

ROYAL BOTANIC GARDENS, CEYLON.

REPORT OF THE DIRECTOR FOR THE YEAR 1880.

I TOOK over the charge of the Gardens on 20th February, a few days after Dr. Thwaites's retirement. During the remainder of the year the ordinary routine duties of management and maintenance have been carried on, and require no further mention here. Since, however, some new departures have been made and changes introduced, it may be well to put on record the character and condition of the Gardens, and the directions in which I am desirous to further develop them and have already commenced to do so.

I.—PÉRÁDENIYA GARDEN.

The principles of management consistently carried out in these gardens for many years past aimed at the preservation, to as great an extent as possible, of their natural character. The result has been all that could be desired in that respect, and their luxuriant and tropical wild beauty has been a characteristic feature of the gardens. Trees were rarely felled but allowed to decay, new ones were planted without regard to their surroundings, crowded together and never pruned, and the struggle for existence permitted to go on almost unchecked.

The result of this was naturally the predominance of some plants and the more or less complete destruction of others. Few were able to exhibit their full proportions and complete development; even the flower-beds, never weeded, formed dense thickets under the shade of large trees, where it not unfrequently happened that rare and interesting species were choked and barely alive from the inordinate luxuriance of some dominant but worthless weed. The same principles forbade any arrangement or systematic classification of the plants in accordance with their affinities, or the attachment to them of any explanatory labels. In short, many portions presented more the appearance of a beautiful wild jungle, where plants from the tropics of all latitudes strove for the mastery, than of a scientific garden for the public utility.

My first duty seemed to be to ascertain the contents of the garden, but in the absence of labels, of any fairly complete or properly arranged catalogue, and of available detailed records referring to the past, this work will be one of some duration, and is only partially carried through. During the explorations necessary for this purpose, several successive portions of the garden have been opened out and greatly improved. The accumulated débris has been taken away, numerous dead, dying, and unsightly trees and shrubs have been removed, and those harmful from shade felled. The greatest care has however been taken to conserve every specimen of interest, and of course all unique specimens; some have been re-planted in more favourable positions, and thus others have had the opportunity afforded them of attaining their true development and taking their natural form. By the sacrifice of common and often-repeated sorts room has been also gained for planting additional species. Much more similar work has yet to be done.

The grand scenic character of the gardens is due largely to the magnificent trees—palms, bamboos, and figs especially—which they contain. Effective objects of this kind it has been my endeavour to isolate and enhance in value in the landscape; and I have not hesitated to take off unsightly or superfluous portions, and to clear away native wild vegetation and inferior specimens which destroyed their symmetry or hid the proper display of their beauties.

Roads.—These are numerous and remarkably well planned and constructed. By far the greater part are adapted for carriages, a point of some importance in a tropical garden. It is worth putting on record that the total length now open extends to nearly four miles of carriage drives and one and a-half mile of foot-paths. All are in excellent repair, but require constant attention, especially after heavy rain. In places a better system of drainage will have to be employed.

Buildings.—An addition to these is the house lately vacated by a clerk in the employ of the Public Works Department, which has been put into thorough repair, and is now occupied

by the draftsman of this establishment. A small grant has enabled this and other pressing repairs to be carried out. The clerk's and gardener's offices, the store, and the entrance lodge have all been put into good order, and a new and substantial carpenters' shed and a new plant-shed erected. Repairs have also been made in the houses of the head gardener (lately in occupation of the draftsman) and the plant-collector, and the more pressing wants of the "Assistant Director's" bungalow (occupied by the Cryptogamist) have been supplied. The roof of this house is however in a very unsubstantial condition, and requires thorough renewal. The roof of the herbarium building is also in a leaky state, and needs further attention.

The young plants and cuttings in the plant-sheds suffering from want of light, windows or sky-lights of glass, so far as it could be obtained, have been inserted in the roofs, and shelves and trestles erected.

Improvements at Entrance.—The approach to the gardens from the high-road was (as remarked in the Report for 1870) inconvenient and unsightly. It afforded access only from the Kandy direction, and turned into the gate at a dangerously sharp angle. In the Pérádeniya direction was a foot-path only, made four years ago. Both these have been enclosed, dug up, and grassed over, and two short carriage roads of easy gradient and symmetrical curves have been formed from the high-road to the gate. The triangular space thus enclosed has been levelled and turfed, and the hedge replaced by an iron fence sixty yards long. In thus forming an entrance more worthy of the garden it was necessary to sacrifice two of the trees of *Ficus elastica* on the right hand of the gate; the effect has been greatly to enhance the striking appearance of the grand avenue of the same species on the left hand side, so much admired and now much better seen. The fine mahogany and star-apple trees remain as before, and some fresh ornamental trees have been planted. The steep bank which here forms so good a protection and screen to the gardens has been draped with large ferns and foliage plants.

The well-known palm-grove just within the entrance (as well as the newer one in the circular road) has been carefully gone over. Its beauty had become somewhat impaired from the great height many of the trees have attained. The bare dead stem of one of the talipot palms which flowered in 1877 has been felled and its base converted into a seat; it measured sixty-eight feet in length and twelve feet in circumference. A few other specimens have been taken out, and brushwood and undergrowth removed; and two young talipots and several specimens of other and fresh species planted. The ground under the trees has been carpeted with small ferns and selaginellas.

Ornamental Lake.—A principal want here has been a piece of water suitable for the growth of aquatics and as an ornamental feature. The new water supply, completed last year, has now allowed the transformation of a small muddy pond in the southern part of the garden into some approach to an ornamental lake. It has been cleaned out and enlarged, the banks sloped and turfed, many trees and bambocs surrounding it cleared away, and an unsightly piece of jungle and a rubbish heap in the neighbourhood removed. A constant supply of water, brought by an open channel 650 ft. long, falls into this little lake which is about 30 ft. above the river, from which it is only separated by a steep wide bank probably permitting some soakage. Several of our more ornamental native water plants are now growing here, and it is hoped that some more striking exotic species will soon be added. But unless the water can be emptied out, and the bottom, which is very foul, be properly puddled to an uniform depth, little success can be hoped for.

Grass.—The fine stretches of grass which give such a park-like aspect to the garden are a source of heavy and constant expense. More than one-third of the whole expenditure on labour is absorbed by grass-cutting, which is nearly always going on. It is wholly effected by the primitive method of reaping with heavy grass-knives and never succeeds in producing anything like a turf, as it is impossible to do it with sufficient frequency. Nothing would more tend to improve the grounds than greater attention to the grass: were this once properly levelled, cleared of stones and weeds, and the coarse grasses and other plants kept short and never permitted to become rank or to seed, the wild untidy portions could be readily and quickly replaced by fine dry lawns of short tuft. I therefore urgently request to be provided with means to purchase a large mowing machine for bullocks, and I feel confident that the large first cost will be quickly repaid by the saving of labour, which

will also then become available for attending to other parts of the garden which now too often suffer from the imperative need of the grass-cutting.

New South Garden.—About sixteen acres of land at the south of the course of the old Colombo road, and extending to the satin-wood bridge have hitherto not been brought into cultivation, but have for many years lain in an unfenced and neglected condition, a tangled scrub of coarse weeds traversed only by a few cattle on their path to the river bank. A preliminary clearance of this adventive vegetation revealed the ground to be much undulated and picturesque, and the soil in parts appears to be superior to that in most portions of the garden.

I propose to lay out this area mainly as a systematically arranged scientific garden, as represented by a classified collection of trees and shrubs and of herbaceous plants. But space will also be afforded for new nurseries and for growing a larger stock of plants of commercial value for the benefit of the planters and others and for experimental purposes.

Another feature of this new portion of the garden will be a fine drive, connected (at the lake) with those already existing, and passing near the river bank almost to the satin-wood bridge, commanding pretty views. This road has been commenced and will be pushed on to completion as rapidly as possible.

I venture to urge the necessity of a sufficient protection to this addition to the garden, along the high-road. A hedge of dwarf bamboo has been planted, but this is not sufficient to keep out cattle and other marauders. The only effectual protection is an iron wire fence, and this I consider to be very necessary. The length required is 305 yards.

Labelling.—The utility of a public Botanic Garden is greatly increased by a judicious system of labelling. Indeed without it little more than a feeling of admiration can be experienced by even intelligent visitors, and this is often mixed with a sense of confused dissatisfaction. It has been customary here to accompany visitors over the grounds and attempt to supply by word what could be far better conveyed by the eye, but the objections to this as a regular practice are obvious.

A really good permanent label for a moist tropical climate is still a desideratum, nor is a single sort possible for universal adoption. I am also limited as to cost. For interesting, valuable and striking species I intend to employ printed labels cemented by resin between two plates of thick glass, and the whole enclosed in a painted zinc frame. A few of such labels have been set up and found to answer very well. The ordinary labels will be of white metal with black letters.

Each label gives, besides the scientific name, the English and Sinhalese ones (where such exist), the natural family to which the plant belongs, and its native country.

The new systematic garden will also be carefully labelled, and in connection with this I hope to complete a full systematic catalogue of the contents of the garden to supersede the preliminary list printed last year. How eager the public are to acquire any help towards a knowledge of the contents of the garden is seen by the comparatively large sale of that catalogue; but a small guide pointing out the chief plants of interest would probably be of more general utility to visitors.

Propagation.—As may be seen by the amounts given below (§ vi.), the sale of plants and seeds has now reached a considerable magnitude. The sum thus accruing and returned to the Treasury has been more than double as much during the year 1880 as during the previous one, a result partly due to a system of quarterly advertisements in the principal newspapers, initiated in June. It is certainly not in my opinion an object to be aimed at by a State Botanic Garden to bring in a revenue. In the absence however of any professional florists or nurserymen in the colony, the garden must continue to do their work, however more satisfactorily the time and labour thus spent might be employed. But it may be hoped that this will gradually cease.

A great assistance and relief to the staff has been effected by the appointment of a head gardener. Mr. Clark, who was selected by the Director of Kew Gardens for the post, arrived towards the close of the year. He at once initiated changes and additions to his department. A temporary hot-bed has been erected, and a potting-house and other conveniences made; an open orchid house or shed has been commenced, and the work properly distributed. I have every reason to expect that a greater measure of success in the raising and propagation of foreign plants will result from this appointment.

The soil of the present nurseries, which have been in use for over half-a-century and are much exposed to the N.E. wind, being greatly impoverished, I propose to make fresh ones in the recently cleared south garden.

The principal want in this department is *glass*. A few glass frames are required for raising grafts and cuttings and protecting young plants from drip, draughts of wind and rapid changes of temperature, whilst yet affording light. Hitherto old Wardian cases have been generally employed.

A still more pressing need is glass roofing for the plant sheds (or one of them), and the orchid-house, which is at present thinly thatched with grass in the manner so successfully practised at Calcutta, but not suited to a purely tropical and very moist climate like Pérádeniya. This glass should be obtained from England, and its cost would not be large, hough beyond the ordinary means at my disposal.

A well-shaded rockery has been formed near the office and store, and planted up with (chiefly) native ferns, ground orchids, sonerilas, balsams, acrotremas, &c.

II.—HAKGALA GARDEN.

The Superintendent has been engaged during the year in the formation of a new Plantation of *Cinchona Ledgeriana*, in barking and preparing for the market some trees of *C. officinalis*, var. *crispa*, in digging out and barking stumps of old *C. officinalis* and *C. succirubra*, and in re-planting a portion of the ground with var. *crispa*. He has also succeeded in raising some Himalayan and other conifers from seed.

The water-course in this garden still requires some attention from the Department of Public Works, the masonry work having been left in an unfinished state.

There is room in Hakgala for very great improvement in almost every respect, and in accordance with the desire of His Excellency the Governor I have lately submitted a plan for its more efficient management. As the details of this are still under consideration, it is not at present possible to say more than that they are framed with the object of rendering Hakgala garden of greater and more varied usefulness to the Colony.

III.—HENARATGODA GARDEN.

Each year appears further to demonstrate the utility of this branch, the management of which is very satisfactory. The trees and plants are well cared for and in good health; a new nursery for the propagation of Para India-rubber has been formed, as well as fresh plantations of Liberian and Jamaica coffees and of cacao. The various new economic plants suitable for hot-country cultivation sent from Pérádeniya to a more congenial climate have been carefully planted out, and are well attended to and flourishing.

Several large trees of *Ficus modesta* have been felled, being found to injure the young plants beneath; the walks have been partially remade, and a bamboo fence has been erected round such parts of the boundary as were specially liable to the trespass of cattle.

The bridge at the entrance to the garden which had become dangerously insecure has been repaired.

IV.—ECONOMIC AND USEFUL PLANTS.

Coffee.—In spite of the great impulse lately given to the cultivation of other plants, which is still gaining strength, coffee remains unquestionably the staple product of the Island. In view of the continued prevalence of leaf-disease, one of the earliest hopes of the planters was the introduction of new varieties, it being, not unreasonably, thought that in some of these there might be found to reside a greater power of resistance to the growth of *Hemiteia*. With this view His Excellency the Governor obtained from the Jamaica Government a considerable supply of seed of the best Blue Mountain coffee there cultivated. This, as stated in last year's report, germinated well; and by desire of His Excellency, young plants to the number of over 26,000 have been distributed free of charge to such planters as cared to possess them. I regret to say that the hope expressed by my predecessor in the report just referred to has by no means been realized. The disease attacked the seedlings with remarkable intensity, and not a few actually succumbed under it. It is worth remarking that a small plantation of this variety made at Henaratgoda is in a very healthy condition, the plants, now one year old, three or four feet high, and commencing to flower. It will be interesting to watch the further development of these at so low an elevation.

By the kindness of Messrs. Leechman I have had the opportunity also of growing seed of a coffee from Nakunaad, Coorg, which had a reputation as "disease-resisting." It is however now suffering from a bad attack.

Mr. S. M. Kay-Shuttleworth brought from Java seed of nine varieties of coffee there grown, all of which we have raised at Pérádeniya. One of these is a remarkable plant, with very narrow leaves, and perhaps may be distinct species. All have been attacked by *Hemileia*.

There is indeed very little reason to suppose that any variety of *C. arabica* is "disease-proof." Even other species are the hosts of the *Hemileia* parasite; our native wild species, *C. travancorensis*, and the African *C. liberica*, are both susceptible; yet it by no means follows that all suffer equally in health. It is fortunately not necessary for me to attempt to go further into this matter, as the whole subject of "leaf-disease" is undergoing an exhaustive examination by Mr. Marshall Ward, specially appointed for the purpose and attached to this Department. During the year Mr. Ward has published two able and original papers embodying the results of his investigations into the character and structure of the fungus itself, the mode of its life in the coffee leaf, and the precise nature of the damage it works. A true knowledge of the disease is thus being steadily completed, and the progress already made appears to me to be highly encouraging for the future.

Liberian coffee has now taken its position as a valuable crop in the lower districts. The beautiful naturally-grown trees in Férádeniya continue to bear well. It is to be regretted that the efforts made to induce the natives of the low-countries to take up this culture, so eminently adapted for them, have had such slight results. A box of seeds has been sent to the Maharajah of Travancore at his Highness's request.

Tea.—Hopes are entertained that a market may be found for this product in the Australian Colonies, samples of Ceylon-grown tea sent to the Melbourne Exhibition having met with much appreciation. This has given a great impulse to the cultivation in our planting districts. A box of seeds has, at the request of the Director of the Botanic Garden at Manilla, been transmitted to that place.

Cinchona.—An impulse has been given to this cultivation during 1880 unparalleled in any previous period, and indeed it may be said to have become general, to a greater or less extent, on all estates in suitable situations. It is principally *C. officinalis* and *C. succirubra* that are being so extensively grown; of these, many planters have now very extensive nurseries, and little or no seed has been purchased from Hakgala. Nor is it necessary for the Government to continue any further large propagation of those species.

The remarkable suitability of the climate of our higher elevations for *C. officinalis* is very evident, but at heights below 4,500 feet it appears more desirable to grow other sorts. This species shews considerable variation in the form of leaf, ranging from a narrow lanceolate up to a broad oval. A large-leaved form much in favour from its quick growth (often but incorrectly termed *C. condaminea* in Ceylon) may not improbably be the result of crossing with *C. succirubra*. The narrowest-leaved variety (*C. crispa*) has been grown at the Hakgala plantations since their establishment, and thence spread over the estates. As it appears admirably fitted for the highest situations, I submitted a sample of the bark from trees about nine years old to my friend Mr. Howard, F.R.S., who has favoured me with the following analysis and remarks:—

"This bark used to be called *crepillá*. It was the Quina fina de Loja. I am glad to say it keeps up its character for goodness, thus:—

Quinine	...	4·10
Cinchonidine	...	0·70
Cinchonine	...	0·20
Quinidine	...	0·20

Total alkaloids 5·20

This would give of sulph. quinine 5·45 per cent., very much better than most of the bark grown in Ceylon."

I have had some of these trees coppiced, and a small quantity of bark has been shipped for sale in London.*

* This consignment was highly appreciated in Mincing Lane. At the sale, early in February in 1881, after a brisk competition it was sold for 7s. 6d. per lb., Mr. Howard remarking on its superiority over smot Ceylon bark. [Note added March, 1881.]

Of the more valuable *C. Ledgeriana*, it is a matter for regret that I am not able to report a larger stock in the Government garden at Hakgala. There are at present about 3,000 seedlings, mostly raised from the seed received from Java in 1878, but some from a little seed received this year. I was able to meet the great desire of planters to possess themselves of this important plant only to a very small extent; but a distribution of 1,250 young plants to 32 applicants was made. However I have satisfied myself that there are scattered over several estates a considerable number of *C. Ledgeriana* from seed obtained by private application from the Government gardens in Java, Darjiling or the Nilgiris, the whole being the descendants of the seed originally brought over by Mr. Ledger. I desire to press upon the attention of the owners of these trees—many of which are now commencing to flower—the extreme importance of minimizing the chances of their being crossed by the pollen of other and inferior kinds. If any of these be in the immediate neighbourhood, they should be destroyed. Selected and marked or numbered trees should be analysed by a competent chemist, and the results compared with the characters of the trees. Those with a good bark-analysis should be kept as seed-trees, those with a bad one ruthlessly destroyed. In this way alone it is possible after a few years to obtain seed which will come true. No pains should be spared in this matter. It is important that growers should realize that before long (assuming that quinine retains its commercial pre-eminence over the other alkaloids) it will be only the best barks that will secure good prices; the inferior must hang on hand and only be disposed of at reduced rates.

Though *C. Ledgeriana* (like its close ally *C. Calisaya* in all its forms, of which indeed it may be one) is difficult to propagate by cuttings, it is without difficulty grafted on *C. succirubra*. The method consists merely in cutting a straight flat flap in the stock and inserting the sloping end of the graft (also cut perfectly flat) so that the naked surface of its wood, cambium and bark shall be in accurate contact with the same portions of the stock. The flap of bark embraces the graft on the outside, and the whole is kept in position by a firm bandage of soft thread. The plants require to be kept in an equable temperature and protected from draughts till union is complete, when the upper portion of the stock may be removed.

Twelve plants of the hard Carthagena bark (believed to be *C. cordifolia*) were sent from Kew under the charge of Mr. Clark. In spite of his attention, they suffered greatly in the passage through the Red Sea, and it is much to be regretted that only two recovered sufficiently to be sent on to Hakgala. Should they ultimately not survive there, it is confidently hoped that some fresh ones may be obtained from Darjiling, where Mr. Gammie has been very successful in its propagation.

I have also received from the Government plantation at Neddiwuttum, Nilgiris, a Wardian case with some young plants of the kind called *C. officinalis* var. *pubescens* by Mr. Howard but considered a hybrid by the late Mr. McIvor. Owing to remarkably careless packing these were nearly all dead on arrival, but a few have survived and are doing well. They possess much the appearance of *C. succirubra* at present.

In September I had the pleasure of accompanying Mr. Moens, the Director of the Government Cinchona Plantations in Java, on a tour of inspection through a part of our hill-country estates, and of gaining much useful information about the methods employed by him in his successful management of the Dutch plantations.

Cacao.—The Secretary of State for the Colonies, on the representation that there are superior varieties of cacao grown in Trinidad not yet in cultivation in the East, has caused young plants of them to be sent from that colony to Ceylon. The plants were selected and packed by Mr. Prestoe, Government Botanist at Trinidad, and despatched to Kew on 8th September. Here they remained but a few days, being brought on at once by Mr. Clark in six Wardian cases and arriving here on 5th November. In spite of the long double journey and indifferent packing, they arrived in fair condition. The varieties are eleven in number. It is intended that a proportion of these shall be forwarded to the colonies of Singapore and Fiji. Mr. Prestoe, in his report accompanying the plants, points out that some variation from parental characters may be expected in these seedlings, also that the varieties are so slightly marked as to be generally ignored by growers in Trinidad. He also remarks that it is "certain that some of the best varieties of cocoa are already in Ceylon."

This valuable consignment was accompanied by fifty young plants of the shade-tree generally grown with cacao in the West, *Erythrina umbrosa* (also called "Bucare" and "Bois immortelle"), and a packet of seed of the same species had been previously received

from Mr. Prestoe, through the Royal Gardens at Kew. These have been sown in batches in August, October and December, and have germinated and grown well. As they were gathered in March, it is obvious that the belief of Mr. Prestoe, that they "do not retain their vitality for many days," is unfounded. Cuttings have been made from these seedlings and they root with the greatest facility. A large number can be raised at any time should a demand arise. In the Kandyan country however cacao does very well without protection of this kind; but in the hotter and dryer low districts it will probably be found an advantage to employ the *Erythrina*.

It is probable that cacao will become one of the leading products of the Colony and largely contribute to its future prosperity.

India Rubber.—Of the three species of South American trees here in cultivation, *Manihot Glaziovii* (Ceara rubber) is still the only one which has flowered. Seed of this has been supplied during the year to the Government gardens in India (Calcutta, Saharanpore, Ootacamund) and distributed as widely as possible among the planters in the Colony, 24,550 seeds having been thus disposed of as well as 1,879 rooted cuttings. We have also sent small quantities to the Botanic Gardens of Singapore, Mauritius, Jamaica, British Guiana and Kew, to the Acclimatization Society of Queensland, and to Mr. H. Low, H.B.M.'s Resident in Perak. Soon after my arrival at Pérádeniya I wrote a few "Notes" upon these plants which were printed as a Government paper, and have been distributed with the seeds. I have also given a botanical description, with an accurate figure, of *Manihot Glaziovii* in the London "Journal of Botany" for November. This plant is now flourishing in Ceylon in suitable places, and proves very hardy; in the new estates in the Trincomalee district it is reported to be thriving, but to have shewn itself intolerant of wet. In the Nilgiris I am informed it is doing well at 2,400 feet, and Major Seaton reports from British Burmah that there are 500 and upwards set out and well established in the Mergui plantation.

With regard to Para rubber (*Hevea brasiliensis*) its cultivation will be probably found to be satisfactory only in rich land not much above sea-level, where the temperature is high and equable and the rainfall large. At Pérádeniya the trees are now making but slight progress and suffer from wind, especially in the dry north-east monsoon. At Henaratgoda their progress is all that could be wished; our largest trees are now at three feet from the ground, sixteen inches in circumference. During the year 662 cuttings were raised and distributed. *Hevea* has proved completely unsuited to the climate of Calcutta, but is doing well in Burmah and Perak. In the latter place a tree has flowered sparingly (at two and a-half years and thirty-five feet high): Mr. Low kindly promises seed if any ripen, but this must be a premature blossoming, for Mr. Jenman of British Guiana informs me that he has not observed trees to flower with a stem of less than ten inches in diameter.

Two plants of *Castilloa* have been sent to Calcutta. Those in Burmah are reported to be flourishing. Much better success now attends the propagation by cuttings of this fine species. Our largest trees at Henaratgoda have now a circumference of nearly seventeen inches at a yard from the ground, and the trees are beginning to take their true form.

I hope during the coming year to make an experimental trial of the yield of caoutchouc from these S. American species.

With regard to other rubber-yielding plants, we have a fine plant of a species of *Landolphia* flourishing at Henaratgoda. Several plants of this genus, all climbing shrubs, afford African rubber, which appears to be also yielded by a fig, *Ficus (Urostigma) Vogelii*. This latter, and one or more kinds of *Vahea* (not distinguishable as a genus apart from *Landolphia*) from which Madagascar rubber is obtained, have lately been imported into Ceylon by several gentlemen. Our plants of *Gutta Sanggarip* (probably *Willughbeia martabanica*) from the Malay Peninsula, sent in 1879 by Mr. Murton, are doing well.

Gutta Percha.—This valuable commodity is afforded by numerous large trees of the family *Sapotaceæ* growing in the Malay Peninsula and Islands. Of the best known and most valuable of these, *Dichopsis Gutta*, there are several young trees in Pérádeniya and Henaratgoda, and I have during the year, through the kind exertions of Mr. Low, our Resident at Perak, received a consignment of germinating seeds of the second best variety of that country.

This is called "Gatah Sunde," and Mr. Low informs me that it forms a very large tree 120 feet high, but quick growing. From specimens of the foliage and fruit sent with

the seeds, it would appear (so far as can be determined without flowers) to be a species of *Payena*. This is a valuable gift, as "the Gatah trees in Perak [as everywhere else] sufficiently large to produce the gum are now very rare, and very great difficulty arises in procuring seeds or specimens." The young plants are growing vigorously in Péradeniya and Henaratgoda. The commercial necessity for a systematic cultivation of Gutta-percha yielding trees is rapidly becoming a pressing one.

Cardamons, &c.—The cultivation of the Malabar variety of this condiment has considerably extended in Ceylon, being found to be highly profitable lately. Applications for roots and seeds have been so numerous as to be beyond our power to supply them, though a considerable increase to the space allotted to their cultivation has been made. Nutmegs, cloves, ginger, turmeric, vanilla, pepper, arrowroot, and other hot-country plants have also been distributed in considerable quantities.

Ipecacuanha.—I cannot report much progress with this culture. Though readily enough propagated, the plants remain small, and even at Henaratgoda where they seed, make exceedingly slow growth both above and below ground.

Timber trees.—Several applications have been made from India for seed of the Mahogany, from an erroneous idea that it is produced here abundantly. It may be therefore well to mention that the production of a ripe capsule is a rather rare event in Ceylon, though the tree flowers abundantly. It is to be regretted that a plan for the formation of a plantation of this valuable wood in the Southern Province has fallen through for want of funds. Our beautiful native woods, especially calamander, which is becoming very scarce, are also now calling urgently for protection, and I strongly advocate the formation without delay of Government plantations, under proper and efficient management.

The following are some of the more interesting additions to the collections during the year :—

DICOTYLEDONS.

- Calodendron capense*, Thunb. A handsome rutaceous tree. The wild chestnut of the Boers. Cape of Good Hope.
- Rhus rhodantha*, F. M. Queensland. Remarkable in the genus for its large red flowers.
- Erythrina umbrosa*, H. B. K. Native of Trop. S. America where it is called Bucare. The "Bois immortelle" of the W. Indies.
- E. velutina*, Willd. Trop. S. America and W. Indies. Like the last, used to shade Cacao.
- E. Vespertilio*, Benth. Queensland. Remarkable for the shape of its leaves.
- Pterocarpus santalinus*, Linn. f. Red Sanders wood. South India; a rare and local tree.
- Copaifera officinalis*, L. Central America. One of the trees probably yielding the drug Copaiba.
- Bauhinia Vahlii*, W. & A. Central India. A gigantic climber.
- Holarrhena pubescens*, Wall. (var. of *H. antidyenterica*, Wall.) The Kora of India. Used in native medicine for dysentery.
- Euphorbia resinifera*, Berg. Morocco. Affords the gum Euphorbium of commerce. And other species of *Euphorbia*.
- Jatropha podagrica*, Hook. Central America. A curious plant with bottle-shaped stem.
- Croton Eluteria*, J. Benn. Bahamas. The source of Cascarella bark.
- Brosimum Galactodendron*, Miq. The "Palo de Vaca" or cow tree of Venezuela. A large tree with a juice closely resembling animal milk, and used as an article of food. This, of which both seeds and plants have been safely transmitted from Kew, is an interesting addition to the garden.

MONOCOTYLEDONS.

- Teysmannia altifrons*, Zoll. & Reich. f. I have little doubt in referring to this species the seeds sent from Perak in June last by Mr. Low, and now growing well here. He describes this palm as the handsomest and most graceful imaginable, and it appears to be very local. *Teysmannia* is only hitherto known from Sumatra, but from the description in Miquel's Flora must be almost certainly this Perak palm. Major McNair, R.A., informs me that it is called "Daun Pâyong" (leaf umbrella) by the Malays, and it would appear to be the palm mentioned recently by Mr. Murton in the "Gardeners' Chronicle" under the name of "Duan Sang."
- Smilax officinalis*, Kunth. New Grenada. The source of "Jamaica" sarsaparilla. The plant figured in Bentley and Trimen's Med. Plants, t. 289.

Bambusa Brandisii, Munro. Tenasserim. Described as a magnificent bamboo, the stems reaching 120 ft. in height.

I am very anxious to increase our collection of Orchids, and take this opportunity of offering our native kinds and some of the Indian and Malayan species in exchange for those of South America and the West Indies.

VI.—SALES.

The number of stocked Wardian cases, plants and seeds sold during the year 1880 principally to residents in the Colony, was as follows :—

	Pérádeniya.	Henaratgođa.	Hakgala	Total.
Wardian Cases	.. 17	.. —	.. —	17
Economic Plants	.. 19,890	.. 12,857	.. 8,542	41,289
Seeds of the same	.. 118,556	.. 13,987	.. —	132,543
Garden Plants	.. 6,531	.. 372	.. 42	6,945
Ornamental Trees	.. 1,318	.. —	.. —	1,318
Packets of Seeds :				
Forest Trees	.. 112	.. —	.. —	—
Garden Plants	.. 75	.. —	.. —	—
Vegetables	.. 42	.. —	.. —	—

The number of purchasers was at Pérádeniya 918, at Henaratgođa 239, at Hakgala 43 ; Total 1,180.

The receipts from the sales, paid to the Colonial Treasurer, were

	Rs.	Cts.
From Pérádeniya	.. 5,392	38
Henaratgođa	.. 1,373	8
Hakgala	.. 1,072	15

Total .. Rs. 7,837 61

This is an increase of 4,012 rupees and 28 cents over the receipts for last year. 1879, or considerably more than double.

VII.—HERBARIUM AND LIBRARY.

Herbarium.—The collections of dried plants are mostly in fair order. The Ceylon Plants (“C.P.”) containing the types described in Dr. Thwaites’ “Enumeratio” and many of those of Moon and Gardner’s publications, are however lying loose on half sheets of paper, and need to be fastened down to prevent further loss and displacement, and damage by breakage of fragile specimens. I intend to carry this out as time may serve.

Pressure of work in this first year of my charge has, I am sorry to say, prevented me from making any tour for collecting. A few species have however been added to the Ceylon flora during the period by the garden collectors and by the exertions of Mr. W. Ferguson of Colombo. I cannot but express a desire that other persons, especially those residing in the little known parts of the Colony, would send me fresh or dried specimens of any plants they may think rare or curious, for my examination.

The Foreign herbarium has been arranged for more easy reference, and some new trestles erected for its accommodation. The only addition has been a small but interesting packet of South Indian species from Col. Beddome.

I am desirous of bringing together a structural and economic Museum of Ceylon Botany, to comprise the large and hard or soft and pulpy fruits and seeds unsuited for preservation in the herbarium, stems, barks, roots, resins, gums, fibres, oils, medicines, &c., as well as simple manufactured articles from these. This will, I feel sure, be a valuable adjunct to the Gardens, and I shall thankfully receive any donations from native or European gentlemen who will assist me.

I felt the want of some such collection in connection with the Melbourne Exhibition. I received an unaccountably late notice, only some five or six weeks before the closure of the time for receiving articles, and had therefore no opportunity of doing more than rapidly bringing together an imperfect and fragmentary assortment of hastily prepared specimens. Such as it was, however, I am pleased to notice it has proved acceptable and interesting.

During the clearing of parts of the garden a few stems and roots of structural scientific interest were cut down and uprooted. I sent a selection of 15 of these to the new Natural History Museum (British Museum) at South Kensington, and have received the thanks of the Trustees for them, who also defrayed the cost of their transmission.

The Draftsman has added 22 finished drawings to the fine series of coloured illustrations of the plants of Ceylon, having accompanied me on a visit to the Nuwara Eliya District. A portion of his time has been occupied in making duplicate drawings of Ceylon Lepidoptera for the serial work now being issued in London on that group of insects. He has also the general care of the herbarium.

A good number of our mountain and sea-shore species still remain to be figured, as well as many common ones, and nearly the whole of the grasses and Cyperaceæ, but the series, which is entirely the work of one family (father and two sons) of artists, is now a very full one, and probably unequalled in the East for accuracy of botanical detail combined with beauty of delineation. It is to be regretted that no selection from them has ever been published, though suggested thirty-five years ago by Dr. Gardner. Such a selection could still be made—though many of our plants have since been figured in the works on Indian Botany of Beddome and others—and, with suitable text, would form a valuable and handsome contribution to science, worthy of the traditions of this establishment and spreading a knowledge of the interesting and peculiar vegetation of Ceylon.

Library.—All the books included in the printed "Return of Botanical Books" and in the MS. additions thereto, I find to be in the library; of a few there are duplicate copies, most of which (including some on Cinchona) I have sent to the Hakgala Garden.

In addition, I found on my arrival a large quantity of books and pamphlets not entered in the "Return." Of these I have made a list.

Dr. Thwaites, with great liberality, permitted me to go over the valuable books he had left behind him at Péradeniya, and to select what I pleased for the library. This I very gratefully did, and thus have been added some important works. Others which we already possessed, or which were not botanical, I sent, with Dr. Thwaites's permission and in his name, to the library of the Colombo Museum.

Having since gone over and re-arranged the whole of these books, I am now engaged on a proper systematic catalogue to replace the quite incorrect "return" abovementioned. With this I have made considerable progress, and its compilation has revealed rather numerous imperfect books. Such gaps I am endeavouring to supply, and my thanks are due in several quarters for help in so doing. Colonel Beddome has kindly sent the parts necessary to complete our copies of his indispensable works on Southern Indian Botany, the Colonial Office has supplied the three concluding volumes of Bentham's "Flora Australiensis," and Kew has sent Baker's "Flora of Mauritius" and several smaller works. Other benefactors, besides Dr. Thwaites, have been Mr. C. B. Clarke, now of Kew, Sir Ferd. von Mueller of Melbourne, Mr. G. Wall of Colombo, and others. I must also specially mention the Council of the Linnean Society of London, who in the most liberal manner have offered me the 23rd to 30th volumes of the valuable "Transactions" (needed to complete our set) at one-half of the reduced price allowed to Fellows. This is the second occasion on which the Péradeniya Library is indebted to this celebrated Society.

Many books being out of repair or altogether unbound, 38 volumes have been bound during the year in an inexpensive manner in Kandy.

VIII.—EXPENDITURE.

The whole expenditure on this establishment during the year has been as follows:—

	Rs.	Cts.
Salaries	13,544	70
Gardeners' and Labourers' Wages—		
Péradeniya (Revenue Service) ...	6,667	01
Henaratgoda (do.) ...	1,999	83
Hakgala (do.) ...	2,995	91
Pavilion (Miscellaneous Service) ...	2,195	23
Office Contingencies ...	1,948	81
Travelling (Transport) ...	1,462	76

Total ... Rs. 30,814 25

Péradeniya,
1st January, 1881.

HENRY TRIMEN, M.B.,
Director.

CEYLON TEA.

We call special attention to the letter which our late Governor Sir Wm. Gregory has very kindly written in the interests of Ceylon tea planters. We feel sure that the continued interest thus manifested in the promotion of our planting industries will be generally appreciated. We do not, of course, forget that it was during Sir Wm. Gregory's term of Government that attention was first properly directed to "new products," more especially to tea and cinchona, and in respect of the quality of the former our late Governor has all along been a firm believer in the capability of Ceylon to produce the finest teas. The suggestion now made is one well deserving the attention of our planters, many of whom have individually been entering into arrangements with retailers in different parts of the old country. Why not combine and establish a West End "Ceylon Tea and Coffee Room," or simply a store for the sale of packets of such produce from a few lb. up to a cwt.? The subject is one which might well be discussed by the Planters' Association as preliminary to definite action. The custom of the large number of metropolitan residents now connected with or interested in Ceylon would, of itself, ensure a fair amount of support for a West End Store of the kind we speak of.

NEWS FROM BRAZIL.

(From Our Own Correspondent.)

PATENT LAWS—LABOUR LAWS—COFFEE PROSPECTS.

Fazenda Angelica, S. João do Rio Claro,
20th March 1881.

In answer to a correspondent's enquiry in your paper a few weeks ago, I would say there is every facility for getting a patent for an invention in Brazil. Give some one a power of attorney, plans and specifications, and copy of original patents given in another country (latter not practically necessary), and the attorney through himself or an agent in Rio de Janeiro will make application. The cost will be from £50 to £100, including agency.

I have not time at present to give you a report. I will merely say that coming crop (1881-82) is expected to be two-thirds the last one.

Here in S. Paulo, it will be nearly the same, as young coffee coming into bearing will make up for old coffee trees, which have very little fruit on them this year.

A blow has been struck at international or inter-provincial slave trade. In the three coffee-producing provinces, a tax of £150 (1,500\$000) in province Rio de Janeiro, and £200 (2,000\$000) in provinces of S. Paulo and Minas Geraes, on each slave entering from any other province, has to be paid at time of registration. Coffee cultivation can now be extended only by the use of free labour. This weakens the power of the Emancipation party, as they expected that the other 17 provinces of the Empire, as soon as they got rid of their slaves, would outvote, the three coffee-producing provinces, who had bought them, and declare for immediate emancipation.

The hands of the advocates of the "dying out" system of emancipation are thus strengthened. I am willing, however, to believe that the real intention of the law-makers in framing, and of the Government in sanctioning, the law was to enforce the coffee planter to use more energy in obtaining free labour.—Yours truly,

A. SCOTT BLACKLAW.

CEYLON TEA IN AUSTRALIA.

(From a correspondent.)

MELBOURNE, April 24.

I have been out of town seeking for information respecting Ceylon tea, and from all I can learn it appears that we must try up-country, if we wish to break down the hold that China tea has upon the market. I asked a storekeeper up-country the other day if I should send him some samples of Ceylon tea. His answer was: "I never buy from samples, unless the bulk is at hand to be compared with the samples. Show me a few chests, and then, if they are equal to samples, I may buy."

Three persons in Melbourne, are trying to sell Tea by sample. They do not, and will not succeed. I have written to two gentlemen in Colombo, asking them to send me down a few chests of Tea, and if they do, I will take it nearly 100 miles from Melbourne, and try the country. I bought a few pounds of Tea before leaving Colombo, and have given it all away. I gave a small quantity to a farmer's wife without telling her what it was, and after trying it, she said "that is fine Tea! where did you get it?"

COFFEE still quoted at 81s.—It strikes me that if things go on as they are doing we shall all be short of coin very soon. The German firms report a panic as prevailing in coffee at home. Short crops kill us here, it will be a funny thing if extraordinarily big crops should kill Brazilian coffee planters: prices becoming unremunerative, and at the same time the price of labor rising is not a healthy state of things!—*Cor.*

SHEVAROY PLANTING NOTES, April 26.—I understand that a company has been formed to open out the Kollymullays, a range of hills lying to the south of the Shevaroy's, very accessible from the plain, and favourably situated as regards rain, soil and elevation for coffee planting. The area available for planting on the Shevaroy's is becoming much circumscribed, and capitalists are forced to look for "pastures new." With heavy jungle and abundance of water, some of us might do better by migrating "bag and baggage" to the Kollymullays. There is, however, one drawback—the hills are said to be very feverish. For all that I wish the pioneers of coffee-planting on the Kollymullays every success. So mote it be.—*Madras Times.*

FOOD ADULTERATION.—Not long since the *New York Hour* referred to the discouraging report of a Committee of Experts appointed by Congress to inquire into the adulteration of articles of foods and drink in this country. A similar inquiry in Vienna, by a Society for the Protection of the Public Health, has resulted quite as unpleasantly. Almost everything examined proved to be more or less adulterated. Out of nine hundred and fifty samples of milk, nearly all, were found to be skimmed and diluted with water while some had come from diseased cows and some were given a delusive richness through the medium of borax, soda and soap. Of two hundred specimens of butter, all contained an excessive proportion of water, and many showed component parts of beef fat, lard and stearine. Lard, in its turn, was adulterated with borax and lime, but this came from Hungary and America. Ground coffee consisted mainly of roasted grain, beans and chicory. Bread was found to contain numberless less savory and wholesome ingredients than flour. Even the wine and beer, those mainstays of the Fatherland, had not escaped adulteration. Of one thousand one hundred samples of Austrian and Hungarian wines, fifty-two were artificial concoctions outright, while many others were found to be largely watered and artificially colored. Finally Pilsner beer showed soda, Vienna beer contained glycerine, and seventy-three of the liqueurs examined had traces of arsenic or copper, besides other deleterious substances.—*New York Hour.*

Correspondence.

To the Editor of the Ceylon Observer.

SIR WILLIAM GREGORY ON CEYLON TEA.

Coole, Gort, Co. Galway, April 8th.

SIR,—An extremely good letter on the subject of Ceylon tea written by Mr. Mackenzie has recently appeared in the *Observer*. It ought to attract attention to induce planters to combine and obtain a better position for this product in the London market.

I cannot at all understand its being so lightly esteemed by the dealers at home, as every person of my acquaintance who has tried it praises it, and I find a pound of Ceylon tea to be a most acceptable present to all ladies of my acquaintance who have received it. We drink no other tea in my house; nor shall I do so, as long as I can get a regular supply of the same quality as heretofore. It strikes me that the planters might obtain an agency for the sale of their tea in the West End of London. I do not know whether it would be expedient to combine it with any agency for the sale of Indian tea, or whether it might not be introduced into the Co-operative Societies. Of course precaution would have to be taken that teas of an inferior quality should not prejudice the sale of those of a higher standard.

There are always difficulties in the way of newcomers, such as your tea. They are regarded as intruders and as likely to affect vested interests, but these difficulties can be, and ought to be overcome. Your uncle, Mr. A. M. Ferguson, has done right good work in Australia by introducing Ceylon tea there, and I expect that ere long many a pannikin of it will be brewed in the bush, for its excellent flavour will make it a favourite without milk.

I take so much interest in Ceylon, and especially in its tea, from personal predilections that I feel aggrieved at a product which ought to be so popular meeting with such little favour hitherto, in fact being almost unknown. The small amount as yet received in England will account in a measure for this, but as the export of it will soon be large, I may be excused for recommending that some combined action may be taken in respect to it, without loss of time.

—I remain, sir, yours obediently,

W. H. GREGORY.

COFFEE :—THE YIELD OF LAWRENCE ESTATE, DIKOYA.

Lawrence, Dikoya, May 9, 1881.

DEAR SIR,—With reference to the yield from this estate, quoted by you from a correspondent's letter, I beg to say that having gone into the figures a couple of months back with Mr. Harding, they shew an average crop of over 23 bushels of parchment (nearly 24) per acre, for the nine years ending 1879-80 from coffee in full bearing, nearly 5 cwt. per acre, instead of 3½ as your correspondent says.—Yours truly,

WALTER S. AGAR.

TEA AND CINCHONA.

SIR,—Talking of 'puffing': have you seen the prospectus of the "Tea and Cinchona Plantations Company, Limited"? Companies might be the medium of doing much good in developing the resources of the country. But in Ceylon the best known of these have done much harm. Yet a man who has been deluded into investing money on a promise of 19 per cent (even 70 per cent was promised in one case) is thought a "very rude person," if he makes any remarks other

than laudatory of all concerned, or asks awkward questions, when instead of 19 per cent., he finds considerably less than nothing is the result. (But then the directors have gained experience, and as your daily contemporary says in reference to the recent meeting of a Company, experience not paid for is not worth having! Some consolation doubtless in that.) To be successful in the end, Companies should not require much puffing. The new Company above-mentioned has got together in the shape of extracts from *Observer*, and other papers market reports, essays on tea, Mr. Ballardie and Mr. Downall's reports and letters &c. &c. evidence to prove that this tea will give them 39 per cent profit, and their cinchona £40 per acre of annual production "being about half of the lowest result which has come of their notice." True, with reference to their Tea they appear to think they prove too much, and they reduce their profits to £6 10s per acre per annum. Now, the directors and promoters of this Company are doubtless all honorable men and have had the best advice from the best sources of information: and we may accordingly all look forward to the day when Ceylon will find its 200,000 acres of cinchona will be reaping an annual profit of £8,000,000 (eight millions) sterling!! A pity to break up our ground for gold digging!! Figures can be made to prove anything on paper. Of course, the directors make no mention of the low dividends of the Indian Tea Companies; of the fact that cinchonas die out, of the failures recently experienced in attempts to replant this product, of the total annual consumption being only a fraction of £8,000,000; nor of the report current in Ceylon that the best of the two properties in Morowak Korale, which the directors have arranged to purchase, and for which we must suppose they are to pay the larger half of £14,000 (that being about the sum for which the estates are to be bought) was recently offered for sale for £3,000, and that the only bid was £100! Why don't they publish their prospectus in the *Observer*, that they may cheer the hearts of the many disappointed men now amongst us? If this Company's property can be turned to such account, why not that of others? W. McK.

COFFEE-MANURING ON "ALOOWIHARE" AND "VENTURE" ESTATES.

DEAR SIR,—With reference to the extract from an up-country report, which appeared in your issue of 4th instant, and insofar as it applies to Mr. Ross, his estates, and the manure used by him, I should like to make a few remarks, with a view to correct the false impression likely to be conveyed by the statements therein made.

Mr. Ross has all along been in the habit of manuring liberally, and of late has in his system of cultivation, been guided by the best scientific advice he could get and would seem to be satisfied with what he has done, and the result of his expenditure on the manures recommended to him, judging by the fact that he is about to send out a large consignment of the same again this season.

And now, in the first place with regard to Aloo-wihara. Until last season, this estate got none of the manure sent out for Venture, when about 20 acres were treated with it as an experiment, and the result was most satisfactory. Your correspondent makes rather a misleading statement when he says "Aloo-wihara has actually fallen off in crops as much as any estate in Matale, certainly more than any estate which has received similar care and outlay. This too in the last four years while manures have been made from analysis." Now until last year, the soil of Aloo-wihara had not been analysed and the first of the manure now in use on Venture was only applied on that estate two years ago.

That this estate has fallen off in crops cannot be denied, and Mr. Ross himself attributes the same to the effect of successive attacks of leaf disease, and the fact that manuring has not been carried out so extensively of late as formerly. But your correspondent would have you believe that it was doing no better than any other estate, in fact not so well as some which had got similar attention. Would he say what place or places he refers to, as I am not aware of any estate in that neighbourhood which has had the same amount of cultivation as Alooowihara has had, even of late?

Is your correspondent aware that this estate for years averaged from 7 to 8 cwts per acre, so that if it has fallen off, there was some room for it to do so and still leave some profit over expenditure?

He may be right in this way: that it has fallen off more cwts. per acre than any other estate about there, as it was not possible for many of them to fall off 3 cwt. per acre, and continue to give any crop at all. If it only gave 4 cwt. per acre last season, it is nothing so very extraordinary, and was still sufficiently ahead of the average of the country to justify the expenditure on manure.

And now, with regard to Venture and its crops: in the two years 1876 and 1877, the coffee in full bearing gave an average of $6\frac{1}{2}$ cwt. an acre, and in the last three years it has averaged $5\frac{1}{2}$ cwt. This crop is estimated to average, at least 6 cwt. per acre, which will bring the four years average up to $5\frac{1}{2}$ cwt. and the six years' to 6 cwt. per acre.

Now, will your correspondent name any unmaured estate in Dikoya district that comes within $1\frac{1}{2}$ cwt. per acre of this? I doubt it, and moreover, there is no estate in the neighbourhood, that has been without manure for that time.

Again, the manure now in use has only been once applied over the whole estate—about August and September 1879. Last year's supply has only now been applied, and instead of its "consisting chiefly of bones and poonac" there is not an ounce of either in the composition of the manure as prescribed by the agricultural chemist.

Again, your correspondent says:—"Surely Venture (naturally the finest estate in Dikoya) would have given at least 4 cwt. per acre without manure during these three years 1879, 1880, 1881." Upon what does he base this supposition? What estate without manure has done so? As I said before, there is no place in the neighbourhood that has been without manure, and I deny that Venture is naturally the finest estate in Dikoya. The upper half or more may be, but the lower 100 acres was chena land that had been planted before and abandoned, and every planter knows what that means.

Again, if Lawrence, until two years ago averaged within $1\frac{1}{2}$ cwt. per acre of Venture, why has it fallen off since then? I have shown that Venture for six years will show an average of nearly 6cwt. per acre.

Will Lawrence estate, which your correspondent has taken as a criterion show an average of 4 cwt. per acre for these three years 1879, 1880, 1881, as he seems to infer a good estate ought to do without manure: and has there been no cattle manure, lime, bones and poonac, applied there during these three years?

I must ask the proprietor of Lawrence estate to excuse my bringing in the name of his property so frequently in this letter, and I only do so, because your correspondent has pointed it out as an example of an unmanured estate adjoining Venture. In conclusion, I don't think Mr. Ross desires or stands in need of any advertisement of himself, his estate, or his manure. I believe he is content to take his own line and go his own way which, I think you will agree with me, seems to answer very well, judging from the figures I have given you above.—I am, dear sir, yours faithfully,
PLANTER.

A NEW RUBBER.

155, Fenchurch Street, London, 14th April 1881.

DEAR SIR,—As I know you like to be to the front, I send you enclosed some seed out of a small "post packet" of a new rubber, *Tabernaemontana Crassa*, just received from Africa. I found this plant among some of my Landolphiads. I have had three lots of seed and fruit over; all bad. I hope this may be sound. Some of the Ceylon agents here begged a few at 6d each seed. They go out to-day.

I return half of all I get to the senders of the seed to reward them for their trouble, and with the sender of this I have advances out (of) £400. Knowing he lived among those valuable plants, I hoped he would send me some carefully put up. This and other new rubbers kept No. 4 back of "Commercial Plants." Even one rubber I give the engraving of I can't name, as the base of the flower was off. I hope Dr. Trimen may flower it first. We have no similar plant in the Herbarium of this country.—Yours faithfully, THOS. CHRISTY.

You will notice that the *Tabernaemontana utilis* is the cow tree of British Guiana, famed for its milk, so this is part of the way on the road for proof that it yields well. I sent fruit, flowers and leaves to Kew early last year. I sent their opinions, and for this name of *T. crassa*. [The four seeds received will have a fair trial given to them.—Ed.]

COFFEE LEAF DISEASE:—MR. GRAHAM ANDERSON'S EXPERIMENTS:—THE JAVA GOVERNMENT OFFERING NO REWARD FOR A REMEDY FOR *HEMILEIA VASTATRIX*.

Barguni, Munzerabad, Mysore, 3rd May 1881.

DEAR SIR,—I deem it my duty to hand you an extract from an official reply which I have just received from the Government of Java with reference to my application to be registered as a competitor for the reward for a remedy for leaf disease (*Hemileia vastatrix*). Having seen frequent allusion made in the *Observer* and several other papers to the "reward offered by the Java Government" I shall await with interest any information you may obligingly offer in regard to the way in which we have all indulged in a popular hallucination.

My own attention I may observe, was first attracted by a paragraph in an English paper in which it was clearly stated that extensive experiments on separate estates would be conducted with all remedies which might be suggested.

Encouraged by the frequent allusions to the reward I have devoted much time, attention and money to the conduct of numerous experiments and having forwarded detailed information in regard to all my researches to the Java Government, I now find there is no chance or prospect of any remuneration whatever.

As you are aware agricultural experiments are most costly luxuries to indulge in, and my experience of voluntarily attempting to assist to the best of my ability will be scarcely of a nature to encourage others to imitate my example.—I am, dear sir, yours faithfully,
G. ANDERSON.

Extract from an official letter No. 2.925 dated Batavia, 2nd April 1881. Departement van Binnen landsch Bestuur. "I am happy to say that the leaf disease on this island is not of such a serious nature as would warrant our Government making experiments on a large scale for combating the same.

"It is on this account that you will not be surprised on being informed that our Government has not deemed it necessary to advertise any reward for a remedy against the leaf disease (*Hemileia Vastatrix*) so that the information you seem to have had on the subject is entirely erroneous." (Signed) G. S. H. HENN,

Director for Agriculture.

COFFEE MANURES : MORE ABOUT POTASH.

Colombo, 12th May 1881.

SIR,—It may help towards a more intelligent use of artificial manures, if we examine the composition of Ceylon made cattle manure. Two samples received from Mr. Joseph Fraser of Damboolagalla estate, Matale, had the following composition. No. 1 is the analysis of cattle manure from cattle fed upon coconut poonac and guinea grass, the bedding being mana grass. No. 2 is the analysis of manure from cattle fed upon guinea grass only, the bedding mana grass.

	No. 1	No. 2
Moisture expelled at 212° F.	80.487	74.674
Organic Matter and combined Water	14.442	19.177
Ash	(5.071)	(6.149)
Insoluble Silica	1.805	1.664
Soluble Silica	.209	.193
Oxide of Iron, Alumina and Phosphates	.569	.430
Lime	.497	.717
Magnesia	.067	.171
Potash	.951	1.068
Chloride of Sodium and Soda	.575	.827
Sulphuric Acid	.159	.217
Carbonic Acid and loss	.239	.862
	100.000	100.000
Nitrogen	.446	.544
Phosphoric Acid	.250	.092

The most striking feature, in these analyses, is the fact, that of the four chief manurial ingredients viz. nitrogen, phosphoric acid, lime, and potash, by far the most abundant is potash which averages fully 18 per cent of the manure ash. The proportion of potash is much higher than in English farm yard manures, is indeed double as great. Analyses of the ashes of mana grass, guinea grass and coconut poonac, separately, would be desirable to ascertain the proportion of potash and other ingredients derived from each of these sources. The percentage of potash in the manure from cattle fed on guinea grass only is slightly higher than in the other, when calculated into the weight of the manure as it stands; but if calculated into the weight of the ash of the manure, it is slightly higher in that from cattle fed upon both poonac and guinea grass. The latter manure has a very decided advantage in respect of phosphoric acid. It was contrary to my expectation to find No. 2 richer in nitrogen than No. 1, and in the case of a substance so difficult to sample, from its want of homogeneity, as cattle manure: more analyses are desirable before accepting this as a general fact. It was, however, to some extent confirmed by analyses of dung from cattle fed on guinea grass only (analysis No. 3), and that from cattle fed on coconut poonac as well (analysis No. 4).

	No. 3.	No. 4.
Moisture expelled at 212° F.	73.500	75.186
Organic Matter and combined Water	20.53	21.195
Ash	(6.247)	(3.619)
Insoluble Silica	3.667	2.221
Soluble Silica	.3.8	.159
Oxide of Iron, Alumina and phosphates	.499	.438
Lime	1.037	.464
Magnesia	.078	.066
Potash	.213	.091
Chloride of Sodium and Soda	.076	.043
Sulphuric Acid	.112	.078
Carbonic Acid and loss	.237	.039
	100.000	100.000
Nitrogen	.529	.392
Phosphoric Acid	.139	.174

Here again we notice that in the dung from cattle

fed upon both coconut poonac, and guinea grass, although the percentage of ash is much lower, yet the phosphoric acid is higher than in the guinea-grass-fed cattle dung. When guinea grass is the only feeding material, it would appear that both the dung and total manure are much richer in lime, than when coconut poonac is used as well.

From the large percentage of potash in Ceylon-made cattle manure, those holding different views regarding this substance will, most likely, drawn opposite conclusions as regards its place in artificial manures. Thus the nitrogen and phosphate manurists will argue, that the very fact of cattle manure being richer in potash shows that the soil from which it was derived is best able to supply this ingredient, and there is therefore no occasion to add it to our artificial manures. The nitrogen, potash and phosphate manurists, on the other hand, will argue, that, since potash is such a conspicuous ingredient of cattle manure (the stand-by of the planter), it is wise to introduce a considerable proportion of it in manures for coffee, of which it forms by far the most abundant mineral constituent. The balance of what little experimental data is as yet before us decidedly favours the latter view. We have the testimony of Mr. Graham Anderson and Mr. Talpott, founded on actual experiments, in its favour, the said experiments, moreover, having been carried out on soils richer in potash than those of Ceylon. In the March number of the *Journal of the Chemical Society* an extract from a leading continental scientific magazine informs us, that "experiments which were carried out at Potsdam shewed the most suitable manure for fruit trees to be a mixture of potash sulphate and superphosphate which increased the number of blossoms considerably." Mr. Fraser also, I understand, has found that on Damboolagalla estate those fields at least, the analysis of which shewed a lower percentage of potash responded very well to sombreorum, which is essentially a mixture of potash sulphate and superphosphate of lime. Of the commercial salts of potash, besides wood ashes, our choice from considerations of expense, is probably restricted to the nitrate, muriate, and sulphate. The first can be obtained from India. A very good sample for agricultural purposes submitted to me by a Colombo firm contained nearly 90 per cent salts of potassium, the nitrate constituting nearly 80 per cent. Much of the crude Indian nitre, however, is greatly inferior to this, containing much common salt; but, if cheap enough, is useful as a manure. Nitre of 80 per cent furnishes fully 11 per cent of nitrogen, so that is a highly nitrogenous as well as potassic manure.

Commercial muriate of potassium contains about 88 per cent of muriate and costs about £8 or less per ton. A crude muriate of potassium and magnesium called carnallite can be had from Stassfurt in Prussia for less than a third of the cost of the purer salt; but as it only contains 25 per cent of muriate of potassium, the purer salt would be the cheaper as a source of potassium. Kainit is a crude potash sulphate which comes from the same mines at Stassfurt, Voelcker's analysis of it is as follows:

Moisture	3.36
Water of combination	10.88
Potassium Sulphate	24.43
Calcium Sulphate	2.72
Magnesium Sulphate	13.22
Magnesium Chloride	14.33
Sodium Chloride	30.35
Insoluble Silicious Matter	.71

100.00

A cheaper source of sulphate of potash, if still to be had at its former price of about £8 per ton, is

a lye product called plate sulphate of potash, from kelp. The following are Dr. Richardson's analyses of it, made on samples taken from parcels of 100 tons.

