumstances under which he operates. The cinnamon plant has few enemies; cattle and goats eat the young shoots while tender; squirrels too destroy some. The principal insect enemy is a minute beetle, that breeds in the leaves, and sometimes does a good deal of injury, by retarding growth, and rendering the wood unhealthy and unpeelable. A red, articulated worm about two inches long cuts its way up the centre of some old and unhealthy sticks, growing on partially decayed roots, but the injury from this insect is hardly worth taking into account.†

Several of the larger proprietors have for some years past strongly competed for the highest prices at the sales; and sometimes one, sometimes another has prevailed. As a higher finish requires time and greater skill, this contention resolves itself into a money matter; if you want finer work you must pay higher for it; accordingly on some estates there is a scale of payments for quality, from 12s to 50 cents per pound. It is remarkable, however, that the estates that have always taken the highest average for their whole crops have never adopted this system, but have paid one fixed price for all qualities; it is therefore doubtful whether the bestowing of great labour and skill on a limited portion of the crops pays so well as fair average work at a medium price. The great object of the cinnamon planter is to secure his available crop within a limited time, and if he keeps a number of his best hands making smarta at less than one pound per day, while inferior hands make three or four pounds in the same time, at one-third of the price, he would need an ample supply of labour to secure his crops; more ample than most people can command. It has actually happened on a large estate on which this system was followed, that the crops fell off from 800 to 500 bales in a few years, and an awful lot of coarse cinnamon and chips had to be made before the estate could be restored to its old condition; this happened from literal obedience to the instructions of the proprietor, though he in all probability did not calculate that maintaining the honour and glory of his mark would cost him £2,000 or £3,000 per annum.

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* Cinnamon has recently been planted to a considerable extent on the older estates around Kandy,—in Dumbara, Nilambe, &c.—COMPIREL.
† A curious illustration of the fact that the function of the “white ants” is to dispose of dead wood without meddling with living, uninjured tissue is common in the Colombo cinnamon gardens, in the shape of “nests” of the termites built upon around cinnamon bushes, which latter continue to flourish all the same.—COMPIREL.
THE CULTIVATION OF CINNAMON.

(From the "Journal of the Eastern Archipelago.")

It appears from experience that the soil of Ceylon is more favourable to the growth of Cinnamon than to that of any other aromatic plant. A sandy soil is that which is generally selected for cinnamon, but other soils may be chosen also, such as a mixture of sandy with Red soil, free from quartz, gravel or rock, also red and dark brown soils. Such land in a flat country is preferable to hilly spots, upon which, however, cinnamon also grows, and even abundantly, such for instance as the hills of Ceylon which are known by the name of the "Kandyan Mountains." The soil that is rocky and stony under the surface is bad, and not adapted for the cultivation of cinnamon, as the trees would neither grow fast, nor yield a remunerative return.

When a tract of land of the above description is selected, the whole of the ground should be cleared, leaving a few trees for shade, so that the labourers might return for rest and relaxation; these may be from 50 to 60 feet apart. The trees felled should be well lopped, burnt and cleared away, the stumps should be removed with the roots, after which they may be allowed to remain, in order to save expense of carriage, merely by observing some degree of order in their disposition, by forming regular rows, of which the intermediate spaces are planted with Cinnamon. The ground being thus cleared, holes may be dug at 8 to 10 feet apart, a foot square; the distance from each plant will depend upon the nature of the soil,—that is, the poorer the soil, the nearer to each other should be the trees planted, and vice versa.

When this operation is over, the holes be intended for cinnamon roots, or stumps, the latter must be carefully removed with as much earth as can be carried up with them and placed in the holes, taking care not to return the earth removed originally in digging the holes, which are to be filled with the soil scraped from the surface, which has been previously burnt, exposed, and formed into manure. Should no rain have fallen after the placing of the roots in the holes, the stumps should be well covered, and watered morning and evening, until such time as the sprouts shoot out fresh buds, which will be in a fortnight or so from the time they were transplanted, when the watering may be discontinued. In a month, the new shoots will be 3 or 4 inches high,—this depends much upon the weather.

If the holes be intended for young plants or seedlings, the plant must be removed with holes of earth from the nurseries, and placed in the holes, taking the same care as with the stumps, both in watering and covering, in the event of its being dry weather. When the seedlings take root, the coverings should not be removed until the plants throw out a new pair of leaves from the buds, which is a sign of their having taken root.

When a plantation is formed of old stumps all the branches should be cut down within 6 inches from the ground;—this should be done with one stroke of a sharp instrument, in order to avoid the splitting of the stem. From these stumps cinnamon may be cut and peeled within 18 months from the time of transplanting. Often this is done after the lapse of 12 months from the time of transplanting.

From seedlings one cannot expect to gather a crop before two or three years from the time the plants were transplanted, when there will be but one or a single tree, which when cut down as already shewn, 4 or 6 inches to the ground ought to be covered with fresh earth gathered from the space between the rows, and formed in a heap round the plant. The next crop will be 3 or 4 times as much as the first, from the number of sprouts the stem will throw out, and so on every year, the crop increasing according to the number of sprouts each stem will throw out yearly from the cuttings. In the course of 7 or 8 years the space left between the rows will only admit the peelers and others to go round the bushes, weed, clear and remove cuttings, as the branches from each bush will almost touch each other at their ends.

It is essentially necessary to take every care not to allow any creepers or other weeds to grow: the former interfere with the growth of the bushes by entangling, because it (sic) not only takes out so much of the fat feeding the cinnamon trees, but interferes with the peelers during the cutting season and prevents the branches to grow up straight with a free circulation of the air. The plantation ought to be kept clean and free from weeds; the cinnamon requires no manuring, but when the plantation is weeded the bushes should be covered with the surface soil and raising the ground round the bush by making a heap of the earth, which answers well in lieu of manure. This
operation must be attended to as soon as the cinnamon sticks be removed for peeling. The plantation requires weeding 3 or 4 times a year during the first 2 or 3 years, then twice a year will answer the purpose—as by that time the trees will form into bushes and destroy the seeds of the weeds on the ground.

The forming of a nursery is necessary, for which a space of ground, say an acre, should be selected in a rich bit of soil, free from stones. Clear the whole of brushwood, only leaving the large trees for shade, remove all stones, stumps and roots, dig the place well 6 or 8 inches deep, then form into long beds of 3 or 4 feet wide, put the seeds down 9 or 12 inches apart, cover them 8 or 12 inches above the ground by a platform, and water them every other day until the seeds grow up and give one pair of leaves; then leave off watering (unless very dry weather—then it ought to be continued), but not uncover until the plants grow up 6 or 8 inches high, and can bear the sun, and these seedlings will be ready for transplanting after three months from the time they were sown.

The forming of nurseries is done at the close of the year before December. When this be done first, the party commences clearing and preparing the land during the dry season, which is from the beginning of December up to end of March following. April will set in with heavy rain (it is generally so in Ceylon) and will continue wet weather till the end of August, and very often till September and October, and have the benefit of 4 or 5 months' rain.

The cinnamon seeds are to be gathered when they are fully ripe: they must be heaped up in a shady place, to have the outside red pulp rotted; when it turns quite black, then have the seeds trampled or otherwise freed from the decomposed pulp, uninjuring the seeds, and have them well washed in water (just as done to cherry coffee, before they are made into parchement in the white shell), and have the seeds* well dried in the air without exposing them to the sun, and then put them in the ground prepared for their reception. In washing the seeds, those that float on the surface should be rejected.

There are five different sorts of cinnamon, viz:—

1st is called Panni Miris Kurundu.
2nd " " Tiththa " "
3rd " " Kahatte " "
4th " " Walli " "
5th " " Savel " "

Of these, the first kind is the best of all, the 2nd and 3rd although inferior are peeled likewise, the 4th and 5th are spurious.

The distinction in the cinnamon can be known both by taste and the shape of the leaves on the tree, and an experienced "Chaliya" man will judge the quality of cinnamon by first sight.

The quality of the bark depends upon its situation in the branch; that peeled from the middle of the bush or branch being the most superior or 1st sort, that taken from the upper end is the 2nd quality, while the bark removed from the base of the branch, or the thickest end, is the most inferior and called the 3rd sort.

From the cinnamon bark refused in the sorting store of all kinds, in separating the first, second and third qualities and in making up into bales for exportation, the refuse is collected, and by a chemical process, cinnamon oil is extracted, which sells very high, with an export duty of 32 or 1½ rupee on each ounce, exclusive of the British duties payable in England for importation, which is at present one shilling and three pence per ounce.†

From the cinnamon leaves, a kind of liquid is extracted in the same manner, which goes by the name of "clove oil," and is sold for a little less than cinnamon oil,‡ with a duty, I believe, as on cinnamon oil.

Of the cinnamon roots camphor is made, and sells well both in Ceylon and other parts of the world by exportation.§

* If cinnamon seeds after washing be exposed to the sun, even for twenty minutes, the shells will crack into two and destroy the seeds from growing.
† No export duties exist in the Straits Settlements.—Ed. [Nor in Ceylon.—Compilers.]
‡ At a vastly lower price.—Compilers.
§ We doubt if the camphor obtained from cinnamon roots was ever exported except as a curiosity. Even in Ceylon we have never heard of it being used, except in the form of candles at grand native marriages.—Compilers.

27
CINNAMON.

LAURUS CINNAMOMUM,

Belonging to a genus of the class and order Eucaudria Monogynia.

The roots of the Cinnamon tree are branchy and ligneous; the bark of these roots has the pungent smell of camphor, with the delicious odour of cinnamon, and yields camphor by distillation. The wood of the tree is light, fibrous and inodorous. The trunk is from 12 to 18 inches in diameter, rising to the height of from 20 to 30 feet; it grows irregular and knotty; the external bark is thick, rough and scabrous, and of an ash colour, the inner bark is reddish. The bark of the young shoots is often speckled with dark green and light orange colours. The branches are thick and spreading, and shoot forth horizontally or inclining downwards; they are covered with numerous oblong leaves growing in pairs opposite to each other; when first developed these leaves are of a bright red hue, then of a pale yellow, and, when arrived at maturity, of a dark olive colour. At full growth they are from 6 to 9 inches long and from 2 to 3 inches broad. The upper surface is smooth and shining and of a darker green than the underside. The petiole has the odour and taste of cinnamon. The plant blooms in January and February and the seeds ripen in June, July and August; many white flowers grow on one peduncle; they have no calyx. Their smell is, though not strong, exceedingly pleasant, resembling a mixture of the rose and lilac. The fruit is an oval berry larger than a black currant, and adheres in the manner of an acorn to the receptacle which is thick, green and hexagonal. The leaves when full grown emit a strong aromatic odour on being bruised and have the pungent taste of cloves.

Crowns and wood pigeons devour the berries with great avidity; in passing through them, the productive qualities of the seed remain unimpaired, and by this means the plant is disseminated over a great extent of country, it being found even in the thickest and most impassable jungles. Cattle of all descriptions eagerly feed upon its foliage; when the berries are first gathered, their taste resembles that of the juniper berry; they soon become dry and then assume the form of a small kernel contained in a thin shell. If boiled they yield and unctuous substance which when cold becomes solid like wax. It emits an agreeable odour, and may be formed into candles, which formerly were reserved for the exclusive use of the Kandyan Court.

The prepared bark of this tree is the cinnamon of commerce. Diversities in the quality of cinnamon do not appear to arise from any varieties of the plant, but from care and skill in the preparation, the soil and exposure of the country, the age and health of the plant. It is rarely found worth collecting except on the southern and western aspects of the island. Beyond certain limits the bark is never of a good quality, as it is powerfully affected by local circumstances. The Karuwa of the Malabar Coast has been considered by many botanists as indetical with the Laurus Cassia, but it is said that specific difference can be discovered between the Cinnamon tree of Ceylon and the Karuwa. The prepared bark of the Karuwa is according to good authority inferior to the best Ceylon cinnamon. It is however allowed to be superior to the produce of the cinnamon tree which is found on the northern and eastern part of the island. Linnæus deceived by the name of Laurus Cassia was miscld, and ascribes qualities to that tree which it does not possess. The cassia bud of commerce is not the produce of the Laurus Cassia, but it is the fleshy hexagonal receptacle of the seed of the Laurus Cinnamonum. When gathered young the receptacles completely envelope the embryo seed, which progressively protrudes, but continues firmly embraced by the receptacle. The buds are of various sizes, having the appearance of nails with roundish heads. If carefully dried the receptacle is nearly black. These buds are not prepared in Ceylon.

The cinnamon plant delights in a sitificous soil with an admixture of vegetable mould, in which only it produces the sweet taste, aromatic smell, and the pale brown or russet colour which renders it so valuable as an article of commerce, and useful as a spice; for it has generally happened that plants even of the genuine kind, when grown in valleys on marshy ground or those subject to inundations, lose their characteristic properties; the plants growing in Batticaloa and Chilaw, which are allowed to be of the genuine kind, are deficient in smell and taste and are consequently less useful or valuable; and the cinnamon grown in the valleys of Moronea [Morawak Korale.—Compilers.] the soil of which is marly, yields a bark of inferior quality. Again the plants which were raised in Bombay, from seeds and seedlings sent thither at an early period of the British rule in this island, although they grew luxuriantly, produced bark of an inferior quality which was not valued as an article of commerce.
Besides the inferiority in smell, taste and colour, which invariably mark plants grown in any other than a silicious soil, a disadvantage of no little importance to the grower has been observed to follow. Whilst the stumps of plants grown in silicious soil shoot forth rapidly and are fit to be peeled a second time, within a period of but four or five years, and produce bark superior in quality to that peeled at first, those grown on a hilly or marshy soil require a time of not less than six years before they can undergo a second peeling, and yield bark less in quantity and inferior in quality to that peeled at first.

When the ground is prepared in planting cinnamon, the low brushwood and young trees are cut down, but lofty trees are allowed to remain at intervals, as it is found that the tender plants thrive better under their shade than when exposed to the direct rays of the sun. The planting usually takes place when the seeds are ripe. For this purpose a line is stretched across the ground, and guides are formed by it by planting two or three per foot square. Hands of six or seven feet. The brushwood and branches having been previously burnt, their ashes are then spread upon the newly dug spots, and into each of them four or five cinnamon berries are sown in holes made with a dibble; they are then covered with earth, and branches of trees are laid over the parts to prevent the earth from becoming parched, and to protect the young shoots so soon as they come forth. This takes place in about 15 or 20 days; sometimes the berries are sown in nurseries and the young plants are transplanted in the month of October and November. In favourable situations, shoots attain the height of five or six feet in about six or seven years, and a healthy bush will then afford two or three shoots for peeling. In a good soil every second year from four to seven shoots may be cut from one tree; thriving shoots of four years' growth are sometimes fit for cutting. As four or five seeds are usually sown in one spot and in most seasons the greater part germinates, the plants grow in clusters "not unlike a hazel bush." If the season be unusually dry, many of the seeds fail, while the want of moisture is often fatal to the young shoots, so that it is sometimes necessary to plant a piece of ground and several times successively. A plantation of cinnamon, even on good ground, cannot be expected to make much return until after the lapse of eight or nine years. [In Ceylon we suppose 4 or 5 years.—Compilers.]

This plant is likewise sometimes propagated from shoots, cut from large trees or by layers, or lastly by transplanting large stumps. The method of culture by seeds is considered the least advantageous, and the trees are longer before they arrive at perfection. If cultivated from shoots the sprouts must be continually watered, or they will not thrive. Those selected for the purpose should be very young, not having more than three leaves, if older they die.

The third method by layers is recommended by Dr. Wright [Wight.—Compilers.], since the numerous side branches which issue from the bottom of the trunk always furnish a plentiful supply well adapted for laying.

The transplanting of the old roots is a plan of modern adoption, and the practice is much approved, since they yield shoots of the usual size twelve months after they have been placed in the ground. Great care is however necessary in their removal, for should any of the rootlets, even of one-tenth of an inch diameter, receive injury, the whole root will certainly perish. Zimmern mentions a fifth method of cultivation, or rather a manner of obtaining cinnamon of superior quality. When the tree is cut down and a fire kindled on the spot to consume the stumps, the roots afterwards throw out a number of long straight shoots which yield incomparably fine cinnamon. From these are cut the cinnamon walking sticks, which in appearance resemble those of the hazel tree, and retain the taste and smell of cinnamon. They have no scent, however, unless when the bark is rubbed.

The peeling process commences early in May and continues until late in October. When a Chaliya perceives a shoot of a proper growth, he strikes an instrument which resembles a small bill-hook obliquely into the shoot. He then gently opens the gash to discover whether the bark separates freely from the wood; should this not be the case, he leaves the sucker for a future time; some shoots never arrive at a fit state for decortication. Plants of several years' growth sometimes bear numerous marks of annual experiments made for the purpose of ascertaining whether the bark were in a favourable situation for being removed.

The shoots which are cut are usually from a half to three-quarters of an inch in diameter, and from three to five feet long. Some travellers in former times asserted that the cinnamon was peeled from the tree while standing, and that nature provided the decorticated plant with a new bark. It is said that the experiment has been recently tried on several plants, all of which died in consequence.
The shoots being cut are tied in bundles and carried to sheds appropriated to the preparation of the cinnamon.

Being cleared of small shoots and leaves, two longitudinal slits are made in the bark, which is gradually loosened with the convex side of the knife, and then, usually, half the circumference of the bark comes off in one entire slip. When the bark adheres firmly to the wood, it is strongly rubbed with the handle of the peeling knife until it is disengaged and stripped off. The sections of the bark thus obtained are carefully put one into the other, the outer side of one piece being placed in contact with the inner side of another, they are then collected into bundles and firmly pressed or bound together.

In this state the bark is allowed to remain for twenty-four hours or sometimes for a longer period, by which means a degree of fermentation is induced that facilitates the subsequent operation of removing the cuticle. After being subjected to this treatment the interior side of each section of bark is placed on a convex piece of wood, and the epidermis, together with the greenish pulpy matter immediately under it, is carefully scraped off with a curved knife. This is an operation requiring some nicety, for if any of the outer bark be allowed to remain, it gives an unpleasant bitterness to the cinnamon. In a few hours after the removal of the cuticle, the pieces are put one into the other, the bark dries, contracts, and gradually acquires the appearance of a quill or pipe, the whole forming a congeries of quills more than a foot in length. During the first day the cinnamon is suspended under the shelter upon open platforms, and on the second day it is placed on wickerwork shelves and exposed to the sun. When sufficiently dry it is made up into bundles of about thirty pounds weight each, and these are deposited monthly in the Government Magazine of Colombo, where, previous to preparing them for shipment, they undergo an examination by experienced native sorters under the superintendence of an European appointed for the purpose.

The bark of large shoots or thick branches of trees produces coarse cinnamon; occasionally the external pellicle of this sort is scraped off, which thins the cinnamon and improves its colour. It is however, even then, thicker and of a darker colour than that of a good quality, while it is of a very inferior flavour and is disagreeably pungent. This sort is always rejected by the inspectors as unfit to be exported to Europe. The bark of very young and succulent shoots is likewise of an inferior quality, and is not admitted among the Company's bales. It is very thin and of a light straw colour, of very little flavour and that evanescent: shoots exposed during growth to the direct rays of the sun have their bark more acid and spicy than the bark of those which grow under a shade. A marshy soil rarely produces good cinnamon, its texture under this circumstance being coarse grained and spongy, while its possesses very little aroma.

It is hardly possible to discover the cause which produces the varieties in the quality of the bark, since branches from the same trees are found to yield cinnamon of very different qualities.

The best Ceylon cinnamon is thin, smooth, and shining, and of a light yellow colour; it admits of a considerable degree of pressure and bends before it breaks, the fracture is thin and splinterly. It has an agreeable warm aromatic flavour with a slight degree of sweetness.

When masticated, the pieces become soft, and seem to melt in the mouth.

From cinnamon which has been rejected for shipment, oil is usually extracted; best oil of cinnamon sinks in water, but when inferior it is of smaller specific gravity. A very large quantity of bark is required for obtaining only a small portion of oil; it is reckoned that 80 lb. of newly-prepared cinnamon yield about 5½ oz. of heavy oil and 2½ oz. of light oil. Cinnamon is packed in bales for exportation being bound with ropes, and then put into double gunnies. It is the usual custom to send black pepper among the bales; this practice originated with the thrifty Dutch, since by filling up the interstices between the circular packages with peppercorns, tonnage was economized. If there were no pepper, coffee was substituted. Thunberg attributes peculiarly excellent effects to this method of packing with pepper.

E. BODDAM,

Mysore Gazette.

On Special Duty.

* Is cinnamon bark now ever thus exposed to the sun?—COMPILERS.

† Cinnamon is now, except in the case of "chips," invariably made up in bales of 100 lb., carefully oov ered with gunny cloth.—COMPILERS.

‡ This article was of course written while the East India Company and the Ceylon Government Cinnamon Establishment existed.—COMPILERS.
CINNAMON.

A TRIP THROUGH SOME OF THE CINNAMON (AND COCONUT) DISTRICTS, CEYLON.

Having had occasion during this month to pass through some of our favourite cinnamon districts on business, I lay a few notes of my observations before your readers. First in order of merit, though not in the order of my visit, comes Goluapokuna, the premier cinnamon estate. The extent of this magnificent property is 1,100 acres, about a half of which is under coconut, not planted in the usual style amongst the cinnamon, but in separate fields alternating with cinnamon. This estate is superintended by Mr. Raoul Fiechault, the oldest and most experienced Cinnamon Planter in the island, whom I was very glad to meet after a long interval, and who is looking as buoyant and youthful as ever. As assistants he has Messrs. Nicholas and Campbell, the former a son of the Rev. Nicholas, and the latter a son of the late Mr. A. Campbell of the P. W. D. The estate is in two divisions, each division being under the supervision of an assistant, and as the working accounts and produce of each division are separate, and the cinnamon is separately shipped, a spirit of healthy rivalry is fostered between the assistants to work economically, and turn out the best samples of cinnamon. The quilling of cinnamon here has gone as near perfection as possible; the average number of quills to a pound of all the qualities reaches about 35, while minus the 4th quality the number averages about 45 to a pound. Your readers, who do not deal in cinnamon, can form some idea of the fineness of the quills, by being told that the cinnamon sold to the Fort houses averages from 15 to 20 quills to the pound! Everything may be overdone, as I believe this is, for quality is undoubtedly sacrificed to quality. Work like that I have indicated takes a deal of time to do, so unless the estate can command an unlimited number of peelers, all the crop cannot be taken in during the season, and the peelable sticks become coarse. I suppose Mr. Smith, the rich and fortunate possessor of this splendid estate, does not mind this, as long as his cinnamon tops the market. By the way, it is right to mention that the rate of payment to peelers on this property, as on Mr. Rajapakse's too, I believe, is higher and very naturally than on the generality of estates. While other estates pay 16 cents for the quilling of the first three qualities of cinnamon, and 12 cents for the 4th quality, this estate pays 21 cents for what is termed superior cinnamon, 19 for the first three qualities, and 12 cents for the 4th quality. As the 4th quality of cinnamon on this estate is about the thickness only of what is known as 1st in the Fort houses, I conclude that the coarser sticks are scraped, and the outturn of chips is very high.

The coconut topes belonging to this estate are very highly cultivated. They are ploughed at intervals, and the trees manured with bones, castor cake and cattle manure. The questions that naturally arises in one's mind is, why should coconut trees be manured with castor cake when coconut poonac, a product of the tree, is available? I cannot answer the question, for I have nothing to do with the management of the estate. If, like the Horrekelly estate and the estates of Messrs. Gabriel Croos and Akbar, machinery were erected for pressing and combing fibre, heaps of available manure could be had in the resulting poonac and coir dust. And if the hundreds of acres of swamp which intersect the estate be used for Paddy cultivation, hundreds of cattle could be stall-fed under the very coconut trees, with poonac and paddy straw, so that not a particle of valuable dung or urine would be wasted. They will be applied direct to the trees, saving the cost of application, all that is needed being ploughing to thoroughly mix the manure. The Deauville Railway, which can be easily laid down and worked, and as easily taken up on this flat estate would be very useful to transport crop, cattle-food, &c. That a go-ahead coffee planter, with new products on the brain, has something to do with this estate, becomes evident after seeing the attempts made to grow the various kinds of Rubber, Cacao, Liberian coffee, &c. No part of this estate is suitable for the growth of any of the products I have named, as most of the estate is sandy, and the bungalow is situated on a cabook hill, through the soil of which hardly anything but the roots of large trees could penetrate. As Ceara Rubber is said to grow anywhere, perhaps the sandy soil, if it does not exactly suit it, will permit of its growing. The Visiting Agent of this estate evidently believed, without reservation, the wonderful growing powers it attributed to Ceara Rubber when it was introduced, for I see a water-logged swamp,
more fit to grow the Sago palm than Ceara Rubber, planted with this product. All I can say of the plants are that they are growing. Perhaps the Agent will triumphantly say that, after all he is not as gullible as he seems to be; but the plants are as yellow-stunted and sickly-looking as plants could well be. You may remember that Mr. Borron put some cuttings of Ceara, in a bare rock and heaped pieces of rock in them, to see whether they would grow if pressure were on them. Being disgusted that the cuttings did not grow, he communicated his disappointment to the Observer. As I have to notice the appearance of a few other estates before reaching Negombo, I had better proceed.

Kimbulapitiya, which adjoins Goluwapokuna, is another fine property. The old and venerable part-proprietor of this estate, Mr. Young, lately came by his death under very painful circumstances in Kandy. With that plucky spirit which is the birthright of the Britishers, he indulged in a form of exercise which hardly became his years. Though repeatedly warned by his friends, he persisted in riding a spirited horse, till he was thrown down and died. This property is under the supervision of Mr. Carry, a son of the late superintendent, another old planter who died recently. It does not appear to be so carefully worked as its neighbour. If the Superintendent took a leaf out of the book of experience of his neighbours and went in for high shade for his cinnamon, by topping off the low, overhanging branches of the large trees, it would add greatly to the appearance of the estate, and to the growth of the cinnamon under them. On looking over these old cinnamon estates, one is struck with the utter absence of roads on them, and wonders how efficient supervision is compatible with this want. This estate is said to possess a splendid field of coconut-palms, the nuts of which are said to be superior in thickness of kernel to those of even highly-cultivated Goluwapokuna.

Between Kimbulapitiya and Mr. John Carl Fernando's estate lie a few small pieces of low-lying cinnamon land belonging to natives. The carefully trimmed and impregnable (to cattle) cadu fence on Mr. Fernando's estate, arrests attention. This style of fence is as cheap and effective as one could wish to have, and withal it is pretty. Cadu nuts are planted along the line of fence about a foot apart; when about a cubit high, the plants are bent down and twisted one with another. Shoots are thrown out by these, which in turn receive the same treatment, till you get up your fence to the required height, when all that is done is to trim the fence. Through this fence no animal larger than a hare can creep. I suppose this fence grows best on sandy soil, as I have planted the nuts on soil which is not sandy, and two years' growth hardly reaches a cubit. This estate has cinnamon and coconuts growing together, a mistake on poor sandy soil, and the look of the coconut trees suggests that thorough drainage has been too long delayed. Perhaps better management than a conductor's, although more expensive, would have assured better cultivation. The few other large properties passed before Negombo is reached, also suggest that sufficient importance is not attached to thorough-drainage in low-lying and swampy situations. Negombo is at last reached. The appearance of the highly ornamental street lamps is striking. They supply a great want on dark nights. The town is clean, and trade appears to be brisk.

From Negombo I must "hark back" to Heneratgoda, as the journey I undertook was from that station to Mahara inland, via Ekele. The first cinnamon estate met with is Gálila, at one time a crack estate. It has passed through strange vicissitudes. It was at an early period in charge of that veteran cinnamon planter, Fredrick Schrader. It is generally believed that Messrs. Stevenson and Lawrence made their money by this estate, having bought it at a low figure, and sold it after a few years' residence on it to Denis Aratchi, till then a conductor on an adjoining estate belonging to the Messrs. Armitage, for somewhere about £14,000. It was when managing this estate that Mr. Stevenson first tried the English market with chips. His effort met with success, and the high prices for cinnamon then ruling so stimulated this new industry, and gave it so firm a footing that growers, in spite of plain figures being placed before them, and the opinion of grocers and respectable agents in England, still cling to the trade in chips with a blind tenacity. Owing, it is said, to this estate being purchased with borrowed capital, the recent low price of cinnamon, and the prodigality of a member of the old man's family, the condition of this place has been going from bad to worse, till one sees acres and acres of once fine cinnamon quite snuffed out. What
remains is quite stunted in growth, the result of long-continued neglect. Some agreement was lately entered into by which the creditor or his agent, either took over the property or advanced money for its working; but up to date no appreciable difference in the state of the estate is to be seen.

Next in order comes the estate once belonging to Arbuthnot & Co., and till lately superintended by Mr. Raoul Piachaud of Golupokuna. When this estate was for sale seven or eight years ago, offers, it is said, were made for it reaching up to £16,000. The agents were willing to close at this figure, when Mr. Piachaud wrote valuing the place at £18,000. Offers rose till Messrs. Loos, Staples and Wijeyasekere took over the property at that figure. This was during the time of high prices—when there were instances of gambling in cinnamon lands. Before, it is said, the money was paid down, the present owners offered £21,000, and so became the purchasers of this fine property. So that the other three each received £1,000 simply for their pluck in offering £18,000 for it. This estate does not seem to be quite so energetically worked now as before, probably owing to continued low prices for cinnamon.