	Irish.		Scotch.
Sulphate of Potash	77.43	75.28	83.06
Sulphate of Soda	21.31	20.89	14.89
Sulphate of Lime	...	.80	...
Chloride of Sodium	...	.54	.67
Insoluble Matter	...	1.04	...
Moisture	...	1.55	1.44
	100.09	100.10	100.06

Sulphate of potash has this advantage for agricultural purposes over the nitrate and muriate that it is less soluble in water. The muriate dissolves in 3 parts of water at 60°, the nitrate in 7, and the sulphate in 11. The sulphate, moreover, in the hands of Mr. Anderson has been found to have a certain curative or preventive effect on leaf disease. A good deal more might be done by analysis to ascertain whether or not there is a connection between leaf disease and a deficient supply of potash to the coffee plant. The coffee leaf not being of direct commercial importance, little has been done as yet in determining the composition of the ash in the different stages of the leaf's growth. The tea leaf, on the other hand, has been analysed in all its stages, and it is remarkable the extent to which potash disappears from the leaf as it grows old, so much so, that Zoller affirmed "that the age of tea leaves may be determined from the analysis of the ash. Thus, young leaves of which the best teas consist contain much larger amounts of potash and phosphoric acid than the older leaves, which are comparatively deficient therein, while they become richer with age in lime and silica. The ash of a sample of young tea, grown in the Himalayas, amounted to 5.63 per cent. and it contained in 100 parts 39.22 of potash, 4.24 lime, 4.38 of oxide of iron, 4.35 of silica and 14.55 of phosphoric acid" (Hassall.) In marketable teas the amount of potash in the tea ash varies to a great extent, as the following examples from Watt's Dictionary of Chemistry, quoted by Hassall, will show, and where potash is low, it will be observed, soda is high and *vice versa* :-

	Souchong	Souchong	Oolong	Young Hyson.	Young Ning
Soda	25.46	1.70	40.00	9.26	12.88
Potash	3.70	44.96	12.38	33.95	23.38
Lime	11.36	8.77	7.68	8.17	8.39
Phosphoric Acid	12.62	11.46	8.26	16.64	17.44
Sulphuric Acid	10.14	6.96	8.27	4.89	4.76
Silicic Acid	16.04	8.79	7.81	10.89	5.59

Potash being the dominant element of the ash of the coffee seed, the formation of fruit must tend to drain the leaves of their potash and if the supply is not equal to the demand, we can imagine an abnormal condition of the leaf to be induced, rendering it liable to the attack of *hemeleia* while the seeds would be reduced either in number or size. Again, if at any stage of its growth, the coffee leaf, like the tea leaf, requires a much larger proportion of potash than at other stages, and the supply be not equal to the demand, we may in this case also have an abnormal condition of leaf and disease the result, I think, at all events, that this line of investigation is worthy of attention.

M. COCHRAN.

COFFEE AND LEAF DISEASE.

8th May 1881.

DEAR SIR,—Regarding the cure of leaf disease: the leaf disease appears to have come in a most mysterious fashion, and will, no doubt, go away as mysteriously as it came, and I do not think that any

earthly agency or power can do otherwise than simply assist the afflicted trees by doses of manure and proper cultivation. Beyond that, nothing can be done until the disease leaves of its own accord, and I think, from a general impression which I have somehow got, that it has begun to go off already. I have noticed that good paying coffee, which had been abandoned during a time of financial depression, and which has now been brought back into cultivation, was all the better after the abandonment, and looked most vigorous and healthy. Perhaps a good way with fields of leaf diseased coffee might be to manure them well and then abandon them for a time, letting suckers and everything grow, until the power of the tree asserts itself over the disease. When, and if, the tree has thrown off the disease, it may then be handled or pruned and the ground weeded. I do not think that weeds harbor the disease: otherwise, were they to do so, they would manifest signs of suffering from it themselves. I merely describe what has come under my practical observation, and I should be glad to hear the opinions of others on the subject.—Yours truly,

FACTS AND FANCIES.

CACAO CULTURE.

Dickeria, 12th May 1881.

SIR,—Every *Ceylon Observer*, I eagerly look out for more information of our new products. And that "kittle" one Mr. Drummond wrote about cacao, has baffled me more than any plant I ever tried in the clearing, either as plants in pots, stumps, seed at stake, or any other way I can try it. Stumps I have tried and been the most unsuccessful. In large, medium and small plants, all are the same, although they got every care given to them. Even a lot of strong healthy plants got eaten down by hares, leaving 2 to 7 or 8 inches of a stump above ground, which was afterwards carefully protected. But almost all have died, so I say stumps no more.

Seed at stake: with a good protection from wind, and a light shade, if the season is favourable, success must follow.

Plants in pots or baskets well hardened about a foot high, their little rootlets as little disturbed as possible and immediate protection from wind, should also do well, if planted in season. After they are planted out, a checkered sunlight does more good than dark shade; and when they make a fair start in growth, gradually get them into full light. A stirring up of the soil round about the plant 18 inches to 2ft. also brings the plant on very fast. They are also the prey of many insects, and consequently require much attention. But when they get up, where, or what, will we get for a more handsome lucrative tree, loaded with fruit, giving recompense for our care and attention? I so far agree with Mr. Drummond that cacao does require shade, according to clearness and power of the sun, but I do not care for jak, it being dense. But with my little experience as yet I cannot say what tree would be the best. Perhaps, a mixture of Liberian, rubber. Cloves and a few plants here and there—in fact any light shade tree that will give returns and be remunerative, and wind-protecting. Belts of nutmegs ought to keep out any amount of wind.—Yours truly, R. C.

ROOT CROPS.—It is astonishing that the cultivators of India should never have considered it a part of good farming to cultivate root and other crops purely for cattle feeding purposes. We give the results of a series of experiments at home, from which it will be seen that a crop of 30 tons (818) maunds of turnips has been raised from an acre.—*Indian Agriculturist*.

FROM CEYLON TO FIJI.

(By an ex-Travancore Planter.)

THE VOYAGE FROM MELBOURNE TO LEVUKA; LIFE IN FIJI.

The "Suva" left Melbourne on January 12th, passed Lord Havre's Island January 17th, and on Jan. 23rd sighted Kandava, the first of the Fiji group. On the same day, we anchored in the harbour of Suva. The entry to it is by a break in the coral reef by which the island of Viti Levu, like nearly all the rest, is surrounded. Those reefs to a certain extent form a natural breakwater. The Bay of Suva was very beautiful, the water calm as an inland lake, the forest-clad hills rising up from its southern margin, wonderfully fresh and green. They rose to a height of about a thousand feet, when they bordered on a "glorious cloudland" that would form a fine subject for Mr. Skeen's camera. The other side of the bay is low-lying and covered with an orange-green grass intermixed with light scrub of a deep green. The forest does not appear to be so heavy as in India: it gives the impression of being soft and luxuriant. The forest scenery on the whole has a good deal of resemblance to the low-country hills nearest Colombo on the Kandy railway, if they were brought down to the sea. The grass of Fiji has the appearance of being very rich; when it is well cropped down by cattle it forms a beautiful sward. Sewa at present does not consist of more than a store or two, a hotel, and about a dozen houses, but there is a lot of building going on. Some unmistakably English cattle that I saw grazing gave a homely look to the place. I made the acquaintance of the South Sea Islanders for the first time at Suva. They are a fine muscular race, copper coloured, with broad noses, protruding lips, and hair like merino wool. The Fijian trims his hair to stand on end in a curious fashion, but the imported labourers take no trouble with theirs. The Fijians are not good workers, I am told. They were Fijians, however, who landed the cargo from the steamer. Generally, they are employed on such jobs, as, though incapable of sustained effort, they can work very heartily for a short time, and, being strong men can carry big weights. The South Sea Islanders are not at all so servile as Hindus, but the shrewd look of many a Tamil cooly and kangani is wanting. Unlike the Hindus, they are always laughing and joking. The fibre of a tree generally forms the dress of the Fijian: he wears a piece of it round his waist, and many folds in a turban on his head. This natural cloth has often a sheen not unlike that of satin. A ball dress made entirely from it is exhibited in the Fiji Court at the Melbourne Exhibition. The imported labourer, I think, nearly always wears cotton clothing.

About 2 o'clock on the 24th January, we left Suva for Levuka, and arrived there about 9 o'clock at night. The *ci-devant* capital of Fiji looks very beautiful when viewed from the sea at night. Its lights are rendered wonderfully brilliant by being set in the dark shade of the hill. The impression I formed of the place then was not displaced next morning by the test of daylight. It is really at any time a picturesque place. A town entirely of wood and iron was novel to me, and I was reminded of descriptions I had read of American townships "Out West." On the hillside above the business part of the place, there are a good many houses tastefully built and situated. The principal street naturally faces the beach. The most prominent building is the Mechanics Institute. The Bank of New Zealand is very tastefully finished. The *Fiji Times* issues from a fine new building. The houses in Levuka, as all over Fiji, are of wood, generally with iron roofs, but sometimes with shingle. The preference given to the former roofing

would lead strangers to suppose that the people of Fiji, not content with the climate, endeavour to bring it up to the highest standards of tropical heat by attracting with the agency of iron as much as possible of the sunshine to their dwellings and places of business. Shingles are quite as easily obtainable as iron. Timber is imported from San Francisco and New Zealand. Native wood is not much used, sawing in pits under European supervision being very expensive, and only one saw-mill being yet erected. The inhabitants of Levuka as a rule, go about in shirt sleeves, and with hats that in Ceylon would be regarded as most inadequate protection from the sun. Children attending school go considerable distances to their homes at midday for their meals, and return to school again; apparently without any evil effect. Here, a European, however high his rank, does not think it necessary to move about in a bandy as in Ceylon and India. Riding is more in vogue. Horses are imported here at reasonable rates. They receive very little attention from their owners, and many are allowed to graze about at will. Sheep and cattle are reasonable in price. Sheep do not do so well, as they grow too fat for breeding purposes. Angora goat-farming has been instituted, but I have not ascertained if it has reached beyond the experimental stage. Pigs do very well in some places. They are found in a wild state, and they with a few kinds of fowl constitute all the sport. Fish is very plentiful—in the sea. The finny inhabitants of the Fijian waters are singularly sagacious, and, as a rule, give a clear berth to the baited hook. Some, of a small description, are caught in nets by women. It is a very curious sight to watch them on those expeditions. Some hold the net in a suitable spot, while others frighten the fish towards it, by approaching in a line, and making a peculiar sound by clapping the hands under water. Plantations are near enough to the sea, but Ceylon planters who may think of coming to Fiji need not entertain any fairy visions of fish. Fresh and very good meat is always to be got in Levuka, but such is not always the case in the outlying islands, where people are often obliged to be content with salt beef, which has the merit of being of good quality, however questionable its suitability in a salted state for the tropics.

The two principal districts in Fiji are the Rewa and Tavuni. The latter island I have seen, and it well deserves the appellation of the garden of Fiji. It rises in a very fine slope to a height of several thousand feet, and there is very little indeed of it upon which coffee would not grow. The coffee I saw was at an elevation of about 1,500 feet. It was free from leaf disease and in fine vigorous growth. The soil is a dark vegetable mould, almost peaty in appearance. It seems to suit the coffee plant admirably. It is of great depth, but, though this will give greater freedom to the tap-root, I do not see that soil for ages buried at this level can supply more vitality to the plant than any other kind of sub-soil. Owing to the volcanic origin of the soil, it absorbs the rain very rapidly, but there is certainly some wash. I think draining would be an advantage, but that is not the opinion entertained here. Coffee is found not to do at all well under shade. Belts for the wind are supposed to be a mistake too, and have been felled in some cases. I think, however, they should be as valuable here as they undoubtedly are in Travancore. I saw the effect on coffee of the very heavy gale that swept over these islands a few weeks ago. The coffee was two years old and unstaked. There were no leaves blown off, but a good many trees were shaken, which would have been prevented had they been staked. Land suitable for coffee costs about £3 per acre, but I think it can be bought cheaper inland. Eight and ten cwt the acre is not a fiction that distance fabricates, but sober fact. On well-kept coffee there is seldom any picking below the figures, and not

unrarely they are exceeded. There is a curious fact in connection with coffee leaf disease in Tavuni. A comparatively old estate, which had been neglected and allowed to grow weedy, is suffering from leaf disease. Very near, and in constant communication with it is a young estate. It has remained all along free from the disease. I have seen chincona succirubra plants growing a few feet above sea level. The growth seemed everything to be desired, but I fancy the analyses cannot turn out well at such a low elevation. There is, however, plenty of suitable high land. I also saw a few tea plants, and they seemed all right. One considerable item of estate expenditure is buildings. Only European carpenters can be obtained, and they receive 16s. per day. Timber also is costly. The South Sea Islanders seem to have no mechanical genius whatever, and the attempts of missionaries to teach them useful arts have failed. They are quick to pick up common duties, and, on the whole, seem to be as good workers as the Tamils. The Government is accused of being too hildly anxious for their well-being. Whether this be the case, is hard to say. No doubt, when Sir Arthur Gordon unfurled the British flag, very different laws to those of the old native Government were necessary to give every one the liberty of the British subject, and the old settlers must have felt the difference, and given an exaggerated importance to the subject. The labourers, being engaged by Government and guaranteed protection, no doubt fully avail themselves of the situation: more so, certainly than if the planters dealt directly with them. Superintendents—they are but “overseer chaps” down here—are, as a rule, boarded by the employer and receive salaries ranging from £6 to £15 per mensem; a few managers of large properties are paid better. These rates chiefly refer to sugar, which is as yet a much more important industry than coffee. I think the public of Fiji might with very good taste do away with the term overseer; there are so many disagreeable associations connected with the word. Any K. C. B. objecting to sit at table with artisans should not come to Fiji. It is a very democratic colony. The missionary work is chiefly in the hands of the Wesleyans. They, and the Roman Catholic missionaries in a less degree, stopped the horrible vice of cannibalism, and prepared the islands for the advent of the British settler. This fact should be an unanswerable argument to use with those who ridicule missions. The inter-insular trade of Fiji is carried on by a large mosquito fleet. There are a few pretty large steamboats and vessels engaged in it. There is communication once a month with Sydney, Melbourne and Auckland. The Sydney boat, rejoicing in the Indian name of “Ganga,” is a very fine large steamer.

SILK PRODUCING.

On Silk-producing, and other lepidopterous insects, by Alfred Wailly (Membre Lauréat de la Société d'Acclimatation de France), 110, Clapham Road, London, S. W. England.

The following paper on this subject will, we think, be found interesting to many:—

During several years, I have studied and reared many species of silk-producing Bombyces and other lepidoptera. My reports on this subject, have appeared in various numbers of the “Bulletin de la Société d'Acclimatation,” Paris; the “Journal of the Society of Arts,” and “the Entomologist,” London; “Isis,” Berlin; “The Scientific American,” New-York, &c.

Of the wild silk producers reared in Europe, I may mention: *Attacus Yama-Mai*, from Japan; *Attacus Perryi* and *Attacus Cynthia*, from North China; *Telea Polyphemus*, *Samia Cecropia*, *S. Promethea*, and others from the United States of North America; *Attacus Mylitta*, *Attacus Alas*, and *Actias Selene* from India.

The sending of living cocoons and pupæ (which I purchase every year) has always been successful from North America, but as this has not been the case with respect to live cocoons sent from India and South America, I shall make a few remarks on the sending of live cocoons and pupæ from India, and other distant countries to Europe.

The time for sending these living insects should be from about the beginning of October, till about the beginning of April, so that the cocoons should not be subjected to the heat during the whole time of the voyage to Europe. On the cases containing the cocoons and pupæ, there should be written in large letters: *Living cocoons* or *Pupæ of lepidoptera*, with request to keep them in the coolest places in the ship. The cocoons should be well packed in the straw, hay, moss, or anything that will deaden the shocks, to which the cases may be subjected in transit. Bare pupæ must be placed in bran, saw-dust, or soft moss, &c. All should be sent, as soon as possible, after their formation. Small quantities of cocoons pupæ should be sent by *sample post* in registered boxes, not exceeding eight ounces in weight for each box; the boxes must be strong, and it is best to tie a label to each box, and affix the stamps to the label.

Persons, living too far inland to send living pupæ, may send dead specimens of the perfect insects, butterflies, and moths. These should be in good condition, and placed with folded wings in paper envelopes. As it is well known, butterflies are caught with a gauze net, they should be killed immediately after they are captured, which can be done by carefully pinching the thorax of the insect when its wings are folded; or, as it must be done with moths, they should be placed in a bottle, containing cyanide of potassium, or some other poison. It is also important, when the dead insects have been put in a box, to add some poison to protect them from the attacks of mites, dermestes, beetles, ants, &c., as there are great many entomologists in Europe, who make a particular study of the larvæ of lepidoptera. I shall now pass to this subject.

To rear lepidoptera from the egg, the moths should be placed in cages (having muslin sides) for the inception, and the laying of eggs. Moisture should be maintained in the cage. When the ova have been obtained, they should be placed under a glass, with a small branch, or leaves, of the proper feed plants, so that the larvæ should find their food as soon as they are hatched.

When the larvæ (caterpillars) are small, I rear them under bell glasses, having a few holes on the dome. These glasses, which are of various sizes, according to the number of size of the larvæ, rest on saucers, full of sand, covered with a piece of paper. Small branches of the food plants are plunged through the paper into the sand, and kept fresh for several days, even without water. The glasses must, of course, be kept in the shade. Some species can be reared in this manner, till they turn into pupa (chrysalid state). With respect to the larvæ of the large Bombyces, after the first or second moult, it is best to rear them, without the glass covering, on branches (the longer the better) plunged in water; small twigs must be avoided.

The larvæ should be reared in the open air, but sufficiently protected from enemies, or in a well-ventilated room; also (and this is the best plan) on the living trees, protecting them from birds, &c.

Larvæ, which go into the ground to turn into the pupa state, should be reared in cages, containing a few inches of light soil; such cages must be used with larvæ, the habits of which are not known. An open box or case containing a few inches of soil is often all that is required. A branch of the food plant is plunged in a bottle containing water, and the

bottle is placed in the box. When a box has to be closed, air must be given by means of perforated zinc on the sides of it.

Larvæ can be found in almost unlimited number, on bushes, shrubs, trees, and low plants. Larvæ, which feed by night, can only be obtained in large numbers, by looking for them with a lantern at night.

Cocoons are found on the branches, on the trunks, or at the foot of trees; pupæ by digging at the roots of trees; others are found on the stems of grasses, on branches in the bushes, and on walls and fences.

To conclude, I may say, with regard to the sending of cocoons, pupæ, and also ova of Lepidoptera, that, with a little care, and especially, if they were given in charge of the captain, or some other person on boardship, they could be sent to Europe from distant countries, and arrive alive in good condition.

In 1864, salmon and trout ova, were safely sent from England to Australia and Tasmania, packed in a box, which was placed in the ice house of the S. "The Norfolk." In the same manner, silkworm ova, cocoons, and pupæ could be sent to Europe from very distant countries, and arrive in perfect condition. Alfred Wailly, 110, Clapham Road, London, S.W.—*Indian Daily News*.

CALIFORNIAN BEE CULTIVATION.

There is ground for supposing that there were no bees in the New World prior to the invasion of the European. The Indians agree that the busy little insect is never found far distant from the outskirts of civilisation, and there is a recorded tradition that the invasion of California by the backwoodsman was predicted by a warrior of the Gumas tribe, on discovering a bee-tree on the Gila River. As civilisation advanced, however, its pioneers soon learned to value the honey; and a race of hunters grew up, who made it their business to track the flight of the wild bees to their nests in old hollow trees, and then, by smoking the bees out, and cutting down the tree or its branch, with a hatchet, obtaining the combs, which were carried away in buckets and tubs. It is only in recent years, however, that anything like bee culture has been attempted; but so rapidly has the system extended, that it has now become quite an important industry, more than thirty-five millions of pounds of honey being annually produced and sold in America. The trade is principally carried on by large capitalists who have often from 2,500 to 5,000 swarms of bees, and even larger numbers, one firm having as many as 12,000. Perfect organisation is necessary for the management and care of the little workers. In the United States the bees are "farmed out," i.e., aparies of say a hundred swarms are placed in the grounds of farmers, the distance between each apiary being generally from three to four miles. The farmers receive either a fixed rent or a share of the honey for the accommodation. The bee-owner has a staff of skilled workmen who clean out the hives and remove the boxes of surplus honey as they are filled. In addition to these experienced bee-men, occupation is afforded for many other people in manufacturing the boxes in which the honey is transported to the different markets, one firm alone, we believe, finding employment for nine men and two steam saws during six weeks of the year in cutting up the timber for the 72,000 boxes which they require. The glass-makers also find some custom from the honey dealers, the slides and ends of the boxes being of glass. On an average one acre is estimated to support twenty-five swarms of bees, and the yield of a swarm is generally about 50 lb. of honey; so that the trade is evidently capable of yet further development. Much attention is paid to the improvement of the breed of bees, and, with characteristic ingenuity, the Americans have introduced many contrivances to save the time and labour, not only of the honey dealers, but of the bees themselves.—*Graphic*.

AN OLD PLANTER ON CEYLON PLANTING PROSPECTS

This mail brings us a letter from a Kadugaunawa and Walaha pioneer, whose communications were well-known in our columns in "Days of Old" under the sobriquet "Saxon." We quote from his communication as follows:—

"I am at present at Bath. It is a very beautiful city and neighbourhood, with a genial climate, but their spring, like everywhere else the cold east winds have been, is very trying. The weather is now fine and mild and spring may be said to have come at last. Farmers are having a hard time of it with such seasons. I am glad to hear a good crop is expected and that planters' prospects are looking up. It is always the way: people run from one extreme to the other. When I left Ceylon, planters were in high glee, and expecting great things. I must say they have been very extravagant and now that many have got to the end of their tether, they think it all up with them.

"I hope it will do many a great deal of good and make them more cautious when good times return, to take advantage of their opportunities and make hay while the sun shines. How many times before have hard times come on the planters, generally at the time least expected. There is nothing new in the present depression: it might have been expected, and there is no reason why good times should not again return, as they have always done before.

"Until you get two or three rattling good heavy monsoon rains, you will not get rid of leaf disease. All other remedies will prove useless and unavailing.

"The rain must come at the proper time. You should have a very heavy monsoon next May, if my observations be correct. Remember me to all old friends in Ceylon. I still read the *Observer* with great interest, and only wish I could return again to have another spell at planting and to stir up your degenerate Government."

SOUTH INDIAN TEA AWARDS.

The *South Indian Post* publishes the awards for South Indian teas at the Melbourne Exhibition and adds:—

The above must satisfy even the most sceptical that for excellence of quality, our South Indian teas stand unrivalled. The Nilgiri Tea Planter has, of recent years, been much disheartened at the low prices that have ruled in the English market for Indian teas. The depression has been variously accounted for. Indian produce was insignificant till very recently, and the overwhelming influence of the importers of China tea has been brought to bear, to drive it out of competition. The fall in price has been disastrous to many concerns within the past twelve months. Scores of tea gardens have been abandoned in the North. Quality not quantity has been the continuous cry from the brokers at home, and the reason for a demand of this nature is not far to seek. Systematically Indian teas have been used to mix with the inferior China article much to the detriment of the Indian tea industry. Fresh markets have, of course, been suggested as a remedy, and investors in Indian tea gardens have not been slow to discover and take advantage of such outlets as offered. The Melbourne Exhibition offered a capital opportunity for establishing a market in Australia, and the high awards for our tea must be most flattering to the fortunate planters who had been to the trouble of competing. Two of the Coonoor gardens—Brooklands and Glendale—have taken the first order of merit for their

Orange and Flowery Pekoes. We believe both these estates adopt the same processes of manufacture. For a sound bulky tea, the Kodanaad Estate takes a high place. This estate alone manufactures no less than four hundred thousand pounds of tea per annum. The sate factory results above will do more to push Indian tea in Australia than a year's advertising.

CURE FOR COFFEE GRUBS.

We very seldom forget a handwriting (any more than a face) we have once seen; but we are puzzled to identify the old colonist and probably contributor, who sends us the following "pencil notes" by last mail from the Highlands of Scotland. Certainly, his contribution to the "grub" discussion could not have arrived at a more seasonable time, for the evil is at this moment under the consideration of the Committee of the Planters' Association, and will probably form a topic of remark at the general meeting to be held early next month. "Grabbing" with the aid of pigs is surely worth a trial. Here is what our correspondent says:—

"Enclose, say, a quarter of an acre of badly grubbed coffee with upright stakes with wauatches interlaced sufficiently strong to prevent a pig breaking through: into this enclosure put 2 or more healthy hungry pigs with a bucket of water and sufficient poonac daily to keep the pudies in line merely, and let them hunt with their noses for the rest of the living—make them work for their grub in fact, and in a fortnight I would be surprised if there is a grub left in the enclosure—the drop-pings from the pigs will also in a great measure pay for outlay in poonac, and if a really well fed and educated "sandy" is wanted for the bungalow there he is! Thirty years ago—alas!—I remember a fearful epidemic of typhoid fever having set in, in a large set of coolie lines—the mortality was fearful. A medical man was engaged and stationed on the estate to watch progress. He at once ordered the coolies to be removed from the lines to the store, or any other available houses, and condemned the old lines to be burned. This was done and a site for a new set was looked for. This was fixed upon a very badly grubbed bit of coffee, as useless for further cultivation. I remember the appearance of the white dried stems and branches with just a leaf here and there to shew there was still life in the plant. Well the lines were built, coolies dwelt therein and once more the sound of song and tom-tom arose among the survivors of the unfortunate crew who dwelt in the old lines on the plantation. The coolies were allowed small patches for gardens, as the ground was considered worthless for coffee cultivation. They also kept pigs, and with the upturning of the earth, grub hunting, the plot was in a very short time like a newly ploughed field! In less than six months, tender young leaves began to come out on the dried branches, and in the following year they came out abundantly, looking as glossy, fresh, and green as any planter would like to see. Grand healthy trees took the place of the old dried ones, and up till 1862, when I saw them last, they were perfection, and bearing, I should say, 15 cwt. per acre, at least. Some will say that this occurred only in the immediate neighbourhood of the lines, but no; the improvement stretched for acres round, and was clearly traceable to the grubbing of the pigs. The experiment cannot cost much, and I hope it will be carried out with favourable results. Pigs, it is true, help themselves to coffee berries, but a wreath of the Longden thorn, or any other substitute, would prevent them from putting their noses where they were not wanted! Should the experiment be found a success, improved hurdles, such as they keep sheep in the turnip fields here, could be made at little expense."

COFFEE LEAF DISEASE AND MR. SCHROTTKY'S REMEDY.

LINDULA, 14th May.—Although it is a dull time of the year, our district is not entirely void of work interesting to coffee planters. I refer to the operations which are going on for the expulsion of our worst enemy, *leaf disease*. But is it necessary to name it? For it is ever in our thoughts, a source of continual anxiety and biting care.

Passing through Gleneagles on Friday morning, any one would have thought that snow had fallen in the night. A portion of the estate looked quite white. The cause of this was soon apparent, for along the lines of the coffee arose great puffs of smoke, as if our artillery had been brought up to extirpate the long suffering coolie.

On getting nearer, however, I saw that the coolies themselves were casting on the winds handfuls of pinkish white powder, so fine and light that the slightest breeze carried it along in rolling clouds, enveloping completely, trees, coolies, and superintendents. The effect on the trees was as if they had been snowed upon, every leaf being as covered with the powder as the lilacs and laurels along the Clapham road are with dust on the evening of the Derby day. The coolies looked like millers but seemed as jolly as sand boys, though the powder is annoying enough at first, and results, until one gets accustomed to it, in a pretty strong fit of sneezing.

This was the scene of Mr. Schrottky's process of vaporization, and whatever the ultimate effect may be in keeping away or checking the disease, the application is most thorough. Not only the leaves, but the branches, the stems of the coffee trees, and every inch of ground is covered with the impalpable powder, and the smell of it is all-pervading. (What chiefly recommends itself to me in this method is the simplicity and ease and *thoroughness* with which it performed, and I think Mr. Schrottky can be congratulated in having devised this practical form of applying carbolic acid to the trees as a cure against leaf disease. All authorities seem to agree in considering carbolic acid a specific for parasitic fungoid life, but the difficulty of applying it, seemed insurmountable, as no one ever thought of applying it but in a liquid form. It was a bright idea to incorporate it with a dry medium and use it as such an impalpable fine powder. The success of the application if success there be as I heartily hope, will be due entirely to this. I hear that 60 average coolies have yesterday gone over nearly 80 acres, and Mr. Schrottky hopes to finish the estate (about 200 acres) on this, the second day.

Mr. GRAHAM ANDERSON'S revelation of the views of the Java Government in reference to coffee leaf disease certainly astonishes us. Apart from the probability that the statement about a reward (which was certainly published in Batavia journals) was never officially communicated; was in fact a planter's or merchant's idea misconstrued—the wish being father to the thought: yet how can we reconcile the official answer that *hemileia vastatrix* in Java has never assumed a serious form, with the actual results of the present coffee season in Netherlands India? Is it not shown on the same official authority that we must go back to 1834 to get a coffee crop so small as that anticipated for this year from Java, and to what but leaf disease can this extraordinarily falling-off be attributed? The Java authorities would seem to be blinded to the fact, and yet, only last year, they proposed sending an expensive Commission to travel through Ceylon and India and report on *hemileia vastatrix*!

In the Brazilian province of Bahia the juice of a certain climber has been found to yield a wax from which excellent candles can be made and, from the resinous bark, candles are obtainable which rival spermaceti in whiteness and brilliancy of light.—*S. A. Journal*.

TEA IN CEYLON.—MR. Magor (partner in the well-known Calcutta House of Messrs. Williamson, Magor & Co.) has been on a short visit to Ceylon. He spent a fortnight in visiting the Yakkessa and Ambegamuwa tea districts, Dikoya, Dimbula and Hewaheta. He was much pleased and rather surprised to see our progress in tea and thought a great deal of our prospects where the tea was planted on fairly good land, but thought it was a mistake to plant on chena or old worn-out land.

SUN-STROKE AND DIET.—Dr F. T. Oswald writes as follows about sunstroke in the *Popular Science Monthly*, for April last:—"To abstain temporarily from animal food taking refrigerating diets such as vegetables, fruits, &c. counteracts the effects of a high atmospheric temperature, but the calorific influence of meat and fat, combined with solar heat and bodily exertion overcomes the organic power of resistance; the pyretic blood changes produce congestion of the brain and sometimes instant death. I venture the assertion that in 19 out of 20 cases of comatose sunstroke it will be found that the victims were persons who had gone to work in the hot sun after a meal of greasy viands. One to two p. m. is the sunstroke hour.

TEA AND TEA.—There are frequent complaints from "the Lane" as to the quality of the China tea sent over to this country. There is a marked deterioration even as compared with the inferior quality of some of last season's shipments. China tea of a kind has been sold as low as 2½d per lb., a price which we venture to think is sufficiently indicative of the kind of rubbish which now finds its way into the market. Indian tea, although prices are not encouraging to growers, is becoming more and more popular among consumers. Grocers are directing attention to it, and now it is the rule to see trade announcements in regard to blends of Indian and China, while not a few retailers sell pure Indian tea, and think that the exigencies of the times demand that they should announce the fact in large type.—*H. & C. Mail*.

MINING INDUSTRY.—No better method of developing on a large scale the mining resources of any country has yet been discovered than by the formation of public companies. The "Benighted" Presidency has been singularly fortunate in securing a large share of the confidence of London capitalists in respect of the Wynaad and Nilgiri gold regions, no less than sixteen Companies having been formed for the purpose of gold mining in the district of Devala alone. It will bring a great deal of foreign capital into that Presidency, and if gold quartz be turned out in a fair proportion of the mines in paying quantities, a new era will have commenced there, both for capital and labour.—*Times of India*.

YIELD OF RUBBER TREES.—The twelfth volume of the *Encyclopaedia Britannica* just published contains an article on "India-rubber," by Messrs. E. M. Holmes and T. Bolas. We shall give this ere long, but meanwhile we give the figures for yield of caoutchouc from different varieties of trees. Pará (*Hevea Brasiliensis*), yields 6 ounces in 3 days, the juice yielding generally 32 per cent of its weight as caoutchouc. For Ceará (*Manihot Glaziovii*) the yield is not given. Central American (*Castilloa elastica*): a tree 20 to 30 feet high to its first branches is expected to yield 20 gallons of milk, each gallon giving about 2 lb. rubber. Assam rubber (*Ficus elastica*): about 20 oz. milk collected in August gives 15 oz. caoutchouc, but the percentage is sometimes so low as 10 per cent. From February to April the milk is scantier but richer in

caoutchouc. Borneo rubber (*Urceola elastica*) yields sap in three years. Rangoon rubber (*Chavannesia esculenta*) yields 3½ lb. at 7 years. This is certainly very encouraging.

THE WAX PALM IN PERNAMBUCO.—The Camanba palm (*Copernicia chifera*) seems to be a much more important plant in some parts of Brazil than is generally supposed. In Pernambuco the plant is very abundant, and the uses to which it is put very numerous. The wood for instance, is used for roofing both as beams or rafters, and as laths upon which to support the tiles; the fruits are used for feeding cattle, and the leaves are used for making hats and mats. A valuable medicine is obtained from the roots, which has recently been brought to notice in this country. From the shoots or leaves a wax is obtained; for this purpose they are cut before they unfold, dried in the sun, powdered and boiled, the wax rising to the surface of the water. This wax, it is stated, is not produced in any thing like the quantity that it might be. It is shown, in a recent report of Her Majesty's Consul at Pernambuco, that the export of this wax during 1875-76 amounted to 18,668 kilos, valued at £778; in 1876-77 to 171,980 kilos valued at £6,957; in 1877-78 it fell to 89,482 kilos of the value of £3,168; and in 1878-79 to 1,542 kilos valued at only £61. By far the largest portion of this wax finds its way to this country. It is shown that the decrease during the last year was due to the famine and drought which so severely crippled all industry in the province. It is not a little remarkable that at the time when roasted date stones are proposed as a substitute for coffee, we should also learn that the stones or seeds of the Camanba palm, when roasted, are used in Pernambuco as coffee.—*Journal of the Society of Arts*.

THE DEGENERACY OF INDIAN CATTLE.—The *Indian Empire* remarks on this subject:—"If the inferior breed, we now find were indigenous to the country, it might have been useless to complain. But such is not the case. So far back as nearly seven centuries ago, Marco Polo, speaking of Bengal, which he evidently never visited, but wrote about from report, says:—"The people have oxen as tall as elephants, but not so big." At any rate, the *Ayeen Akhbarry* mentions that very beautiful white oxen of great size and capable of carrying a load of 15 maunds were to be found in Sharifabad, the modern district of Burdwan. Nor is the description in the *Ayeen Akhbarry* improbable or exaggerated. To this day especially the districts of Hissar and Hurriannah in Northern India are famous for the large size of their cows, which are sometimes used for draught purposes by the Commissariat Department, and are occasionally to be met with in the streets of Calcutta. Keeping in view the extremely varying conditions of soil and climate in Burdwan and those two districts of the North-West, we are decidedly of opinion that neither the soil nor the climate is responsible for the great deterioration in the present breed of cattle in the Lower Provinces. The first step that should be taken to prepare and smooth the way for a fair chance to the improvement of the present breed of cattle must obviously be to encourage the cultivation of green crops which will yield a supply of the most nutritious fodder. When this first step has been taken and generally adopted, it will then be possible to give a fair chance to the physical revival and fuller development of the present miserable breed. It will be time enough afterwards to attempt the improvement of it by crossing it with better and more vigorous stock, imported from other parts of India, and even from other countries in the world, which excel in the size, physical strength, and milk-producing capacity of their cattle. If only the economic value of this reform were once fully realised, it is probable that some earnest effort to bring it about would be undertaken. But it is not within the province of the Government to initiate such an enterprise, nor is it within the scanty means of the agricultural classes to undertake it. It lies with the zemindars to take the matter up.

SALE OF JAVA CINCHONA BARK.

In publishing the following Sales-return, it is necessary to remind our readers, that the prices realized are given in cents of a florin, which coin is equal to about 1s 8d sterling and therefore, practically, to our rupee. It must also be noted that the "half-kilo" is 1 1/10th lb. avoirdupois. It will thus be seen that no very wonderful prices were realized at the latest sale of Java bark, the very best being 398 cents for 1st quality officinalis stem bark, the equivalent of about 6s 1d per lb. Calisaya Schuhkraft sold for a better price than Ledgeriana; but of course none of Mr. Moens' carefully selected produce can have been offered on this occasion:—

On 11th March 1881 the following lots of Java cinchona bark were sold at Amsterdam:—

86 bales and 29 chests Java cinchona bark.

				Sold at cents per 1/2 kilo.	
6	b. C. Calisaya	Schuhkraft	stem bark 1 qual.	216	—
16	do	do	do 2 "	118	—
23	do	do	root bark	323	324
23	do	do	broken quill	246	—
4	do	do	twig bark	141	—
1	do	do	dust	231	233
8	do	do	Javanica stem bark 1 qual.	250	—
6	do	do	root "	147	—
1	do	do	twig "	161	—
7	do	do	dust	195	201
1	do	do	Hasskarliana stem bark 1 qual.	250	—
4	do	C. Succirubra	do do	251	—
1	do	do	root bark	147	—
3	do	do	dust	200	—
1	do	C. Officinalis	stem bark 1 qual.	398	—
1	do	do	root "	190	—
2	do	do	dust	251	—
1	do	C. Calisaya	Ledgeriana stem bark broken		
			thin quill	204	—
5	c.	do	Schuhkraft stem bk. long quill	144	—
1	do	do	do root bark	111	—
3	do	do	do do	181	—
5	do	do	do twig bark broken		
			quill and dust	108	—
48	do	do	do twig bark dust	89	—
	do	do	do do broken		
			quill and dust	98	118
2	do	do	do twig bark dust	89	—
			4 chests and 40 bales Tjomas.		
1	c.	Calisaya	Ledgeriana short quill No. 1	251	—
22	b.	do	do dust	200	—*
1	c.	do	Schuhkraft short quill No. 1	140	—*
1	do	do	do broken "	140	—*
1	do	do	do stem bark "	9	153
27	b.	do	do dust	91	—
			18 bales Java.		
4	b.	chips and dust		50	—
4	do	quill, dust and broken quill		120	—
6	do	chips and dust		45	—
4	do	quill		115	—

Those marked * were withdrawn.

COFFEE-PLANTING IN SOUTHERN INDIA AND CEYLON.

The following letter recently addressed to the editor of the Madras Mail is worth reproducing:—

COFFEE CULTURE IN INDIA.

SIR,—As I am about to invest in Coffee, I should be much obliged if any practical Coffee Planter would kindly give me, through the medium of your columns, the results of his experience on the following little points.

Often, in walking over estates of two hundred acres and upwards, you will observe single trees and little patches of coffee here and there, bearing at the rate

of ten cwt per acre, and in the case of the single trees often as high as at the rate of four tons per acre. On enquiry you will find that the average crop of the whole estate is under thirty tons. The expenditure you will be told is about two thousand pounds per annum, and with a shrewd guess you will know that your friend is receiving some five hundred pounds a year as interest on the money sunk in his estate, and considers himself rather a lucky man and worth (by his own valuation) some ten thousand pounds—the value of his two hundred acres of coffee. He will blandly tell you that coffee property is cheap at fifty pounds per acre. I am told that this would be a good estate. On the other hand you will often see gardens, of an acre or so in extent, about bungalows in towns where manure is easily got, bearing annually at the rate of one ton per acre. Now, what I want to know is whether I should buy a large estate, or whether I should buy fifty or sixty acres of the best jungle procurable, and having opened it out, begin with heavy manuring from say the second year of its growth. By heavy manuring, I mean sufficient to force it to give at least ten cwt per acre. As single trees on a large estate, without manure, will give ten cwt. per acre, I presume that by manuring sixty acres sufficiently heavily, at least thirty tons could be produced annually, and at a much cheaper price than it could be on an estate of two hundred acres, and of course with a great deal more profit. About manure not being procurable in sufficient quantity for the above system of cultivation, I am told that any quantity of bone dust and poonac meal can always be got on the Western Coast, and furthermore that these manures, if only on account of their easiness of application, are cheaper in the end than cattle manure is. CARACTACUS.

It has, of late years, been an admitted fact that it would be far better for coffee planters to have 100 or even 60 acres of really good land under coffee than 200 or 300 acres of indifferent quality. In the same way, certainly, better to cultivate the former area highly than to divide attention over twice or four times the area without capital or labour to do it justice. Sixty acres of coffee yielding 10, or let us say 8, cwt. per acre would be equal to a gross return of about R20,000 from the plantation, against which expenditure at the rate of R150 per acre would amount to R9,000, leaving a satisfactory annual profit. We have made a liberal allowance for expenditure, provided the plantation is not very badly off for labour and means of transport. In Ceylon, in many cases, expenditure has been reduced to R50 per acre without manuring, and R120 per acre is now considered here a liberal allowance even with high cultivation. Where labour is abundant and land freely available, the temptation is, of course, to go on felling and extending, one argument being that a European planter can look after 200 acres of coffee as easily as 60 acres; and another that in only most exceptional cases (in Ceylon) are the trees and soil now-a-days equal to yielding 8 cwt. per acre: 4 cwt. being more like the return even from liberal cultivation; and, therefore, a greater area must be counted on to make the investment worth the while of European planters. We feel sure, however, that the belief is becoming increasingly prevalent, that it would have been far better for most of the Ceylon planters had their motto been *Festina lente* in the extension of their plantations. Had the average area under coffee in the young districts been 100 instead of 200 acres per plantation, while the reserve forest was gradually planted with new products (tea and cinchona more especially), the position of the planters would be much stronger and

better to-day. Grub, leaf disease and other enemies would have been less prevalent; the capital outlay would have been much lower; and time would have been given to learn whether coffee, tea, or cinchona was the most suitable product to cultivate. We remember, in visiting the Dimbula district so far back as 1872, and hearing on all sides the boast of one man planting 300, 500, 700 or even 1,000 acres with coffee in one year, recalling the fact that in the "days of old," when work was more carefully done, a fifty acres clearing was considered enough for one planter in a season. However, we may take it for granted now, that the era is past when purchasers of blocks of forest-land in Ceylon of 200 and 300 acres used to enter forthwith into felling contracts for the whole to be cleared in one season, in order to be planted with coffee. The order of the day with our planters now is, for a would-be proprietor to plant gradually, 50 or at most 100 acres in a season and with a variety of products. Let our neighbours in Southern India who are not benefited or affected by the "gold fever," take a note and profit by the dearly-bought experience of their Ceylon brethren.

A LOW-COUNTRY TRIP THROUGH "TERRA INCOGNITA" :—RAKWANA TO BENTOTA.

For a good many years, we had been pressing on the Rakwana planters to explore the country westward between their mountain range and the sea, with reference to the question of Railway Extension as well as to the opening of new districts. We are much obliged to the gentlemen who at length undertook the journey, and more particularly to "H. W.," who has furnished us with the following very interesting notes. It will be seen that, while there is no great encouragement offered at present for a railway or for pioneer planters, yet that the picture is not all darkly shaded. There are resources for cattle-feeding, for developing a timber trade, for gemming, and even for Liberian coffee and cocoa planting from Kabaragala westwards, which shew how great a change might be effected by road or rail and the introduction of capital. We feel sure that the report now furnished on this line of country will not be thrown away, but that it will be the means of directing the attention both of the Government and the public to what has hitherto been an overlooked and neglected district.

FROM THE GONGALA RANGE TO THE SEA.

We had long meditated a trip from Rakwana to Bentota. A plan of the country to be crossed was obtained from the Surveyor General, but it was little more than a sketch, and, as it turned out, we found that only three Europeans were known to have crossed the dividing ridge between Kukulugama on the Kudugama, an affluent of the Kaluganga and the Bentota river. One of these was Dr. Thwaites who botanized in that country, and one a Government Agent of Ratnapura. It was veritably a *terra incognita* we were to explore. We could take no horses, and we had to trust a good deal to our good luck for food supply.

We started towards the end of February; it was a little late and the weather was showery, but a young moon promised its assistance as our journey progressed. Our party consisted of our two selves, an appu, fourteen coolies, and two Sinhalese guides. We called for the latter at the first village, where we found a harvest festival was being kept, the men all standing *en queue* two by two with hands joined and upraised before a temporary altar at which a young man officiated, intoning a service, and at the end of each sentence the villagers joined in with a vigorous "Hoch," which, if more than usually loud, elicited smiles of approbation.

The morning was far advanced before we felt that the distance covered warranted our stopping for breakfast, which we took at the foot of some giant bamboos on the banks of the stream we had followed all the morning. The stream here was broad and shady with deliciously cool looking pools that invited to bathe, and, while breakfast was being laid out, we had a swim and a change.

Our course so far had been a descending one, but we were now well away from the hills, and crossing the river entered upon a series of flats that succeeded one another with hardly a break to Kukulugama. These flats are narrow and border one or both sides of the river and are laid out as paddy fields or planted with minevi, which just now was young and of a bright-green colour. Sweet-potato plots also abounded, and these and the young minevi were carefully and very neatly palisaded. A few stiles would have been very useful, as our loaded coolies had frequently great difficulty in getting over the fence.

We halted at *Pennapella* for dinner at the Vel-Vidana's house. I may as well here remark that we had good and sometimes very good house accommodation all through our journey, stretchers and sometimes jakwood bedsteads and mattresses being at our disposal. We got a few snipe before dinner, which we took by the light of a kerosene lamp. An outhouse afforded space for the coolies' cooking operations, which were continued with great gusto, the rice being *ad libitum*, and only measured by their containing powers and the absence or happy presence of each article of curry-stuff being freely commented upon.

We carried our guns next morning, getting an occasional shot at a snipe, and breakfasted at the Muhandiram's bungalow at *Wedagala*—a new house and built on a strange-looking site high above the river. He explained that it was out of the way of the floods, which are the bane of this country. After this, we noticed that all the buildings were on elevations, and the alluvial deposits forming these strangely flat lands were now accounted for. What quantity of rain falls here in the twelve months is not known, but it must be very great, and leads to floods and famines, one of which is alluded to in an Administration Report of a former Government Agent of Ratnapura, as having caused the abandonment of thirteen (13) villages in the Kuku Korale.

At *Delgoda*, which by the foot-paths is 25 miles from Ratnapura, we stayed two days at the Ratamahameya's new bungalow which he gave up to our use. He was expecting the Assistant Government Agent from Ratnapura, then Mr. C. A. Murry, who came to Kukulugama partly to receive the paddy dues, but chiefly to see this part of his province.

We employed the time in ascending the *Wepanagala*, two miles from *Delgoda*, which is 2,350 ft. high, and from which we had a good view of the country. Chena everywhere, in the hollows and on the hills, nothing but chena: suggestive of a large population with an insatiable desire for burning huge areas. The population is really very small, the rainy season is a long one, and I tried, but failed, to account for the total absence of big jungle. Ten miles to the south ran the *Sinha Raja* forest, running from the *Morawak Korale* in an unbroken line westward for some fifteen miles, almost uninhabited and away from available water carriage: with this grand exception, the landscape presented to the view a rough broken country, all chenaed. It may be that the constant rainfall is prejudicial to the growth of the jungle trees. The *Ratamahameya* told us it was usually fine in January and February, and sometimes in December, but wet all the other nine months, and that the fields are frequently flooded.

The advent of the Government Agent at Kukulugama caused a general movement to that village. The

foot-path crosses a number of tributary streams to the main river: many of these are wide and deep and are crossed by edendas. To a nervous man the transit over some of these is very trying, but to loaded coolies it would almost seem an impossibility. Our Tamils declined to attempt to cross on the swinging bamboo with loads, and we had to get the villagers to carry the loads over, not without much delay. The path twice crosses the main stream, and ferry boats at both crossings were available, seemingly without charge.

Kukulugama is the largest village in that neighborhood, and we found a goodly assemblage had congregated to receive the Agent. Mr. Murray had ridden a portion of the distance from Ratnapura, but after leaving *Karawiti* the remaining seven miles had to be done on foot owing to the want of bridges. Since then, I believe that owing to Mr. Murray's representations something has been done to improve the road from Ratnapura, but a good deal must still be wanting. The roadway itself, as I understand, from *Agalavatta* in the Pasdun Korale to Ratnapura is well laid, chiefly an embankment, but bridges are required.

The poverty of the people was rendered very prominent by the price realized by the sale of the paddy rents—a few rupees. Sweet-potatoes are largely grown, but merely for local consumption. Gourds and beans of all kinds would grow well and are growing, but "It is not the custom of the people" was the reply, when we asked why they were not more cultivated. Tamarinds and limes were growing at *Kukulugama*. Fowls and eggs were scarce, and we were generally told to shoot the fowls as they could not be caught, the "custom" of the fowls being to roost in the trees round the huts.

It would be well if fairs could be instituted at the principal villages, say on the occasion of the paddy rent sale, and exhibitions of produce, accompanied by prizes, held. It must first be begun by the authorities, and later on the village headman would take a pride in keeping them up. Athletic sports and games of skill, say shooting matches, could also be held to unite all ages in desiring the recurrence of the fair day.

The true wealth of this district lies in its *cattle breeding* facilities. Nowhere have I seen such pictures of healthy cattle. Pasture-fed, as they necessarily are, they appear to be in prime order for the knife. But want of roads is the great drawback and enterprise is as usual wanting. I made frequent enquiries and I only heard one man say he had sold any cattle to the butcher.

Before leaving the *Kukulu Korale*, I will summarize my notes. The population is small and poor. The soil is very poor; some of it is flat alluvial land and might be suitable for tea and Liberian coffee. The climate is excessively wet, and I should say a very undesirable one for Europeans. The elevation of *Kukulugama* is 838 feet. The river there is about 60 to 80 feet broad, but navigation is hindered by falls lower down.

From *Kukulugama* we took the pilgrims' path and progressed southwards. Our way ran over a hill covered with jungle, a part of the *Sinha Raja* forest. The path was at first pretty good, was partly cut, and is kept in order by the villagers for the benefit of the pilgrims from Galle. The lower portion of the hill was, as usual, chenaed, but the top and further side were covered with large forest. We passed a small village—*Bambarabotuwa*, and shortly after topped the ridge, at about 1,200 feet. Here, and on the south face, was heavy jungle, all one kind, *hora*, the large leaves of which strewed the ground. The descent on the south side was painful, the path being a mere track over loose rock on very steep land.

The jungle was said to be infested with elephants. We

stopped for breakfast and lighted our fire near a newly cleared bit of land, surrounded with jungle. There was a small hut on the clearing which we approached to make some enquiries from two boys in charge. The hut was a mere shed and served as cover for cooking operations, while their true abode was a hut in a tree. I went up the ladder of about twenty feet and found a well-built room of ten feet square securely placed in the branches, out of reach of the elephants, of whom the natives appear to be much afraid.

The distance from *Kukulugama* to *Kalugala* is about (15) fifteen miles. With the exception of the *hora* jungle there is little to note—broken hilly lands chenaed with but few signs of present habitation. At *Kalugala* we entered on a new aspect: a large population, healthy and robust and enterprising; the houses were remarkably good, tile roofs, handsome verandahs with carved wood pillars and well-built whitewashed walls, presented an appearance which the interiors sustained. One bungalow contained a dining table sufficient to seat two dozen people, and there were chairs sufficient to accommodate all. The potato plots were large, one I noted as being about (3) three acres, and numerous coconut trees and fruit trees bespoke better soil and greater wealth.

The natives are chiefly engaged in timber cutting for the Colombo market. Water carriage is convenient, and some of the timber I saw was enormous. Whether much is left is a question. We saw but little, and could not learn of any as available; but it is possible we were purposely misled. To a canoeist, I cannot imagine a better country for a survey, deep streams running for miles in every direction, well supplied villages, and good lodging. From what I saw, I think it would well pay a man able to buy jungle land to make a trip up those waters in search of timber for the saw pit.

Gemming is carried on on that side, and we just missed meeting Mr. Symonds who had come up to superintend the survey of some gemming lots.

At *Hewisse*, I made a special trip to a piece of jungle, and I see my notes are:—alluvial soil, jungle trees of small size, with deep roots: top soil, sand and black loam for 12 in. deep: sub soil, yellow earth, sand and clay mixed—for 8 inches—in one hole 20 inches deep. Very suitable I thought for cocoa. I dug another hole, with similar result. There were no stones.

Apart from the water carriage, the means of transport are very defective. The edendas are better and more substantial than those in the *Kukulu Korale*, but the paths are worse. The ridge of the paddy fields formed the basis of the path in many places, changing with each crop, and at the best very treacherous. One well laden cooly slipped off the little ridge, and sticking manfully to his load would have disappeared, but for timely aid. In the wet season boats must be in great request, but they cannot supply the place of a road. A road from Colombo to Galle passes within a short distance of *Hewisse* and *Hattá*, and branches from that into the villages are required.

At *Hattá*, the *Bentota* river or *Gin-ganga* is 50 feet wide, very deep, and navigable for four miles farther up. Very suitable for a steam launch: the river having little current and there being no obstructions. We made the distance from *Hattá* to *Bentota* twenty miles. We were told that a road also existed to *Bentota* from *Hattá*, but it would appear to be in little use. Whether there is large jungle near the river was not made clear. We saw none, but the boat men spoke of one block as being not far away.

The journey to *Bentota* by boat was easily done in the day.

Looking back, the one thing noticeable was the want of means of communication. No roads, no bridges, rendered locomotion difficult and tedious.

From village to village, the direct road was merely a short cut, sometimes the rocky bed of a stream, impassable except in moderately fine weather. The constant wet produces a plentiful supply of sweet grasses, and the true wealth of the district should lie in cattle rearing. A little encouragement from the authorities by prizes being given once a year, and roads made to enable the cattle to be brought to market, would tend to develop this source of wealth so suited to the natives. The streams run in deep beds with abrupt steep banks. Fords are few and bridges are much required.

The population is small (the largest village being Hewisse with 523 inhabitants; Kukulugama may have 400); but probably enough to pay for the upkeep of the roads, after they have been made or put in order.

To sportsmen, Kukulugama in January would be a pleasant enough spot for a week's stay. There are elk, deer and peacock. If snipe and pigeons fail, the natives will allow of their fowls being shot! There must be lots of hares, and altogether I could fancy many a worse place for a visit. H. W.

CINCHONA CULTIVATION IN JAVA UNDER THE DIRECTION OF MR. MOENS.

It seems rather late in the day to publish Mr. Moens' Report on the Cinchona Gardens and experiments under his care, for the year 1879. Nevertheless it will be found that the information contained in the Annual Report for 1879 fully justifies its translation and publication in our columns at this time. There is no current source of information open to our cinchona planters of more interest than that afforded in Mr. Moens' Reports, and we need only attract attention to a few of the experiments made and discussed by him in order to shew their practical importance. For instance in reference to his favorite *Ledgeriana*,—the process of grafting which on *Succirubra* is specially referred to—we are told how difficult it is to get the tree to blossom (and consequently to seed) unless it has a long dry season. No wonder, therefore, though Mr. Moens when visiting Ceylon last year disapproved of the young and high districts between Great Western and Adam's Peak as a field for *Ledgeriana*. A lower and drier elevation will be required, and everything points to the Uva climate and soil as most likely to suit this richest of the quinine-yielding barks. The Madulsima Company and other proprietors who have already planted in the Principality are to be congratulated. So conscious are the former of the value of their cinchona enterprise that we learn they are to send out a trained analytical Chemist who will attend solely to their interests, reside on their properties, and no doubt carry on experiments similar to those in which Mr. Moens has led the way. To return to the Java Report, it will be observed that Mr. Moens had tackled the problem of growing a second set of cinchona trees on the same land. He pronounces it a very difficult task, but does not apparently despair of success if care and a little extra expense are given to the cultivation. The result will be awaited with interest in Ceylon. Again, Mr. Moens pronounces in favour of close planting, a point on which there is a considerable diversity of opinion among local planters. His careful statistics (compiled with all the accuracy of a chemist accustomed to

deal with minute particles and fractions) of the actual yield of bark from both *officinalis* and *Ledgeriana* trees of different ages, and grown under different specified circumstances, will be of permanent value and are very useful for comparison with the results obtained on our hills. To enable comparisons to be made, we may remind our planters again that the kilogram is equal to 2 1-5th lb. English, and a meter is about 1 1-10th yard. The cost of harvesting the bark by the new process of scraping is given, and Mr. Moens has satisfied himself that drying the shavings in the sun does not affect their quality prejudicially. The destruction of *Ledgeriana*—over ½ bouw (very nearly an acre) in extent through grub is an unusual experience. Has any one observed grub attack *cinchona* in Ceylon, or is it possible that some part of the mysterious dying-out of trees here may be attributable to this cause, no proper examination having taken place? It will be observed that the highest price secured for bark during the year under review was about the equivalent of 13s 9d per lb., and that this was paid for a case of shavings off *Ledgeriana* trees.

In the Report for the first quarter of the present year, it will be seen that Mr. Moens confirms the good opinion of the *Ledgeriana-succirubra* grafted trees, and this is really the special step in advance which Ceylon planters have next to practise; but how can this be done until the precious variety is made available here, our so-called "*Ledgerianas*" being tested analytically. Mr. Moens acknowledges that he profited in several ways by what he saw and learned during his trip through Ceylon and India, and we shall look forward with much interest to his special Report on the journey.

REPORT ON THE GOVERNMENT CINCHONA ENTERPRIZE IN JAVA FOR THE YEAR 1879.

By J. C. Bernelot Moens.

1. STATE OF WEATHER.

During 1879 the weather was very favorable for the plantations. The proper dry monsoon failed, for the rain continued steadily and it was seldom dry for more than a few days consecutively. The plants in consequence made on the whole satisfactory progress. On two places on the establishments situated to the south of Bandung—Tjinjirecan and Kawah-Tjiwidei—rain-gauges were placed by the meteorological observatory at Weltevreden, and the rainfall was measured daily. On Tankoeban-Præe this was considered to be unnecessary, as observations are already being taken there on the private cinchona garden Soekawana.

2. INCREASE.

The total number of plants standing in the open at the end of December was 1,678,670. Of these 44,100 were *Ledgeriana* cuttings and 310,970 *Ledgeriana* seedlings. In the nursery beds were 397,550 plants more, of which 7,460 were *Ledgeriana* cuttings. At the end of 1878 an abundance of excellent *Ledgeriana* seed was obtained, so that not only the nurseries of the Government enterprise but also those of private planters were fully supplied with plants of the best kinds. As was predicted in the former annual report, the first ripening of the *Ledgeriana* seed in 1879 was very late—in November and December. And the quantity was small, so that

the orders of private planters in Java could scarcely be executed, while to British India and Ceylon planters on this occasion no seed of this variety could be spared. The *Cinchona Ledgeriana* appears, more than the other kinds, to require a long dry season, in order afterwards, when the rain falls, to bring forth blossom in abundance, so that after the extremely dry year 1877 nearly every tree blossomed. After the unusually wet east monsoon of this year, there is the fear that now also again little blossom will appear,—and in that case that in 1880 also the fruit will not ripen before December. The planting of cuttings of *Ledgeriana* was continued steadily, but the success continues small, although attempts were made in many ways to introduce improvements into the mode of treating the cuttings. As the experiments made sometime ago—especially in 1876—to graft *Ledgeriana* on other varieties of cinchona were not crowned with such success as to lead to their continuance, this year another method of grafting was practised which has succeeded excellently and promises well. The *Ledgeriana* grafts are now grafted on *succirubra* stems of about a year old, or on good rooted cuttings of this variety, in the manner employed in Europe for the grafting of rhododendrons &c. The whole operation takes place in the forcing-houses, where plants remain until they have made a good growth. A portion of these grafts, about 2,600, have already been planted out, and they are now at the commencement growing very vigorously. The question is,—and it can only be settled by the experiment,—if the graft can continue to grow on the *succirubra* stem and then share in the advantage of the quick strong growth of the red cinchona, or if this cannot take place in the long run. In the latter case an experiment will be made of placing the grafts very low down on the *succirubra* stems, and then planting them so deep that the graft itself will have the chance of sending out roots and growing on its own account. The great advantage expected from this artificial propagation is, besides a quicker growth of the *Ledgeriana*s, the possibility of obtaining a number of plants from the best of the trees experimented on. The attempt to grow cuttings of these, though often made, never succeeded, while now about a thousand thriving grafts of these trees very luxuriantly developed are ready to be planted. Among these are *inter alia* about a hundred slips of the tree No. 67 which yielded 13·3 p. c. quinine. The layering of *Ledgeriana*s, formerly tried now and then with good results, has been carried out this year on a larger scale, and this method of propagation also succeeds excellently. The plantations of *C. officinalis* were extended only on the high-lying establishment Kawah-Tjiwidei: the newly opened gardens there continue very good. *C. succirubra* was planted especially where the soil or the lay was less suitable for other varieties of cinchona. The number of trees of this species was increased by 42,600. The decrease in the total number of plants in the open is due to the following circumstances. 80,000 plants of *C. officinalis* have been written off as worthless, as will be further mentioned in sec. 3. At Lembang and at Tjibitoeng old gardens of *C. Schuhkraft* were rooted out, which showed little sign of further growth, so that a replacement by *C. succirubra* appeared desirable. The uprooting will be continued during 1880. At Tjinjireoan, where, in fields planted for the second time, great mortality was experienced, it appears from an enumeration that from this cause the figure for the existing plants was put too high, and this number has therefore been proportionately diminished. The harvesting reduced the number by about 200,000 plants, mostly of badly developed trees of inferior varieties. Of the best kinds, *C. Ledgeriana* and *C. officinalis*, this year the harvesting has been chiefly by the taking off of strips and the cutting in slivers (scraping) of the bark,—and with *officinalis* also by the

partial stripping after McIvor's method. Only on Nagrak about 2,400 *officinalis* plants were uprooted from a field which needed thinning out.