Still another instance of high price for cinnamon land. A choice 100 acre block of the first noticed Gallà estate was bought 5 or 6 years ago at the rate of Rs50 the acre. This fine compact property and the Ekele estate, which belonged to the late Mrs. Driebberg, are perhaps the most carefully-worked cinnamon estates in the Island. The Planter-Proprietor is a firm and consistent believer in high cultivation, and, notwithstanding depressed times, these properties are as clean as a well-kept garden and attract the attention of every passer-by. You may remember having taken one of late from the Observer, a para written by a man from the hills, who had gone to the Jaela resthouse for a change, and who in his walks passing these properties was struck with their order, as regards weeding and pruning. His experience is the experience of every passer-by. Mr. Driebberg received his first training as planter on a coffee estate of the Messrs. Rudd, under Mr. Forbes Laurie. On his mother purchasing Ekele estate from the estate of the late Mrs. Raymond, he went up to serve his apprenticeship under Mr. Piachaud. As after results show, the training he got was useful. The cinnamon of these estates, as can be seen by the published price lists, comes third in order, Golupokuna and Mr. Rajapakse’s cinnamon being first and second; but, as I said in my last, they obtain a special-quantity of cinnamon by paying special prices. While there I saw the cinnamon Mr. Driebberg was preparing for the Show, and I think he can safely challenge the world to beat the samples, seeing that the cinnamon cultivation is confined almost exclusively to our tight little Island. Although he did not get the Gold Medal at the Exhibition, he fully deserved it, and he has the satisfaction of knowing that the sympathies of the public are entirely with him. While on this subject I think it not fair to Exhibitors that those sending exhibits should sit in judgment on what they send. Perhaps you may be aware that Mr. Driebberg was the Gold Medallist at the previous Show, and was awarded the Gold Medal at the Melbourne Exhibition together with Mr. B. Spink for the best Cinnamomum zeylanicum.

While at Mr. Driebberg’s bungalow, an old peeler with recollections of the Dutch period dropped in. He recounted his experience as a peeler under the Dutch rule. There were no regular gardens then, and cinnamon grew in the jungles. A census of the peeler population was kept, and every head of a family was ordered to deliver at the Government stores a certain quantity of cinnamon annually, the cinnamon to be cut from wherever it was growing on Government or on private lands. At the appointed time the village Headman was to accompany the peelers with their cinnamon to Colombo, when each man’s cinnamon was weighed and taken over. The poor unfortunate who, from idleness or any other cause, delivered a quantity less than that ordered, were publicly whipped at Galle Face ladies being assembled at the “upstairs house” to witness the whipping.

The Dutch knew the requirements of the outside market, and all the cinnamon they had in store beyond requirements was burnt. (A lesson for cinnamon growers of the present day on scrapings chips.) It is not to be supposed, the old man said, that this compulsory labour was done gratuitously. Each of the registered families received a bushel of rice, a measure of salt, and 7s. 6d. monthly. With a chuckle, and an attempt at a twinkle of his now sightless eyes, the old man related how they, the peelers, made capital of their calling. Enjoying as it did the monopoly in cinnamon, the Government watched all brushes wherever growing with a jealous care, and promptly and severely punished all those guilty of destroying a cinnamon bush, even those on private lands. Whenever a man felled a piece of jungle to cultivate it, a peeler would on the sly scatter a
few branches of cinnamon on the land, and go to his hut and charge the goya with wilfully destroying a cinnamon bush, and as proof point out to him the branches scattered on his newly-opened land. To purchase silence, and save himself punishment, the frightened land-owner would give the man a bribe of rice, coconuts, &c. So that a peeler in those days must have been a privileged individual. This old man with commendable foresight has provided for his funeral, which cannot be very far off, considering his great age, by having a coffin built for himself. He has also given the customary dhana or almsgiving for the repose of his soul. So that now all he has to do is to die.

Leaving Ekele, I drove along the Colombo road to the Mahara Station. This fine road always admired for its evenness, is now in a most wretched state, and is a succession of ruts along both the wheel tracks. Travelling as I did in a hackery, it was far from comfortable. Just as one wheel got out of a rut the other entered into one, giving the hackery something of the motion of a pulper sieve. As a result, however forward I might be sitting, a few jerks brought me to the back of the hackery, and just as I was about to be pitched out, I gathered myself and moved forward, only to go through the same movements again. As this pitching-out process was going on incessantly, you may gather I was pretty well shaken before the turn to Mahara was reached. It served me one good turn. It made my liver, which was getting torpid, act; but the remedy was worse than the disorder.

Between Jaela and the Mahara turn a good few cinnamon estates are passed. First in order comes Mr. De Breard’s, a fine compact little property, which will not suffer in appearance or in the working, if visited oftener: but it is said to abound in snakes. Bolawatte, a fine property, looked peculiar, as travellers along the road were able to “overlook” the property, owing to the short growth of the cinnamon. There is a wonderful change in the appearance of the place now—it seems to be growing. Kapuwatte is an estate in which cinnamon and cocoanuts are grown together. The unsuitability of the land to grow the products together is clearly indicated by the sickly yellow colour of the coconut branches. The local agent of the former owner of this property is said to have given it to the present proprietors at a figure lower than others offered for it. The great harm done to valuable properties in the hands of greedy lessees, is shewn in the weedy state of this place. Welisara estate too looks neglected. Mahara being reached and my notes ended, I must say good-bye.—Ceylon Examiner.”

CINNAMON.
(From the “Encyclopaedia Britannica.”)

Cassia Bark is the aromatic bark derived from various species of Cinnamomum other than C. zeylanicum, which is the source of the true cinnamon of commerce. The greater part of the supply coming from China, it is sometimes termed Chinese cinnamon. The tree or trees which yield the Chinese supplies are very extensively cultivated throughout the southern provinces of that empire, and grow with little care or attention in situations unsuited for others forms of cultivation. From various species of Cinnamomum, cassia is also obtained in Northern India and Nepal, in Java, Borneo, Sumatra, and the Philippine Islands. The bark is imported into England in bundles, which are from 1 foot to 18 inches in length, and weigh about 1 lb. The bundles consist of quills of bark from half an inch to an inch in diameter, generally single, rarely double. The bark is much thicker than that of true cinnamon; the taste is more pungent and the flavour less delicate, though somewhat similar to that of cinnamon. A large quantity of thick, woody bark, of inferior quality, is now imported under the name Cassia vera, or Wild Cassia. The properties of cassia bark depend on the presence of a volatile oil—the oil of cassia, which is imported in a pretty pure state as an article of commerce from Canton. Cassia bark is in much more extensive demand on the Continent of Europe than in Great Britain, being preferred to cinnamon by Southern nations. Both oil and bark are useful in medicine; but their chief use is for flavouring liquors and chocolate, and in cooking generally. When ground as a spice it is difficult to distinguish cassia from cinnamon, and it is a common practice to substitute the cheap common spice for the more valuable article. The adulteration may be detected by the behaviour of a decoction in presence of iodine, which, in the case of cinnamon, produces little effect, but
with cassia strikes a deep blue colour. *Cassia Budia*, which have a pleasing cinnamon flavour, are the immature fruits of the tree or trees which yield Chinese cassia. They are brought in considerable quantities from Canton, and used as a spice and in confectionery. Some confusion occasionally arises from the fact that *Cassia* is the generic name of an extensive genus of leguminous plants, which, in addition to various other medicinal products, is the source of the senna leaves which form a most important article of materia medica.

**Cinnamon** is the inner bark of *Cinnamomum Zeylanicum*, a small evergreen tree belonging to the Natural Order Lauraceae. The leaves are large ovate-oblong in shape, and the flowers, which are arranged in panicles, have a greenish colour and a rather disagreeable odour. Cinnamon has been known from the most remote antiquity, and it was so highly prized among ancient nations that in very small quantities it was regarded as a present fit for monarchs and other great potentates. It is mentioned in *Exod.* xxx. 23, where Moses is commanded to use both sweet cinnamon (*Kinnamomum*) and cassia. It is likewise alluded to by Herodotus under the name *Kinnamomum*, and it is frequently mentioned by many other classical writers. It is now almost exclusively a product of Ceylon, but the origin of the plant and the derivation of its name are matters of considerable doubt and dispute. The Arab traders, by whom the trade in this and other Oriental spices was conducted in ancient times, surrounded the history and production of these precious and lucrative products with grotesque tales of mystery. It is contended by some that cinnamon was originally obtained from the promontory of Gardafuli (the region of classical geographers), while others lean to the opinion that it was brought from China, whence the chief portion of the closely-allied cassia bark is still derived. Although as the product of Ceylon, cinnamon did not come prominently into the market till the settlement of the Portuguese in the island, it is the opinion of the best authorities that the tree yielding it is indigenous, and certainly no other situation and climate have yet been found where the trees flourish so well and yield a bark so fine and so delicately aromatic.

The cinnamon gardens are confined to a strip of country in the neighbourhood of Colombo. When the trade was at its best, five of the principal gardens measured from 15 to 20 miles in circumference, but now the area of cultivation is very much restricted, and plants which were at one time tended with the greatest care, and guarded with inhuman jealousy, are choked with the natural profusion of jungle vegetation. The bark is taken from shoots of eighteen months or two years growth, in which time they attain a length of from 6 to 10 feet, and a thickness of from 1/4 to 2 inches. The plants are managed on the coppice system, and only four or five shoots are allowed to grow up from each stool. The shoots are cut down twice a year after the rains, and the bark is detached in lengths of about a foot. After lying in bundles as taken from the shoots for about a day, each separate piece is carefully scraped to remove the outer and middle layers of the bark, and the remaining portion is thereby often reduced to the thickness of one-hundredth part of an inch. The pieces are then made up into composite quills by placing the smaller pieces inside the larger, and thus the cinnamon is often formed into straight firm rods of from 3 to 4 feet in length. After drying in the sun the bark is ready to make up into bundles for exportation.

Cinnamon of an inferior quality is grown in Southern India at Telli-cherry and Tinnevelly; and in Java the cultivation was introduced by the Dutch about the year 1825. The plant has also been grown in the colony of French Guiana, and in other localities. The produce of none of these places, however, approaches in quality to the cinnamon of Ceylon, which also the largest proportion of the entire consumption is supplied. Nearly the whole quantity prepared in Ceylon is brought to the British market. The value of Ceylon cinnamon submitted to the English Board of Trade, was in 1874 more than 2s. 2d. per lb., that from other localities being estimated at about 10d.

Ceylon cinnamon of fine quality is a very thin smooth bark, with a light-yellowish brown colour, a highly fragrant odour, and a peculiarly sweet, warm, and pleasing aromatic taste. Its peculiar flavour is due to an aromatic oil which it contains to the extent of from 0.5 to 1 per cent. The essential oil of cinnamon, as an article of commerce, is prepared chiefly in Ceylon, where the coarser pieces of bark are used for its extraction. These
CINNAMON.

are roughly powdered and macerated in sea water for two days, when the whole is quickly distilled. The oil is of a golden-yellow colour, with the peculiar odour of cinnamon and a very hot aromatic taste. It consists essentially of cinnamic aldehyde or the hydrate of cinnamyl, and by the absorption of oxygen as it becomes old it darkens in colour and develops resinous compounds with cinnamic acid.

Cinnamon is principally employed in cookery as a condiment and flavouring material, being largely used in the preparation of some kinds of chocolate and liqueurs. In medicine it acts as an aromatic stimulant and cordial; but it is chiefly prescribed for improving the flavour of bitter substances and to correct the griping action of purgatives. Being a much more costly spice than cassia, that comparatively harsh-flavoured substance is frequently substituted for or added to cinnamon. The two barks when whole are easily enough distinguished, and their microscopical characters are also quite distinct. When powdered bark is treated with tincture of iodine, little effect is visible in the case of pure cinnamon; but with cassia a deep-blue tint is produced, the intensity of the coloration depending on the proportion of the cassia.

CINNAMON.

(From "Spoon's Encyclopaedia.")

Canella, or Canella Alba. (Fr., Canelle blanche; Ger., Canella) — The bark of Canella alba has aromatic stimulant properties. The tree grows to a height of 20—30 or even 50 ft., in the Bahamas, several of the W. Indies (Barbados, Cuba, Guadaloupe, Jamaica, Martinique, St. Croix, Trinidad), and in S. Florida. The bark is collected by subjecting it first to a gentle beating, to remove the suberous layer, and an additional one to effect a further separation; it is then peeled off, and dried, ready for export. It is now shipped solely from the Bahamas (Nassau, New Providence I.), where it is called "Whitewood bark," or "Cinnamon-bark"; the exports, in 1876, were 125 cwt.; the market price is about 24—30s a cwt. The drug reaches us in the form of quills, 2—8 in. long, ⅛—1 in. wide. It has a bitter, pungent, acrid flavour, and an agreeable cinnamon-like odour, which it retains for centuries; even its corky coat is fragrant. Its medicinal use in Europe is decaying; as a condiment, it is used by the W. Indian negroes. It is often confounded with Winter's-bark. The powder mixed with aloes forms the Hiera Picra of the druggists' shops.

Cinnamon and Cassia-oils. — An essential oil, erroneously called "white cinnamon," is obtained by the aqueous distillation of the bark of Canella alba; it is a mixture of caryophylllic (eugenic) acid, an oil resembling cajuput, and an oxygenized oil. It is not a commercial article.

Essential oils of considerable importance are derived from the true cinnamon of Ceylon, Cinnamomum zeylanicum. Foremost is that yielded by the bark, to the extent of ½—1 per cent., which is extensively distilled (aqueous) in Ceylon, and rarely in England. It is a golden-yellow liquid with powerful cinnamon odour, sweet and aromatic but burning flavour, and sp. gr. 1.035. It is largely used in perfumery. Ceylon ships some 15,000—40,000 oz. annually of this oil, chiefly to England. A century ago, the average yearly sales by the Dutch E. India Co. were but 176 oz. The leaves afford a brown, viscid, essential oil, of clove-like odour, sp. gr. 1.053, sometimes exported from Ceylon; and a third oil is supplied by the root,—a yellow liquid, lighter than water, with an odour of camphor and cinnamon, and a strong camphoraceous flavour.

Various species of Cinnamomum occurring in Tropical Asia afford the so-called "cassia-bark." From this bark, is distilled, notably in China, an essential oil agreeing chemically with that of Ceylon cinnamon bark, but of less agreeable odour, and sp. gr. 1.066. The yield by distillation is about 3 lb. of oil from 1 cwt. of bark. The oil is an export of no small importance from some Chinese ports. Pakhri shipped 66,650 lb. in 1877, and 200 piculs (of 133 lb.) in 1879; Macao exported about 480 piculs in 1879. A large proportion comes to Great Britain, but Hamburg seems to be the most important destination. The oil is used for perfuming soaps.

Cassia (Fr., Cassie; Ger., Cassia). — The bulk of the spice known as cassia, or "Chinese cinnamon" as it is frequently called on the Continent, is produced by an undescribed tree of S. China, chiefly growing in Loting and Luehpo (in Kwangtung province), Taiwao (in Kwangsi), and in Kweichow, and found in about 19° N. lat. in the forests of the Le Ngum valley,
on the left bank of the Mekong, near the Annam frontier. The tree is generally referred to as *Cinnamomum [Cassia] aromaticum*. It is said to grow with little attention in situations unsuited to other crops. The bark of the tree, forming "cassia lignea," occurs in small bundles about 1 ft. long and 1 lb. in weight, bound up with split bamboo. It has been stripped off the tree by running a knife along each side of the branch, and gradually loosening it; it is then allowed to lie for 24 hours, undergoing a sort of fermentation which permits the epidermis to be easily scraped off, the bark soon drying into the form in which it appears in the market. The quills bear a close resemblance to cinnamon, but are less uniform and less carefully prepared. They are thicker and harder than cinnamon, and rarely consist of more than two quills, one rolled in the other. There is no doubt that the powdered bark is very largely substituted for the higher priced cinnamon, discrimination between them being a matter of some difficulty. The most reliable tests yet made known for their distinction are given by Henhner, in a paper read before the Society of Public Analysts, Nov. 19, 1879, the main deductions from his observations being: (1) The proportion of ash in cinnamon is pretty constant (4.59-4.73 per cent), cassia lignea giving much less (1.84), and cassia vera nearly the same as cinnamon (say 4.08); (2) the amount of ash soluble in water is 25.04-28.98 per cent in whole cinnamon, about 18 in chips, 8.15 in cassia vera, and 26-40 in cassia lignea; (3) the proportion of oxide of manganese is never more than 1 per cent (0.13-0.97) in cinnamon, but over 1 (1.13-1.53) in cas-ia vera, and 3.65-5.11 in cassia lignea; (4) the cinnamon ash is always white, or nearly so, while both the cassia ashes are grey or brown, and yield abundance of chlorine on heating with hydrochloric acid. The young branches of the tree affording cassia lignea are collected and tied up in fagots, constituting cassia twigs, which are a large article of local commerce. The immature fruits of the same tree are believed to form the cassia buds of English trade. Cassia vera or wild cassia is an inferior kind of cassia lignea. The approximate London market values of the spice are:—Lignea, 36-60s. a cwt.; vera, 22-46s.; buds, 49-72s. Our imports of cassia bark (lignea) fluctuated from 1,408,021 lb. in 1856, to 283,869 in 1861, 1,117,999 in 1865, 349,349 in 1886, and 875,991 in 1879; since then, it has not been specified in the Returns. In 1878, London received 3,500,000 lb. Hamburg usually imports about 2,000,000 lb. annually direct from China, besides large quantities indirectly. The shipments from Canton, whence it is chiefly exported, had grown from 13,800 piculs (of 133 lb.) in 1864, to 96,778 piculs in 1879. In the same year, Pakhoi despatched 3,081, worth; and Shanghai, 1,244 piculs of buds, 3,234 piculs of lignea, and 4,467 piculs of twigs. The twigs are mainly an article of local consumption. In 1872, Canton shipped 456,533 lb. of them to other Chinese ports. In 1879, Hankow imported from foreign ports, 1,387 piculs of lignea, 8,773; and from native ports, 1,283 piculs of buds, 3,811, 1,1824 of lignea, 7,479, and 3,990 twigs, 3,442. The trade in buds has decreased, the exports from Canton having fallen from 400 piculs in 1848, to 233 in 1866, and 165 in 1877. Several other several non-Cingalese species of *Cinnamomum* afford kinds of cassia bark in their respective localities. In the Khasia mountains of E. Bengal, the barks of three species (C. obtusifolium, C. paniciforum, and C. Tama), growing wild at 1,000-4,000 ft., have recently been collected and brought down to Calcutta. Our import of the genuine, or only a variety of the true cinnamon (C. zeylanicum), found in India, Ceylon, Java, and the Indian Archipelago; fruits are also gathered in some districts of S. India, but are much inferior to Chinese buds. C. Tama extends into Sylhet, Sikkim, Nepal, Kumaon, and even Australia. The Archipelago produces two species, C. Cassia and C. Burmanni var. a. chinense, both said to be cultivated in Java. Padang (Sumatra) exported 6,127 piculs (817,066 lb.) of the bark in 1871; and Cadiz imported 93,060 lb. from the Philippines in the same year.

According to Low, the "lawang" of Borneo is the aromatic bark of a wild species of "cinnamon," and is produced in abundance in all parts of the island. It much resembles the true cinnamon of Ceylon. A recent writer on the Indian Archipelago (Moore) states that "cinnamon" is the most costly product of Cochin China, and is an uncultivated article. It has a very pungent taste, and is far more aromatic than that of Ceylon. There are several qualities of it, some of which bear a most exorbitant price, and are solely appropriated for the royal use. The outer rind is never removed
from it, and it is consequently much thicker than Ceylon cinnamon. It is in high demand among the Chinese, who export large quantities, and prefer it to the best cinnamon of Ceylon. Possibly it is this particular kind which is meant in the Consular Returns for Shanghai for 1879, where an export of 504 piceus (of 133½ lb.) of "cinnamon" is stated, in addition to the figures relating to cassia. Hanbury and Flückiger doubtfully refer this thick "cinnamon," or more properly cassia, to C. Cassia and C. Burmanni var. chinense.

**Cinnamon** (Fr., Cannelle de Ceylon; Ger., Zimmt, Ceylon Zimmt, Kanel.)—True cinnamon with which caseia is confounded, is produced by Cinnamomum zeylanicum, a small evergreen tree of many varieties, distributed through the forests of Ceylon up to 3,000 and even 8,000 ft. The quality of the bark varies exceedingly with local conditions, some being so inferior as to be collected only for purposes of adulteration. The culture of the best kind seems to be restricted to a strip of country 12-15 miles broad on the S.-W. coast of Ceylon, between Negombo, Colombo, and Matara, up to an elevation of 1,500 ft. A sandy soil is generally selected, but others may be chosen, such as a mixture of sandy with red soil, free from quartz, gravel, or rock; also red and dark-brown soils. Such land in a flat country is preferable to hilly spots. A rocky and stony subsoil is not adapted, as the trees would neither grow fast, nor yield a remunerative return. In making a plantation, the whole of the ground should be cleared, leaving a few trees 50-60 ft. apart. The felled trees should be well lopped, burned, and cleared away. The stumps and roots, after burning, may be allowed to remain, in order to save expense of carriage, merely observing some degree of order in their disposition, by forming regular rows. Holes are dug 8-10 ft. apart and 1 ft. sq.; the distance between the plants depends upon the nature of the soil: the poorer the soil, the nearer should the trees be planted, and vice versa. Should the holes be intended for cinnamon roots, or stumps, the latter must be carefully removed with as much earth as can be carried up with them, and placed in the holes, taking care not to return the earth removed originally in digging the holes, but filling them with the soil scraped from the surface, which has been previously burned, exposed, and formed into manure. Should no rain fall after placing the roots in the holes, the stumps are well covered, and watered morning and evening, until the sprouts shoot out fresh buds, which will be in a fortnight or so from the time of transplanting; watering may then be discontinued. In a month, the new shoots will be 3-4 in. high, much depending upon the weather. If the holes be intended for young plants or seedlings, the latter are removed with holes of earth from the nurseries, and placed in the holes, taking the same care as with the stumps, both in watering and covering, in the event of its being dry weather. The coverings should not be removed until the plant throws out a new pair of leaves from the buds, which is a sign of their having taken root. When a plantation is formed of old stumps, all the branches are cut down to within 6 in. from the ground; this should be done with one stroke of a sharp instrument, in order to avoid the splitting of the stem. From these stumps, cinnamon may be cut and peeled in 12-18 months from the time of transplanting. From seedlings, no crop can be expected before 2-3 years from the date of the transplanting, when there will be but single trees. These, when cut down as already observed to 4-6 in. above the ground, ought to be covered with fresh earth gathered from the space between the rows, and formed in a heap around the base. The next crop will be 3-4 times as much as the first, from the number of sprouts the stem will throw out, and so on every year, the crop increasing according to the number of sprouts each stem will throw out yearly from the cuttings. In the course of 7-8 years, the space left between the rows will only admit the peelers and weeder, as the branches from opposite bushes will almost touch each other. The plantation must be kept clean and free from weeds. Cinnamon requires no manuring; but when weeding, the roots of the bushes should be covered and heaped up with the surface soil, this being done as soon as the cinnamon sticks are removed for peeling. The plantation requires weeding 3-4 times a year during the first 2-3 years, then twice a year will answer the purpose.

For the nursery, a space of ground is selected in rich soil free from stones. The whole brushwood is cleared, leaving only the large trees for shade; all stumps, stones, and roots are removed, and the place is well dug 6-8 in. deep, and form'd into long beds 3-4 ft. wide; the seeds are sown 9-12 in. apart, and shaded at 8-12 in. above the ground by a pandal.
of leaves; they are watered on alternate days until they have one pair of leaves, and the watering is continued in very dry weather; but the shade is not removed until the plants are 6-8 in. high, and can bear the sun. These seedlings will be ready for transplanting 3 months after the time when they were sown. Nurseries are made just before the close of the year. When this is done first, the land is prepared during the dry season, from December to March, both inclusive. April sets in with heavy rain generally in Ceylon, and the weather continues wet till September-October. The cinnamon seeds are gathered when fully ripe, and heaped up in a shady place; the outside red pulp then rots and turns quite black, allowing the seeds to be trampled out or otherwise freed from the decomposed pulp; the seeds are well washed in water (just as is done to cherry coffee, before making into parchment in the white shell), and dried in the air without exposure to the sun. Seeds that float on the surface of the water should be rejected. The quality of the bark depends upon its situation on the branch; that peeled from the middle of the bush or branch is the best or "1st" sort; that taken from the upper end, the "2nd"; while that obtained from the base of the branch, or the thickest end, is called the "3rd" sort. The peeling process commences early in May, and continues until late in October. When a Chilaw perceives a shoot of a proper growth, he strikes a small bill-hook (catty) obliquely into the shoot, and gently opens the gash to discover whether the bark separates freely from the wood; should this not be the case, he leaves the sucker for a future time. Some shoots never arrive at a fit state for decortication. Those which are cut are usually $\frac{1}{2}$ in. diam., and 3-5 ft. long. They are tied in bundles, and carried to sheds appropriated to the preparation of the cinnamon.

Being cleared of small shoots and leaves, two longitudinal slits are made in the bark, which is gradually loosened by the convex side of a peculiar knife (mama), and then usually half the circumference of the bark comes off in one entire slip. When the bark adheres firmly to the wood, it is strongly rubbed with the handle of the peeling-knife, until it is disengaged and stripped off. The sections of the bark thus obtained are carefully telescoped one into the other, collected into bundles, and firmly pressed or bound together. In this state, they remain for 24 hours, or more, thereby facilitating the subsequent removal of the cuticle. The interior side of each section of bark is placed on a convex piece of wood, and the epidermis, together with the greenish pulpy matter immediately under it, is carefully scraped off by a curved knife. This is an operation requiring some nicety, for if any of the outer bark be allowed to remain, it gives an unpleasant bitterness to the cinnamon. In a few hours after the removal of the cuticle, the pieces are put one into the other till they form almost solid sticks about 40 in. long. On the first day, they are suspended under shelter upon open flat forms; on the second day, they are placed on work shelves, and exposed to the sun. When sufficiently dry, they are made up into bundles of about 30 lb. each, which previous to shipment, are subjected to a process of assort-ment. For export to Europe, the bark of large shoots or thick branches, producing coarse cinnamon, and that of very young and succulent shoots, possessing little flavour, is rejected, and used for the preparation of the essential oil.

The cinnamon-gardens of Ceylon had increased from 14,400 acres in 1860-4, to 26,000 in 1878. It is still being extensively planted upon nearly worn-out coffee estates, and upon other land considered unpromising for more valuable crops, and the results are said to be satisfactory. The exports from the island have fluctuated considerably, having been 776,675 lb. 38,383d., in 1864, 2,685,395 lb., 134,720d., in 1865, 1,132,191 lb., 53,077d., in 1874, and 1,665,481 lb., 78,069d., in 1878. The London market values of Ceylon cinna-
mom are:—1st quality, 1s.-3½d. a lb.; 2nd, 11-28d.; 3rd, 7-21d.; 4th, 7-18d.; chips, 14-64d.

The peculiar tendency of cinnamon to deteriorate in new localities, coupled perhaps with the absence of due care and experience, has rendered it impossible to produce the spice equal to the Cingalese article anywhere outside that island. It is most nearly approached by that grown in S. India, known as "Malabar," "Tinnevelly," or "Tellicherry," and valued at 1s. 5d.—2s. 4d. a lb. In the Seychelles are said to exist 2,000 acres of cinnamon shrubs, which are utilized solely as firewood. In Dominica also, the plant is found commonly in a wild state. Brazil and French Guiana afford insignificant quan-
tities of a very inferior cinnamon. But Java occupies an important position.

* Should be Challya.—Compilers.
as a producer of this spice. The culture and preparation do not differ essentially from the methods practised in Ceylon, but the packing is usually effected in wooden cases, and black pepper is said to be sprinkled among it to preserve the flavour. The export from Java in 1879-80 were: 638 piculs (of 135 lb.) to Holland, and 24 to Australia.

Our imports of cinnamon in 1880 were: -1,337,272 lb., 91,544$, from Ceylon; 189,548 lb., 8,212$, from other countries; total, 1,566,820 lb. 99,757$. Our re-exports in 1880 were 1,172,166 lb., 78,805$, chiefly to Spain, Germany, Mexico, and Holland.

CASSIA AND OTHER SPICE BARKS.

(From Siamonde's "Tropical Agriculture.")

Many of the trees of the Laurel family, to which the Cinnamon and Cassia belong, contain an aromatic principle, which resides in many parts, such as the bark, leaves, and fruit. Of this we have instances in the berries and leaves of the bay (Laurus nobilis); the latter are used for flavouring custards, puddings, &c. Figs imported into this country are also packed in them.

Laurel leaves in Greece are more aromatic than in other localities. It seems as if in warmer climates the aromatic principles of plants are more profusely developed, like the bitter and astringent principles in the colder regions. In America the bark and wood of Sassafras officinale have a pleasant aromatic odour, which leads to a considerable commerce. In the United States the essential oil obtained from it is used to give a pleasant flavour to effervescing drinks, tobacco, and toilet soaps. The bark of a Brazilian tree, Mespidophyllum pretiosa, resembles the true sassafras in odour. There is a thick sassafras bark produced in Burmah, Martaban, and other parts of India. An eastern sassafras is obtained in Sumatra from Sassafras Parthenoxylon, and in Nepal from S. glanduliferum; while the bark of Benzoin odoriferum of North America is also highly aromatic. The bark of Atherospernum moschatum of Tasmania is pleasantly aromatic. The aromatic Malambo bark (Croton Malambo), of Central America, is said to be used in the United States for adulterating spices.

The spice bush (Oreodorphne Californica) a lofty tree, has leaves which are pungently aromatic, and the spice wood (Lindera Benzoin) found in Western Virginia has a highly aromatic wood. Sassafras nuts, the large separate cotyledons of two Lauraceae trees of Brazil, are also occasionally met with in commerce and used for flavouring. Another member of the Laurel family, Daphnidiurn Cubeba of Nees von Essenbeck, has berries which have an agreeable warm aromatic flavour, and are used as spice by the Chinese.

In ancient Italy the berries and flower buds of the myrtle were used as a kind of spice. The modern Tuscans and the people of Syria and Palestine still frequently substitute these for pepper or flavouring.

Cassia Bark.—Messrs. Hanbury and Fllickiger have furnished more ample details respecting this bark than had previously been published, and they state that various species of Cinna momum occurring in the warm countries of Asia from India eastward, afford what is termed in commerce Cassia bark. The trees are extremely variable in foliage, and inflorescence, and aromatic properties, and the distinctness of several of the species laid down even in recent works is still uncertain. At present, neither botanists, pharmacologists, or spice dealers are able to point out characteristics by which to distinguish the barks of this group, or even to give definite names to those found in our warehouses.