3. EXTENSION; UPKEEP.

At Kendeng Patoeha another piece of ground of about 10 bouws in size was opened. The want of work-people hindered the completion, so that at the end of 1879 only 4 bouws were cleared for planting. At Rioen-Goenoeng also a piece of jungle land about two bouws in size was added to the existing plantation. On the newly opened land situated on the Malawar mountains to the north of Tjinjireoan, and now as a separate establishment bearing the name Tirtasari, a wooden house was erected as a temporary residence for the superintendent. The want of labour here also prevented the speedy carrying out of the preparation of the land, but still by degrees some bouws were cleared for planting, while good progress was made with the chief roads. As this establishment has hitherto been reserved exclusively for *C. Ledgeriana*, obtained from the original trees by artificial reproduction (cuttings, grafts and layerings) the further operations could be put off until a supply of labour offered. In November the first two bouws there were planted, half with cuttings, the other half with grafts. On the old establishments progress was made with the rooting out of the fields of inferior kinds, chiefly to make room for *Ledgeriana* seedlings. It has been found that cinchonas grow much less readily on ground which has already been planted with cinchona than upon fresh jungle land. The same is the experience with the coffee estates, and in the case of the Government coffee culture the result has been a system of cultivation whereby the old gardens are being constantly written off and allowed to revert into fields of alang-alang, glagah*, and lantana, and new forest is felled for the purpose of opening new gardens. Notwithstanding the great expense attendant on a first opening, the advantage to the enterprise apparently is greater—on account of better and quicker growth of the cinchona trees—if the old fields, as soon as the first planting is cropped, are regularly abandoned, new land being opened. However, it is not for a Government enterprise to set such an example, and it will therefore be endeavoured by an increased and rational culture of the soil, and by bestowing more pains upon the plants, to bring those lands which from time to time become of a less satisfactory condition into a flourishing state. Since it is thought more advantageous to cover these lands, planted for the second time, as quickly as possible with a close grove of trees, closer planting is adopted on these places,—at scarcely four feet apart in fact. After three to four years the gardens will need thinning out probably, and will even then yield, in the case of *Ledgeriana*, bark of some value. As, on account of the want of labor, there was not enough land at Kendeng Patoeha prepared for the *officinalis* plants, which were too big to remain longer in the nurseries, it was necessary to plant at only three feet apart. With this variety, which has a very slender stem and scarcely any side branches, there is every hope of a good result following on this plan. Here also in time thinning out will have to be considered. The chemical analyses of young *Ledgeriana* seedlings and *officinalis* plants of 3 to 4 years old also served for the collection of more data for the regulating, according to knowledge of ascertained facts, of the distance at which it is necessary to plant. A four year old *Ledgeriana* tree yielded on an average 0·26 kilogram of bark, so that four trees of this age are needed to give one kilogram of dry bark. The three year old *officinalis*

* *Saccharum spontaneum*: see Mr. W. Ferguson's Ceylon Grasses, No 139.—Tr.

trees gave per tree 0.088, the four year old 0.155 kilogram dry bark, so that 12 to 7 trees respectively would be necessary to produce 1 kilogram of bark. The trees on which these experiments were made stand at distances of 6 feet for *Ledgeriana* and 5 for *officinalis*, and are growing well. According to the analyses the average value of these barks was estimated at f6 and f4 per kilogram, according to the present market rate. Measurements were also taken in a flourishing garden at Tjibeureum of two year old trees planted at 5½ feet. The average height was 1.45 meter, the diameter of the top 1 meter, * while the circumference of the stem was 0.1 meter measured at 0.1 meter above the ground. Among 50 trees standing together, which served for the purpose of this measurement and will also serve for the continuation of these experiments, only two could be considered hybrids. The maximum given by one of these trees was a height of 1.9 meter, a diameter of the upper part of 1.4 meter, and a thickness of the stem circumference of 0.14 meter. The *Helopeltis Antonii* continued its attacks on the plants, though not to any great degree. The catching of these insects was carried on steadily. But when they appear here and there at the very highest tops of the *succirubra* trees where they cannot be reached they spread once more over the plants, and the extermination of these pests is most unlikely. At Rioen-Goenoeng half a bouw of *Ledgeriana* plants was entirely destroyed by the *koe-ock*, † the larva of a chafer, which had chosen the finer rootlets in this plantation for its food. In the young *succirubra* gardens at Lembang many caterpillars of *Daphnis hypothous* CRAM. ‡ were found, which were feeding on the leaves of this variety of cinchona but otherwise did no harm to the plants. As the *officinalis* gardens at Tjinjireoan, Tjibeureum and Rioen-Goenoeng—which were apparently opened at too low an elevation for this variety—were steadily getting worse, were continually damaged by the *Helopeltis*, and were gradually dying out entirely, it was resolved at the end of the year to write off the whole of the trees, to dig out what remains, and to use the land for other varieties.

4. HARVESTING OF BARK.

The crops of 1879 amounted to about 53,000 kilos, of which 51,000 kilos were destined for dispatch to Europe and 2,000 kilos for the medical service in [Netherlands] India. At the end of the year 36,134 kilos had been exported. The continuous rainy weather greatly hindered the drying of the bark, and this process went on only very slowly, as no complete appliances for artificial drying were available. The dispatch was attended with difficulties. So few laborers were to spare on the establishments that none of them could be taken to transport the packed bales and chests to the cinchona packing houses at Tjikalong and Tjihangoewang, and coolies were not had for months for that purpose. Since November the needed draft cattle also, for the transport carts, were not to be had, as they were required for the ploughing of the sawahs. On this account in the beginning of January there were still 16,900 kilos left in the packing-houses. The cinchona bark of 1878 was sold at Amsterdam in two batches, on the 30th April and 2nd July. The following prices per half kilo were realized:—

C. Calisaya	<i>Ledgeriana</i>	... f 6.31 ^a	... f 5.60
"	"	Javanica	... 1.38 ^b ... 1.33 ^c
"	"	Schuhkraft	... 1.20 ^b ... 0.98 ^d
"	"	Anglica	... 1.58 ...

* Apparently the diameter of the crown of the tree across the branches is meant.—ED. C. O.

† It is to be regretted that Mr. Moens does not give the scientific name of this insect: *koe-ock* (pronounced *kawak*) in Malay means a tiger-cat.—TR.

‡ Dr. Snellen van Vollenhoven has kindly identified insects useful or noxious to the cinchona culture only.

C. <i>officinalis</i>	... f 2.80 ^b	... f —
" <i>succirubra</i>	... 1.75 ^b	... 1.47 ^b
" <i>Haaskarlana</i>	... 1.23	... 0.83 ^d
" <i>Pahudiana</i>	... 1.10	... —
" <i>lancifolia</i>	... 1.57 ²	... 1.15
" <i>caloptera</i>	... 1.35 ^b	... —

The average price of the first batch was f1.774^b, that of the second f2.09^b, per half kilo. The highest price, f9 per half kilo, was paid for a chest of shavings of *Ledgeriana* bark, the produce of the experiment of cutting off only the outermost layer of bark from the living tree. The total amount realized was f197,417.23; the expenses of sale and dispatch were f17,716.30, so that the net result was f179,700.93. The experiments with the mossing system of McIvor were continued, and in 1879 1,129 *succirubra* and 716 *officinalis* trees at Tjibitoeng and Kawah-Tjiwidei were again treated by this method. For covering indjoek was chiefly used this time in place of moss, as it had already been found that this stuff succeeded quite as well, was more easily procurable, and allowed of a more rapid completion of the trees. Of the hundred *succirubra* trees which were treated in this manner in 1877 for the first time at Tjinjireoan and Tjibeureum not one has yet died. In 1878 the second strip was not taken from 18 of these trees, as the first had not completely renewed. In 1879 it appeared that on 12 trees the second strip had not completely renewed. The renewed bark of the first strip, which was thus two years old, was now taken off. In those parts where the renewing had succeeded well the bark was quite loose and was 6 to 8 millimeters thick. In many places however it was thinner and adhered closely to the stem. Altogether 160 Amst. lb. were obtained from this experiment. These trees have thus yielded:—

In 1877	240 A. lb.	original bark,
" 1878	280 " "	mossed original bark.
" 1879	160 " "	renewed bark.

On stripping for the third time the impression was created, that it would be better, in place of taking off the renewed bark in the third year of the experiment, in this manner, when it is two years old, to wait another year, and thus to give the tree a year's rest. According to information from British India the same result has been arrived at there. In 1878 at Tjinjireoan, Tjibeureum and Tjibitoeng together 1,000 trees were stripped according to McIvor's method, which yielded 1,252 A. lb. bark. At Tjibitoeng, on the removal of the second strips of original bark, the trees were carefully examined, and it was found that of the 454 trees, which were covered half with moss and half with indjoek, in the case of 274 the first strip had renewed completely, in 178 it was not entirely renewed, and in 2 it had entirely failed to renew. Of these trees 23 had been injured by the larva of *coleoptera*, and of these 28 had been covered with moss and 4 with indjoek. At Kendeng Patoeha (Kawah Tjiwidei) in 1878 50 *officinalis* trees were partially stripped. They then yielded 27 A. lb. bark. In 1879 the second strip was removed, and again 27 A. lb. bark were obtained. Seven trees had died, in ten the first strip had not renewed, and many had been injured by the larva of a chafer (*Eurytrachelus euryccephalus* BURM.) which, under the moss, bored through the stems. In 1879 2,316 trees were again operated on, which yielded 826 A. lb. dry bark. At Nagrak the experiment was made on C. Calisaya Schuhkraft. From the first stripping in 1878 70 A. lb. and from the second in 1879 65 A. lb. original bark were obtained. At the end of a year four of the trees were dead, and on 20 the bark had not entirely renewed. The expenses of mossing were made up in various ways, and depended chiefly on the greater or less difficulty of procuring moss and indjoek. They averaged, in the case of *succirubra*,

at the first stripping: for moss covering 15—24c. per tree, for indjoek covering 10—18c. per tree. At the second stripping 51—2c. was necessary, at the third about 11c. per tree. The indjoeking of the officialis trees at the first stripping cost 5c., the mossaing 6½c. per tree. On the whole the impression conveyed by this method of harvesting in the case of succirubra is not unfavourable, so far as the experiment has gone. The succirubras which have been three years under this treatment have as healthy an appearance as trees left intact, as in the case of those where the bark did not renew the bare patches of wood, which died on the surface, were for the most part covered by the outgrowth of the interjacent strips. That many of the officialis trees and several succirubras will be attacked by insects, was feared from the first. By covering with indjoek the evil will apparently undergo a diminution. The renewed bark is of very good quality and of a high commercial value. There are however some great drawbacks connected with the method. The material for covering, where the work is done on a large scale, is difficult to procure. The stock of moss in the immediate neighbourhood of the gardens is soon exhausted, and it has then to be sought longer and at a greater distance. Indjoek is also difficult to procure in quantity, and if it has to be brought from a distance it is expensive, has to be often fetched, and thus takes away too much labor. Private persons in British India are already making use of the straw of a species of grass, the fruit of which is eaten by the natives (coraly-grass), which is apparently *Cynosurus coracana*. On account of the scarcity of labour at present prevailing in the cinchona gardens it is with difficulty that men can be spared for the stripping and covering, which moreover requires the best men. The experiments of treating other varieties besides succirubra and officialis according to McIvor's system gave results which cannot justify their continuation, as the renewed barks were not much better than the original. Renewed officialis barks will for the first time be analyzed in 1880. The experiments with the method first begun in 1878, of cutting the bark in chips from the living tree, were continued in 1879. A year after the bark was cut from five experimental trees this was repeated for the second time. On the first occasion there was obtained from these trees about 0·52 kilo and on the second 0·41 kilo dry bark per tree, so that the bark had replaced itself to almost its original weight in one year's time. On these trees only half of the bark was cut from two sides of the stem, while the two other sides were left intact. Regarding the chemical investigations of these barks, which are very remarkable, information is given under sec. 8. Although the quantity was very satisfactory the quality left something to desire, and it will be advisable to give the barks somewhat longer—at least two years—rest. For this reason the larger experiment, with 60 trees, has not been continued this year but will be deferred till 1880. For the first time this method has been tried on 110 officialis trees, which yielded 95 A. lb. bark, on 121 succirubra trees, which gave 339 A. lb. bark, and on 459 Ledgerianas, from which 590 A. lb. dry bark was obtained. These barks were dispatched with the crops of 1879, for the purpose of ascertaining their commercial value. The officialis trees suffered apparently not in the least, the Ledgerianas somewhat more than formerly, and the succirubra trees looked very sickly for some weeks. Probably one reason of this is that whereas the former experiment with this method was made in the dry season the bark is now cut off at the beginning of the rainy season, it being supposed that the trees bear this treatment probably better in the period of rest than when the flow of sap is in full force. The injury is not per-

manent, for at the end of one to two months the appearance of the trees was perfectly fresh and healthy. The cost of scraping was: for succirubra 5 cents per tree or 1 ⁵/₁₀ cent per lb. bark, for Ledgeriana 2 ²/₁₀ cents per tree or 1 ⁷/₁₀ cent per lb. bark. The succirubra trees were scraped to a height of 3·8 meter, the Ledgerianas to 1·8 meter above the ground. The stems were not covered with moss or indjoek. The experience, that the replanting of a land where a cinchona plantation has been already cropped occasions such difficulties, makes it all the more important to find a method which permits the obtaining of a regular supply of bark without killing the trees themselves for that purpose. There was sold this year at Amsterdam on account of private parties 165 bales and 29 chests of cinchona bark, the produce of the lands Pamanoeakan and Tjiasem, Tjomas, Waspada and Lerep. The barks were analyzed for sale by Messrs. d'Ailly & Sons. The prices were in accordance with the qualities offered, and the yield of alkaloid satisfactory.

5. ESTABLISHMENT; MATERIAL; EXPENSES.

By the Government order of 15 Jan. 1879, No. 7, it was determined that the staff of the cinchona enterprise should be increased by an overseer of the second and one of the third class. In the previous order of 7 Nov. 1878, No. 4, the appointment of an assistant director was promised. These were accordingly fulfilled by the appointment of the controleur of the 1st class R. van Romunde as assistant director, by Government order of 22 June 1879, No. 2. By order of the Director of the Inland Affairs dated 26 Feb. 1879, No. 132, E. J. Veulemans was appointed to the office of overseer 2nd class, and A. A. Stauffenbeil Zijmers was appointed overseer 3rd class. There was no change in the rest of the European staff. The fixed native establishment comprised at the end of December: 1 cinchona mantri, 1 carpenter, 1 packing-house mandoer also postman, 14 mandoers, and 175 boedjangs. The obtaining of labour during the year was difficult in the extreme, and at the time of the paddy harvest most of the establishments lost a great part of even the fixed laborers, who could not only work to greater profit but found a more pleasant occupation, coupled with feasts and the association of acquaintances and friends. The establishment that suffered worst from this was Rioen-Goenoeng, which for months had to manage the upkeep of about 150 bouws with 11 fixed laborers and their wives. In November and December the people returned again, and several came to offer themselves to be taken on as boedjangs. The nursery-houses are in good condition. The great nursery-house at Tjinjiroean was specially adapted for the Ledgeriana grafts. At Nagrak a new nursery-house was completed, which gives every satisfaction. The expenses connected with the enterprise consisted of:—

	f.
Salaries of the European staff ...	25,375·00
Stationery	330·00
Travelling and halting expenses ...	2,187·69
Salaries of the fixed native staff ...	17,460·00
Pay of day laborers	10,506·04
Construction and repairs of tools ...	642·98
Transport and packing of bark ...	2,475·42
Do. of money and materials ...	62·75
Materials for the upkeep of nursery-houses and sheds	1,156·87
Daily requisites for the analytical laboratory	251·50
Servants for the laboratory	180·00

60,628·55^s

being 4,681·44^s less than was estimated in the budget of 1879.

6. DISTRIBUTION OF CINCHONA.

Ledgeriana seed was sent to a number of private persons, whilst officinalis and succirubra seed was also distributed in large quantity. From Ceylon there was also a request for lancifolia and Calisaya Javanica seed, which was supplied. But the endeavours of many Ceylon and British India planters to obtain Ledgeriana seed also could not this time be gratified, on account of the too limited supply. The native population are still as little inclined as ever to plant cinchona. Succirubra seed was applied for by the foresters of the jungle districts of Samarang, Bayelen, and Madioen. These officers wish to try and utilize this tree for the planting of portions of the woodless mountains of their districts. The applications were fully met. Twelve wardian cases were sent to Japan, containing officinalis, Ledgeriana, succirubra and Calisaya Schuhkraft (Josephiana) plants.

7. INFORMATION ON THE VARIETIES OF CINCHONA CULTIVATED IN JAVA.

As it was important, on account of the notorious proneness to hybridization of the varieties of cinchona, to obtain a more accurate knowledge of the mode of fertilization, particular attention was paid to this subject at the proper blossoming season of the cinchonas, which lasts from January to March. The cinchonas have heterostyle flowers, which are thus brought into mutual fertilization by insects. In most cases the corolla tube is pretty long, and the style often very short, so that, as a rule, only insects possessing a long proboscis can be of help in the fertilization. At the top of the inferior ovary, and thus at the foot of the style, is found a disc, which secretes honey, and the insects cannot get at the honey unless they penetrate the corolla tube with their proboscis, and in doing this bring the pollen of the mature stamens in contact with the pistil. But they also carry off a portion of the pollen on their proboscis from one flower to another, and so the fertilization takes place easily enough. Not only in the case of the insects to be mentioned afterwards, is the pollen found on all parts of the mouth, but on the drones (*Bombus rufipes*) it is met with in clusters on the metatarses of the hindlegs, and easily recognized under the microscope as cinchona pollen. The chief agent in the fertilization is the drone already mentioned, *Bombus rufipes*, LEPEL., which is found in millions in the cinchona plantations, attracted by the very strong odour of the cinchona blossoms, an odour which can be perceived at some distance. These hymenoptera are to be seen flying with eagerness from one cluster of blossoms to another and not omitting a single open flower: from each blossom they gather honey and increase their stock of pollen. If one stands in the midst of blossoming cinchona trees soon every sound is overpowered by the hum of the thousands of busy insects. Besides these drones there are several lepidoptera of the largest kinds which aid in the fertilization, notably *Papilio Priamus*, BOISD., *Ornithoptera criton*, FELD.; *Ornithoptera Pompejus*, CRAM., whilst some smaller ones are also met with, especially *Pieris Critheo*, BOISD., *Terias Hecabe*, L., and *Iphthyma Stellera*, ESCHSCHOLZ. These insects also appear in thousands in the gardens during the blossoming season, and the first three named, exceptionally large butterflies, are seen from early morning till evening near sunset flying regularly from flower to flower seeking their food. Now, as these insects fly also from one plantation to the next, from one variety of cinchona to another, it is evident that frequently pollen from the one variety is transferred to the other, and so often from seed hybrids are obtained: and also that in a year like 1878, when, after the preceding drought, almost all the Ledgeriana trees blossomed, the chance of hybridization is much

less,—as the insects can then keep more to the one variety of cinchona, and do not need to fly from one to the other,—than is the case when in each plantation only a few trees of the same variety come into flower at the same time. Among the plants from the seed of 1878 moreover there appeared much fewer hybrids than among those raised from seed obtained in other years. Experiments were tried purposely this year with artificial fertilization, and of these the following succeeded: micrantha × Calisaya Javanica, micrantha × Calisaya Schuhkraft (Josephiana), micrantha × officinalis, Pahudiana × Calisaya Schuhkraft, and succirubra × Calisaya Javanica. The fruits are not yet ripe: the seeds will be kept separate in order to gain further knowledge of the product of these crossings.

8. CHEMICAL ANALYSES.

The state of the weather was not favourable for the blossoming of the Ledgerianas. On this account also little bark from blossoming trees was analyzed—only the numbers 22, 71 and 72 refer to such analyses. The analyses 1—21 are of various portions of bark from the same tree. The analysis showed that in the case of these (now twelve years old,) Ledgerianas the bark over a great portion of the stem is very rich in quinine, and that only that from the upper portion of the tree and from the thinner branches is of less value. Perfectly inexplicable is the variation which was observed: that, for instance, the bark at a height of 5 meters was equally rich in quinine as at 1½ meter above the ground, while the portion lying between them contained less of that alkaloid. It was in accordance with previous experience that the root bark contained much more cinchonine than the stem bark, and it is noteworthy that quinidine, which is entirely wanting in the stem bark, was found only in this root bark. In order to have a basis of comparison for the Ledgeriana seed plants it was ascertained what was the yield of alkaloid from the intermixed bark obtained by cutting a strip of bark from ten two year old strong shoots of coppiced original Ledgerianas. The analysis is given under No. 48. As a second basis of comparison, use can be made in the investigation of the young twig bark under No. 21. In the examination of the Ledgeriana seedlings several important results were obtained. In the first place it appeared that the young trees followed as a rule the composition of the mother trees, so that for example when the latter contained quinidine the seedling also contained that alkaloid. In the second place, it was seen that it was possible to pick out the very worst, mostly hybrid sorts, for when this was done the analysis showed quinine-yield corresponding with the valuation based on the external appearance. If of seedlings of one same parent tree four types were taken, of which 1 was considered the best and 4 the worst, the analysis generally confirmed this. And lastly it was found that in general the quinine-yield for such young trees is very satisfactory, and gives the best hope for the future. The analyses 29—43, 49—69, and 73—80, refer to these young three to four year seedlings. Those distinguished by letters (A, B, C, &c.) were examined, partly as representatives of the Ledgeriana type, partly (-9—53) as types of large-leaved micrantha-like descendants, which, as was supposed, appear to be of little value. Very high figures for quinine were given by No. 32, 36, 37, 38, 41, 61, and 69. Of otherwise similar descent and exterior, those trees which had developed most gave the highest figure for alkaloid-yield. As was said in sec. 4, the five test trees which a year ago were scraped now again had the renewed bark taken off. For comparison of the difference in composition between the original bark and that renewed, after

scraping, in one year, they are here placed side by side :-

	No. 1 uncovered.		No. 2 with moss.		No. 3 with indrak.		No. 4 with moss.		No. 5 with moss.	
	Original bark.	Renewed bark.	Original.	Renewed.	Original.	Renewed.	Original.	Renewed.	Original.	Renewed.
Quinine	7.57	5.63	7.90	8.90	8.61	5.74	6.67	5.37	6.10	5.30
Cinchonidine	...	...	...	...	...	...	...	...	...	...
Quinine	...	...	...	...	...	...	...	...	...	...
Cinchonine	trace	0.88	trace	0.38	trace	0.70	0.42	0.47	0.23	0.41
Amorphous alkaloid	0.76	0.17	1.28	0.17	0.91	0.35	0.24	0.17	0.36	0.15
Total	8.32	6.18	9.18	8.55	9.52	6.79	7.33	6.01	6.69	5.66

It will be seen that there is a remarkable agreement in these renewed barks. No. 2 alone shows a difference, which cannot be explained. But if this tree is left out of the reckoning there is very little difference in the results of the four remaining analyses, although the yield of the original bark varied greatly, so that it appears that in this renewing, at the beginning at least, a bark of very uniform composition is formed, as regards the alkaloid yield. The formation of so much cinchonine in this young tissue is also peculiar—a peculiarity which is also noticed in renewed succirubra bark. No. 2 cannot owe its high quinine yield to the moss-covering, else the same influence would have operated in 4 and 5. The cutting off the bark in shavings from the living tree was, as an experiment, also tried on officinalis and succirubra trees. The analyses of these barks are given under 117 and 90 and 91. The examination of renewed succirubra bark was also continued, and no diminution was observed in the yield of quinine, which rather increases steadily. The renewed bark, No. 85, which was 26 months old, is certainly of very great value. The renewed bark of some other varieties of cinchona gave no remarkably good results. In the following table are placed side by side the analyses of the original, original mossed, and two-year renewed bark of the same trees :-

COMPOSITION.	C. Succirubra 1.			C. Pahudiana 2.			C. Hasskarliana 1.			C. Hasskarliana 2.			C. Micrantha 1.			C. Micrantha 2.			C. Calisaya Schubkraut.		
	Original.	Original mossed.	Renewed.	Original.	Original mossed.	Renewed.	Original.	Original mossed.	Renewed.	Original.	Original mossed.	Renewed.	Original.	Original mossed.	Renewed.	Original.	Original mossed.	Renewed one year old.	Original mossed.	Original.	Renewed one year old.
Quinine	0.67	1.06	2.75	1.12	1.56	1.15	1.42	1.96	1.16	1.95	1.95	1.42	1.96	1.16	1.10	1.95	1.16	1.95	1.95	1.95	1.95
Cinchonidine	2.86	2.90	0.81	0.57	0.86	...	0.31	0.77	...	2.04	0.38	0.26	0.77	...	2.23	0.60	...	1.10	1.10	1.10	1.10
Quinine	...	...	0.05	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Cinchonine	3.73	4.72	3.37	1.10	0.40	...	1.06	1.16	0.75	3.15	4.88	1.70	1.16	0.75	2.00	2.18	...	1.50	1.50	1.50	1.50
Amorphous alkaloid	0.70	0.52	0.84	1.05	2.03	1.72	0.41	0.40	0.41	1.16	0.26	0.41	0.40	0.79	0.05	0.11	0.05	0.66	0.66	0.66	0.66
Total	7.46	9.20	7.82	3.84	4.35	3.87	3.20	4.29	2.70	6.26	6.62	3.20	4.29	2.70	3.88	4.34	2.93	4.05	4.05	4.05	4.05

In succirubra there is usually some quinine formed in the renewed bark, but specially distinct is the formation of a large quantity of quinine and the diminution of a great deal of the cinchonidine, while the

yield of cinchona sometimes remains the same; though it usually somewhat increases. In the other barks there is an evident disposition to form more quinine and less cinchonidine, but the increase is not remarkable and is not complete enough to justify the application of McIvor's method on a large scale to these sorts. The barks which were rich in quinidine—Haskarlana 1 and Calisaya Schuhkraft—produced this alkaloid also in the renewing of the bark. The analyses of *C. officinalis*, *C. lancifolia* and *Calisaya Schuhkraft* will be concluded in 1880. The analyses 97 and 8 were carried out with a view to ascertain if such young officialis trees had already an appreciable value. The result is assuring. The experiment was made by choosing ten trees of different exterior and origin in a plantation, cutting from each two strips, mixing them, and analyzing. The wounds were covered with moss, and in two months they were all covered with new bark. It was found by previous experiments that bark cut in quills was not injured by being dried in the sun. But the question was whether bark cut in shavings (scraped) could also bear the drying in sunlight without a decrease taking place in the yield of alkaloid and especially of quinine. The analyses 23—28 and 90—91 were carried out to gain data for the answering of this question. The bark, cut from one stem, was divided into two equal parts and the one half dried in the sun the other over an oven. This experiment was tried three times with bark of different *Ledgeriana* trees and once with *succirabra*. The differences are on the whole so insignificant that there need be no fear of drying in the sun, even for these barks cut in shavings. The *Cinchona cordifolia*—No. 116 was analyzed in order to better determine the value of this kind. It belongs to the cinchonine producers, approaches in that respect to *C. micrantha*, from which, however, the variety differs greatly, and is of little value. This tree grows best in the lowest lying gardens at Lembang.

9. PREPARATION OF FEBRIFUGE ALKALOID.

In the analytical laboratory of the medical department, Weltevreden, by de Vrij's method so-called, out of 3,000 kilograms of dry bark 56 kilograms of quinetum were prepared—less than 50 per cent of the alkaloid that was present in the bark. With this quinetum, trials will be made in the different military hospitals. Analyses were made of different kinds of quinetum, the result of which is given below. Of these analyses the second was performed by Mr. J. Hekmeijer, principal of the analytical laboratory at Weltevreden.

COMPOSITION.	1	2	3	4
Insoluble in dilute hydrochloric acid	0.52	1.92	9.00	6.22
Water	4.30	0.80	6.00	3.80
Asu	3.00	0.80	2.20	2.10
Quinine	6.50	4.60	6.94	13.42
Cinchonidine	25.13	60.20	24.63	40.56
Cinchonine and quinonine	52.35	30.18	35.95	27.51
Amorphous alkaloid	7.12	0.42	9.92	4.80
Coloring matter and residuum	1.08	1.08	5.36	1.60

Quinetum No. 1 is that prepared in British India and sold by the Government there at 20 rupees per English pound. It is of a fine white colour, and has a peculiar sweet smell. It is packed in tin boxes holding $\frac{1}{2}$ an English pound, which are provided with directions for use in English and Hindustani. No. 2 was prepared at Weltevreden. It has the same appearance and smell as the Bengal, but is a little darker colored. No. 3 is a sample of the first quinetum prepared by Broughton in Madras and called by him amorphous quinine. It is a yellow stuff, sticky like resin, and looking like rhubarb powder,—on the whole a very impure preparation. Equally with the

samples 1 and 4 I owe this also to the kindness of Dr. King, superintendent of the Bengal cinchona gardens. No. 4 is quinetum of the manufacturer Whiffen in London. This had a gray-brown tint, smell of methyl-alcohol, and left a sandy residuum on solution in dilute hydrochloric acid. Besides these samples of quinetum another preparation was analyzed, produced by the same maker, under the name of quinetum sulphate. It has been tried in British India, and consists of

23.26	per cent sulphate of quinine,
51.40	cinchonidine.
24.30	cinchonine.

This has a very good appearance and greatly resembles the quinine sulphate of commerce, but with the microscope the larger crystals of cinchona sulphate can be detected. This preparation is apparently combined mechanically by the mixture of $\frac{1}{3}$ cinchonidine sulphate with $\frac{2}{3}$ quinine sulphate and an equal quantity of cinchonine sulphate. The quinetum of different preparations was also of very different composition. As the loss is so excessively great in the preparation by extraction with dilute hydrochloric or sulphuric acid (de Vrij's method), that about half of the alkaloids are as good as lost in the process, another method of preparation is to be adopted in Bengal, and at the same time a large proportion of the quinetum will be made into sulphate compounds, with a view to remove the amorphous alkaloids, which sometimes form $\frac{1}{2}$ of the whole, and to which disagreeable results are ascribed.

The Government cinchona gardens were visited during the course of this year by many cinchona planters from British India and Ceylon. Dr. King also, the director of the botanic gardens in Calcutta and superintendent of the cinchona gardens in British Sikkim, visited Java, chiefly with the object of inspecting the *Ledgeriana* gardens. By Government order of 5th Dec. 1879, No. 23, it was determined that the director of the Government cinchona enterprise in the Preanger Regencies should visit the principal cinchona gardens in British India in 1880.

[Since writing our preliminary remarks we find that Mr. Moens' Report is really dated January 1880: it was probably kept back by the Netherlands authorities from the public for some reason, while the Quarterly Statements are at once given.—Ed.]

REPORT ON THE GOVERNMENT CINCHONA ENTERPRIZE FOR THE FIRST QUARTER 1881.

The weather continued very rainy during the past quarter. At the end of January the Nagrak establishment was again visited by a severe storm, by which about 2,000 trees were destroyed. On the other establishments, at the same time, heavy gusts of wind were indeed experienced, but the plants suffered no damage worth mentioning from this cause. The plants are on the whole flourishing. In some parts of the gardens they suffered somewhat from excess of moisture. This was the case especially on the Lembang establishment. But now that the showers of rain are less heavy the trees are beginning to recover. The harvesting by partial stripping and by cutting in chips (scraping) of the bark was carried out during the rainy weather, and renewed three year old bark was also gathered. For the covering of the stripped trees use is now generally made of alang-alang and other local varieties its grasses, which so far do very well. The last batch of the crop of 1880 was sent to Batavia in February. The quantity intended for sale in the Netherlands amounts altogether to 109,080 Amsterdam lb. packed in 26 chests and 825 bales. This amount will probably

be sold in Amsterdam about July. For day laborers 2,719 was paid. The supply of labor was satisfactory. The *Lagerianas* grafted on *succirubras* are becoming exceptionally nardy. They have a different shape to plants grown from seed. The lowest branches of the grafts grow much more vigorously than those of seed plants, and the trees on this account assume a handsome pyramidal form. After they had stood for one year in the open the medium height was 0.88 meter, the diameter of the crown 0.60 meter, and the circumference of the stem 0.069 meter. They beat the cuttings planted at the same time in the same gardens, which had a mean height of 0.62 meter, a crown-diameter of 0.37 meter, and a stem-circumference of 0.04 meter. Since the catching of insects and the cutting off of branches where their eggs could be laid the *Helopthis Antoni* has not been noticed at Tertasari. The director of the cinchona enterprise returned to Batavia on 31 December from his journey to British India. His observations on the cinchona culture there will form the subject of a separate report. Various modifications in the method of cultivating plants, followed in British India, and which appeared of practical advantage, have been introduced by way of experiment into the cinchona establishments and so far succeed very well. The method of harvesting by which the bark is taken from the living tree in portions, the tree being preserved, will also be more generally practised; it was seen that the cinchona trees on the Nilgiris had borne this operation already for a long period without great harm. The chemical analyses which are being performed will be reported on in the next quarter. An analysis of some British India cinchona barks proved that barks of the same variety but from very different places of growth have the same yield of alkaloid. Of importance is the result of an analysis of *succirubra* bark renewed after scraping and two years old. The same alteration which results from the practice of McIvor's method of partial stripping, viz. increase of quinine and diminution of cinchonidine, was also observed in the case of this renewed bark.

J. C. BERNELOT MOENS,

Dir. Government Cinchona Enterprise.

Bandoeng, 4th April 1881.

The number of plants in the nurseries and in the open on 31st March is as follows:—*Nurseries*: 278,390 Ledg. (including 8,240 cuttings and grafts), 248,950 suc., 83,000 of.; *open*: 535,130 Ledg. (including 60,000 cuttings and grafts, but not counting the more or less 6,700 original *Lagerianas*), 601,100 Cal. and Hass., 495,990 suc. and calop., 410,520 of., 16,700 lanc., 260 micr.: total 2,670,040

of reducing the new products planted amongst coffee to their respective *acres*. I venture to suggest that, however unfair it may seem to retain the original acreage of the coffee, after it has been all, or part planted with cinchona, or cacao, it is even more unfair, and quite confusing to *reduce* it. *In fact*, it is not reduced. The productive power may be, and no doubt, in most cases, is reduced, but not the *acreage*. Moreover, the breadth of land actually planted with cacao or cinchona amongst coffee, is not *reducible* to an equivalent *acreage*. The case in which 100 acres of coffee is planted up between the rows with cacao or cinchona, is not represented statistically by *any* division of that acreage between the two! After you have assigned a proportion, say 70 acres for the coffee, and 30 for the other product, the *fact* remains that you have no such acreages at all, but 100 acres of *both combined*. However the tables may seem to be simplified by such a proportioning of the two, they are *in fact* complicated very much thereby; for it may and most probably will happen, that, in some cases, the 70 acres of coffee will disappear, and the 30 acres of cacao or cinchona will become 100 without the planting of a single additional plant. Some people are planting wide in order to retain *both* products in cultivation; whilst others are planting the new product *close* to take the place of and entirely supersede the coffee. Now, I foresee that future statistics of *production* will be seriously hampered by the system of *apportioning* the total acreage between the two; for it cannot be expected that the cacao or cinchona planted in the coffee, will yield precisely, or even nearly, as it would do if it occupied the ground alone. The produce returns, hereafter based on such a system, will be inconsistent and confusing.

"You will say, perhaps, that I ought not to criticize a system without being prepared to propose a better, but I think it quite fair. I hope you will think so—to point out the consequences likely to ensue upon your plan, even though no better were offered!

"I have not given sufficient attention to the subject; but, as far as I see at present, I think it would be better to have 3 columns instead of 2—one with coffee only; one coffee and cinchona or cacao; and a third with the number of growing trees of the new product. For example

	Coffee.	Coffee and cacao.	Cacao trees.	Total.
Estate ...	30	70	2,100	100
	acres	acres		acres

This would give the *actual* and unmistakable statistics. In the case of cinchona, I think that the additional figures which would be necessary to distinguish between the large and small descriptions, would be amply repaid, thus:—

Estate...	Acres coffee			Trees succi- &c. officinalis.	Total acres.
	coffee.	cinchona.	Trees succi- &c.		
40	60	36,000	90,000	100	

"I am sure that with your well-trained mind you cannot feel *satisfied* with the compromise of apportionment in the case of mixed products; nor with the "*allowances*" you have had to make for supposed failures in the case of cinchona and cacao. Against both these solutions of the difficulty your mind *must* have revolted. For, after all, the *acres* do not really represent in the one case, nor the allowance in the other, any true statistical data. As regards the latter difficulty, I should propose to class all plants, whether of cinchona or cacao, *under 6 months old*, along with *nurseries*; and take statistical account only of plants that have been out in the field over 6 months. By this means, failures may be put out of the question, because *supplies* are never counted. As these do but fill the vacated places of plants already taken into account, they are never afterwards added as new plant.

THE CEYLON HANDBOOK AND DIRECTORY FOR 1880-81:

ACREGAE UNDER OLD AND NEW PRODUCTS ON PLANTATIONS IN CEYLON.

THE LIBERTIAN COFFEE ENTERPRISE IN CEYLON.

Among the references to our Handbook of a kindly complimentary nature which we have received (and published, from time to time) are some of more than a mere passing interest to which we have too long delayed to refer. For instance, the Chairman of the Planters' Association has favoured us with some valuable criticism of the mode we ventured to adopt in estimating the area cultivated with new products on coffee plantations, as well as on other subjects. Mr. Wall, writing soon after the volume appeared, said:—

"I turn to account a few spare moments, before leaving the office, in a *friendly* criticism of your solution of the extremely difficult problem

"In this way, all 'intended' planting would, of course, be excluded; and the number of trees would be of those *fairly recognizable*. True, many of the cinchonas, and some few cacao, would fail *after* the 6 months; but, as the failures would be supplied, the statistical value of the record would be but little affected, as the percentage of failures *after* that age may be very fairly estimated.

"You will see that I wrote the first six pages of this letter before leaving home. In the meantime, I have thought well over the subject, and am satisfied that the suggestions are worth your consideration; though at this moment they are too late for your present issue.

"This idea, viz., that it is too late, deters me from making other suggestions, especially as they are comparatively unimportant, and your preliminary review is admirably good and complete *as it is*. But I add a few notes:—

"*Mixed* cultivation will, I believe, be henceforth rather the rule than the exception. There is a strong feeling now against great breadths of land being occupied by any single product; and there is a growing belief that the qualities of the soil may be more completely utilized by mixed products than by single. Hence, a strong reason why a good and satisfactory system of statistical record should be at once established.

"I feel confident that the *apportionment* of the acreage between the various products, by an imaginary division of the area occupied by both, will not answer in the long run. So satisfied am I, that I would most willingly confer with you, and give you any help you may think proper to accept, to make the record at once reliable and intelligible.

"You set down the failure of crop in 1871, our first *general* and serious disaster, to leaf disease! But it was not till 1872 and '73 that it became *general*, nor till 1875 that it was quite *universal*.

"A Quaker firm, who were much interested in Liberia, showed me samples of Liberian coffee in 1851; and they were classed with our very highest Ceylon marks; which, at that time, and for years afterwards, realized much higher prices than the ordinary run of estates in general. I mean such marks as I M P, D L B, K & G, C H C, Gonavy, &c. These fetched 20s more than ordinary marks. I was then the owner of K & G (Pallagolla), on the Ramboda pass, and I got 80s odd when Elkadua and other good plantation was worth only 60s. My Quaker friends were great coffee roasters. The reason I did not then bring this kind of coffee to Ceylon, was that the low-country was universally regarded as extremely unhealthy, and there was *abundance* of cheap land in the fine mountain regions; and very little inducement to extend *coffee* cultivation even there. Still, I well remember that these excellent judges classed Liberian (*when properly cured*) with our best Arabica kinds.

"A most important feature of Liberian coffee is *said* to be its fruiting again and again on the same eyes. The fact that Arabica fruits only *once* from the same eyes, is the reason why pruning is *imperative* and why the trees ultimately must become crippled. When I say that pruning is *imperative*, I mean that unless you *cut* off the exhausted twigs, they must die of their own accord; and when they die, it is always uncertain where the process of mortification, once begun, will stop. The fact, if it prove to be one, that Liberian will go on producing from the same eyes, will not merely be a saving of pruning to a great extent, and a preservation of the symmetrical framework of the trees, but it is a guarantee for longevity and permanence!

"The case of a tree that goes on producing fruit, must not be confounded with that of an *annual*, which has a separate *generation* every year. We are,

in fact, raising our new plants from the fruit, in many cases, of the identical trees from which most of the early plantations were raised. Nearly all the estates I have planted have been from Allacolla (Maturata) seed. The introduction of Blue Mountain seed offered very little encouragement; for the plants so raised were worse punished than any others by leaf disease! A *great many* of them are said to have *succumbed* outright!

"I think it is a mistake to say that the samples of our coffee have fallen off in quality: Ceylon finer marks still maintain their high character in *all respects*, price, outturn, and proportion of triage. Mr. Daendlicker (Volkarts) remarked, spontaneously, a few weeks ago, on the high quality of the produce, especially from the old estates and old districts. A short time ago, one of the leading merchants asserted that the quality had declined, and I forthwith challenged the opinion. Put to the proof by extensive comparisons of *Mil* accounts, he was obliged to give in; but maintained that the proportion of *triage* was greater. The comparison was therefore reserved and it was proved that there has been no such falling-off. Seasons make a difference, no doubt; but, on the whole, there is no proof of decline in quality, but the contrary.

"In the matter of precarious blossoming season, it should be remarked that *Liberian* seems able to blossom at almost any time, and in spite of almost any weather! Of course, we need more experience to confirm this idea, but it *seems*, so far, probable.

"It is quite illusory to set down *any* number of trees of cinchona as representing an acre. Almost *any* number, from 1,000 to 5,000 *might*, under certain conditions of species and circumstance: but none actually *does* so statistically.

"The principal factor in the calculation of the future prospect of cinchona, in my opinion, is the relative future values of quinine and quininetum. The very best authorities (though I did not know Howard was amongst them till I read your paragraph) agree, that the alkaloids are as efficacious and as valuable as quinine! King appears to have *proved* it. Dr. Trimen remarked to me one day lately that nothing but *fashion* and prestige kept quinine in the position it has hitherto held! Recent advices from home show that the value of the other quinoid alkalies is becoming rapidly recognized. Well, then if this be so, what will be the future position of the hardy *succirubra* with its high percentage of alkaloids, as compared with the less robust kinds, that produce *less* alkaloid, but more quinine? The prospect of a febrifuge for the *million* is grand for humanity, but the degradation of quinine proper to the level of quininetum as an article of commerce, will seriously disturb calculations based on existing relative values!!

"When I said that I did not know Howard as an authority; I meant, of course, as one who recognized the value of the other alkaloids. Everyone knows Howard as one of the very highest authorities on this subject, but I had an impression that he held the relatively high estimate of quinine over all the other alkaloids."

On the other hand, here is Dr. Trimen in the Report just published warning planters against *succirubra* and other poor yielders of quinine, and advocating, above all, the cultivation of the rich *Ledgeriana*. So far as the market at present goes, the worthy Director is, of course right; but, the question of what grows best in our climate and soil must be considered, and, as we have said in our Handbook, and as Mr. Wall points out, we may possibly ere long see a revolution in the market, and the inferior but cheaper alkaloids more sought after than quinine.

As regards our apportionment of the area planted

with different products, the arrangement in the present Directory is confessedly an *ad interim* one, and we had fully determined another year to give fuller details and in a more convenient form or somewhat as follows:—

ACREAGE :

Total.	Cultivated.			
	Coffee.	Tea.	Cinchona or Cacao.	Other Products.

It is, of course, impossible to give separate columns for all the minor products—an ever-increasing family—with which our planters are experimenting, and it is equally impossible to expect to attain perfection in any work such as that under review; but it is certainly satisfactory to feel that the Chairman of the Association is not alone when in a second and later letter he is good enough to say:—

“The division of the work into two volumes is an immense improvement. The Directory, in constant use for reference, is far handier in its separate form, and that immense mass of information which you have accumulated on all the most important subjects affecting the agriculture, commerce, and social condition of the Colony, is much more conveniently studied in its present form. It is, in fact, an ample volume of itself, and of incalculable value to people interested in the island and its enterprise and progress.”

CHLORATE OF POTASH has become so thoroughly popular as a medicine that it is not amiss to remember that it cannot be employed recklessly, at all events for children, since the use of it has caused death. In one instance a boy of three years was given 180 grains in thirty-six hours and died at the end of ten days, with symptoms which indicated an abuse of the remedy.—*New York Hour.*

CINCHONA.—The Conservator of Forests will be desired to forward direct to Mr. Thomson, formerly of Jamaica but now of Bogota, an adequate supply of seed of the fine kind of “cinchona officinalis” which grows on the Nilgiris. On receipt of intimation by Government of its despatch, the Secretary of State will be informed accordingly, in view to Sir Joseph Hooker’s services being enlisted for obtaining plants of the “China cuprea.”—*Madras Standard.*

A NEW SUBSTITUTE FOR TEA OR COFFEE.—The following is an extract from the *Grocer*:—Mr. William Taylor, commission agent, York-street, Glasgow, has been appointed agent for “Teako,” which is described as “a new substitute for tea or coffee.” We should be glad to know of what this new substance is composed. The result of a chemical analysis of it should be published: it would no doubt prove interesting, and perhaps surprising.

A LONDON TEA AGENCY FOR CEYLON.—Mr. Turing Mackenzie’s suggestion for a meeting of Ceylon tea-planters as a preliminary to united action for the establishment of a West End Tea Agency is well deserving of attention. Such a meeting would be the first step towards the establishment of a Ceylon Tea Syndicate. Perhaps, it will be well to wait now for the return of the Ceylon Commissioner to get the benefit of his experience and counsel. We have no doubt, that Sir Wm. Gregory and other home friends of Ceylon would give the movement all the support in their power.

Correspondence.

To the Editor of the Ceylon Observer.

A LONDON TEA-ROOM AND AGENCY FOR CEYLON TEA.

Maskeliya, 16th May 1881.

DEAR SIR,—I was afraid that my proposal to establish in London a tea-room and agency had quite fallen to the ground. I see, however, that Sir Wm. Gregory comments favourably on my letter: and as you yourself have taken the matter up I begin to hope that something may yet come of it.

I feel convinced that such an establishment would be the best advertisement that our tea planters could have; and as a considerable portion of our planting community is now interested in tea, it would only seem natural for the Planters’ Association to move in the matter.

Want of funds, of course, would be the serious difficulty; but surely the numerous gentlemen now engaged in tea-planting could, if united, command sufficient influence to start a Company for the purpose of establishing a tea-room and agency in London, with a view to stimulating a demand for our teas.

It may be said by some that we have no tea, should a large demand arise, and what is the use of creating a demand before we have the supply to meet it? But if we wait to create a demand until we have a large stock of tea, the market will be glutted, and prices ruinously low. Clearly, therefore, the sooner a start is made the better.

Apart from the benefit of the tea-room as an advertisement, the agency would be most advantageous to planters, who by shipping direct could realize a decent profit themselves, while they could put their tea in the market cheaper than if they went through the brokers’ hands—in fact, the planter would sell at a low retail price, and the consumer would get a good genuine article at a cheap figure.

The General Meeting of the Planters’ Association is close at hand: could not the tea planters contrive to meet and discuss this question?—Yours faithfully,

W. TURING MACKENZIE.

GRUB.—I see Mr. W. Smith is tackling the grub again. Did anybody think patana had anything to do with breeding or harbouring them? Perhaps the richest fields of young coffee I ever saw were on the flat lands in Rakwana, and they were always killed out in a few years by grub 40 miles from any patna. All flat lands on the south side of the island have been liable to it. Did ever anybody see damage done on steep lands?—*Old Planter.*

MADAGASCAR PADDY.—Mr. Robertson, of the Government farms, Madras, submitted lately to the Board of Revenue a report on the experimental cultivation of Madagascar paddy which he considers the home of the Carolina species. The product of the experimental cultivation of this variety of rice appears to the Board of Revenue to be of superior quality, and if Mr. Robertson’s present opinion, the it thrives with a quantity of water less than the indigenous varieties, should be confirmed by further experience, the result should be of great value to localities where the rainfall is scanty and water not always abundant. The samples received by the Board will be forwarded to the Chamber of Commerce, whose opinion the Government would be glad of both as to the article itself and upon the suggestion to send the grain and rice to London for valuation. 48 lb. of seed sown on the 20th September ’80 yielded on 2nd February ’81 1,483 lb. grain, and 2,436 lb. straw.—*Madras Standard.*

THE PROSPECTS OF INDIAN TEA.

The days are passed when tea planters hoped to make a fortune in a few years. There are mainly two reasons for this. Firstly, the prices of tea have fallen greatly, in many cases 30 and 40 per cent. This is due to the fact that supply, in the case of Indian tea, has overtaken demand. Still, there is some comfort to all interested in the industry to be derived from the low prices which have ruled during the last two years. So cheap have Indian teas been that the attention of the trade has thereby been directed to them, and consequently the deliveries of the last few months have exceeded any known previously. It is calculated by those best able to judge, that if the present rate of deliveries in London continues, the stock in June next will not exceed 12 million pounds, and the truth is, strange as it may appear, that below this point it is not well that the stock in hand should fall, because, if it does, dealers will not be able to meet their requirements, and will then perforce buy more China. There is another point which should give comfort and hope to the Indian planter, in spite of the fact that we are heavily handicapped in our race with China inasmuch as owing to more expensive labour our cost of production *must* exceed theirs. This source of hope is the great point now generally admitted, that Indian tea is better and goes further than China Tea. The experience of each of us can quote instances of individuals dropping China tea and taking to India: who knows of any one doing the reverse? We admit the taste for Indian tea is more or less an acquired one. Still, the public at home have already been educated to the taste by the yearly increasing proportion of Indian mixed with China tea. Speaking generally (though the exceptions are many and increase yearly), it is true that Indian tea is not obtainable pure, but no more is China. The bulk of the tea now sold to the public in the United Kingdom is a mixture, three parts China and one Indian, and all points to the fact that in a few more years the general mixture will be half-and-half.

We are thus surely paving the way, in other words, teaching the English public, to like Indian tea, and the broad fact that, once used, it is never abandoned for its rival, is surely a very hopeful feature. The truth is that were it possible to *make* the population of England, Australia and America drink Indian tea for one week only, the demand after that week would be enormous, and we should hear no more of "supply exceeding demand;" nay more, many thousands of acres would at once be added to the present cultivation in India.

But we have somewhat wandered from the question we set out with, *viz.*, *why* tea does not pay now as it once did. The first reason we have given; the second is that there is now no market for tea seeds. This last reason is little dwelt on, but it is a very important factor. The days were when R300 per month, and even more, was paid for tea-seed, and though this did not last long the price for many years up to 1878, was about R100. Now it is simply unsaleable. The receipts for tea-seed, during all these years, formed a large part of mature garden earnings, and, to quote one instance, thereto in a great measure were due the big dividends paid by the Assam Company.

But though tea prices may, and we think will, improve, it is not likely we shall ever again see the rates obtainable formerly. This being so, it is probable that only those plantations in the future will pay that produce tea cheaply. How is this to be done? Those gardens that are heavily weighted by unsuitable climates, by a bad class of plant, by slopes which are too steep, by inordinately expensive la-

bour, or other causes, will have a hard time of it, but plantations with natural advantages need in no way despair; though, as we said above, we cannot, in the matter of cheap labour, vie with China, we have a great advantage over the Flowery land as regards economy of production in another respect. We allude to the use of machinery, which does much now, and will do more and more as each year passes, to reduce the cost of production. Machinery in the manufacture of tea is, we believe, almost unknown in China. There each and every operation is performed by hand; here in India, many now do, and eventually all will, wither, roll, fire and sort by the help of machines. It says not a little for the enterprise and the inventive genius of the Anglo-Saxon race that, while in China the manufacture of tea dates back many centuries, and yet all the tea is still made by hand, we in India, who have only planted tea some 40 years, have invented machines and use them to-day for each and every operation in manufacture. It is but as yesterday that we imported Chinamen to teach us the *modus operandi*. We now know far more than they do on the subject, and, verily the pupil has beaten his master.

Though machinery reduces the cost of production, and in more than one case improves the quality of tea, and planters know it, the difficulty before them to-day is to know which is the best machine for each operation. Unanimity on this point is not to be expected yet. One swears by Jackson, another by Kinmond, others by Ansell, Barry, Lyle, the inventor of the Sirrocco, and so on. The machines and names of inventors are many, and each has its disciples. Perhaps the most favourite rolling machines are Jackson's and Kinmond's. But we see the latter has just produced what he calls a "Centrifugal Rolling Machine" which he thinks will supersede all others. We have not seen it, though it is at work on several gardens, and so can give no opinion about it; but another of Kinmond's machines, his Dryer, we know well. It was long a moot point if tea could be efficiently fired by any other agent than charcoal. Many affirmed that the fumes of charcoal were necessary, and when, years ago, Colonel Money, so well known by his writings in tea matters, affirmed from experiments that charcoal was not necessary, but that any fuel would do the work, few believed him, for people said it was impossible to credit that the Chinese would have gone on using charcoal (so much more expensive than other fuel) for centuries, were it not a necessity. What Colonel Money then predicted has already come to pass. Much of the tea now produced in India never sees charcoal at all, and it is very certain that in two or three years all Indian tea will be fired by machinery. We say this is certain, simply, because, apart from the saving effected by using other fuel, the value of teas fired by machinery is increased. It is natural it should be so, because by the use of the best machines invented for that purpose, the heat can be regulated to a nicety, an impossibility by the old mode of charcoal firing.

Kinmond's Dryer is, in our opinion, the best tea-dryer machine yet invented. Space forbids our describing it minutely (besides only those, and they are few, who understand tea machinery would appreciate our description), but its general features we will shortly touch on. In the comparatively small space it occupies in a factory, and in the large quantity of work it does in a given time, we think it unrivalled. This last feature does away with the necessity of night-work, which, apart from other drawbacks, is prejudicial to the excellence of tea, because, among other reasons, its color cannot then be appreciated in its several stages. Tea made at night is never very good. With sufficient motive power, sufficient rolling machinery, and Kinmond's dryers, the factory, let the leaf gathered be what it may, can be shut

up at dark. Kinmond's dryer may yet be improved upon by himself or by others, but as it now stands, it possesses a feature peculiar to itself, and all-important. The hot air, driven by a fan (the speed of which, under control, regulates the temperature), does not pass successively through the different trays, for the hot air, drying the tea in each tray, has a separate inlet and outlet. By this means is avoided the objection of carrying the moisture absorbed by the hot air from one tray to the other. Another peculiarity in the machine is, that the same air is used again and again, being re-dried and re-heated each time. By this two advantages are obtained: 1, fuel is saved; it is easier to heat air which still retains caloric, than fresh air: 2, the aroma of tea is very volatile, and when hot air, which dries it, passes away, some of the essence and strength of the tea goes with it. But here the same air being used again and again, the volatile essence (how much who can say,) is returned to the tea. It is reasonable to suppose that this will increase the value of the tea; indeed, we know it did so materially in one garden last season.

We do not doubt that the unanimity wanting at present amongst planters as regards machinery, will more or less come with time, but only long experience can settle the merits of rival machinery. One thing, however, is very certain, if the exports of Indian tea ever vie in quantity with China, it will be due to the use of machinery in manufacture. *Friend of India.*

JAMAICA.

The Governors of the Jamaica Institute have offered a prize of £20 for the best Essay on the fibre produced from either the Penguin, Banana, Rhea or China-grass, Aloe or other Island plants susceptible of cultivation in sufficient quantities to form the basis of a sustained industry. Also a prize of £15 for best samples, not less than 112 lb. (avoir.) of clean marketable fibre produced in the island from either of the aforementioned plants.

Mr. W. Bancroft Esquent lectured in the City Hall on Tuesday evening last. His subject was "The Timbers of the Island." The audience was a very respectable one, and the attendance was good. The chair was occupied by His Lordship the Bishop. The Lecturer spoke in terms of praise of the qualities of native lumber, preferring it to foreign. He described the saw mills at Chepstowe, and showed specimens of Jamaica shingles, barrel staves and coconut plank out of which he got beautiful panels made for his house. He spoke in reference to pimento trees showing that pimento walks did not as is generally supposed, owe their formation to accident alone. He also produced two specimens of pimento trees grown at the Botanical Gardens by Mr. Morris.—*Gall's News Letter.*

NEW PRODUCTS: LOW-COUNTRY REPORT.

WEATHER AND DRAINAGE—LIBERIAN COFFEE AND CRICKETS—CACAO—BAMBU FENCE.

Western Province, 12th May 1881.

April has been a wet month here. Indeed, from 17th March, when the dry season may be said to have closed, we have had no lack of moisture, and would very willingly have spared a moiety of our portion had we been the disposing parties, for we have had more than a pleasant dispensation of all the elements of storm, except frost, snow, and hail.

I have been chiefly employed in trying to perfect a drainage system to save in some measure the awful wash that comes of awful rains, but I am sorry to say my success has only been partial. I can only look on in despair when I see a drain four feet deep

and five feet wide silted up and running over when ten minutes' rain fills an escaped drain four feet wide to the depth of eighteen inches.

Of the Liberian coffee seed I have put down since the beginning of the year, less than ten per cent failed to germinate, but I have lost perhaps as much as five per cent, by the crickets. I am therefore hastening to transplant them into baskets, where alone they are safe, for several months at this stage. Of course they are again exposed to this enemy when put out in the field. Last season, it was towards the end of November when they disappeared absolutely, during three months, the very first plant cut being discovered on the 1st of March. During March and April, their ravages continued to increase, and only during the last fortnight: have they fallen off, from the havoc they were previously carrying on. I was however warned a week ago not to congratulate myself too soon. One part of the field had not been touched when this month began, but now it is brought up to nearly the same percentage of cutting as the other fields; fine healthy plants, six to nine inches high, cut clean off; the greater part of them so close to the surface, that there is small chance of fresh shoots. After a careful examination, I estimate the losses up to date at one-fourth of all the plants put out last planting season. It is very annoying, after all the trouble and anxiety of carrying the plants through the dry season with little or no loss, to have them destroyed, just as the season became favourable to quick growth, and I am obliged to own myself at the end of my resources. The means of protection, that seemed effectual last season have signally failed now, and my only hope is that they have nearly run their course for the time, to appear again in August, if we have as in the last two years a dry June and July. So far as I have been able to ascertain their habits, they breed twice a year, the old race dying out during the heavy rains of the two monsoons in May and November, after having deposited their eggs in the soil, where they are hatched by sun heat, during the dry season, and the dryer the season, the more abundant will the brood be: they only infest soils of a loose, dry, warm, nature, and especially those rich in organic matter, avoiding clays and coarse gravels. On the present occasion, they first appeared on steep stony grounds, facing the morning sun, and on several such faces they have hardly left a plant uncut. For the rest, there seems no rule. Sometimes on one side of a road one half of the plants are cut, on the other side none; round one boulder all are cut, round the next one none. As I already stated, the south-west face of this place, remained untouched till some time after the destruction had slackened on the eastern side, and on the former it still goes on, though it has almost ceased on the latter. Nothing could be more satisfactory than the growth of the plants that have escaped, and I hope they will be out of danger before the next brood appears. Many of those, however, that were too strong of stem to be dealt with have had every leaf cut off, and have their growths much checked thereby. All the stems that have been cut above lowest buds are making an effort, but my former experience is that the next brood of crickets attack by preference those that have been injured by their parents, but I have found the present brood so much more acute and enterprising than the last, that the race may possibly be intellectually progressive.

I had made up my mind that I would not meddle with cacao any more here, unless I were under orders from superior authority, but such a change has come over every surviving plant, since the middle of March, that hope has revived, and I now propose, on one part of the plantation, to carry out the original design of

alternating in the lines Liberian coffee and cacao plants, by tilling in the vacancies of the latter at once. I now know that all the losses of plants, on land not exposed to the S. W. wind, has been due to too much dry weather, either immediately or remotely before the young plants got a firm hold of the ground. Now I see plants that two months ago looked all but dead, expanded into brilliant and abundant foliage, and running up like Jonah's pumpkin; and though I may still have many failures, I now entertain no doubt of ultimate success, even in such seasons as we have had during the last two years, which, from all I can learn, were considered by my native neighbours unusually dry.

Those who carry on planting operations in the midst of native villages ought to be thankful for a wrinkle, with regard to the material of an impenetrable fence. The Calcutta bambu, *Bambusa arundinacea*, planted three feet apart, becomes a perfect fence in twelve months on tolerable soil, and needs no more labour to keep it in order than any other living fence. I sowed the seed twenty-three months ago, and have it now in good spots thirty feet high. I find it grow well on all soils, except hard gravel or wet swampy ground, and it can be freely propagated to any extent, by dividing the roots. Nothing could be better as a belt to break the wind in exposed situations, and, when a few years old, it will supply nearly all the material for light temporary buildings. I planted it ten feet apart with a teak plant midway, but even at that distance it has filled up the spaces in the best soils in twelve months.

DATE COFFEE IN AMERICA.

It is satisfactory to learn that the coffee merchants, retailers and consumers of North America are inclined to give no quarter to the attempt to foist on them "date" or any other abominable coffee mixtures. The following is from the *New York Daily Tribune* of March 17th:—

MAKING COFFEE OF DATES.

A VAST SCHEME PROPOSED IN LONDON.

THE AMERICAN PEOPLE SOON TO BE GIVEN AN OPPORTUNITY TO INVEST IN THE DATE COFFEE COMPANY

—\$25 SHARES SOLD IN LONDON FOR \$160—

SELLING PATENTS IN OTHER COUNTRIES—WHAT IS THOUGHT OF THE SCHEME HERE.

The people of the United States are soon to have an opportunity of investing large sums of money in a wild speculation now occupying the attention of the English public. This is a project for making coffee out of dates. A company has been formed in London, called the Date Coffee Company, which proposes to revolutionize the coffee trade of the world. It has issued flaming prospectuses, has expended large sums of money in advertising and has actually succeeded in selling its shares in the English market at \$160 each, their par value being only \$25; and all this before the company has made a dollar of legitimate profit or fairly begun operations. The originators of this bold scheme have succeeded so well in England that they have already turned their attention to America, and they are publishing in London glowing accounts of their prospects here. They estimate their profits in this country to begin with at \$2,500,000. They have already opened correspondence with some brokers in this city, and an agent is soon expected here to begin operations. The first movement will, it is said, to close a contract with an advertising firm by which \$50,000 will if necessary, be spent in

advertising the project, after which the projectors anticipate no difficulty in relieving the American public of a few millions of dollars. The whole scheme from its inception to its present wonderful success in London reads so much like a chapter of the "South Sea Bubble," or John Law's exploits in Paris, that persons on this side of the water almost doubt, the truth of what they read in the London press in regard to it. There is no doubt, however, that even in this age of enlightenment such a project can be successfully carried out in London when it would fail here.

The Date Coffee Company (Limited) was formed over a year ago to manufacture a partial substitute for coffee out of dates according to a patent obtained by T. F. Henley. The patent consists in drying the date fruit by a process which separates the seeds from the pulp. The seeds are then placed in a revolving vessel, and subjected to heat, under the influence of which they become in color like roasted coffee. When cool they are crushed and mixed with real coffee and a little chicory, and the whole is claimed to produce a mixture "superior to the best Mocha coffee." The company was started in London early in 1880, with a proposed capital of \$250,000, divided into 10,000 shares of \$25 each. A few months afterward application was made to the London Stock Exchange for an official settlement and a quotation. The settlement, which gave the company an official standing, was granted, but the quotation was refused on the ground that there were too many shares in the hands of the directors, it appearing that only 265 shares had been really purchased. The company then found that the English Government would not allow this adulterated coffee to be manufactured in England, but would allow it to be imported at a duty of 4 cents a pound.

The works were then started in Kurrachee, India, where dates are said to be plentiful. As the sale of the article as coffee is accompanied by a statement of how it is adulterated, it does not come within the prohibition of the adulteration act.

At the end of the first year the Company showed no profits. It then occurred to Mr. Haymen, the chairman, according to the Company's reports, that as the Company only owned the patent for England, the patentee, Mr. Henley, might establish companies elsewhere and thus open undesirable competition. Negotiations were therefore opened with Mr. Henley to get the whole of his patents without further payment. He saw the force of this brilliant idea at once. It would virtually pay him by "the enormously increased value" of the large number of shares he already held, or by "the enormously increased value of the dividends he would get from organizing in different countries companies to work the patents." From that time forth the projectors saw fortunes within easy grasp. It became their business to sell patents rather than manufacture adulterated coffee. They claimed to manufacture coffee at less than half the cost of the genuine article. The samples they exhibited from the manufactory at Kurrachee were slightly adulterated with "date coffee," and, of course, were principally composed of real coffee. How the managers revelled in figures may be understood from the following letter, written by the chairman to an inquirer:

"H-rewith statements showing the profits the Date Company expect to make. The original prospectus showed a profit of \$250,000 a year on a make of forty tons of coffee a week, or 100 per cent per annum on the entire capital, but our capital is, even when the debentures are converted into shares, only \$200,000. The estimates upon which this profit was worked out have been proved by actual working to be correct. Since these estimates were made we have obtained the whole of Henley's patents, and our capital account is the same.

"We estimate that we shall sell these patents for \$250,000 each, which would amount to \$2,500,000, or \$250 a share; but we shall, in addition, have Founders' shares in each of the different companies entitling the Date Coffee Company to one-half of all profits after 50 per cent has been paid to the shareholders of these different companies.

"Now, as our figures show that each Company's profit will be \$500,000 a year, the Date Coffee Company will have a yearly profit of \$125,000, or \$1,250,000 in all, to which add \$250,000, the profit you will make, and you have the following results:

"Each \$25 Date Coffee share will receive a bonus of \$250 per share and annual dividends of \$3,000 per share.

"Assuming, therefore, that shares are bought to pay 10 per cent. the Date Coffee shares, after receiving \$250 bonus for each \$25 share, ought to be worth \$1,500 per share.

"The figures are large and look extravagant, but they are, I think, beyond dispute. Yours faithfully,

HENRY HAYMEN."

The first effort was to start a French Company. This was done by the same men who organized the English Company and they sold the patent to themselves for \$250,000. This gave them the start required. The \$25 shares of the English company immediately rose in value from almost nothing to \$160. A German company was then organized without trouble. The chairman said: "I have had twenty-five years' experience in the city of London, and I have never in my life had money pressed upon me so fast as I have had in connection with the French and German companies." All the shares of the German Company were applied for two or three times over. A proposal was received to pay \$100,000 for the Russian patent, and the speculation in the shares of the companies seems to be general in London.

At this stage the managers have turned their attention to the United States. At a recent meeting of the stockholders Chairman Haymen said:

"In the United States and Canada during the years 1877 and 1878 about 140,000 tons of coffee were used; during the same time the quantity used in the United Kingdom was only 15,000 tons, while on the Continent of Europe it was 300,000 tons. You will see, therefore, there is a much larger field in the United States than there is upon the Continent, comparatively speaking. I except France, which we consider finished. Therefore we have thought it better that we should take up the United States after the German is finished; so it will be the third company. [Cheers.] Now the United States is equal to five patents. We can put up our works at five different seaports at such a price as will enable each one in those divisions to more than equal the United Kingdom. The terms upon which we have negotiated I cannot say are concluded. I calculate we shall realize from the United States a minimum of \$2,500,000, and it may be even more than that."

A well-known American, who has been interested in the coffee trade in London for some years, in speaking of the Date Coffee Company and its product, said:

As actually sold in the English market this 'dates coffee' is declared in the printed label on the tin box in which it is sold to be 'a mixture of dates with one of the finest coffee and a little chicory,' which being translated means—this compound is 'caramel coffee and chicory. Now caramel is roasted sugar, well-known all over France, employed to color brandies, in universal use among cooks for soups, etc., and largely in use combined with coffee. 'Café Cercella' is an article of wide consumption in Paris and has enjoyed great repute for years. This 'date coffee' is infinitely inferior to it. If the Company does actually roast the dates—which I very much

doubt—it obtains only caramel, not a whit better than roasted cane sugar and much more expensive. It they do actually roast some dates, my opinion is that it is only enough 'to swear by.' It would be an interesting question to know why they put chicory in the article they sell. We had all sorts of coffee substitutes during the war, but as soon as genuine coffee could be had again the substitutes disappeared. This humbug will have its day and the promoters of the scheme will line their pockets, and no doubt some of the first purchasers of shares will make money; but it is lamentable to think of the fate of the last comers."

F. B. Thurber, of H. K. & F. B. Thurber, was asked if he knew anything of this new scheme. "I do not," he replied, "but it can be safely set down as a sham. Surely things can be more easily got on up in England by means of joint stock Companies than in this country."

"Do you know of dates ever having been used to adulterate coffee?"

"I have heard of their use abroad. In this country, especially during the war, peas, rye, chicory, and various other things were used to adulterate coffee. There are essences sold now, composed of caramel, chicory, etc., which are used in coloring coffee and giving it a fictitious appearance of strength. Since the retail grocers have taken to grinding coffee for customers, the use of adulterated coffee has been largely decreased. The only safe way to buy coffee is in the bean. We impress that upon all our customers. Coffee in the bean is not adulterated. The fact that this Date Company is so particular to refer to Mocha coffee is but another evidence of its being a fraud. Now, Mocha coffee is not the best. Coffee was originally obtained in Arabia and exported from Mocha, hence the name Mocha coffee. Since then, better coffee has been found elsewhere. But Mocha coffee is comparatively scarce, hence it is higher in price."

"You do not think, then, that there is a chance for 'date coffee' in this country?"

"No. There is no necessity now for adulterating coffee. The price has been tending downward for years, and the use of adulterated goods of any kind is reprehensible, and becoming justly a subject of legislation. There is a better chance for adulterated coffee to sell in England than here. Any one who has been there knows how difficult it is to get a good cup of coffee there. Americans use about three times as much coffee as Englishmen, perhaps because they know how to make good coffee. The largest consumption of coffee per capita is in Holland. Germany comes next, and then France and the United States, in which two countries the per capita consumption is about the same. As for the use of dates for coffee, on the scale proposed by this Company, it is absurd. There would not be dates enough to supply such a use, and of course the demand for them would increase their cost above that of pure coffee."

Other large coffee dealers were consulted in regard to the date coffee scheme, and they all considered it a plan for defrauding the public, and predicted that it would find no favor in this country. One of them said: "There has been over \$7,000,000 lost in coffee in this country in a year owing to the increased production and declining prices, and it is absurd to talk about introducing adulterated coffee under such circumstances."

THE DEVELOPMENT OF NEW BRANCHES OF INDUSTRY IN INDIA.

A paper sent to us by the Madras Government contains a communication from the Under Secretary to the Government of India, Home, Revenue, and Agricultural Department (Public), to the Chief Secretary to the Government of Madras, forwarding an extract from Section I, Chapter VI, Part II, of the

Report of the Indian Famine Commission, and inviting attention to the views expressed by the Commission as to the desirability of encouraging a diversity of occupations and the development of new branches of industry in India. The extract is headed "Encouragement of Diversity of Occupation," and states that "at the root of much of the poverty of the people of India and of the risks to which they are exposed in seasons of scarcity lies the unfortunate circumstance that agriculture forms almost the sole occupation of the mass of the population, and that no remedy for present evils can be complete which does not include the introduction of a diversity of occupation through which the surplus population may be drawn from agricultural pursuits and led to find the means of subsistence in manufactures or some such employments. It will be almost self-evident that such a change in the condition of the people could not be brought about by any direct action of the State, and that there would be much risk of interference of this description, discouraging the spread of sound principles of trade and retarding the operation of private enterprise. So far as we are able to form an opinion on a question so difficult of solution, the desired result can only follow upon an increased desire to apply capital to industrial pursuits in India, which again will be a consequence of a growing conviction that adequate profits may be secured on investments, under a condition of continued peace and good government. The State should certainly use its utmost endeavours to assist in the preparation of the country for reaching such an advanced condition, but it will, we believe, be by indirect means, such as the extension of railways and the development of local trade and foreign commerce, that the end will be attained rather than by any attempts to give adventitious aid to particular branches of industry. Capital will accumulate in the country or will flow into it for investment in proportion as security is maintained and facilities for obtaining profitable markets for all sorts of produce are enlarged."

The obstacles that stand in the way of the investment of English capital in India, such as the climate, the distance, and the want of exact knowledge of the country, are then referred to, the writers pointing out that direct State aid could not be given to any undertaking without some corresponding power of control or interference, and the exercise of any such power would be almost certainly incompatible with the successful management of industrial occupations, and they add—"It is probable, moreover, that the whole available means of the State will yet be required for many years, either for railway extension, with or without the co-operation of private enterprise, or for the extension of irrigation works which are no less necessary, and which experience has shown to be unsuited for management by private Companies. There are, however, directions in which we have no doubt the Government might usefully aid in fostering the inception of new industries. The introduction of tea cultivation and manufacture is an instance of the successful action of the Government, which should encourage farther measures of a like character. In this case, the Government started plantations, imported Chinese workmen, distributed seed, and brought the industry into a condition in which its commercial success was no longer doubtful. It then retired from any share in it, sold its plantations, and left the field to private capitalists. The cultivation of cinchona is a measure of a somewhat similar description, though it has not yet passed entirely into the hands of private persons. In treating of the improvement of agriculture, we have indicated how we think the more scientific methods of Europe may be brought into practical operation in India by help of specially-trained experts, and the same general system may, we believe, be applied with success

both to the actual operations of agriculture and to the preparation for the market of the raw agriculture staples of the country. Nor does there appear any reason why action of this sort should stop at agricultural produce and should not be extended to the manufactures which India now produces on a small scale or in a rude form, and which, with some improvement, might be expected to find enlarged sales, or could take the place of similar articles now imported from foreign countries. Among the articles and processes to which these remarks would apply may be named the manufacture and refining of sugar; the tanning of hides; the manufacture of fabrics of cotton, wool, and silk; the preparation of fibres of other sorts, and of tobacco; the manufacture of paper, pottery, glass, soap, oils, and candles." Some of these arts are already practised with success at Government establishments, and these institutions afford practical evidence of the success of the arts practised and are schools for training the people of the country in improved methods; and so long as any such institutions fairly supply a Government want which cannot be properly met otherwise or carry on an art in an improved form, and therefore guide and educate private trade, their influence can hardly fail to be beneficial. The same may be said of the workshops of the Government and the railway companies which are essential for the special purposes for which they are kept up and gradually train and disseminate a more skilled class of artisans. The writers continue:—"The Government might further often afford valuable and legitimate assistance to private persons desiring to embark in a new local industry or to develop and improve one already existing by obtaining needful information from other countries or skilled workmen or supervision, and at the outset supplying such aid at the public cost. So far as the products of any industries established in India can be economically used by the Government, they might properly be preferred to articles imported from Europe, and generally the local markets should be resorted to for all requisite supplies that they can afford. We are aware that steps have been taken within the last few years to enforce these principles, but more can certainly be done and greater attention may properly be paid to the subject. Otherwise than as above indicated, we do not think it desirable that the Government should directly embark in any manufacture or industry in an experimental way. Such experiments to be really successful or valuable must be carried out on a commercial basis. The conditions of any Government undertaking are rarely such as to give it this character, and the fear of incurring an undue expenditure on what is regarded as only an experiment will often lead to failure, which will be none the less mischievous because it was thus caused."

The writers conclude as follows:—"There is no reason to doubt that the action of Governments may be of great value in forwarding technical artistic and scientific education; in holding out rewards for efforts in these directions, and in forming at convenient centres museums or collections by which the public taste is formed and information is diffused. The great industrial development of Europe in recent years has doubtless received no small stimulus from such agencies; and the duty of the Government in encouraging technical education is one to which the people of England are yearly becoming more alive, and which it is certain will be more adequately performed in the future. All the causes which rendered such action on the part of Governments desirable in Europe apply with greater force to India. Experience, however, is still wanting, even in England, as to how such instruction should be given, and for India it will be hardly possible at present to go beyond the training of ordinary workmen in the practice of mechanical or engineering manipulation. To whatever extent it

is possible, however, the Government should give assistance to the development of industry in a legitimate manner and without interfering with the free action of the general trading community, it being recognised that every new opening thus created attracts labor which would otherwise be employed to comparatively little purpose on the land, and thus sets up a new bulwark against the total prostration of the labor market, which in the present condition of the population, follows on every severe drought."

This paper was communicated by the Madras Government for remarks to the Board of Revenue, the Director of Public Instruction, the Chief Engineer, Public Works Department, the Commissary-General (through the Military Department), and the Superintendent of the School of Arts.

KALUTARA AS A LIBERIAN COFFEE DISTRICT.

(Contributed.)

A few years ago, Kalutara was not even thought of by European capitalists as a place affording a fair field for investment in lands for coffee cultivation. But no sooner had 'leaf disease' laid low the once flourishing estates in the Central Province, than attention was turned to the cultivation of new products. Thus, the hitherto hidden resources of unimportant districts were developed, contributing to the material wealth of the country. The construction of the Kalutara Railway offered no small inducement to local capitalists to open out lands in the Kalutara district, the soil as well as climate having been previously ascertained to be eminently suited for Liberian coffee. Messrs. Leechman and Aitken, Spence & Co. seem to have been the pioneers of this coffee in Kalutara, Culloden and Puttupaula estates are reputed to be two of the most flourishing and lucrative Liberian coffee estates in the island. Almost every year finds two or more estates opened up. This is due, in the main, to the encouragement offered to enterprising men by the unequalled success which has attended the cultivation of Liberian coffee in the district. But what has the Government done to render the burden and risk of the planters light? Where are the roads?—without which, the most obtuse official must perceive, the hazard attending the opening of an estate is considerable. Even the existing roads are so badly kept that they would shame a barbarous country; but strange to say, with the exception of the effort only now put forward by the Planters' Association at Kalutara, no voice was hitherto raised by the planters there to have new roads opened up. If Mr. Wace, the Assistant Government Agent at Kalutara, has the true interest of his district at heart, he should not rest until the roads and bridges in Pasuun Korale are put in thorough repair, and new roads, rendered necessary by the clearing of new crown lands, are opened up. The minor road which runs along the Kaluganga, leading to Udapitiyaoda, is in a most disreputable state; and the bridges along the road are rotting. Nobody seems to take the slightest notice of this road. Want of funds, it was alleged, was the reason why the work of repairing could not be taken in hand by the road officer. Of course he is not to blame. But somebody will be hauled over the coals in case of a carriage or horse accident, if it happen on that road. I sincerely hope Mr. Leechman will make out a strong case in favour of the Kalutara Planters' Association, who, I see, have moved in the matter, and shame Government into opening out more roads leading to the coffee estates in the district.

There can be no gainsaying that Kalutara will, in a short time more, draw a considerable number of capitalists who will lay bare the rich resources of the lands surrounding it. The soil in some of the new clearings has been pronounced by competent authorities to be very rich and capable of comparison with any in the

slaud. The surface soil, about two feet in depth, is a sort of loo-e loam, and the atmosphere surrounding the lands is so humid that there is no chance of a season of drought telling severely on the plants during their early stage. Planting in baskets is a capital idea, and the only safe way in which a large proportion of the plants could be grown successfully. The system of shading the plants with the ordinary fern to be found in marshy grounds is very judicious indeed. But in continual wet weather the covering should be removed, as I found in the plants which had the shading on (while the rain continued for a few days) that some of the leaves rotted off, owing to the incessant dripping of water from the fern.

The only enemy that seems to attack the young plants is the bloodsucker, which appears to take a malicious delight in gnawing away the plant about the middle of the stem.

The tea plants in the Kalutara district are, I learn, doing remarkably well. The easy distance from Colombo to Kalutara ought very soon to bring more enterprising men there.

NETHERLANDS INDIAN NEWS.

COFFEE—SILK—TRAMWAYS.

(Straits Times.)

Tigers it is said, have caused a falling off in coffee cultivation and silk culture in the Southern districts of Acheen Proper judging from the following statements in a report on a tour of inspection recently made there by Mr. Van Wyck, a controller:—

"On the 19th February, I went with the headmen to the coffee plantations which the *Kejuranan* [a local chief] had laid out with the aid of 10,000 guilders advanced to him by Government. The state of these plantations left very much to be desired. The recently planted portion, especially, looked miserable and badly cared for. In many places the young plants had been choked by lalang and weeds and had died off, so that traces of cultivation could only be found with difficulty. The headmen told me that the little care taken of the plantations was attributable to the great number of tigers appearing in them of late. Fifteen men had already been killed by tigers, and many of the persons who lived on the plantations had abandoned them from dread of sharing the same fate. Within the last few months, however, less had been heard of tigers, so that there was a prospect of the cultivation of the plantations being resumed.

"Silk culture is falling off. I was assured this was in consequence of the difficulty of finding the necessary food for the worms. These insects feed on the leaves of a plant named *Duan kertu*, which grows in the jungle on the neighbouring mountains. Owing to the great number of tigers which have appeared of late in these districts, the inhabitants no longer dare to go out looking for the said leaves, so that this industry is retrogressing. Some cocoons were shown me at my request. They have wholly the appearance of the silk-worms grown in Europe. These cocoons were boiled in water, the silk being afterwards spun off or reeled."

During his tour through these districts—Lohong, Loping and Kluang—which had suffered least from the war, Mr. Van Wyck was hospitably and cordially received by both headmen and people, and met with every attention and regard from them. He states the Chinese there are far advanced in agriculture, the rice fields being irrigated by well constructed canals, and kept free from weeds. Besides coffee and paddy, pepper, sugar cane and tobacco are grown. The cultivation of pepper had, however, decreased owing to the blockade. Cattle rearing was unimpor-

tant, from disease. Among the exports were guano to Penang and birds nests similar to those of Java. Gold is found at many places, and petroleum is known to exist. Mr. Van Wyck was favourably impressed by the Achinese of the districts, whom he describes as not fanatical but susceptible of instruction, eager for information, and industrious, his firm conviction being that much may be made of them by the spread of knowledge, and that, when they once understand the good intentions of the N. I. Government, they will prove good subjects. He examined the land applied for by Messrs. De la Croix and Brau de St. Pol Lins, and assembled the headmen concerned, who expressed their approval of the application for the land, and their desire that the Government would give the permission asked for. During his whole tour, the only articles stolen from him were potatoes—one or two at a time, with the object of planting them. He hence soon distributed them among the people and gave directions how to grow them. Achinese seemed to be partial to cultivating potatoes, from their profitable nature and tastiness.

The firm of Dummier and Co. has obtained a Government concession for laying a double line of steam tramway from Batavia to Meester Cornelis. The cars are to run on sunken rails at the rate of 15 kilometres per hour as the extreme limit, and the line is to be completed in two years. At Surabaya, an application has been made for a concession to lay a steam tramway there also.

“Surabaya, 21st April.—To those who consider more frequent communication with the Moluccas desirable, it is glad tidings that a Singapore firm which owns the steamers “Thames,” “Penang,” “Celestial,” and “Bivouac,” intends from the 15th May, to run a vessel (the “Thames”) from Surabaya to Macassar, Menado, Gorontalo, Amboyna, Banda, Timor, Deli, and Bima, and back. Should the experiment succeed, the “Penang” will also be put on this line.—Batavia Dagblad, 26th April.

To develop the resources of Java, another association with a paid up capital of 500,000 guilders has been established in Holland, styled the East Java Culture Company, to manage Coffee and Cinchona plantations.

The Java coffee crop for 1881 was officially estimated at 815,300 piculs on the 31st March.

It is officially reported that the tin yield in Banka, last year, was 72,684.92 piculs, against 77,615.44 piculs in 1879.

THE MANUFACTURE OF COTTON OIL from the cotton seed, according to the *London Times*, is becoming of importance in the United States, there being at the present time upwards of 41 oil mills, of which nine are in Mississippi, nine in Louisiana, eight in Tennessee, six in Texas, four in Arkansas, two in Missouri, two in Alabama, and one in Georgia. The annual quantity of seed converted into oil now amounts to about 410,000 tons, the yield being at the rate of some 35 gallons of oil to the ton of cotton material. Moreover, each ton leaves 750 lb. of oil cake of admirable fattening qualities. A great deal of the cotton oil is imported to Italy and other countries where the olive oil is a staple, and, in point of fact, cotton oil is there superseding the olive oil, not only for utilitarian purposes, but also as an article of food. It is said, too, that the use of cotton oil in this way is gaining ground in some parts of the States. The following are the statistics of consumption:—

	Export. gallons.	Home consumption gallons.
1876-7	1,316,000	2,000,000
1877-8	1,457,000	1,800,000
1878-9	5,750,000	2,425,000

Indian Agriculturist.

COFFEE.—We learn from Yercaud that the coffee crops this year are not likely to turn out well as the want of rain is greatly felt. Up to the 1st instant, the rainfall in the coffee-growing tracts of the Shevaroyis was next to nothing and the trees which gave promise of a bumper crop this season, do not look so well as they would under other circumstances. It appears that, in the past year, rain fell in Yercaud during the whole of April, and that about this time last year the trees looked at their best. It was expected that this year would be a good one, but the hopes and expectations of the planters have, to some extent, been blasted. If rain does not fall during this month, the coffee crops of the Shevaroyis will be very small. Some fine estates belonging to a firm at Madras that lately went into liquidation were placed by the trustees in the hands of an experienced planter, and we hear that under him they are doing well. The proprietors of coffee estates in the Shevaroyis are giving increased attention to their condition, and it is hoped that their anticipations in respect to crops will, later in the year, be realised.—*Madras Standard.*

THE FERTILITY OF NEW ZEALAND is very great, and for agricultural purposes the percentage recorded below would, were there no financial drawbacks, point irresistibly in favour of that country:—

	Average yield per acre.			Mean of six years	
	Wheat. bush.	Oats. bush.	Potatoes. tons.	Hay. tons.	
Victoria	13	18½	3½	1½	
New South Wales	14½	19	2½	1½	
New Zealand	27½	33	5	1½	
South Australia	8½	12½	3½	1½	
Queensland	12	10	2½	1.3	
Tasmania	17½	24	3½	1½	
Western Australia	11½	16½	2½	1½	

The average of these is 15 bushels, and we are surprised to find it so low, in a new country like Australia, in India the average is 14 bushels, but this must be remembered is only the *rabi* crop. The land is beside, frequently culled on to produce a *khari* crop as well, so that compared with Australia, which only produces one crop a year, our yield must be considered better than theirs.—*Economist.*

THE STRAITS SETTLEMENTS AT THE MELBOURNE EXHIBITION.—We (*Straits Times*) have been favoured with the following list of awards for Exhibits from the Straits Settlements in the Melbourne Exhibition:—

Order of Merit.	Exhibitor.	Exhibit.
First	Paterson, Simons & Co.,	Gum, Copal [& Gutta Percha.
do	Guthrie & Co., Gums,	Gutta Percha &c.
do	Too Tye Sin, (Penang)	Indian rubber and [Gutta Percha.
Hon. mention	D. D. Daly.	Pewter & Blacktin Ware.
Hon. mention	T. B. Rowland,	Ornithological specimens.
First...	N. P. Trevenen,	Models of Malay imple- ments.
do	Borneo Company,	Collection of Ores.
do	Government of Straits Settlements,	Collection of Tin Ores.
Second	Captain China	Tin Ores.
First	Guthrie & Co.	Gambier.
do	W. H. Read,	Gambier.
do	C. Favre.	Crystallised Fruit.

Order of Merit.	Exhibitor.	Exhibit.
Fourth	Penang Sugar Estates,	Rum in Bulk Dark.
do	J. Lamb, Penang	Rum in Bulk, White
do	Penang Sugar Estates	do
Fifth.	Ondermring, Sumatra*	Cigars.

* This appears to be a mistake, as the Ondermring Co. only exhibited tobacco.

LIBERIAN COFFEE IN DEMAND IN AMERICA.

Our readers will remember our report of a conference called, at the instance of Mr. Wm. Walker in London, to consider the merits of Liberian Coffee and to meet Mr. Edward Morris of Philadelphia, an enthusiastic member of the Society of Friends who believes in the regeneration of Western Africa through education provided for by Liberian Coffee. "Plant Coffee" was to be the burden of his cry to the negroes of the West Coast, and in return for the resulting produce, America would send all that was required to ensure the education and christianization of the tribes. This mail has brought us the following letter from our philanthropic friend:—

Philadelphia, April 13, 1881, Office 609, Walnut St.
MR. FERGUSON, MY DEAR SIR,—You will remember giving me a copy of a book with yellow cover, full of information about Liberia Coffee, and its introduction into your promising Island of Ceylon. I value it very much. I lately loaned it to some one, cannot tell who, I consider it lost, never expect to see that copy again. I beg of you to send me another copy regardless of cost—and I will make returns for it—if it is out of print please advertise for a copy, and I will pay you.

Ever since I had the pleasure of meeting you in good old England, I have been intending to write to you, to encourage some, no matter how many, of your planters to ship me a hundred or a thousand bags of "Liberia-Ceylon coffee." In view of my well-known connection with Liberia *here*, I am quite certain I could create a *high price* trade for Liberia-Ceylon coffee. Do make the effort, to this end. Forward the book, and let me hear from you. I will sell your coffee and make returns in a draft on London or in American merchandise—as per order,—Respectfully,
EDWARD G. MORRIS.

We publish this letter as the best means of making Mr. Morris's request known. It must be remembered that his firm in Liberia send coffee to the United States, and at the Philadelphia Exhibition Mr. Morris carried off the first prize for the finest coffee, since which time he has not been able to meet the demand for the quality of produce they are able to send from Liberia. The price he mentioned to us, at which he was selling, was a very high one, and we have not the slightest doubt that if any Ceylon merchant or planter consign some of their produce to Mr. Morris, he will do his best to find a good market for it and to promote a profitable sale.

PLANTING AND SCIENTIFIC EXPERIMENTS.

Notwithstanding the high position already attained by the typical "Ceylon Planter" in the estimation of the tropical agricultural world, there is no doubt that by accurate observation and logical reasoning, he has still to arrive at many important truths bearing on his profession. The routine of working an estate is a small matter, which any one with a moderate allowance of brains should readily pick up. Indeed the existing system of planting has grown out of a very limited number of minds, and many of the practices now held to be demonstrated truths were very slow in making way against adverse prejudices, supported in many cases by men in whom their fellows put confidence. If, however, the planter has still a

wide field for his individual investigations, this age of specialities has opened up fields of scientific enquiry that can only be properly cultivated by co-operation. There can be no better means of applying science to a planter's practical work than in the way we have so often advocated of establishing Experimental Stations, to test the practical value of the various manures and fertilizing substances within his reach on the plantation or offered to him in the local market. It will be generally admitted that costly manures have been applied to cultivated land in Ceylon, without yielding the reasonably anticipated results. Henceforward, no doubt, the custom is likely to grow among our planters, of obtaining an analysis of the soil to be operated on, so as to know with some degree of certainty in what elements of fertility it is deficient with reference to the cultivated plant. The planter who takes this course is on the true scientific path, but he has to provide all the cost himself and is not called on to publish his results for the public benefit, whether these be success or failure. Few people like to publish their failures, and if they publish their successes, the chances are they will not be believed.

Ceylon with its Central Planters' Association, and with branches in every important planting district, already possesses the principal element for carrying out a series of public experiments that would settle once for all a number of pressing questions affecting the interests of every estate proprietor in the Colony. As such experiments would have value only when conducted on the soundest scientific principles, a special Agricultural Chemist would have to be appointed to carry them out. The salary paid should be a liberal one, so as to secure a first-rate man, and contributions towards it should be made by the District Associations according to their strength and numbers. Surely when so many "Visiting Agents" make handsome incomes out of the planting interest, one Scientist could be maintained by the whole body for the general benefit without the individual contribution being considered a hardship. When individual planters are found to incur the whole expense of analysis and experiment, in the firm belief that it will pay them, it is only those who have already given an *a priori* decision that all manuring is "*bosh*," and that the soil and climate of Ceylon have ceased to suit the plant that has for above forty years yielded its principal staple, that are likely to oppose the general adoption of such a scheme. There are some amongst us, judging by the correspondence which reaches us, who believe that recent critics absolutely delight in the picture of ruin (so far as coffee is concerned) they have drawn; but this is a mistake, for "W. McK." himself has confessed to us personally that notwithstanding his remarks in reference to the "Aluwihara" and "Venture" experiments,—criticism altogether premature—he believes Mr. A. Ross, senior, is on the right track in the course he has adopted. Mr. Ross's example is, we are aware, to some extent being followed in other places: various experiments are being made with new and old manurial substances—kainit and gypsum have, for instance, been imported,—but unless stations systematically conducted are established for the benefit of all, it is quite certain that the majority of isolated individual experiments will simply result in money being thrown away without even the proprietor concerned reaping benefit, much less the general public. The application no less than the selection of experimental manures as well as the inspection of the results, require more scientific guidance than the planter usually has, or can afford to give. District Experimental Stations are therefore imperatively called for.

COFFEE OIL.

We give the following translation from the *Indische Mercur* for March:—Although we make daily use of coffee as a drink we are not yet fully acquainted with the chemical nature and the composition of the products which result from the roasting or burning of it, nor with the oil, which constitutes one of the most interesting and characteristic elements of the bean. The presence of coffee oil is completely manifested by roasting, when the oil, driven out of the bean by the power of the heat, is thereby partially liquefied, and diffuses, together with other products of the combustion, the peculiar aroma of burnt coffee, an odour not possessed by any other substance. In very strongly made coffee the oil can also be seen floating in little drops of fat on the liquid. The amount of oil present in coffee beans varies from 8 to 13 per cent, and at least half of this is lost in the roasting. It should be a not unprofitable experiment to try to collect this oil, especially in large establishments, where large quantities of coffee are roasted, and thus also large quantities of oil are lost. In the year 1871 not less than five hundred thousand tons of coffee were consumed, the amount of oil lost from which may now be easily calculated. Dr. Cech of St. Petersburg tried the experiment of collecting the oil in one of the coffee-roasting establishments in Berlin; he connected the machine in which the coffee beans were roasted with a sort of condenser and a receiver, so that he first cooled the ethereal oil and then collected it as a liquid. At the commencement there was scarcely any vapor to be collected any-where in the machine, but when the beans became brown and the whole mass was well heated such a large quantity of ethereal oil was produced that it could be collected after condensation in the form of successive drops. If this operation is performed in a chamber, without making use of such a condenser, the oil runs in little streams along the cold walls. The requirements of roasting have hitherto been of such a nature that the roasting and stirring take place in the open atmosphere, which makes the condensing and collecting impossible. Experiment has taught however that the coffee which is being roasted must, as soon as the beans are brown, be brought away from the heat to be stirred, as it is feared the mass would be burnt if this were not done. And that is just the moment when the oil is being most largely produced. If any one could think of a method of uniting the spit with an exhaustor, which would collect the gases and convey them to the condenser, and which would on the other hand admit sufficient air to cool the beans completely, he would be on the road to success. Dr. Cech is of opinion that the oil extracted is admirably adapted for the manufacture of liqueurs. In order to study the properties of coffee oil Dr. Cech pounded 50 lb. of different kinds of coffee to powder in a mortar, than made a decoction of it with alcohol and ether, and so obtained two and a half lb. of extract. The beans used were not all of the same good quality: some sorts had 8 others 13 per cent of oil, indeed there were some that had less than 8 per cent oil. The coffee oil is green, thick, and transparent, and after it has stood for some time fine long needle-shaped crystals are deposited. These appear to be caffeine. This oil becomes turbid in the space of half a year, though it may have been kept in opaque stoppered flasks. In the course of time more and more crystals are deposited, and after about a year the flask is half filled with a dirty colored mass of crystals; the liquid floating above however appears transparent, clear, and of a fine green color, from which it is to be inferred that a portion of the coffee oil consists of a fluid oleaginous acid. The percentage of composition of the coffee oil is however so far not yet ascertained. This still needs the attention of practical chemistry. Time must teach what can yet be made with the oil.

CINCHONA CULTIVATION.

DR. TRIMEN ON RED BARK.

MR. ELIOT HOWARD EXTINGUISHING "C. PUBESCENS HOW."

We draw special attention to Dr. Trimen's letter giving a full explanation of his views in reference to the cultivation of red bark. It seems that the Director in deprecating the extension of cultivation with the inferior sorts, referred to the Calisaya species only and not as we supposed to *Succirubra*. In addition to the reasons now given for regarding the red bark with favour, we may mention the fact that it is used in the manufacture of beer in Germany, and the probability that through the shaving process, the renewed produce may prove to be a manufacturer's bark of no mean value. Crown bark in all its degrees requires no advocacy, and of course the fortunate possessors of *Ledgerianas* and the finer *Calisayas* are to be envied rather than treated to words of encouragement; but we would fain put in a good word even for the "inferior" *Calisayas* in so far as to deprecate discouragement after the very satisfactory analytical and market results obtained by Mr. J. A. Roberts of Pussellawa and the proprietors of Emelina. It seems probable that in the Ceylon climate and soil *C. Hasskarliana*, *Josephiana*, &c., will, for some reason or other, give better results than in Java. At any rate, the trial ought to be persevered in by those who have already planted these kinds, while in all future clearings, planters should as far as possible aim at putting out the best, taking elevation, climate and soil into account as well as the plants available. Where *C. officinalis* succeeds well in Ceylon, it may be a question if a more profitable kind can be planted taking everything into account. We suppose the finest and most promising cinchona clearings of this kind to be seen at the present time in the island are between Udapussellawa and Nuwara Eliya in the Kandapola division, at elevations of from 5,500 to fully 6,000 feet. Nothing can exceed the regularity and vigour with which crown bark trees flourish in this region, and it will be interesting by-and-by to compare the yield of bark and prices obtained for the same, with those realized for the *Ledgeriana* trees grown in Ceylon.

Our correspondents "T. N. C.," "W. F. L.," "T. C. O.," and other cultivators of cinchona will be interested in the letter which has just reached us from Mr. J. Eliot Howard. Our readers will, remember the discussion which took place in our columns over the different varieties of *Officinalis* and on the value and position of certain hybrids. "*C. pubescens*, Howard" was freely referred to as one of the best recognized hybrids between *C. Officinalis* and *Succirubra*, and Mr. Clements Markham's mistake in putting it as a hybrid of *Calisaya* and *Officinalis* was commented on. We think "T. N. C." stood alone on that occasion in his wish to drop the name "*C. Pubescens*" as misleading for the hybrid, but here we have Mr. Howard himself asking that the *coup-de-grace* may be given to the variety associated with his name, the term "*C. pubescens*" being used for a species long ago established and having quite different characters. Mr. Clements Markham will have to correct his book. Mr. Howard writes as follows:—

Lord's Meade, April 29th, 1881.

DEAR MR. FERGUSON.—I have to thank you much for a copy of your Hand-Book for Ceylon just received.

I find that I am credited with having created a new species of Cinchona, the "*C. pubescens* How." I do not say that I find this in your book; for I have not had time to examine it; but my correspondents in Ceylon are writing to me about it. I think I have pointed out before that this is all an error, arising from my suggesting to Mr. Melvor the word *pubescens* as applicable to one out of two hybrids, found by him

at the same time, and similar except in the above characteristic.

The bark of this sent me by Mr. McIvor was very rich, but then what he subsequently sent was quite different.

The rich form of this hybrid is, I find, now cultivated by certain planters, but it will not, I think, come true from seed, being only a *hybrid* as Mr. McIvor thought, I believe.

The "*C. pubescens*" is a *species* long ago established and having quite different characters.

There is no end to the confusion of botanical nomenclature unless the *original* designation of species are adhered to.

If you will favour me by giving the *coup de grace* to "*C. pubescens* How." you will much oblige me.— Believe me, yours very truly,

JOHN ELIOT HOWARD.

We have no doubt that Mr. Howard's wish will henceforward be complied with in Ceylon.

PRICES FOR CEYLON AND INDIAN CINCHONA BARK IN 1880.

We have received a copy of the usual set of tables showing the prices realized by the different marks of Ceylon and East India cinchona bark sold at public sale during 1880, compiled by Messrs. C. M. & C. Woodhouse, and printed for private circulation. Prefixed to the tables is an epitome of the quantities received from the different districts, and the prices realized compared with 1879. We see from this that Prospect estate on the Nilgiris again topped the market with 12s 6d for renewed crown against 12s 8d in 1879. Mungpoo in Sikhim came next with 10s 10d for yellow quill. The Government Gardens at Ootacamund did not do so well as in 1879: 10s 2d for renewed crown and 8s for mossed crown were the maximum prices in 1880, against 11s 7d and 9s 3d in the previous year. Jamaica's highest figure was 8s 10d, against 10s 1d in 1879. The highest figure for Ceylon was 10s for root bark. We will now give a summary of the highest prices realized. Table I gives the "Government cinchona grown at Ootacamund," the highest price 10s 2d being obtained for renewed crown of 1866 and also of 1869 planting. Table II gives the "Government cinchona grown in the Royal Botanical Garden, Mungpoo, Calcutta." (This description is somewhat equivalent to "bark grown in Hakgala, Colombo," Mungpoo being in British Sikhim.) We have already mentioned the highest price obtained by this garden. Table III refers to Jamaica, and Table IV to Darjeeling, the bark being supplied almost entirely by one estate (the Darjeeling Tea and Cinchona Association), the highest price being given for a case of quill at 6s 6d. Table V gives "other East India," a somewhat indefinite description: most if not all of the estates are South Indian. Besides the 12s 6d for Prospect bark, 9s 10d to 9s 11d was paid for renewed crown Doveton, and 8s 1d for NSH quill. Table VI gives the Ceylon barks. The following are the prices over 6s:—AHT quill 6s 10d; Ardallie quill 6s 4d to 6s 6d, root 8s 6d to 8s 7d; Bamberkelle quill 6s 7d to 8s 4d, chips 6s 8d, root 7s 6d to 7s 10d; BBWD quill 6s 2d, root 10s; CBLM root 8s 10d; Calsay quill 6s 1d to 6s 7d, root 6s 2d; Chrystler's Farm quill 6s 6d to 8s 1d; Cabragalla quill 6s 1d, root 9s 6d; Cranley quill 6s 1d to 6s 3d, root 8s 1d; S & Co. root 6s 7d; Dessford quill 6s; Elbedde quill 6s; Glentilt root 7s 11d; Great Western quill 6s 3d, root 6s 4d; Loolcondura quill 6s 2d to 8s 1d, root 7s 1d to 7s 3d; MK quill 6s to 7s 4d; Maria quill 6s 1d; Maha Ellia quill 7s 2d, root 7s 10d; Manickwatte quill 6s 7d to 8s 2d; Norwood quill 6s 1d to 6s 4d; Queenwood quill 6s 2d to 6s 10d. root 7s 3d;

Rookwood quill 7s 3d to 7s 4d, root 6s 5d; Sutton quill 6s 5d to 7s; St. George root 6s 4d; Troup root 7s 8d; Wannerajah quill 6s 6d to 7s 1d; Wavendon quill 6s 6d to 6s 9d, root 6s 1d.

A TEA OR "GENERAL PRODUCE" SYNDICATE FOR CEYLON.

We can see no good reason why the tea-planters of Ceylon and the mercantile agents interested in their product should not combine for the establishment of a Syndicate after the fashion already set before them in Calcutta. If there is not sufficient unanimity to secure adequate support for a local Syndicate, then we would advise an application to Calcutta for permission to establish an affiliated branch of the institution now working so successfully in India. Fortunately this very idea has been promulgated already by a gentleman closely connected with the Calcutta Syndicate. Mr. Magor, who recently visited Ceylon, and who was reported to be well pleased with all he saw of our tea industry, dropped the suggestion while here that inasmuch as the interests of Indian and Ceylon tea planters were practically identical in regard to opening new markets, they might well work through one and the same Syndicate. Mr. Magor, we find, is Secretary to the Committee (which is composed of Messrs. Jardine, Skinner & Co.; Begg, Dunlop & Co.; William Moran & Co.; Macknight, Anderson & Co. and Williamson, Magor & Co.) of the Calcutta Syndicate, and he has been good enough to send some papers with its proceedings to a friend in Colombo, from which we gather particulars of special value with reference to the project now before the public. The Calcutta Syndicate was formed at a meeting held on 9th February 1880 of merchants interested in opening up a trade in Indian Teas with Australia. Certain sums were subscribed by the Firms who agreed to join, for the purposes of the Syndicate, and a managing Committee was appointed consisting of three Tea Agency Firms, one a firm of Tea Brokers and one of Shippers of Tea, in order to collect subscriptions, to solicit the aid of Government and deal with the shipment and sale of the teas. Three months later it was found that many public Companies and plantation proprietors were anxious to co-operate with the Syndicate by forwarding consignments of tea for disposal on their account at the best price obtainable in the Melbourne market. The great point was to secure uniformity in the quality and appearance of the tea shipped, so that the same description could be easily and at any time repeated if orders were sent by dealers and others. The Syndicate therefore determined to bulk all teas received from each district, classifying them simply as Assam, Darjeeling, Cachar tea and so on, and retaining standard samples for reference. All such bulked teas are shipped under the Syndicate mark. At the same time the following detailed instructions have been issued for tea plantation managers as to Quality, Classification and Packing:—

The requirements of the Australian Market, as far as can be ascertained are principally for the lower grades, and the Committee therefore recommended that the bulk of tea forwarded should consist of—

1. *Broken Souchong, or Broken Pekoe Souchong.*—Black leafy with strong, dark, full-flavored liquors.

N. B.—Dusty Broken to be particularly avoided.

2. *Souchong and Pekoe Souchong.*—Small even-made leaf of good appearance, with clean, dark liquor.

The above two classes should form the bulk of the Consignment but a small quantity of the following probably find a ready sale, viz:—

3. *Pekoe.*—A Good medium Pekoe leaf with some tip. Fair strength and brisk flavor Darjeeling Pekoes and Pekoe Souchongs, and also Souchongs, if not too bold, with good quality and flavor would probably sell well,

but no *extra fine* Teas should be sent. Nothing worth over about 14 As., and this should only form about a quarter of the Consignment.

Packing.—The packages should be as uniform as possible in size, strongly nailed, but *not iron-hooped*.

The size of the box should be 25" x 17" x 12", inside measurement, 45lb. to be packed in each package.

The Boxes should be neatly made, and Tares as even as possible.

Marking.—The only mark required is the garden mark, to distinguish the boxes on arrival in Calcutta, and "Tea Syndicate" on the opposite side.

Invoice.—To accompany each parcel.

It is the province of the Calcutta brokers carefully to inspect and value every parcel and to set aside for bulking only those parcels which they consider suitable. The proceeds of sales are returned to the various contributors of tea in proportion to the value fixed on each parcel before bulking. The Syndicate was started with a contribution of R20,000, subscribed by merchants and agents, and a grant from the Indian Government of R10,000 towards the expenses of the undertaking. We believe the Government grant was made on condition that the operations of the Syndicate should be gradually extended to "general produce" and not simply confined to tea.

Now here we have information of great value in helping us in Ceylon to decide on the best course for promoting the interests of our young and promising Tea industry. The advantages of the course of action adopted in Calcutta are not confined to the better opportunity afforded of establishing a large trade in the class of tea required for the Colonies, but the system also ensures that unity and identity of interests so essential to success where it is attempted to create a market for a new and comparatively unknown description of product. It seems to us in the first instance that the Ceylon tea planters and their agents could not do better than unite to form themselves into a branch of the Calcutta Syndicate. All approved teas supplied to the local Committee would then be inspected, and if approved, valued, bulked and classed as Ceylon Tea and forwarded to the Syndicate's Agents in Melbourne, Sydney, New York, or to whatever other destination it may be intended, in which operations have been begun. The great advantage of working along with India would be that we should at once share in a system and concern already well-known, and profit by the wide-spread advertisements of its teas already circulated by the Syndicate. Under the same head of "Indian Teas," the produce of Assam, Cachar, Ceylon, Darjeeling, would thus, hereafter be offered for sale by the Syndicate's Agents. Whatever new efforts might be deemed needful in Great Britain or Europe generally, would be for the benefit of Ceylon equally with that of each of the Indian Districts. Already the Syndicate have determined to operate in America, and they have sent Mr. D. A. Sibthorp (who is a professional Tea-taster) thither in charge of considerable consignments. This gentleman has become acquainted with the nature and quality of Ceylon teas at the Melbourne Exhibition, and we feel sure he would do justice to bulked consignments sent from this Colony. It only remains, therefore, for the planters and their agents to consider whether the hint dropped by Mr. Magor when passing through Ceylon, should not be taken up and acted on, enquiry being made in the meantime as to the terms of affiliation and the conditions under which Ceylon tea would be taken charge of by the Syndicate's Agents.

JALISAYA LEDGERIANA FLOURISHING IN MASKELIYA.

Nothing will give us greater pleasure than to be placed in a position to assure Mr. Moens (and the cinchona planting world generally) that, whatever may

be the case in Java, "a long dry season" is not required in Ceylon to enable the precious *Ledgeriana* to blossom and seed, any more than to grow luxuriantly. And a few more facts added to those furnished in the interesting statement made by Mr. Christie of Maskeliya, ought to convince even Mr. Moens of the fitness of certain portions of our younger districts between Adam's Peak and Great Western for the cultivation of this valuable species. After all, although blossom is an important matter, it is not the most important in respect of cinchona. If the *Ledgeriana* trees grow vigorously and put on bark after the fashion of the "*succirubra*" species (as stated by Mr. Christie) certainly the cultivation should be pronounced a decided success. His comparisons speak for themselves, and we trust these will be followed by others made by the possessors of *Ledgeriana* calisayas of an appreciable age in Boltumbe or West Haputale, in Madulsima, Maturata, and other districts. The piece of bark sent to us by Mr. Christie requires no microscope to discover its quality; to break it and taste it is almost sufficient! The analysis shews that Ceylon "*Ledgeriana*" of the true type are not likely to be a bit behind those of Java in their value to the manufacturers of quinine. Mr. Howard will be greatly interested in the experience of Mr. Christie (whom we heartily congratulate), and we shall forward to the veteran Quinologist the piece of bark sent to us, to enable him to judge of the result even at this early stage.

THE PRODUCE MARKET: THE FALLING-OFF IN PRICES.—This time last year prices were higher than now, as follows:—

Middling Plantation Ceylon ...	14 per cent.
Good Ordinary Native Ceylon ...	19 "
Mysore Coffee ...	22 "
New York Fair Rio ...	35 "
Coconut Oil ...	12½ "
Cochin ...	10 "
Mid. Uplands Cotton in London ...	15 "
Tinnevely "	13 "
Fair Dhollerah ...	26 "
Good Fair Westerns ...	26 "

"GOLD IN CEYLON."—We are indebted to a correspondent signing "Granite" for the following:—"A quick and inexpensive method of testing quartz is much needed at the present time. Here is one: take a candle and a blowpipe and apply the flame to the face of a promising lump of quartz, concentrating the heat on one particular spot for three minutes more or less. If there is gold, it will very shortly become coated with the precious metal. 'Contrary, no.' This test I have seen applied to good specimens of silver ore, with the result, as may be supposed, of completely plating the heated surface. Having fancied that the ardour of the gold-seekers was abating somewhat, I have sent this note, and am in hopes it may give a fillip to their flagging zeal."

CITY ANALYST'S REPORT.—Mr. Thomas Jamieson, F.C.S., public analyst for the city, has examined in the course of the past three months examples of milk, confections, tea, oil, and butter. In the milk there was no excess of water and no deficiency of cream. In two cases the confections contained no injurious ingredients, two varieties were "harmless," one was injurious, and one "suspicious." The oil was free from injurious ingredient, and the butter was found to contain 51 per cent. of butter fat and 49 per cent. of other fat. Mr. Jamieson examined four samples each of teas of 1st, 2nd, 3rd and 4th qualities. Of the 1st and 2nd qualities the samples were unadulterated, in the 3rd quality one contained 8 per cent of other than tea leaves and in the 4th quality there were two such samples one of which contained 21 and the other 3 per cent. The amount which the analyst earned in fees was £1.—*Aberdeen Journal*.

Correspondence.

To the Editor of the Ceylon Observer.

TEA, CINCHONA, AND COFFEE CULTIVATION :
—IN EXPLANATION.

The Tea and Cinchona Plantations Co., Limited.
DEAR SIR,—In the prospectus of this Company is printed the following from Mr. H. J. Seymour, dated Jany. 25th, 1881 :—

"I am glad to be able to give you some information respecting tea in Rakwana and Morawa Korale district (the district in which the whole of the Company's properties are situated). I was in charge of 'Barra' estate (about five miles from the Company's land) for a year or so, and we did very well with our tea which was planted on abandoned coffee land. I am not sure as to the yield of leaf, but think we got between 500 to 600 lbs. per acre, &c."

You will note Rakwana and Morawak Korale are made out to be *one district*, and Panilkande and Anningkande are said to be *only five miles* from Barra. Now the real distance is quite fifteen miles, and although, no doubt, tea grows exceedingly well in Morawak Korale, the Rakwana and Morawak Korale districts are very different in most respects. On "Barra" there is still fine coffee which was old when Morawak Korale district was opened, whereas the Morawak Korale coffee is already almost entirely abandoned.

Again, Mr. Seymour had really nothing to do with tea on "Barra." Mr. Ryves was in charge of it, and I have the very best authority for saying that the yield per acre was then just about half of the quantity above stated. In fact, there were only about twelve acres in partial bearing, and none in full bearing at the time Mr. Seymour was on "Barra."

I adhere to the "facts" mentioned in your correspondent's letter, as to "Venture" and its crops and manures. Up to quite recently the bulk of the manure was *bones and poonac*. The quantity and composition of the mixture are in my possession, having been given to me by the proprietor and superintendent of the estate.

But, as you have pointed out to me, you did not say Mr. Ross had already got 3 to 4 cwts. extra per acre from his manure, but merely that if he did get that quantity at an expenditure in manuring of £70 per acre it would repay him, I quite agree with you. Many others besides me understood you to imply that he had already increased his crop by 3 to 4 cwts per acre.

That Mr. Ross does not now use bones and poonac proves that he is still experimenting; and, as his experiments are under the guidance of one of the best practical chemists in Britain, we may depend upon everything being done in accordance with the best principles. That he may succeed must be the fervent wish of all who are interested in coffee; that he deserves success all who know him will admit. He has long been recognized as one of our most plucky, intelligent, and enterprising planters. W. M. K.

Mr. Ross's manure of 1878-79.

Herewith copy of prescription	manure handed	
to me 2½ years ago :—	£	s.
5 tons dissolved phosphates ...	@	8 10
7 ,, sifted guano (Peruvian) ...		13 0
8 ,, muriate of potash ...		8 10
4 ,, sulphate of magnesia ...		4 15
4 ,, nitrate of soda ...		16 15

To above add 30 tons bones and 60 tons castor or other cake.

C. SUCCIRUBRA AND THE CINCHONA
ALKALOIDS.

Royal Botanical Garden, Peradeniya, 23rd May, 1881.

DEAR SIR,—I fear from a remark in your columns on Saturday that the observations I made in my annual report for last year on the cultivation of cinchonas have been misunderstood in one point by you, and I am anxious to put myself right. It was very far indeed from my intention in those recommendations to "warn planters against succirubra." On the contrary, as many planters are well aware, I have been strongly recommending them to keep up a good back-bone of that species so as to be prepared for possible changes. The advice in the report was addressed to those who are so fortunate as to possess plants of *Ledgeriana*, the inferior sorts alluded to being specially the various *Calisayas*, so liable to be mistaken for it. I also expressly guarded my observations by the remark "assuming that quinine retains its commercial pre-eminence over the other alkaloids," for, of course, a change in this respect materially alters the whole conditions of the enterprise.

He would be a rash man who ventured to predict the future course of events; but though the *ultimate* issue may not improbably be that a pure mixture of the four alkaloids without any other substance mixed with them will be generally used, there are no signs of any speedy change in the present state of things, and therefore I feel justified in the advice I have given.

Fashion and custom have extraordinary power in Pharmacy (extending even to the constant prescription of drugs which are known to be almost inert, though possessing a high popular prestige), and the great quinine-manufacturers, whose power is undoubted, may be expected to resist with all their strength any change in the present estimation of quinine.

There is another matter in which *C. succirubra* plays an important part; that is "bark" itself as a drug. It must be remembered that cinchona bark is still largely prescribed for many complaints. In connection with this, I send you a copy of the *Pharmaceutical Journal* just received, in which attention is drawn to an important article by Professor Flickiger of Strassburg, the leading pharmacist in Europe. I have been lately in correspondence with him on the subject of this article, and was able to assure him that we in Ceylon grew extensively the true *C. succirubra* as understood by Howard. You will see that he gives his reasons for fixing upon the bark of Indian grown *C. succirubra* as the official bark of the new German Pharmacopœia to the almost complete exclusion of other kinds.

This decision is of especial importance when it is remembered that the necessity of an international Pharmacopœia is now generally recognized and likely to be actually undertaken, in which case the action of Germany in this matter of bark might not improbably be generally adopted.—I am, sir, yours faithfully,
HENRY TRIMEN.