The bark which bears par excellence the name of cassia, or cassia lignea, and which is distinguished on the Continent as Chinese cinnamon is a production of the provinces of Kwang-se and Kweichan in Southern China. Cassia lignea is also produced in the Khaya mountains in Eastern Bengal, whence it is brought down to Calcutta for shipment. In this region there are three species of cinnamon, growing at 1,000 to 4,000 feet above the sea-level, and all have bark with the flavour of cinnamon, more or less pure; they are Cinna monum obtusifolium, Nees; C. pauciflorum, Nees; and C. Tamala, Nees, C. iners, Reinw., a very valuable species occurring in Continental India, Ceylon, Tavoy, Java, Sumatra, and other islands of the Indian Archipelago, and possibly, in the opinion of Thwaites, a mere variety of O. Zeylanicum, but, according to Meissner, well distinguished by its paler, thinner leaves, its nervation and the character of its aroma, would appear to yield the Cassia bark or wild cinnamon of Southern India. C. Tamala, Fr. Nees et Eberm, which, besides growing in
Khasya, is found in the contiguous regions of Silhet, Sikkim, Nepal, and Kumaon, and even reaches Australia, probably affords some Cassia bark in Northern India. Large quantities of a thick sort of cassia have at times been imported from Singapore and Batavia, much of which is produced in Sumatra. In the absence of any very reliable information as to its botanical sources, we may suggest as mother plants C. cassia, Bl. and C. Bureana, Bl. var. n. Chinense, both stated by Teijsman and Binnendijk to be cultivated in Java. The latter species growing also in the Philippines, probably affords the cassia bark which is shipped from Manila (Pharmacognosia).

The bark is stripped off by running a knife along the branch on both sides, and then gradually loosening it, and after it is taken off it is suffered to lie for twenty-four hours, during which it undergoes a kind of fermentation, and the epidermis is easily scraped off. The bark soon dries into the quilted shape in which it is brought to market. In China it ranges in price from 8 to 25 dollars per picul. It is there used to flavour medicine, and for making incense. The extreme tender ends of the branches of the tree are also used as a spice.

Of late years no separate account has been taken by the Board of Trade of Cassia bark, but we can get at some details of the special commerce by referring back to the official returns of a few years past. The imports and value of this spice bark were as follows in the years specified:

<table>
<thead>
<tr>
<th>Year</th>
<th>Quantity</th>
<th>Value</th>
<th>Year</th>
<th>Quantity</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
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<td>1864</td>
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<td>1865</td>
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<td>980,729</td>
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<td>1867</td>
<td>521,852</td>
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<td>22,142</td>
<td>1868</td>
<td>588,212</td>
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<td>1869</td>
<td>530,537</td>
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<tr>
<td>1862</td>
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<td>20,180</td>
<td>1870</td>
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<tr>
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<td>1,086,985</td>
<td>41,263</td>
<td>1871</td>
<td>875,991</td>
<td>40,612</td>
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</tbody>
</table>

If we trace the re-exports of cassia bark in the years for which the shipments have been enumerated, we find that there is but a small consumption of it in this country, not more than about 40,000 lb. a year on the average. The bulk of the receipts go to the Continent, true cinnamon bark being preferred here.

The re-exports of Cassia bark were in

<table>
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<th>Year</th>
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<th>Value</th>
<th>Year</th>
<th>Quantity</th>
<th>Value</th>
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<td>535,672</td>
<td>25,963</td>
<td>1869</td>
<td>544,422</td>
<td>26,699</td>
</tr>
<tr>
<td>1867</td>
<td>534,735</td>
<td>24,361</td>
<td>1870</td>
<td>611,123</td>
<td>27,192</td>
</tr>
<tr>
<td>1868</td>
<td>302,329</td>
<td>18,693</td>
<td>1871</td>
<td>61,220</td>
<td>—</td>
</tr>
</tbody>
</table>

In 1872 the value of the Cassia lignea bark shipped from the fourteen Chinese ports open to commerce was 11,591,334 dollars; and in 1873, 14,007,924 dollars. Some Cassia bark is shipped from Padang to the United States.

There has been a very large and steady increase in the export of this product year by year from Canton, as will be seen by the following figures:

<table>
<thead>
<tr>
<th>Year</th>
<th>Quantity</th>
<th>Value</th>
<th>Year</th>
<th>Quantity</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1865</td>
<td>7,683</td>
<td>130,030</td>
<td>1867</td>
<td>24,660</td>
<td>440,885</td>
</tr>
<tr>
<td>1866</td>
<td>8,374</td>
<td>139,175</td>
<td>1868</td>
<td>36,055</td>
<td>721,098</td>
</tr>
<tr>
<td>1864</td>
<td>13,851</td>
<td>228,874</td>
<td>1869</td>
<td>40,686</td>
<td>860,485</td>
</tr>
<tr>
<td>1865</td>
<td>23,514</td>
<td>398,776</td>
<td>1871</td>
<td>61,220</td>
<td>—</td>
</tr>
<tr>
<td>1866</td>
<td>23,960</td>
<td>455,113</td>
<td>1872</td>
<td>76,464</td>
<td>—</td>
</tr>
</tbody>
</table>

The imports of spices of all kinds from China into this country have been as follows (the bulk of this is Cassia bark):

<table>
<thead>
<tr>
<th>Year</th>
<th>Quantity</th>
<th>Value</th>
<th>Year</th>
<th>Quantity</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1870</td>
<td>888,913</td>
<td>22,695</td>
<td>1873</td>
<td>951,896</td>
<td>32,775</td>
</tr>
<tr>
<td>1871</td>
<td>597,101</td>
<td>17,080</td>
<td>1874</td>
<td>2,732,215</td>
<td>80,190</td>
</tr>
<tr>
<td>1872</td>
<td>1,363,507</td>
<td>65,683</td>
<td>1875</td>
<td>1,206,598</td>
<td>35,608</td>
</tr>
</tbody>
</table>

Cassia buds are the immature fruits gathered and dried of several species of cinnamon, chiefly the Chinese Cassia lignea. They are used in confectionery,
having the flavour and pungency of Cassia. The average quantity imported in each of the thirteen years ending with 1842 was 4,023 lb., and we consumed about 6,700 lb.

We received in

<table>
<thead>
<tr>
<th>Year</th>
<th>Quantity</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1867</td>
<td>7,355</td>
<td>467</td>
</tr>
<tr>
<td>1868</td>
<td>50,676</td>
<td>3,565</td>
</tr>
</tbody>
</table>

No more recent returns have been published of the imports. In Southern India the more matured fruits of one of the varieties of *Cinnamomum iners*, Reiw. are collected for use, but are very inferior to the Chinese cassia buds.

When gathered young, the receptacles completely envelope the embryo seed, which progressively protrudes, but continues firmly embraced by the receptacle. The buds are of various sizes, having the appearance of nails with roundish heads. If completely dried the receptacle is nearly black.

Cassia buds are shipped from Canton, but the exports have much declined.

Rondot estimated them as averaging in 1848 53,333 lb. a year. In 1866 only 31,066 lb., and in 1867 but 22,000 lb. were shipped from Canton.

**Cinnamon.**—The Cinnamon of commerce is the aromatic bark of a species of laurel, *Cinnamomum Zeylanicum*, Breyn. Its fruit is a small berry in the form of an olive, with a kernel. The bark is composed of thin layers which are separate, and which, cut in lengths, are exposed in the sun, and curl up in drying. Good cinnamon should be fine, thin, brittle, of a yellowish brown, and aromatic. It is one of the delicate spices of the table, and is also used in medicine.

In the "Feuille de la Guyane" for 1820, of Guisan, page 319, it is represented as a very hardy plant, growing well in all situations, soils, and aspects, on the summits of mountains, on the borders of streams which wash its roots; in alluvial soils, thoroughly or badly drained, it is stated to succeed well. This differs, however, from the opinions entertained in Ceylon, where cinnamon of a superior quality is restricted to sandy soils. Leblond remarks that every part of the tree is important, and can be applied to some useful purpose, the wood, leaves, fruit, and bark. The roots even yield, by distillation, a camphor of a better quality than that ordinarily used in medicine. The old trunks furnish resinous knots which have the odour of rosewood, and can be advantageously employed for furniture; the leaves furnish an oil appreciated by perfumers; a distilled water from the flowers, besides the soft and pleasant odour sweetness the worst breath, animates the spirits, and diffuses its pleasant perfume wherever it is used. A decoction of the fruit furnishes a useful wax.

The cinnamon is raised most readily from seeds, although the fine kinds are propagated in Ceylon by layers, and they differ in the degree of aromatic principle or flavour just as much as the nutmeg varies in respect of size, but the quality of the seedlings can always be ascertained in the seedling bud by tasting the leaves.

Cinnamon was held in high esteem in most remote times of history. In the words of the learned Dr. Vincent, Dean of Westminster, it seems to have been the first spice sought after in all oriental voyages. Both cinnamon and cassia are mentioned as preciousodoriferous substances in the Mosaic writings and the different Biblical works, also by many of the writers of antiquity; and from the accounts which have thus come down to us, there appears reason for believing that the spices referred to were nearly the same as those of the present day. That cinnamon and cassia were extremely analogous, is proved by the remark of Galen, that the finest cassia differs so little from the lowest quality of cinnamon that the first may be substituted for the second, provided a double weight of it is used (Pharmacographia). This bark was an article of export from India in the time of the author of the Periplus of the Erythraean sea, and even long before it was much used among the masters of the ancient world. Nero is reported to have burnt a quantity of cinnamon and cassia, at the funeral of Popposa, greater than the countries from which it was imported produced in one year. Marco Polo, the Venetian, incidentally mentions this spice in several places, but gives this name to wrong articles sometimes. Caesar Frederick, a countryman of Marco Polo, who travelled in Asia about A. D. 1563, describes the process of gathering the spice in Ceylon.

The roots of the cinnamon tree are branchy and ligneous; the bark of these roots has the pungent smell of camphor, with the delicious odour of cinnamon, and yield camphor by distillation. The wood of the tree is light, fibrous, and inodorous. The trunk is from 12 to 18 inches in diameter,
CINNAMON.

rising to the height of from 20 to 30 feet; it grows irregular and knotty; the external bark is thick, rough, and scabrous, and of an ash colour; the inner bark is reddish. The bark of the young shoot is often speckled with dark-green and light-fawn colours. The branches are thick and spreading, and shoot forth horizontally or inclining downwards; they are covered with narrow, oblong leaves growing in pairs opposite to each other. When first developed, these leaves are of a bright red hue, then of a pale yellow, and when arrived at maturity of a dark olive colour. At full growth they are from 6 to 9 inches long, and from 2 to 3 inches broad. The upper surface is smooth and shining, and of a darker green than the under side. The petiole has the odour and taste of cinnamon. The plants bloom in January and February, and the seed ripen in June, July, and August. Many white flowers grow on one peduncle. Their smell, though not strong, is exceedingly pleasant, resembling a mixture of the rose and lilac. The fruit is an oval berry, larger than black currants, and adheres in the manner of an acorn to the receptacle, which is thick, green, and hexagonal. The leaves when fully grown emit a strong aromatic odour on being bruised, and have the pungent taste of cloves.

The prepared bark of this tree is the cinnamon of commerce. Diversities in the quality of cinnamon do not appear to arise from any varieties of the plant, but from care and skill in the preparation, the soil and temperature of the country, the age and health of the plant. It is rarely found worth collecting except in the southern and western aspects of Ceylon. Beyond certain limits the bark is never of a good quality, as it is powerfully affected by local circumstances.

The Karuwa of the Malabar coast has been considered by many botanists as identical with the Laurus Cassia, but it is said that no specific difference can be discovered between the cinnamon tree of Ceylon and the karuwa. The prepared bark of the karuwa is, according to good authority, inferior to the best Ceylon cinnamon. It is, however, allowed to be superior to the produce of the cinnamon tree which is found on the northern and eastern part of the island. Linné, deceived by the name of Laurus Cassia, was misled, and ascribes qualities to that tree which it does not possess.

The cinnamon plant delights in a silicious soil, with an admixture of vegetable mould, in which only it produces the sweet taste, aromatic smell, and the pale brown or russet colour which renders it so valuable as an article of commerce and useful as spice, for it has generally happened that plants, even of the genuine kind, when they grow in valleys or marshy ground, or on land subject to inundations, lose their characteristic properties; two-ninths of the plants growing in Batticaloa and Chilaw, allowed to be of the genuine kind are deficient in smell and taste, and consequently less useful or valuable; and the cinnamon grown in the valleys of Moronea Corle, the soil of which is marshy, yields a bark of inferior quality. Again, the plants which are raised in Bombay, from seeds and seedlings sent thither at an early period of the British rule in that island, although they grew luxuriantly, produced bark of an inferior quality, which was not valued as an article of commerce.

Besides the inferiority in smell, taste, and colour, which invariably marks plants grown in any other than a silicious soil, a disadvantage of no little importance to the grower has been observed to follow. Whilst the stumps of plants grown in silicious soil shoot forth rapidly, and are fit to be peeled a second time within a period of but four or five years, and produce bark superior in quality to that peeled at first, those grown on a hilly or marshy soil require not less than six years before they can undergo a second peeling, and yield bark less in quantity and inferior in quality to that peeled at first.

When the ground is prepared for planting cinnamon, the low brushwood and young trees are cut down, but lofty trees are allowed to remain at intervals, as it is found that the tender plants thrive better under shade than when exposed to the direct rays of the sun. The planting usually takes place when the seeds are ripe; for this purpose a line is stretched across the ground, and, guided by it, the planter turns up about a foot square of ground at intervals of six or seven feet. The brushwood and branches having been previously burnt, their ashes are then spread upon the newly-dug spots, and into each of them four or five cinnamon berries are sown in holes made with a dibble; they are then covered with earth, and branches of trees are laid over the parts to prevent the earth from becoming parched, and to protect the young shoots as soon as they come forth. This takes place in about fifteen or twenty days; sometimes the berries are sown in nurseries, and the young plants are transplanted in the months of October and November. In favourable situations shoots attain the height of 5

* Should be Morawak Korale.—Compiler.
or 6 feet in about six or seven years, and a healthy bush will then afford two or three shoots for peeling. In a good soil every second year from four to seven shoots may be cut from one tree; thriving shoots of four years' growth are sometimes fit for cutting. As four or five seeds are usually sown in one spot, and in most seasons the greater part germinate, the plants grow in clusters not unlike a hazel bush. If the season be unusually dry many of the seeds fail, while the want of moisture is often fatal to the young shoots, so that it is sometimes necessary to plant a piece of ground several times successively. A plantation of cinnamon, even on good ground, cannot be expected to make much return until after the lapse of eight or nine years. This plant is sometimes propagated from shoots cut from large trees, by layers, or, lastly, by transplanting large stumps.

The method of culture by seeds is considered the least advantageous, as the trees are longer before they arrive at perfection. If cultivated from shoots, the sprouts must be continually watered, or they will not thrive. Those selected for the purpose should be very young, not having more than three leaves; if older they die.

The third method, by layers, is recommended by Dr. Wight, since the numerous side branches which issue from the bottom of the trunk always furnish a plentiful supply well adapted for layering. The transplanting of the old roots is a plan of modern adoption, and the practice is much approved, since they yield shoots of the usual size, and they have been planted in the ground. Great care is however necessary in their removal, for should any of the rootlets, even of one-tenth of an inch diameter, receive injury, the whole root will certainly perish. Thunberg mentions a fifth method of cultivation, or rather a manner of obtaining cinnamon of superior quality. When the tree is cut down and a fire kindled on the spot to consume the stumps, the roots afterwards throw out a number of long straight shoots, which yield incomparably fine cinnamon. From these are cut the cinnamon walking-sticks, which in appearance resemble those of the hazel tree, and retain the taste and smell of cinnamon. They have no scent, however, unless when the bark is rubbed.

The peeling process commences early in May, and continues until late in October. When a Chilaw perceives a shoot of a proper growth, he strikes an instrument which resembles a small bill-book obliquely into the shoot. He then gently opens the gash to discover whether the bark separates freely from the wood; should this not be the case, he leaves the sucker for a future time. Some shoots never arrive at a fit state for decorication. Plants of several year's growth sometimes bear numerous marks of annual experiments made for the purpose of ascertaining whether the bark was in a favourable situation for removal.

The shoots which are cut are usually from a half to three-quarters of an inch in diameter, and from three to five feet long. Some travellers in former times asserted that the cinnamon was peeled from the tree while standing, and that nature provided the decorticated plant with a new bark. It is said that the experiment has been recently tried on several plants, all of which died in consequence. The shoots being cut are tied in bundles, and carried to sheds appropriated to the preparation of the cinnamon.

Being cleared of small shoots and leaves, two longitudinal slits are made in the bark, which is gradually loosened with the convex side of the knife, and then usually half the circumference of the bark comes off in one entire slip. When the bark adheres firmly to the wood, it is strongly rubbed with the handle of the peeling-knife until it is disengaged and stripped off. The sections of the bark thus obtained are carefully put one into the other, the outer side of one piece being placed in contact with the inner side of another; they are then collected into bundles, and firmly pressed or bound together.

In this state the bark is allowed to remain for twenty-four hours, or sometimes for a longer period, by which means a degree of fermentation is induced which facilitates the subsequent operations of removing the cuticle. After being subjected to this treatment, the interior side of each section of bark is placed on a convex piece of wood, and the epidermis, together with the greenish pulpy matter, immediately under it, is carefully scraped off with a curved knife. This is an operation requiring some nicety, for if any of the outer bark be allowed to remain, it gives an unpleasant bitterness to the cinnamon. In a few hours after the removal of the cuticle, the pieces are put one into the other, the bark dries, contracts, and gradually acquires the appearance of a quill or pipe, the whole forming a congeries of quills more than a foot in length. During the first day the cinnamon is suspended under shelter upon open flat forms; on the second day it is placed on wickerwork shelves, and exposed to the

* Should be Chilwy.—COMPILERS.
sun. When sufficiently dry it is made up into bundles of about 30 lb. weight each; previous to preparing for shipment they are subjected to the process of assortment.

The bark of large shoots or thick branches of trees produces coarse cinnamon. Occasionally the external pellicle of this kind is scraped off, which thins the cinnamon and improves its colour. It is, however, even then thicker and of a darker colour than that of good quality, while it is of a very inferior flavour, and is disagreeably pungent. This sort is always rejected by the inspectors as unfit to be exported to Europe. The bark of very young and succulent shoots is likewise of an inferior quality, and is of no commercial value. It is very thin, and of a light straw colour, having little flavour, and that evanescent. Shoots exposed during growth to the direct rays of the sun, have their bark more acrid and spicy than the bark of those which grow under a shade. A marshy soil rarely produces good cinnamon, its texture under the circumstances being cross-grained and spongy, while it possesses but little aroma. It is hardly possible to discover the cause which produces the varieties in the quality of the bark, since shoots from the same tree are found to yield cinnamon of very different qualities.

The best Ceylon cinnamon is thin, smooth, and of a light yellow colour; it admits of a considerable degree of pressure, and bends before it breaks, the fracture is thin and splintery; it has an agreeable warm aromatic flavour, with a slight degree of sweetness. When masticated the pieces become soft, and seem to melt in the mouth.

From cinnamon which has been rejected for shipment, an essential oil is usually extracted. The best oil of cinnamon sinks in water, but when inferior, it is of a smaller specific gravity. A very large quantity of bark is required for obtaining only a small portion of oil: it is reckoned that 8 lb. of newly-prepared cinnamon yield about 6 1/2 oz. of heavy oil, and 2 1/2 oz. of light oil.

There was long an export duty on cinnamon in Ceylon; this was first imposed in 1832 on the abolition of the Government monopoly, and fixed at the rate of 36 per lb. on the best, and 28 in the second quality. It was then reduced in 1832 to 28 6d., and 26 in 1841; on the 1st June, 1842, to 18 per lb.; on the 1st September, 1848 to 4d. per lb. and a few years afterwards it was wholly abolished.

The duties on imports levied by the British Customs on cinnamon were, in 1830, 6d. per lb. on British grown and 15 on foreign. The home consumption was 40,588 lb. In 1841 the consumption had declined to 15,625 lb.; the duty was then reduced 50 per cent, and in 1852 the consumption had recovered to 36,325 lb. In the following year (4th June 1853) the duty was lowered to 2d. per lb. alike on the British and foreign; the consumption of that year being 43,000 lb. The consumption in 1859 had reached 50,789 lb. In 1860 the duty was abolished, and, as has been already shown, the consumption was trebled in quantity.

CINNAMON.

(From Porter's "Tropical Agriculturist.")

Laurus Cinnamonum—belonging to a genus of the class and order, Encandyria Monogynia.

It is probable that cinnamon was known to the ancients at a very early period. We find mention made of this aromatic more than once in the Bible—in Exodus, chap. xxxix. 23; in the Songs of Solomon, chap. iv. 14; and in Proverbs, chap. vii. 17. It was likewise known to the Greeks and Romans, but being supplied to them from Arabia and the north-east coast of Africa, it was naturally, though erroneously, supposed to be the produce of those countries. The Arabian, however, brought this article of merchandise from India, whereto it might easily have been conveyed from Ceylon, and whence it was transported to the shores of Arabia, thus giving rise to the fable which invested with spicy odours the Sabean coast.

The Arab merchants intentionally shrouded in mystery the manner of obtaining cinnamon, and in consequence, the ancients entertained the most preposterous ideas on the subject.

Heterotus relates that cassia grew in Arabia, but that cinnamon was brought thither by birds from India, the fabled birth-place of Bacchus. This writer stated that cassia grew in a shallow lake, the borders of which were infested
CINNAMON.

by winged animals, resembling bats; that these were powerful creatures, and uttered piercing cries, but that the Arabs made war against them, for the purpose of obtaining the spice; and, defending their eyes from the attacks of the monsters, drove them from their stronghold for a brief period, and then, unmolested, collected the cassia.

A still more marvellous account was given by the Grecian historian of the manner in which cinnamon was obtained. According to him, the Arabs themselves were perfectly ignorant of the situation of the favoured spots which yielded this spicy produce; some, however, asserted, with much appearance of probability, that it grew in the country where Bacchus was born: they gave the following account of the plan resorted to, for acquiring cinnamon. Some very large birds collect together a quantity of the shoots and the small branches of the tree bearing cinnamon, with these they build their nests on lofty mountains inaccessible to man. The inhabitants of the country make use of an ingenious contrivance to obtain the materials of these aerial abodes. They place large pieces of carrion flesh near to the haunts of the birds who seize with avidity on the prey and bear it to their nests, which not being made sufficiently strong to bear this additional load, the fabric gives way, the pieces of cinnamon fall to the earth; the natives carefully collect and export them to foreign countries.

Such is the account of an historian, whose accuracy and fidelity of relation is rarely questioned. It furnishes a forcible example of the extreme ignorance of the ancients, as to the origin of eastern productions.

The great additional expense incurred in the transport of oriental merchandise in those days, when it came through a circuitous route both by land and sea, and the risk and uncertainty attending the navigation, considerably enhanced the price of these articles, causing their use to be confined wholly to the wealthy and luxurious; who, however, consumed cinnamon in profusion, but more for its odorous qualities, in the manner of incense than as an addition to food. It is recorded that two hundred and ten burthens of spices were consumed on the funeral pile of Sylla, and that Nero burnt at the obsequies of his wife, Poppea, a quantity of cinnamon and cassia exceeding the whole importation of one year.

Even in comparatively modern times, the products of the more eastern parts of Asia were chiefly imported into Europe, by the way of Egypt. The Venetians almost entirely engrossed this lucrative branch of commerce, and through their hands these articles were supplied to the rest of Europe. But when the passage round the Cape of Good Hope was discovered by the Portuguese in 1498, Indian commerce was turned into a different channel, and the Portuguese soon supplanted the Venetians in the traffic with Indian commodities. Early in the sixteenth century they obtained permission from the powers at Ceylon to establish a factory in that island. Though the Europeans had thus licence from the ruling authorities to prosecute this trade, the Arab merchants did not submit, without a struggle, to this intrusion. They vigorously opposed the landing of the strangers, perceiving at once in their establishment the total downfall of that monopoly of the cinnamon trade which they had so long enjoyed. Notwithstanding these hostile efforts the Portuguese succeeded in erecting the fort of Colombo. Soon after this undertaking was accomplished, they had the address and good policy to make a treaty with the King of Kandy, by the terms of which the Portuguese engaged to assist the King and his successors in all their wars, and in return were to be furnished out of the Kandyans territory with an annual supply of 124,000 lb. of cinnamon.

The Dutch viewed, with a jealous eye, the rich and thriving settlement of the Portuguese, and, soon after they had established themselves in the East Indies, became desirous of monopolizing the cinnamon trade. With this view they sought to undermine the Portuguese in the favour of the king of Kandy, with whom they so far ingratiated themselves, as to induce him to enter into a negotiation with them, which had for its object the driving of the Portuguese from the island. They were so far successful that in 1612, the king entered into an engagement with the Dutch East India Company to sell to them all the cinnamon that could be collected in his kingdom. The Portuguese did not, however, quietly submit to this arrangement; and, after long contesting the matter, entered at length, in 1645, into a treaty of peace with the Dutch, whereby it was arranged, that thereafter the cinnamon trade should be divided equally between the two nations. During the period in which this treaty was in force, both parties employed native cinnamon cutters, or chalies, to cut and prepare the aromatic bark, and all that was collected on either side was deposited in a central station upon the river Dandegam near to Negombo. When the
cinnamon harvest was completed, an equal division of the quantity obtained was made, and each party paid to the chalisa half of the stipulated price for peeling and otherwise preparing the whole.

The amicable arrangement was not, however, of very long continuance; and, in 1652, fresh occasion was found for war, which proved most disastrous to the Portuguese, who were finally expelled from the island of Ceylon in 1658. The Dutch now made strenuous efforts to obtain a strict monopoly of the supply of cinnamon. For this purpose they endeavoured to engross the exclusive commerce of the Malabar coast, and drove thence the Portuguese, while they prohibited the natives from supplying the English with produce under penalty of confiscation.

Their perseverance in this arbitrary course was most expensive, while it proved inadequate to insure a total exclusiveness of the trade. Merchants of other nations, by paying an enhanced price for the articles they desired, were always able to obtain them from the natives, notwithstanding the decrees of the princes of the country; and the wild cinnamon of Malabar, under the name of cassia, still found its way to Europe by other channels than that of Dutch commerce. Holland, however, continued for many years to enjoy the exclusive trade of the cinnamon of Ceylon, and the Dutch East India Company evinced much anxiety that the produce from this island should always retain a decided superiority over that of any other country. Notwithstanding, however, their repeated injunctions, that none should be exported which was not of an excellent quality, they often had reason to complain that the shipment of an inferior kind was allowed. The cause of this disregard to orders was said to have arisen through the requirement by the home authorities that a larger quantity should be consigned to Europe than could be procured of good quality.

Meantime the Dutch became seriously alarmed at the gradual but steady encroachments in the cinnamon trade of other nations. Although the Dutch extirpated the trees wherever they could find them on the coast of Malabar, yet a large quantity was annually obtained thence, which rendered the monopolizers still more desirous that their Ceylon cinnamon should be so undoubtedly superior as to allow of no competition.

Although the difficulty of obtaining a sufficient quantity from the King of Kandy's territories was constantly and increasingly felt, yet the Dutch still continued entirely to depend for their supply on the produce of the uncultivated trees growing in Kandy, and never turned their attention to the cultivation of cinnamon trees in their own territories, whereby they might have become independent of the Kandyan kingdom.

They, however, clearly saw that their trade must decline unless a sufficient exportation of the best article should, from the comparison, cause that of inferior quality to get into disrepute, and prevent its sale at prices which would yield any profit to the importers. The importation of cinnamon into Holland did, in fact, gradually lessen, until, at length, the Dutch were induced to adopt the most efficient and sensible method for retaining the superiority of their cinnamon by obtaining an unerring supply. This method was to cultivate it in their own territory. So simple and rational a plan was not, however, accomplished without calling for great exertions in combating many prejudices, and in removing many obstacles. On the one hand the natives were of opinion that the tree, in a state of cultivation, would not yield so good cinnamon; while the supreme government of the Dutch East Indies considered it a wasteful and useless expenditure to form plantations of a tree, the produce of which could be obtained from plants of spontaneous growth.

Falck, who was Governor of Ceylon in 1765, and during several subsequent years, was enlightened enough not to be influenced by either of these objections. Trial was made on a small scale with perfect success, and the Governor clearly saw the great advantages likely to accrue from establishing more extended plantations. With undeviating perseverance he pursued his course; nor could he be turned aside from the prosecution of a plan which he knew would prove so beneficial to the settlement. Fortunately, his successor was equally convinced of the importance of this plan, and pursued with equal zeal the cultivation of the cinnamon plantations which M. Falck had established.

The labour of clearing and planting was chiefly performed by the natives, who, being incited by the promise of rewards and honours, continued their work with tolerable alacrity. To cut the shoots and prepare the bark was a work exclusively confined to the Government peelers; any other persons convicted of cutting, or otherwise destroying cinnamon trees, were visited with heavy penalties. Indeed, the importance attached by the Dutch to the cinna-
mon trade, cannot be better shown than by the rigour with which the smallest interference with it was punished. "The selling or giving away the smallest quantity of cinnamon (even were it but a single stick), the exporting of it, the peeling of the bark, extracting the oil either from that or the leaves, or the camphor from the roots, except by the servants of Government, and by their order, as well as the wilful injuring of a cinnamon plant, were all made crimes punishable with death, both on the persons committing them, and upon every servant of Government who should connive at it."*

The Dutch soon had reason to congratulate themselves on the step they had taken to become independent of Candia, since every year brought with it increased difficulties in obtaining a supply from that territory.

But the year 1793, their plantations were sufficiently extensive, and matured to allow of the whole annual supply being drawn from the Dutch possessions alone.

When Ceylon was captured by the English in 1796, the cinnamon found in the store-houses was sold by the conquerors to the East India Company for 180,000l; and, in the latter end of the ensuing year, 13,893 bales were brought into England.

The English Government continued to pursue the same line of policy which the Dutch had followed with regard to this branch of commerce. The natives, as well as all other persons, were strictly prohibited from trading in cinnamon. A regulation was made, sentencing to confiscation every ship on board of which more than 20 lb. of cinnamon should be found that had not been embarked by authority of Government, and where the quantity was less than 20 lb. exacting a penalty of fifty star pagodas for every pound.

The manner of conducting the cinnamon trade when Ceylon first fell into the possession of the English, does not appear to have been particularly happy. The Governor, influenced by the representatives of Mr. Johnville, a French gentleman who held an appointment in the cinnamon department, became fearful that the extensive plantations might yield too great a quantity of cinnamon, and recommended that part of the trees should be extirpated. This hasty and inconsiderate advice was not, however, immediately adopted.

After the peace of Amiens, under the provisions of which Ceylon was formally ceded by the Dutch to the British Government, a new arrangement was made, and the Governor-General of India had no longer any control over the Governor of Ceylon. It was, however, considered advisable that the East India Company should still enjoy monopoly of the cinnamon trade. An agent was, therefore, appointed to reside at Colombo for the purpose of receiving the cinnamon collected by Government. It was stipulated that four hundred thousand pounds, or about four thousand three hundred and twenty-four bales of ninety-two and a half pounds each, were to be thus furnished. Any quantity which might be collected beyond this was ordered to be burnt, while the home Government recommended that the cinnamon plantations should be limited to the quantity requisite of obtaining this amount.

So unadvised a recommendation appears to have been made in consequence of an erroneous opinion respecting the ease with which cinnamon could be collected, and the facility with which it might be cultivated. This is not the only instance which could be furnished of the disastrous effects produced by the system of legislating at a distance, on subjects which require local knowledge for their proper management. Government, fearful of producing too great a quantity of cinnamon, had now recourse to that system recommended by Governor North, an ordered many of the cinnamon plantations to be rooted up. It was fortunate, however, that this business of destruction was a work of labour, and was often evaded by the purchasers of the plantations; since the annual supply soon became much reduced in quantity, and was collected with difficulty. Notwithstanding the unlooked-for addition thus obtained from the produce of the rescued trees, the whole quantity furnished fell far short of that stipulated in the agreement. As soon as General Maitland assumed the Government of Ceylon in 1805, he became fully aware of the impolicy of the recent proceedings, and while one of his first acts was to stop the progress of destruction, he took every means to encourage the more extended cultivation of the cinnamon tree—a line of policy likewise pursued by his successors.

The system of forced labour which prevailed in Ceylon, when we first acquired the island from the Dutch, was long continued and exacted from the native population with a degree of severity which would scarcely be believed by any who have not witnessed it. In many instances the natives have been

* Bertolacchi's Ceylon, p. 241.
CINNAMON.

forced to labour without being paid for their services; and to such an extent has the vile monopoly of cinnamon been carried, that if in the garden of any person a cinnamon-tree should happen to spring up, the owner of the garden could not consider it as his own property, neither might he remove it, but was compelled to nurse and rear it for the Government; and by the Dutch law, if a man were found cutting down a cinnamon-tree, he was liable to have his right hand cut off.*

The enlightened policy of the present day has happily put an end to a system productive of so much cruel oppression; and by an order of the Government, bearing date October 1832, the cinnamon trade is declared free.

Marshall, in his description and history of the laurus cinnamomum, given in the tenth volume of the "Annals of Philosophy," assigns very extensive limits to the cultivation of the cinnamon-tree. He states, from good authorities, that this plant is found on the Malabar coast, in the island of Sumatra, Cochin China, Tonquin, the Sooloo Archipelago, Borneo, Timor, the Nicobar and Philippine islands. It has been successfully cultivated in the isle of Bourbon and the Mauritius.† In the Northern Circars, on the estate of Messrs. Beaufoy & Co. at Travancore, the first object has been to naturalize and cultivate cinnamon. For this purpose seeds and plants have been procured from the island of Ceylon, and cinnamon cultivators engaged. This plantation has only been a few years in progress, and its success is not yet ascertained. Into the island of Du Prince, on the east coast of Africa, the cinnamon-tree has been transplanted, and likewise into the Brazil. Tobago, Guadaloupe and Jamaica. This plant was introduced into Guiana in the year 1772, from the Isle of France, and the inhabitants now cultivate it in their gardens and round their cottages. In this manner they prepare cinnamon in sufficient quantity for domestic purposes, and transmit a small quantity to France.

The roots of the cinnamon-tree are branchy and ligneous; the bark of these roots has the pungent smell of camphor, with the delicious odour of cinnamon, and yields camphor by distillation. The wood of the tree is light, fibrous, and inodorous. The trunk is from twelve to eighteen inches in diameter rising to the height of from twenty to thirty feet; it grows irregular and knotty; the external bark is thick, rough, and scabrous, and of an ash-colour; the inner bark is reddish. The bark of the young shoots is often speckled with dark-green and light orange colours. The branches are thick and spreading, and shoot forth horizontally or inclining downwards; they are covered with numerous oblong leaves growing in pairs opposite to each other. When first developed these leaves are of a bright red hue, then of a pale yellow, and, when arrived at maturity, of a dark olive colour. At full growth they are from six to nine inches long, and from two to three inches broad. The upper surface is smooth and shining; and of a darker green than the under side. The petiole has the odour and taste of cinnamon. The plant blooms in January and February; and the seeds ripen in June, July, and August. Many white flowers grow on one peduncle; they have no calyx. Their smell is, though not strong, exceedingly pleasant, resembling a mixture of the rose and lilac. The fruit is an oval berry, larger than a black currant, and adheres in the manner of an acorn to the receptacle, which is thick, green, and hexagonal. The leaves, when full grown, emit a strong aromatic odour on being bruised, and have the pungent taste of cloves.

Crows and wood-pigeons devour the berries with great avidity; in passing through them the productive qualities of the seed remain unimpaired, and by this means the plant is disseminated over a great extent of country, it being found even in the thickest and most impassable jungles. Cattle of all descriptions eagerly feed upon its foliage. When the berries are first gathered, their taste resembles that of the juniper-berry; they soon become dry, and then resume the form of a small kernel contained in a thin shell. If boiled they yield an unctuous substance, which, when cold, becomes solid like wax. It emits an agreeable odour, and may be formed into candles, which formerly were reserved for the exclusive use of the Candian Court.

The prepared bark of this tree is the cinnamon of commerce. Diversities in the quality of cinnamon do not appear to arise from any varieties of the plant, but from care and skill in the preparation. The soil and exposed parts of the country, the age and health of the plant."‡ It is rarely found worth collecting except on the southern and western aspects of the island. Beyond certain limits

* Report of Committee of House of Commons on East India affairs, 1831.
† In 1785, 3,000 cinnamon trees were flourishing in the Isle of France.
the bark is never of a good quality, as it is powerfully affected by local circumstances.

The *Karwoo* of the Malabar coast has been considered by many botanists as identical with the *cassia*, but it is said that no specific difference can be discovered between the cinnamon tree of Ceylon and the *karwoo*. The prepared bark of the *karwoo* is, according to good authority, inferior to the best Ceylon cinnamon. It is however allowed to be superior to the produce of the cinnamon-tree which is found on the northern and eastern part of the island.

Linnaeus, deceived by the appellation of *cassia*, was misled, and ascribes qualities to that tree which it does not possess. The cassia bud of commerce is not the produce of the *cassia*, but is the fleshy hexagonal receptacle of the seed of the *cassia cinnamomum*.

When gathered young, the receptacle completely envelopes the embryo seed, which progressively protrudes but continues firmly embraced by the receptacle. The buds are of various sizes, having the appearance of nails with roundish heads. If carefully dried the receptacle is nearly black. These buds are not prepared in Ceylon.

A rather elevated situation is most favourable to the growth of cinnamon; a sandy loam mixed with decayed vegetable matter, is the soil in which it flourishes best. Shelter appears to contribute to its luxuriance, since it grows with unusual vigour near to houses.

When the ground is prepared for planting cinnamon, the low brush-wood and young trees are cut down, but lofty trees are allowed to remain at intervals, as it is found that the tender plants thrive better under their shade than when exposed to the direct rays of the sun. The planting usually takes place when the seeds are ripe. For this purpose a line is stretched across the ground, and guided by it, the planter turns up about a foot square of ground at intervals of six or seven feet. The brush-wood and branches having been previously burnt, their ashes are then spread upon the newly-dug spots, and into each of them four or five cinnamon-berries are sown in holes made with a dibble; they are then covered with earth, and branches of trees are laid over the parts to prevent the earth from becoming parched, and to protect the young shoots so soon as they come forth. This takes place in about fifteen or twenty days. Sometimes the berries are sown in nurseries, and the young plants are transplanted in the months of October and November. In favourable situations shoots attain the height of five or six feet in about six or seven years, and a healthy bush will then afford two or three shoots fit for peeling. In a good soil, every second year, from four to seven shoots may be cut from one tree, thriving shoots of four years’ growth are sometimes fit for cutting. As four or five seeds are usually sown in one spot, and in most seasons the greater part germinate, the plants grow in clusters. “Not unlike a hazel-bush.” If the season be unusually dry many of the seeds fail, while the want of moisture is often fatal of the young shoots, so that it is sometimes necessary to plant a piece of ground several times successively. A plantation of cinnamon, even on good ground, cannot be expected to make much return until after the lapse of eight or nine years.

This plant is likewise sometimes propagated from shoots cut from large trees, or by layers, or, lastly, by transplanting large stumps. The method of culture by seeds is considered the least advantageous, as it requires greater attention than other modes, and the trees are longer before they arrive at perfection.

If cultivated from shoots, the sprouts must be continually watered or they will not thrive. Those selected for the purpose should be very young not having more than three leaves; if older, they die.

The third method, by layers, is recommended by Dr. Wight; since the numerous side branches which issue from the bottom of the trunk, always furnish a plentiful supply well adapted for laying.

The transplanting of the old roots is a plan of modern adoption, and the practice is much approved, since they yield shoots of the usual size twelve months after they have been placed in the ground. Great care is however necessary in their removal, for should any of the rootlets, even of one-tenth of an inch diameter, receive injury, the whole root will certainly perish.

Thunberg mentions a fifth method of cultivation or rather a manner of obtaining cinnamon of superior quality. “When the tree is cut down and a fire kindled on the spot to consume the stumps, the root afterwards throw out a number of long straight shoots which yield incomparably fine cinnamon. From these are cut the cinnamon walking-sticks which, in appearance, resemble those
of the hazel-tree, and retain the taste and smell of cinnamon. They have no scent however, unless when the bark is rubbed."

This tree is now cultivated to a large extent in Ceylon, more than sixteen hundred acres of land are laid out in cinnamon plantations, and the number is annually increasing; one of the largest gardens under this culture, called Marandan, is close to Colombo. "The surface of this land is a pure white sand, under which is a deep stratum of rich mould. In some parts of the island, where this earth is deficient, the trees are barren and not worth cutting. In marshy places also, they thrive no better, but become decrepit, and the bark acquires a bitterness which destroys its sweet and aromatic qualities."

The cinnamon department gives employment to a vast number of persons in Ceylon; from twenty-five to twenty-six thousand people† being usually engaged in the cultivation of the tree and the preparation of its bark.

The peeling process commences early in May, and continues until late in October. When a Chaliath perceives a shoot of a proper growth, he strikes an instrument which resembles a small bill-hook, obliquely into the shoot. He then gently opens the gash to discover whether the bark separates freely from the wood; should this not be the case, he leaves the sucker for a future time. Some shoots never arrive at a fit state for decortication. Plants for several years' growth sometimes bear numerous marks of "annual experiments" made for the purpose of ascertaining whether the bark were in a favourable situation for being removed.

The shoots which are cut are usually from a half to three quarters of an inch in diameter, and from three to five feet long.

Some travellers in former times asserted that the cinnamon was peeled from the tree while standing, and that nature provided the decorticated plant with a new bark. It is said that the experiment has been recently tried on several plants, all of which died in consequence.

The shoots being cut, they are tied in bundles and carried to sheds appropriated to the preparation of the cinnamon. Being cleared of small shoots and leaves, two longitudinal slits are made in the bark, which is gradually loosened with the convex side of the knife, and then, usually, half the circumference of the bark comes off in one entire slip. When the bark adheres firmly to the wood, it is strongly rubbed with the handle of the peeling-knife until it is disengaged and stripped off. The sections of the bark thus obtained are carefully put one into the other, the outer side of one piece being placed in contact with the inner side of another; they are then collected into bundles and firmly pressed or bound together.

In this state the bark is allowed to remain for twenty-four hours, or sometimes for a longer period, by which means a degree of fermentation is induced that facilitates the subsequent operation of removing the cuticle. After being subjected to this treatment, the interior side of each section of bark is placed upon a convex piece of wood, and the epidermis, together with the greenish pulpy matter immediately under it, is carefully scraped off with a curved knife. This is an operation requiring some nicety, for if any of the outer bark be allowed to remain, it gives an unpleasant bitterness to the cinnamon. In a few hours after the removal of the cuticle, the pieces are put one into the other; the bark dries, contracts, and gradually acquires the appearance of a quill or pipe, the whole forming a congeries of quills more than a foot in length. During the first day the cinnamon is suspended under shelter upon open platforms, and on the second day it is placed on wicker-work shelves and exposed to the sun. When sufficiently dry it is made up into bundles of about thirty pounds weight each, and these are deposited monthly in the Government magazines of Colombo, where, previous to preparing them for shipment, they undergo an examination by experienced native sorters under the superintendence of an European appointed for the purpose.

The bark of large shoots or thick branches of trees produces coarse cinnamon; occasionally the external pellicle of this sort is scraped off, which thins the cinnamon and improves its colour. It is however, even then, thicker and of a darker colour than that of a good quality, while it is of a very inferior flavour and is disagreeably pungent. This sort is always rejected by the inspectors as unfit to be exported to Europe. The bark of very young and succulent shoots is likewise of an inferior quality and is not admitted among the company's bales. It is very thin and of a light-straw colour, of very little flavour, and that evanescent.

* Cordis's Ceylon.
† Sir A. Johnston in Trans. Royal Asiatic Society, vol. i.
Shoots exposed during growth to the direct rays of the sun have their bark more acrid and spicy than the bark of those which grow under a shade. A marshy soil rarely produces good cinnamon, its texture, under this circumstance being coarse-grained and spongy, while it possesses very little aroma.

It is hardly possible to discover the cause which produces the varieties in the quality of the bark, since shoots from the same tree are found to yield cinnamon of very different qualities.

The best Ceylon cinnamon is thin, smooth, and shining, and of a light yellow colour; it admits of a considerable degree of pressure and bends before it breaks; the fracture is then splintery. It has an agreeable, warm, aromatic flavour, with a slight degree of sweetness. When masticated, the pieces become soft, and seem to melt in the mouth.

From cinnamon which has been rejected for shipment, oil is usually extracted; the best oil of cinnamon sinks in water, but when inferior it is of smaller specific gravity. A very large quantity of the bark is required for obtaining only a small portion of oil; it is reckoned that 80 lb. of newly-prepared cinnamon yield about five and a half ounces of heavy oil, and two and a half ounces light oil.

Cinnamon is packed in bales for exportation, firmly bound round with ropes, and then put into double gunnies. It is the usual custom to send black pepper among the bales; this practice originated with the thrifty Dutch, since by filling up the interstices between the circular packages with pepper-corns, tonnage was economised. If there were no pepper, coffee was substituted. Thunberg attributes peculiarly excellent effects to this method of packing with pepper.

_Cassia._—It is very difficult to determine what is the cassia of commerce, which is now so largely imported into this country. It is, however, most probably the bark of the cinnamon-tree of other countries, and is nothing but an inferior quality of cinnamon. It is well known, that the rejected or third sort of that prepared in Ceylon has been surreptitiously imported into England, and sold under the denomination of cassia.

The subjoined tables exhibit the quantity of cinnamon and cassia imported, exported, and retained for home consumption during the last five years, together with the revenue arising therefrom.

### CINNAMON.

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<td>1827</td>
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<td>359,592</td>
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<tr>
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<tr>
<td>1831</td>
<td>225,869</td>
<td>504,643</td>
<td>23,172</td>
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### CASSIA.

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<td>1827</td>
<td>415,702</td>
<td>427,695</td>
<td>49,084</td>
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<tr>
<td>1828</td>
<td>549,535</td>
<td>356,320</td>
<td>55,787</td>
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<tr>
<td>1829</td>
<td>817,688</td>
<td>795,342</td>
<td>62,252</td>
<td>2,101</td>
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<td>837,589</td>
<td>797,624</td>
<td>65,705</td>
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<td>1831</td>
<td>398,820</td>
<td>718,772</td>
<td>61,162</td>
<td>1,526</td>
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The duty on both cinnamon and cassia is now 6d. per lb. when brought from British Possessions, and 1s. on other sorts. This was fixed in 1829; previous to that time, a duty was paid on cinnamon of 2s. 6d. for that from British Possessions, and 3s. 6d. on foreign; and on cassia from all parts, 1s. per lb.

The price of cinnamon is, at the present time, exclusive of duty—

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<th>Sort</th>
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<tr>
<td>First sort</td>
<td>8</td>
<td>6</td>
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<tr>
<td>Second sort</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>Third sort</td>
<td>4</td>
<td>3</td>
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Price of cassia, 3l 15s. to 4l per cwt.

Price of cassia buds, from 3l 10s. to 3l 15s. per cwt. exclusive of duty, which is the same as on cassia.
CINNAMON.

CINNAMON.
(From "Materia Indica," by Whitelaw Atinile, M.D., M.R.A.S.)

CINNAMON.—Kārruva puttay (Tam.) Kuimie darchinnie (Duk.) Darchinnie (Pers. and Hind.) Kurundu (Cyng.) Sāndilinga putta (Tel.) Kaimanis (Malay.) Darasita (Sans.) Canel (Dut.) Canella (Port.) Darsi (Arab.) Canelle (Fr.) Kanohl (Ger.) Kinamon (Greek.)

Laurus Cinnamomum (Linn.).


This fragrant, pleasant tasted, and pungent aromatic bark, is a favourite medicine of the native practitioners of India, who consider it as tonic, cordial, and stimulant, and give it in doses of from eight grains to a scruple.

From the bark there is prepared by maceration in sea-water and then distilling with a slow fire, an essential oil, which in Ceylon is considered as of great efficacy as a rubefacient in cases of sprains.

The greater part of this aromatic bark which is brought to India, is the produce of Ceylon, where it grows in great abundance in many parts of the island; it is also now an article of trade from several of the eastern islands, especially Borneo.* It is cultivated at Quang-uy in China, and of a very fine quality in the central mountains of Cochín China. (See Voyage à Pekin par M. de Guignes.) It has lately been found to arrive at tolerable perfection in sheltered situations in Lower India; and De Comyn says, in his "State of the Philippine Islands," that the cinnamon plant is found in its native state in the interior of Peru, and when carefully cultivated, not inferior to that of Ceylon (see work, p. 25.); and it is well-known that the plant in the same dominions is quite common in the woods of Mindano. Niewhoff found it in China in the Province of Quangsi in the year 1655.

There are ten varieties of cinnamon known in Ceylon, but of these the Scholias only bark four, viz., the rasue kurundu, naí kurundu, kapuru kurundu, and cabette kurundu, the first is reckoned the finest, and the cabette the worst.

The tree seldom rises above the height of fifteen feet; the leaves stand in opposite pairs on short petioles, and are from four to seven inches long, oblong, pointed, and tri-nerved; the flowers which are axillary and terminal panicles, are white, but without odour.

The laurus cinnamomum with six other species are growing in the botanical garden of Calcutta; it is the katu karu of Rheed (Hort. Mal. 5. p. 105, t. 53), and is described in the Flor. Zeyl. 145, and Burm. Zeyl. (62, t. 27.)

Śintok, Dr. Horsfield tells us, in his "Account of Java Medicinal Plants," is the Java name of a species of laurus, which in taste is an agreeable aromatic mixture of the clove and cinnamon; the best comes to Java from the Moluccas.

It would appear that cinnamon was in former times not confined to Asia, much less to the island of Ceylon. Pliny informs us (lib. xii. cap. 10), that it grew in Ethiopia, and we know "that Vespasian on his return from Palestine, dedicated to the Goddess of Peace in one of the temples of the capitol, garlands of cinnamon inclosed in polished gold; and in the temple built on Mount Palatine by the Empress Augusta in honour of Augustus Caesar her husband, was placed a root of the cinnamon tree set in a golden cup." (See Phillip's History of Cultivated Vegetables, vol. i. p. 152.) Celsus recommends that it should be given "per potionem." (lib. v. p. 261.) In the Philippine Island there is a tree called calingad, the bark of which tastes exactly like cinnamon. (See De Comyn's State of those Islands, p. 27.)

CINNAMON.

(From "Treasury of Botany," by John Lindley and Thomas Moore.)

Cinnamomum.—The trees furnishing Cinnamom and Cassia barks belong to a genus of Lauraceae, or true laurels, characterised by the presence of ribbed leaves, leaf-buds not provided with scales, a six-cleft leathery calyx,
nine fertile stamens in three rows, with four-celled anthers which open inwardly, except those of the third or innermost row, which open towards the outside of the flower. The stamens of this third row are moreover provided with two sessile glands, one on each side of their base, and within them is a fourth row of abortive stamens. The fruit is berry-like, one-seeded, in a cup-like calyx.

C. zeylanicum is largely cultivated in Ceylon, for its bark, which furnishes the best Cinnamon. The bark is stripped off the branches, when it rolls up into quills, the smaller of which are introduced within the larger and then dried in the sun. The thinner the bark is as a rule, the finer its quality. Cinnamon is largely used as a condiment for its agreeable flavour, while its astringent and cordial properties give it a medicinal value. It is said to possess the special property of restraining uterine haemorrhage.

C. Cassia furnishes Cassia bark, which is much like cinnamon, but thicker, coarser, stronger, less delicate in flavour, and cheaper; hence it is frequently used to adulterate cinnamon. Its admixture, however, can be readily detected, even in a powdered state, according to Dr. Hassall. Cassia is grown in China, Java, &c. The German and Russian chocolate-makers prefer cassia to cinnamon, as affording a stronger flavour. The same, or some closely-allied trees, furnish Cassia buds, which are something like cloves, and, like them, consist of the unexpanded flower-buds; but they possess properties similar to those of the bark.

Other species of this genus afford aromatic barks: such as C. Outilawan, a native of Amboyna, whose bark has a flavour of cloves. C. inera, a native of Malabar, is employed medicinally in fevers and dysentery; the seeds are the parts used; the bark is likewise employed as a condiment. The leaves of C. nitidum, dried, are said to have furnished the aromatic leaves called 'folia Malabathri'; indeed, it is surprising that the leaves of the cinnamon are not more often imported, as they, like the inner bark, though to a less extent, contain the volatile oil on which the fragrant aromatic properties depend.

[M. T. M.]


CASSIA BARK.

(Cinnamomum Cassia.—Laubaceae.)

(From "Cultural Industries for Queensland," by Lewis Adolphus Bernays, F.L.S., F.R.G.S.)

This is a native of all the countries to which the true cinnamon is indigenous, and has a still wider habitat than that tree. It is a larger tree, attaining a height of sixty feet, and has a very wide spread of branches—in other respects very much resembling the cinnamon. The leaves are deep green on the upper and grey on the lower surface, the flowers being somewhat more bell-shaped than the other. It likes similar soil and treatment to that which suits its more important and valuable relative; and, in fact, the two trees differ little from each other beyond the points above-mentioned, except as to the degree of the aromatic principle in the bark. In this respect the tree under notice is greatly inferior, the price of high-class cinnamon being double that of cassia bark. This latter is thicker in substance, less quilled, and breaks with a short instead of a splinterly fracture. It is also far more pungent than cinnamon, and has a slimy, mucilaginous feel in the mouth when chewed. Most of the cassia bark imported comes from the East Indies, and it is principally used for the essential oil which it yields by distillation.

CINNAMON.—The plant of the best variety of Ceylon cinnamon, brought from Kew, in 1879, is now 7 feet high and in excellent health at the Castleton gardens. Several plants obtained by layering its branches have been put out in the experimental garden. Besides which a few are now established in pots ready for distribution. The stock of plants of the ordinary "country" form of cinnamon is very extensive.—Report of Jamaica Public Gardens for 1889.
CINNAMON.

CINNAMON.

(Cinnamomum verum.—Laureaceæ.)

(From "Cultural Industries for Queensland," by Lewis Adolphus Bernays, F.L.S., F.R.G.S.)

This tree, from which is derived a staple product of no mean importance in the commerce of the world, and so familiar in our everyday life, is a native of many warm countries, and has been introduced and is cultivated in others. It is indigenous to Ceylon, Malabar, Cochin China, Sumatra, Java, and many parts of India, while it is cultivated in those countries, as well as in Brazil, Mexico, and other parts of the South American continent. There are many species of the tree, but they are very close to each other, and have not yet been properly distinguished by botanists. The differences consist in size and form of leaves, height of trees, and colour of the bark; but it is thought probable that climate has something to do with these distinctions. In any case the matter is not of sufficient importance to dwell upon here; especially as the cinnamon plants brought to Queensland came from the far-famed cinnamon gardens of Ceylon, the country which of all others produces the best and highest priced bark which reaches the markets of the world. The matter is of less importance, also, from the fact that there is no difference whatever discoverable in the medical qualities of the bark of different species, the degree in which the aromatic principle is present constituting the sole distinction.

Cinnamon grows to a height of from 20 to 30 feet, as the soil and situation may be favourable or otherwise. The trunk is slender and short, with wide-spreading branches; the leaves, which are bright green, and strongly-nerved, being in opposite pairs on a short footstalk. The young leaves are of a bright red colour, gradually changing to a light and again to a dark green. The insignificant white flowers are in clusters at the end of a long stalk. The bark is smooth and ash-coloured. The fruit consists of an oval pulpy berry, of a blue colour when ripe, containing a single seed, very like a small olive. The seed germinates soon after falling, and is very difficult to transport about the world. The importations made to this country have invariably been in the form of seedling plants in wardian cases. As many hundreds of plants have been distributed among the gardens of the coast lands, it is probable that we have the material already from which to form experimental plantations.

The quality of the soil is a most important feature in the cultivation of Cinnamon; a dry, sandy soil, which would be iminimal to the successful growth of most trees, being an essential condition of success in this case. Not only is the general growth of the tree benefically influenced by a siliceous soil, but the quality and early maturity of the bark produced under these conditions is superior to that of trees grown in a hard, stiff or wet soil. Grown under favorable conditions, the trees can be made to yield their first product in five years; but in wet or heavy soils, or in shaded situations, not only are the trees longer in maturing, but the quality of the bark is never so good.

Cinnamon is extensively planted upon nearly worn-out coffee estates and upon other lands considered to be unpromising for more favourite kinds of cultivation, and the results are said to be satisfactory.

In Ceylon Cinnamon is always grown in clumps or coppices, some of the stools being of great age. The shoots are not cut when less than from half to three-quarters of an inch in diameter, and those are selected which are tender and young, and promise to peel easily—the bark from such shoots being more valuable than from older wood. I abridge from many sources of information the following, as being the best and most reliable description of the method of cultivation:—"When the ground is prepared for planting cinnamon, the brushwood and young trees are cut down, but lofty trees are allowed to remain at intervals, as it is found that the young plants thrive better under their shade than when wholly exposed to the rays of the sun. The sowing takes place when the seeds are ripe. A foot square of ground is turned up at intervals of six or seven feet. The ashes of the clearing having been spread on the newly-dug spots, four or five cinnamon berries are dibbled into each. These are then covered up and protected with brushwood, both to prevent the surface from parching and to shade the young plants. Sometimes the berries are sown in nurseries and transplanted as soon as fit, in suitable weather. The seeds germinate in from fifteen to twenty days. Under
favourable conditions the first shoot may be cut at about the sixth year, when
a healthy bush will afford two or three shoots for peeling; from four to seven
shoots may be cut from one bush every second year. As four or five seeds are
usually sown in one spot, and in most seasons the greater part germinate,
the plants grow in clusters not unlike the hazel bush. If the season be unusually
dry, many of the seeds fail, while the want of moisture is fatal to the young
plants, so that it is often necessary to plant a piece of ground several times
successively; with intelligence and care the Queensland planter will have little
difficulty in his early experiments with cinnamon, in preventing failure from
these causes. The plant is also propagated from cuttings and from layers;
both methods resulting in earlier bearing of the plants than in the case of
seedlings. Great facilities are afforded by the coppice system of growing, for
increasing by means of layers, the numerous side shoots near the ground
according abundant material for layering. When old stumps are cut down close,
and a fire kindled on the stumps, the roots afterwards throw out a number
of long straight shoots, which are said to yield incomparably fine cinnamon;
such shoots make the cinnamon walking-sticks, which always retain the taste
and smell of cinnamon.

The shoots being cut are tied in bundles and carried off to sheds for
preparation. Being cleared of small shoots and leaves two longitudinal slits
are made in the bark, which is gradually loosened with the convex side of
the knife, and then, usually half the circumference of the bark comes off in
one entire slip. When the bark adheres firmly to the wood it is strongly rubbed
with the handle of the peeling knife until it is disengaged and stripped off. The
sections of the bark thus obtained are carefully put one into the other, the
outside one of one piece being placed in contact with the inner side of another;
they are then collected into bundles and firmly pressed or bound together.

In this state the bark is allowed to remain for twenty-four hours, or
sometimes for a longer period, by which means a degree of fermentation is
induced that facilitates the subsequent operation of removing the cuticle.
After being subjected to this treatment the interior side of each section of
bark is placed on a convex piece of wood, and the epidermis, together with the
greenish pulpy matter immediately under it, is carefully scraped off with a
curved knife. This is an operation requiring some dexterity, for if any of the
outside bark be allowed to remain it gives an unpleasant bitterness to the
cinnamon. In a few hours after the removal of the cuticle, the pieces are
put one into the other, the bark dries, contracts, and gradually acquires the
appearance of a quill or pipe, the whole forming a congeries of quills more
than a foot in length. During the first day the cinnamon is suspended under
shelter upon open platforms, and on the second day it is placed on wicker
work shelves and exposed to the sun. When sufficiently dry it is made up
into bundles of about thirty pounds weight each, and these are deposited
monthly in the Government magazine of Colombo, where previous to prepar-
ing them for shipment, they undergo an examination by experienced native
sorters under the superintendence of a European appointed for the purpose.