The article referred to is as follows :—
CINCHONA BARK AS AN ARTICLE OF THE
OFFICIAL MATERIA MEDICA.

In a recent number of the *Pharmaceutische Zeitung* Professor Flückiger has drawn attention to the uncertainty now prevailing as to the kind of cinchona bark that would be best to use for pharmaceutical purposes. He considers that from the importance of that drug as a medicine this circumstance alone is sufficient to justify the existing desire for a revision of the German Pharmacopœia, and the same view may be applied to the Pharmacopœias of most other countries.

One of Professor Flückiger's objections to the three kinds of cinchona bark now officially prescribed is

that they are referred to only as of South American origin, and he points to the development of the supply of bark from British India since 1867 as having now reached a stage when India-grown bark requires to be considered in a very different manner from what was possible when the last German Pharmacopœia was published in 1871.

The question to be considered is how the cultivated cinchona bark imported from India should be dealt with in a new Pharmacopœia, and Professor Flückiger is of opinion that its consideration must not be confined merely within the limits of a pharmacopœia commission, or undertaken exclusively from a medical or pharmaceutical point of view, but that it must be conducted also with suitable regard to the present position of cinchona bark as an article of commerce as well as the probable form that it may take in the future.

From an examination of the various circumstances obtaining in regard to those varieties of South American cinchona bark which are now official, Professor Flückiger arrives at the following conclusions, which, we think, will be of interest to our readers.

The flat calisaya or yellow bark of the Pharmacopœia, he finds to be more scantily and less regularly exported than formerly and at the same time it has become inferior in quality, the amount of alkaloid in the Peruvian and Bolivian calisaya bark being very much less than we were formerly accustomed to. Whatever may be the cause of this deterioration it is unquestionable that the official calisaya bark does not meet the requirements which the Pharmacopœia should demand of cinchona bark to which preference is to be given; such bark ought to be obtainable abundantly and uniformly at a comparatively moderate price, and it should contain an adequate as well as a constant amount of alkaloid. In addition to these points it is to be remembered that the therapeutic action of cinchona bark must be in part ascribed to other constituents besides the alkaloids. The quinotannic acid, quinovin and quinovic acid, as well perhaps as quinic acid, are present in smaller proportion in the stem bark of calisaya than in most kinds of branch bark. All these facts are regarded by Professor Flückiger as being so unfavourable to calisaya bark that, he would recommend its being abandoned as an article of the official materia medica. As a further reason for taking such a step, he refers to the geographical as well as the political situation of the frontier lands of Bolivia and Peru where the cinchona calisaya is indigenous. The high table-land surrounding the Titicaca Lake is very difficult of access, very insufficiently connected with the rather defective ports of the Pacific Coast Islay, Arica, or, if the territory in question be somewhat further extended, even Iquique and Cobija. Occasional violent floods and earthquakes also combine to render the development of these localities very questionable, and the present unsettled state of the country is a further reason why the pharmacist should not rely upon such an uncertain source for the supply of such an important drug as cinchona bark.

The same remarks are applied to the bark known as Loxa or Huanuco bark, and even somewhat more forcibly. Though perhaps it may be hoped that at some future time the Chilians may improve the condition of the southernmost cinchona district adjoining the ports of Cobija and Iquique, there is now little prospect of rapid economical advance in the central district of Peru surrounding Huanuco. If the Peruvians have not hitherto seen the desirability of making a sensible use of their cinchona wealth, it is not likely they will now be able to undertake the cultivation and planting of trees as a business, and it may be feared that impending revolutions will scarcely leave the Government of that unfortunate country time or means of opening up the interior for trade.

As to red bark, it is urged that the district where the *Cinchona succirubra* is indigenous in South America is so limited as to account for the very scanty supply of this bark and also for the high price it commands. Whether bark of the same character may not eventually be obtained at a cheaper rate from India is a question that must be left for the future to solve, but for the present there can be no hope of obtaining thick stem bark, such as is ordered by the German Pharmacopœia. Such bark is not often to be had at all, and its intrinsic value seldom corresponds to its price.

In Bolivia and that part of Peru within the valley of the Amazon cinchonas are probably abundant, as indicated by Ledger's discovery of the very valuable tree named after him; but those sources of supply will become accessible only when the numerous rivers of that immense region shall have been opened up for regular traffic. The possibility of exporting cinchona bark of excellent quality from that locality has already been practically demonstrated, but it will probably be a long time before there be any trustworthy means of communication.

Beyond these sources of South American cinchona bark there is the northern part of the cinchona region in Columbia and Venezuela, to which belong the *C. lancifolia* and *C. pitayensis*. The south western section of this district is partially connected with the Atlantic Ocean by the rivers Cauca and Magdalena and this part of South America undoubtedly still yields the greater portion of the cinchona bark of commerce. At the ports of Carthagena and Savanilla especially, as well as those of Maracaibo, Puerto Cabello and La Guaira, are very considerable harbours, which are connected with the Atlantic Ocean by the Caribbean Sea, and for the shipment of bark they have an obvious advantage over those situated on the Pacific. The objection raised by Professor Flückiger to taking the bark supplied from this district for pharmacopœia purposes is based upon the difficulty he thinks there would be in making a selection from among the various kinds differing very considerably in their appearance and in the amounts of alkaloids, etc. For the preparation of quinine, mere differences of character are of less importance, provided that the amount of alkaloid be sufficient; but in selecting a variety of cinchona bark for the Pharmacopœia, it is, in Professor Flückiger's opinion, at least necessary to put prominently forward a specific kind of bark, even if it be not exclusively ordered. If the bark thus adopted, is to be moderately uniform in outward appearance he thinks it is scarcely possible to look for it from Columbia or Venezuela, while at the same time he thinks there is much reason for giving preference to a branch bark rather than a stem bark. The latter is always proportionally more costly, since it is better to work in the quinine factory.

After thus surveying the native habitat of the cinchonas from the Central Cordilleras to the northernmost extremities of the mountain range without finding any part of it whence cinchona bark is to be obtained to suit the requirements of the Pharmacopœia, Professor Flückiger points to the cinchonas cultivated in India as presenting the most advantageous opportunity for the selection of an official bark for the Pharmacopœia.

As regards the amount of alkaloid in Indian grown bark, experience has shown that it is increased by cultivation and though all Indian grown cinchona bark may not be equally rich, that is also the case with the bark growing wild in South America. As time progresses it may be expected that the systematic culture of cinchona trees in India and Java will have led to a knowledge of the most favourable conditions for securing the largest and most uniform produce. It is now beyond question that India furnishes excellent cinchona bark and it only remains to inquire

whether that country can be relied upon for yielding enough of it. At present the supply from India may be taken as amounting to about one-tenth part of the entire production from all countries, although it was only in 1867 that the first India cinchona bark made its appearance in the London market. Professor Flückiger thinks, therefore, that it is only a question of time when South America shall be equalled in this respect by India and other colonies and that the latter may even become the chief source of supply.

Following up the question as to the kind of bark to be selected from among those grown in India, Professor Flückiger does not approve of deciding altogether from the amount of alkaloid. He holds that if the physician desires to have recourse to the curative action of the alkaloids it is best to employ them in a pure state, and to employ cinchona bark or some one of its pharmaceutical preparations, chiefly in cases where the accessory influence of other of its constituents is desired. From this point of view it is admissible to dispense altogether with bark, which like good flat calisaya, is of value chiefly on account of the quinine it contains.

In selecting from among the branch bark of various kinds of cinchona there is some difficulty, but taking all things into account Professor Flückiger inclines to that of *C. succirubra* as being most suitable to adopt as official for pharmaceutical purposes; but in order to provide against any possible future experience contrary to that we now possess, he would not entirely exclude other kinds of bark provided they contain a sufficient amount of alkaloid.

INDIA-RUBBER PLANTS.

London, 6th May 1881.

DEAR SIR,—I have received another lot by post of *Tabernaemontana* seed, and it was eagerly purchased here by Ceylon men, who see that it is a great advantage to get the seed of new trees rather than have to pay 10s for plants and wardian case and the freight and expenses.

As I found that after Brazil, the west coast of Africa sent the next largest quantity of rubber to this market, you will admit I was warranted in searching out for these trees that yielded this supply. I have still about four unnamed. Professor Oliver of Kew worked out the details of this? *Tabernaemontana crassa* from the specimens I sent him.—Yours faithfully. THOS. CHRISTY.

A LONDON AGENCY FOR CEYLON TEA.

Strathellie, Nawalapitiya, 25th May 1881.

DEAR SIR,—Mr. W. Turing Mackenzie's suggestion of a London tea agency for Ceylon should not be allowed to fall to the ground. I should propose that a meeting of those interested in tea should be held in Colombo to discuss the matter. If any gentlemen in the mercantile community could find out for us the best way of proceeding, or the probable cost of establishing an agency, I will undertake to do what I can towards getting the promise of a lot of tea, and I think I am safe in saying that if there is a prospect of getting a good sale for it I could get contributions of from 10,000 lb. to 20,000 lb. of tea to help to start the thing. Money would be required too, and I dare say many who have only a little tea at present and expect to have a good deal more would give a money subscription. Of course, no one supposes this tea will be given away, but those who contribute it must take their chance of a good or indifferent sale, and I for one, from experience gained by sending tea home, am certain we shall have no difficulty in selling our tea, if it is only properly advertised.

The pruning season is now at hand, and I suppose much tea will not be made for some little time, but in the meantime let those interested think the matter over, and let us have a meeting in Colombo, say in Au-

gust. Race week is generally a good time for getting men together there. If I can be of any use in collecting promises of chests of tea or promises of money I shall be glad to hear from those inclined to contribute either.—Yours faithfully, P. R. SHAND.

“LEDGERIANA” CULTIVATION UNDER THE SHADOW OF ADAM'S PEAK

MASKELIYA BEATING JAVA!

St. Andrews, Maskeliya, 23rd May 1881.

DEAR SIR,—In your preface to Mr. Moens' Report on the Java Government Cinchona Gardens, you add the weight of editorial opinion in corroboration of Mr. Moens' disapproval of the young districts as a field for *C. Ledgeriana* cultivation. Now, had enough things are said of the young districts without this, and I must ask you to beg the young districts' pardon and heal the wounded feelings of my *Ledgeriana* trees by retracting this statement. I did not think Mr. Moens had sufficient experience of our climate to form a fair opinion about it; and even granted that our climate is too damp to induce profuse blossoming, that is no reason why the quantity or quality of our bark should be condemned. However, I do not think that our climate is too wet to produce a proper amount of blossom, but as the blossom is very slow in coming out, it does get too much rain on the top of it, and in Java such would also seem to be the case. Most of my old trees are covered with bud and blossom, and Mr. Agar tells me that the trees at Mahanilu, which he obtained from me in 1876, are also in blossom.

My oldest *Ledgerianas* will be five years old next month, and are well-grown, robust-looking trees, and many of them would give almost as much bark as a *succirubra* tree of the same age; for, though the stem may be smaller, the bark is far thicker. I measured four of the best to-day, growing side by side. They averaged 16 feet in height, and stem 13½ inches, in circumference a foot from the ground. Now to compare Ceylon with Java, Mr. Moens says that it takes four of his four year old *Ledgerianas* to give one kilogram of dry bark, i.e., each tree gives just nine ounces. This statement is not very clear, and I can hardly believe it to mean that if a tree were cut down all the bark would only weigh nine ounces. Perhaps it means that nine ounces can be taken from a living tree without killing it. I unfortunately have no four year old trees, but I am perfectly certain that at four years my trees would have averaged more than twice nine ounces, and one tree (one of the best) broken across by the wind last year (when it was four years) gave almost three lb. of dry bark, exclusive of the stump and root.

Mr. Moens' interesting figures about his fifty *Ledgerianas*, two years old, led me to compare mine.

To-day I most carefully measured 52 trees beginning at the first tree of the first line, passing over only two, one with a double stem, and one that had been broken across; the other 50 were a fair average and included two small supplies. If my calculations of the Java metre* is correct the Java and Ceylon figures are:—

	Fifty Java 2 years old <i>Ledgerianas</i> .	Fifty St. Andrews 22½ months old <i>Ledgerianas</i> .
Average height ...	57	65 inches.
„ stem circumference 4 inches from ground ...	3.937	3.965 „
„ across branches ...	39.37	38. „
Maximum height ...	74.80	84. „
„ stem circumference ...	5.51	5.5 „
„ cross branches ...	55.12	48. „

* Mr. Moens' metre is, of course, the French one of 1.093638 yard.—ED.

Mr. Moens describes his measurements as being from two year old trees in a "flourishing garden at Tjibeureum"; mine are from trees planted out on 5th July 1879 amongst coffee. So, taking all these circumstances into consideration, the Ceylon figures are so much better than the Java ones that I cannot help thinking that Mr. Moens dates his four or two years from the day the seedlings are pricked out, and not as we do in Ceylon from the day the plant is put out in the open. If Mr. Moens continues to record the growth of his 50 trees, I will be much interested to continue the comparison.

My old trees are planted at an elevation of about 4,000 feet. The 50 recorded above are growing on steep land, with deep gritty soil at an elevation of about 4,250 feet. I believe that the non-clayey slopes of the hills in the centre valleys of Dimbula, Dikoya and Maskeliya will grow Ledgeriana perfectly, and that with a sheltered eastern aspect, it will do well up to 5,000 feet, although I would prefer 3,500 or so.

I send you a small bit of bark from one of my old trees; in similar bark I have seen the alkaloids and it gave an analysis of 4.79 sulphate quinine at four years of age—probably the richest Ceylon bark, of its age, upon record. If you break the piece of bark, examine the fracture under a microscope, I dare say you will see the particles.

I see that Mr. Moen, as well as Dr. Trimen, remarks upon the difficulty of getting "cuttings" to strike. I hardly know what the technical meaning of a "cutting" is. Does it include suckers from the stem of the tree? I have no difficulty whatever in getting suckers to strike, but with the ends of branches it is very different, and only two or three per cent root.—Yours truly,

THOS. NORTH CHRISTIE.

TEA.—Letters from Darjeeling say that they are having an exceptionally hot and dry season, though it opened very promisingly, indeed, with fine soft weather. The latest estimates from this district do not place the crop of 1881 as larger than that of 1880; but labor is reported to be very plentiful, and this, coupled with the rising prices at home, many make a better season than was anticipated.—*Indian paper*.

JAMAICA planters have been reinvited to learn that something is at last to be done towards the improvement of railway communication in the island. The Crown Agents for the Colonies are now advertising for tenders for the construction of works described as follows: 1. a railway beginning at the Old Harbour Terminus of the Jamaica Government Railway and terminating at Porus, the total length being 24 miles, 1 furlong, 7 chains, or thereabouts; 2. a railway beginning at the Angel's Branch Terminus of the Jamaica Government Railway and terminating at Ewarton, the total length being 14 miles, 2 furlongs, 3 chains or thereabouts.—*Colonial Register*.

PRESERVATION OF EGGS—I give a few recipes, and will feel thankful for satisfactory results. The former I have tried from the months of June to February; the eggs kept fresh for about three weeks:—

1.—Place the eggs on their smallest end on a perforated wooden rack.

2.—Oil of linseed or poppies, it is said, will keep the eggs fresh for two years (?)

3.—Solution of gum arabic applied to the shells. Result:—One year fresh (?)

4.—Unslaked lime, 14 lb.; table salt, 4oz.; cream of tartar, bitartrate of potash, loz. each; and water sufficient to form a solution to float an egg. This is Jayne's liquid reduced, I believe. Have any of these recipes been tried? The last, it is said, will keep a year.—*Asiatic*.

CEYLON AT THE MELBOURNE EXHIBITION.

FRUIT AS AN ARTICLE OF FOOD.

Mr. Buck, before his departure for India with Mr. Inglis, came to the conclusion that amongst the millions of India, especially Northern India, Australian fruit would be acceptable and in demand as an article of food. Hence the article which you will see in the *Argus* of 28th April. Mr. Moody told me of the intended trial shipment for India of apples, and asked me about a similar shipment to Ceylon. I could not honestly hold out the prospect of any very large demand in our colony, but I am not sorry to learn that a shipment of Tasmanian apples was made by last steamer. Had I known the fruit was positively going, I should have written about it. Knowing that apples from Australia are pretty frequently in our markets, I did not care to send any on my own account, but I asked Messrs. Law, Somner & Co. of this city to forward 20 to 30 lb. of grapes through their agents at Adelaide. Mr. Withers of the P. & O. Company having kindly consented to allow the box go in the ice-room. I fear there has been some hitch, as Messrs. Law, Somner & Co.'s agents have never responded to their request. Non-resinous sawdust is the substance usually employed for packing grapes, but I saw an account of a very successful shipment to England in cork-dust. If this could be obtained, it would, no doubt, be preferable, but with special arrangements for carriage, quick voyages and cheap freight (which are all close at hand), I quite feel that India and Ceylon could take and would be immensely benefited in taking large quantities of the delicious grapes grown so profusely in these lands. Apart from "the grape cure," what nicer or more nutritious lunch could any man partake of than a couple of Swallow & Ariell's Australian biscuits and a bunch of Australian grapes? What renders a trade in fruit precarious and fruit consequently expensive is the liability of fruit to spoil. But by attention to mode and period of plucking, careful packing and quick transit in cool chambers, fruit could certainly be carried to India and Ceylon as well as to England in good condition. Mr. Inglis, who long resided in India, has made certain calculations of cost, profit, &c., which Australians do not regard as very encouraging, considering the rather high cost of fruit in Melbourne itself,—this as regards apples. But from Tasmania, South Australia and Queensland any quantity of fruit could be sent to a fairly profitable market. The Curator of the Horticultural Gardens here, having called at the Ceylon Court and offered to supply fruit or seeds, I visited the gardens a few days ago, and was much interested in what Mr. Neillson shewed me and told about apples, pears, peaches, cherries, "persimmons" (a Japan fruit) &c. The many hundreds of varieties represented surprised me, and I was specially interested in trees dwarfed by a species of double grafting. The stock is the "paradise" apple, and on the first graft a second graft is put. The result is that trees about the size of coffee bushes grow 4 dozens each per annum of very fine apples. It strikes me that some of these dwarf planted in tubs might bear good fruit even in Ceylon. I remember Sir John Cheap bringing to the *Observer* office some fine apples produced in Deltota, on small three year old trees grown in tubs. Mr. Neillson will make up boxes of choice apples for Ceylon when I advise him, and is ready to give plants of vines, figs, persimmons, &c., I hope to arrange about this. Of peaches a good many remain in these gardens, although a species of "blight" (aphis, I believe) has within the past few years, threatened to annihilate this fine fruit in Victoria. The American blight has also affected apples, and a moth has been very bad with "black spot" on the leaves and fruits of pear trees.

While there are portions of Australia where wheat cannot be grown in consequence of rust, it is reassuring to learn that a grub, which some years back threatened to put an end to cabbage culture, has entirely disappeared. Mr. Neillson finds that the best remedies for the insect blight are superphosphates applied to the roots of the trees, and the form of carbolic acid called phenyle* syringed on the foliage. The acid, if applied so strong as to be likely to injure the foliage, is washed off after a few minutes by the application of water. But I must reserve for notice on a future occasion a series of the Garden Reports from 1872 to 1880, courteously furnished to me by Mr. Neillson. Insect pests are occasionally as common and as mischievous in Australia as are the cockchafer beetles and their grubs in Ceylon. Mr. Wallis of the Agricultural Department has kindly complied with a request from me by presenting me with two sets of lithographed and coloured sheets (one for the Ceylon Government, the other for myself) of the poisonous snakes and of the insectivorous birds of Victoria. Before I had seen the sheet of 36 birds, I had been struck with the habits of a tame "Australian magpie" at the abode of Mr. Ferguson, of the Mount Macedon State nurseries. A large horsefly on my clothes was instantly snapped up by the bird, as were all insects within his purview. The so-called "magpie" would, I believe, be a great acquisition in Ceylon, not only as a preyer on chafers and grubs but for the sake of his sweet, pathetic notes, a combination of the dove and thrush. Less remarkable but far more prevalent than the "laughing jackass" with his cacchinary shouts—theirs rather, for male and female kingfishers respond—are the "magpies" and their notes. If we laugh with the "laughing jackass" we listen with surprise and delight to music from magpies. I am contemplating taking or sending a few pairs to Ceylon. The "magpie" is the largest considerably of the birds figured as insectivorous and is thus described:—

"WHITE-BACKED CROW-SHRIKE, OR MAGPIE (*Gymnorhina leuconota*). LOCALITY: Generally distributed over Victoria. FOOD: locusts, grubs and larvæ of various kinds."

Next in value appears to be "HARMONIOUS SHRIKE-THRUSH (*Colluricincla harmonia*). LOCALITY: all over Victoria. FOOD: beetles, caterpillars and insects." This second shrike seems to be also a song-bird as well as a devourer of insects (as all the shrikes are), but the superior size of the "magpie" renders him the more desirable bird for a trial. He is nearly as large as a crow, and in captivity whistles tunes beautifully. The magpies ought to feel at home on the gum trees now so common on estates in Ceylon and which I have seen loaded with cockchafers on warm evenings.

INDIA-RUBBER FROM INDIGENOUS TREES.—A merchant brought us a branch and a box of seed the other day, taken from a tree which had yielded an abundant supply of milky juice likely to be of value when prepared as India-rubber. "W. F." writes:—"The branch you sent me is well known to me by its Sinhalese name Kiripella, and is the *Ficus infectoria*. See what I say about it in Mendis' list No. 45:—'Kiripella, *Ficus infectoria*, Willd. *Urostigma* do. Miq. Thw. En. p. 265. C. P. 3,083. The bark of this tree is used by the natives for chewing with betel, but the timber of this tree and of most of the other species of *Ficus* are scarcely ever used for any valuable purpose. They are all nearly worthless.' All the figs and we have about 23 species in Ceylon, are natives, but is the rubber from them worth the expense of collection?" That is just the point which only a practical test can settle: our mercantile friend is right in trying the experiment.

* Little's soluble phenyle.

CEYLON COCOA IN GREAT REQUEST.

Cocoa.—The market at public sale this week was strong. Trinidad selling at full rates, Grenada at 2s to 3s advance. Since the auctions there has been business of some importance transacted privately, the market being reported firmer. A little lot of Ceylon cocoa 12 bags Palli, sold at the enormous price of 115s 6d. As regards the sample, it was much the same as those to hand previously, if anything we think the beans were rather smaller. Ceylon cocoa is very much liked, and appears to be very well cured, and remarkably free from moisture, so that the loss in weight is almost nil. As we have, however, pointed out before, these sales of little lots at high prices must not be taken as absolute proof of the real value of Ceylon cocoa in quantity. In this particular instance we happen to know that two brokers had orders for it without limits, so that the price was driven up considerably. When the supply of any article is large, such orders are rarely, if ever, given:—

Stock of cocoa:—

1881.	1880.	1879.	1878.	1877.
Packages.	Packages.	Packages.	Packages.	Packages.
59,915	34,384	16,654	26,063	24,538.

—J. A. Rucker & Bencraft's Price Current, 29th April.

THE TEA SEASON IN CHINA.

HOW THE BIG TEA COUNTRY REGARDS ITS YOUNG RIVALS.

The mail steamers are bringing out the usual flock of tea-buyers, who will soon be off to Hankow to inaugurate the 1881-82 campaign, and before it opens we may be pardoned a few remarks on the season now departing. It was not a profitable one; in fact, it is only about once in ten years that tea merchants own to having had a successful season, and still outsiders wonder how it is that the same number of buyers can come out each year, the same rush to ship take place in Hankow, if every year except the tenth comes with disaster in its train. There is a well-spring of hope in the teaman's breast that never fails. However despondent he may pretend to be to his fellows and the general public, in the sanctity of his own tea-room his cares fall off, and he makes a victim of himself once more as if every tea-muster concealed a trust-worthy guarantee of profit.

It is not so many years, in fact the time is within the memory of many of those who will be in Hankow next month, when China was the only tea-producing country. It was sufficient then for the buyer to watch the deliveries at Home and the export from China, to be guided, with little chance of error, in his operations. But the fatal energy of our race has reared up in British India a frightful rival to the Flowery Land, and India not only demoralises China by sending opium here, but demoralises our tea markets by sending tea in increasingly enormous quantities to London. There are no squeezing mandarins in India; there is European supervision in the packing and firing of the leaf, and the plantations are connected with civilisation by the railway and the telegraph. Everything is done to give India an unfair advantage over China. Consequently Indian tea of the same quality is far cheaper in London than the ill-regulated produce of Hankow and Foochow, and it is only the conservatism of the consumer, who is not yet entirely habituated to the Indian flavour, that prevents our losses being much heavier than they are. Every year this preference for the leaf that has been longer known is wearing away, and our buyers will soon have to reckon with its disappearance. As yet, Indian tea is hardly taken on the Continent of Europe at all: but here too it will penetrate sooner

or later, as it is doing into America and Australia: and then there will be no corner of the earth where the sway of China tea will be undisputed. Java is competing too, and Ceylon is threatening: even the much-vaunted Johore is supposed to be seriously considering the policy of exchanging for tea its rising plantations of coffee.

To believe the warning voices heard from Home, the new season is not opening auspiciously. England has not yet recovered from the recent depression, and cheapness is the watch-word of the dealer and the consumer. Notwithstanding a general lowness of prices, consumption at Home last year did not show the normal rate of increase in tea generally, but rather a fair increase in Indian and a heavy deficiency in China tea. The consumption in England in 1880, as we gather from the London annual tea circulars, was two-and-a-half million pounds less than in 1879; and as the consumption of Indian tea was eight millions larger in 1880 than in the previous year, the actual consumption of China tea showed an unexpected falling off of ten millions and a half. This deficiency was largely remedied by an increase in the export from London to the continent of eight millions, an increase as welcome as it was un hoped-for; but if it had not occurred, the collapse in China tea would have been frightful. This should give a serious warning to the sanguine buyers who are calculating the credits they are about to exhaust in Hankow; whether its lesson is appreciated, the next two months will show. There is little chance of the curtailment of the supply of Indian tea. Even at the low prices at which it was sold in London this last season, it gave profits to all but the oldest and most expensive gardens, and until foreigners can supervise the packing of the leaf in China as they do in India, the produce of the latter country will continue to have an unfair advantage. The time no doubt will come when we shall be able to go up and buy the raw leaf on its native hills, pack it by our own methods, and bring it down by railway to Shanghai for shipment; but for years yet we labour under the disadvantage of having to buy it just as the Chinamen choose to prepare it, without any real knowledge of the total crop at any time, or any immediate power to manipulate the teas to suit the tastes of consumers.

The most remarkable feature of the season now closing is the enormous increase in the export from all China and Japan to foreign countries. In 1868-69 the total export from all China and Japan to all foreign countries was about 205,000,000 pounds; eleven years afterwards, in 1879-80, it was nearly 245,000,000 pounds, the increase in eleven years being forty millions, half of this increase being in Japan tea. This shows a wonderful expansion, considering that in those same eleven years, Indian tea assumed enormous proportions. But this last year has seen an increase as large as in the whole previous eleven years. The total export last year was 285,000,000 pounds, or forty millions above that of the previous season. Japan is only responsible for five millions of this increase, the export of China tea alone being 35,000,000 pounds above that of the season ending in 1880. Half of this increase went to London: America, Australia, and the Continent divided among them the other half. It is easy to understand the present depression of the London market, and to appreciate with what caution buyers should approach the campaign now opening—*North China Herald*.

FIJI.

(From a Correspondent.)

The planters are chiefly interested in growing sugarcane, coffee, and cotton. The spontaneous product of the cocoanut-tree is also turned to lucrative account. There are some other industries of minor

importance. The sugarcane (Vico, if it is the true cane) is an indigenous plant and attains to a height of from 20 to 30 feet. But the best kinds of foreign cane have been introduced, and are seen on the plantations, which are not a tangled mass of cane, as in India, but are carefully and systematically-planted-fields. The plan adopted is on this wise: pieces with five eyes or points are laid (two inches under ground) end on in parallel rows, about five feet being left between the ends and the rows so that a cart can be taken down in any direction; thus during the growing process, the canes get light and ventilation, and can be readily watched and tended. The average yield is 35 tons the acre. Crushing power is at present very limited, but the advantage to be gained by the erection of modern machinery on a large scale has been seen by the wealthy and important Australian Sugar Refining Company, which is now putting up extensive works on one of the most promising cane-growing islands, Viti Levu. But there is plenty of room elsewhere for similar enterprise, with equally good prospects. The crushing now takes place all the year round; it is a bad system, but the want of mills with adequate crushing power necessitates the commencement of cutting before maturity, and the leaving a large part of the crop to over-ripen for months. The result is that the density of the juice from one crop is very uneven, and is seldom taken at its highest. Still, with all its drawbacks, the industry is a paying one, and will in time be highly remunerative to both planters and mill-owners. The exportation of sugar rose from £3,417 in 1875 to £26,687 in 1879; the land under cane cultivation being now about 2,000 acres. Coffee is being successfully cultivated, but it is only within the last three or four years that it has attracted the serious attention of the planters, and already they have had to contend with disease, necessitating the destruction of at least one plantation. The crop, picked in 1880, yielded from 300 to 450 lb the acre, and the berry was of good quality and flavour. The beautiful island of Taviuni takes the lead in coffee, but there are flourishing plantations on other islands, and there seems to be no reason why coffee should not be as successfully cultivated in the Pacific as in Ceylon and in India, and find as good markets. Cotton—Sea-island cotton—has world-wide celebrity; it is easily cultivated in the Fijis, but the production has latterly fallen away, the quotations being too low to tempt the planter. At present there are about 3,000 acres under cotton, but the exports have dwindled from £28,706 in 1875 to £15,690 in 1877. The prices quoted last year were from 2s. to 2s. 6d. per lb., and if those prices could be maintained no doubt a fresh impetus would be given to the industry. The great industry is copra-making, a very simple one, affording a maximum of profit with a minimum of risk, outlay, and trouble. One tree is held to yield 100 nuts a year; 50 trees are planted to the acre, giving about one ton of copra, worth on the plantation £12 10s. But, as a rule, the trees are far too closely planted, especially on the old plantations, and are covered with creepers; so that for want of light and air, they are not nearly so fruitful as they otherwise would be. It is calculated that there are about 10,000 acres under cocoanut, and the value of the copra exported rose in 1878 to £122,194. Besides the copra, the fibre and oil are valuable products; and it is very clear, therefore, that cocoanut-tree planting is a profitable industry in the Fijis. It may be remarked, in passing, that the smell from copra is so disgusting as to make the propinquity of a copra store house, or life on board ship with a freight of it, very trying. Among the minor agricultural or forest products it pays to cultivate or collect for exportation, are ground nuts, of which the annual export is at present about £3,000; arrowroot, some of which is of excellent

quality and fetches in the London market '10d. a pound, and the root of the yangóna or kava (*piper methysticum*) so much esteemed by the natives. This plant, the yangóna, is indigenous to the islands; but will only grow under certain conditions, and is used on all ceremonious and festive occasions. It is prepared for use in the presence of the assembly by servants who chew up the root to pulp, which is then mixed up with water in a kava bowl and the liquor after being strained is drunk off. The taste is something like an aromatic, but not very pleasant compound known as Gregory's mixture: the effect is slightly exhilarating if much is drunk; but it affects the legs and not the senses, and the effect soon goes off. It is said to have considerable recuperative powers on the system after any over-exertion. The natives are very fond of it, and many Europeans make a practice of drinking it. The root has found its way into the London market, and is used medicinally. At Levuka, it fetches 2s. 6d. a pound. Mr. Horne, F.L.S., who visited the islands in 1878, is of opinion that cocoa (*Theobroma cocoa*) would do well there, and that, roughly estimated, there are a hundred square miles on which tea and cinchona could be successfully cultivated. Tobacco certainly answers, and some good leaf and fairly well manufactured and flavoured cigars (quite as good as anything from India) were sent over to the Melbourne Exhibition. Tapioca, ginger, pepper, and spices of all sorts, camphor and vanilla would also be a success in the hands of persons acquainted with the cultivation and manufacture of tropical produce. It will be seen that in the Fijis there, is ample scope for fortune-making but there as elsewhere, money is necessary.—*Pioneer*.

"DATE COFFEE," CUSTOMS DUTY, AND THE ACTION OF THE BRITISH GOVERNMENT.

A Ceylon merchant, now at home, writes to us by this mail:—"Kent, 4th May.—With reference to the compound called Date Coffee, which is now being forced into notice by dint of hard advertising, and the description printed on the labels that it is a mixture of 'Date Coffee' mixed with a portion of best coffee, much has been said about the iniquity of calling burnt date powder Date Coffee, but it does not seem to be generally known that the fraud is in a manner countenanced by the English Government, in admitting the importation of date powder, before it is mixed with coffee, on payment of 2d a lb., the duty to which genuine coffee is liable.

"I gather that this is the case from what was stated at one of the meetings of the Company, on which occasion the extremely plausible chairman said, that an eminent firm of Mincing Lane had undertaken to buy all the powder landed by the Company, at 5d per lb., and that the firm would have to pay 2d per lb. import duty, which would make the cost 7d per lb. Be it remembered that this is the pure date powder before it is mixed with the fourth part of coffee. The Government, for some reason of its own, would not allow the mixture to be effected out of the United Kingdom.

"Now, it may be asked what on earth is the meaning of paying 2d per lb. on dates when the customs tariff does not exact such a duty on that fruit? Simply, I imagine, to make the public believe that the powder is a kind of coffee. Does the Government impose a duty of 2d to protect growers of coffee, or to help in swelling the revenue? Of course, such a tax would not amount to much, but 'every little helps,' and Mr. Gladstone's great aim seems to be to have a surplus revenue. It does seem extraordinary that an article is allowed to be imported into England under a fictitious name, and that a duty is collected upon it, as if it was the genuine article.

"The imposition of the duty is, perhaps, some protection to coffee planters, but it seems nevertheless a

singular proceeding on the part of the English Government.

"Any other vile imitations of other articles of commerce might be introduced in the same way, under the high sanction of the crown, for the delectation of a gullible public."

[Not a day should be lost in protesting against this official scandal and we are glad to think that our planters and merchants are preparing to memorialize.—Ed.]

COFFEE AND SILK.

(*Straits Times*, May 19.)

The authorities in Acheen have taken in hand the encouragement of Silk culture and coffee cultivation, with results thus officially set forth in the *Daily Times*.

"The controller stationed in the XXII Mukims reports that silk worms recently procured from Japan through the Consul General for the Netherlands in the Straits Settlements, had been received with great satisfaction, and that in all respects they had proved a success in the Mukims styled Sibrew, Baid and Indrapuri, and Lamgarung. Two parcels of cocoons had been sent by this official to the Assistant Resident of Acheen Proper. With these, experiments were being made in the IV. Mukims. The interest taken by the people in silk culture is very great. Persons from elsewhere are continually coming to the campongs where the experimental culture is carried on, to ask for cocoons. Probably, ere long, these will be supplied to applicants on a larger scale. These Japanese silk worms have thriven wherever tried in almost every instance. The number of white ones was relatively the smallest. At Campong Riki in Indrapuri where, after distribution of cocoons to neighbouring campongs for the extension of the culture, a quantity of them remained, silk was reeled off from these cocoons which proved far superior in fineness to the Achiheese product. The Government intends to pay unremitting attention to silk culture in order to enable to flourish anew this branch of productive native industry which of late years had been falling off in Acheen Proper."

"The reports received concerning the Liberian coffee planted here and there in Acheen Proper, are generally speaking very satisfactory. In this culture too great interest from the first has been taken by the people. As the soil and climate of Acheen Proper seem to be eminently suitable for the cultivation of Liberia coffee, it may be expected that it will succeed very well here, and as hedge and village coffee, become a source of wealth to the people. The necessary measures have been taken to forward one thousand Liberian coffee beans of good quality to Acheen."

"The method of drying coffee invented by Mr. Van Mannen has of late undergone considerable improvements, so that, at a temperature of only 60° C. and in 20 hours' time, coffee can be wholly dried by this process. Shortly, we understand a commission of experts will repair to the Kredjo estate to inquire thoroughly into the value of the process. One official will be one of the commission."

A FREE TRADE UNION BETWEEN ENGLAND AND THE COLONIES.

The Conference of Delegates, convened by the Dominion Board of Trade of Canada from the various Colonies and Chambers of Commerce, to consider the subject of Inter-Colonial Trade Tariffs, has held several meetings, at which the following Resolutions were unanimously passed:—

"That in the opinion of this Conference it is a matter of the utmost importance for the promotion of the Commercial interests of the British Empire,

and preservation of its unity and integrity, to draw closer the trade relations between its various component territories."

"That, considering the increasing importance of the Colonial Trade of Great Britain, and that her colonies are without direct representation in the Imperial Parliament, and, considering, also, that Commercial Treaties with Foreign Countries, whereby Colonial interests are deeply affected are entered upon by the Mother Country without adequate consultation with the Colonies, this Conference is of opinion that in all matters of Imperial or International Treaties, where Colonial interests are directly or indirectly involved, an endeavour should be made to ascertain the views of the Colonies, and that proper weight be attached to their opinions."

"That it is desirable to form an Association, whose Head Office shall be in London, to be called the Britain and Colonial Union for the consideration and furtherance of Inter-Colonial Trade and Trade between the Colonies and Great Britain."

"That it is desirable that the powers and numbers of the present Royal Commission for the Defence of British Possessions and Commerce abroad should be enlarged or that another Royal Commission should be appointed with the view to taking evidence on the subject of the Trade and Commercial Tariffs existing and in force between Great Britain and Her Colonies and Dependencies; and that this Conference do appoint a Deputation to wait upon the Right Honourable the Earl of Kimberley, Her Majesty's Principal Secretary of State for the Colonies, and the Right Honourable the Marquis of Hartington, Her Majesty's Principal Secretary of State for India, to urge the consideration of this matter upon Her Majesty's Government."

"That, considering the vast and increasing importance of the trade between Great Britain and her Colonies and Dependencies, and that no department of the Executive Government exists, which is specially charged with the consideration of the relations under which such trade is carried on, this Committee would record its opinion that it is highly desirable that those functions of the Executive Government of Great Britain which especially relate to Commerce and Agriculture should be administered by a distinct department, under a Principal Secretary of State, who should be a member of the Cabinet."

The association, under the title of the British and Inter-Colonial Trade Tariff Union, has consequently been founded, the members of the conference itself enrolling themselves as members.—*Colonies and India.*

TEA FROM AN EX-DEALER'S POINT OF VIEW. (*Home and Colonial Mail.*)

The following letter has much that is worth the consideration of both planter and retailer. We think that our friends in India would do well to study the criticism of a not unfriendly outsider as to their work. Looking at the valuable admission the writer makes to teas of Indian growth "possessing everything necessary for the production of a perfect mixture," our planter friends cannot question the *bona fides* of advice coming from such a quarter. We trust the retail grocer will also take the lesson to heart and use Indian teas more fearlessly in future:—

"Sir,—As the output of our Indian tea gardens increases, so the quality seems to decrease in the same ratio. Managers who aim at a 'big crop' seem to lose sight of the fact that hasty or imperfect manipulation reduces the price, and consequently the profit, very considerably. A few 'gardens' yet remain whose managers or proprietors seem to possess sufficient forethought to counteract this evil, and these are amply repaid for their extra trouble. If quantity rather than quality is to be the leading feature of

our planters, it will be equally a serious matter for them and for our own trade. As it is, a very large proportion of Indian tea sold on the London market by dealers is 'undesirable,' chiefly on account of the 'washy' and insipid character of the liquor. At present it is left to the few to know how to select and blend Indian tea—if not to sell alone—to aid the necessary strength and quality to the China growths.

"Then again as to 'brokens.' It is an indisputable fact that better value can be obtained in these than in leafy teas, and yet the average grocer, either from a lack of knowledge of their intrinsic value in a mixture or from prejudice, is slow to appreciate them. Of course, it can be urged on the other side that the 'British public' have been trained for many years to use leafy teas, and that it would be unwise to go off at a tangent and use brokens entirely.

"To the Irish, and particularly to the Belfast dealers, must be assigned the post of honour in educating their customers to use blended, broken Indian tea, and we must admit that nowhere can such value be obtained (not even in London) by the public as in Belfast, for this sole reason.

"By far too many English grocers adhere to the old and worn-out method of 'overdosing' with scented, sometimes combining two or three kinds, which accounts for the oft-repeated complaints of 'herbiness.' Everything necessary for the production of a 'perfect mixture' can be obtained in Indian growths, but it requires very careful handling, and only by constant tasting and 'experimental blending' can this result be obtained.

"If grocers as a body would devote more time to this important branch of their business they would be able to get better profits, and at the same time give the public a much better article than at present, for no one who knows tea can travel through many towns in England—whether staying at hotels or with friends—without coming to the conclusion that the decoction usually obtained as tea is scarcely worthy the name.—I am, &c.,

"EX-DEALER.

"London, April 20th."

FARMING.—I see the editor of the *North British Agriculturist*, discoursing last week on farming failures and changes of tenants in the Lothians, gives some startling particulars. He says:—"When we go beyond seven or eight miles of Edinburgh we find failures and changes of tenantry to an almost incredible extent." In a stretch of Lothian country to the west of Edinburgh, not quite twenty miles in extent where twenty-seven holdings are let to tenants, he is informed, "no fewer than twenty-three farmer out of the twenty-seven have become bankrupt during the past nineteen year, sixteen of them having been left penniless. Of those still in possession, nine have lost most of their capital, while the rest are new tenants." What a lamentable record and loss of tenants' capital. If we care to consider for a minute where go these played-out farmers, we cannot but realize that the rotten systems of land tenure are ruining the best blood of the nation. If we reflect on the intense love of country Scotchmen in general possess, and the effects of the association of a life-time with a particular part, we cannot but be moved at the thought of the future of these old farmers. Love of country! Recal Walter Scott's return to Abbotsford from his visit to Italy. It was his love of country that kept his body together and survived the wreck of his grand intellect. The played-out farmer is unfitted for an active town life, nevertheless to a town he drifts, and there buries himself from old acquaintances and mopes life away, subsisting on the scanty income of those members of his family who are able to work, and have not yet been drafted from his side by marriage.—*Aberdeen Cor.*

COFFEE LEAF DISEASE.

We have more than once pointed out the close affinity which subsists between the fungus which is known as "the potato disease" and *Hemileia vastatrix*, the great enemy of coffee in these modern days. The history of the one fungus is precisely that of the other, only that the one has existed for forty years, and the other twelve, and that more minds have been directed to the investigation of the older pest than to the later arrival. The scientists, however, agree in the circumstance that up to date no remedy has been found for either, nor—if we take European experience as our guide—can we be sanguine of one being likely to be found in the direction of local applications. The result of Mr. Ward's and Mr. Schrottky's experiments has yet to be seen, and we most certainly wish them all success; but it is uphill work trying to accomplish for a perennial fruit-bearing shrub in the tropics, afflicted with fungus what all the science of the West has been unable to accomplish in reference to so important a vegetable, and annual, as the potato. One fact stands forth in the history of all blights, so that those who run may read. The oidium, the phylloxera, the potato fungus, the coffee bug, the *Hemileia*, and we suppose the grub, too, have all appeared, spread and multiplied, where large tracks were under one species of plant. If this can be proved to be connected with blight, as an ever-associated fact, it may be fairly assumed to be one of the causes, till it is proved an error. But, at the same time, we cannot forget that blights have appeared, spread far and wide, done immense damage, and then disappeared, as mysteriously as they came. We must therefore conclude, that great breadths of one cultivated plant do not complete the sole cause of blights, some passing condition of the soil, the atmosphere, or the electric currents, may operate to the rapid multiplication of an insect or parasitic fungus; which, combined with the great quantity of food provided for them, may give the whole of the conditions necessary to make a destructive blight. If such conditions do exist, they probably lie too deep for science with its present powers to reach, and if they were discovered, they might finally be found beyond human control. The one warning that the cultivator can in the present avail of with certainty is to mix his species, and, instead of one product, have twenty, if he can find so many that will pay for the ground they occupy. This has indeed of late years been the course our Ceylon planters have taken, and it is to be hoped none of them in the future will plant large unbroken breadths of any one plant; for, let it be remembered by cinchona, tea, Liberian coffee, and cocoa planters that what are known as "new products" are just as liable to blight as coffee, if the conditions are created. The spread of canker in cinchona seems to be a case in point, although we are aware that the most diverse opinions exist on the subject:—some, like Mr. Forbes Laurie, for instance, believing that close continuous planting over a considerable area is a direct inducement to the disease; others, again, that it is all a matter of soil and drainage, the disease being neither infectious nor contagious; while Mr. Morris of Jamaica in his last Report writes in direct support of close planting as producing the healthiest and most thriving plants. Returning however to coffee leaf disease, we have to lay several contributions on the subject before our readers to-day, including (in order to gratify, and, we trust, finally dispose of our correspondent) one from Mr. Oliver Jones, of Dindigul Medical School, who is so determined to hold all the scientific and planting world wrong in regarding the evil wrought on the coffee leaves as the work of a fungus instead of, as he has found to his own satis-

faction, an insect. Mr. Jones' letter will be found to afford amusing, if not very instructive reading!

Since writing the foregoing, two letters from planters in Fiji have come to hand, and it will be observed that Mr. Storck adopts a tone of the utmost confidence in reference to his discovery of "a cure" for leaf disease. We shall certainly await with interest this gentleman's further experiments in Fiji, and when he has cleared the group of coffee-bearing islands in the South Pacific of the fungus-pest, Mr. Storck will be most welcome to try his hand in Ceylon, although the rate of £4 per acre even for "a perfect cure" is rather high.

LEAF DISEASE AGAIN: MR. OLIVER JONES' MOTH THEORY.

(Communicated.)

It used to be a favourite simile in the good old times, the likening of truth to a rock. Our worthy forefathers meant thereby to indicate that there was something substantial and abiding about it, something that could be handled and held on by, and if you came again and again, it would be found still there immovable and unchangeable.

It would appear, however, that in this rapidly progressive age scientists have come upon new forms of truth, which are as Protean in shape, and unsubstantial in essence, as cloud or gaseous matter.

Witness the history of coffee leaf disease. It seems a long time now since the scientist pronounced the red dust a fungus, and described all its paraphernalia of sporidia mycelia, and all the rest of it, and prescribed sulphur in fumes or otherwise as a poison that would be the death of it. By-and-bye, lime was added to sulphur, to kill it twice dead as it were, so that, turn as it might, the disease found sure death on the one hand and no mercy on the other. It is as unnecessary as it is painful to relate that the disease escaped death notwithstanding.

Then came more scientists and found that there had been some dodging on the part of the mycelia or something or other, and one of the said learned men began sending carbolic acid solution or dilution up the bark of the trees to catch and choke every sporidial mycelia dodger of the lot in their "howfs"—in the cells of the leaves and lay them all outright. Next came the vaporization to smother them as they emerged from their hiding-places.

Then science, under the guidance of the learned, detected new phases, and sulphur and lime were again in demand.

Now comes an embodiment of multifarious science from Dindigul, and after following truth with watchful eye as it went through its various evolutions, he has detected that the whole thing is a moth and its belongings, and the sporidia are no fungus at all but mere dirt, and the mycelia only the threads of silk spun by the said creature. And the medicine that is to do for that moth is ready; yelect in apothecary lingo "cocculus indicus and camphor."

This might be all very well, but there are others again who affirm that the sporidia are real fungi, and find their way into the mouth of the moth, instead of "tother way."

Now all this, of course, is very interesting to those who are engaged in the pursuit of science, but what can non-scientific folks like us make of it all? They may all be right, but one is tempted to think that some one of them has got hold of the wrong end of the thing. Yet when they get so little out of the modes of truth (it used to be modes of error in olden times), how can plain unscientific men "make head or tail of it"?

The Dindigul scientist dwells on the advantage of a theory, and a theory has just occurred to me. In

the hope of its being advantageous I give it. Every one in Ceylon must have been struck with those odd imitations of vegetation in animated life shown in the stick insects, the leaf insects, and the flower insects.

There's no mistaking these, for they show clearly enough to be the work of some mischievous fun-loving imp, playing his fantastic tricks to puzzle Darwinians and Evolutionists generally.

Now have we not got here the same imp of mischief, or there may be more than one of them, practising on our scientists, say on the Dindigul scientist in particular, producing in flesh and blood and its etceteras exact imitations of the fungi sporidia-mycelia, *et hoc genus omne*, down even to their destructiveness on the coffee tree; and all merely to get a "rise" out of a few eager scientists. I do not offer the theory at all to the scientists however. From experience, I know the stores of scorn they have stowed away in their cranial receptacles to be emitted on any one who ventures to promulgate a theory not emanating from their own fermenting noddles.

I lay it with all humility before the unscientific public, glad, if they find it suit them, that they *make what use of it they like*, so that, one way or another, the happy result may be arrived of leaf disease NEVER AGAIN.

MANURE AND THE SETTING OF BLOSSOM.

We learn that, in the case of a very carefully conducted series of observations on an estate in Dikoya, it was found that 60 per cent of the blossoms on manured land had set; while on the unmanured portion of similar land no more than 14 per cent could be reckoned as safe!

INDIA-RUBBER.

The Director of the Botanic Garden, we now hear, has experimented on some of his Ceara rubber trees with satisfactory results both as to quality and quantity of milk. From one tree, it is said, the yield of milk was equal to three ounces of prepared caoutchouc of very superior quality, and this quantity of milk was taken without at all exhausting the available supply. No doubt, the Director will be publishing the results of his work very shortly.

LEAF GATHERING AND DESTROYING will never do. At great expense with a large force of labour you might clear the ground of an estate one day, and the next day find it just as much littered over with diseased leaves. One planter said he saw apparently a regular cloud of spores or dust arise when the coolies were gathering. The fall of leaf lasts for weeks sometimes, so the gathering would have to be almost daily work, or else by postponing it as some suggest, the greater part of the spores would be left behind. In one place where I saw the burning going on, I noticed that a great many trees had been burnt, and that was in their poor coffee too. If science can't be practical let it cease to teach.—*Old Planter*.

PHYLOXERA AND HEMILEIA.—The Melbourne *Leader* says:—"The best plan for subjecting vines infected with the phylloxera to the action of sulphide of carbon is that devised by M. Bourdon. He lays down a system of drains in which an air-current is set up. The sulphide is in this way disseminated so thoroughly that the whole subterranean atmosphere of the vineyard is thoroughly impregnated with the poison, and none of it is wasted. The expense of the drains is considerable, but the sulphide is economised, and the work is really done. It is certainly cheaper to go to a considerable expense in the thorough accomplishment of a result than to waste half the amount in an abortive attempt." Although the hemileia is a fungus and not an insect like the phylloxera, this treatment might prove efficacious as a remedy for the coffee leaf disease.

Correspondence.

To the Editor of the Ceylon Observer.

COFFEE LEAF DISEASE.

SIR,—I, for one, do not expect that a cure for this pest will be found through any local application. We have been bidden by our scientific advisers to burn, bury, or disinfect, all matters to which germs are or may be attached, but we should now be aware of the fact that if a coffee plant is constitutionally predisposed to an attack, it will be attacked if there were not an affected leaf within fifty miles. Six years ago, I raised only one Liberian coffee plant from a handful of imported seed, in a part of the island where no coffee was grown; yet, before it was six months old, it got leaf disease, which never left till about six months ago. It has flowered frequently during the last four years, but not one blossom set till last January, when it threw off the disease altogether, and now promises to give a moderate crop. I have since grown thousands on the same ground, and that was the only one that ever had a spot of disease. I believe that the germs are in the air, and will inevitably reach the plant that is constitutionally suited to their growth, and that the only way in which a plant can be protected is through improving its tone, by some process to be yet discovered.—Yours truly,
PLANTER.

CURE FOR LEAF DISEASE IN FIJI.

Belmont Plantation, Upper Rewa, Fiji, April 8th, 1881.

SIR,—In your issue of January 20th I just notice, under the heading "Still They Come," a reprint from the *Fiji Times*, in which my name is mentioned as having discovered a "remedy" for coffee leaf disease. Now, although this heading does not contain a positive slight, it implies a doubt, either of my assertion or of the veracity of your contemporary. Luckily, it will not alter the fact of my having succeeded in thoroughly and lastingly curing a considerable number of coffee trees, both Arabian and Liberian, of *Hemileia vastatrix*. The treatment was discontinued as long ago as July last, and the trees of both species have since grown three times the size, are in full spike (the Liberian) and splendid condition; and though exposed to accidental re-infection from without (this district is full of disease) have up to this day remained entirely free of the pest. The nursery, made on old, infected ground, is entirely free of disease, as are also some self-sown seedlings, which have sprung up in various parts of the area once covered with coffee (some 15 acres) and destroyed by the Commissioner for Coffee Leaf Disease early in March 1880. Although I am fully aware of the importance of my discovery to many coffee-growing countries, it was and is my ambition to operate in Fiji first, not for the purpose of making further experiments so much, as, firstly, because Fiji is the land of my adoption, and I have some personal interest in it, and secondly, to gain an insight into certain administrative details connected with the treatment, on a smaller scale, before offering my services to the planters of Ceylon and neighbouring countries for so stupendous a task as those countries would present in the application of my own treatment or any other.

What I have done I have accomplished through the outward application of a well-known factor, which material, so far from being dangerous to the health of the coffee tree, will, after doing duty against the disease, remain on the ground as manure. In my correspondence with the Government of Fiji, I have presented a rather high estimate of cost approaching £4 per acre. This may seem a large figure, but in reality is not so, the actual cost being represented

by the difference of labor entailed in dusting the trees with what will afterwards remain as manure on the soil, and that of the mere spreading of the substance over the ground. Three months of sharp work will effect the cure for good and for ever, if such a thing is possible in Ceylon.

If I for sometime shared the mistake as to a filamentous phase of existence of the fungus, why, better men had accepted Mr. Morris' theory; and really there was nothing so very strange in it. The main point remains, which is, that it does not make one iota of difference in my treatment nor the results of it, of which I challenge inspection.

And please be informed that I hereby claim priority before the whole world in what I have accomplished and am ready to do again.—I beg to remain, sir, yours very faithfully,
JAMES C. P. STORCK.

Levuka, 9th April 1881.

SIR,—Understanding from Mr. Storck that he has written to you concerning the treatment claimed to have been discovered by him for curing coffee leaf disease, I write to offer my testimony to the fact that in December 1879 I observed the coffee trees on Mr. Storck's estate to be covered with disease. They were all destroyed, except a few, which Mr. Storck informed me he operated upon, and these I saw last December when they were apparently free from disease. I saw them again last Sunday, when they appeared to be in the same state as on my previous visit and particularly vigorous. It is only fair to Mr. Storck that I should say this much.—Your obedient servant,

WM. FILLINGHAM PARR.

P. S.—I think Mr. Storck's estimate of the expense (£4 an acre) to be very greatly in excess of what the actual cost will be for adopting this treatment.

THE COFFEE LEAF FUNGUS (? INSECT).

Dindigul, 12th February 1881.

SIR,—Believing with Hartley that any hypothesis which has so much plausibility as to explain a considerable number of facts helps us to digest these facts in proper order, to bring new ones to light and make experimental crucis for future enquiries, I am therefore constrained to follow up my report on coffee leaf disease with a few further remarks, in which it is to be hoped that greater light may be cast on the truth that leaf disease has no connection whatever with the fungus theory as advocated by Mr. D. Morris, late of Ceylon, particularly as the facts now put forth contain personal observations over a period of some 14 months. The conclusions arrived at are not deduced from mere speculative analysis, but from careful observation and tedious manipulations with the microscope. But since none of the great scientific advancements have been established without encountering much opposition, the views promulgated by me, concerning the true cause of coffee leaf disease, have as a natural concomitant provoked adverse criticism.

The following notes, however, will doubtless serve to help the readers of the *Observer* to judge whether my investigations in leaf-disease are based on a mere hypothesis or on some basis of sterling reality.

I note that in the beginning of December 1879 a diseased primary branch of *Coffea Arabica* was submitted for my examination by a coffee planter in the district. The branch was a beautiful specimen, the different phases of the disease being well developed. The diseased leaves were at once submitted by me to the following examination:—

a. A quantity of rust was carefully scraped off, mixed with water and its reaction taken, while a small quantity was sipped from the vessel containing the solution: it was insipid and leafy.

b. Macerated three of the diseased leaves in a basin of cold spring water for 18 hours and found on examination that the dark brown spots were isolated patches of dead tissue. In pathological language one would be inclined to call them islands of ulceration, in as much as they had no connec-

tion with the surrounding healthy tissue. The dark brown spots were quite destitute of cuticle and parenchyma. They were simply the remains of reticulate portions of the leaf.

c. A diseased leaf was placed under the microscope and examined: quantities of flocculent matter and bright masses of granular stuff were seen in abundance. This was done with a lens of low power.

d. Placed a minute quantity of rust on a slide and viewed it with a lens of high power. A magnificent cluster of oval shaped orange cells, forming distinct groups, were made visible. These cells however were quite destitute of nuclei. If we admit that the cells are non-nucleated, but filled with a protoplasmic yolk, still one fails even with high magnifying media to detect fission of the mass or segmentation or cleavage of the protoplasm. In truth I am of opinion that the fibrils of silk and the digested cell-tissue (that constitute the main mass of rust) lie entirely external and have no relation with the internal structure of the leaf. Some of the fibrils may be seen in very close proximity to the tissue surrounding the margin of the brown spots, dipping as it were into their interspaces), so that the entire morbid process has its origin and development from without and not from the intercellular tissue of the coffee leaf.

e. A piece of diseased leaf on which the rust and floss were thickly set was cut out and carefully examined with the microscope. The floss was found to be made up of fibrils of fine silk: can trace no hyphæ or conidia.

f. Placed on glass a small quantity of the floss and moistened with water, and when submitted to an examination shewed no signs of germinating, seemed a little elongated, doubtless due to the fact that the fibres were swollen from the moisture in them: not soluble in acetic acid.

g. Having after repeated examinations failed to discover organs of sexual generation, I had no other alternative left but to believe that the orange oval-shaped cells were not *reproductive sporidia*. Because, unless sexual organs of some kind existed, the vital act of reproduction, either by gamogenesis such as takes place in the potato blight or congregation could not be produced. It is a well established law in physiology, that propagation of species, either in the vegetable or animal kingdoms, can only be effected by the union of cell with cell, the elements of the male uniting with those of the female, from which the germ cell is produced, and since it is ordained by a higher power that every *living organism* must be derived from a germ it was but natural for me to conclude that coffee leaf-disease was not due to the growth and development of the fungus *Hemileia vastatrix*, at the expense of the soft cellular tissue of the coffee leaf, but to some other cause, the details of which have already been published in the columns of the *Observer* of the 19th January 1881.

That the larvæ discovered by me do not suck out the spores as advanced by the editor I am confident, for I have frequently, with a low magnifying lens, been able to see that it was the cellular tissue they were feeding on, the movement of the mandibles being lateral, *i. e.* from right to left and *vice versa*. I have also on several occasions been made cognizant of the fact that the excreta cast from the larva was done with a wriggle and dilation of the anal segment; this excreta is identical in color and character to the orange sporanges of Mr. Morris.

In conclusion I can only add, would that the larvæ decrease in number, for with it there shall be a corresponding diminution in the development of coffee leaf disease.—Yours faithfully,
OLIVER W. JONES,

Asst. Supt. Med. School, Dindigul.

P. S.—April 21st.—The moths referred to by your planting correspondent from the interior are in my opinion quite distinct from the moth made mention of by me, for I find that the living caterpillars in my possession continue still to exist in their pupal state and shall do so until the end of March, or at a period corresponding with the first blow of the coffee flowering season. When the moths shall escape further confinement, to enjoy their short life among the sweet smelling flowers of the coffee trees. If the planters would carry out my instructions as regards the destruction of all fallen and diseased leaves by burying them, there would be a corresponding diminution in coffee leaf disease next season—but please note that this must be done before the end of the month.

CEYLON AND JAVA LEDGERIANAS.

A Dimbula planter writes:—"Many thanks for the loan of Mr. Moens' report, which I now return. I was most anxious to compare the analysis of his two year old shoots of original Ledgeriana with an analysis Mr. David Howard had kindly made for me of six thirteen month old Ledgerianas from Conon estate. I cut these six trees down and sent home the whole of the stem bark. The best analysis was No VI, viz. 2.1% sulphate quinine. The average of the whole six was 1.3%. As Mr. Moens' analysis No 48 is of two year old shoots, of old trees and is only 2.86% sulphate quinine, I think there is no doubt that Ceylon will be able to grow as good Ledgeriana bark as Java, by analysis, and Mr. Christie has shewn that we can also compete with them in growth."

COFFEE LEAF DISEASE.

Reports received from a number of districts both north and south of Kandy agree in the opinion that a general outburst of leaf disease is once more imminent. As yet the symptoms are not very apparent to the eye of an inexperienced observer, and very probably the coming attack will not be a serious one; but our older planters have now got to know the indications so well that they can tell its approach some time before the disease becomes apparent. As typical illustrations an estate in Matale East and one in Dimbula are brought under our notice: on both the coffee still looks dark green and vigorous, but scarce a leaf can be plucked from the former and held up to the light that does not shew the fungus at work, while of the latter a Visiting Agent relates how, when approaching it some days ago, his eyes caught a peculiar tinge which he has always regarded as indicative of the early appearance of *Hemileia vastatrix*. In these cases the attack seems to be coming on simultaneously all over the plantations. This is contrary to the experience of others who hold that an attack usually commences from a centre, in a single tree or group of trees, and that it is possible, if observed and dealt with properly in time, to confine and even overcome and extirpate such an attack. One old planter declares that, with a limited area in cultivation, he is able to watch over his coffee as a doctor would over a convalescent patient liable to a recurrence of illness, and that he believes he has more than once been successful in fighting leaf disease by dealing forthwith with the trees about to be attacked, covering over the manure applied (whether cattle-manure or bones-and-poonac) with lime and simultaneously coating the trees with wood-ashes. In this way an incipient attack has apparently been circumscribed and dissipated, and fair average crops have been maintained. But this experience has been gained on a limited area, and with comparatively young coffee. In the majority of cases it is impossible to say in what part of the estate an attack commences, and the manuring, liming and covering with wood-ashes would be rather too difficult and costly a process to apply simultaneously over 200 or 300 acres. Much more feasible, if it can be shewn to be equally effective, is Mr. Schrottky's vapourization with carbolic acid and lime. This gentleman has now completed his operations over the several areas in different districts placed under his charge, and he is as full of confidence in the practical value of his process as he was after his first series of experiments. It is too soon probably to judge of the fields recently operated on, but it will be remembered that around Kandy,

and more especially in Dumbara, certain coffee was treated in January, and we have been shewn reports from the Managers concerned which testify to the unmistakable benefit derived by the coffee,—in fact, to an almost entire immunity from disease which has been running through the adjacent coffee. The principal condition of success is to fix on the right time for application, just when an attack is coming on, and in mist weather when the application at once takes effect. Mr. Schrottky says he has found in practice that three applications to conquer or ward off an attack are not required:—two being sufficient at an interval of a fortnight and costing not more than four rupees per acre for each application. Mr. Schrottky has, in an official letter, called the attention of the Planters' Association to his "Seven Months' Campaign against Leaf Disease" and its results, and as he is shortly leaving the island, we think these results deserve a formal investigation at the hands of this representative body in the interests of all concerned. There will be the more reason for this course, if it be true that the experiment spoken of favourably by the Government Cryptogamist, at the planters' annual meeting, have since fallen through, proving failures, and that Mr. Marshall Ward is wellnigh hopeless of any practical remedy if it be impossible, as the planters say, to burn or destroy the diseased fallen leaves. If therefore, for the present, there is nothing encouraging in the official outlook, the Committee of the Planters' Association owes it to themselves and their constituents, not to allow Mr. Schrottky to take his departure without putting some, at least, of his experiments to the test of observation and report. The day for the general meeting is close at hand, but Dumbara being so easily reached, it surely would not be impossible for the energetic Chairman to arrange for a visit to the treated coffee in that valley. Mr. Gibbon is closely connected with Dumbara, and if he and Messrs. W. Mackenzie and C. Young accompanied the Chairman and Secretary, their report, embodied by Mr. Philip, could not fail to be received with attention and interest at the meeting to be held next week. Mr. Schrottky would, no doubt, be ready to attend and give explanations (if asked to do so) while the Managers in any case would be available on the spot to answer questions. As the inspection would be an unofficial one, Mr. Wall might be able to induce Dr. Thwaites, as an Honorary Member of the Association, to accompany the party to Pallakelle and Gangapitiya, and to render valuable aid in testing the value of the vaporizing process with carbolic acid and lime.

COCONUT ESTATES IN JAFFNA.—Leaving out of account the small account gardens owned by natives, there are thirty coconut estates, covering in round figures 10,000 acres. This number does not include "new clearings" which are now on the increase. All the 30 estates were opened up by Europeans. There are 650 men employed on them in various capacities. The copperah derived from them at each season is reckoned at 3,000 candies bringing R75,000. We hear that two estates owned by Sir J. D. Elphinstone have recently been purchased by Mr. F. Mortimer for R60,000.—*Morning Star*.

GUMS AND RESINS.—Dr. G. Bidie, Superintendent, Government Central Museum, has forwarded to Government a descriptive catalogue of gums and resins, and Colonel Beddome has forwarded a report through the Board of Revenue. The samples collected are to be carefully packed and despatched to the Master Attendant for transmission to England, addressed to the Secretary of State. The thanks of Government have been communicated to Dr. Bidie and Colonel Beddome for the valuable information they have furnished.—*Madras Mail*.

FIBRE-YIELDING PLANTS.

A modest announcement made by the Institute of Jamaica, that it will give two prizes of 20*l.* and 15*l.* respectively, for any essay on the fibre-yielding plants of that island, accompanied by samples of fibre collected there, derives additional importance from a report which reaches us from Mauritius that a gentleman in the latter island has discovered an effectual and simple means—which he anticipates will also solve the difficult problem of extracting the fibre of the rhea or China-grass—of treating the aloe fibre, for which the Colony is famous. In the single industry of paper-making there is a vast field for the consumption of largely-increased quantities of fibre. Attempts have been made from time to time to supplement the existing supplies of paper-making materials, and utilising banana fibre, young bamboo shoots, ramie or China-grass, and other tropical produce; but there is great room for improvement in all that has hitherto been attempted, and in the introduction of new varieties of fibre. And it is not only for paper-making purposes that new fibres are wanted, but for the manufacture of various textile fabrics. As has been pointed out over and over again in these columns, the happy discovery of the value of the fibre produced by a particular species of aloe growing in Mauritius has helped to supply our shipping and our fishermen with ropes and lines almost indestructible in salt water. Carefully conducted experiments, carried on in the countries in which the fibres are grown, are far more likely to be successful than those made in England with material necessarily dry, probably injured, possibly ruined, by the conditions of transit. The Mauritius aloe fibre, prepared in the island from the green plant, is a different product altogether from that manufactured in England from shrivelled specimens; and by encouraging research in this respect our Colonies will be laying the foundation, not merely of new agricultural pursuits, but of new and thriving industries.—*Colonies and India.*

COCONUT CULTIVATION.

More important than any industry we have noticed is coconut cultivation. This occupies a very prominent place and its history is both interesting and instructive. More than half a century has gone by since the opening of the first estate in Jaffna. Of that hardy, enterprising race of planters who cleared jungles and opened up estates in parts infested with wild beasts and seldom frequented by man, there is not one left to tell the story of their trials and reverses or to enjoy the fruits of their toils and labors. Those who bore the heat and toil of the day have disappeared from the scene and already two generations have been numbered with the past. The pioneers of coconut cultivation in the North have been succeeded by men vastly different from them. The most painful circumstance connected with this industry and which has often forced itself on our minds is that under an unwise system of agency leaving the management of estates solely in the hands of indifferent men, on the spot, the original proprietors had been induced to part with their properties for a mere song, dissatisfied with the poor returns derived. The scheme, such in truth it was, was cleverly worked and the result was that coconut property was under-valued or fell into disfavor and men who as agents or superintendents condemned the estates ultimately became the owners upon very easy terms. We will not say anything more than that without a single exception all of them have amassed a large fortune and continue to prosper. One gentleman, however, escaped the effects of his policy and retained his property against good and bad report, sometimes leasing it out and sometimes managing it at his own expense. He is Sir J. D. Elphinstone, the Proprietor of Tattovankotty and Waverly estates.

Not long ago both were offered only R30,000 but Mr. G. H. Elphinstone in charge, convinced that coconut property was not such a drug in the market in Jaffna sent out an experienced and trustworthy manager in the person of Mr. S. Ramanather to inspect, report upon, and work them. Well has he shewn himself deserving of his noble master's confidence! With a long and varied planting experience, acquired under such Planters as Messrs. Elphinstone, Tytler, Bosanquet, and Leake, with a reputation unsullied even by the breath of scandal and remarkably industrious, he worked them for the last three years, shewing a large profit and fixed their value at R60,000. Under his careful and intelligent management, such improvements were effected that higher offers were sent up. But it was resolved not to sell them for less than R60,000. We have just heard that they have been purchased for this figure by Mr. F. Mortimer. This circumstance redounds not a little to the credit of Mr. Ramanather who has effectually disproved the report set agoing by interested persons that Coconut plantation does not pay in Jaffna. From a study of the facts bearing on the subject, we have arrived at the conclusion that Coconut culture is most profitable.

Our Coconut estates are situated in the District of Pachchellappalai. Leaving out of account the small Coconut gardens owned by natives, there are thirty Coconut estates covering in round figures 10,000 acres. This number does not include "new clearings" which are now on the increase. All the 30 estates were opened up by Europeans. There are 650 men employed on them in various capacities. The copperah derived from them at each season is reckoned by an experienced Planter at 3,000 candies, bringing R75,000 at R25 per candy. Very often, however, as in last year, the price per candy goes so high as R38 or 40. Since January, a decline in the price of copperah has taken place, driving many out of the business. There is not the shadow of a doubt that this business carefully conducted is a very remunerative one.—*Jaffna Patriot.*

TEA TASTING.

It is necessary for a tea-taster to have the three senses—sight, taste, and smell *jointly* exercised, to form a correct judgment; or, can he dispense with any one of them, as for instance, sight, and yet arrive at a correct conclusion?

We are of opinion that tea-taster cannot do justice to his profession, unless he possess the three senses above mentioned unimpaired.

In valuing tea for the market, the chief characteristics which a tea-taster looks to are—

- (1) its liquor.
- (2) ,, infusion.
- (3) ,, leaf.
- (4) any distinctive characteristics it may possess.

In deciding as to its intrinsic value, he has to consider the following qualities with regard to—

(i) its liquor: whether strong, rasping, pungent, brisk, flavory, full, thick, malty, dark, or wanting in strength, dull, insipid, thin, burnt, soft, etc.

(ii) its infusion: whether of bright or dull colour; or mixed with green, or any dark or burnt leaves; over or under-fermented, etc.

(iii) its leaf: its make and appearance; whether black, wiry, even, regular, good, well twisted, flaky, bold, tippy; or grey, brown, dusty, little or badly open twisted, irregular; wanting in tips, etc.

(iv) any distinctive characteristics it may possess: as e. g., its "nose," i. e., the character of its aroma; whether of a strong, rich scent, or musty, burnt, highly fired, dull, etc.

In testing the qualities of a tea, therefore, the mind exercises the following faculties:—

- (i) the taste, (ii) the sight, (iii) the sight, (iv) the smell.

Thus the faculty of sight bears an important part in the process of tea-tasting when valuing for the market.

Our correspondent perhaps thinks that by the sense of sight being used, the mind exercises a certain amount of prejudice, either in favour of, or against the tea—according to its make and appearance, before the sense of taste comes into play: in other words, before it is tasted. But this is an erroneous notion, as is well known by any planter of experience. Teas which would be condemned were they to be judged of and valued by their appearance, often fetch the best prices. If the liquor and infusion of a tea are good, its appearance and make will in very few instances tell against it, or lower it in value; if, however, in addition to the above good qualities it possesses a good appearance and make, the fact may increase its intrinsic value considerably. Thus the faculty of sight, though in itself important when placed in comparison with that of taste, holds a subordinate position.

To judge, therefore, of the real merits of a tea, and to enable one to arrive at its intrinsic value, it is essential that the three senses should be used *conjointly*. But, in addition, the senses of touch and hearing are also brought into play. A tea-taster as a rule whenever the sample permits, takes up a portion of the tea he is tasting, to *feel* whether it is crisp; and moreover generally puts his hand to his ear, to *hear* whether it crackles when pressure is exerted. By so doing he is enabled to report whether the tea has been efficiently fired or not. A tea-taster, therefore, in order to be an adept at his work, requires the full and unimpaired uses of all his *five* senses. None of the senses can be rightly used by themselves without the aid of the others; each requires the help of the other in action, to enable one to form a true and correct judgment of the merits and value of a tea.—*Indian Tea Gazette.*

USEFUL GARDEN AND PLANTATION RECEIPTS.

(From the Gardener's Year-Book.)

ASPHALT WALKS.—1. Take two parts of very dry lime rubbish and one part coal ashes, also very dry, and both sifted fine. In a dry place on a dry day mix them, and leave a hole in the middle of the heap, as bricklayers do when making mortar. Into this pour boiling hot coal tar; mix, and when as stiff as mortar, put it down 3 in thick to form the walk. The ground should be dry and beaten smooth. Sprinkle over it coarse sand, when cold, pass a light roller over it, and in a few days the walk will be solid and waterproof. 2. An old gravel path will only require to be swept clean; a new-made one to be well beaten and rolled. Choose a warm day (the warmer the better); let the tar be boiling hot; use the common, long-handled, iron-bound tar-brush and iron kettle, holding about a gallon, for the purpose of taking only so much tar from the boiler at one time as can be used in about a quarter of an hour, and paint over with a good coat. Let a lad follow with dry sifted sand, throwing over enough to prevent the tar sticking to his feet, and then go over with the roller. Two men tarring will employ a lad to follow with the sand, and another to attend the fire and supply the tar as fast as used. This repeated every three years the surface will become quite hard, and the paths will always be perfectly dry and pleasant to walk upon even in the worst of weather.

TO PREVENT IRON GARDEN TOOLS FROM RUSTING.—If iron garden tools are laid for a few minutes in a solution of soda they will be protected from rusting for a long time, even if exposed continuously to a moist atmosphere.

TO DISSOLVE BONES.—Take a large watertight hogshead, and cover the bottom with about 6 in. deep of dry soil; on this put a layer of bones of the same depth, and cover them entirely with wood ashes; on these another layer of bones, then ashes, and so on till the hogshead is full. Leave it exposed to the rains all summer and winter till spring. Then on removing the contents of the hogshead, the bones will crumble to powder under a slight pressure, and form one of the most valuable manures ready for immediate use.

TO REMOVE COARSE WEEDS FROM LAWNS.—Coarse weeds such as plantain, docks, thistles, and dandelion, may be removed from lawns by the application of oil of vitriol. Take an old blacking-bottle with a wire round it to carry it by, and a stick to dip with. The stick should not be pointed, but notched round for an inch or two at the end, the better to hold the liquid. Just one drop quite in the heart of the weed is sufficient to cause death, and the notched stick will contain at one dip enough to destroy three or four plants. If the acid is good (it varies in strength), the work of death can be both seen and heard, for the vitriol hisses, and it burns up the weeds in a moment.

GRAFTING WAX.—Grafting wax is very much used on the Continent for protecting newly-made grafts instead of the clay and horsedroppings formed into a plaster, such as is used in this country. It is also of great service in covering fresh wounds in trees, made either by accident or design, and is a much more cleanly substance, as well as a more neat application, than the ordinary grafting clay. I have here furnished various formulæ for making the grafting wax or mastic, and as I have used them all at various times they may be relied upon to answer the purpose for which they are intended. The first five require to be melted in an earthen pot over a fire, and to be applied warm, but not so hot as to injure the tissue of the bark with which it may come to contact. 1. Rosin, 1 part; yellow wax 1 part. 2. Black pitch, 5 parts; rosin, 1 part; yellow wax, 2 parts. 3. Burgundy pitch, 1 lb.; black pitch, 4 oz.; yellow wax, 2 oz.; rosin, 2 oz.; mutton suet, 2 drachms. 4. Yellow wax, 2 parts; suet, 1 part. 5. Black pitch, 1 part; yellow wax, 1 part; suet, 1 part; pounded brick, 3 parts. The following has not the inconvenience of requiring to be applied warm, and may be prepared and used without being heated. 6. Yellow wax, 1 lb.; turpentine, 1 lb.; Burgundy pitch, 8 oz.; mutton suet, 4 oz. Melt all together and mix thoroughly, and leave them to cool. Form the mass into small balls, as it will not stick to the fingers, and use them when opportunity offers.

LIQUID GRAFTING WAX.—This is a very useful application and is, perhaps, the most convenient for the purpose of all the mastics used for covering wounds and grafting. It is of the consistency of varnish, and is applied very thinly with a brush. Care must be taken not to lay it on thickly, for the surface hardens so rapidly that the alcohol is prevented from evaporating. Rosin, 1 lb.; beef tallow, 1 oz. spirits of turpentine, 1 tablespoonful; alcohol (95 per cent) 6 oz. Melt the rosin over a slow fire; when melted take it off and add the beef tallow, stirring it constantly; let it cool down somewhat, mix the spirits of turpentine little by little with it, and at last the alcohol in the same way. Should the alcohol be added while the mass is too hot, much will be lost by rapid evaporation; if, on the contrary, it is too cool, it will form a viscid lump, and must be slightly heated again. Stirring briskly is indispensable to mix the ingredients thoroughly. In well-corked bottles it keeps for years. If in course of time it becomes too thick, the addition of some alcohol

will make it liquid again. For this purpose it must always be warmed. It is a good plan to put the bottle containing it in boiling water or hot water to accomplish this.

THE MADRAS GOVERNMENT AND CINCHONA.

THE Secretary of State hardly gave a satisfactory reply on the 8th ultimo in the House of Captain Price's question, whether the Indian Government undertook the planting of Cinchona in this country, to encourage private enterprise in that direction, or to compete in the open market with private trade. The Marquis of Hartington is too shrewd a statesman not to see that the question interests a large and influential body of men, who will not rest satisfied with evasive replies or half measures. He added that the Madras Government found some difficulty in following the example of the Government of India, and manufacturing its febrifuge on the spot. What the difficulty is, and by whom created, were points left untouched, and it is these which other authorities have taken up hotly, and exposed to the detriment of the Madras Government. It may not be generally known that a committee sat to report upon the financial results of Mr. Broughton's factory at Ootacamund for the manufacture of amorphous quinine a little before that gentleman quitted the Hills, disgusted with the treatment he had received, and sat upon by tyros, who grew more positive in assertion, the less they understood of the subject they had been called upon to investigate. Mr. Markham in his recent work on cinchona, exposes the fallacies of the report.

The Madras Government submitted a calculation by which it was made to appear that the 'amorphous quinine' was produced at a loss. In the years 1872 and 1873, the quantity produced was 445 pounds. By arbitrarily charging the factory with £2,500 for the bark, and £583 for the cost of working and interest on plant and buildings they made out that the 415 lb. After Mr. McIvor's death, the Commissioner of the Nilgiris was in charge, and as a Collector of revenue, succeeded in obtaining a large income, to which his attention was exclusively directed. The latest blunder has scarcely yet become public in England, namely, the transfer of this Government property to the Forest Department, a Department that has hardly yet done anything for the country, or justified the enormous cost at which it is maintained. A strong movement is now on foot in Ceylon, which has, within the last few years, commenced to send cinchona bark to the English market. Corresponding action among the planters of Southern India is needed to avert the disastrous effects of this competition with private trade, which the Indian Government seem not disposed to abandon without a struggle.—*South of India Observer.*

JAPAN TEA.—With the exception of one million, pounds to Canada and half a million to England, all the Japan tea exported was sent to the New York market during the last year.—*Home and Colonial Mail.*

"INDJOEK."—This substance, so favourably spoken of by Mr. Moens as a substitute for moss in covering cinchonas, is thus referred to by Crawford in his Malay dictionary:—"Ijuk (Jav. duk). The black horse hair-like substance at the insertion of the fronds of the gomuti plant, *Borassus gomuti*, and from which cordage is made." Marsden's dictionary describes it thus:—"Iju or heju, a vegetable substance resembling horse hair which envelops the stem of the *anau*, or *borassus gomutus*. It is also known by the names of *gamuto* and *cabo negro*." *Ijuk* (or in Dutch spelling *intjoek*) is the Sundaese form of the word. The tree has a great many native names, and is known to botanists as the *Arenga saccharifera*. The only one in Colombo flowered and died some years ago at Mr. Justice Dias's house.

Correspondence.

To the Editor of the Ceylon Observer.

•LEAF DISEASE AND THE DIFFERENT VARIETIES OF COFFEE.

June 1st, 1881.

SIR—In the last *Weekly Observer* your remark about the Peradeniya Gardens' report:—"The new kinds of coffee seed introduced from the Blue Mountains, Jamaica, and from Coorg, with a view to overcoming leaf disease, have by no means been a success, the fungus attacking the plants freely and in some cases very severely"—omitting to mention Dr. Trimen's important qualification: "There is indeed very little reason to suppose that any variety of *C. Arabica* is 'disease proof.'" Even other species are the hosts of the *Hemileia* parasite; our native wild species, *C. Travancorensis*, and the African *C. liberica*, are both susceptible; yet it by no means follows that all suffer equally in health.

I remember it was said the first imported plants of Liberian coffee were badly attacked by leaf disease, but after a time they threw it off. That this is likely to be so with the other new varieties would seem to be indicated by Dr. Trimen's further observation:—"It is worth remarking that a small plantation of this (Blue Mountain) variety made at Henaratgoda is in a very healthy condition, the plants, now one year old, three or four feet high, and commencing to flower."—Yours truly,
NUBLUD.

COFFEE LEAF DISEASE AND ITS TREATMENT.

2nd June 1881.

DEAR SIR,—I am glad to see Mr. Oliver W. Jones' letter in your paper giving an account of his further investigation to prove that the first cause of leaf disease is an insect (moth). This was my opinion as written in a letter to you some time ago and now referred to by Mr. Jones, but you differed from me and expressed yourself to the contrary. You, no doubt, believed that Messrs. Thwaites and Morris ought to know best. I do not pretend to dispute the ability of these gentlemen nor to make out that I can hold even a candle to them as far as learning goes; but, with all due respect for those authorities and Mr. Ward, it has often been the case that when doctors cannot agree or cure a person in humble position and without much learning is called in or drops in by accident, and with a simple or plain treatment, which would be scoffed at by the doctors, cures the patient. I differ from Mr. Jones as regards gathering up diseased leaves. I have found by scattering wood-ashes and lime over diseased leaves where there are lots of leaves from shade trees also on the ground, there was no spreading of the disease, but the coffee got more vigorous.

Leaf disease, as a rule, first appears on ridges and in patches. As soon as discovered, fork in lightly some manure around the trees and scatter coral or country lime over the forked ground; also throw wood-ash and country lime over the trees. The latter may have to be repeated but the lime and wood-ashes is a manure, and no doubt Mr. Storck's treatment in Fiji will be nearly the same, as no outward vapour or application which does not help to strengthen the trees will ever do. I have driven leaf disease away with the above treatment (it appeared at different times in patches), kept my trees in good heart, and got good crops.—Yours faithfully,
J. H. W.

[There is nothing in J. H. W.'s experience incompatible with the disease being a fungus, while there are a thousand proofs that the attack has nothing to do with an insect!—Ed.]

BOHEMIAN TEA.—For some years past spurious black and green teas have been manufactured from the leaves of the *Lithospermum officinale* (Gromwell) in Bohemia. These have in some instances been palmed off in the market as “Chinese,” but have mostly been used not only in Bohemia but in other countries in Europe as an adulterant for fine teas. The chemist, A. Vogel, has subjected the plant to a careful botanic chemical analysis, and found that:—Theine or any other alkaloid is not found in the plant, but only cellulose, gluten, gum, glucosides, fat, ethereal oil, resin, tannin, chlorophyll, albumen, acid salts, water, &c. Dextrine also appears to be present in it. The composition of the teas made from the plant we are told “differs greatly and notably from that of Chinese tea.” The genus of plants *Lithospermum* belong to the natural order *Boraginaceae*. There are several species of the plant, but the most important is the *Lithospermum officinale*.—*Indian Tea Gazette*.

GOLD PROSPECTING IN SOUTH INDIA.—A paper published by the Madras Government refers to the question of *prospecting*. In previous orders the Government resolved to omit this subject from consideration in framing leases for mining for gold and metals other than gold, but it has since occurred to them that some kind of temporary exclusive privilege might properly be given to prospectors who desire to test specific localities closely. They think that ordinary prospecting does not require any special protection, but where prospectors have obtained promising indications it may be reasonable to grant what may be termed “*proving*” leases for a limited time over a limited area to test results more closely, say for six months or a year, over half a square mile, though the area might be extended if the block was compact. This arrangement would afford reasonable facilities for testing before applying for a mining lease, and would protect intelligent and scientific research. It is necessary that the area should not be excessive to avoid risk of excluding others who may have more *bona fide* intentions than the concessionaires.

CULTIVATION OF KAPOK IN JAVA.—A planter in Bantam writes:—“In your issue of 19th March, I notice a remark about planting ‘kapok’ trees. I am doing that on a small estate of my own. The cotton trees are planted between the rows of Liberian coffee and give just enough shade for the coffee, and at the foot of the cotton trees I am planting pepper. You of course already know that pepper thrives the best on kapok trees. At least, it is thought so by all people of experience in this country. I am using *two* of Fowler’s steam ploughs on this estate, and I am happy to say we are gradually overcoming all the difficulties which attend the introduction of *such things* in India and *especially* in Java. Others have already followed my example, and I trust the use of steam cultivating will soon become general here. For cane steam ploughs are the thing. I also prepare the ground for tea, and Liberian coffee with them.”

CULTIVATION OF THE ALOE.—A discovery which promises to have important results has lately been made by a scientific gentleman in the island of Réunion, situated near the Mauritius. He claims to have succeeded in solving the problem of extracting vegetable fibre from the aloe or other leaves in an economical manner, and one which can be generally adopted. The principal features of the invention are as follows:—The leaf is first placed for 10 minutes in a bath heated to 95 Fah. and then removed to a second bath of water at its normal temperature, in which some inexpensive chemical substance (not yet made public) has previously been mixed. The leaves are allowed to remain some little time in the second bath, after which it is said that the fibre can be washed out by women or children without any trouble. A patent has been taken out for this process by its inventor.

As the aloe is known to grow as freely as weeds in this colony this discovery would appear to present the means of establishing a new and profitable industry for a very large proportion of our population.—*The Inquirer*.

CHINCHONA SEED.—Sir Joseph Hooker has received an important communication from Mr. Robert Thomson, formerly Superintendent of the Chinchona Plantations, Jamaica, but now resident at Bogota, in which an account is given of a new kind of Chinchona, the cultivation of which in British possessions may prove to be very desirable. The bark which is now a considerable article of commerce, only contains two to three per cent of quinine. Mr. Howard, however, says that “the quinine, though not abundant, is pure.” Its botanical origin is at present unknown, but according to Mr. Howard, the bark is known as *China Cuprea*. The important feature about this species from the point of view of cultivation is the low elevation above the sea at which it will grow, its native range being from 2,000 to 3,000 feet. Sir Joseph Hooker is extremely anxious to obtain seeds and plants of the new species with the aid of Mr. Thomson. In the mean time Mr. Thomson is anxious to procure in some quantity seed “of the fine kind of *Chinchona officinalis* spoken of by Mr. Howard that grows in the Nilgiris.” The Conservator of Forests, Madras has been desired by Government to forward direct to Mr. Thomson an adequate supply of seed of the fine kind of ‘*Chinchona officinalis*’ which grows on the Nilgiris. On receipt of intimation by Government of its despatch, the Secretary of State will be informed accordingly, in view to Sir Joseph Hooker’s services being enlisted for obtaining plants of the *China Cuprea*.—*Madras Mail*.

PLANTING IN SOUTH COORG.—A planter writes from South Coorg to a Ceylon friend:—“In this, the ‘Bamboo district’ of Coorg, the best coffee is to be found. The soil is very rich and jungle good. Nearly all the estates are under shade and on any new land opened the timber or jungle shade, is kept, as it is the best. Where the trees are of a bad kind, they are cut down and artificial shade planted. Last year on some estates here the crops were a failure, but although rather shorter than the year previous we had very good crops, and this year better prospects all over are anticipated. Cinchonas are being tried here and are doing well on high elevations. Round about my bungalow here they are doing well: ‘succirubra’ plants, at an elevation of 3,300 feet or so. We have just got up a supply of cocoa plants for a trial. You of course grow them successfully in Ceylon. I wish you would give me the ‘straight tip’ as we are novices as yet in cocoa cultivation. We can put them in at an elevation of from 2,500 feet up to 3,500 feet, under shade or in open in loamy soil or friable. Our rainfall last year was 52 inches, but it ranges between 45 and 75 inches in this locality, but within fifteen miles or even less 250 inches can be got. I would like you to give me some information also about the indiarubber tree, the varieties for cultivation, &c., and if seed can be procured. A little Liberian coffee has been tried on a neighbouring estate here, and after it had been in for eight years it is not at all a fruitful tree. It grows there at an elevation of 2,500 feet or so. A few plants are to be tried between this and Telli-cherry at an elevation of about 1,000 feet, but doubts are entertained of its ever being successful here. Coffee is such an uncertain thing that people are beginning now to see that something else must be tried to keep the ‘pot boiling’ when bad crops of coffee are got. There was a great gold mania here and everywhere else, about two months ago, but it is dying out. That there is gold is certain, but the quantity is not large enough for profit, as far as assays have yet gone.”

COFFEE LEAF DISEASE.

The absence of sufficient time is likely to prevent the Chairman of the Planters' Association and his fellow-Committee members from visiting the scene of Mr. Schrottky's experiments in the Dumbara Valley before Thursday's meeting. But the work done should not be overlooked on that account, and the members generally cannot but feel obliged to Mr. Schrottky for the paper he has drawn up for them with a resumé of his experiments and their results so far as he and the planters associated with him have been able to judge. We have no doubt his statement will be carefully considered, and at the very least it calls for acknowledgment at the hands of the Committee with an expression of thanks to the gentleman who has devoted so much of his time to the service of the planters without any prospect of direct remuneration. We do not know how far Mr. Schrottky's confidence in his vaporization process will be shared among members of the Association, but certainly so far as the estate reports go, the results up to date are favourable. Most people however, we suspect, will reserve their judgment until the period for another attack on the large areas recently treated has passed over; but that reserve should not prevent due notice being taken of the good work done and the satisfactory results already obtained.

COFFEE LEAF DISEASE.

MR. SCHROTTKY'S SEVEN MONTHS' CAMPAIGN.

TO THE CHAIRMAN AND MEMBERS OF THE PLANTERS' ASSOCIATION OF CEYLON.

SIRS,—When in November last, while on a touristic visit to Ceylon, I decided to make use of a month's leisure, to institute with the help of some practical planters a series of experiments with the view to determine, whether it was really beyond the reach of Chemistry to give Coffee Planters a remedy or palliative of coffee leaf disease (this most dire infection) I had no idea that the work would occupy seven months.

I came very early to the conclusion that science in this case would not be so helpless, as she is generally represented to be, and that the disease (being fairly accessible) could not only be topically destroyed by a number of chemicals, but that the conditions of the sap of the tree could be artificially so altered as to make it less favourable to the development of the disease in the leaf cells. But to reduce this conclusion into a practical form, to devise a practical and cheap method of using any of these chemicals as topical applications or otherwise, and after having found a method, to obtain such proof of the results of the same as would be readily understood and acknowledged by practical men:—this I have found an arduous task which I more than once despaired of bringing to a satisfactory conclusion, and which has occupied a time that I have only been able to give to it by greatly neglecting and sacrificing my interests elsewhere.

With some professional repute engaged, I was naturally reluctant to leave such an important work half done, and with its practical issues involved in doubt. It is therefore with more than ordinary pleasure, that I proceed now to sum up the results these experiments have yielded up to date, and which I think warrant some very satisfactory conclusions regarding the method I recommended for the mitigation, if not prevention of leaf disease, viz. vaporization with Carbolic Acid.

Having a practical object in view, I have investigated the whole subject (as far as I was able, having

only a general and not a special knowledge of Mycology) mainly from a practical point of view, and desiring to make this paper as short and concise as possible, it will, I hope, be understood that my main conclusions though stated in a few words have not been arrived at, without full consideration of every fact that I have been able to observe myself, or been able to collect from such of the planters whom it has been my privilege to meet in my seven months' study of the subject.

THE FUNGUS.

As described generally by mycologists, and more specially by Mr. Marshall Ward, what is known as coffee leaf disease is a parasitic fungus (*Hemileia vastatrix*) propagated by spores, whose germinal tubes when in contact with the lower surface of a living coffee leaf, enter into its stomata, establish themselves in the intercellular tissue, develop at the expense of the cell sap into mycelium which finally forms a receptacle (the Uredo) from which arise and break through the epidermis of the leaf, kidney-shaped orange-coloured Uredo-spores, forming clusters of what constitutes the well-known rust. The same mycelium also produces a secondary spore, the Teleuto-spore.

Before fruiting the presence of the fungus or rather of its mycelium in the leaf tissue, is evidenced by pale-yellow circular spots (called pinspots) transparent or opaque. The healthier the disease, the more opaque the spot.

The fungus has been classified (by Berkeley and Broom I think) as belonging to the Uredineæ. Any doubt as to whether this classification is correct has been removed by Mr. Ward finding the Teleuto-spore.

It is, therefore, perfectly reasonable to look forward to Mr. Ward (the mycologist specially engaged in Ceylon in the investigation of the different forms of this fungus) describing to us, before he closes his work, the three different cycles of generations of this fungus, and the other hostplant on which the transition takes place, this being a distinguishing feature of the Uredineæ.

But what makes this disease so formidable an enemy is the peculiar capability of the Uredo-spores (or rust) to reproduce themselves indefinitely by their constant germination and reproduction without the necessity of passing through the cycle of generations. These orange-spores, of a heavy oily character, germinate in contact with moisture (dew, rain, etc.) and their contents pass into a germinal tube. The spore becomes an almost empty cell, and the whole fabric is then extremely light and capable of wide diffusion.

Wind is, in my opinion, the chief cause of the dissemination of the spores before, but far more so (on account of their lightness) after germination, from one disease spot to another, from one leaf to another, from one tree to another, from one field to another.

As far as I have observed, and from information I have collected, the leaf disease fungus spreads, during the periods favourable to the germination of its spores and to their establishment in the leaf, from chronically diseased centres and travels in the direction of wind currents.

The idea that an estate is absolutely free from disease for, say, three months, and that then it appears simultaneously all over the estate, has, I think, its origin in untrained and defective observation and is greatly due to the extraordinary rapidity with which the disease spreads when all circumstances are favourable.

The germinated uredo-spore will not establish itself in an incongenial nidus. Where congenial conditions do not exist, it will, even when over a stoma, simply dry up.

We may take it for granted that, considering comparatively, force and direction of wind and neighbourhood to diseased parts of an estate, each square inch of lower leaf surface of a coffee estate will receive an almost equal number of spores that maintain adher-

ence. But on different trees the disease establishes itself in a different (but for the same tree rarely varying) force. There exists, therefore, a condition of the coffee tree, or more properly speaking, a condition of the sap of the leaf cells which is peculiarly favourable to the development of the disease. In some trees this condition is continually present, and on these the disease can nearly always be found; it is there in a constant and chronic form. In the generality of trees, however, this condition occurs only twice a year, and it is during those two periods that the disease spreads itself from a few confined disease patches more or less all over the estate.

In the majority of districts these two general attacks of the disease can be distinguished into a south-west and north-east monsoon attack, and they coincide closely, but generally precede by a little the natural, so to speak autumnal fall of the coffee leaf which takes place to a more than usually appreciable extent twice a year. In many cases only one such fall will be acknowledged.

These are periods, comparatively speaking, of a minimum of activity, of a minimum of alkalinity of the sap of the tree—periods when the trees are preparing their gathered stores of nutritious material for a new flush of leaves, when the cellular starch deposits are either changing or on the point of changing into glucose, in order to enable its passage from one cell to the other for the formation of cellulose at the apical or axillary buds.

It is the period just before a maximum activity of the tree, during which the condition of the sap of the leaf cells appears to be most favourable to the penetration of the germinated uredo-spore into the stomata of the coffee leaf and to its establishment in the intercellular tissue. The germinal tubes of this fungus share, no doubt, the apparent property of other absorptive vegetable forms, viz. that of an instinctive knowledge of the presence of congenial food. The condition of the sap of the coffee tree most congenial to the establishment of the fungus is, I take it, when the cellular starch deposits of the leaf are in a state of transition into glucose or sugar, which substance, I am greatly of opinion, furnishes the chief food of the fungus. And this transition, be it well borne in mind, can only take place in the presence of a free acid. The sap of weakly trees seems to be always in that condition.

It remains only to be said that while I agree with others in considering the chief damage done by the disease due to the premature fall of leaf I would add to this, that I feel assured that the disease has a reactionary influence; that it leaves behind in the tree, after a severe attack, a subtle poison, causing a subtle disposition in the tree to recreate the conditions favourable to its re-development, which interferes with and is antagonistic to the natural disposition of the tree to form stores of insoluble starch deposits. From these starch deposits fruit, in first the instance is formed. The fungus requires its food in a soluble form and after a series of attacks the trees appear to readily furnish it. Combine this with the premature fall of leaf, and short crops and the non-setting of blossom can be easily accounted for.

EXPERIMENTS :

WITH PROBABLE REMEDIES FOR THE DISEASE.

My experiments were directed, 1st to ascertain whether the condition of the tree by assimilation of any chemical could be rendered less susceptible to the disease, and 2nd whether a practical method of topical application of some chemical or other, could not be devised that would act better than the sulphur and lime treatment and which would not result, as the latter seems to have done in the majority of cases, in leaving the trees, for some considerable time afterwards, in a more susceptible state as regards the disease than if they had never been treated.

1ST SET OF EXPERIMENTS.

To eliminate all chance of error and of mistaking cause and effect in these experiments, I decided to introduce the chemicals direct into the cambium of the stem by a system of lateral absorption, which I called Inoculation. Doubt was expressed at the time as to whether absorption through the cambium could take place. This matter has finally been set at rest; for experiments made by me at Holbrook-estate with cinchona trees, showed that trees of about 150 lb. weight each, exclusive of roots, were capable of absorbing through the cambium in 7½ days up to 60 lbs. of different chemical liquids, the non assimilated portion of the chemicals accumulating in the leaf cells until (only however in some cases) total collapse of the same ensued.

These inoculation experiments have been detailed by me in a paper written at Doteleya and published in January and need not be republished. My general conclusions are:—chlorides, nitrates, bisulphates, superphosphates and all acids and sour organic manures are apt to increase the susceptibility of the tree to the disease. Sulphates, phosphates, or generally speaking neutral salts that can combine with another atomic weight of acid, all alkalies and antiseptic chemicals (other than chlorides and such as do not owe their antiseptic character exclusively to their oxidising or deoxidising power) decrease the susceptibility of the tree to fall a victim to the disease. Pre-eminently successful among the latter, I found carbonate of potash and carbolic acid. When absorbed into the system of the tree while the fungus was healthily established in the leaf tissue, either of these chemicals prevented the fructification of the pinspots, in some cases entirely; in no case more than 22 per cent of them fruited, while on adjoining untreated coffee, under exactly similar conditions and during the same period, from 76 to 100 per cent of the observed pinspots had fruited.

Carbolic acid was the chemical I experimented with almost conclusively, after the preliminary experiments were over, as it had given me even more satisfactory results than the carbonate of potash.

It was applied to the stem of the tree, mixed into a paste with fine soil and water in about 5 per cent strength, a slip of stout paper being tied round the tree in the shape of a cup to hold the paste.

The chemical penetrated in sufficient strength into the cambium cells to cause their collapse for some distance inwards, but the strength and causticity of the chemical decreased of course until weakened enough to effect entrance into the living cell without causing collapse. Traces thereof (in a combined form of course) were bound to exert their influence on the leaf cells.

One of the chief properties of carbolic acid is its capability of arresting organic change or decay, this power being appreciably asserted in its most dilute form. The fungus, according to my conclusions, luxuriates in cellular tissue, contents of which are in a transient stage. The faintest trace of carbolic acid will arrest this, will stop for some time the conversion of the starch deposits into sugar; that is to say, will prevent the formation of what constitutes, in my opinion, the chief food of the fungus—the result will, of course, be that the mycelium, if still young, will die without fructification for want of suitable food. And this has virtually been the practical result of the above treatment. But the effect of the carbolic acid thus used is of an evanescent character, and I came, somewhat reluctantly, to the conclusion that for this method to be of any practical value, considering the wide and universal prevalence of the different forms of the fungus, it would have to be supplemented by topical application calculated to destroy these forms.

This led to reconsideration of the results of the second set of experiments, ending in my being able to combine the essential features of both.

The inoculation process involved some danger to

the trees, for in some cases the carbolic acid penetrated in sufficient strength to collapse all the cambium cells; but this danger could have been easily eliminated by weakening the strength of the application.

2ND SET OF EXPERIMENTS :

Instituted to determine with what success the fungus, in its more or less developed state, could be destroyed by external applications, choosing such substances and chemicals as were known to be inimical to fungoid life.

Out of the many substances tried (sulphate of iron and copper, arsenical solutions, acids, potash, etc. etc.) two chemicals were found, in our preliminary experiments at Doteloya, to have an eminently decided effect both on the fully developed orange spores of the hemileia and on the yet unfructified mycelium, which both it killed without injuring the healthy tissue of the leaf. These two were sulphate of soda (10 per cent solution) and carbolic acid (1½ per cent solution).

Either chemical in these solution changed the orange-coloured spores into whitish looking bodies considerably shrunk, appearing under the microscope as white empty shells, the unfructified mycelium dried up and left a brown spot as far as its ramifications extended.

The observations were made under the microscope. Both these chemicals were tried on a practical scale by syringing their solutions through the foliage. The sulphate of soda application was practically a failure, not more than ten per cent of the spots and spores being destroyed by it. The fungus seems to possess a power of refusing contact with it when applied as a spray, and this practical difficulty will probably occur with most saline solutions.

The application of carbolic acid gave more satisfactory results. Mr. James Blackett and Mr. Drummond, on close examination of the area a few days after the application, decided that from 40 to 50 per cent of the diseased patches and spores of the fungus on the grees had been destroyed, without injuring the young shoots or leaves. But the practical difficulties of syringing a whole estate seemed insurmountable, and to quote from Mr. Blackett's appendix to my report on the results of these preliminary experiments: "*the external application of the solution of sulphate of soda or the diluted carbolic acid have too many drawbacks in my [Mr. Blackett's] opinion to make them at all practicable.*"

Mr. Blackett laid more weight on the results of the 1st set of experiments, and I put aside therefore all consideration of topical applications, until I came to the conclusion that the results of the inoculation process with carbolic acid were not sufficiently good to enable us to battle with the disease with any chance of success.

I then once more considered carefully the subject of external applications, the practical difficulties of applying liquids etc., and finally decided to try carbolic acid absorbed into and used as dry powder in the same manner as sulphur and lime, as an external application. I used this powder, consisting mainly of finely slaked and sifted coral lime, in a strength of about 3½ per cent acid.

Though the carbolic acid is essentially an alcohol, it enters into a feeble combination with caustic lime, and forms what may, though somewhat incorrectly, be called a carbolate of lime.

On exposure to the atmosphere the carbonic acid thereof combines with the lime, sets the carbolic acid free, which thus escapes as vapour into the atmosphere.

Used in this way, the carbolic acid powder has given me such satisfactory results that I have had no reason yet to change either its strength or the mode of application. The treatment of a diseased area with this powder cast broadly through the foliage of the trees results in stems, branches, leaves, and every square inch of

ground being covered with an appreciable layer of the powder. The ground, stems and branches are covered most thoroughly, but a portion of the lower surface of the leaves seems to the naked eye always to have escaped somewhat the application, though under a magnifying glass, the fine, impalpable particles of the powder can even there be seen in multitudes.

The effect of the treatment on the disease is: 1st the destruction of spores and other forms of the fungus on the ground, 2nd destruction of spores on fallen leaves, on the stem and branches 3rd destruction of spore patches on the foliage of the lower branches and the drying up and prevention of fructification of the pinspots on the same; and 4th the partial destruction of spores and drying up of pinspots on the diseased foliage of the higher branches.

Bearing in mind the great importance that has been laid by Messrs Abbay, Ward, and others, on the gathering and burning of the diseased leaves which only represent a small fraction of the spores that have been shed in any one area, the benefit derivable from a wholesale destruction of not only the spores on the fallen leaves but also of those that have fallen on the ground and the majority of others distributed elsewhere in the treated area will, no doubt, be fully appreciated.

The treatment will have a maximum destructive effect on the different forms of this fungus on the ground, on the foliage of the lower branches, in the absence of high winds and in coffee which covers the ground well and when there are heavy dews or a slight shower after the application to supply the moisture necessary for contact. I have not yet finally decided whether heavy rain immediately after the application neutralizes the benefit. Heavy rain a day or two afterwards does not. Under favourable circumstances, pinspots and spores, even on the highest branches, will be affected by the vapour being retained within the area. It will, on the contrary, have a minimum destructive effect during high winds, on badly covered ground, open patchy places, on trees bordering the upper side of road etc.

The vapour of the carbolic acid in an area thus treated under average favourable circumstances is distinctly noticeable by its penetrating smell for about eight to ten days after application; and in addition to the destruction of countless numbers of spores on the ground and on the fallen leaves by the 3½ per cent carbolic acid powder, there has been unmistakable evidence collected that so long as the atmospheric air is tainted with the vapour of this most powerfully antiseptic chemical, the disease can make no progress. The carbolic acid vapour is, of course, during this period breathed and absorbed into the system of the tree by the stomata of the leaf, and its effect of reducing the susceptibility of the tree to the disease is very much the same, and rests on the same basis as the effect of the inoculation process with the same chemical, and which already has been fully explained.

It will now be easily understood that if an estate is dosed in a proper manner, and at a proper time, with this carbolic acid powder, it may be carried through the period of an attack with little appreciable damage.

I have since March last now treated over 800 acres of coffee with this method of vaporization; have also carefully, from time to time, examined what had been done in January last, as well as what of the large area had been done first, and have now finally come to the conclusion that by two applications costing R4 to R5 each per acre, used at a proper time and under average favourable circumstances, an estate can be carried through an attack of the disease with little damage, and that the diminishment of spores (when operations are carried on over a considerable area) and the general improvement in the tone of the trees

which seems to follow the treatment will make the area less liable to suffer from the disease during the next favourable period for its development.

But still I would advise that four applications costing a total of R16 to R20 per acre, including everything, should be given during the first year. An expenditure of R8 to R10 or even less the second year should suffice. The preparation and application of the powder is extremely simple. The coolly understands it readily, and, though disagreeable work does not object to it; so that under average intelligent management I believe it perfectly feasible to battle successfully with leaf disease with the above reasonable expenditure.

The degree of success obtainable will depend on how and when the applications are given. Detailed instructions as to how and when this treatment should be applied will form the subject of another paper which I have under consideration, and which I hope to finish after another visit to the estates that I have treated, before my departure to India.

The fungus will best be regarded in the light of a weed which has been allowed to over-run and firmly establish itself on an estate. It will involve some trouble and a good deal of expense in the first instance to try and keep it under, but in the natural course of things the damage done by it ought to be sensibly reduced at each periodical attack following the treatment I have recommended; and the cost of keeping it out of a certain area, when operations are carried on over an appreciable extent, will be after a year or eighteen months very trifling. For though the danger of infection from neighbouring untreated estates is considerable, the spores thus re-introduced into a treated area will amount only to a very small fraction of the countless millions of spores that are accumulated by unhindered growth and fruition of the fungus *within* a given area. It is almost needless, I think, for me to add that disappointment will result if any planter thinks he has only to scatter a handful of powder over one part of the estate, to see the disease disappear out of the other part. But once the battle is earnestly begun, there are two qualities that will ensure success—PATIENCE and PERSEVERANCE.

The following records and reports of the observation of the different planters with whose assistance I carried on my experiments and who tried and tested the treatment as finally recommended will, I trust, be accepted as independent testimony that my conclusions are based on data and results, that were apparent not only to the trained eyes of an experimentalist, but which were also apparent to the careful and intelligent observation of practical planters.

The cause and effect of the vaporization treatment with carbolic acid on the incipient forms of the fungus when established in the tissue of the coffee leaf cells, and of reducing the susceptibility of the tree to the disease, I find exactly the same as in case of the inoculation process. The observation and results of the experiments made with the latter process may therefore be fairly accepted as proof of the merits of the former in that respect, when operations are made under circumstances that admit of the vapor breathed and absorbed into the system of the tree.

INOCULATION PROCESS WITH CARBOLIC ACID. DOTLOVA ESTATE.

Operations on a Few trees only.

Observations on the fruiting of healthy pinspots: On treated coffee trees, none fruited; most dried up and turned brown. Untreated coffee trees—83 per cent fruited.

Results examined by Messrs. James Blackett and John Drummond and testified by James Blackett.
12th December 1880.

Bellongalla Estate.

Operations on one acre. Observations on the fruiting of healthy pinspots specially marked for observation: On treated area—87 per cent did not fruit, most dried up, 13 per cent had thrown out a few isolated spores. On the adjoining untreated area—all the pinspots had fruited, additional pinspots and already developed spore patches had formed.

General Observations:—Progress of disease on treated area decidedly checked; progress of disease on untreated area at the end of ten days about 300 per cent.

Results examined and testified by ALEX. THOM.

28th December 1880.

Extract from letter to myself:—"I certainly think the trees which have been inoculated are freer of leaf disease, either in the pin spot or red rust stage, than the adjoining untreated area, but so far I cannot say that the inoculation of carbolic acid has eradicated the disease."
W. D. GIBBON.

5th January 1881.

Moragalla Estate.

Observations on the fruiting of pinspots:—no effect of treatment observed on old shuck trees, nearly all pinspots fruiting. On the main area treated, not one of the pinspots fruited, spots turning brown.

Results examined and testified by Mr. GEO. SLOAN PAXTON.

29th December 1880.

Fairieland Estate.

Observations on healthy, specially marked pinspots. Treated area—In no single instance had any of the pinspots thrown out any spores. The pinspots themselves had turned brown and were pronounced (and in this all were guided by Dr. Thwaites' decision) to have been injuriously acted upon.

Untreated adjoining area—In nearly every instance had the pinspots on this area thrown out spores, a few only had not done so.

Results examined by Dr. Thwaites (late Superintendent, Botanical Gardens), Messrs. Anderson, Dewar, and Pyper and testified by

J. LEWTHWAITE DEWAR
and GORDON PYPER.

13th January 1881.

Roseneath Estate.

Observations on pinspots: Treated area—22 per cent of pinspots fruited, the rest did not.

Untreated area—76 per cent fruited.

Result examined by Messrs. Anderson, Dewar and Pyper, and testified by

J. LEWTHWAITE DEWAR
and GORDON PYPER.

13th January 1881.

Sufficient evidence being now collected to establish that the checking of the progress of the disease, as evidenced by the non-fruiting and the dying off of the pinspots, in the treated area, was due to the treatment and not to accidental natural causes, comparative minute observation on adjoining untreated area, except broad comparison as to the prevalence and state of disease and general appearance of the coffee, was considered by me not further necessary.

Pallakelly Estate.

Observations on healthy, specially marked pin spots: Out of 183 pin spots, only 11 had thrown out a few isolated spores which looked pale and unhealthy. Nearly the whole of the pinspots had been affected and had turned brown.

Results examined by Messrs. Vollar, von Kriegsheim and Gibbs and testified by Mr. H. J. VOLLAR.
14th January 1881.

Peradenia Estate.

Inoculation followed upon the 4th day by vaporization. Observation on healthy pinspots and bright orange coloured rust patches: "No single pinspot" on the marked leaves had thrown out spores, large majority showed a brown patch in centre, and were to all appearance dead. Bright spore patches had

turned brown and most spores grey, a few only retained orange tinge.

Results examined and testified by Mr. G. Ross.
15th January 1881.

Following I give now in the first instance the history, almost up to date, of the area that had been treated early in January last, on Pallekelly and Peradeniya estates, by the process I have finally recommended, viz :

THE VAPORIZATION PROCESS.

With carbolic acid temporarily absorbed and bound by a dry powder.

Pallekelly Estate.

As it was here for the first time, that I tried the above process, I selected for the operation as heavily a diseased field as I could find, paying particular attention to obtain for the experiment healthy and vigorous fungus, so as to eliminate all danger of wrong conclusions. The field was heavily diseased. The disease was at its height and in the centre were about 20 shuck trees in a bare patch, the foliage of which was at the time simply one mass of fruiting fungus, and which would come under the classification of chronically diseased trees.

I.

Observations made on the 8th day after treatment : Out of 104 marked pinspots that presented every appearance of health and vigour before treatment, only one spot had thrown out an unhealthy looking isolated spore. The rest in nearly every instance had turned brownish and appear to be dying off. Bright orange spores and spore patches : 30 per cent of these have been injuriously affected, the spores having lost all colour and patches have blackened. 21 per cent are fading ; the rest of the spores still maintain a bright tinge but patches by blackening in most cases. From the general appearance of the field, a decided check of the progress of the disease is discernible. Results examined by Messrs. Vollar, von Kriegsheim, and Gibbs and testified by Mr. H. J. Vollar.

14th January 1881.

II.

"At Mr. Schrottky's request, I have gone carefully over the field of coffee treated under his direction, a month ago, by vaporization and which had two applications. The last was three weeks ago.

"To what I reported at the time about the result of the treatment, I can now add that I see no bad results. The coffee is throwing out new wood, which looks perfectly healthy, not even the tenderest bud having been injured by the vaporisation. The field was heavily diseased at the time of application, and certainly looks much better now ; though I cannot say that the disease has been eradicated.

"I can see no unusual fall of leaf, and comparing it now with the adjoining coffee untreated, its general appearance is decidedly better."

H. J. VOLLAR.

5th February 1881.

III.

"From what I have seen of the experiments, I fully agree with what has been said (the above) by Mr. Vollar." This addition authorized by Mr. R. B. Tytler.

IV.

"I have much pleasure in stating that on close examination of the field that was treated by your process of 'vaporization,' some three months ago, I find that it compares very favourably with the adjoining untreated coffee. On the latter, leaf disease is again showing up, while on the treated area it was difficult to find a leaf diseased."

H. J. VOLLAR.

9th April 1881.

N. B.—This part of the estate was suffering to some extent from a fresh attack in March, while I was in India. There is no indication of the treated field having suffered to any appreciable extent.

E. C. S.

V.—"The field treated in January and with a couple of subsequent applications has kept remarkably free from disease. With the exception of one tree, now badly diseased, the field is almost entirely free of disease. The shuck trees that were in January full of disease have been keeping and are still without disease."

H. J. VOLLAR.

31st May 1881.

Peradeniya Estate.

Here as well I selected fields that suffered from the disease in a pronounced and vigorous form, and I rejected several fields proposed by Mr. G. Ross, as I did not consider them sufficiently diseased to enable us to judge correctly of the results. In fact, we had some difficulty here in finding a field sufficiently diseased for the purpose.

I.

A four acre field first inoculated, then vaporized, in the usual way.

Observations made on healthy pin-spots and bright orange-coloured spore-patches :—Not a single pin-spot fruited. The spore-patches had almost all died. The patch had turned brown and the orange spores grey. A few only still showed a faint orange tint.

A one acre field ; only vaporized but with three applications within ten days, one of unusual strength.

Results much the same as above. No pin-spots had fruited, and spore-patches nearly all died. "I [Mr. G. Ross] am of opinion that the disease has been checked on the treated area, and this opinion is strengthened by comparing it with untreated coffee elsewhere on the estate."

Results examined and testified by
15th January 1881.

G. ROSS.

II.

II.—"I have carefully watched the *four acres* of coffee on this estate which were treated by both inoculation and vaporization according to Mr. Schrottky's system, and under his direction. In addition to what I reported at the time the results were examined, I now state that as far as I can see no injury whatever has been done to the coffee on this area. Nor is leaf disease present to any appreciable extent. The attack, however, is apparently passing away all over the estate.

"The *one acre* referred to by Mr. Mackenzie situated some distance from the field referred above, received an overdose. This was done at Mr. Schrottky's request with a view of gaining experience of how far the chemical could be used with safety to the trees. A very heavy dose (applied through Week's patent sulphurator) and two doses of usual strength (a handful to a tree) applied all within ten days were followed by a fall of leaf greater in the so-treated area than in the surrounding untreated coffee. I think the damage is confined to this, as the trees are now making new wood.

"On the margin of this patch, there were at the time of treatment, some trees very heavily laden with Rust, and Mr. Schrottky remarked that he did not expect much impression could be made on these. It was from one of them that Mr. Mackenzie carried away the branch which he sent to Colombo."

7th February 1881.

G. ROSS.

III.

The management of this estate changed and the next manager writes :—"In reply to your request to report on the coffee, on which you experimented, I can only state, that it is certainly looking very well and does not appear to have suffered at all from the ap-

plication of your treatment. There is apparently very little leaf disease on any portion of this estate."

6th June 1881.

T. C. HUXLEY.

Results of my own inspection is very much to the same effect. There is however palpable evidence that of what little disease there is generally, there is appreciably less on the treated than on the untreated area. The one acre field look well but the four acre field looks, I think, remarkably well.—E. C. S.

OPERATIONS ON A LARGE SCALE.

A few observations made of the immediate result of the application will perhaps be acceptable. But here we are looking now for a broad, general benefit, which I think, there can be no further doubt, will ultimately result, if my instructions are carried out and the treatment persevered in.

Gangapitiya Estate, 150 Acres.

I.

About ten days after application: "I examined some of the leaves that had a bad attack on them (before treatment) and it appeared, as if the lime and carbolic was killing or eating up the fungus, and left the diseased patch with the same appearance, as if the leaf disease insect had been feeding and sucking out the spores. But some seem still to have escaped." Extract from estate reports to Messrs. Whittall & Co. by

30th April 1881.

L. B. VON DONOP.

II.

"I met Mr. Schrottky this morning at Gangapitiya and we examined together the results of the treatment here. He considers them most satisfactory, and so far as the experiment has gone, I most certainly agree with him.