The bark of large shoots or thick branches of trees produce coarse
cinnamon. Occasionally the external pellicle of this sort is scraped off, which
thins the cinnamon and improves its colour. It is, however, even then, thicker
and of a darker colour than that of a good quality, while it is of a very
inferior flavour, and is disagreeably pungent. This sort is always rejected by
the inspectors as unfit to be exported to Europe. The bark of very young
and succulent shoots is likewise of an inferior quality, and is not admitted
among the bales. It is hardly possible to discover the cause which produces
the varieties in the quality of the bark, since soots from the same tree are found
to yield cinnamon of very different qualities.

The best Ceylon cinnamon is thin, smooth, and shining, and of a light
yellow colour; it is of about the substance of a thick paper, admits of a con-
siderable degree of pressure, and bends before it breaks, the fracture being
splintery. It has an agreeable, warm, aromatic flavour, with a slight degree
of sweetness. When masticated the pieces become soft, and seem to melt
in the mouth, leaving no after-taste. Whatever is hard, thick, dark-coloured,
or excessively hot in the mouth, should be rejected.

From cinnamon which has been rejected for shipment, and also from the
leaves, fruit, and root-bark, a volatile oil, varying in character, is extracted;
the best oil of cinnamon sinks in water, and is powerful enough to blister
the tongue; but when inferior it is of lower specific gravity. A very large
quantity of bark is required for obtaining only a small portion of oil; it is
reckoned that 80 lbs. of newly-prepared cinnamon yield about 1½ oz. of heavy oil, and 2½ oz. of light oil.

It is the usual custom to send black pepper among the bales; this practice originated with the thrifty Dutch, since by filling up the interstices between the circular packages with pepper corns, tonnage was economised. If there were no pepper coffee was substituted. Thunberg attributes peculiarly excellent effects to this method of packing with pepper.

The bark, however, is not the sole product of the cinnamon-tree; excellent camphor is distilled from the roots; a substance called "cinnamon suet," or "cinnamon wax," is also obtained by bruising the ripe fruit and boiling it in water. The oily substance which floats on the water is removed, and when cooled becomes the article referred to, and is used as an ingredient for candles, which thus prepared give out in burning a delicious odour. The wood is light, fibrous, and inodorous; but from old trunks resinous knots are obtained, which work up beautifully in furniture making.

"Cassia buds" of commerce are the unexpanded flowers of the true Cinnamon, although their designation seems to point to them as a product of Cinnamomum Cassia. They are of a dark-brown colour, resembling a nail with a round head, being surrounded with a six-sided calyx, which gradually terminates to a point.

So valuable a product as Cinnamon cannot, of course, be expected to escape adulteration. This is chiefly accomplished by the substitution of the bark of another member of the same family, described in a former article. Some of the outer bark of the true species also finds its way into consumption; and this form and the bark of Cinnamomum Cassia, both weakened by previous distillation, are frequently used as adulterants.

Ground Cinnamon is much more easily and frequently adulterated. In some cases it consists entirely of Cassia, and in others arrowroot and potato flour are found, as well as wheat-flour and sago meal, baked so as to make the resemblance closer.

CINNAMOMUM.

(From John Smith's "Dictionary of Economic Plants."

Cinnamon, the aromatic bark of Cinnamomum zeylanicum of the Laurel family (Lauraceae). It is a small tree, with willow-like branches and alternate, oblong, elliptical, smooth, entire leaves, with longitudinal veins running from the base to the apex; flowers inconspicuous; fruit a small berry. The Cinnamon is a native of Ceylon, India, Malacca, and islands of the Malayan Archipelago generally. By making longitudinal incisions the bark readily separates from the branches, and rolls up in the form of a pipe about the size of the finger, and of various lengths, and when scraped and dried is of a brown colour, and is the Cinnamon of commerce, which is of different qualities according to the countries from whence it comes. The best is cultivated in Ceylon. The Cinnamon tree is known under a great number of varieties, producing Cinnamon of varying qualities. The bark of C. Cassia, known as Cassia; or Cassia lignea, is thicker and stronger in flavoured goods which used to adulterate genuine Cinnamon; this species also furnishes some of the Cassia buds, which consist of the unexpanded flower-buds. Cinnamon is chiefly used as a condiment, and for flavouring confectionery.

CINNAMOMUM.

(From Johnson's "Gardener's Dictionary."

Cinnamon. (From the Arabic name, kinnamon. Nat. ord., Lauraeis [Lauraceae].

Linn., 9-Enneandra 1-Monogynia.)

Cassia Bark is obtained from nearly all the species of Cinnamon-trees. Other countries have their Cinnamon-trees, but differing from the true Asiatic Cinnamon. Stove trees. Cuttings of fine shoots in April, in sand, under a glass, and a moist bottom-heat. Peat and loam. Summer temp., 60° to 80°; winter, 55° to 60°.

C. Baelolgota (Beelolgota). 40. Yellow, green. E. Ind. 1818.
CINNAMON.

CINNAMON CULTIVATION IN THE HILL AND LOW DISTRICTS.

(To the Editor of the "Ceylon Observer.")

Veyangoda, 24th April, 1881.

DEAR SIR,—During the last few years planters, owing to the shortness of coffee crops, have given their attention to what is called new products. Amongst other things attention has been turned to cinnamon cultivation. A very great error has been made in cultivating this product. Plants have been put out singly on one estate in the hillcountry on which I was resident. The visiting agent, on one of his inspecting visits, suggested a field on which the coffee had gone out, to be planted with cinnamon. I was asked to make enquiries in the lowcountry as to cost of plants. Clumps of plants were then selling at R30 per thousand; that was considered too high, and my P. D., who was resident on the adjoining estate, during one of his frequent visits to Ambagamuwa, purchased plants at R10 the thousand and planted them out singly, one in each hole. When next I met him, I pointed out to him the great mistake he had made. The plants would, I said, be fit for cutting in about three years. Each stock would then put out a couple or so of suckers which in their turn will be fit for cutting in a couple of years. The clumps or bushes will thus be gradually pruned, and it would take ten or twelve years before the cinnamon will pay more than the cost of monthly weeding. My P. D. looked surprised and asked me why I hadn't told him so before. For the simple reason, I answered, that he had not consulted me. I have written so much, as I see from time to time advertisements of cinnamon plants for sale, and as a warning to planters not to put out plants singly. It will never pay, especially as the quality of the cinnamon grown on the hills is inferior and is known as Corin cinnamon. The best use to which such cinnamon can be put is to have it scraped into chips and sold for the extraction of oil. Cinnamon seeds are generally sown in the lowcountry, in beds in which drills are made with the hand, and into which from 10 or 12 to a handful of seed is dropped. The more the seed the larger the clump, the sooner it will pay and the chances of the plants growing, as the outer ones protect the inner ones. It has been said in an old number of your Directory, in an article written evidently by that very able planter who now writes from the "Western Province," that it is next to impossible to make supplies good on our old estates. If the writer of the article in question were to visit the estate under Mr. Drieberg's charge at Ekella, he would no doubt be agreeably surprised to see acres and acres of supplies flourishing, by Mr. Drieberg sowing his seed in handfuls in drills. Finally it will be impossible for planters upcountry to put out plants in clumps, unless from nurseries on the estate, as the cost of carriage of so much soil with the clump will be ruinous.—Truly yours,

B.

BRITISH PHARMACEUTICAL CONFERENCE.

RESULTS OF EXPERIMENTS MADE UPON THE BARKS OF CINNAMON AND CASSIA, ALSO UPON THE OILS EXTRACTED THEREFROM.

By J. Woodland, F. L. S., F. G. S., etc.

Wishing to ascertain, if possible, the substance which causes an iodized decoction either of cinnamon or cassia to lose its blue colour, I made experiments upon the known constituents of the drugs with the result of finding that the volatile oils possess the property of absorbing iodine to a considerable extent, which peculiarity the other known constituents of the drugs seem to lack, and as far as the experiments made at present determine, the oils are the only constituents having that decolorizing power.

The oils of cinnamon and cassia both take away the blue colour imparted by iodine, to a decoction of starch, and that of the former drug possesses this property to a much greater extent than is the case with that of cassia, although not in any constant proportion, the amount of iodine that is absorbed by the oils being dependent upon the age of the sample in an inverse ratio, as the greater the age of the oil the smaller is the quantity of iodine solution absorbed by it. This decolorization is more especially seen when the oil and iodine are dissolved in the same medium, such as rectified spirit
CINNAMON.

or carbon bisulphide, but if the oil be diffused in water, and iodine solution with starch paste added, although the decolorization takes place quickly at first, yet after a time it proceeds but slowly, owing to the imperfect contact of the reacting agents. Iodine also dissolves in both of the oils, more quickly in that of cinnamon, and if the iodine be in excess, it imparts to the solution in oil of cinnamon a rich reddish-brown colour, whilst the more slowly formed solution in oil of cassia has a dull greenish-brown colour, with a very slight appearance of red after shaking.

The quality of cinnamon or cassia bark being dependent upon the amount of oil contained therein, it occurred to me that samples of these barks might have their value approximately determined by treating infusions or decoctions of them with a standard solution of iodine, and accordingly, experiments were made which show that although the quality of a bark of cinnamon or cassia can be quickly ascertained, the total amount of oil will not be indicated on account of the time taken by the oil to absorb the iodine. Decoctions of commercial samples of the powdered drugs were made, 1 gram of each taken, and four of them absorbed a decinormal solution of iodine in the following quantities:

<table>
<thead>
<tr>
<th>No.</th>
<th>Cinnamon</th>
<th>Cassia</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>2 4'5&quot;</td>
<td>2 &quot;</td>
</tr>
<tr>
<td>3</td>
<td>4'9&quot;</td>
<td>3 &quot;</td>
</tr>
<tr>
<td>4</td>
<td>11'8&quot;</td>
<td>4 &quot;</td>
</tr>
</tbody>
</table>

The iodine solution was added until, after shaking well, a distinct colour was seen in the froth. Of the four samples of cinnamon, numbers 2 and 3 were poor ones, as there was not much odour emitted by them, and from these and other experiments made, a sample of an average quality ought, if 1 gram be boiled with water and then cooled, to take at least 6 c.c. of a decinormal solution of iodine to colour the froth. Cassia bark requires a much smaller amount of iodine to colour the froth, first, on account of the oil not absorbing so much as before-mentioned; and, secondly, on account of the bark containing a smaller percentage of oil.

In ascertaining if there is any other ingredient or principal in the cinnamon bark which absorbs iodine, great difficulty was experienced in expelling the whole of the volatile oil, for after boiling the powder with a strong solution of salt for four hours, the odour of the oil was still perceptible, and the decolorizing properties still evident. Hence I conclude that a considerable quantity of this ingredient must be left behind after the distillation of the bark with salt water, as I am informed is the process in Ceylon,* and I should like to have the experience of anyone who has witnessed the operation, there or elsewhere, related.

After trying various chemicals, I found that litharge liberates the oil to the largest extent, and also the most quickly, but as with the others, incompletely, although whether its action is chemical or physical, I am not prepared to say. The oil was finally got rid of by boiling the powdered bark for a considerable period with a strong brine, afterwards with a small percentage of slaked lime to convert the residue of the oil into cinnamate of calcium, and on acidifying one portion slightly with acetic acid and adding iodized starch, the colour was not removed, and no odour was perceptible on heating; through the other portion carbonic anhydride was passed, to convert any slaked lime into the carbonate, which was then boiled, and to the cool decoction iodized starch added with a negative result. These experiments lead me to suppose that the oil is the ingredient that alone possesses the decolorizing property, but what compounds are formed beyond that of hydric acid when the oil and iodine combine I am not at present able to state.

The same difficulty was experienced in attempting to exhaust the drug of its oil with benzol, carbon, bisulphide, chloroform, ether, rectified spirit, and alcohol, although, they were used both hot and cold, as the residue when slightly heated invariably gave off the odour of the oil, and a decoction bleached iodized starch paste.

It having recently come to my knowledge that oil of cassia is substituted for oil of cinnamon, a few experiments were performed, by some of which a distinction can be made between the two oils. If nitreric acid sp. gr. 1'36 be added to oil of cinnamon (1 part of the latter to 2 of the former), and the mixture shaken, a bright orange-coloured liquid is first obtained, upon

* As in the case of the Sikkim cinchons bark.—Compilers.
the surface of which floats an orange resinous substance which slowly becomes deeper in colour until a beautiful cherry-red colour is visible, by which time it has changed to a liquid that floats on a lighter coloured substratum, which also in a short time becomes nearly of the same tint, bubbles then commence to appear, and shortly afterwards spontaneous ebullition occurs with the evolution of nitrous fumes, and vapours of benzoic aldehyde; by the time this ebullition has ceased, the amber coloured liquid commences to clear itself, and finally a clear amber liquid is left, with orange globules floating on the surface.

Upon oil of cassia nitric acid sp. gr. 1·36 has quite a different action, as after mixing 1 part of oil of cassia with 2 of nitric acid, a dirty green supernatant resinous mass (slowly turning brown) is seen floating on a yellowish liquid, and no further change is undergone; if a large excess of the acid be added after the first addition, the resinous mass changes to a deep reddish-brown, and the subnatant liquid takes a cherry-red colour. The same reaction occurs if a large excess of nitric acid be added to oil of cassia at first, but in neither of these cases is there any spontaneous ebullition or evolution of the nitrous fumes and benzoic aldehyde vapours.

If oil of cassia be mixed with oil of cinnamon the reaction with nitric acid takes place as with oil of cinnamon, but more tardily, according to the amount of cassia oil present, and at the end of the process a turbid subnatant liquid is seen instead of a clear one, as is the case with pure oil of cinnamon.

Spirit of nitrous ether can also be used to distinguish between these oils, as it forms a clear solution with that of cinnamon, but a turbid one with that of cassia.

Distinction can also be made between the powders of cinnamon and cassia, for on shaking cinnamon powder with iodine water, a greenish brown colour only is seen, whilst cassia powder treated similarly imparts a black colour. A better way, however, is to make a decoction of the powder and, when cold, add tincture of iodine in excess when on shaking well in a test-tube the froth of the cinnamon decoction is distinctly yellow, and that of cassia grey or black, and if cassia powder be mixed with cinnamon, the characteristic froth of the cassia can be distinctly seen.

A vote of thanks was passed to the author of this paper.

Professor Attfield hoped that the author would continue his experiments with the view of ascertaining the special conditions under which this substance would absorb iodine. The absorption of iodine by essential oils was a matter involved in a good deal of obscurity. The amount absorbed appeared to depend a good deal on conditions, and if Mr. Woodland would look into those conditions, it was possible he might be able to give a good method of distinguishing between these substances.

Mr. Brady said with regard to the employment of salt water in the distillation of oil of cinnamon, he had seen a statement to that effect in Pereira's 'Materia Medica,' and it had been repeated elsewhere, but he did not think that salt was employed generally in Ceylon.* In the only distilling establishment he visited, not only was salt water not used, but the distilled water was used again and again, for a manifest economic reason.

Mr. Greenish said he had heard Mr. Brady state that there were several kinds of cinnamon,—eight or ten; he should like to know whether the particular kind of cinnamon used in these experiments was noticed, because naturally it would have an influence on the result.

Mr. Brady said the different kinds were merely planters' varieties; he did not think anyone could define them. A planter would be able to tell the different sorts, but did not think there were even commercial names for them.

Mr. Greenish asked if there were any mode of distinguishing them.

Mr. Brady replied certainly not except by an expert. It was more like commercial sorting than botanical separation.

Mr. Greenish said probably it would have an influence on the result of experiment.

Mr. Brady said practically oil of cinnamon was made by the poorer planters, usually half-caste Portuguese, who would not take the trouble either to cultivate the shrub properly or to prepare the bark for sale as fine cinnamon, and it was quite a question whether growing the finest cinnamon really paid the planters so well as using it in the rough condition as chips for distilling the oil.

* We remember making inquiries at the instance of the late Mr. Henry Mead, and we were distinctly informed that salt never was used.—Compiler.
CINNAMON.

COST OF COCONUT AND CINNAMON CULTIVATION IN CEYLON.
(From the "Tropical Agriculturist," March, 1888.)

I suggested to my Colombo friend that if he were an American, instead of a Sinhalese, by birth, and had some capital to invest, he would probably look about and find twenty more fathers of boys or girls, of his own nationality, religion, and social status, and pool say £500 each. This would give a joint capital of £10,000, with no interest to pay. They would then find a thoroughly competent native manager; and by giving him besides his salary, a certain share in the profits, identify his interests with their own. They would buy of Government a block of 2,000 acres, of which 750 would be planted with coconuts, 750 with cinnamon, and the other 500 held as a reserve. Roads would be opened, and the estate either marked into twenty plots, one for each shareholder, or if it were to be managed as one estate, then twenty good building plots would be laid out at the centre of the property, and a village formed. Some time ago I got the native manager of just such an estate to sit down with me and make the calculation I am now going to lay before you. It was an estate that had failed in the hands of an European capitalist. He was an absentee, his manager cooked the accounts, the kanganies cheated the manager, the coolies stole products from under the noses of both, and so it at last came under the hammer and into native hands. There were several partners and a good practical man to manage under their personal supervision. The result was that within five years the estate paid for itself, and now the owners can meet the market, whatever it may be, and still make money. The manager's figures may be faulty—I cannot vouch for them—but at least I have had them endorsed by several native estate owners of my acquaintance, whose names are known at the Madras Bank and the O. B. C. Here they are:

Investment of a capital of £10,000, contributed by 20 proprietors in sums of £500 each.

<table>
<thead>
<tr>
<th>Dr.</th>
<th>£</th>
<th>s.</th>
<th>d.</th>
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<tbody>
<tr>
<td>To</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Purchase of 2,000 acres of coconut and cinnamon land, at Rs 31,000</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&quot; Surveying</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>&quot; Making roads (which require 20 acres)</td>
<td>75</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&quot; House for superintendent</td>
<td>100</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&quot; Clearing 1,500 acres at Rs (net, exclusive of timber sold off)</td>
<td>50</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&quot; Plants for 750 acres coconuts (75 per acre)</td>
<td>50</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&quot; Plants for 750 acres of cinnamon (3,000 per acre at Rs 2)</td>
<td>225</td>
<td></td>
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<tr>
<td>&quot; Setting 56,250 coconut plants at 3 cents</td>
<td>108</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&quot; Planting 750 acres cinnamon at Rs 25</td>
<td>93</td>
<td></td>
<td></td>
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<tr>
<td>&quot; Holing and covering do.</td>
<td>131</td>
<td></td>
<td></td>
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<tr>
<td>&quot; Weeding 1,500 acres, 1st year, at £1</td>
<td>1,500</td>
<td></td>
<td></td>
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<tr>
<td>&quot; 10 watchers at £1 per month</td>
<td>120</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&quot; Superintendent's salary at £3 per month</td>
<td>36</td>
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</table>

Total cost at end of the 1st year £6,629 8 6
Weeding, watchers and superintendence, 2nd year 1,656 0 0

Same for 3rd year, £1,656 ...
" 4th year, 1,656 ...
Cr. £3,312 0 0

By crop of cinnamon in the 4th year 562½ bales at Rs 750 per bale... £21,075
Deduct cost of peeling at Rs 16 ...
9,000 1,207 10 0

By Crop 5th year at 1 bale per acre, 750 bales, at same price 1,612 10 0
" 6th year the same ... 1,612 10 0
" 7th year, an increase of 25 per cent 2,015 10 0
" 8th year, same rate of increase 2,418 10 0
" 9th year, do. 2,821 10 0
" 10th year, at 3 bales per acre 3,225 0 0
" First yield of coconuts on 750 acres at Rs 24 nett 1,800 0 0

£16,713 0 0

In the 15th year the income will be
For Cinnamon £3,225 0 0
" Coconuts 3,600 0 0

£6,825 0 0

—Cor. of Ceylon Times.]
CINNAMON.

[The figures look too good to be true. The market for cinnamon is not very promising, while coconuts were never cheaper than now. No allowance is made for part of the land turning out unsuitable for cinnamon or coconuts after planting, as in the case of the Horrekelly estate: 2,000 full-grown coconuts per acre is, we suspect, a good average yield for a property of 750 acres, and therefore we would put £2,500 instead of £3,600 as the full income from this source. So with cinnamon, £1,000 off the above income would be a safer estimate, but even then the investment offers a very encouraging return.—Ed. T. A.]

PEELING CINCHONA AND CINNAMON BARK.

(To the Editor of the "Ceylon Observer.")

Koslanda, 12th Feb. 1882.

Dear Sir,—In your issue of the 5th, I observe a note on peeling cinchona with the help of a cinnamon-peeler's stick for rubbing the bark, so as to facilitate the peeling.

From my experience, it is undoubtedly a fact that this stick is necessary in peeling cinnamon, but it is no help whatever in peeling cinchona.

I tried both the cinnamon-peeler's knife and the rubbing process with cinchona, and found the stick utterly useless, to say nothing of the damage it did the bark; but I strongly recommend the knife to cinchona planters, if they really go in for barking and making pipes à la mode.

Cinnamon, as a rule, will not peel all the year round, but I never found it the case with cinchona: so the stick for rubbing is not necessary, even if it were a success.

I tried it simply for curiosity sake, and found that the rubbing, although gently applied, damaged the bark to a great extent.

I also observed that cinchona will not peel after 36 hours (from the time it is cut), and the only remedy in a case of that kind is to steep the sticks for an hour or two in water.—Yours faithfully,

H. J. C.

THE TRADE IN CINNAMON.

(To the Editor of the "Ceylon Observer.")

27th April 1882.

Sir,—I find that a correspondent, who signs himself "Cinnamon," has been addressing your daily contemporary as to the means to be adopted to raise the price of cinnamon even by a small amount. I venture to address you on the same subject, as greater publicity here and in England will be given to this important matter by its finding a place in the columns of the Observer. At the present time, when a powerful agitation is set on foot to prevent adulteration of coffee and thus raise the price of our staple product, it will not be amiss to make an effort to similarly benefit a product which has given a name to this island. As the production of cinnamon is confined wholly to the island, combination to effect any change will be much more easy than in the case of coffee, tea, cinchona or any other product which has foreign rivals.

First and foremost we want monthly sales of cinnamon. A lukewarm and half-hearted effort was made some time ago to effect this change. A change could not then have been made, owing to the combined front presented by the English brokers against any departure from the old-established quarterly sales. The brokers predicted a still further fall in prices, if a change were made, and the agitation, if it could be dignified by such a name, ceased. Now to us who are not well versed in the mysteries of brokerage it occurred that any plan that would remove a middleman between the grower and the consumer would be a decided advantage to both. By the present system of quarterly sales, immense quantities of cinnamon accumulate, and are purchased by large capitalists, who supply the wants of the consumers, with a profit to themselves. If monthly sales are established, small capitalists, i.e., consumers, can afford and will be able to buy cinnamon themselves, and the profit made by the middleman, the large capitalist, will be divided between themselves and the grower, as the consumer will, even if he pays a penny per lb. more than the large capitalist at the quarterly sale, be paying less than what he would have to pay were he to buy of the middleman. I fear that to illustrate my meaning I have been rather prolix; but I have been endeavouring to make myself plain to my native friends, who are the chief growers.
Next in importance to monthly sales is the necessity to do away with the trade in chips. There will be many who will open their eyes at this suggestion, and consider it the proposal of a madman to still further lessen the income from an already poorly paying product. To prove that the idea is not a wild one, and will eventually benefit the grower, I shall resort to figures. Let us take, for example, an estate of 100 acres, the fair average yield of which ought to be a bale (100 lb.) per acre per annum. The outturn of chips let us take as half of the quilted cinnamon; and this outturn any experienced planter will tell you is very high. The local price for chips is from Rs.40 to Rs.45 per candy of 5 cwt., or say roughly from 7c. to 8c. per lb. The cost of scraping chips is 3c. per lb.; so that the profit will be from 4c. to 5c. per lb. Let us resolve this to a profit and loss account:

<table>
<thead>
<tr>
<th>Description</th>
<th>Rupees</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loss of suppressing 2,500 lb. chips, being $\frac{1}{2}$ yield of 100 bales cinnamon, at 5c. per lb.</td>
<td>125.00</td>
</tr>
<tr>
<td>Profit by the suppression of the chips</td>
<td>75.00</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>200.00</strong></td>
</tr>
</tbody>
</table>

I think hardly any one will deny that, by the chips being withheld from the English market, we will benefit by a rise of at least 2c. or $\frac{1}{2}$ penny per lb. at the sales. If this be admitted, then it will be clear that, instead of being losers, we shall be gainers by not permitting chips to be scraped on our estates. Considering that the trade in chips is of very recent growth, it will not be a very hard matter to suppress it. A combination on the part of the principal native and European planters not to have chips scraped on their estates, together with an undertaking with merchants not to ship chips, will, I am sure, effect the desired change; while those who scrape chips amongst the small landholders can find a ready sale for them for the purpose of distilling oil.

I hope proprietors of cinnamon land, though they have not a representative association, will see the necessity of calling together a meeting, absent proprietors being represented by their agents, to consider what steps ought to be taken to protect their interests.—Truly yours,

PLANTER.

THE TRADE IN CINNAMON.

(To the Editor of the "Ceylon Observer.")

Colombo, 5th May, 1882.

SIR,—Your correspondent "Planter" finds fault with the quarterly sales of cinnamon in the London market, and with the aversion of London brokers to any change. I allow me to point out that "Planter" is in no way compelled to submit to a system he objects to, but that in the local market he will always find buyers ready to pay the equivalent of the London quotations.

The local market offers all the advantages "Planter" asks for. He may sell at any time he likes; he does away with not one but two middlemen, and, above all, he has a chance of forming an opinion of his own as to the actual state of the market and the probable future by the attitude of buyers on the one hand, and the knowledge of prospective supplies on the other.

It seems to me the local market is growing in relative importance for all other articles: why should cinnamon planters adhere to the old system, the defects which do not lie in the quarterly sales but in the habit of consigning?—I am, sir, yours faithfully,

MERCHANT.

REPORT ON THE DIFFERENCES BETWEEN THE ESSENTIAL OILS OF CINNAMON AND CASSIA, BY MR. A. H. JACKSON.—The reporter stated that, tested from a physical standpoint, the oils possess distinctive and characteristic odours, and that the cinnamon oil has a more fiery taste than the cassia, but that neither the relative densities nor the refractive energies are sufficient guides in distinguishing mixtures of these oils, though the density of the oil of cassia was found to be somewhat greater than that of the oil of cinnamon. The chemical examination seemed to show that the constituent or constituents in which the oils differ from each other are present only in extremely small proportion.—Pharmaceutical Journal.
THE CINNAMON TRADE.
(To the Editor of the "Ceylon Observer.")

8th May 1882.

Sir,—Referring to the discussion now going on as to the effect of the trade in cinnamon chips or the price of quilled cinnamon, I find from your Directory that the exports for the year ending the 30th September 1880 amounted to 474,484 lb of chips as against 1,395,534 lb bales. It will thus be seen that the output of chips is over one-third of quills, considerably more than a planter allows, and there can be no doubt that the withdrawal of this enormous quantity of chips from the market must benefit their apparent higher prices realized in the London market just suffice to cover the heavy charges. The demand for chips is always reported brisk and steady in London, and it seems only reasonable to infer that in the absence of chips there would be more inquiry for quills. If this results in prices advancing by one-third of four or five cents (say 1s to 2s) we should not lose by throwing away our chips; but I anticipate the rise in price will be considerably more. It only requires that my fellow proprietors should see the matter in this light to secure the practical abolition of the trade in chips and steady rise in prices. "A Merchant," in reply to "Planter," in a late issue of the Observer, suggests local sales as a means of doing away with the middlemen, who, by means of quarterly sales, and otherwise, swallow up so large a share of the profits which should go to the producer. If local sales do away with two classes of middlemen, how comes it that "Merchant" makes no higher offer than is represented by London prices? If growers failed to realize in London at least as much as they do here, I hardly think they would continue the practice of shipping on their own account. We seek to do away with middlemen, not as such, but as absorbers of our profits. "Merchant" purports to do away with the middlemen, only to put their profits into his own pocket; otherwise, he would pay us London prices plus the profits of the middlemen, or at least as many of them as he does away with.

Again, there is this to be observed, that "Merchant" under the guidance of interested brokers, offers the same for well-known brands which fetch over 2s in London as for bark which sell at 1s 6d. The result is that small-holders sell to the native emissary, who sells to the merchant, rather than to the merchant direct; for the native gentleman pays a high price to mix with inferior stuff and sell to the merchant. If merchants deal direct with responsible men willing to let their marks be used, the result is likely to be satisfactory to both parties.—Yours truly,

PROPRIETOR.

3rd July 1882.

Sir,—I am pleased to find that the agitation set on foot by "Cinnamon" in the local "Times" and taken up by me in your columns has been productive of some good. Though there are scores of men in the country who will be benefited directly by the suppression of chips, yet such is the apathy amongst us natives, that no one interested himself in the subject, till "Cinnamon" with commendable zeal distributed copies of his letter to many of the principal native landholders, and through the medium of private letters to the most influential amongst them managed to set on foot the Native Agricultural Association. Long years of usefulness I wish it most heartily.

This is one outcome of the agitation. Another is that the subject has attracted the attention of the brokers in London, as I find by the letter of your London correspondent. It is idle for your correspondent to say that the withdrawal of chips will not influence the price of quilled cinnamon. If he refers to the export of chips, the quantity sent from Ceylon for the last two years will appall him. I am sorry I have not your "Directory" at hand to give the exact figures (please supply the omission*) but, if the withdrawal of this immense quantity does not give us a better price for our quilled cinnamon, nothing will. We in Ceylon have not the slightest fear of China.

* The export of cinnamon chips in the last three seasons was 118,518 lb., 474,484 lb. and 821,772 lb. respectively.—Ed.
supplying what we withdraw from the market. Confectioners with an established reputation will be slow to use the next to worthless cassia bark for flavoring purposes, in the place of cinnamon. Cinnamon, whether quilled or in chips, must, I suppose, be ground to powder when used for flavouring confectionery. No wonder then that chips find so much favor amongst small confectioners, as the quills we bestow so much care in preparing, when ground to powder, cannot be distinguished from powdered chips, except by an expert, who will be able to detect a milder flavor in the former. If chips be withdrawn, and cinnamon be still in demand by confectioners, it is reasonable to suppose they will go in for quilled cinnamon, and with increased demand prices will rise. When the prices of cinnamon went up about a twelvemonth back, I remember reading in the commercial letter of either the Observer or the "Times," that the keeping up of the prices were practically in the hands of the growers, by keeping back the immense quantity of chips then flooding the market. For the London brokers to now tell us what is opposed to all common sense is foolish.

As for the arguments against monthly sales, I need not take the trouble to refute them, as your correspondent simply repeats what the brokers told us before. We were not 'wished' with the soundness of their arguments, neither are we now. Self-interest makes them still adhere to antiquated and out-of-date quarterly sales.

I trust now that the Association has been formed, some members will ere long bring forward a motion by which all members will bind themselves to discontinue scraping chips on their estates—even for a couple of years. If the withdrawal of chips does not favourably affect the price of quilled cinnamon, then we can all resume scraping. Again wishing the Ceylon Agricultural Association long years of usefulness, I subscribe myself a Planter.

THE CINNAMON TRADE:

It is evident from the recent correspondence in the local Ceylon papers that the prices at which cinnamon has been selling in the market, especially at the last few quarterly sales, have not been remunerative to growers. This is the case even with those who ship direct on their own account, while to those growers who sell to merchants on the other side, the present values must be even less profitable, as the merchants to whom they sell can only make offers to show them a profit on public sale quotations, after taking into consideration the expenses of freight, loss in weight, dock charges, and so on. In this, as with all other commercial productions, the price realized is of course simply a matter of supply and demand, and the present statistics show that the former is far in excess of the latter. The stock here has increased gradually year by year, and is now no less than 7,292 bales of Ceylon. 1,412 packages of China cinnamon, and 4,641 packages of chips against a total last year of 5,994 packages of Ceylon and China cinnamon and 3,456 packages of chips. This very heavy stock, of course, greatly depressed the market, and at the last quarterly sales in May prices dropped to the extent of 4d. to 6d. for a fine to superior qualities, and 2d. to 3d. for inferior to good sorts. The system of quarterly sales, which survives as a relic from a former state of things, no doubt materially aggravates the evils from which the growers in Ceylon suffer. They are kept out of their money for an unnecessary period, and the stocks accumulate over a period of thirteen weeks, until they reach an immense total. When the sales finally take place, a crushing quantity is offered, and prices are unduly depressed, to the benefit of speculative buyers and the injury of planters. The sales of cinnamon, in the interests both of the growers and of the home trade, ought to be held from week to week, just as is done with any other commodity. There is no virtue or peculiarity in cinnamon that necessitates its being sold in a different way to other things. Even monthly sales, instead of quarterly ones, would be decidedly a step in the right direction, for the present system of quarterly sales only multiplies speculative buyers, who buy largely to supply orders that come into the market during the three months without sales, and thus obtain a profit which the planters ought to get. For instance, export orders that cannot be held over for the quarterly sales have to be executed at a profit from second-hand parcels in the market. Dealers also have to buy largely for a three months' stock, to avoid having to buy between the sales, and have thus to hold more cinnamon than they would
need under a more reasonable system. Here, again, it is the planter who has to pay. Some of the correspondents of the Ceylon Observer recommend that chips should not be sent to this market. This, however, appears a short-sighted policy, which would simply stimulate the demand for cassia and China cinnamon if the price of quill Ceylon should rise, which appears very doubtful, though broken cinnamon might do so. If weekly or monthly sales were established they could not in any way tend to decrease the demand, but they would render it more even, would make realizations more prompt, would save interest and dock charges, would throw open a sort of small monopoly; and while bringing better prices to the planter, would be beneficial to the dealers and shippers by interfering with the operation of the speculative buyers.—Produce Market Review.

CINNAMON CULTIVATION AND CHIPS.

(To the Editor of the "Ceylon Times.")

SIR,—You have fallen into the error of considering "the greater or less abundance of chips to be the result of neglected cultivation," and that in a highly cultivated estate there ought to be but a trifling quantity of chips. Now the only cultivation that a cinnamon estate receives is weeding and pruning. These works generally follow a cutting; a pruner to get a "peelable" stick in the middle of a cinnamon bush, has to press down the obstructing branches, and these, if they do not right themselves and assume an upright position, will be cut down by the pruner. Besides these bent down branches, the pruner, in trimming a bush, removes all old wood that is not likely to ever peel again. The prunings are scraped into chips. If your idea is that the production of chips is confined almost entirely to lands in the hands of natives, you are wrong. For natives, or at least the poorer class, resort to what is known as forced cuttings, to get as much crop as possible during each season, thereby leaving no old wood damaging the bushes. Besides forced cuttings, natives peel almost all the year through, and whenever by the help of a few showers of rain, sap flows freely between the bark and the stick; so that you see, sir, very little or no old wood is left on their lands, and consequently their lands produce a minimum of chips.

According to the style of cultivation carried on a properly managed estate, peeling takes place only twice a year. During a cutting there are many sticks that from no apparent cause, or from the apparent cause of their carrying a tree, do not peel. These are reserved for the next cutting, that is six months hence. During the interval, if the growth of cinnamon be fast, many of these sticks will have passed the age for peeling, and will be fit only for the pruner’s catty, or in other words for chips. Thus you will see that the production of more or less chips is no gauge as to the proper cultivation or want of cultivation of a property; if anything the contrary of what you held is true. I shall be very glad if any planter of experience correct the views of a young yet

CINNAMON CULTIVATION.

(To the Editor of the "Ceylon Times.")

SIR,—I fail to be convinced by the repetition of your assertion that an estate well cultivated must produce but a small quality of chips. If by proper cultivation you mean harvesting the bark at the proper seasons, I am one with you; as the missing of a season must necessarily harden the "peelable" sticks and make them fit only for chips. That in good cultivation you include the seasonable harvesting of the bark, is apparent from the concluding portion of your paragraph, where you say "that the quantity of chips need not be of any serious extent unless from neglect" (in harvesting bark?). Besides missing the season, unseasonable weather has a great deal to do with the production of a large quantity of chips. That you write from personal experience, I am aware, but am I wrong in believing that your experience has been confined to only visiting cinnamon estates; and might I respectfully urge, that when anybody takes to visiting an estate, cultivating products of which he has no personal experience as planter, he is likely to hold some views on the results of cultivation which will be erroneous?

Observant Planter.
CEYLON CINNAMON AND CHINA "CASSIA."
(From the "Tropical Agriculturist," November, 1882.)

For a couple of centuries including the period of Dutch rule and the first half century of British rule, an average of about half-a-million lb. of cinnamom, the fine spice of which Ceylon has a natural monopoly, sufficed for the wants of the world. The quantity exported was, indeed, rather under the round half-million, for the average for the five years ended 1841 was only 452,000 lb. In those early days, consumption was, no doubt, restricted by the enormous export duties which prevailed, and which, apart from increasing the competition of China cassia, tended to encourage the cultivation of the true cinnamon in Java and at Tellicherry on the west coast of India. At the end of the period mentioned Government abolished the unprofitable cinnamon department, sold their gardens and gradually lowered the duties, which were finally abolished. The result was that the averages rose as follows:

<table>
<thead>
<tr>
<th>Years Ended</th>
<th>Cinnamon (lb.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1846</td>
<td>530,000</td>
</tr>
<tr>
<td>1851</td>
<td>565,000</td>
</tr>
<tr>
<td>1856</td>
<td>755,000</td>
</tr>
<tr>
<td>1861</td>
<td>807,000</td>
</tr>
<tr>
<td>1866</td>
<td>825,000</td>
</tr>
</tbody>
</table>

Then came the great spring, owing to what at the time was deemed the grand discovery, that it would pay better to send cinnamon chips into the market than distil cinnamon oil from them. In 1857 the million of punds was, for the first time in history, exceeded, and in 1869 we had the culminating export of 2,685,000 lb. Next year the two millions were exceeded, but there was then a considerable decrease and the average for the five years ended 1871 was 1,834,000 lb. The average for the next five years went down to 1,264,000 lb.; and the two millions of pounds have not again been so closely approached since 1871 as in the season just closed, for which the exports were:

- Baled cinnamon: 1,600,000 lb.
- Chips: 394,000 lb.

Total: 1,994,000 lb.

For ten seasons there has been no higher export of baled barks than in that just closed, and the quantity of chips was only exceeded in 1879–80 when the enormous quantity of 474,484 lb. were shipped, or above the old average for total export. Recently there has been an agitation in favour of discontinuing the export of chips, so as to improve the prices of the fine, long-qualified cinnamon. Looking at the motives which usually actuate human nature, it is in the last degree improbable that any compact binding owners of cinnamon gardens not to export chips, or sell them for purposes of export, would be observed. A certain number will refuse to enter into the compact and another uncertain number (we fear a considerable percentage) will violate it, either by directly exporting chips, or selling to those who will export. With the abolition of the duties, and the export of chips from Ceylon the cinnamon enterprise, both in Java and Western India, ceased to be profitable, although curiously enough, the growers of cassia in China believe that they are suffering from the competition of Java cinnamon. Although Ceylon has no monopoly of the growth of cinnamon, yet for fineness of quality its spice, largely grown in almost purely siliceous sand, is entirely unequalled. But as in the case of coffee, the millions look to cheapness more than quality, and so the true cinnamon has long had a formidable rival in the cassia of China, the bark of an inferior variety of the cinnamon laurel, or, which at any rate as grown in China yields an inferior bark. How formidable that rival is, and how slight the effect on the market of withholding the chips, if that were possible, would be, we had no idea until we saw the statistics embodied in a report on China cassia by the Hong Kong Botanist. This report, which has been sent to us by the local Government for perusal, will be duly noticed. For the present we confine ourselves to the figures for exports from Canton. If these can be depended on the quantity of 1 lignea, twigs and broken twigs, exported in 1879 considerably exceeded 100,000 piculs of 133 lb. each,—say 131 million of pounds! That, to be sure, was the maximum, but after a considerable falling-off in 1880 the exports in 1881 reached in piculs,

- Lignea: 54,526
- Broken Ligneas: 3,129
- Twigs: 6,941
- Bark of Ligneas: 2,832

Total piculs: 67,428

or close on nine millions of lb. The average export of cassia, therefore, considerably exceeds four times, is, indeed about five-fold the figures for Ceylon.
cinnamon, and the Chinese growers would be only too ready to fill in the
deficiency of supply created by the withholding of Ceylon chips. No doubt
our most inferior chips are better in quality than the best China cassia. We
recollect that some time about 1848 we received specimens of the China
spice from the late Capt. Margesson, R. A., who was then, serving at Hong
Kong and who was interested in Ceylon cinnamon. The bark was coarse and
pungently hot, instead of having the fine delicate flavour of our best quality;
but the very strength of "cassia," will be counted a merit by many of the
pudling eaters of England. Besides bark, about an average of 2,000 piculs, or
over a quarter of a million pounds of "cassia buds" are annually exported.
Can any reader tell us why the buds of our true cinnamon have never been
exported as a spice from Ceylon? The source of the China cassia is now
ascertained to be exclusively a variety of the true cinnamon, *Cinnamomum cassia*,
Blume; "yuk quai she" of the Chinese.

THE "CINNAMOMUM CASSIA" OF CHINA, SOURCE OF THE
"CASSIA LIGNEA" OF COMMERCE.

(From the "Tropical Agriculturist," December, 1882.)

It may be known to some of our readers that, owing mainly to the
silence of the ancient chronicles, the question has been hotly debated amongst
scientists, especially in Germany, as to whether cinnamon was indigenous to
Ceylon. As one of the oriental names of sugar is simply a modification of
the word China, so cinnamon has been traced to a similar origin. *If* our
cinnamon came to us from China, far back in the ages, then soil, climate
and cultivation have effected a very great improvement. The tree, however,
is scattered over our forests, up to near the summit of our highest mountain,
which is 8,295 feet above sea-level, and we believe that botanists are now
agreed that the precious spice tree is really indigenous to Ceylon. It is
curious that a somewhat similar controversy should have raged over the origin
of the cassia bark of China. There was not, we believe, any question that
the bark came from China, but only as to whether it owed its origin to one
tree, a species or variety of cinnamon, or was gathered from several trees of
different species. Sir Joseph D. Hooker, anxious to have the question set at
rest, moved the Earl of Kimberley in the matter, and at his lordship's instance,
Mr. Charles Ford, Superintendent of the Botanical and Afforestation Depart-
ment, Hong Kong, was deputed to visit the districts, up the West River
(Sai Kong), in which cassia is produced. The main scene of the cassia
culture is so close to Hong Kong, which is situated in N. Lat. 22°12' and
E. Long. 114°15', (16° further north and 34° further east than our cinnamon
districts), that the meteorological conditions cannot be very different. The mean
monthly temperature of Hong Kong ranges from 55°-63° in January to 85°
in July and August, the annual means being from 73°-74°. The annual
rainfall ranges from 66 66 inches to 111°57', so that the average is much what
ours in Colombo is. The chief climatia differences are the much lower
degree of cold experienced and the fall of the vast bulk of the rain in South-
West monsoon months—May to September. October gets a fair quantity, but
a dry season extends from November to April, although in some years a good
deal of rain falls in March and April. The 16° further from the equator,
probably influences the quality of the China bark as compared with our Ceylon
spice, but the main differences must arise from the widely opposite conditions
of soil, situation, culture and harvesting. Our regularly cultivated cinnamon
is all grown on flat plains, and much of it in the fine sand we noticed in
our previous article. The whole of the China cassia trees are, it appears,
grown on the sides of hills which rise to an altitude of 1,000 feet, the plant-
tations being terraced. The bark also is taken from plants six years old,
instead of from stems of about three years' growth as with us, and the epid-
ermis is actually removed by a plane instead of being scraped away by the
knife of the cinnamon peeler. Our readers will peruse with interest the
following account which Mr. Ford gives of the culture of China cassia:

"Plantations exist on situations with all aspects, any particular one not
apparently receiving consideration in preference to others. They are at altitudes
of from about 300 to 1,000 feet above sea-level, and on slopes of from about
50 to 30 degrees. Plantations were nowhere seen on level ground, in fact so
very little level ground exists in the localities of cassia cultivation that, even
if wanted, it could not be obtained. The very small portions of level ground
that there are in the bottoms of small valleys, are used for the cultivation
of rice and vegetables. Land carrying the thickest vegetation of grass and
ferns—*Gleichienia dichotoma* chiefly—is selected. Naturally the soil contains a fair quantity of humus for a depth of from six inches to a foot, but the accumulation of vegetable matter is not more than to give the soil a light brown colour; the consistency of the soil is from friableness to hardish compactness. If very dense the vegetation is burnt. The soil is dug to a depth of about one foot and placed in small terraces or steps three feet apart, and of a width varying according to the steepness of the hills, frequently they are not more, sometimes even less, than eighteen inches wide. No manure is used either when the ground is prepared or subsequently."

The plants are placed in the ground at distances of three feet apart. The peeling of the bark and the gathering of the buds and leaves (for all are utilized by the Chinese) are thus described:

"Bark.—When the trees are about six years old, the first crop of bark is obtained. The season for barking commences in March and continues until the end of May, after which the natives say the bark loses its aroma and is therefore not removed from the trees. The branches, which are about an inch thick, being cut to within a few inches of the ground are carried to houses or sheds in the vicinity of the plantations. All the small twigs and leaves being cleared off, a large bladed knife, with the cutting edge something like the end of a budding knife, is used to make two longitudinal slits, and three or four incisions, at sixteen inches apart, round the circumference through the bark; the bark is then loosened by passing underneath it a kind of slightly curved horn knife with the two edges slightly sharpened. Pieces of bark sixteen inches long and half the circumference are thus obtained.

"The bark, after its removal and while it is still moist with sap, is then laid with the concave side downwards and a small plane passed over it and the epidermis removed. After this operation the bark is left to dry for about twenty-four hours and then tied up in bundles about eighteen inches in diameter and sent to the merchants' houses in the market towns.

"Leaves.—The leaves which are cleared from the branches that are barked, are carefully preserved and dried, and afford by distillation cassia oil. A large quantity of leaves are sent to Canton, where I was told, the operation of distilling is performed.

"Twigs.—These are removed from the cut branches at the same time as when the leaves are obtained. They are a marketable commodity for native uses.

"Buds.—Cassia buds are the immature fruits. They are gathered when about one-eighth grown. Buds and the seeds which are annually required for sowing are obtained from trees ten years and upwards of age that are left standing at about fifty and a hundred feet apart amongst the trees which are cut down every six years for their bark. These seed-bearing trees are not cut, unless there is a demand for the very thick bark on their trunks, when some of the trees which can be conveniently spared are sacrificed."

The small twigs being utilized, nothing is said about distilling oil from the bark, but the leaves seem in great request for the distillation of "cassia oil." The leaves of our Ceylon plant, which are excessively brittle, give out, when broken, the odour, not of cinnamon, but of cloves, and all we have ever learnt about leaf oil and its uses in Ceylon is, that rubbed inside the boards of books it preserves the books from fungi and insects. Are we right in assuming that our cinnamon growers leave all small twigs and leaves on the ground, when cutting the matured sticks? We have never heard of cinnamon leaf oil as an article of inland sale or external commerce, and, as we noticed on Wednesday, the idea of utilizing the immature seeds as cinnamon buds seems never to have occurred to any one in Ceylon. Why? And could not a market be found for the very powerful essential oil so plentiful in the leaves of the cinnamon laurel? If the information which Mr. Ford obtained regarding the yield per acre and money returns of the China cassia culture are correct, we can only feel astonishment that much of the culture is not abandoned, instead of being persevered with and even extended. Mr. Ford gives the figures thus:

"The yield per acre is probably about 11 piculs which is sold by producers for about $1.70 per picul, i.e., $18.70 per acre, which, as the bark is only obtained once in six years, gives but $3.11 per annum per acre for the bark, but in addition to this a little must be added for the income from the sale of leaves and "buds;" the former, however, would be very small as they only realize about 20 cents per picul when dry, the latter fetch $15 per picul and are a yearly income; but no satisfactory information could be obtained as to the production per acre."
A gross money return of under R40 per acre per annum is poor enough, in all conscience, without following Mr. Ford into what we cannot but consider an error, from his want of knowledge of the system adopted in cinnamon culture. With us there are many, perhaps a dozen plants in the same stool, the stems of which are cut annually, in succession, as they attain the age of about three years. It is possible, although Mr. Ford did not notice it, that the same system is adopted by the Chinese cassia cultivators, but, even if there is only one plant in each hole, it is not credible that all the trees would be cut down simultaneously, and that then there would be a blank in harvesting for six years! Mr. Ford describes a system of coppicing, which must, as in Ceylon, result in stems which will ripen at varying periods and so be ready for cutting, year by year. Instead, therefore, of the starvation return of R$11 per acre per annum (a little over R6!), the gross return from bark, twigs and buds must be somewhat over R40 per acre per annum, of which probably R20 net remain to the grower.

Mr. Ford remarks:—

"It has been thought that the 'yield is gradually decreasing' in consequence of the 'prices of late years shewing no profit to producers.' From the following table of the quantities and values of cassia exported from Canton the above assertion is scarcely borne out, as although the yield in 1881 was much less than in 1879, yet it compares favourably with the past ten years, being higher than in 1871—73—74—75—76—77, and 80, and not much less than in 1872; 1879 seems to have been the best year on record, over 100,000 piculs having been exported. Although the yield does not seem to be decreasing yet the prices have fallen very much; in 1875 they fell to less than one-half, what they had been for the previous 13 years, and they have not since recovered, but seem rather to be a little decreasing. In spite of these bad times the producers continue to make large annual new plantations, which would seem to indicate that there is still some profit to be made."

If the figures which Mr. Ford has borrowed from Simmonds' book can be depended on, then the increase in the export of cassia from China in twenty years has been enormous and quite accounts for the depression in the Ceylon cinnamon trade. The rise has been from 7,683 piculs, say a little over one million of pounds, to over 134 millions in 1879. For 1882 the export could not be much less, as the estimates Mr. Ford obtained were

| For Loting district | ... | 50,000 piculs, |
| Taiku | ... | 32,000 |

Total: ... 82,000

say about 11 millions of pounds, without counting twigs. Can any of our readers, interested in cinnamon, supply us with figures shewing the imports into Britain of Ceylon cinnamon and China cassia for a series of years? No doubt an appreciable quantity of China cassia goes to other countries, but, as a good deal probably goes to Britain, we should be able in some degree to test the correctness of figures which have taken us utterly by surprise. Messrs. Russell & Co of Canton and Hongkong, who supplied Mr. Ford with specimens of bark, &c., could, no doubt, supply valuable information as to the history of the rapid rise and progress in the past twenty years of a trade which has so seriously affected the cinnamon interests of Ceylon. Our exports of fine cinnamon, including chips, was for last season close on two millions of pounds. The exports of inferior cinnamon from China, the Eastern Archipelago, India, Burma and all other producing countries (which, of course, supplied their own wants), must have been from seven to tenfold our exports. Mr. Ford's visit to the cassia districts was so timed that he arrived in the flowering season, so that he was able finally to solve the botanical question, and, besides a set of the instruments used in the process of decortication, he brought back plants, some of which were to be sent to other colonies. Dr. Trimen will soon be able to tell us if the China cassia is in reality anything more than a variety of the true cinnamon, influenced by circumstances of climate and culture. Indeed, the technical description given by Mr. Ford, which we do not quote, may settle this question. The probability is that China cassia bears the same relation to Ceylon cinnamon that China tea does to that of Assam. The largest tree Mr. Ford saw was 40 feet high, 3 in. circumference with bark ½ inch thick. Some of the cinnamon trees in our forests are, perhaps, a little taller than 40 feet? There were no varieties of the one species, and it does not seem to grow wild in China, although it is
said to be found in the forests of Cochin-China. Mr. Ford has "no doubt but that writers who have named other kinds as cassia yielding trees of China have been mistaken or misinformed on the subject. One writer alludes to a tree in terms which partly correspond to the description of Machilius velutina, Champ., another tree belonging to Lauraceae and indigenous to South China. It is quite possible that this tree may have been supposed by a casual observer to yield cassia bark because it is sometimes grown in plantations intermixed with those of Cinnamomum Cassia. The trees are reared, planted, and treated in precisely the same manner as the cassia trees, but the bark is required for a very different use, viz., to supply a glutinous extract which is used to stick together powdered cassia bark and sandal-wood Santalum album—to form the joss sticks used for incense. Cinnamomum Burmanni Ei., which it has been supposed may probably yield in part the cassia bark of the Canton market does not, I feel sure, supply cassia bark to any extent. I did not see it anywhere cultivated, nor was it seen growing wild in any but very small quantities, and these wild trees bore no signs of having been cut as had the cassia trees; many natives were asked if it was ever used, but, with one exception, all denied that it afforded any cassia bark. The one exception was and old woman, who was cultivating a field of Indian corn close to a few small trees of Cinnamomum Burmanni, and who said that its bark was sometimes, but rarely, used to adulterate the true cassia bark."

Thus did Mr. Ford solve the botanical problem and obtain valuable information regarding the important cassia industry in China. We do not quote the portions of the report which describe the mode of propagating the plant, as it does not essentially differ from the process pursued in the case of cinnamon. Neither can we find room for the detailed account of the general botanical features of the West River district, however interesting it is to scientific men. We may notice, however, that in China the cassia or cinnamon plant and pine trees (genus sinensis) are associated.

After writing the above, we referred to the article "Cassia" in Simmonds' book and we find that, while 76,464 piculs of 133½ lb. of cassia were exported from Canton in 1872, only 1,363,000 of all kinds of spice were imported from China into Britain in that year. And probably most of the cassia imported was again exported. Up to 1870 only about 40,000 lb. of cassia per annum was consumed in Britain, cinnamon being preferred. We should like to know if there has been any change in public taste in the interval? And whether, on the Continent of Europe, Spain especially, Ceylon cinnamon is still used to flavour chocolate? For purposes of chewing by those who labour in quicksilver mines (under the idea that it counteracts the evil effect of mercury fumes), we should think the more pungent cassia is likely to be preferred.

From Simmonds' book on Tropical Agriculture it appears that even Messrs. Hanbury and Flückiger shared the opinion which Mr. Ford has now dissipated as to the very varied origin of cassia, but they traced the bulk to species of cinnamomum prevailing from India eastward. While China supplies the world with the greater proportion of the inferior cinnamon called cassia, it is said to be produced in the Khalsa hills in Eastern Bengal and exported from Cutchta. We extract as follows:

"In this region there are three species of cinnamon, growing at 1,000 to 4,000 feet about the sea-level, and all have bark with the flavour of cinnamon, more or less pure; they are Cinnamomum obtusifolium, Nees; C. paeoniflorum, Nees; and C. Tamala, Nees. C. iners, Reinw., a very valuable species occurring in Continental India, Ceylon, Tavoy, Java, Sumatra, and other islands of the Indian Archipelago, and possibly, in the opinion of Thwaites, a mere variety of C. Zeylanicum, but, according to Meissner, well distinguished by its paler, thinner leaves, its nervation and the character of its aroma, would appear to yield the Cassia bark or wild cinnamon of Southern India. C. Tamala, Fr. Nees et Eberm. which, besides growing in Khalsa, is found in the contiguous regions of Sylhet, Sikkim, Nepal, and Kumaon, and even reaches Australia, probably affords some Cassia bark in Northern India. Large quantities of a thick sort of cassia have at times been imported from Singapore and Batavia, much of which is produced in Sumatra. In the absence of any very reliable information as to its botanical sources we may suggest as mother plants C. cassia, Bl. and C. Burmannii, Bl. var. a. Chinense, both stated by Teijsman and

* The statement in the Encyclopaedia Britannica as to the export of "wild" cassia from China is contrary to what Mr. Ford states, and as Cochin China marches with China all probability is in favour of wild trees in the forests of both countries.
Binnendijk to be cultivated in Java. The latter species growing also in the Philippines, probably affords the cassia bark which is shipped from Manila (Pharmacographia.)

We can only repeat that during the period of Government monopoly of cinnamon in Ceylon, the Dutch managed to introduce the true cinnamon into Java, the cultivation of which extended while the Ceylon spice was burdened with duties so high at one time as 35 6d per lb. Probably some of the product of the plants so obtained and cultivated is now exported as cassia. The United States, which take most of the Padang coffee, get also some cassia bark thence. The position of cassia in the commerce of China is important, seeing that the exports of this article in 1873 were valued at $14,000,000, or fully 24 millions sterling. The value, like that of cinnamon, has gone down in the period since 1873. The export of cassia buds from China has fallen off, and we find it stated that

In Southern India the more matured fruits of one of the varieties of Cinnamomum iners, Reinw., are collected for use, but are very inferior to the Chinese cassia buds.

The article on cassia in the new edition of the Encyclopædia Britannica is short, but it includes some interesting information, amongst the rest the fact that our fine Ceylon cinnamon is adulterated with and often superseded by the coarse cassia. To quote:—

"The bark is imported into England in bundles, which are from 1 foot to 18 inches in length, and weigh about 1 lb. The bundles consist of quills of bark from half an inch to an inch in diameter, generally single, rarely double. The bark is much thicker than that of true cinnamon; the taste is more pungent and the flavour less delicate, though somewhat similar to that of cinnamon. A large quantity of thick, woody bark, of inferior quality, is now imported under the name Cassia vera, or Wild Cassia. The properties of cassia bark depend on the presence of a volatile oil—the oil of cassia, which is imported in a pretty pure state as an article of commerce from Canton. Cassia bark is in much more extensive demand on the Continent of Europe than in Great Britain, being preferred to cinnamon by Southern nations. Both oil and bark are useful in medicine; but their chief use is for flavouring liqueurs and chocolate, and in cooking generally. When ground as a spice it is difficult to distinguish cassia from cinnamon, and it is a common practice to substitute the cheap common spice for the more valuable article. The adulteration may be detected by the behaviour of a decoction in presence of iodine, which in the case of cinnamon, produces little effect, but with cassia strikes a deep blue colour. Cassia Buda, which have a pleasing cinnamon flavour, are the immature fruits of the tree or trees which yield Chinese cassia. They are brought in considerable quantities from Canton, and used as a spice and in confectionery. Some confusion occasionally arises from the fact that Cassia is the generic name of an extensive genus of leguminous plants, which in addition to various other medicinal products, is the source of the senna leaves which form a most important article of materia medica."

"The cultivated cassia itself has thus a rival in the bark of the wild trees, and the competition of both added to over-production accounts for the depressed position of the Ceylon cinnamon trade."

In an article on cinnamon in the local Examiner allusion is made to the extension of the culture in recent years under the influence of the high prices which then prevailed. Near Negombo fertile fields were converted into cinnamon gardens and the plant was grown on coffee estates upcountry. Of "chips" the record is:—

"Keeping in view the fact that the exports have been swelled by chips—a comparatively new industry, unknown 20 years ago when only quills were prepared on estates—the Agricultural Association has taken steps to abolish, or even to restrict, the preparation and exportation of chips. When it is considered that scraping chips costs about 3 cents per lb., and that its selling price is about 7 or 8 cents, it will be seen that the producer nets only about 5 cents. This on 400,000 lb. the present annual outturn, represents about R20,000. If the withdrawal of this enormous quantity of inferior and woody stuff should have the effect of raising the price of the one and a half million lb. of quills now exported by one and a third cents a lb., the producer will be reciprocated for the loss of his chips."