"In exposed places such as along roads and ridges trees were found very badly effected, but this it appears is caused by the powder [or rather its vapour.—E. C. S.] being blown away from these, as inside for every twelve leaves affected, only on one could a living fungus be found. The rest of the leaves had a black spot, where the fungus had been established. On those where the disease had only commenced, a dried-up pale yellow mark was observable but in both cases (which I consider most important), the leaves appeared healthy and performing their functions." Extract from a letter to Messrs. Whittall & Co., by

L. B. VON DONOP.

31st May 1881.

From my observations, I came to the conclusion that this estate has passed through a pretty severe (as evidenced by the large number of dead pinspots throughout the estate) attack of leaf-disease during this month, but which had failed to develop itself, except in places where the treatment could reasonably be said to be able to exert little or no influence. Two applications were given.

E. C. S.

Pallekelly Estate, 100 Acres.

"Undernoted is what I have to say on the 100 acres treated with the carbolic lime. The field had its first application on 18th April (2nd on 19th May.) Then leaf-disease was not very noticeable; only on a few patches was it bad.

"Looking at it to-day, these patches have decidedly improved and comparing the field with untreated coffee, the comparison is most satisfactory as regards the effects of the treatment.

"The leaf disease found on the treated portion was only a few isolated spores on a tree here and there, whereas on the untreated portion the diseased leaves are covered with spore patches (16 leaves with isolated spores were picked from the treated area in six minutes, whereas in the same time 76 leaves—badly diseased—were got from the untreated coffee.

"P. S.—The calculation worked out is about one and one-third spore-patches on the treated, to 40 spore-patches on the untreated."

H. J. VOLLAR.

31st May 1881.

I am, sirs, your most obedient servant,
EUGENE C. SCHROTTYK,
Technical and Agricultural Chemist,
Author of

"The Principles of Rational Agriculture,"
"Bombay Waters and the Albuminoid of Ammonia Test,"
"Man, Plant and Soil and their Co-relations,"
"The Chemistry of Indigo Manufacture,"
"The Red Spider,"

and late Editor of the *Indian Agriculturist*.

Colombo, 7th June 1881.

COFFEE MIXTURES.—In answer to the opinion that coffee adulteration is not so common in England as is supposed, a well-informed correspondent writes:—"I suppose some people go by analyses of coffee, sold as such, and probably purchased by parties whose appearance would put the vendors on their guard. The evil exists in the great manufacturing centres, and in the lower class of shops, where the million are served. There the stuff handed across the counter in answer to applications for coffee, is what needs scrutiny. It is all very well for certain gentlemen to say that the buyers have their remedy, and know what they buy. But, in fact, the Courts of law are no remedy for them. Their remedy is in buying tea and letting coffee (so-called) alone. They would have coffee, if they could get it in decent form; but they are not born with either coffee mills to grind for themselves, nor with education to understand the bearing of the subject."

THE PROSPECTS OF CINCHONA PLANTATIONS.—Although the profit on cinchona plantations is said to be from 70 to 80 per cent., cinchona growers in Ceylon and the East Indies will need to look closely into the cost and possible profit of their plantations, since they may soon have to compete, not only with the Government plantations, but with enterprise in Bolivia. In 1878, a few private individuals tried the experiment in that country of cultivating the cinchona tree, and now, according to the report of the Dutch Consul, there are on the banks of the Mapiri, at La Paz, four or five hundred thousand young trees of two years' growth. In other places also new plantations are springing up, chiefly on the mountain slopes, which are cultivated for three-fourths of their height. The cultivation of the cinchona in its original home is, of course, easy, the chief danger being from drought or ants during the first two years, and the only labour necessary is to keep the young plants free from weeds during the same time. To give shade to the seedling plants bananas are planted between them. Already excellent yellow bark from Bolivia has been sold in this country, and cultivated South American red bark, yielding 3 per cent. of sulphate of quinine, has lately appeared in the London market. At the drug sales this month large quantities of the bark known as "china cuprea" have again been offered, and with it some bark closely resembling it in external appearance, but not containing quinine. Several other parcels of bark have also been offered which do not appear to contain quinine, and probably do not belong to the cinchona genus at all. The variety of gum which gives a rosy, mucilage, in appearance like white of egg, is still to be met with in commerce. It may interest those who have it in stock to know that it may be restored from its allotropic to its natural condition by dissolving it in hot water, and allowing it to stand for twelve hours or so in a warm place. In appearance the gum is hardly to be distinguished from the best "Turkey" sort, but is of a greyish, rather than a yellowish-white tint.—*Pharmaceutical Journal*.

Correspondence.

To the Editor of the Ceylon Observer.

LEAF DISEASE AND A POSSIBLE REMEDY.

DEAR SIR,—If Mr. Marshall Ward is correct, and the very air of a coffee estate is laden with the spore of *Hemileia vastatrix*, would not the forming smouldering heaps, upon which carbolic acid or other powerful disinfectants should be placed, to windward of fields of coffee have a beneficial effect? It would be a cheap way of applying the vapour.

The smoke from the heaps without the disinfectants might possibly do some good, particularly if several adjoining estates would set fire to the heaps on the same day, and the heaps be large enough to go on smouldering for many hours.

The present season of strong winds would be a favourable time to try the experiment. E. F. T.

P.S.—If the fields be large, parallel heaps at requisite distances might be formed.

[Great care would have to be taken to prevent the coffee catching fire.—Ed.]

CINCHONA CALISAYA THE BEST VARIETY FOR LOW ELEVATIONS :—NEARLY 24 LB. DRY BARK PER TREE OBTAINED AT 2,500 FEET.

Pooprassic, 6th June 1881.

DEAR SIR,—Perhaps you may consider the following figures of interest as bearing on the mooted point, which is the best variety of cinchona to grow at certain elevations.

With the object of making my Lemagastenne calisaya trees as pure and select as possible, I rooted out forty out of my original eighty trees, keeping only those trees true to the type that gave the best analysis. From these forty trees, I got 955 lb. dry bark, which Mr. Symons sold for me in Colombo for R912'65. This is equal to 23'87 lb. bark per tree, or R22'81. The price realized per lb is not very good, and I might have done better if I had sold at home. But when you consider that these trees were growing on poor patana soil, at an elevation of 2,500 ft., and that they were selected as being inferior, I think it will be allowed that calisayas are the best varieties for low elevations.—Yours truly, J. A. ROBERTS.

CINCHONA CULTIVATION :—WEEDS AND DYING OUT OF TREES,

WHY NOT TREAT CINCHONA LIKE LARCH PLANTATIONS?

Hamilton; Lanarkshire, 11th May 1881.

DEAR SIR,—I am obliged to you for inserting my two letters of the 23rd February and 2nd March in your paper, and I have now further evidence to bring forward in favour of my theory of not weeding. In Mr. Morris' Report on Jamaica Gardens and Plantations, he gives an instance where a cinchona nursery had been made in the forest adjoining a coffee estate in 1868 from which most of the seedlings were removed the same year, and only a few of the smaller and weaker plants left behind. Mr. Morris writes :—"Hearing that a few cinchonas were still left, I was led to visit the spot in order to examine the trees and their condition after the lapse of so many years. It was evident that since 1868 nothing whatever had been done to the spot. The road was quite overgrown and the surrounding forest was thick and almost impenetrable. The condition of the cinchona trees occupying an area of about 120 square yards, was, however, very remarkable. By carefully counting them, I found there were 379 trees on this small area, some of which were only nine inches apart. Most of the trees consisted of the crown bark (c. officinalis); they were about 29 feet high with tall clean stems ;

the largest measuring 15 inches in circumference at the base, and the smallest 8 inches. Being the remains of a nursery, it was naturally expected that some of the trees would be very close and others considerably isolated. They appear, however, to have grown up and completely shaded the ground, for underneath the soil was clear of weeds and covered with a thick covering of fallen leaves.

"The condition of the trees and the locality in which they were found shewed clearly that cinchona trees thrive best where they are planted closely together, and when the ground is well shaded and kept cool and moist.

"Moreover, these trees indicated that when a cinchona plantation has been thoroughly established, and the trees completely cover the ground (say in the third year from planting), no further attention is necessary till they have arrived at maturity and be fit for barking."

I am glad to see that Mr. Wickham's experience is favourable to non-weeding. Mr. Forbes Laurie, in his reply to my former letters, makes the most of the bad effects of weeds in robbing the soil of its productive qualities, but takes no note of the gain in soil from rotten leaves, branches, cut weeds, etc., etc., of the bad effects of the sun to the exposed soil and to the cinchona rootlets. How does Mr. Forbes Laurie account for chena land or abandoned coffee estates gaining in soil by lapse of years, if weeds are such exhausting crops as, he makes them out to be?

Mr. Morris is clearly of the opinion that cinchona roots should be kept cool and moist, and the simplest and least expensive way to do this is to let weeds grow, cutting them down periodically when they grow too high. The weeds cut down would act as a moulding and would eventually decay and form soil. After the cinchonas cover the ground, the weeds do not grow, as experience shows.

I do not see any reason why cinchona plantations in Ceylon should be treated differently to larch or other plantations in this country, where clean garden-like weeding is never thought of.—Yours truly,

H. J. MCCALL.

INDIA-RUBBER AND GUTTA PERCHA.

London, 13th May 1881.

DEAR SIR,—I send you by this mail proof of No. IV. of my Commercial Plants. One of the points to bring out is that the demand for rubber and gutta is increasing every day. Telegraphs and telephone, cables, and many other uses demand constant supplies, which will increase. The old Indian plan can't be depended upon.

I have sought for the trees and seeds for our colonies where the supply of rubber came from. It is most difficult testing the milk to see if it has a large enough deposit of cream—if you like to call it—to make the rubber worth while collecting.

But if a poor rubber is well collected and clean, it will fetch a good price. Little is known yet of the best plan for taking out the elastic gum from the juice of the tree.—Yours faithfully,

THOS. CHRISTY.

FORMATION OF A TEA ASSOCIATION.—A meeting of representative members of a large number of Calcutta firms interested in the cultivation of tea was held at the Chamber of Commerce on the 18th instant to consider the question of forming a Tea Association, with a view to consultation and united action in matters of common interest, such as notably the regulation of the bonus system; extension of sales of Indian Tea in India; dealing with bright improvement of communications; questions affecting the tenure of land; Inland Emigration and the like.—*Madras Mail*

TASAR SILK IN INDIA.

We have received from the Madras Government a paper containing Major Coussmaker's account of his experiments in Tasar Sericulture during the past year. He writes from Camp Rajur, Taluka Akola, and reports that though he has not succeeded in gathering a crop of cocoons of his own rearing, he has yet gained so much more experience of the knowledge of the difficulties in the way that he believes that he will eventually be able to overcome them without increasing the expense of the cultivation. His failures last monsoon were owing to the imperfect construction of the cages in which he tried to rear the worms. These were at first entirely made of tarred screens of split bamboo, and served the purpose of keeping out rats, mice, birds, squirrels and lizards, but being dark the plants did not thrive well, and the worms were always striving to escape. He then altered the construction, made them longer, and put netting at the top instead of pieces of screen, and here everything thrived well for a time, until some wasps and other insects managed to get in and puncture the silkworms, from the effects of which the majority died and very few lived to spin their cocoons. He is to try to counteract this next monsoon with coarse open cotton cloth which will, probably, turn out to be cheaper than netting. He also states that the small plantation which he laid out is thriving and will eventually be able to support a considerable number of worms. His collection of cleaned perforated cocoons ready for the manufacture now amounts to about 30,000, weighing about 60 lb. and sown up in bags, in which state they will remain without deterioration for an indefinite period. Eggs were distributed in Ceylon amongst other places, but the names of the persons are not mentioned. We hope the experiment will be a success.

AUSTRALIAN FRUIT FOR CEYLON AND INDIA.

The Melbourne *Leader* of 7th May says:—

"We have frequently suggested to fruit growers the advisability of seeking a market for their produce in Ceylon, India, and other neighbouring countries, in preference to England, and among the benefits which the Great Exhibition is likely to confer on the community we may now look forward with hope to the accomplishment of the means of a profitable disposal of surplus fruit. The Commissioners for India having interested themselves in the matter, and communicated with the committee of the Horticultural Society on the subject, that body at once instructed Mr. Neilson, curator of the gardens, to prepare cases of apples of different varieties, by way of experiment, and these were despatched to Calcutta a few days ago by the steamer 'Hydaspes,' consigned to the hon. Mr. Inglis, brother to the Executive Commissioner for India. Nine cases in all were sent:—one for the Governor-General, one for the Lieutenant-Governor of Bengal, a third for other officials, and the remainder to be sold by auction; so that a fair estimate of their value is likely to be obtained."

The cases contained upward of 400 varieties, English and American, besides eight seedlings and some pears. The fruit was packed in ordinary bushel cases, each sender packing as he thought best, those from the Horticultural Society further being wrapped separately in different kinds of paper, the sides of the case being also lined with double sheets of paper. The *Leader* regrets that the experiment was not on a larger scale, a case of each variety being sent; and also that the ordinary fruit cases were used, these being not strong enough for a long sea voyage. Deal cases would not do, on account of their imparting a flavor of turpentine to the fruit, Kauri pine being however an exception. The *Leader* suggests eucalyptus

or other woods, and points out that the Americans have shown that close barrels cannot be excelled for the conveyance of fruit, but it is added:—

"These are in some respects more convenient than any other form, yet rectangular cases could be better stowed on boardship, and would probably be equally good for the purpose."

As to the profits to be made, it is said:—

"Little can be surmised as to the profits likely to be obtained, though Mr. Inglis has made a calculation, in which he states that apples sell in India for 1s 6d to 1s 8d per score, which would amount to 10s to 12s the bushel; and he estimates the expenses of transit, &c., at 2s 6d, which would leave 7s 6d to 9s 6d for fruit and case."

On this, another Melbourne paper says:—

"Fruit in bad condition invariably lands exporters in loss, as those know who have been unlucky enough to have fruit spoilt *en route*. At last week's market apples ranged from 2s to 8s a case, and as the season advances the value of best apples will be higher, the glut of non-keepers having gone by. It would appear, then, that the 5s or 6s per case, the estimate of Mr. Inglis, will be likely to prove too low to attract the right sort of fruit. The few cases just sent experimentally to India and England will hardly afford reliable grounds for estimating the probable results of shipments made on an ordinary commercial scale. Growers will have to wait results of larger consignments, and it will not be until after several trials that the best methods of packing, the best varieties, and the best seasons of year for the business, will be ascertained."

A GOOD TIME COMING FOR TEA.

(*Friend of India.*)

A good time seems to be dawning for the Indian tea industry. The cause of the painfully low prices, which for two years have weighted down the hopes of all engaged therein, has been simply that supply has outrun demand. But the low prices that have ruled stimulated consumption, and at last a change seems to have set in. The London deliveries for April were 4,300,000 pounds. If such last (and there is every reason to think they will, for Indian tea grows in favor at home daily), it equals a yearly delivery of nearly 52 million pounds, and we can at the outside, this year, only give them 50 millions! This must send up prices, in fact the prospect of it has done so already. Fine teas have quite lately been quoted 2 or 3 per pounds higher.

Good news also comes to us from Australia. Thanks to the efforts of the Calcutta tea Syndicate, our teas are now appreciated and enquired for there. One year more (and we believe the Syndicate has no idea of abandoning that field for at least so long) and the trade with Australia may safely be left to private enterprise. America also looms in the distance for the Syndicate intend exploring that field too. Luck attend them, for with a considerable portion of our teas diverted from the London market, we might almost see again the prices that ruled three and four years ago.

We look for help also in another way. A new method has lately been introduced for packing Indian teas in slightly decorated tin-boxes holding 20 pounds. There are manufactured by Messrs. Harvey Brothers and Tyler, of Mincing-lane, and are used already on many gardens. They have several advantages, which I have no space to set out now, but in my opinion their greatest claim to favor is the good they will work for the tea industry generally, by introducing Indian teas into places where they are unknown, and by fostering the habit of drinking our teas pure. For sold in this shape they will go much into consumption,

and will not be used, to the same extent, to bolster up inferior Chinese kinds.

There is yet another point. It is generally admitted now that India cannot vie with China in the production of coarse cheap teas. In short, that, if success is sought, quantity must give way to quality. As regards fine teas, none can beat us, in fact none can make as good as we can. Speaking generally, planters this year are picking finer than they have done hitherto. This of course will lower the produce; indeed, so much so, I doubt if the fifty millions alluded to above will reach the United Kingdom this season.

Brighter days are therefore dawning, and I think the dividend columns of Tea Companies in the spring of 1882 will not show so many ominous "nils" as they present now. E. M.

NOTE.—We trust our correspondent, who is an authority on the subject of tea, is right in his expectation that the prices will rise, but our own hopes in that respect are not quite so sanguine.—*Ed. F. of I.*

**NETHERLANDS INDIAN NEWS :
CINCHONA AND DATE COFFEE.**

(From the *Straits Times*, 28th May.)

CINCHONA CULTURE.—From a description of the cinchona barks intended for sale in the Netherlands from the crop of 1880 amounting to 109,080 half kilogrammes, it appears that the proportion of quinine in the many varieties differ greatly. As an example, we subjoin the product, first quality, of the Malawar estate. The proportion of quinine amounted in the Succirubra to 1.0, in the Calisaya 1.5, in the Schukraft 0.9 in the Haskarlina 1.8, in the Officinalis 2.6, in the Pahudiana 0.4, and in the Ledgeriana 7.9 per cent.—*Samarang Vaderland*, 7th April.

Java Cinchona planters will hear with great interest that Mr. A. H. J. Diemont intends to establish at Amsterdam, a steam manufactory for the preparation of sulphate of quinine, land for the purpose having been bought. So far as we are aware, there are in America three, Germany three also, and in France, England, and Italy, only one each of the manufactories of this description. The manufactory to be built will, therefore, be the first in the Netherlands and the seventh in Europe.—*Batavia Dagblad*, 2nd May.

The *Surabaya Handelsblad* gives the following further particulars regarding date coffee:—"A Frenchman noticed that the poorer classes in Persia, in default of coffee, roasted dates and used them as substitute for the same. He followed the example, and with an Englishman manufactured the so called date coffee. A speculator bought the so-called secret, and succeeding in getting out a patent for it in England. This patent was made over to a Company, and which secured rights in other countries. In France and Germany, these patent rights were sold to other Companies for sums that forthwith recouped the original English Company its capital. This naturally caused a great rise and a brisk speculation in shares; with an eye, above all, to the sale of the patent rights in other lands, especially America, where five minor Companies had undertaken to find a market for the shares. The rising of the shares passes for proof that the product is in demand. As soon as this gambling abates, the affair will again sink to nothing, and the profits made will consist of the losses which silly people will have suffered from who buy shares 300 per cent above par. From date coffee itself no profit can be made, for the article is nothing more or less than an adulteration of genuine coffee—namely 75% burned dates and 25% coffee. It is said that the French-English Company has a manufactory at Kurrachee, but no dates appear to be there."—*Ibid*, 3rd May.

To coffee planters, it is certainly important news that the experiments with the drying system of Mr. Van Maanen, made in the presence of a commission of experts, have led to the most satisfactory results. In 22 hours, the drying of a quantity amounting to 50 piculs of coffee was accomplished, and the cost of the same was not more than 6 cents per picul. Should it turn out that coffee dried in this way continues of good quality on arrival in Europe, Van Maanen's mode will soon be adopted everywhere, for the expense of putting up the apparatus is comparatively small.—*Samarang Zondagsblad*, 8th May.

**CEYLON AT THE MELBOURNE
EXHIBITION.**

COMPLETE LIST OF AWARDS TO CEYLON.

JURY 1.—FINE ARTS.

II.—A. M. and J. Ferguson, Colombo, engraved and lithographic maps.

JURY 3.—EDUCATION.

III.—A. M. and J. Ferguson, Colombo, maps, &c.
IV.—School of the Church Mission, Cotta, technical and special schools; A. C. Dixon, maps, &c.

JURY 4.—BOOKS AND STATIONERY.

Commended.—Government Agent, Kandy, styles and book; A. M. and J. Ferguson, printed books; Rev. C. de Alwis, printed books.

IV.—Ceylon Government, printing.

JURY 5.—PHOTOGRAPHY.

I.—W. L. H. Skeep & Co., Colombo, landscape and building photographs, bronze.

II.—L. E. Douffet, landscape and building photographs.

JURY 9.—FURNITURE.

II.—D. F. De Silva, carved ebony stand and pair of ebony couches.

III.—Don Andris, Galle, two carved ebony lounging chairs.

IV.—A. C. Sumps, lounging chair and teapoy.

JURY 11.—GOLDSMITHS' WORK

I.—Ceylon Government, Colombo, goldsmiths' and silversmiths' work, service; Government Agent, Kandy, goldsmiths' and silversmiths' work, silver.

II.—J. B. Gomes, Mudaliyar, goldsmiths' and silversmiths' work.

III.—D. F. De Silva, goldsmiths' and silversmiths' work; P. B. Halipane, Ratemahatmeya, goldsmiths' and silversmiths' work; D. J. Werasiri, goldsmiths' and silversmiths' work, ornaments; J. B. Gomes, gems and precious stones; Don Gabriel Dewapura Jayasinghe, gold hairpins and earrings.

IV.—Halpe, Ratemahatmeya, goldsmiths' and silversmiths' work; Don Suwaris, gold and silver jewellery; Don Carolis Ratnawibusane, gold and silver jewellery; Bentara Yahatugoda Tepani-hami, ivory charms for chains.

JURY 12.—BUILDING MATERIALS.

Hon. Mention.—John Kyle, Colombo, concrete.

JURY 13, 22.—MEDICINAL BARKS.

II.—E. H. Cameron, cinchona bark, Lee, Hedges, & Co. cinchona bark; Muckwood & Co., cinchona bark; T. C. Owen, Oonoonga Estate, cinchona bark; Delmege, Reid & Co., essential oils; Dr. Trimen, Director of Royal Botanic gardens, Kandy, collection of medicinal herb, roots, bark, &c.

III.—D. A. T. Dessanaika Mudaliyar, medicinal oils.

Hon. Mention.—Ceylon Government, Colombo, Hal resin; Dissaraika, Mudaliyar, tanning barks.

JURY 14.—FANCY GOODS.

I.—D. F. D. Silva, Colombo, dressing cases, work-boxes &c., bronze.

II.—Don Adrian Wijenarayanan, Galle, dressing cases, work-boxes, &c.; D. J. Werasiri, Galle, fancy articles, carving, &c.

III.—A. W. Subehami, Galle, dressing cases, work-boxes,

&c.; H V Carolis de Costa, Galle, dressing cases, work-boxes, cigar cases, &c; B. Y. B. Baaban Hami, Galle, dressing cases, work-boxes, cigar cases, &c.; Don Nicholade Silva Weerajayasundra Goonawardene, Galle, dressing case, work-boxes, cigar cases, &c; K Hormusjee, basket and straw work.

V. G. Y. B. Tepanis Hami, Galle, fancy goods; Don Andris Dewapuratne Jayasinghe, Galle, fancy goods; Don C. W. Abeynarayane, basket and straw work.

JURY 15.—WALKING-STICKS.

II.—Don Adrian Wijenarayane, Galle, walking-sticks.

JURY 18.—CORAL AND SHELLS.

HON. MENTION.—Government of Ceylon, Colombo, shells A. De Dominico, Colomb, black coral.

JURY 19.—TIMBER.

II.—Ceylon Government, Colombo specimens of Ceylon woods; H. B. Peiries, Morotuwa, specimens of Ceylon woods.

III.—Don B. G. Andris, Kumbalwella, specimens of Ceylon woods.

IV.—D. J. Dissanaika, Hapitigam Korale, specimens of Ceylon woods; D. A. Wijenarayane, Point de Galle, specimens of Ceylon woods.

V.—Gabriel Fernando, Alutkuru Korale North, specimens of Ceylon woods; R. H. Martos, Kumbalwella, specimens of Ceylon woods.

JURY 20.—FIBRES, TOBACCO, &c.

I.—Delmege, Reid, and Co., flax, hemp, fibers, silver, Armitage Bros., oils silver.

II.—Delmege, Reid, and Co., oils; Government of Ceylon Colombo, oils; Dessanaika, Mudaliyar, oils.

III.—Dessanaika, Mudaliyar, flax, hemp, fibres; Government Agent, Kandy, candle nuts, oils, nuts, &c; Dessanaika, Mudaliyar, gum, resins, and wax; Delmege, Reid, and Co., Colombo, leaf tobaccos, Ceylon Government, Colombo, leaf tobaccos; T. P. William, Heneratgoda, leaf tobaccos.

IV.—A. C. Sumps, Colombo, flax, hemp, fibre; J. F. Drieberg, Ekelle, oils; J. P. Williams, Heneratgoda, gum, resins, and wax; J. R. Ingleton, Dumbara, cigars; Mackwood and Co., Colombo, flax, hemp, &c.

JURIES 24-25. AGRICULTURAL IMPLEMENTS.

V.—Ceylon Government, Colombo, models of various implements.

JURY 28.—MINING, METALLURGY.

II.—W. A. Fernando, Colombo, plumbago

III.—Delmege, Reid, and Co., plumbago; Armitage Bros., plumbago; A. C. Dixon, B.Sc., F.C.S., collection of rocks, minerals, gems, &c.

IV.—A. M. and J. Ferguson, Colombo, plumbago, enclosing quartz, showing what care must be taken to separate foreign matter.

JURY 30. NAVIGATION AND LIFE-SAVING.

II.—Government of Ceylon, Colombo, models native boats and vessels.

III.—Delmege, Reid, and Co., Colombo coir rope; Messrs Leechman, Colombo, coir rope.

JURY 31.—ALIMENTARY PRODUCTS

COFFEES.

I.—Mackwood and Co., Goonambil Estate, coffee, silver; S. Rajapakse, Mudaliyar, cinnamon, bronze; J. F. Drieberg, Ekelle Estate, cinnamon, bronze; J. F. Baker, (Polwatte Mills), Yakkabendakelle Estate, coffee, silver; Whittall and Co., coffee, silver; Lee, Hedges, and Co., coffee, silver; Colombo Commercial Company, Colombo, coffee, silver; Keir, Dundas, and Co., Loolecondra Estate, coffee, silver; Courthope, Bosanquet and Co., coffee, silver.

II.—H. De Silva, cinnamon; Lee, Hedges, and Co., cinnamon.

III.—Thotulagalla Estate, coffee; Delmege, Reid, and Co., coffee; Delmege, Reid, and Co., Kintyre Estate, coffee; Delmege, Reid, and Co., Tillicoultry Estate, coffee; Armitage Bros., coffee.

HON. MENTION.—Commissioners for Ceylon, Colombo, paddy and rice.

SUBDIVISION JURY 31.—FEAS.

ORANGE AND FLOWERY PEKOS.

I.—All Silver—Keir, Dundas and Co., Loolecondra Estate, Upper Hewahetta; Keir, Dundas and Co., Loolecondra Estate, Upper Hewahetta; Keir, Dundas and Co., Loolecondra Estate (two awards); The Ceylon Company Limited, Koladania Estate, Ceylon, &c.

III.—Keir, Dundas, and Co., Loolecondra Estate; C. A. Hay, Windsor Forest Estate; Mackwood and Co., Galbolde Estate; Keir, Dundas, and Co., Loolecondra Estate.

PEKOS.

I.—Haldane and Anton, Dimbula, silver; A. J. Stork, Blackstone Estate, silver.

III.—A. J. Stork, Blackstone Estate; P. R. Shand Dunedin Estate; Mackwood and Co., Galbolde.

PEKOS SOUCHONG.

I.—Keir, Dundas, and Co., Loolecondra Estate, silver.

II.—P. R. Shand, Dunedin Estate.

III.—Mackwood and Co.; G. and W. Leechman, Agra watta Estate; Ceylon Company, Hope Estate; Ceylon Company, Sagama Estate; C. A. Hay, Windsor Forest Estate, Ceylon.

SOUCHONG.

II.—Keir, Dundas, and Co., Loolecondra Estate.

III.—Mackwood and Co., Colombo; G. and W. Leechman and Co.; Windsor Forest Tea Estate; Ceylon Company (Limited), Koladenia Estate.

BROKEN PEKOE.

I.—Keir, Dundas, and Co., Loolecondra, silver; Ceylon Company (Limited), Sagama Estate, silver.

III.—C. S. Armstrong, Rookwood Estate, Deltota; Mackwood and Co., Galbolde (two awards).

CONGOUE.

III.—J. A. Smith, Lonmay Estate; Keir, Dundas, and Co., Loolecondra Estate.

MIXED TEAS.

III.—T. C. Owen, Onoonagala.

COLLECTIVE EXHIBITS.

I.—Keir, Dundas, and Co., Loolecondra. Upper Hewahetta, silver.

II.—Mackwood and Co., Galleboia Estate.

JURY 36.—SEEDS.

II.—Government Agent, Kandy, kekua and gingelli oils, mandal seeds.

Commented.—G. & W. Leechman, Colombo, produce of coconut palm.

JURY 37.—MISCELLANEOUS MACHINERY.

V.—Government Ceylon, Colombo, Kandyan spindle and comb.

LADIES JURY.

I.—E. J. Tenishami, lace; Rev. T. R. Dowbiggin, exhibit of lace supplied by Mission School.

II.—Don Adrian Wijenarayane, lace.

INDO-AUSTRALIAN FRUIT TRADE.

I was glad to hear by last mail of the perfect success of an experiment of mine to send fresh Australian grapes to Ceylon, and by the "Khedive" (freely by kindness of Mr. Withers, the P. & O. Agent will go,) two boxes of choice apples from the gardens of the Horticultural Society of Victoria: one box for His Excellency the Governor; the other for the Editor of the *Observer*, in order that he may open at the office and distribute the fruit, noting the result in the paper. In fruit as well as meat, cheese, butter, &c., I have no doubt a considerable trade will yet spring up with India and Ceylon. I enclose a copy of the Memorandum on the subject drawn up by Mr. Jas. Inglis, the Commissioner for India, who has the benefit of Indian and Australian experience:—

INDO-AUSTRALIAN TRADE.

MEMORANDUM ON EXPORT OF FRUIT FROM AUSTRALIA TO INDIA.

Indian Court M. I. E. 19th April 1881.

In previous papers issued from this Court by Mr. Buck on the subject of the export of Australian produce to India, it has been noted, that in any dealings on a large scale, it is of little use to study the requirements of the European Residents. The wants of the natives must be ascertained, and if these can be met, the trade is worth consideration.

Fruit of all procurable kinds is greatly in demand by the natives of India, especially in the northern

parts, where fruit is scarcest; and where there is a numerous middle class who can afford to buy it.

Large quantities of apples used to be brought to Calcutta by the Ice ships from America. The multiplication of ice machines of late years has somewhat checked this supply: but there is still the same demand as formerly.

Apples dried and fresh, dried apricots, figs, raisins, pistachios, almonds, walnuts, pomegranates, and grapes, &c., are imported from Afghanistan. Dried fruits and nuts in the largest quantity. The cost of carriage is great, as hundreds of miles have to be traversed by the camels who carry the fruit.

The statistics for importation from Kabul and Kandahar, taken from the Inland trade Returns, are about £120,000 worth, yearly.

The price of apples, of smallish size, at Cawnpore, in the centre of Northern India and in Calcutta is about a rupee, or from 1/6 to 1/8 a score. The grapes are of a long whitish kind, with thickish skins, very sweet, and they are packed in round chip boxes, three rows to each box. Each grape is cut from the bunch, and laid separately on layers of cotton wool. In this way, they bear long journeys, a large per centage keep good for months and they sell in Calcutta at an average of about a rupee per box. I estimate each box to contain, say about 100 grapes.

It is proposed by Mr. Buck, Director of the Department of Agriculture and Commerce N. W. P. & Oudh, and President of the Indian Committee for the M. I. E. to send from India to the Horticultural Society of Victoria, samples, prices and other information of all the fruits imported, and the information thus obtained will doubtless appear in the Society's annual report.

The Cabulee fruit, after the stones have been taken out, is dried in the sun. Fruit drying seems to be but little practised in Australia, though large quantities are annually wasted from want of a ready sale. Orchard cultivation is rapidly extending and the supply of fruit year by year, more and more outpaces the demand.

There are two issues now to be tried:—

I. Whether Australian fruits can be successfully sent to India.

II. Whether, if sent, they will command a sufficiently profitable market.

As to the first point, I will briefly state what is being done.

Mr. Buck addressed a series of questions to the Horticultural Society of Victoria, and at a recent meeting of their Committee, it was arranged at my suggestion to send up a small trial consignment, and this, under Mr. Neilson's careful supervision is now being prepared. By the kindness of Mr. Withers, the courteous representative of the P. & O. Co. in Melbourne, the cases will be carried at a reduced freight, and will be specially taken care of during the voyage. Mr. Cole of Richmond—for presentation to the Governor-General contributes a special case of choice varieties, so also does Mr. Lang of Harcourt and Mr. H. U. Cole of Upper Hawthorn, and indeed every grower who has been applied to, has liberally and promptly responded. It is desirable to have as many fruit-growing districts represented as possible, and all particulars will be accurately noted and reported on, as to which varieties, and from what districts arrive in finest condition, and offer best prospects of being successfully exported.

The apples are being packed in different ways, and the present shipment is, in fact, purely an experimental one, with a view to gather useful hints from the result, whatever it may be. Every method and every season should be tried, and by following this up with small shipments monthly, until the right plan and right season are definitely ascertained. Dried fruits especially should be tried, and the best mode

of drying should be ascertained by experiment.

Calcutta is probably the best market, but there is a transshipment at Galle which militates somewhat against the export of whole fruit. Bombay and Ceylon are likely to prove good markets, and should be tried, and I am sure Mr. A. M. Ferguson, Executive Commissioner of Ceylon, would be happy to take charge of a trial consignment for Ceylon, and report thereon. Mr. Buck has also agreed to obtain fuller information from Colonel St. John, the Resident at Kandahar, about the methods pursued in drying fruit in Afghanistan, of what sort are the apricots, &c.

As to the second point "whether, if sent, our fruit will command a profitable market," it should be borne in mind, that the present price of fruit in India is not to be taken as that which would be obtainable for large quantities and regular supplies. A poorer stratum of purchasers would have to be reached, who would not take the fruit at the price given by the richer classes, for the present limited supply. At the same time, it must be remembered, what a vast population there is, and how, even a small profit, multiplied by a great consumption, would make a trade worthy to be grasped.

It is computed that there are by weight about 40 lb. of apples in a case, or about 56 cases to the ton. Let 1/—per case represent freight, and cartage &c. Price of case 6d. average price per case in local market say 5/—to 6/—Sundry charges 1/6. Total cost 9/—(and I think that is a liberal estimate.) It would not be difficult to calculate the profit in India, if the apples sold at 1/6 per score.

It is not improbable that the wood of the cases would fetch a good price, for the manufacture of tea boxes or for other purposes.

Whole fruits have been sent from Melbourne to Vienna, grapes and oranges from Adelaide to London, so that there seems to be a fair promise of success, in inaugurating a fruit trade between Australia and India.

The foregoing notes might equally apply to the oranges and lemons of N. S. W., the grapes of South Australia, and the delicious fruits of Tasmania, as to the rich ripe harvests of the orchards of Victoria.

JAS. INGLIS,

Executive Commissioner for India.

There can be no doubt that bunches of fresh grapes from Australia would be far preferable to the single fruits which come from Cabul. A pretty fair trade in apples already exists, but a great and useful trade in grapes has to be developed.

With reference to Mr. Inglis' Memorandum, he and I have received letters from a Mr. F. A. Palleine of Hobart, Tasmania, about fruit "de-hydrated" by a patent of his. I encouraged his proposal to send a trial shipment at the reduced rate, to Ceylon, and if I am able to take a run to Tasmania I'll see his process and report the result. I feel that in all matters of this kind I can be of some use to Ceylon, apart from my special functions as Exhibition Commissioner.—Yours faithfully,
A. M. FERGUSON.

LIBERIAN COFFEE.—It will be good news to all interested in "New Products" to know that Messrs. Robinson & Dunlop have made a sale, the first, we believe, locally of Liberian Coffee at R40 f.o.b. This coffee was from Mr. Forbes Laurie's Liberia estate.

SALE OF CEYLON TEA IN MELBOURNE.—Mr. Henry Poett reports sale of 12 chests of "Sembawatte" tea at 1s 6d per lb. in bond. The tea was pronounced of excellent quality. Advices from Queensland give very encouraging accounts of the opinion of experts on samples of Ceylon teas distributed there. It is much more liked than Indian. There is a good prospect for our teas in Queensland, if care is taken to send nothing but a good article.

CEYLON TEA IN MELBOURNE.

The following results for Ceylon tea sold in Melbourne by Messrs. Greig & Murray on the 10th May have been received by this mail:—

1.	31 half-chests Looecondera pekoe 40 lb. small black very even leaf few ends, strong malty rich very brisk pekoe flavour	1s 4½d
2.	24 half-chests do pekoe souchong 40 lb. well twisted greyish black leaf, rich and full ripe malty pekoe flavour	1s 5d
3.	48 half-chests Looecondera pekoe souchong 40 lb. blackish brown well curled leaf, strong full ripe pekoe flavour	1s 2d
4.	11 half-chests Calsay broken pekoe 38 lb. small black very even leaf full of tips, pungent thick heavy and very flavory	1s 0½d
5.	10 half-chests Calsay pekoe 38 lb brownish black rather loosely twisted leaf, extra fine very oavory brisk pekoe kind	1s 1½d
6.	11 half-chests Calsay souchong 38 lb. bold black fairly curled and even leaf, strong and pungent ripe full flavory	10½d
7.	18 half-chests Calsay pekoe souchong 38 lb. blackish brown well curled leaf, pungent and strong full ripe flavor	1s 1½d
8.	38 half-chests Boos pekoe souchong 38 lb very handsome small wiry leaf full orange pekoe tips, rich full ripe malty pekoe flavor	1s 1d
9.	20 half-chests Rookwood broken pekoe 43 lb. small black very even leaf, orange tips brisk burnt very flavory malty pekoe	1s 2d
10.	45 half-chests Kandal Oya pekoe souchong 38 lb. boldish black fairly curled evenish leaf strong and rather pungent rich flavory	11½d
11.	18 half-chests Kandal Oya souchong 38 lb bold greyish brown curled and twisted leaf, full ripe brisk flavory	10½d

ANALYSIS OF COFFEE PULP.—The *Indische Mercur* says:—A French chemist named Poussingault has subjected this fruit to a careful chemical analysis, and has found as the result that it contains 2.37 per cent cane sugar, 8.73 per cent grape sugar (glucose), and 2.21 per cent sugar of milk. This chemist is still doubtful whether alcohol can be extracted from this fruit to any useful purpose, so that further experiments in that direction are very desirable.

COFFEE IN THE SHEVAROYS.—We learn from the Shevaroyts that coffee prospects are as unfavorable as they were in the beginning of the month, and that the slight showers of rain experienced there in the past few days have not done anything towards improving the prospects of the coming crop. In the early part of the year the best anticipations were entertained about the prospects of coffee and many of the planters were pretty sure of making up, during the present year, the losses they experienced in the past. Leaf disease has not quite disappeared from the estates and the planters are doing their best to get rid of it. The use of bone manure has something to do with the appearance of this enemy of the planter, but it is believed that with perseverance and industry, the difficulty will be overcome, and that leaf disease will disappear. That the Shevaroyts are still attractive to those who are determined to do a fair business in coffee, is evidenced by the fact that, only a few weeks ago, a European planter from the Wynaad applied for and obtained land at the Shevaroyts and has already begun operations. The coffee estates belonging to the late firm of Messrs. Lecot and Co. are said to be steadily progressing, and if the next season turns out to be better than present appearances warrant, the liabilities of the estates will be paid up much sooner than anticipated. The good luck that has attended the planters in Wynaad, is not likely to attend those on the Shevaroyts as regards gold. But what is there to dissuade planters from prospecting? In every part of the Neilgherries and Mysore, gold has been discovered, and it may even be found on the Shevaroyts if diligent search is made.—*Madras Standard*.

Correspondence.

To the Editor of the Ceylon Observer.

CINCHONA C. LEDGERIANA IN CEYLON AND JAVA.

Lynford, Bogawantalawa, June 8.

DEAR SIR,—I send you measurements of 12 Ledgerianas growing on North Cove. They are grown at an elevation of at least 5,300 feet, and are not yet one year old.—Yours faithfully,

A. R. LEWIS.

	Java 2	St. An-	North Cove
	years old	drew's 22½	11½ months
	Ledgeri-	mos. Led-	Ledgeri-
	anas.	gerianas.	anas.
	inches.	inches.	inches.
Average height.....	57	65	58
" stem 4 inches			
from ground.....	3.9	3.9	3.1

COFFEE ADULTERATION ; CHICORY MIXTURES AND DATE COFFEE.

Kent, 19th May 1881.

SIR,—“A bonus dividend of 8s per share, making, with the payment on March 3rd last, 100 per cent this year, has been declared by the Date Coffee Company (Limited).” I see by an *Overland Observer* lately received, that the Planters' Association was about to memorialize the home Government against the legalized adulteration of coffee with inferior and cheaper substances, and permitting its sale to the public under the simple condition that its mixture is stated on the label. I do not think there is the slightest chance of such memorial meeting with any success at the hands of the present ministry, in whose minds the idea of protection in any shape seems to be utterly abhorrent and opposed to the spirit of the age. I think, however, that the planters are quite right in protesting against the permissive adulteration of their produce, not only as an injustice to themselves, but as having a demoralizing effect upon the English trading community. As some check upon the extent to which this practice might be carried on, I think your suggestion that the exact proportion of the substances used should be stated on the label affixed to the package is a good one and I would further suggest that this information should be given in much larger type than at present used, and not as it were squeezed into a corner, in small type, in the hope that it will not be perceived, as in nine cases out of ten it is not. I was told the other day that the German Date Company has advertised its intention of prosecuting for libel any detractors of the Company—rather a significant proceeding and the meaning of which I leave to the understanding of your readers. The Chairman of the Planters' Association will, no doubt, with his well-known ability, put the grievance in as strong a light as it can be placed, and I do not see the great necessity of the Chamber of Commerce joining in the movement. The planters after all are the parties most injured, and they are numerous and important enough to command attention.

Leaf disease, I see, continues to be a subject of anxiety, but I think I perceive a lessening fear prevailing among planters generally, and a more hopeful feeling setting in. The better prospects in regard to crop may partly account for this: and with reason, for it is a proof that, destructive as the disease is, the coffee plant is still capable of yielding fruit, provided it has fair play in the way of good weather at the blossoming season, and other critical periods of the year.

I am very sanguine that, with the general practice of destroying fallen leaves, and invigorating the trees,

when it can be afforded, with manure, the disease will be stamped out finally, and that prosperity will reign again among the hard-working and much-enduring planters of Ceylon. The farmers of my neighbourhood are beginning to grumble at the want of rain. The ground is fearfully dry, and cattle and sheep are starving for want of grass. There has been a good lambing season, but the poor mothers can scarcely afford the little things sufficient nourishment owing to their emaciated condition. Hay will be at any price I expect, unless we have 24 hours of a good down-pour almost immediately. There is a grand promise of fruit, but rain is wanted to fill it out. Should the farmers have another bad year, it will be a terrible thing for the country. I am a landed proprietor to a small extent, and am beginning to have dismal forebodings as to Michaelmas rent. One of my tenants, whose lease of 21 years will expire next Michaelmas and who has hitherto paid £240 a year, has given notice that he cannot continue the tenancy, unless I reduce the rent to £150, and then he will only continue as a yearly tenant. The land he occupies is in one of the most fertile parts of Kent. This will give you some idea of the state of agriculture in England at the present moment.—Yours truly,
AN OLD COLOMBO MERCHANT.

TIN TEA BOXES.—We have received from Messrs. John Walker & Co. a sample of the tin tea box so strongly recommended by Col. Money, and which we have no doubt will be largely adopted by Ceylon tea planters.

KALUTARA TEA.—We have been agreeably surprised at the quality of three samples of tea, supplied to us by the Manager of Culloden Estate, Kalutara District, from the first considerable quantity manufactured by him. Mr. Davidson deserves great credit for the preparation which, so far as we can judge, is very satisfactory. But our surprise arises from the very agreeable flavour of tea grown in a district comparatively only a few feet above sea-level. We should judge that the liquor of the Kalutara tea will not be as strong as that of leaf grown higher up, more especially in Ambagamuwa. But it is evident now that Ceylon can produce a tea of a superior marketable quality from sea-level up to 6,000 feet elevation.

PUBLIC SALE OF CINCHONA BARK.—Messrs. Robinson & Dunlop put up for public sale to-day at their offices, Bailie Street, the undermentioned lots of succirubra cinchona bark. The bark was from trees, 7 and 8 years old, grown on the Deyenellekelle Estate, Walaha Valley, Lindula, average elevation 4,200 feet. Average of five analyses by Messrs. Cochran, Dixon, Powell Jones and Symons of the stem quills shewed 2.52 yield sulphate of quinine. Analysis by Mr. M. Cochran of the mossed bark shewed 2.91 yield sulphate of quinine:

	Sold for.
Lot 1.—1,07½ lb. stem quills	R1.75
Lot 2.—2 5 1 lb. stem pieces	R1.10
Lot 3.—550 lb. branch bark	57½c
Lot 4.—300 lb. root pieces and dust	R1.30
Lot 5.—105 lb. large root pieces	R1.65
Lot 6.—200 lb. mossed stem quills	R1.85

Next came bark from trees, 4 and 5 years old, grown on the Erroll Estate, Dikoya. Average elevation 4,200 feet. Average of two analyses by Messrs. Dixon and Symons, of the shavings from 5 years old trees shewed 2.77 yield sulphate of quinine. Analysis by Mr. Symons of the shavings from 4 years trees shewed 2.32 yield sulphate of quinine.

Lot 1.—1,174 lb. shavings from 5 years old trees ...	R1.90.
Lot 2.—234 lb. shavings from 4 years old trees ...	} R1.45
Lot 3.—41 lb. stem bark.	

There was an attendance of over 20 mercantile gentlemen, and the bidding was fairly spirited, the German firms buying most of the bark.

ARTIFICIAL DRYING OF COFFEE.

The following is a translation of the report on the Van Maanen process by the Commission appointed by the Commercial Association at Samarang:—

“We the undersigned, having assembled as a commission at the request of Mr. P. J. van Maanen and of the Commercial Association of Samarang, to be present at a trial of the process discovered by the aforementioned gentleman for the artificial drying of coffee, and to give an opinion on it, have much pleasure in reporting as follows: The drying apparatus on the estate belonging to Messrs. J. and A. M. Engelken situated in the Soeracarta residency on account of its great simplicity costs exceedingly little to set up. The experiment was made with a quantity of coffee of the same quality as about 36 picols dry and prepared which had previously lain for a day on the drying grounds; the process in the apparatus lasted 22 hours, after which the coffee appeared to be completely dry and ready to be stored away. The operation requires little oversight, is exceedingly simple, and cheap, only about 5½ cubic ells (more or less) of fuel (jungle wood of different sort) being required for the drying of the above amount. Although we readily state that the drying takes place very uniformly, and that the coffee was exposed neither to exceptional heat nor to prejudicial damp, we must reserve our judgment especially on the question of the influence which the artificial drying may exercise on the taste and colour of the coffee, as it can only be ascertained on arrival in Europe if the quality has suffered or not. In order to settle this point Messrs. Engelken intend to send a batch of coffee to the Netherlands, treated in the following manner:—

25 picols dried in the ordinary way on built grounds.
25 picols dried first artificially and then further in the usual way.

25 picols dried first on the grounds and then thoroughly by the artificial process.
25 picols dried entirely artificially.

This batch, shipped to the Netherlands and brought into the market simultaneously, will enable brokers to pronounce a decided opinion on the influence of the process of Mr. van Maanen on the colour and flavour of the coffee, and the final judgment on the utility of this method must depend upon this. If the result of this experiment should appear to be successful we do not hesitate to recommend strongly this process for all coffee estates and especially for those which on account of their elevation experience constant difficulties with the ordinary manner of drying. Although all the advantages enumerated by Mr. van Maanen in his pamphlet should not be realized (for instance the expense in some cases will probably be higher than fixed by him though even then far below that of the present system of drying or what a Guardiola apparatus costs) there can be no doubt that the van Maanen process has great advantages, which will very speedily recoup the cost of setting up as well as of purchase. In conclusion we may mention that the experiment was seen by Mr. D. Pies, Chief Inspector of the Government Coffee Culture, who showed himself greatly impressed with the drying apparatus of Mr. van Maanen.—Samarang, May 1881.—F. J. Knoops, K. van Gessel, A. Bauer, J. H. Dezentje.”

INDIAN WHEAT.—We have received from the Indian Government a “Supplemental Report on Indian Wheat,” by Dr. M. C. Cooke. It appears that in his report of 1879 Dr. Forbes Watson remarked on the weevilly condition of the samples of Punjab wheat received by him, and consequently a second series of samples was sent, and this report gives a very satisfactory statements of the quality of the wheat, the best being valued at 50/6 to 51/ and said to be “very finest, like Oregon.”

NETHERLANDS NEWS.

TRAMWAYS—COFFEE COMPANIES—MANGOSTEEN SHELLS.
(From the *Straits Times*.)

Batavia 20th May.—"In Java there is at present a rage for steam tramways. It is expected that the Batavia one will soon get its materials for construction. In Java three gentlemen have obtained the concession for laying a probably very remunerative line. It is also intended to apply for a steam tram concession for a line between Surabaya and Grissee, and for another between Batavia and Tangerang."

"At Surabaya, three coffee growing companies are in course of formation. There is good news from Samarang to the effect that along the north coast of Java, opium smugglers are vainly looking for the contraband opium receiving vessels which have been obliged to keep away owing to better surveillance."—*Batavia Dagblad*.

"*Mangosteen shells.*—Mr. G. Naef, at Lochm, has made a comparative examination of mangosteen shells and oak bark, to determine the value of the former as tanning material in leather making. It appeared therefrom that the mangosteen shells contain one sixth more tannin than oak bark, and that the value of the former may therefore be set at about 7.50 guilders per 100 kilogrammes."

AUSTRALIAN GRAPES FOR INDIA AND CEYLON.

TO THE EDITOR OF THE "MELBOURNE DAILY TELEGRAPH."

SIR,—With reference to the efforts made, in connection with the grand Exhibition which has just closed, to promote a trade in fruit from the Australasian colonies to India and the East generally, you may perhaps allow me to state the result of a small experiment with grapes made at my instance. My order was given to Messrs. Law, Somner, and Co., of this city, and they confided its execution to Mr. Charles Pitt, of Adelaide, Mr. Withers, the obliging agent of the P. and O. Company, having consented that the box should not only be placed in the ice-room of one of the company's steamers, but that it should be carried free of cost. In this liberality regarding small trial consignments, Mr. Withers is emulating the example set by Captain F. Bayley, the P. and O. Company's agent at Galle. By last mail I heard of the arrival of the box containing about 40lb. of grapes, and superlatives are resorted to in order to describe the perfect condition in which the fruit had arrived, and its deliciousness. The time of transit was about twenty-five days from Adelaide to Colombo, but as not a single berry showed the slightest sign of injury or decay, there can be little doubt the fruit would have retained its good condition for double the period. Of course, the fact that the box was carried in the ice-chamber of the steamer may have contributed largely to the favourable result, but probably fruit well-selected and well packed, as in this case, would carry well if merely placed in a cool part of the ship. In an account of a recent experiment where grapes were sent from Adelaide to London, I observe that corkdust was the packing substance used; but in the case of the package to Ceylon, nice clean sawdust seems to have answered admirably. Such experiments as these show that, provided moderate freight can be arranged, a large trade in grapes from Australasia can be carried on. The fruit packed in bunches, and not subjected to much land carriage (railways being generally available, both in India and Ceylon to render land transit as rapid and as little injurious as possible), must be greatly superior in freshness and good condition generally to the Kabul fruits, packed one by one in small boxes, to which Mr. James Inglis, Commissioner for India, referred in his

valuable paper. The value of a plentiful and fairly cheap supply of so refreshing and nutritious a fruit as grapes to Europeans residing in the hotter parts of India and East can scarcely be exaggerated. One of the most trying, and, if not checked in time, one of the most fatal affections to which Europeans are subject in the tropics, is what is popularly known as "sore mouth," from its prominent symptom. The tongue and mouth assume a pink colour, as the evidence of inflammation of the whole mucous membrane. This inflammation is periodically relieved by natural means, but continues to recur, and if the disease does not end in acute dysentery, but becomes chronic, it wastes away the patient, much as phthisis does. One of the great remedies prescribed for this disease is "the grape cure." Patients are ordered to a vine region, and directed to make grapes their chief article of diet. The late Chief Justice of Ceylon (Sir Edward Creasy, author of "The Decisive Battles of the World") came to Australia on such an errand. Without undervaluing the benefits derived from a sea voyage, and the change of scene and air, there can be no doubt that good ripe grapes possess large curative properties and probably their use as a common article of diet in the tropics would act as a preventive of the painful and depressing affection I have noticed. A full supply of grapes, therefore, would be a great boon to Europeans in India, Ceylon and the East generally; while, if supplied at a fairly moderate price the millions of natives would also be large consumers. Let us hope that a large trade in this and other fruits which flourish, and can be grown to any extent in these favoured lands of the south, may speedily spring up, to the mutual benefit of suppliers and receivers. If the experiments I have detailed, or any further efforts I can make, tend to such an end, I shall feel—and I am sure I can speak for the Indian Commissioners also—only too glad to believe that a part from the direct duties of my position, my visit to Melbourne has resulted in some good. I may add that, thanks to the liberality of the P. and O. Company, trial specimens of Messrs. Swallow and Ariell's flour and meat discs (supplied without charge) went by last steamer to Ceylon, and that choice apples from the Melbourne Horticultural Society's Gardens are to go forward on Tuesday next, one box for the Governor of the colony, and one for the Editor of the *Observer* to distribute and notice.—I am, etc.,

A. M. FERGUSON,
Commissioner for Ceylon.

LOW-COUNTRY PRODUCTS: GENERAL REPORT.

WEATHER—CACAO AND CRICKETS—LIBERIAN COFFEE AND BLOSSOM—CINCHONA—FIJI COTTON—GARDEN STUFF, &c.

Western Province, 7th June 1881.

The weather during May has been very satisfactory our longest spell without rain being only eight days. On the last day of the month the monsoon opened very mildly, and up to date very little rain has fallen, but some has fallen every day. The weather, at present, is rapid alternation of sunshine and cloud, with an occasional short sharp shower—nothing could be better for growth. All the cultivated plants are thriving, but the weeds best of all.

The crickets have disappeared for the season, and I have been able to estimate the loss of plants, which I find much less than I expected. I think now the supplies will not need, to be much more than 15%. The cut plants amounted to about 34%, but with the fine growing weather a good deal more than one half of them are growing anew. We may expect that the weaker ones will be attacked again, as some of those put out two years ago have been cut four

times, and are now behind the seedlings put out last November, of which all that escaped the enemy during March and April may now be considered out of danger.

During last month I have transplanted all the seedlings I had in the germinating sheds into baskets, where they are thriving; but unfortunately they are not safe for the field, else I could have got the whole place planted up in this glorious weather.

The old plants promise a great blossom towards the end of this month, but it would have been greater, if we had been treated to less rain, since the middle of March; the trees having gone more to leaf and wood, than to the formation of flower; and so we have a pair of secondaries, instead of from twenty to thirty flowers, at points of the primaries. I suppose, however, that there will be the more blossom on a future occasion, from the greater quantity of wood. To bear well, the Liberian coffee wants much sun. I have plants, *not under shade*, but so situate, that they get only a few hours of sun daily. They run up rapidly, with large spaces between the leaves, the leaves are of an immense size, and have a very brilliant gloss, but with a height of six feet, and with the lower primaries thirty inches long, they never have had a blossom, and show no signs of it now; while more exposed plants of half their size have scores of half-grown fruit, and much promise of flower. It is only, however, where the plants have advanced to the dignity of two or three pair of leaves, that they begin to appreciate sunshine; and even then, they must have sufficient moisture in the soil. I have seen trees droop, after a month of drought, that were six feet high.

I said in my last report that I would once more fill in the failures of the cacao on that side of the estate, where the least failure of the former plantings took place. I thought to get seed from the Government Garden, and accordingly sent for a sample, with the usual luck of those who have trade dealings with Government: that is paying 20% higher than the current price, while the goods are of inferior quality, to the extent of 50% seeds not much larger than Liberian coffee, and only 60% germinated, producing plants too weak to carry the seeds erect. I returned to my old vendor, a wiser man; and from the seed now in nursery I hope to fill all vacancies on the eastern side of the rocks, where the survivors are now coming on with a rush. It is less than two years since the first plants were put in, and several of them are in flower. One especial pet has been in flower for above six months, but has not yet formed fruit. The white-ants still continue to settle some of the weaker plants, but they have now nearly finished all that suit them.

I have not great expectations from the cinchonas, but so far they have made no complaint. In a few weeks, we may expect them to declare their intentions fully.

The other things that have been planted are generally thriving. Fiji cotton is becoming a weed. The most advanced teak tree is 25 feet high, and as upright as the monument. The Calcutta bamboo threatens to give some trouble to keep within bounds, where the soil suits it, but much is to be forgiven to a plant that promises before long to become a fence that no bullock can storm. Young jak plants grow at the rate of a quarter of an inch daily, and the *Holcus Sorgham* grows ten feet in two months. I have grown some thousands of orange plants, but they are attacked by insects, as soon as they come above ground, and the work goes on day by day, whenever a bud appears, till the plant perishes, battling long and hard for its life. Out of all my plants, I have only one that I can say is out of danger. As for native garden stuffs, were we to turn our attention in that direction, they could be grown in cart loads. Two years ago,

a couple of chilly plants were put in a recess about three feet wide, between two large boulders. The crop gathered twice a year is half a bushel. Of arrowroot, I made a cwt., from a patch less than a square chain in extent, while beans, brinjals, bandakai, betel give great crops. Such European vegetables as have been tried, however, have been conspicuous failures. About twelve months ago, I stuck in some hundreds of pineapple plants among the rocks. They are now fruiting abundantly, but they are never allowed to ripen. The crows and the coolies have all the benefit, but I do not care for them myself, and the transport to a market would swallow up all the proceeds. If the new process we hear of comes to anything, something may ultimately be done with the fiber.

There is a story of an Australian colonist who sowed shelled rice, and was deeply disappointed, when it did not grow. We, in Ceylon, have no right to laugh at this wise Willie, for in the year of grace 1880, an eminent planting agency, of long standing, imported the husked seed of the African oil palm, and sold it to experimentalists, for the purpose of propagation. It was no doubt all done in good faith, but a good deal of disappointment resulted. "Ignorance, sheer ignorance, madam," as Dr. Johnson said, when taken to task for a blunder in his dictionary. A thousand of those seeds were sent to me, but I was not disappointed, having had some experience in the cultivation of palms. Your Aberdeen correspondent some time ago suggested, opening a trade in cocoanut poonac with England. I expect we can advantageously use all the poonac we produce for our own purposes, and English stock-keepers have in African palm meal a very superior feeding substance, relatively much cheaper than poonac. I believe the trade in palm oils is a great and a growing one, and in the habitat of the plant they can be got for little more than the labour of collecting them. Some of your correspondents can perhaps tell us the result of their experiments with this palm. If it can be successfully cultivated, it will be come an important element in the industry of the island. I have no faith in imported seed, but every seed produced in the colony should be used for propagation, as soon as it is ripe.