The writer then proceeds to defend the combination to refrain from exporting chips. No defence is needed of what the growers have a perfect right to do, if they choose. We can only repeat our scepticism as to the agreement being observed, and our fear that the hiatus created by the withdrawal
of chips would be at once filled up by cassia bark. Cinnamon is bulky in proportion to its weight, and the article is so delicate and liable to damage, that it has to be stowed very carefully on board ship, passenger cabins being sometimes utilized for the purpose. But agitation for an alteration in the tonnage scale and for a reduction of freight and charges is perfectly legitimate. We can only hope that there may be a speedy revival in this ancient staple of Ceylon trade as well as in the newer products.

THE CASSIA LIGNEA OF CHINA.

(From the "Tropical Agriculturist," January, 1883.)

In a recent notice of a report on the Cassia Lignea of China, we recorded our recollection of a specimen sent to us some thirty years ago by the late Capt. Margesson, R. A., as tasting coarsely hot and pungent. Whatever the cause, the specimen now sent to us by the local Agricultural Society is distinguished by the very reverse quality. It does not seem to have been long kept, and yet on tasting it, our first impression is that the percentage of the essential oil present which gives its peculiar odour and its value to cinnamon is exceedingly low. We should certainly qualify it as a very inferior cinnamon, very dirty and very badly prepared. Much of the epidermis remains on the bark, no doubt from the planing operation being imperfectly performed. Altogether the bark compares most unfavourably even with third-class cinnamon and only in the quality of cheapness can it possibly compete with the fine and carefully knivescraped cinnamon of Ceylon.

CINNAMON PRODUCTION AND SALES.

(To the Editor of the "Ceylon Examiner.")

DEAR SIR,—I notice a letter in the columns of the Observer signed "K. G." on Cinnamon Cultivation, which is evidently written by an old stager. I am at one with him in his statement that small native holdings turn out little, if any, chips. For this reason, that in such places peeling goes on almost all the year round, and no sticks are allowed to grow "coarse." It is different on a large estate. During the peeling season, the estate is gone over once, and very seldom twice. For a variety of reasons, often unexplainable, a certain proportion of sticks do not peel. They remain till the next crop, when if they are peetable they are cut and peeled, or if they have passed the peeling stage and have turned "Katta," they are cut down by the pruners, and the bark converted into chips.

In former days when cinnamon was carelessly quilled and the 4th quality cinnamon was made half the length of the other qualities, and as thick as a child's arm, the practice "K. G." refers to of getting peelers to cut coarse sticks first was no doubt very good and profitable; but in these times of severe competition, when every man strives to excel his neighbour in the fineness of his quill, and none but cinnamon of fine make is saleable, or at least saleable at a price to leave a margin of profit, however small, the cutting of coarse sticks is next to useless for quilling purposes. Often and often have I cut sticks of mediocre coarseness to have quilled for 4th quality cinnamon, and have signally failed, owing to the bark not folding in. This wasn't a draw-back formerly, when it wasn't essential for the quills to be closed and the heart hid from view. Now, sir, I am of those who think that the loss of these coarse sticks, and in fact of the coarser qualities of cinnamon and of chips, is a positive gain. Less cinnamon, but finer quality, will be thrown into the market, and is bound to fetch higher prices, and higher prices will more than compensate for the withdrawal of coarse cinnamon and chips. I have been consistent in this belief and I have acted up to it. Unfortunately solitary efforts cannot stem the tide, and coarse cinnamon and chips are shipped in large quantities. "More cinnamon, more money," is analogous to the deep-rooted belief of the ignorant peasant, "more trees to the acre, more crop." Acting up to this belief he stocks a patch of ground with trees that will more than suffice for four times the acreage, with the result that the plants choke each other, and have an upward race for light and warmth, and bear little or no crop. This in no way shakes his belief in his system, and he exultingly speaks, not of the extent of his land, but of the number of trees it contains. So with cinnamon proprietors, men of education, they fail to see that when the demand for their produce is limited, a limited supply will help keep up prices. Facts and figures have been placed before them in vain. It is a crying shame that when the principal growers of cinnamon are the prominent members of an Association, that Association, from want of unanimity, is powerless to effect a change for the better.—Yours truly,

B.
CASSIA.—In a note read at the Linnean Society, by Mr. W. T. Thiselton Dyer "On the Origin of Cassia lignea," he remarks that the want of exact evidence as to the botanical source of this spice is now cleared up. Mr. C. Ford, Superintendent of the Botanical Department at Hong Kong, has made an expedition to the districts in which the cassia tree is cultivated, and has brought back herbarium specimens in flower, which prove to be those of Cinnamonomum Cassia. So far as Mr. Ford could ascertain, cassia buds and leaves as well as barks are obtained from this tree only. The leaves are sent to Canton for the distillation of oil of cassia, and the buds are gathered when about one-eighth grown. The thick bark, so much valued by the Chinese, is obtained from trees reserved for seed bearing, when such can conveniently be spared for the purpose.—Pharmaceutical Journal.

THE CINNAMON TREE IN QUEENSLAND.—The Brisbane Planter and Farmer, in noticing a nursery, states:—We find several notes in our book which space will not admit of our amplifying. But we cannot overlook a tree to which we desire very particularly to call the attention of our readers. This is the cinnamon-tree, which has grown to perfection. It is a large shrub of about 10 to 12 feet in height, and as many in diameter from branch to branch. It is the cinnamon of commerce, and, according to Mr. Williams, will grow on any stony ridge where but little or no frost is felt. The bark is taken from the last growth just as the new shoots are being made, and is cut off precisely as bark is peeled for the tanner. We were told that a tree will produce about 10 lb. of bark, and as little or no cultivation is required after the earlier days of growth, the people of our coast country should at once enter into this industry to the extent of a score or two of trees at least. In this way a new and valuable industry might be established, and our exports correspondingly raised. [Our contemporary evidently thinks that the bark of commerce is taken from trees such as he describes. It is not, and from her old coppiced plantations, can Ceylon more than supply the world's wants.—Ed.]

CINNAMON AND CASSIA VERA.—From time to time reference has been made in this country to the advantages presented by the arrangement under which the United States imports of drugs of inferior quality are intercepted at the custom house; but in the light of a statement in one of our exchanges this guardianship would appear to be a broken reed to lean upon. According to the Oil, Paint and Drug Reporter an application was made recently to the bureau of statistics at Washington for information as to the quantity of "cassia vera" annually imported into the country. The preliminary question, "What is cassia vera?" proved a stumbling-block, and after it had been passed from one employed to another, it was discovered that the sum total of the knowledge on the subject possessed by the custom-house experts was that there were two articles of a similar character, called cinnamon and cassia, the former coming from Ceylon and paying a duty of twenty cents per pound, the other coming from China and paying only half the amount of duty. Inquiries spread over a wider area raised the doubt whether the greater part of the cinnamon imported into the United States during recent years has not been entersd—and passed—as cassia, payment of the higher rate of duty being thus avoided.—Pharmaceutical Journal.

CINNAMON IN ANCIENT TIMES.—Dr. Carl Schumann's 'Kritische Untersuchungen über die Zimtländer,' published as a supplement to Petermann's Mitteilungen, is a most erudite contribution to the history of geography and of commerce. The author carefully examines the notices on cinnamon and cassia to be found in the writings of the ancients and of the Arabs, and critically examines these by the light of modern research. The ancient Egyptians procured their cinnamon from Punt, which is identified with the "Regio Cinnamomifera," or the modern Somali land. But neither cinnamon nor cassia was a product of this region, nor are they now, and this point is amply proved and illustrated by a consideration of the geographical distribution of the Lauraceae. The khisit of the inscriptions in the temple of Der al Bahari is correctly transliterated "cinnamon" or "cassia"; the latter word and the gizi of Galen and the kezi'ah of the Hebrews are derived from it; but it is itself a corruption of keshi, the Chinese name for cassia. The author concludes from this that China supplied the ancient world with most of, if not all, its cinnamon, but did so through traders settled in the ports of Arabia or of the Somali coast. China maintained her monopoly until the discovery of cinnamon on the island of Ceylon. Ibn Batuta is credited with having first mentioned this island as a cinnamon region, for the Saya'd of Kazwini and Yakut is not Ceylon, as supposed by Col. Yule and others, but Râmi or Sumatra.—London Atheneum.
CINNAMON.

EXPORT OF CINNAMON.

(To the Editor of the "Ceylon Observer")

Colombo, 24th August 1885.

Cinnamon is not usually affected to any very considerable extent by the failure of rain or protracted dry weather. To say that cinnamon has been short in production owing to the extension of coconut and tea planting is simply a fallacy. Cinnamon has in no place been uprooted or burnt out to make room for other new products. But those who urge this as a reason to account for the decline in the exports of cinnamon forget to take an account of land which is being newly converted into cinnamon plantations. The slight decline in the exports besides being due to the lateness of the working season, may also be accounted for by the unprecedentedly low prices which have ruled for some time in the cinnamon market—prices which held out little or no inducement to proprietors of cinnamon properties to prepare the article for shipment. That the lighter kinds are in greater favour is easily explained. The owners of small patches of cinnamon do not grudge to pay higher wages to the peelers and others engaged in the curing trade in order to give to their small consignments an appearance very much the same as if not quite equal to that of the product of large estates. This is easily accomplished by burning the bark a finer appearance. But after all this consists only in appearance, not in quality. Cinnamon is an article which has to be tested by taste, not by sight.—Yours truly, H.

LOSS OF WEIGHT IN CINNAMON, &c.

In a recent article we commented on the very serious loss of weight which cinnamon account sales show, and pointed to the need there exists for united action or firm individual remonstrance to secure relief. With tea a loss of three per cent is considered excessive; and even the reduced loss of 3½ per cent in a recent shipment was considered by the proprietors of the "Ceylon Advertiser"—enterprising business men in the Fort—to be capable of still further reduction. We have now before us an account sale of cinnamon sold on the 27th July last, and refer to some of the figures in the hope that shippers will carefully scrutinize their own accounts and see how heavy and unjustifiable is the loss they are called upon to bear. The shipment consisted of 20 bales weighing 2,000 lb. and two bags (cuttings and clippings) weighing 112 lb.; total weight 2,112 lb. The account sale accounts for only 1,970 lb.—the loss being 142 lb., or about 6½ per cent. That proprietors cannot afford this loss at present prices does not need proof; but whether they can afford it or not, is the loss justifiable? We think not. The usual draft is said to be a lb. on every parcel—heavy enough in all conscience—and will account for 22 lb. What then has become of the other 120 lb. worth, according to the prices realized, at least £6 sterling? Appropriated by someone at the warehouses, or by careless weighing made over to the purchasers. Surely, losses like this should not be submitted to without demur. The shipper in question had, by frequent letters, succeeded in reducing the loss in weight from 7 to about 3½ per cent, and rested satisfied. His silence for some time has resulted in the loss in weight being doubled again! It cannot be any error in weighing here, because remonstrances led to a reduction in the loss. It cannot be that the loss was due to diage, because cinnamon shipped with 7 per cent of moisture would not reach in a fit condition to be sold. It will be moulid and have to be thrown away. The loss represents the carelessness or dishonesty of the employees of the Warehouse and Dock Companies or some of their hangers-on; and London agents should be pressed not to permit such outrageous appropriations. We may say that the shipment was sold within a month of its arrival. This leads us to the warehouse charges which amounted to £8,10/- on 42 parcels for 3 weeks, and against £113,19/- gross proceeds. The bulk of the charges is owing, no doubt, to the undoing and re-doing of every single bale of cinnamon—a ruinous operation, which facilitates and explains the loss in weight. The loss in weight is a matter which each shipper must deal with individually with his own agent; but united action, through the Agricultural Association or otherwise, is necessary to do away with the system, involving both loss and expense, of opening out every bale of cinnamon. The only parties benefited, so far as we can see, are those interested in the warehouses; and perhaps London agents are more interested in them than their Ceylon principals are aware. The same
system of unpacking every parcel obtained with tea, but vigorous remonstrance has led to its abandonment. Any way, we see no reason why it should not be sufficient to open one bale of each quality for a sample. Shippers are not likely to attempt to practise any deception, and ruin the risk of having a mixed or adulterated bale opened; for this would regulate the rate for their good cinnamon. It is to their manifest interest to be fair; and if the leading shippers combine, there is no reason why they should not secure the abandonment of a system which imposes an unnecessary charge, damages the spice by exposure, and renders abstraction possible. We trust we have written enough to induce cinnamon proprietors to endeavour to guard against losses and charges which, we think, can be guarded against.—"Ceylon Examiner."

CINNAMON IN JAVA.
(Translated for the "Straits Times.")

A correspondent advises planters in Java now that coffee is borne down by leaf-disease, low prices, and enhanced land assessment to take to cinnamon growing. It seems, so he says, that cinnamon growing well as it does up to the height of 1,500 feet above sea-level requires less care and less expense at the start than coffee, besides having the advantage of coming into bearing within five years. The bark, branches, and leaves of the cinnamon tree all may be turned to profit in some way, even oil and tallow being among its products. He estimates that a cinnamon tree in bearing yields yearly a net gain of 1,000 guilders per bowo.

ESSENTIAL OILS OF CINNAMON AND CASSIA.—Second report by Mr. A. H. Jackson on "The Differences between the Essential Oils of Cinnamon and Cassia." In his previous report Mr. Jackson dealt chiefly with the physical behaviour of two oils and stated his opinion that, whilst there was some difference in their specific gravity and refractive energy, there was nothing sufficiently characteristic to supply a satisfactory method of distinguishing between them. In the present report more particular attention is paid to the chemical aspect of the question. The most promising experiment consisted in a comparison of the behaviour of the residues of the two oils after the removal of all the cinnamaldehyde by treatment with potassium bisulphite and ether; but although some slight differences have been noted they are not sufficiently definite to encourage further work in that direction.—Pharmaceutical Journal.

CINNAMON CULTURE.—Veyangoda, 14th June.—Cinnamon peeling operations are in full swing, but there seems to be a general paucity of peelers. Some account for it as the outcome of the sickly season; others say that there has been a general migration to the small Native Gardens, where the lines of the peelers are more pleasant, owing to their being able to get through more work, as quality in make is not insisted on (and this means more pay), and where Coconuts, Jak, and vegetables are allowed gratis. Neither the one nor the other cause can operate for long, and we hope in time to have sufficient peelers for our wants. In the meantime, the sticks that could not be harvested last year owing to the failure of the N.-E. monsoon, are, with the weather we are now having, growing apace—not much to be regretted though in the face of the result of the last sales, when there was a rise in the price of the coarse qualities and a corresponding decline in the price of the fine qualities. If such a thing as unanimity is attainable amongst Cinnamon Planters, a reversion may be possible to the old style of quilling Cinnamon to suit the present requirements of the trade, and the making of fine Cinnamon, which had reached ridiculous lengths, abandoned. As formerly, only coarse sticks can be cut and the Cinnamon quilled to the size of the present 3rds and 4ths—payment accordingly. This will benefit the peeler, as he will be able to get through more work; and the Planter, as he can harvest his crop during the season, and not as now all through the year, giving the bush no time for development. If the trade has had a surfeit of dainty dishes of superfine Cinnamon, and wants as a corrective plain, coarse Cinnamon, suit their healthy tastes, I say, with plenty of coarse Cinnamon and—I say it with fear—chips."—"Ceylon Examiner."

* This would mean a larger outturn, and as spice is not an article the demand for which grows space, there would be a further fall in price, growers not being strong holders.—Ed. "Ex."
CINNAMON: THE LONDON MARKET AND PRODUCTION.

After a protracted difference between the London brokers and the Cinnamon growers of your island, in respect of the holding of sales of spice, the practical men of the Lane have been enabled once more to adopt the old mode of quarterly, in preference to the ill-judged resort to monthly sales. On Monday next, the old system will be again adopted, that of selling on the last day of every third month, and so the 31st of May will henceforth be remembered as the restoration of the ancient order of things, whether it will help to restore the old scale of prices or any approach to them remains to be seen. A few days ago I had a long conversation with Mr. Kilby, of the old and well-known firm of spice brokers, whose acquaintance I had made forty years ago when First Sort Cinnamon was selling at eight shillings a pound. You may, perhaps, remember that Mr. Kilby, during the wordy contest re monthly Cinnamon sales, carried on for a long time, stoutly opposed the innovation on the ground that it would be detrimental to the interests of all engaged in the trade—growers, shippers and dealers. He reminded me that, in the controversy carried on upon the proposed change, he had predicted as a consequence a fall in the price of the article of thirty to forty per cent. And what has been the result? Second Sort spice was then a shilling: it is now seven pence!—a decline of quite forty per cent. In reply to my enquiry as to the effect of reverting to the old system he remarked that it was always a most difficult task to work up prices from a fall. The trade, once centred entirely in London, was now scattered over the world, and, although Ceylon still enjoyed the monopoly of the article, which no other country produces, there is a keen competition amongst sellers in various countries. Orders are now executed in Colombo for foreign houses at fixed rates, and those Continental firms put their spice on the market in competition with the London article, and so the price is lowered as well as the market. This system, added to the monthly sales, was exercising a disastrous effect on the cinnamon market. Whilst admitting his facts, I suggested that the diversion of the cinnamon trade had no connection with the change in the order of sales, but had taken place long previously, and was one consequence of the opening of the Suez canal, and it could no more be brought back to its old and accustomed channels than could that of coffee. I reminded him also of the existence of foreign mercantile firms in Colombo, who will, of course, conduct their business relations direct with their Continental constituents rather than through circuitous route of London. He, however, maintained that a proper conduct of the Cinnamon trade on the part of growers in Ceylon might be the means of rising the standard of prices to what they were five years ago. In reply to my further enquiry as to the competition of Cassia, he said he attached no importance to that; it was such a different article, and could only affect the fourth class of spice. As for the effect of over-classing cinnamon, he said it was quite inoperative. The trade was not to be deceived by any such device, nor did the making up of low qualities of spice in small thin quills to resemble the finer sorts exercise the slightest influence on market prices, which depend on the intrinsic quality of the bark and not on its make up.—"Ceylon Times."

CINNAMON CULTIVATION IN THE SOUTHERN PROVINCE.

(From a Correspondent.)

Of late years the cultivation of Cinnamon has greatly spread in the Southern Province, and it is interesting to note that Sinhalese capitalists are largely interested in the new plantations which have sprung up in Ambalangoda, Wallananduwe, Vowlagalla, Hapugalla, Mataara, &c. The plantation spice from these estates is said to be of excellent quality, and the produce is readily taken up by the Galle merchants for export to Europe. The present market price all round is quoted at 36 cents per pound first cost. Our informant states that there are nearly 100 plantations and gardens now, whereas formerly there were scarcely half a dozen. To Mr. Simon Perera, the owner of the large estates in Galle, belongs the credit of having embarked so successfully in the cultivation and preparation of cinnamon in this province.—Ceylon Observer.

CONSUL'S REPORTS—MADAGASCAR.—Spices.—Cloves and cinnamon can also be cultivated with success, but as they are of very slow growth, their cultivation is discouraging to foreign planters, and the natives have not the means to plant extensively.—Chemist and Druggist.
CINNAMON AS IT WAS AND AS IT IS—A VISIT TO THE NEGOMBO DISTRICT.
(To the Editor of the "Ceylon Observer.")

Negombo, 3rd March, 1887.

Dear Sir,—After a period of many years I have come over here on a pleasure trip, and to visit the old places where I was interested in coconut and cinnamon. It is a sad sight to see the once flourishing cinnamon estates, which used to give very handsome income, neglected and abandoned. Two of the crack estates in the Kadirana district are getting on with peeling. I wonder how they manage to peel in this hot and dry weather. I shall feel obliged if the superintendents of the two estates will let me know through your journal how they manage to peel their cinnamon. Some of the estates in Katunayaka belonging to the natives are kept in fair order. It is surprising how the coconut palm stands the drought in the Negombo district; the trees are looking fresh and green, while at Mirigama and Veyangoda the trees are suffering dreadfully; the leaves all hanging down and you can hardly see the trunks of trees, and the nuts drop and the branches break down. Popping up the bunches in the season does more harm than good. The tender nuts that drop are sold at 25 cts. per 100 to the villagers, who turn it to copra and sell it to traders, and the traders mix it with good copra and sell it to the merchants. Buyers ought to be very careful as to how they buy this season copra, as these nuts that drop down this drought are immature; they are only fit for cooking purposes. I have no faith in the Mirigama, Ambepussa and Veyangoda districts for coconuts; the trees will not last long. The way the trees shed their boughs and get them at the top, and at the age of 30 years the trees will hardly give any crop. The great mistake done in this district is planting on the surface; the soil in these districts is of a hard gravelly soil, so for the convenience of the cultivators they take a handful of soil and place the plants. When I was in Negombo I went along with the late Mr. Jummaux to his property at Veyangoda and warned him as to the way the goyais were planting. Mr. W. H. Wright is doing the correct thing in planting deep. If he plants his coconuts 5 feet deep, he could be certain of his trees bearing in 3 or 4 years, and say in the 8th year he could calculate on a good return. By planting your plants say 4 to 5 feet deep you could put your plants all through the year; as the plants are under ground the sun does not affect them. I shall feel very much obliged to Mr. Wright if he could let me know through your journal the depth he puts down his plants. I took a run up to Ekala. What a change there is in the place—it is quite a little town! I visited some of the cinnamon estates and made enquiries for an old friend of mine, he was away from his estate. I am sorry I missed seeing him. I took the liberty as he was an old friend of mine, and went over his estate. It is kept in perfect order, the cinnamon and coconuts are looking their best. My old friend, Mr. Piachaud, deserves credit for keeping his estate in such good cultivation in these hard times with low prices. I went over the large Ekala estate, one time owned by Messrs. Darley, Butler & Co., but now in the hands of natives; it is kept in a most desirable state and the bungalow standing on the hills is no more, where I spent pleasant days with poor Jim Minto. On my way from Mr. Piachaud's I was obliged to pass Mr. Drieberg's estate to get to the high road. I am sorry I missed seeing him and making his acquaintance. Of the little I saw of his property it looks well cared for, the cinnamon bushes stand 8 to 9 feet high. I saw some nice species of cacao on this estate, the trees stand 7 to 8 feet. I went to the Resthouse and was surprised to see the new building. It is a great pity the old building was pulled down; it used to face the canal. I can't say much of the new one. I took boat at the Resthouse and returned to Colombo and enjoyed my trip exceedingly.—Yours truly,

S.

CINNAMON CULTIVATION—PRACTICAL INFORMATION.

Negombo District.

Dear Sir,—Your correspondent "S." is pretty correct in saying that many of the cinnamon estates in the hands of natives are in a disgraceful state: a large number have not been weeded for many years. All that is done is to cut and peel such sticks as nature gives them, pruning once a year, and at the same time chopping down jungle growth. The cinnamon bush being a very hardy plant stands much neglect; would it were otherwise for the sake of
those who do give it justice! What is another puzzle is that though many old estates from neglect give barely 50 lb. an acre, the export of the spice, instead of diminishing, increases. Can this be that those estates in Awaswella, Kalutara and Galle, planted in the palmy time of prices are now coming into full bearing? I fancy this is the explanation. We cannot, therefore, look for a rise in prices from diminished production. Prites are so low that the greatest economy in working has to be practised to give the proprietor a very miserable profit. "More power to your elbow" is the means by which the two crack estates he alludes to manage to peel just now. Friction has to be used to almost every stick, yet the colour of firsts and seconds is good, while that of thirds and fourths is rather dull. What would you have—if the wood now being cut and peeled were left in the bushes it would get very coarse, and either all go to fourths or chips; besides, if not cut now, new wood for the year after would not shoot up, thus a double loss would be incurred. Better to risk a little loss in colour than the disagreeable certainty pointed out above. I fancy, too, that Kidirana has had more rain in February than some other parts where cinnamon is grown, and this has given us an advantage; on the 9th a little over an inch fell, and on the 25th almost an inch-and-a-half.

TENNAM PELLAI,

CINNAMON AND TEA CULTURE.—No. I.

7th June 1887.

DEAR SIR,—In a foot-note to my last letter insisting that there is no analogy between the treatment a cinnamon and tea bush receives in cultivation, and that it is unsafe to draw conclusions as to the age a tea bush will attain from the known age of cinnamon bushes, you say that though "there is no topping of the cinnamon bush, and no constant renewal of the leaves, yet there is a continual removal of coppiced stems and a continual renewal." This is not so: cinnamon crops are harvested twice a year, therefore the coppiced stems are not continually removed but only twice a year. I again repeat that there is no analogy whatever between the two in cultivation, because nature's laws are not violated by cinnamon being topped and made to assume an artificial existence, by an unnatural growth being induced and checked very frequently, and by an annual hacking.

The majority of the estates I passed through on my way to Nuwara Eliya last September had no leaves on the pruned bushes. Even if not wilfully stripped, no leaves that will serve their purpose are left on a tea bush in the process of pruning. Only old attenuated leaves remain. It is only the climate of the hills that saves tea from total extermination if pruned during dry weather. So great is the shock to the bush from this unscientific treatment, that a whole field of pruned tea was nearly killed out in the lowcountry during a dry season.

I lay no claim to an intimate knowledge of agricultural chemistry, but I have an idea you are mistaken when you say that "the material for leaves comes to a great extent from the atmosphere." I believe you are confusing one of the functions of leaves, to draw supplies of food from the atmosphere for the building up of the tree as a whole, to that function being of use only for the growth of leaves. The authority you quote says, no doubt, that there is much ammonia in rain and water, but rain-water is absorbed mostly by the roots. As regards coffee, Mr. Hughes has proved by analysis that leaves are a more exhausting crop than the beans, and his recently suggesting that white castor cake and bones be applied to tea suggests the possibility that tea leaves are as exhausting a crop as coffee leaves, for the manure he recommends is composed principally of phosphorous, potash and nitrogen.—Yours truly,

B.

No. II.

10th June 1887.

DEAR SIR,—In my opinion there is very little in common between tea and cinnamon; cinnamon is known to have yielded its special product for a century year by year on soil where tea would not even take root. In the one case the crop is wood and bark, in the other leaf alone; the one crop leaves the leaves on the land and with no other aid from manure maintains its rate of average crops from generation to generation, the other may possibly do the same on suitable soil and climate, but no such fact has yet been proved in Ceylon. My private opinion is that on the deep clay loams of the mountain zone tea will
be as enduring as cinnamon on the sands of the lowcountry; I am more doubtful about the poor gravels either high or low. The crop of cinnamon probably makes much lighter demands on the soil than that of tea; indeed, it must needs be so, else the soil of the old fields must have been exhausted long ago, but it looks as if the natural rate of decomposition in the material of the soil was quite equal to the necessary supply of soluble bases for the annual crops. It is generally held that leaves contain a larger proportion of the soluble bases than any other part of the plant and the newly developed and immature leaf more than the older and harder growth. It is also said to be the same case in respect to nitric acid, and if this be true, tea must be a very exhausting crop. As to thwarting the natural law, cinnamon and tea are on all fours: nature in both cases bears a forest tree which the cultivator reduces to a bush and keeps it so.

I believe the theory is pretty firmly established that plants derive their carbon and oxygen from the atmosphere through their leaves; that they derive any part of their nitrogen from the same source is a disputed point, but the evidence so far favours the negative. I therefore conclude that with the exception of carbon and oxygen all the elements that are found in the parts of plants are derived from the soil either as mineral bases or as acids that each plant requires in definite proportions according to its species and the deficiency of any one of which gives unsatisfactory results to the cultivator.—Yours truly, HERMIT.

CINNAMON (Cinnamomum zeylanicum).—Some fine bundles of this important and well-known spice were exhibited. These bundles were remarkable for the smallness of the quills of which they were composed, as well as for their pale even colour and delicate flavour. One bundle was obtained for the Museum.—Notes on Articles Contributed to the Museum of the Royal Gardens, Kew, from the Colonial and Indian Exhibition, 1886.

CINNAMON CULTIVATION IN Ceylon.—Cinnamon peeling is at a standstill owing to a heavy bud being on, and will possibly not be resumed till this month is well nigh over. In the meantime the favourable weather is causing the bushes to grow apace. I have to congratulate you on a new departure, or rather on the resumption of an old practice, the making public the results of the Cinnamon sales. As the form in which you give it is open to improvement, I trust you will favourably entertain my suggestion to give the price each quality fetches, the same as is done with Tea. This will afford more information than simply giving the range of prices and the average. The average price, any produce of more than one quality fetches, is a very misleading test to apply as to its excellence. The average price is lowered or raised according as lower or higher qualities predominate. The brand that heads the list, occupies that exalted position owing to its two first qualities only having been sold. The older Estates, where soil is sandy and the growth not very vigorous, can in a matter of course make a larger percentage of the finer qualities of Cinnamon. The same with the Estates, that, in direct violation of the resolution passed by the Agricultural Association, and by which they were bound, never gave up the short-sighted and pernicious practice of scraping Chips. Estates were, owing to the richness of the soil, the growth of the cinnamon is vigorous, will have the bulk of the Cinnamon consist of the lower qualities, unless very tender Cinnamon is cut. One noticeable feature in the shipments from Mr. De Soysa's numerous Estates, is the absence of the 4th quality Cinnamon. Has he gone a step beyond the Resolution of the Association or does he convert his forth quality Cinnamon also into Chips for the still? The Laird of Wester-Seaton asserts that if all Cinnamon Planters had followed his example, and scraped Chips only for the still, the price of Cinnamon was bound to rise. I go further than he, and say that if all Cinnamon Planters had followed my, I believe, solitary example, and did not scrape Chips at all, the price of quilled Cinnamon was sure to have risen. Cinnamon oil is but a concentrated form of Cinnamon, and for some purpose can with advantage be substituted for it, under these circumstances it must be regarded as much a rival of quilled Cinnamon as Chips. But the respected Laird of Wester-Seaton so little believes this, that he consistently refuses to sell Chips except for the still, even though he receives a higher offer for them, and asserts that he will sooner bury their Chips, than sell them for export. Paddy-crops are being harvested everywhere, and the air resounds with the cheering strains of harvest songs. Except in a few favoured fields, crops are not above the average.—Local "Examiner."
CINNAMON PLANTING REPORT FROM SIVANE KORALE.

BETTER PROSPECTS FOR THE BARK—A RETROSPECT: HIGH PRICES IN THE SEVENTIES AND STIMULUS TO CULTIVATION—SPURIOUS BARK AND CHIPS—LOW PRICES AND QUARTERLY SALES—THE AGRICULTURAL ASSOCIATION CALLED TO BOOK, &C.

There is a flash of brightness just now in the prospects of another sorely tried industry. Cinnamon has laboured for long in the throes of steadily decreasing prices. As the cause of this is evident and acknowledge on all sides, one would have thought that a combination between the handful of principal growers to apply the remedy for it was easily attainable; but it is not so. Cinnamon not being an article of diet or of daily consumption it was very easy for the supply to exceed the demand. A stimulus to extended cultivation was given in the high prices ruling for the spice in the Seventies. Anything and everything that could pass off for cinnamon was shipped. Quills were manufactured with cinnamon bark only for the outer covering. Spurious bark did duty for stuffing. It was about this time that Mr. J. D. Stevenson of the Mattakkuliya Mills, then a cinnamon planter in the Ekala district, started a new industry by the scraping and export of chips. "Chips," be it noted, is the bark of the coarsest and most inferior cinnamon, and that cannot be quelled. That was the first downward step; a taste for it, and a demand too, were soon developed; for flavouring purposes it answered as well as the best quality of cinnamon. What it lacked in delicate flavour it gained in pungency. When a suitable quality of cinnamon, though not of a very presentable appearance, could be had for a few pence, it was absurd to imagine that buyers would eagerly turn their attention to cinnamon priced at so many shillings per lb., simply for the sake of a decent and more presentable appearance. A taste for coarse and inferior bark has been created, and we are paying the penalty for it in prices that leave but a narrow margin of profit. When once it was pointed out to us that supply was in excess of demand the remedy was easy, the more so as, unlike with other products, the island did not compete with the world, the production of cinnamon is confined to the island and is in the hands of a comparative few. Shortly after the Agricultural Association was started, a resolution was brought forward, binding its members not to scrape or export chips. After full discussion it was passed. Yet so lightly do its members regard their obligations that they continued the pernicious and suicidal policy as if no such resolution was passed and as if they were not in honour bound to carry out its intentions. This persistence in exporting chips is the more to be wondered at, as the members of the Association who are interested in the spice are men of intelligence and withal very shrewd in money matters. A little thought ought to satisfy them that by giving up what yields them but a minimum of profit, is manufactured in small quantities, and is bid for by the farthing, will benefit, by lessening the supply, what yields a higher profit, is calculated by the bale of 100 lb. each, and is generally bid for by the pence. The Association finding it was foiled in its object of reducing supply and raising prices, by the unreasonableess of those most interested tried the expedient of substituting monthly for quarterly sales. This change was very reasonable considering that cinnamon was the only product that was sold privately, other products, including all manner of spice, being brought before the public weekly. As was to be expected this met with bitter opposition from those most interested in preserving the time-honoured practice—the middlemen or large purchasers who were the principal buyers. By monthly sales they would lose their occupation of vending the spice at their own figures in the long intervals between the sales. The opposition in the Lane met with a response here in the timid who were prepared to sacrifice everything to prevent the price of cinnamon going down. The old conservative members too opposed the innovation as an innovation. In the meantime cinnamon, like all the other products, was receding in price. The English brokers, who seem all along to have been playing into the hands of the buyers, and gave no support whatever to the producers. kept constantly dinning into the ears of the grower that the fall in price was mainly owing to the monthly sales, and that no improvement in the market could be expected as long as these were persisted in. What seemed strange to us here was that the buyers persisted in their opposition to the change although it enabled them to buy the spice cheaper than before. A kind of desultory warfare was kept up between grower and buyer, the former insisting and the latter objecting to monthly sales. The battle was sidled with the latter. A climax was reached when the buyers that a body refused to bid at a sale unless the brokers gave them a guarantee that the next sale would take place a quarter hence. No business was effected and the brokers referred matters to the growers. The contest had now become un-
ENEMY TO THE CINNAMON BUSH.

(Dear Sir,—Have you ever witnessed an insect of the accompanying sample? They have been a cause of great destruction to my cinnamon plantation. They eat up the leaves as per sample and the tender tops and buds of the plants, owing to which the bark cannot be peeled. The insect you will find of a dark colour within the white case hanging by the leaves. Will you or one of your many subscribers kindly let me know through the medium of your columns some remedy for the destruction of these insects?

A YOUNG PLANTER.

[Mr. A. P. Green is good enough to tell us that the offender is "Metisora plana, Walker; fam. Psychidae."—This is the larva of a little moth, found on most trees and shrubs in the neighbourhood of cultivated districts. It constructs a portable silken case, which is more or less covered with pieces of stems or leaves of the food plant, in which the larva lives and undergoes its transformation. The female is wingless, and passes its existence in the larval case,
CINNAMON.

There are several species of this family, most of them larger than the one sent by your correspondent. Tennent, in his Natural History, says:—The Sinhalese call these larval cases Darakatte, or "billets of firewood" and regard the inmates as human beings, who, as a punishment for stealing wood in some former state of existence, have been condemned to undergo a metempsychosis under the form of those insects. I really cannot suggest any remedy for their destruction, never having before heard of their being so numerous as to cause serious damage. Washing the trees with lime water or syringing with soft soap and tobacco water might induce them to depart, but I cannot give any authority.

A VISIT TO THE NEGOMBO DISTRICT:


Goluapokuna, Kadirana, Oct. 23rd, 1888.

A period of well nigh half-a-century has elapsed since I first made acquaintance with this the great cinnamon region of Ceylon. Poor Wm. Ferguson was then commencing his career in Ceylon as a Sub-Assistant Surveyor, and was taking part in the operations preliminary to the sale by Government of its cinnamon plantations and the final abandonment of the once-profitable trade and monopoly in the spice. Our Dutch neighbours in Java had gone far enough in experiments to show that Ceylon had no natural monopoly in the growth of cinnamon, although then and still, as in the case of plumbago, it possesses a monopoly of the best and finest kinds. And so the decree had gone forth for the sale of the Gardens and the absorption of the Cinnamon Department in the general Service, although for years subsequently a revenue accrued to Government from exorbitant duties on the world-famed spice, which is supposed to add sweetness to the breezes which "blow soft o'er Ceylon's isle." Monopoly prices, heavy export duties, and I am sorry to be compelled to add, adequate profits on the private capital and industry embarked in the private enterprise of cultivating and preparing cinnamon, have long been matters of the past,—the long ago,—the ancient times which many think were better than these. In those times I made the acquaintance of "the base line" which would be undervalued only by the class described by Sydney Smith as capable of "speaking irreverently of the equator." We saw the towers too, which are not only to be repaired but to be raised, each of the two, by 30 feet of additional height. They will then, I suppose, be more useful than ever before as aids to a strictly correct trigonometrical survey of the island, to become the basis of detailed cadastral surveys.

At the time of which I write the Government cinnamon department and the special importance of the Mahabadda were not mere traditions. Walbooff, the head of the department, had been killed by being thrown against a tree while riding, but the Rajepakse's name inseparably connected with our special spice staple, were in full force, and I suppose it was the uncle of the benevolent old Sampson whom I met on the occasion of my visit, when I was a black-haired, red-cheeked lad, instead of an old man "withered at the top" as my good friend Dr. Elliott used to say of grey hair. Mr. Walbooff had been wont to hold Court and administer justice in the building set on a cabook-hill whence I now write, while Waring's and Walker's bungalows were household words. Cinnamon is more prevalent than ever in this its favourite region, though not now cultivated and prepared, except on this and a few other estates with the care and attention which high prices formerly justified. Of this plant as of others there are distinct and greatly differing varieties. The natives appreciate four well-marked kinds of cinnamon, of which one is of a far higher jät, giving a much finer bark than the others. On this estate all supplies are confined to this high-class variety.

PLANTING IN THE LOWCOUNTRY, WESTERN PROVINCE, CEYLON.

PROFIT FROM CINNAMON VERY LOW, COMPARED WITH THE LOW PRICE FOR THE SPICE.


I have heard it asked what is the value of an acre of cinnamon land at the present day with the very low price for the spice. A compact little estate very favourably situated and midway between Colombo and Negombo, and within four miles of a railway station, recently changed hands at R200
the acre. That will naturally be looked upon as the market value of cinnamon land; but this land was somewhat neglected in recent years. For land in a state of high cultivation and in a favourite locality I think R300 per acre could still be had from those on the lookout for an investment. And what is the yield per acre? In the "Planting Molesworth" the yield per acre is given or the authority of two old planters at a bale of 100 lb. I have known estates yield double this, but that is exceptional. What is the income per acre? A bale of cinnamon unassorted can be had at present for about R3.5. Against this must be set

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<th>Superintendence per acre</th>
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<td>Peeling per bale</td>
<td>15.00</td>
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<tr>
<td>Kangani</td>
<td>1.00</td>
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<tr>
<td>Weeding twice a year</td>
<td>10.00</td>
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<td>Pruning</td>
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<td><strong>Total per bale</strong></td>
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How is cinnamon made to pay it? will be naturally asked, and how is it valued at R300 per acre when the yield per acre is R4 less than the expenditure? I will answer that presently. The figures are not mine. According to the authorities I quoted superintendence is given at R12 to 15 per acre. I made it R10. Pruning is given at R6. I have made it R3. I have taken no account of interest on capital, cost of tools, upkeep of buildings and contingencies, &c., and yet people make a living out of cinnamon! It is very evident that the financing of a cinnamon estate is a secret that both the "old planters" you have consulted had no intention of divulging when they supplied you the figures embodied in the "Planting Molesworth." They may ask you to pledge me if I say that on a well-cultivated and well-managed estate the yield will be more than a bale per acre and the expenditure will be less than the figures quoted, while on native gardens the working can hardly be dignified by the term cultivation, and is done mostly by the family or at cheap rates, while chips yield a few rupees the acre. Anyway the profit from a cinnamon estate in these days of low prices is cut very fine and is hardly discernible.

**CINNAMON PLANTING AND THE RETURNS IN CEYLON.**

To the Editor of the "Ceylon Observer."

12th November 1888.

Dear Sir,—I read with pleasure and interest your Siyane Korale correspondent's letters, though not always agreeing with his views upon agricultural matters. He is usually careful in his figures and quotations; but in his letter of the "End of October 1888," appearing in your issue of the 8th instant, he transgresses in this particular. Writing on the subject of Cinnamon he quotes figures from the "Planting Molesworth" as given he says by "two old planters"; and after making liberal deductions from the rates for cost of different works, he forms an estimate of what it would cost to produce a bale, or the expenditure on the upkeep of an estate per acre, the yield being taken at 100 lb. or one bale, and then asks how is cinnamon made to pay when it sells for R4 per bale less than it costs to produce it? Truly this is a tough problem, and one I am glad to say I have not yet been called upon to solve in my experience, though I must admit that it has been, and is still, a puzzle to me as to how some estates manage to make expenditure and income meet. Partial abandonment, no expenditure except on preparation, and taking what nature gives under such conditions, is the solution to some; but this is at the cost of the steady ruin of the property and less income each year. Your correspondent a short while ago, in replying to a trenchant attack made on him by his Hapitigam rival, twitted him with misquoting his words, and of setting up a "man in buckram" that he might have the satisfaction of knocking him down. There is an old axiom to this effect: "People who live in glass houses should not throw stones." I said above that your correspondent gets his figures by mixing those given by the "two old planters;" this I object to as it is not fair to either. "Another Old Planter," in Notes on Cinnamon in your "Planting Molesworth," had left cinnamon planting for over a decade; he gives the cost of works at that time when probably owing to good prices and better yield, a few rupees extra of expenditure per bale was not thought much of; it is very different now, and you may remember that I sent you a few Notes on this subject shortly after the appearance of the "Planting Molesworth." Where does your correspondent get his information that superintendence is put down at from R12 to R15 per acre? Certainly not from the notes of "An Old Planter;" there he will find that the "cost of upkeep, including superintendence,
is given at R13 to R15 per acre,—a very different thing to that sum being put down to superintendence alone. It may interest your correspondent to know that superintendence, weeding and pruning on the estate "An Old Planter" manages, does not cost R12 per acre; and he is vain enough to think there are few estates kept in better order! I do not think that either of the "two old planters" would "look askance" at your correspondent for saying that "on a well-cultivated and well-managed estate the yield will be more than a bale per acre, and the expenditure less than the figures quoted." If he will kindly look at the Notes of "An Old Planter" he will then read: "Crop per acre 150 lb. quill bark, old estates with many vacancies will not give more than 100 lb. per acre." I think your correspondent would hardly venture to estimate more than this. What handicaps so many of the old estates is the large number of vacancies; and it is a hopeless task trying to supply these, particularly when the soil is very sandy. A proprietor who owns an estate that yields 150 lb. quill bark per acre is a lucky individual, and should make a fair profit annually. I quite agree with your correspondent, when he says "anyway the profit from a cinnamon estate in these days of low prices is cut very fine, and is hardly discernible." I am afraid the valuation of R400 per acre is much too high; the first value of an estate can only be arrived at by taking the average yearly profit, after allowing for proper upkeep and cultivation, and allowing ten years in which to pay off the purchase money. The only remedy for the low price of cinnamon is the discontinuance of preparing chips; almost all the cinnamon property in the Island is in the hands of natives, and if large owners would combine and agree, the matter would be settled at once. It is hopeless however to expect this; they have no sufficient confidence in each other to believe that the terms of such an agreement would be honourably carried out.—Yours truly,

AN OLD PLANTER.

CINNAMON PLANTING AND THE COST OF WORK.

Siyane Korale, 17th Nov. 1888.

Dear Sir,—If by mixing up the figures of two "old planters" I have done your correspondent an injustice, I crave his pardon. It was unintentional. I must apologize to your correspondent for having unintentionally credited him with giving R13 to R15 for superintendence alone. It does interest one to know that superintendence, weeding, and pruning cost R12 per acre on the estate your correspondent manages. It certainly shows careful and intelligent supervision. But is not the good order of the property your correspondent manages, due as much to the nature of the soil as to careful management? And is not the cheapness of weeding due to the same cause? Let confidences be mutual. The property I manage is planted with coconut and cinnamon, and crediting each product with half the superintendence, the cost of superintendence, weeding and pruning is R15 the acre, and yet I cannot say that my estate, at least the cinnamon, is in good order as regards cleanliness, that many are picking at the back of the weeder. So you see, in spite of higher expenditure, I cannot indulge in the proud boast of your correspondent. With crop at from a bale to a bale and a half per acre, all I have to say is that if it is meant as a general average it is too high. I have known an old estate, as old as the one your correspondent manages, give two bales the acre once. That was many years ago and the figure has never been reached again. I also know a young estate with bushes not quarter the diameter of the bushes on old estates, yield two bales the acre recently. I attribute it to exceptional causes, but I am confident it will yield two bales the acre again. But of course these figures are exceptional.

I am sorry your correspondent thinks my valuation of cinnamon land high, and yet only a few years ago a well-known estate in his neighbourhood changed hands at about three times my figure, and the purchaser was said to have made a profit in his purchase. "How have they mighty fallen." I am glad to hear your correspondent thinks the remedy for low prices is the discontinuance of scraping chips. I have been always of this opinion and did my little best to bring about this desirable change, and have even gone so far as to give practical evidence of my belief by ceasing to scrape chips. I do not go with your correspondent and attribute the discontinuance of this suicidal system to native proprietors distrusting each other. Men of intelligence and position have been spoken to and they cannot see, because they will not, that the contemptible sum above cost they get for their chips is not profit, but an indirect loss, as it takes away from the price of their quilled cinnamon.—Truly yours,

A YOUNG PLANTER.
CINNAMON CROPS IN THE NEGOMBO DISTRICT.

KADIRANA, 8th Feb.—Very dry here: no rain since the 8th of last month. The "bud" with blossom, which began to show about the middle of last month, stopped all peeling, and there is nothing doing but pruning and weeding. Owing to very unsatisfactory seasons for the last two years I anticipate a short crop of both cinnamon and coconuts this year and a rise in the price of the latter; as for the former I despair of any marked improvement in prices. I am glad to observe by the Customs returns that the quantity of chips exported this year to date is only about half what it was at the same time last year. I wonder what can be the cause of this. Is it that the months of May and June last year were so favourable for peeling, that coarse wood, which in other years would have gone to swell the chips, was made into quill cinnamon? The health of the people is better than it was during December and January, when dysentery in many villages and fever in all prevailed to a serious extent. Colds and coughs are common, and a few cases of fever. A little rain would be welcome, as pastures are looking brown.

CINNAMON PLANTING REPORT FROM THE NEGOMBO DISTRICT.

SPLENDID WEATHER—FORTHCOMING CINNAMON CROPS AND FALL IN PRICE—PROPOSED COMBINATION OF CINNAMON GROWERS TO DISCONTINUE EXPORT OF CHIPS—OPINION OF A LONDON BROKER—CINNAMON SEED—COCONUT LEAF-DISEASE IN VEYANGODA AND MR. DRIEBERG'S REPORT.

Negombo, 29th April 1889.

We are having splendid weather, with hot afternoons and wet nights. All vegetation looks as if fresh life has been put into them. Cinnamon has a splendid flush which will give it a good growth. Peeling operations will commence about the 25th of May. I do not think the crop this year will be a large one. Cinnamon has hardly grown and the bushes look very scanty. It will be advantageous to cinnamon planters if crops are small, as they may expect a rise in price. Mr. Jardine, the veteran planter of Goluapokuna, is agitating stopping the scraping of chips. He thinks that if chips are stopped from being exported there will be a rise in quills. I shall feel obliged if Mr. Jardine will get up a meeting of all cinnamon planters to discuss the matter. Some say that they will sell the scrapings to those who distill oil. I remember 20 years back of old wood used to be cut down and dried and then sold as firewood. Planters were then so particular that they never sold the coarse wood fresh, as buyers would scrape them. The large quantity that swell the market is from the new district. People were not particular as to what kind of seed they planted. Seed from coarse wood produce coarse, and unpeelable cinnamon, which helps to increase the large quantity of chips. There was such a demand for cinnamon seed at one time that people paid from R10 to R15 per bushel. Mr. Beven of Veiyangoda should also agitate stopping the scraping of chips in his district, as a very large quantity of coarse cinnamon and chips are produced by natives of that district. Coconuts are looking its best in the Negombo districts. I hope the disease in Veiyangoda has disappeared after the present heavy rains, and we are anxiously waiting for Mr. Drieberg's report on the coconut leaf-disease. I hope the report will be published in the local papers. I enclose a report from a leading London broker as regards cinnamon chips. I shall feel obliged if you will publish it with this letter.—Yours truly,

AGRICOLA.

"Regarding the proposed combination of cinnamon growers to cease shipping cinnamon chips from Ceylon, the question has been carefully considered and the opinion of our leading spice brokers is that provided the export of cinnamon chips from Ceylon be stopped, not in part but wholly, it would no doubt exercise an important influence over cane cinnamon sold in London; but there would always be the risk, of some growers breaking through the arrangement, induced by the advance in the value of chips which would probably take place if any small lots came forward. It is estimated that chips have been imported during the past few years to an extent equal in weight on the average to nearly 4,000 bales of cane cinnamon per annum, and there can be no doubt that a large portion has been used in place of quills."—London Broker.
CINNAMON.

THE FUTURE OF CINNAMON: THE NEED OF STOPPING THE EXPORT OF CHIPS.

To the Editor of the "Ceylon Observer,

Goluva Pokuna, Negombo, 27th June 1889.

DEAR SIR,—The persistently low prices realized for cinnamon bark during the past 7 or 8 years, and the serious outlook in the future form the fact that the exports instead of diminishing are increasing, has caused me to address some of the largest owners of cinnamon property with a view to inducing them to discontinue the preparation and sale of "chips," which, in the opinion of most growers, is the main cause of the continuance of low prices. This of course is no new revelation, for we have it on record that at the inauguration of the "Ceylon Agricultural Association" held in Colombo on the 24th June 1882, this question was the very first discussed; and the following resolution was proposed and adopted by that large and influential meeting:—"That the Committee appointed today do take into consideration the question of the large exportation of chips that is now being made and which this meeting believes has materially contributed to a fall in prices of cinnamon, and report on this subject to a general meeting of this Association on a day hereafter to be named, &c." The Committee presented their report on the 1st August, the pith of which was contained in the following clause: "The Committee under these circumstances trust that all members of this Association who are interested in the cultivation of cinnamon will join in doing their utmost to stop the scraping of chips say for a period of three years, save for the purposes of their own stills and those of their constituents."

With the adoption of the resolution and the recommendation of the Committee, the matter, so far as I can learn from inquiries, ended; and the position today is much worse than it was in 1882. The output of both quill bark and chips is greater, and prices have receded till they leave hardly any visible margin for profit. That one attempt has failed is no reason that another should; and I think the time has arrived when a fresh, more determined and more united effort should be made. The replies to my letters are sufficiently encouraging to warrant a meeting being called to discuss this question and to endeavour to, if possible, arrive at some satisfactory solution of the difficulty. Before however calling a meeting it has occurred to me that perhaps it would be well to have the subject thoroughly ventilated through the local papers, both English and Sinhalese, so that when we do meet we may have some well-matured and feasible proposals to bring forward. The subject is evidently beset with many difficulties which accounts for the "Ceylon Agricultural Association" as quietly acquiescing in permitting the matter to drop out of notice. The more light we can get through discussion the better our chances of ultimate success. In endeavouring to revive an interest in this subject I am at trying to effect something more than the mere passing of resolutions which bind no one; and if I thought that the present movement was likely to be as barren of results as was that of the Agricultural Association in 1882, I should have small heart to proceed; I hope for better things however. Proprietors must see that unless they can devise some means by which the price of cinnamon can be raised the cultivation of it by many must become unprofitable; indeed to some, I fear, this stage has already arrived, for how can it pay the owner of an estate to cultivate when the bulk of his crop sells at from 6d to 8d per lb. in the London market? Any proposal therefore likely to offer a prospect of improving this state of things should, I think be cordially welcomed and carefully and seriously examined. It is too much to expect that all cinnamon growers will consent to cease to prepare chips; ignorant people will not see the advantages to be gained. My hope, therefore, is in the large body of intelligent and influential cinnamon proprietors who must represent quite two-thirds of all cinnamon property; these gained success may fairly be considered certain. I will now throw out a few suggestions for consideration and discussion:—

1. To call a meeting of all interested in the cultivation of cinnamon to discuss the question of entirely discontinuing the preparation and exportation of chips.
CINNAMON.

2. To appoint a Committee with powers to correspond with owners of cinnamon estates of 50 acres and upwards to try and persuade them to join in this movement.

3. To consider the feasibility of forming a Syndicate of all who join in this movement for the purpose of bringing up chips from the small gardens, to be converted into oil.

Suggestions 1 and 2 seeing they bind no one to anything will no doubt be agreed to. In the event of the Committee being successful in securing the consent of the majority of growers, which I sincerely hope they will be, what then? Are we to be content with that? Are we to have no reasonable guarantee that all will act in good faith? I certainly think it is absolutely necessary that we should, otherwise our proceedings will be a farce. I would therefore propose that an agreement should be drawn up and signed by each consenting party binding himself on honor not to prepare or export chips for a period to be determined upon. No honest man need take umbrage at being asked to subscribe to a document of this tenor. It would tend I submit to give confidence where confidence is essential, and very few I trust would be found so dead to truth and honor as to break such an agreement. Should we be so fortunate as to reach this stage, we would have great cause for congratulation, yet this would only be a small measure of relief and would not secure the full object we have in view; here then would come in my 3rd suggestion. The annual exports of chips is about 500,000 lb. or quite one-fourth of the total yearly crop of cinnamon. We might, I think, fairly infer that one-half of this would be represented by estates that would agree not to prepare chips, leaving the other half or 250,000 lb. to be dealt with otherwise. I propose therefore that all who agree to refrain from preparing chips do form themselves into a Syndicate for the purpose of buying up all the chips that are offered for sale in the local markets, paying a price equivalent to the highest that could be obtained in the London or continental markets so as to insure that none is exported. It is well-known that bark cinnamon oil is greatly adulterated by some manufacturers, if therefore pure oil only were made I feel convinced that all the chips now used for this purpose, as well as the 250,000 lb. mentioned above would all be absorbed, and that without any danger of overstocking the market. Particularly would this be the case if the manufacture of "cinnamon-leaf oil" were suppressed, for of this above from 80,000 to 100,000 ounces are exported annually. Proprietors seldom manufacture this oil themselves, and it has often been a puzzle to me to find a reason why they should allow others to prepare it. The amount paid by the owner of a still to the estate for the privilege of being permitted to use as much leaf as he likes is from Rs to 100 a year, and for this paltry sum he allows his land to be robbed of hundreds of tons of leaf that should be returned to the land to enrich it, while he aids and abets in throwing on to the market thousands of ounces of oil which help to keep down the price of his quill bark: could a more suicidal policy be imagined! This practice is to my mind the height of folly, and instead of encouraging it I would willingly pay several hundred rupees annually to keep off the "leaf oil" distillers from any property I had anything to do with. To sum up, the remedy for low prices is in the hands of growers themselves. Ceylon has a monopoly of cinnamon; and if its output is reduced there need be no fear of any other country stepping in to supply the deficiency. Let all proprietors firmly refuse to permit the manufacture of "leaf oil" on their estates and then there will be a demand for all the bark oil we possibly can prepare from chips. The Syndicate of growers will most likely make sufficient profit from the manufacture of oil to cover all expenses connected with its working, but should a small loss accrue it would be insignificant when distributed over the acreage that would be represented; while the gain in the value of quill bark by the total suppression of chips would be considerable. Proprietors of cinnamon property hold a unique position, and if only one-half of them will for their own interests be unanimous, they will be able completely to control the cinnamon market. The above few remarks are written in the hope that they will be taken up and fully discussed by those in whose interest they have been formed. It is no exaggeration to say that the subject is one of vital importance to cinnamon proprietors (aye, and superintendents too, as their interests are identical) and that they cannot afford any longer to let matters drift as they have hitherto done.—Yours truly,

WILLIAM JARDINE.
SOUTH AMERICAN CINNAMON. — The American Druggist says that at the exhibition of South American products held at Berlin in the early part of this year, some cinnamon bark was exhibited, which Professor Tschirch considered fully equal in aroma and sweet taste to the Ceylon cinnamon. It was in pieces about 2 inches broad and $\frac{3}{4}$ inch thick. The essential oil prepared from it by Tschirch could not be distinguished from that of the Ceylon bark, through the yield was inferior. This is due to the fact that the pieces are taken from older branches which have a bark rich in stone-cells and therefore poorer in oil-cells. It is very low in price and should have a promising future.—Planters' Galette.

[If it has, it will to the further depression of the trade in fine Ceylon cinnamon, which even now is scarcely remunerative.—ED.]

CINNAMON.—The trade in Ceylon Cinnamon, once a prosperous business, seems doomed to perpetual paralysis. The miserable prices obtained for the article in this market must be grievously felt in your island by growers and shippers. Looking at the figures of trade, from the Ceylon side, the cause is not far to seek. Enormous production fully accounts for current values, a very large proportion of your shipments being represented by chips. To this fact the present range of prices is largely due, more than which it is to be feared that the produce bought by merchants from dealers is not always genuine. Notwithstanding the large quantity which Ceylon sends to Continental ports direct, the still larger shipments to the United Kingdom are nearly all re-exported, the home consumption of the spice being infinitesimal. The figures for the past two years are as follows:

<table>
<thead>
<tr>
<th>Year</th>
<th>Imports</th>
<th>Exports</th>
</tr>
</thead>
<tbody>
<tr>
<td>1887</td>
<td>1,109,973</td>
<td>1,222,500</td>
</tr>
<tr>
<td>1888</td>
<td>1,351,990</td>
<td>1,121,324</td>
</tr>
</tbody>
</table>

Whatever difference of price exists between chips and baled Cinnamon, no doubt arises from the superiority of quality of the one over the other, yet in actual use a portion of a stick from a bale, and a chip of genuine spice of equal quality, do not differ as regards value for use. Looking at the course of the trade for years past, it would appear that the great decline in price has taken place since the shipments of ships from your island. Over and over again it has been pointed out to growers and shippers that, if they would see better prices, there must be a resolve amongst them to refrain from the export of chips in any quantity; but, so far, this advice has been disregarded, and instead of utilizing chips for the purpose of oil-making, they continue to be sent over here to weigh down prices by flooding our market beyond any hope of recovery.—London Times.

CINNAMON is one of the articles honored with princely charges. We have an account sale before us shewing the gross value realized by a shipment at £147 19s. 3d., against which are charges aggregating £30 8s. 1d., or over 20 per cent. Deducting freight, the charges amount to over 12½ per cent. Another account sale shewing £77 15s. 10d. as the sale price of the produce, disclosed only £56 14s. 10d. as net proceeds—no less than £21 1s. or over 25 per cent being absorbed by freight and London charges. A third account shows £45 8s. 4d. as the gross proceeds; reduced by £86 of charges, which do not include, of course, the local transport, packing and shipping charges. If these London charges, which seem modest enough in Commission and brokerage, can be reduced, they can be done only by united action and present agitation. Feeling how little can be achieved by so small a unit as Ceylon, some producers deem it best to sell their produce locally; but there is small satisfaction even in this, for purchasers here are quite equal to the computation of London prices less London charges, and offer no more than the just equivalent of the net proceeds. Cinnamon growers, feeling that they are still further weighted by quarterly London sales, are agitating through the Agricultural Association for more frequent auctions. As it is, one or two Continental Firms are the only local purchasers, chiefly on commission for their principals in Europe. English merchants do not compete with them, avoiding the risk of their consignments reaching London just too late for one sale, and having to wait three months for the next. It is to be hoped that monthly auctions may secure better prices, if not in London, at least locally, by leading to increased competition among merchants who, with the gift of charging, may have the gift of securing a
reduction in those London charges which seem so capable of reduction. An attempt should be made to find out whether the charges, now felt to be heavy, are really legitimate, or whether their reduction can be reasonably expected. Especially in the case of tea—an industry capable of almost unlimited expansion because the demand for the article should know no limit—should a vigorous attempt may be made to protect it from charges which may give it the death-blow at a time when the future of the colony seems so closely wound up with it.—Ceylon "Examiner."
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