On my next visit to the Henaratgoda Garden, I will get seeds or slips of all the new products to be found there. Anything that succeeds there can hardly fail here. I think that, as a rule, there is too much shade maintained on that garden, and that many of the plants cultivated would thrive better with more sun. So far as Liberian coffee is concerned, I have no doubt whatever, and for cacao, however much it may enjoy shelter, I greatly doubt the utility of over-head shade.

SCIENTIFIC MANURING:—INSOLUBLE VS. SOLUBLE PHOSPHATES.

(Communicated by an Old Planter.)

Mr. Hughes, in his last letter to the *Observer*, alludes to the Aberdeen experiments, in support of his advice to the Ceylon planters, to administer powdered coral to their land. The advice is no doubt a good one, but the use of powdered coprolite in the "A. A. A." experiments had no reference to the use of lime in any form as a manure. It appeared to Mr. Jamieson, and the Association he serves, that the dicta of the "Voelcker" school of chemists, which decided that insoluble phosphates, and especially insoluble mineral phosphates, were of no manurial value, should not be accepted, without further tests than the dogma had been founded on. For this purpose, the A. A. A. experiments were instituted, and carried out, during a series of years, with great care, and scientific skill. The almost utter failure of the phosphates of alumina and iron to increase the crops tended

to confirm the former belief, as regarded those substances, but the results were very different with the insoluble phosphates of lime, which on an average of several hundreds of tests were found only 7 per cent less effective than the soluble phosphates. It was then objected that the Aberdeen lands being deficient in lime, it was probably the lime, and not the phosphate, that effected the increase of crop. Mr. Jamieson at once admitted that the objection was tenable, till the results were confirmed by further experiments on land that had already sufficient lime in its composition to render the tests of phosphate more independent. To this end, two fresh experimental stations were established in different parts of England. The same experiments were repeated in the Lothians, under the auspices of the Highland Society, with results even more favourable to the use of insoluble phosphates, than those obtained by Mr. Jamieson. The question is one of nearly as much importance, to the Ceylon planter, as to the British farmer, and its settlement will be impatiently waited for by the students of scientific cultivation. If Mr. Jamieson succeeds in fully proving his case, it will enable the cultivator to supply his crop-bearing plants, of all kinds, with the necessary amount of phosphatic manure, at a very much lower price than the substances hitherto in use bears. It would be presumptuous in one who is ignorant of the A. B. C. of Agricultural Chemistry to offer an opinion, where authorities disagree, but my sympathy is with the man who questions nature, for the advantage of the public, and I wish Mr. Jamieson well through it.

INDIAN TEA IN AUSTRALIA.

A correspondent writes:—"Indian tea growers and shippers must not be discouraged by the negative results of the shipment of Indian tea to Sydney. It is the old story of the Pearls and the members of the Porcine tribe. I am myself an old Australian, and remember the time—before my palate became educated—when nothing but the "Post and Rail Variety of Tea" was enjoyable to me. "Post and Rail Tea," thus called, because of the quantity of timber that would be floating in the quart pot in which the camp brew had been made. We really did enjoy it, for we knew no better. It must have left the importers an immense margin of profit, such a margin as they certainly would not make on really good tea. The Australian storekeeper who retails tea buys on credit from the importers. Long credit, too. Mostly Post and Rail Tea is good enough for him. Why should he look out for better? Why, at much loss of profit, educate the palate of his customers? If that cargo of Indian tea had been sold and parcelled out to tea-drinking New South Wales, not another stick of Post and Rail would have been sold again. But the time is near when soon the Australians will drink better tea. A little organisation, a few samples judiciously distributed, and the days of Post and Rail are numbered: Why not present a chest or two of sound Indian tea to one or another of the temperance leaders in the colony?—*Home and Colonial Mail*, May 13th.

QUEBRACHO WOOD.

(*Journal of the Society of Arts.*)

Mons. F. Rhem has lately communicated a paper on the "Quebracho Wood" to the *Société Industrielle du Rouen*, from which the following particulars are extracted:—This wood belongs to the family of the Asclepiades, and comes from America. Being very hard, and composed of a great quantity of interlaced fibres, the tannin it contains is different from that of chestnut or of oak. Gelatine precipitates this tannin

out of a water solution with a flesh colour, while salts of protoxide of iron give an ash-grey precipitate, and the peroxyde salts a dirty greenish colouration. When boiled with weak sulphuric acid, the tannin is not converted into gallic acid. According to a German chemist, quebracho wood contains 18 per cent. of tannic acid. The bark of this wood contains an alkaloid, analogous to quinine. Extract of quebracho, now much used in wool dyeing, giving a yellow shade with a tin solution. It gives even shades, resembling those of cutch, if used with bichromate of potash, but its principal use is for obtaining blacks, for which the wool is given first a bottom of the extract, then passed through iron, and dyed with the quebracho; this, in these conditions, can replace cutch. Solutions of quebracho wood, or extract, will only keep limpid if heated to a certain temperature, but get turbid on cooling. Dyeing experiments, with the dry quebracho extract, as manufactured by a French firm, in comparison with cutch, have proved the former of more value, since, with a lower price, it possesses a greater richness of colouring matter. There series of trials were made: one, by passing the cotton prepared in a quebracho or cachou bath through bichromate of potash; the second, through iron; and, in the third, the patterns were passed through iron and then chromed. In all cases the same results were obtained, showing the advantage of the quebracho over cutch, in spite of a slightly more greyish shade of the colours obtained with the former. The same results have been got by printing mordants on calico, ageing, dunging, and dyeing with quebracho extract or cutch; in all cases the quebracho shades being identical with those of cutch, not only for the tone of colour, but also in regard to fastness.

EXPERIMENTAL STATIONS AND MANURING.

From the *Aberdeen Journal* received by last mail we extract the following from the report of the Annual General Meeting of the Aberdeenshire Agricultural Association. The committee report for last year:—"The experiments for last season, which comprised oats, turnips, and grass, have on the whole been very successful, and yield new and valuable information, for which reference must be made to Mr. Jamieson's elaborate and valuable report.

"The conclusions indicated in Mr. Jamieson's first reports regarding the action of manures on turnips have been now so fully confirmed by repeated experiments that they may be accepted by farmers as a guide to the economical and effective application of manures.

"The conclusions suggested by the experiments on oats and grass during the last two years remain to be verified or modified by further experiments in coming seasons.

"The two stations in England have not entailed serious expense on the Association, and will probably be continued by the localities. The information yielded by these stations confirms the conclusions arrived at from our experiments in this county. It must be highly satisfactory to the members to learn that the example set by this Association has been followed on a more extensive scale by a similar association in the county of Sussex. It is hardly necessary to point out that the more numerous the stations conducted systematically, the wider and more reliable the information gained for the benefit of all. The committee again desire to express their sense of the great value of Mr. Jamieson's labours, and of the devotion he applies to this most important and valuable branch of scientific investigation."

The Marquis of Huntly said: "I hear that on all sides there is but one opinion that our able chemist has held his own, not only in the opinions he has expressed, but in the newspaper warfare to which he has been subjected." The first conclusion we ar-

rived at—viz., “that phosphates of lime decidedly increased the turnip crop, but that the farmers need not trouble themselves to know whether the phosphates are of animal or of mineral origin,” was met by a storm of criticism. A great many experiments have been made, and in every case where properly conducted, have supported our conclusions. The second conclusion which we first published, and have continually repeated, is “that soluble phosphate is not superior to insoluble phosphate to the extent that is generally supposed.” We are obliged to keep these conclusions in the foreground, and to show by our experiments year by year the evidence in support of them, because it is felt that great difficulty arises (attendant on their acceptance) for more than one reason. We have to contend against the teachings implanted during a generation; a tendency of the masses to be carried away by floods of plausible words; the custom of farmers to imbibe their notions of manures from manure dealers, and the opposition of manure dealers or manufacturers, although I am bound to say that, regarding the last, no difficulty has been felt in this neighbourhood, as all the manure manufacturers in this town and district have been most eager to assist in every way the work of the association. (Applause.) I am pleased to see that they are an eminent exception to the trade in other places. When we consider the enormous amount of money which has been taken from the farmer by the erroneous doctrine that insoluble mineral phosphate has little or no effect on plants, the necessity is seen for repeating yearly the important words in the second conclusion we originally arrived at. The additional drain upon the farmers by reason of the other error of ascribing to soluble phosphate twice the manurial value of bone phosphate enforces us to publish and republish the fact that we find yearly the superiority is on the average only about 10 per cent. I hope that on some early day a general acceptance of these facts will be adopted, and until such time we must continue to repeat our conclusions, and to add our proofs.

“On the 29th of November last we carried out the following experiments:—First of all 600 turnips were left in the land as they grew without any protection. I need not say that when these were taken up on the 26th of March this spring they were all rotten. Secondly, a row of 600 turnips was furrowed up with the plough in the usual Aberdeenshire fashion, and when taken up about 83 per cent were rotten, or about five rotten to one whole turnip. Thirdly, we tried what I might call the Forfarshire system, by opening a furrow with a single-boarded plough; two drills of turnips pulled, without anything cut from them, were laid against the perpendicular side of the furrow, and the soil turned back over them with the plough. Of these, about 28 per cent. were destroyed or rotten, but of the good turnips many were wet and dirty. Fourthly, we opened a deep furrow with a double-boarded plough; the turnips were shorn of leaves with the scythe, harrowed out, and eight drills put into the furrow. They were partly covered by one round of the single-boarded plough, and the remaining uncovered portion covered with earth by spade. Out of these 600 turnips about 16 per cent. were destroyed, but they did not come up quite so clean as they should have done, or as those in the next experiments we tried, and which I may call the English way, which was putting the turnips into pits. I had three different pits, about six feet square. Into No. 1, 600 turnips, as they were pulled, without anything cut off, were thrown. This is the ordinary way I have seen it done in Huntingdonshire since I was a boy. In the next the 600 turnips had the leaves cut off; and in the third pit, they had the leaves and the roots cut off. The pits were 3 to 4 feet high, and each contained about 1½ cart loads

of turnips, and were covered with 4 inches of earth. In No. 1, there were 552 healthy turnips, out of the 600, and 48 destroyed, or 8 per cent.; in No. 2, there were 550, and 50 destroyed or 8 per cent.; and in No. 3, there were 570, and 35 destroyed, or 6 per cent.; and the great advantage was that the bulbs were healthy, clean, and dry. Now, I cannot say how deeply important I think these facts are to the Aberdeenshire people. At a very slight cost, by throwing these turnips together and covering them with 4 inches of earth, you can get them comparatively healthy after four months' time. After paying a high compliment to the ability of the Association's chemist, Mr. Jamieson, the noble Marquis concluded by moving the adoption of the report.

Mr. J. W. Barclay, M.P., in seconding the report, said the experiments carried out in Aberdeenshire had been watched with the greatest interest in England, and he was sure that in one form at least agricultural depression would be met by the increased information which that and such like Associations were collecting. The more of these stations throughout the country with the view of eliciting information on certain definite points the greater advantage would it be to them and to the whole community. It must be gratifying to the subscribers to the Association to see that they had entered upon a very good work, and that the work they had done so far had been so appreciated that their example was to be followed in other parts of the country. He should hope that the Government might be able to see its way to do something for this branch of scientific investigation. No doubt there were great difficulties connected with it; but if the Government was going to aid agriculture in any way, he did not see how it could do it more effectually than by some system of scientific investigation akin to what had been carried on by that Association. He had much pleasure in moving the adoption of the report. (Applause.)

PLANTING IN SINGAPORE.

The planting interest in Singapore is reviving, and we are glad to find that the growth of tapioca has rewarded the enterprise of those who embarked in it. The extraordinary failure of the nutmeg trees some twenty years since discouraged Europeans from planting them. Such was put down as worthless. It is due to Mr. Chassariau that he has demonstrated the capability of the land. Some ten years since he purchased from Government about a thousand acres of land at \$175, and subsequently Sir Andrew Clarke made him a grant of two thousand acres in order to show his appreciation of the efforts and success of his planting. There has unfortunately been some difficulty in giving possession, and up to the present time only eight hundred acres had been made over. We believe that the Government allege that they have no more land in the locality, and offer some in a different part of the island at terms differing from the original grant. This is an undignified proceeding, and hardly accords with the service rendered by M. Chassariau, which was duly appreciated by Sir Andrew Clarke. The extent of the estate is about 2,200 acres, with about twenty-six miles of road. The yield is about 15,000 piculs for the year, the market value being about \$5 per picul. Next year will probably yield 20,000. It is chiefly exported to London and Marseilles. The retail prices are enormously out of proportion, being about 300 to 400 per cent. in advance of the import prices. This naturally checks consumption, and does an injury to the planter. The improved machinery, made by Messrs. Dalbouze, Paris, which has lately been laid down, can produce 100 piculs

per day. The Brazilian plant has lately been introduced and its yield is some 20 per cent. more than Straits, or Java. The coolies are Chinese and Javanese who are free, and are engaged on daily wages. The position of the estate as extremely pretty, and the barometer ranges four to five degrees less than the town. Messrs. Putfarcken, Reiner and Co., Singapore, are the financial general agents for the estate.

Another enterprise is that of the Trafalgar Estate, under the management of Mr. Knaggs, who is a part owner with Messrs. Maclaine, Fraser and Co. This estate has been opened a little over two years. The present area under cultivation is about 1,000 acres, out of a total of 2,000, and the yield at present is about twenty piculs per acre. The machinery is capable of turning out about sixty piculs per day. Great attention is paid to the forming and manipulation, and the highest prices are thus obtainable. The number of men employed is about 300 to 400 Chinese, and Javanese, at 17 to 20 cents per day wages. Mr. Knaggs is an old planter in the West Indies, and has been some years in Province Wellesley.—*London and China Express.*

CEYLON PLANTERS, when they are inclined to grumble, ought to think of the extremely hard times experienced by farmers and proprietors in the old country. We refer to a woeful account of farming prospects in England given in the *Pall Mall*.

AUSTRALIAN MEAT AND FLOUR BISCUITS.—We have now circulated in the Fort and among the Planters at their General Meeting some of Messrs. Swallow & Ariell's "Beef Biscuits" and we shall be glad to have opinions of their value.—A merchant writes:—"I consider the Australian Beef Biscuits a palatable and wholesome food. They would, I think, be found a useful and agreeable addition to the provisions of the jungle traveller. A few crumbs taken from one of these biscuits and moistened with water, will, when placed under a microscope, exhibit small bundles and shreds of muscular fibre."

MANURES AND MANURING.—In another place will be found an interesting letter from a gentleman whose relative in South America shews the way in which fertilizing substances can best be procured direct from the source of supply in Chili and Peru. We fear the Ceylon planting industry cannot at present face the commencement of an enterprise of this kind, but we trust the day is not far distant when we shall see vessels carrying cargoes from Valparaiso to Colombo. There will also be opportunities then for procuring plants and seeds of cinchona as well of other new and valuable products. The paper from the *Field* on the various substances commonly classed under "Lime" by the cultivator, their nature and uses, is full of interest and instruction.

COFFEE.—A few weeks ago, we alluded to the prospects of coffee in the Shevaroy's and stated that the present season was not likely to turn out favorable, owing to the scanty fall of rain at the proper time. We hear that a slight change for the better has taken place in the condition and prospects of coffee in the Shevaroy's, but further advices are awaited. From South Coorg we learn that coffee prospects there are favorable, and that owing to seasonable showers of rain the estates in many parts of South Coorg look promising, and planters expect a good crop, which, if they secure, will make up, to some extent, the loss they suffered last year, when the season, though it looked very favorable at the outset, turned out a very disappointing one. The weather at the date of our advices, 3rd June, portended rain: the south-westerly winds had set in, but the rains had not made their appearance. The fall of rain in South Coorg from 1st January to 2nd June was 10.96 inches against 9.81 inches in the corresponding months last year.—*Madras Standard.*

TEA AND COFFEE.—The *Rangoon Gazette* says:—"Tea is not the only article which will succeed in India and Burmah; we have Coffee thriving well in many a gentleman's garden here, one party having to our knowledge kept himself supplied for about a fortnight with the produce of a few coffee shrubs in his compound. As all varieties seem to thrive even in the heart of Rangoon, they should yield large crops on the Karen and Arakan Hills; in fact in any place where there is high ground. We are glad, therefore, to hear that a gentleman of Akyab has undertaken the cultivation of Mocha Coffee, and we hope every encouragement may be afforded to him. In the latest published official report (September) from the Amboyna residency, it is stated that coffee cultivation is extending there, more than 200,000 coffee plants having been set in the ground in one month in a single district. The Rajahs of Lesser Ceram have also given permission to introduce this cultivation there. In the islands of Ceram Nusa, and Haruku, the coffee trees looked well and were bearing heavily."

ADEN CATTLE.—A paper published by the Madras Government contains a report from Mr. W. R. Robertson, Superintendent of Government Farms on the experiment begun at the Saidapet Farm, in 1874 in breeding and rearing cattle of the Aden breed. In the Annual Report of the Farm for the year ending 31st of March 1874 Mr. Robertson stated that with the view of effecting some improvement in the cattle of the district around Madras it was intended to import a few animals of the Aden breed. He added:—"The Adens have a high reputation as dairy animals; the name Aden by which they are distinguished has probably originated from Aden being the port from which cattle of this breed are generally shipped, they are not found in the neighbourhood of Aden, but are brought from districts situated at considerable distances from the coast. They are small animals, and the bulls of the breed are therefore better suited for use in the early stages of experiments, in improving the breeds of small cattle generally found in Southern India, than are bulls of the Nellore and Mysore breeds, which in some instances have been used for this purpose." In June 1874 the cattle arrived at Madras. One of the cows died during the voyage; the remaining animals, consisting of one bull, one cow, and two calves, reached Madras in safety, but were all much out of condition when landed. The cost of the stock in Aden was R208-14-0, and for their conveyance, &c., to Madras the charge was R630-12-0, making the total outlay on account of this importation R839-10-0. Mr. Robertson was disappointed with their appearance, but subsequent events proved that they were more valuable than they looked. In the four years 1877-80 the cow gave birth to four calves, and during all that period careful statistics were kept of the quantity of milk yielded in addition to that consumed by the calves, the average monthly yield being about 75 Madras measures. The milk was excellent in quality, 16 to 17 pints yielding one pound of butter. From May 1877 up to nearly the end of December last the total yield of milk was 2,910 measures, or 1,091 gallons, and during this period the cow reared four calves. The food of the cow was daily 4 lb. of groundnut oil cake, 2 lb. of wheat bran, 30 lb. of green fodder, $\frac{1}{2}$ oz. salt. These are now at the farm of the Aden breed five bulls, one cow, and three heifers. The bulls are in considerable request for use with the small cows of the neighbourhood. They are regularly employed in farm-work curving, ploughing, &c., and are remarkably docile and steady at work. The result of the experiment has been so encouraging that Mr. Robertson asks sanction for the expenditure of a sum not exceeding R1,200 in importing a fresh supply of the cattle from Aden, say two bulls and four cows with calves.

Correspondence.

To the Editor of the Ceylon Observer.

"CINCHONA VERSUS LARCH OR ANY OTHER PLANTATION?"

DEAR SIR,—In reference to that letter of Mr. McCall's from Hamilton, concerning the cultivation of cinchona in Ceylon, I may be allowed to make a few remarks on the treatment of forests in Scotland, as compared with cinchona plantations in Ceylon.

I have advocated for the last three years that cinchona will grow as well, if not better, more closely planted than what we are doing at present.

We are endeavouring to grow trees, "and not bushes;" by so running them up good clean stems will produce a greater amount of bark.

Trees that are grown for timber in Scotland are generally planted 2½ by 2½ feet and 3 by 3 feet; often a mixed plantation of Larch, Beech, Ash, Elm, Oak, Scotch Spruce, and Silver Firs. But a great deal depends on the locality and condition of the soil in planting a mixed forest. All the inferior trees are partly thinned out after the tenth year, and again when necessary. In a well cultivated plantation the grass and natural plants are always kept down, until the trees are strong enough to choke them out. As the trees grow up, all herbage gradually disappears.

Who has not roamed through the forests, under shade of fine trees, and found the ground covered with nothing but vegetable mould, decomposed leaves and twigs. Why mention a larch plantation? Since the disease has been so bad among the larches, foresters have found out that in planting a forest of mixed trees the larch trees grow better and are not so subject to that fatal disease. I would advise, all those planting cinchonas "to plant close," and as the plantation comes on, thin out all the straggling and weak trees: little pruning would then be wanted, in removing strips of bark, no shading or moss is required, and very few weeds will grow after a time. In fields where the cinchonas begin to die out in patches, "as if from dampness," a few more drains should be cut, and the plants stuck in thick, about a foot apart.

I do not advocate leaving the weeds and only cutting them down occasionally. Keep your plantation clean, if possible. In planting timber trees in abandoned coffee land or for wind belts, "plant close," the one tree will protect the other. Go wherever you may, you will find that close planting is always carried out in growing timber trees, and the same will hold good for cinchona. We grow timber which gives us bark. Planters feel the want of advice on arboriculture, not having a practical forest department in the Island. If Mr. McCall will pay a visit to Perthshire, he will find a great deal to interest him, in the fine forests of Dunkeld, Scone, Dupplin and Taymouth,—I am yours,

AN OLD MEMBER OF THE SCOTTISH ARBORICULTURAL SOCIETY.

CEYLON TEA AND THE AUSTRALIAN MARKET.

c/o Messrs. R. Scott Johnson & Co.

15 Government Place, East, Calcutta.

May 23rd, 1881.

SIR,—I am tempted to drop you these few lines on a subject of great importance to the Ceylon planting community, and Ceylon trade in connection with Australia. I am well-known in the Bengal presidency and also partially in Madras, as having been of old days connected with the Indian Press; and for many

years past I have made Australia (New South Wales) my home, and been also in several of the other colonies. As I feel and know that I have something essential to say on the *Tea trade* which you wish Ceylon to open up with Australia, you will excuse my addressing this letter to you, and the Ceylon public through you.

Being a late arrival from Australia, I was aware while there, of the efforts made (by you) to give the budding trade a fair start; and my attention was again drawn to the subject by a planter, as I passed through Galle.

I have tasted Ceylon tea, and am familiar with Indian teas, having been on the seats of their production in Assam, Gachar, Kangra, and other parts; and I have no hesitation in saying that your Ceylon tea carries off the palm in flavour and body from nineteen-twentieths of Indian teas; and in fact, for its price, ranks as the best of the teas we have anywhere.

Such being my deliberate judgment, and I have no mean knowledge of the subject—even of China teas from the variety made for the palates of Emperors and Shahs, to the beastly rejections so largely exported to Australia—I should heartily, as a great tea-drinker, wish to see good tea make its way in the world; and as an Australian, wish to see Ceylon tea supplying the half-a-crown and even three and six pence *stuff* so common in the great southern continent.

But permit me to say that however praiseworthy valuable your *introduction* of Ceylon tea to the notice of Australia was, during the late Melbourne Exhibition, as an Australian who knows Australia well, and how things are managed there, that a great deal and indeed every thing is now needed really to *establish the trade*.

If nothing now be followed up as I indicate below, Ceylon tea will be forgotten in a few months in Australia, even if there be kept up a small shop for its sale in Melbourne, or Sydney, and there appear an occasional advertisement.

You must be a young and inexperienced man indeed if you think that where old interests are concerned (in this case of the China tea merchants) and the field fully occupied, a new article can be made to make its way into popular favour by the mere force of its being the best. I know all the obstacles in the way of Ceylon tea supplanting Chinese teas in Australia, and it is because I know them, and the way to go about in the matter, and am convinced that if my plan is adopted that Ceylon tea will be the favourite with high and low in New South Wales and Victoria, that I take the trouble to write this, and even offer to carry it out.

First and foremost, then, you can do nothing in Australia—at least you will do nothing in this matter, without an active, energetic, practical travelling agent, or as we call it there, commercial traveller. He must have some standing among and knowledge of the merchants, as well as know Australian ways and manners, especially among the tea-grocers and suppliers, well.

Then, with this knowledge, and those abilities, with earnestness, if he is "worth his salt," he will in at most a couple years be able so to start the trade that, with ordinary attention thereafter, it will continue to grow and expand.

There ought to be one agent for New South Wales, and one for Victoria; for the field of country is very large, and probably as much change will be brought about through the medium of the large numbers of store keepers (tea-sellers) in the interior (and there are numerous towns in the interior) as through the merchants and tea-importers in Sydney and Melbourne. Of course, a small shop in a very prominent place, will have to be kept in both localities. This would, however, for two agents (tail a

double expense, which will probably come heavy on your tea-planters. Or the plan of one energetic agent may be adopted for both Sydney and Melbourne, only the two capital cities, with an occasional run into the interior. Or, one agent may be appointed for only New South Wales, the Colony best adapted for the purpose, and should the trade take root there, then Victoria be afterwards taken in hand. These last two plans would entail only, with one agent, a single cost.

I think I have detailed enough, without being too prolix; and I am ready with both my knowledge of tea, and practical knowledge of Australia and the subject, to place all my services heartily at your disposal to ground and establish the trade in tea of Ceylon with Australia. I am sure of success.

But of course for such an end the tea-planters of Ceylon must unite and form a Syndicate as in India, and I must enter into a regular engagement with their recognized managing agents in Colombo, who ought to be one of the leading and most respectable firms there.

In my case personally, for I cannot answer for the cost of the services of others, the expense would amount to about £600 per annum for a period of two or three years, as salary £300, as travelling expenses and room rent £300. I am convinced the thing could not be done for less with any agent worth entertaining. After the above period, the trade being better known and grounded, the travelling expense may be reduced. A small commission over sales above a certain quantity may be added as an additional incentive to effort.

My plan is now before you and your planting readers. They may be sure that no other will succeed, and that if the trade be not now established at the beginning it never will. They require to be united, and contribute only a very small fraction individually for a short period of say 3 years to see what may be done. Of course everything will depend on the ability, energy, and thorough Australian knowledge of the agent.

I have done, and you are at liberty to communicate my address to those who may wish to bring the subject to a practical issue.—Yours truly,

ALEX. MACKENZIE CAMERON.

[It is not likely that Mr. Cameron's proposal will receive attention for the present at least: one reason being that Ceylon has already half-a-dozen agents at work in the Southern Colonies: Messrs. Jas. Henty & Co. promise to do all they can for Ceylon teas; Messrs. Poett and Henry have advertised themselves as Melbourne agents, and Mr. Rowbotham is doing something in tea in the same place. Mr. Hector Mackenzie is working hard and successfully to bring Ceylon tea into notice in New Zealand. Another planter is likely to start for Adelaide, there to establish himself as a Ceylon agent, and an enterprising Colombo merchant has just started for Brisbane and Sydney to see what can be done in the Colonies, of which they are the capitals. All these gentlemen look to their commission for remuneration, and there is therefore no chance of the Ceylon tea planters paying £600 a year for a special "commercial traveller" of their own. Far better would it be to join the Calcutta Syndicate and get Ceylon teas introduced into America and other new countries under its auspices.—Ed.]

SALT has been used most successfully in the cultivation of onions. It is said to expedite the growth of the onion while it destroys or weakens that of weeds, and does a great deal to ward off the attacks of insects. Grubs and wire worms cannot be destroyed by this agency without using it in such quantities as also to destroy vegetable life.—*South of India Observer.*

AGRI-HORTICULTURAL SOCIETY OF INDIA.

At a meeting held on the 26th May last, the following from Clements R. Markham, Esq., C. B., dated London, 27th March, in reply to an application for seed of Cuzco Maize and Quinua seed for trial in the Himalaya, as suggested by Captain Pogson was read:—"A good supply of quinua seed," writes Mr. Markham, "was sent out to the Government of India in 1874, which I obtained through Messrs. Antony Gibbs & Sons of Lima. Mr. Hume said it was *bathu*, but this is a mistake, *bathu* is the "*Chenopodium album*" of the Punjab, which grows on the plains, and is not a hill product. Quinua is the "*Chenopodium quinua*," which is cultivated at very great elevations. I suppose the Government gave a portion of the quinua seeds sent out, in 1874, to the Agri-Horticultural Society of India. [The Society did not receive any.] I trust this was so for I fear that, in the present state of affairs in Peru, it will be difficult to get fresh supplies for some time to come. All the chief ports are occupied by hostile Chilian forces, there is no communication with the interior, and many of the merchants have left. It is quite uncertain how long this will last, but I will bear in mind your wishes both as regards Cuzco Maize and Quinua. Meanwhile I will consult Messrs. Gibbs as to the prospect of renewing communication with the interior of Peru."—*Pioneer.*

AUSTRALIAN FRUIT TRADE.

The experiment that is about to be tried in Australia, of endeavouring to establish a trade with this country in fruit, is one that will have a direct interest for a large number of Anglo-Indians. Few stations, indeed, are so well off in this respect, that the prospect of a good and varied foreign supply—if it could be obtained at a reasonable cost—would not be most acceptable. Excepting for the brief season when the mango and lichi are obtainable, and the few places where, when obtainable, they are good, it must be confessed that the Mofussil has not much to boast of in the way of fruit. The tasteless water-melon, the sickly guava, pachydermatous oranges thick of flake and innocent of juice, dry pomegranates and woolly custard-apples, to omit the commoner abominations of the country, are not these the total resources of an ordinary Indian garden? In Australia on the other hand, thanks to the admirable climate, English fruits have thriven as well almost as English rabbits; so much so, that the excellence of the display in this branch of horticulture is said to have been a feature of the Melbourne Exhibition. It is not singular, therefore, that Mr. Buck, the zealous pioneer of Indo-Australian trade, should have suggested that out of their superfluity, the Australians might turn their attention to supplying India. It is stated that Mr. Buck has been in communication with the Horticultural Society of Victoria as to the quantity of fruit available for export, and as to the prices at which it could be supplied. The Society seem to have entered into the idea very heartily; and some of the leading growers have already inaugurated the trade by sending presentation cases to the Viceroy and to the Lieutenant-Governor of Bengal. It would, of course, be premature to offer a conjecture on the prospects of success, until something is known of the prices at which it will be possible to offer the Australian produce in this country. The market, we should fear, would at first be very limited; and unless it is carefully managed at starting, there will be little chance of any great extension. Were it not for the example of America, there would be a difficulty in believing that fruit conveyed from such a distance could ever be anything but an expensive luxury. As it is, however, there seems to be no reason why Melbourne pears and Tasmanian grapes should not enrich Indian dinner tables, within a month of their being gathered from the parent tree.—*Pioneer.*

CINCHONA CULTIVATION :
QUININE AND CINCHONIDINE.

We give special prominence to the extract from the letter of a Java planter which Mr. E. H. Cameron is good enough to send us. His correspondent is in constant communication with Mr. Moens, and writes therefore with all that gentleman's authority. The fact that there is an age beyond which the cinchona tree seems to cease to add to its bark, or at any rate to the secretion of the more valuable alkaloids, has been already pretty well understood. No doubt we have a great deal to learn in reference to the age at which this stage is reached in different countries, and, indeed, at different elevations with varying soils and climates. The further fact that at a certain period trees containing cinchonidine begin to increase the secretion of this alkaloid at the expense of the quinine is a discovery closely affecting the possessors of Ledgeriana and other valuable types. It is evident that trees containing no cinchonidine never lose their richness in quinine. But Ceylon must do a great deal more in analysis as a guide to the planter before the latter is able to discriminate between his trees in the same way that Mr. Moens does in Java. Nevertheless, it is of importance to follow, step by step, the very valuable discoveries of him who certainly stands first in the scientific cultivation of cinchona; and not his least contribution to our knowledge will be this discovery respecting the reason why quinine is diminished in trees after a certain age. The letters are as follows:—

To the Editor "Ceylon Observer."

SIR,—I have just received a letter from Java containing information important enough to be of great interest to those of your readers who are interested in Cinchona. The writer speaks with authority, being the largest private grower of Cinchona in Java, and also having the advantage of exchanging ideas with Mr. Moens almost daily.—I am, &c.,

Agra Patana, June 18th.

E. H. C.

(Original, verbatim et literatim.)

Maintenant encore quelque chose pour la connaissance de kina, spécialement de Ledger. On sait déjà depuis quelque temps qu'il y a dans les barques quelque rapport entre le chinine et le cinchonidine; par exemple renewed bark de succirubra ou officinalis perd en cinchonidine et gagne en chinine, monte donc en valeur. La plupart des Ledgeriana n' a pas de cinchonidine, cependant il y a aussi, qui en ont, même de très riches. Mr. Moens a trouvé ça toujours un mauvais signe; il préférer *p. e.* une barque de 8% sans cinchonidine, toujours à une barque de 10% de chinine avec 1% de cinchonidine;—et ça surtout pour la semence, il le croit un signe que l'arbre est un peu bâtarde. Son opinion est maintenant bien constaté. Mr. M. a analysé pour la deuxième fois quelques arbres primitifs (maintenant 14 ans), qui étaient analysés à l'âge de 8 ans. Tous les arbres sans cinchonidine ont maintenant encore juste le même contenu de chinine;—les autres ont perdu de chinine, et gagné de cinchonidine, donc perdu en valeur. Un arbre, qui avait dans le temps 10.7% de chinine avec un peu de cinchonidine a maintenant seulement 7.5% de chinine et 3.4% de cinchonidine.

Fiez vous donc un peu de tout, qui a de cinchonidine; c'est au moment peut être bon mais ça devient mauvais. Des autres alcaloïdes, *quinidine* est bon, a même une assez grande valeur; *cinchonine* ne vaut rien, mais ne nuit pas. ●

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(Translation.)

Now some more facts on the subject of cinchona, especially Ledgeriana. It has been known for some time that there is in the "barques" some connection between the quinine and the cinchonidine: *e. g.* "renewed bark" of succirubra or officinalis loses in cinchonidine and gains in quinine, the value therefore increasing. Most of the Ledgerianas have no cinchonidine: there are, however, some which contain a little, even very rich ones. Mr. Moens always looks upon that as a bad sign, and would always prefer *e. g.* a "barque" of 8% without cinchonidine to a "barque" of 10% of quinine with 1% of cinchonidine: and this especially for seed,—as he thinks it a sign that the tree is a little hybridized. His opinion has now been confirmed. Mr. Moens has analyzed for the second time some original trees (now 14 years old) which were analyzed at the age of 8 years. All the trees without cinchonidine have now exactly the same amount of quinine; the others have lost in quinine and gained in cinchonidine, and therefore lost in value. One tree which had at that time 10.7% of quinine with a little cinchonidine has now only 7.5% quinine and 3.4% cinchonidine. Therefore, do not reckon too much on any that have cinchonidine: it may be good at the time, but it will become bad. As to the other alkaloids, *quinidine* is good, is even of some value; *cinchonidine* is worth nothing, but does no harm.

CINCHONA LEDGERIANA SEED AT £236 PER OZ.—

Some people in Java think Ledgeriana seed worth not a little—£236 an ounce! Such is the tenor of a mercantile advice which states that for a small quantity of Calisaya Ledgeriana Cinchona seed of a superior kind from trees of a good age, the bark of which has been chemically tested, as much as 100*l.* (£8-6-8) per gramme of 3,000 seeds is asked. As the ounce contains 28.34 grammes, this is at the rate of £236 per ounce!

VICTORIAN APPLES.—The two small cases of Victorian apples sent forward by the P. & O. steamer by the Ceylon Commissioner as a trial shipment arrived here to-day. One case was for His Excellency the Governor. The other contained, packed with tissue paper in two compartments, about 130 apples of different varieties. Out of this number 30 (or 25 per cent) were quite bad; and half as many more nearly so. Out of the remainder we are making a distribution in the Fort as well as we are able, so as to give business men some idea of Victorian apples. What are good—say 60 per cent—are very good: palatable and of fine flavour.

THE SALES OF CINCHONA BARK reported by this mail are chiefly noteworthy on account of the 9s per lb. paid for one case of fine crown renewed from the Nilgiris with the well-known mark "W. R. A. Prospect." For good medium quill 5s 7d was bid, but not taken. For red bark, bold mossed quill, 3s 9d paid. Some of the "Price Currents" wrongly put the Prospect bark down as Ceylon. The highest price got for Ceylon bark at these sales was 4s to 4s 3d for bold clipped quill crown, 4s 3d being bid for the root bark but not taken. Messrs. James Cook & Co. have the following remarks on our bark:—The 264 packages offered, went off slowly without change in prices, the principal mark sold was a good shipment of Hamilton, which, being bark of a nice character, met with competition at full prices, good and fair quill, although mixed with some weak branch and a little coarse growth stem, fetching 3s 9d to 3s 10d; the more broken quill sold at 2s 6d, weak and papery branch 1s 9d, and good twigs 6d. 17 bales root, however, of the same mark realized but 2s 1d, and 3 cases 2s 2d. Of 94 bales Frotoft, chiefly crown, weighing 24,000 lb., about two-thirds sold at 3s 6d to 4s 3d. GA Ouvah red very bold trunk and stem 3s 3d per lb.

Correspondence.

To the Editor of the Ceylon Observer.

CARDAMOM PLANTING.

DEAR SIR,—It has hitherto been the custom to plant single cardamom bulbs taken from old bushes. It struck me sometime ago that, as the object was to grow a good bush, a simpler plan would be to put several plants to a hole. I found that it has succeeded admirably. Even seedling plants three to four inches high can be safely put out during the heavy rains. Three to four plants to a hole, and each plant nine inches apart from the others. The young plants throw out several shoots in a few months, and the result is a magnificent bush in a year. The old method is a slow, tedious and far from a profitable one. The present prices for cardamoms, *properly gathered and cured*, are really very handsome, and should they even go down to a third, the return from an acre of cardamoms is more profitable than coffee yielding two and a half cwt. the acre. The planting out of this product should be vigorously carried on. It requires a very small outlay comparatively, if the method of planting as above suggested is followed.

R. S.

MANURING; WHY NOT IMPORT RAW MATERIALS FOR SPECIAL MANURES (AND ALSO CINCHONA SEED) DIRECT FROM SOUTH AMERICA?—MANURING WITH LIME AND GYPSUM;—ENEMIES OF COCOA.

SIR,—The enclosed extracts are taken from a letter recently received from South America. The writer is professionally acquainted with analytical and agricultural chemistry, and I send them, as they may possibly interest some of your readers.

I notice that nitrate of soda and guano form two of the chief ingredients in Mr. Ross's Venture manure. Judiciously used, they are doubtless valuable fertilizers, and I should say it would be advantageous to import them direct, both as regards purity and cost, judging by figures supplied me.

As regards potash, the remarks thereon are in reply to a query as to whether there is no simple and cheap means of extracting some from rock? Given this, and the island need not look elsewhere for a cheap and abundant supply of a substance of more manarial importance here probably than any other, judging by the analysis of tea and coffee. And it is a curious fact that cinchona bark from trees growing in a soil naturally impregnated with it, though very young, has shewn an unusually high proportion of quinine. Much of Ceylon soil is, I fancy, rather deficient in potash, but in many places large quantities of felspar exist, containing as high a proportion as 13 to 15 per cent., and much of it will be found in an already partially decomposed state from the action of the atmosphere. When the rock does exist, it might possibly be turned to good account, by crushing, as indicated. But the cost of transport on so large a proportion of useless matter would, I fear, render its removal to a distance prohibitive. Pure potash realizes £40 to £70 per ton, and were a feasible process discovered for extracting it manufacturers here would not be dependent on a local market only. That it has not yet been hit on seems rather contrary to the spirit of the 19th century; and that *practically* science must so far confess itself unable to assist nature in the matter. At present, the whole supply, or nearly so, of purified potash is obtained by the somewhat barbarous and certainly wasteful process of reducing immense quantities of pine wood to ashes in Canada.

Whilst on the subject of manure, a very interesting article appeared in the *Field* of April 23rd on lime and its effect under its different conditions and combinations; and the different conditions of substance treated. There is an equally interesting letter in a previous number (April 16th) on gypsum.

Quick and slacked lime too, it would appear, if applied to undecomposed vegetable matter, will fix the ammonia, or at any rate will not force it; but where the slightest decomposition has set in, it does so at once and wastes it!

This being so, has not the chief virtue of many a fine heap of manure, possibly representing a large outlay in cattle establishments, been unwittingly destroyed by its admixture? And has not the effect to a more limited extent been the same where applied broadcast as a check to leaf disease or as manure, a proportion of the leaves which it may have reached, being at the time of contact with the lime in a partially decomposed state? Where manure heaps have been at once covered with earth, or the leaves and lime buried together, the earth covering will doubtless have prevented loss by absorption. Gypsum on the other hand, without a single drawback, seems to possess all the merits of lime, and more, as a manure, and at the same time the power, not only of fixing all the ammonia in substances it is applied to, but of absorbing and holding it from the air. The best results, it is said, may be secured by mixing it with other manures, natural or artificial—a mixture of gypsum with crude phosphatic and nitrogenous manures being probably preferable to superphosphate of lime. Its effect on foliage when applied to the leaves after a slight shower of rain or dew, so that it can cling to them, is said to be very marked; and eventually, as the sulphur becomes liberated, it acts beneficially in destroying fungoid growth of all kinds. Surely such a valuable material as it would appear to be deserves more attention than it has hitherto received in Ceylon if price permits. The English price is quoted at 10s to 15s per ton only!

The cinchona referred to in the letter from South America is in the same part of the country that Ledger procured his seed from, and I fancy are varieties of calisaya. Whether the 6 to 7 per cent mentioned means total alkaloids or quinine only, I cannot at present say, but should seed be procured, it will be from analyzed trees. Now that the war has terminated so entirely in favor of the Chileans—always well spoken of, and as a comparatively energetic, progressive people—rapid development of the resources of the country may be anticipated. But I gather this at first will more be as regards the unearthing of its mineral wealth, which from accounts that have reached me from time to time must be immense, more particularly in silver, equalling Mexico and Colorado! The conclusion of peace will, however, I suppose, give a fresh impetus to bark collecting.

C. R.

P.S.—As a protection to young cocoa, &c., against white-ants, has chloride of lime been tried here? In a north country paper, a gardener states that a prior application to a seed bed will keep all insects off, and if a rag steeped in it be tied round a tree it will free it from attack. But whether injurious or not, if not properly used, I am unable to say.

Extracts from South American letter.

I have talked over the matter of nitrate with a friend, whose note I enclose. To re-ship nitrate from Liverpool or England would hardly answer. There is nothing to prevent a ship being freighted direct from this coast. The doubtful point on that score is the freight, if any, a ship might expect from Ceylon elsewhere. It would be necessary on both sides that a business

of this kind be worked through a commercial house, of course, of good standing. I could make some arrangement with the enclosed or any other house, and get them to ship a small cargo of suitable nitrate, but the enterprise must come from your side, as many have been the disappointments here in shipping to markets where the article has lingered unappreciated.

The plan would be: along with a good house for your friends the planters, &c., to get a small cargo of say 600 tons taken up between them. I believe that from a proper application of the material they would reap nothing but benefit. It must be administered in the main only as a stimulant. But in a so-called unrefined nitrate, which I would prefer to send, there would be the advantage of the traces of iodine, &c., &c., which must long have been washed out of your upper regions, and which nature might find some subtle use for.

Rather than send a whole cargo of nitrate of soda, I should advise, say, half, in some phosphatic guano. This, mixed with a proportion of nitrate, would make an ideal manure, and especially with you, where your product draws heavily on the phosphorus in the soil. There is no better form in which to apply phosphoric acid than in these guanos. From the fine state of subdivision, the plant can assimilate as much as it requires and the rest remains. As regards the sale of guano, there should be no doubt, if the price can be kept at all within the mark, as no doubt your owners of land are well aware that money so spent is so much on the value of the land, for some years to come.

Have you any traffic in phosphoric manures in the island, by which I can reckon what you are in the habit of paying for phosphoric acid? You ought to have some sources of phosphoric acid of your own, in the shape of mineral phosphates, or antediluvia bones. Are they looked after?

You mentioned felspar as abundant. If it is *orthoclase* it might have a value for the potash it contains (as much as 10 or 12 per cent in a pure specimen). That would be supposing you had a cheap water power, by which to reduce it to impalpable powder. In that state, with the help of the carbonic acid of the air and rain, the plant could extract what potash it wanted. Mixed with a little nitrate, it would become, still more soluble, and it would be a great addition to the value, if ground up with natural phosphates. From what I reckon, quartz crushing here, the cost of grinding &c. might be 10s. per ton.

Now-a-days, I observe that fine grinding is being recognized as better than solution in acids for mineral manures.

How are you off for water power? There should, I imagine, be many mountain streams with falls, if not abundance of water. With 50 ft. fall and upwards, a very little water goes a long way.

Cinchona.—If I get any seed at all, I should think it would be of the best kind, but it would be more satisfactory if luck had taken me, or still takes me, that way myself.

The principal cultivator began about six years since to re-plant in the same ravines in which the trees had erst flourished naturally, and I hear with great success. He seems to cut down the fifth year's growth, replacing accordingly, and the bark gives six to seven per cent.

The property now is supposed to be worth some \$800,000, but he was mixed up with Daza (ex-president,) and now I should fancy his pecuniary prospects are clouded.

There appear to be two varieties cultivated, but my impression is that more value there is thought to be in and part of bark selected than in variety.

I have had to report a good deal lately on gold mines, which are becoming the rage again. They have never as yet done well in Chili as they have been taken up

with too small a capital. I am glad to see that in Southern India they are pitched at a higher scale, and with honesty in management ought to pay.

As soon as things are settled, I suppose I shall be in Bolivia again to look at some silver mines. My last trip north was interesting, as I saw a new class of nitrate deposit not before understood.

You will have been glad to read of the success of the Chilians in Lima. The army behaved admirably after the fight, and reports you may have seen as to Chilian excesses are simply untrue.

Chili is not perfect, but its people are industrious and justice is pure, which cannot be said of Peru or Bolivia.

Extracts from the "Field" referred to.

LIME AND ITS COMPOUNDS.

THE CHIEF FORMS in which lime is used in agriculture are quicklime, carbonate, phosphate, superphosphate, and sulphate of lime. I propose to offer some suggestions on the considerations which should guide our choice of the particular form of lime to apply according to the circumstances of various cases. The carbonate, phosphate, and sulphate are natural productions, but quicklime and superphosphate are manufactured commodities.

As quicklime is the simplest form, I will deal with it first. Beside the name quicklime, it is called hot lime, burned lime, caustic lime, &c.; but the single word "lime" exactly represents its composition, and is the best term that can be used for it. This lime is manufactured from its carbonate, which exists in the form either of limestone or of chalk, and is composed of 56 parts of lime and 44 parts of carbonic acid, making 100 parts by weight of carbonate. By heating in kilns the whole of the carbonic acid is driven off, and lime is left. By this treatment, the lime having lost its neutralising acid, has become a highly active substance, exhibiting great caustic properties, and energetically endeavouring to unite with some other body capable of satisfying and neutralising its peculiarly active character. This craving is usually satisfied in the following manner. Water may be added, or if not, lime will get it from the atmosphere, when combination takes place. In the former case it is quickly accomplished, and great heat is consequently developed; whilst in the latter a slow union goes on, proportionately as the lime can obtain the moisture from the surrounding air. When the reaction is complete, hydrate of lime has been formed, and its composition is by weight as follows: Lime, 56 parts; water, 18 parts. This hydrate is a dry whitish powder, and is soluble in water, which fact is highly important, as it will be seen that the next change renders it a body perfectly insoluble in that medium when pure. Now the carbonic acid in the air begins to act on the hydrate, and gradually but completely turns out the water, and in course of time regains its original position of union with the lime, so that now we have the same compound that we started with, viz., carbonate of lime; and the only difference is that now it is in a minutely divided state, and so can the better be acted upon by disintegrating agencies, but otherwise it is quite as insoluble as the chalk was in the first place. Therefore, to furnish plant food for present use, the lime should be applied before it has taken back its carbonic acid from the atmosphere.

Now, these various changes must be clearly understood if we are to know when and how to apply lime to the soil to the greatest advantage to the land and ourselves. When the lime is in the soil—suppose, for instance, in its form of hydrate—instead of getting supplied with carbonic acid from the air, it gets it from decomposing matter in the soil, and by so carrying off the products of decomposition, aids and hastens the

decay of further portions. and thus assists in bringing them into a form available for plant food. But if the lime has been long exposed to the air before spreading upon the land, this valuable property is entirely lost.

On the other hand, it is not wise to spread the lime before it has become hydrated, as, supposing there are compounds of ammonia in the soil, the lime seizes upon the acids of these compounds and sets free the ammonia, which rapidly escapes into the air; besides, instead of causing the decomposition of organic matter in a favourable manner, it would take away its water, dry it up, and tend to carbonise it and render it useless. The lime should really be shot in heaps in convenient places, and slacked in the same way as the bricklayer slacks his lime for making mortar; and as soon as it has been mixed up with sufficient water it should be covered up with earth, to keep the carbonic acid of the atmosphere away from it. After allowing it time to slack, it should be quickly spread upon the land, and harrowed in immediately. It should not be ploughed in, as it is well known that lime rapidly sinks into the soil, so that it only requires a superficial covering of earth, just sufficient to keep the air from readily reaching it. Lime applied in this way also assists in decomposing the rocky materials existing in soils, thereby liberating the alkalies and aiding the formation of nitre, which is of such well-known value as manure. In this form also, it neutralises free acids, and also renders land light and porous—sometimes, in fact, too porous for wheat and other crops requiring compact soils for their perfect development. In cases of this kind, the roller will generally be a sufficient remedy, as it is only the mechanical action of the lime, and not its chemical composition, that has caused the difficulty. Indeed, it is impossible to injure heavy land by the application of lime in any quantity, provided it is properly slacked and applied in its hydrated form. With lighter soils it is different, and if too much lime in its caustic form be applied to these, it quickly decomposes the small available quantity of organic matter which such soils contain, and uses it up in one short season. No doubt it whips up the immediate crop, but it does so at the expense of the future. To soils of this kind, sulphate may be applied as a source of lime in large quantities, without the slightest fear of injury, and, indeed, with the most beneficial results; but of this I will speak later on. With regard to the limes manufactured from chalk, it is believed by farmers that those made from the lower grey chalk give better results than the purer and whiter limes from the upper beds, and many who have had long agricultural experience willingly give a much higher price for the grey than the white. It might seem strange at first sight that a lime containing alumina and other impurities should be more esteemed for agricultural purposes than the purer article but it is no doubt these that really enhance its value. Professor Way discovered that the fertility of soils largely depended upon the presence of certain forms of double silicates of lime and alumina, potash and alumina, and ammonia and alumina; and it is more than probable that these clay-containing grey limes hold their silica in the form of a double silicate of lime and alumina, and possibly that very form of double silicate Professor Way found to be so valuable. The value of this double silicate of lime depends upon its property of passing into the double silicates of potash and ammonia in presence of these bases respectively, and so forming compounds easily soluble in the carbonic acid contained in rain water, and in the weak organic acids with which they come in contact.

Before leaving the consideration of this simple form of lime, it may be well to mention that if it is mixed with *perfectly fresh dung* no harm will happen; but if decomposition has commenced ammonia has been

formed, and, no matter what from it may have taken—whether carbonate, humate, ulmate, &c.—the lime will inevitably seize upon the acid, and set the ammonia free to escape into the atmosphere.

Phosphate of lime, such as is found in bones, coprolites, and other natural substances, is composed of lime 168 parts and dry phosphoric acid 142 parts, by weight. In this form it is a perfectly insoluble substance, the bone production being, however, more readily changed to a soluble form than the mineral. When the dairy pastures, especially of Cheshire, became exhausted through furnishing for a length of time the phosphates to build up the bones of the young stock raised on them, and also those carried away by the milk which was sold for human consumption, it was discovered that an application of bones, either fermented or ground more or less finely, produced excellent results, often entirely renovating land which had become almost useless. These effects, however, were produced slowly, as bones in their *natural* form cannot act as plant food. Whether they are heaped with earthy matter, or whether as bone dust they are applied to the soil, the subsequent action in either case is similar. The organic portion is fermented and decomposed, and the phosphate of lime is acted upon in the following manner. Carbonic acid is perhaps the most obliging acid known. It is turned out of its combination with all basic substances by the direct application of any other acid under the sun; but in the case under consideration it has a slow but effective revenge. It has such an affinity for lime that, under such conditions as it finds in the soil or compost heap, it gradually takes away one-third of the lime from the insoluble phosphate, forming with it chalk, and leaving the remaining two-thirds behind. These two-thirds are now in combination with the original quantity of phosphoric acid together with some water which has also been admitted, and the substance now formed is bicalcic phosphate of lime, its composition by weight being as follows: Lime, 112; phosphoric acid, 142; and water, 18. Here, it will be seen, the carbonic acid has taken away 56 parts of the lime to form chalk, whilst 18 parts of water have replaced the 56 parts of lime taken away. The new body is fairly soluble, and is probably the very best form of phosphate of lime to add to the land. It is able to furnish plant food slowly but surely; it is sufficiently soluble, but it is not rapidly used up, and it feeds the plant through all stages of its growth. Agriculturists were perfectly satisfied with fermented and ground bones, until it was discovered and made known by Liebig that, if bones were subjected to treatment with sulphuric acid, a much more soluble, and, it was supposed, better manure, was obtained.

This discovery was immediately utilised by a well-known manure manufacturer, and so great was his success that other large makers sprung into existence one after another, until the industry has now become of enormous dimensions. Now many hundreds of thousands of tons of pyrites are imported annually, for the manufacture of the sulphuric acid required to make this manure. These are shipped to the Thames or the Tyne, &c., where the manure maker burns out the sulphur and oxidises it to sulphuric acid, after which the copper is extracted, and the residue then passed on into other hands for the manufacture of iron. The principle involved in the production of superphosphate is as follows. After the gelatine has been extracted from the bones, they are treated with sulphuric acid, in proportion of 196lb. of pure acid to 310lb. of bone phosphate. As before stated, this bone phosphate is composed by weight of 168 parts of lime, and 142 parts of dry phosphoric acid.

The sulphuric acid now acts in precisely the same way that the carbonic acid in the soil acted under the older system, but it does exactly twice the work of the latter, and does it rapidly, instead of by a tedious process. Instead of taking away 56 parts of

lime as the carbonic acid did, it appropriates 112 parts, forming gypsum in this case, instead of chalk, as in the former, and leaving the new compound—namely, superphosphate of lime,—to possess the following composition; lime by weight, 56 parts, phosphoric acid, 142 parts; and water, 36 parts. So now we have less lime by 56 parts, and more water by 18 parts.

The gypsum formed artificially in the manufacture of this 234 parts of superphosphate amounts to 272 parts, and the two bodies are in a state of intimate mixture, and so remain to be sold as is well understood as superphosphate of lime and some manufacturers further add large quantities of ground gypsum as a "drier." Therefore commercial superphosphate is very largely made up of gypsum. It was found that mineral phosphates, such as coprolites, might be mixed with the bones without seriously interfering with the quality of the manure, and it is now often the practice to mix equal quantities, and afterwards treat the mixture with the sulphuric acid. This has the effect of keeping the price within reasonable limits. The action of superphosphate depends greatly upon the composition of the soil to which it is applied. Leaving the gypsum for the present out of consideration, it is found that, if there are no free basic substances or carbonates present in the soil, the superphosphate is quickly dissolved, and causes rapid and rank growth; but its effects are quickly exhausted, and the plant then fails to acquire that nourishment it needs to fill its cells in the later stages of its growth.

But it almost always happens that there is more or less lime, or carbonate of lime, in the soil, and this immediately seizes upon a portion of the phosphoric acid of the superphosphate, and leaves precisely the same compound as that obtained by the fermentation of bones, which compound is the mean between the natural insoluble tricalcic phosphate and the extremely soluble superphosphate of lime. This medium compound is also the form of the so-called "reduced superphosphates," which from age and contact with basic substances have lost some of their phosphoric acid; and though thereby they have become commercially depreciated in value, their practical utility has for many purposes increased. So, as a rule, after superphosphate has been applied to land, it becomes exactly similar to fermented bones, with one great difference, however, viz., that the former contains at least half its weight of gypsum; and some of the good results usually ascribed to superphosphate are due to the presence in its composition of this large proportion of sulphate of lime. Superphosphate should be applied in small quantities to turnips, swedes, &c., and to all soils that are short of phosphoric acid; but it would often be found that a dressing of gypsum mixed with bone dust and soot, &c., would be equally efficacious at a less cost.

Carbonate of lime, in the form of chalk, marl, shell-sand, &c., is sometimes used for applying to land, and in some cases it has its advantages over hot lime; for though it does not decompose the silicates, it does not use up the organic matter, and therefore is better adapted for light soils, which have not any organic matter to spare. It can also sometimes be obtained at a very cheap rate, and, where lime is dear, economical reasons may dictate its use. It is useful for neutralising free acids in soils, and so sweetening the herbage; but it is lumpy and insoluble, and difficult to deal with, and, with manufactured lime and ground gypsum at reasonable prices, chalk is not likely to be used to any extent by practical people.

Sulphate of lime is found naturally in the form of gypsum, which is composed of lime, 56 parts, dry sulphuric acid, 80 parts, and water, 36 parts, by weight. This requires grinding before is available for use, and it can now be obtained in the form of

powder at a very moderate cost. The sulphate of lime is useful as plant food, whenever a soil requires lime or sulphuric acid. Lime is present in most soils, but many districts are very deficient in sulphuric acid, and ground gypsum is the most convenient and the cheapest form of sulphuric acid to apply. Where a sandy soil requires lime, in which case *quirk* lime is objectionable, gypsum answers the purpose admirably. It is portable, easily spread, and slowly soluble, and it assists such light soils, both mechanically and chemically, in retaining ammoniacal and other manures that are applied to them. This form of lime is an excellent top dressing for clover, which requires both the lime and the sulphuric acid that it furnishes. Dry clover contains five parts in a thousand of sulphur, and only two parts in a thousand of phosphorus, so that in this case it is absolutely necessary to add a sulphate to the soil as a manure. Sulphate of lime is a capital manure for mangolds, the long red variety in particular taking away more sulphur than phosphoric acids. It should be applied largely upon all lands where sheep and other stock are kept, as all animals require sulphur. With regard to this, Johnstone states that wool contains 5 per cent. of its weight of sulphur, and he says the wool grown in Great Britain and Ireland carries off four million pounds of sulphur annually, and calculates that to make up for this loss alone 300,000 tons of gypsum should be applied to the land every year. He goes on to say that the hair grown by the population adds fifty per cent. to these figures; and, if we consider the quantity of hair grown by cattle, horses, domestic animals, and vermin, it must be seen that if this were added to Johnstone's calculation the latter would be enormously increased. Sulphate of lime is also an excellent manure for all leguminous crops as beans, peas, &c. It should always be applied, with farmyard and other ammoniacal manures, to all crops, as it reacts with ammonia, and forms sulphate of ammonia, instead of the carbonate, and so saves a most valuable plant food, viz., nitrogen, which would otherwise, from its volatility as ammonia, be entirely lost.

By scattering gypsum daily over manure heaps, stable floors, and in closets, etc., an immense quantity of nitrogen is saved, the value of which, could it be calculated, would reach a surprising amount.

The best results may be obtained by using gypsum with guano, bone dust, shoddy, rags, soot, and other nitrogenous and phosphatic manures, and it would probably be found that a mixture of bone dust and gypsum would produce a more lasting effect at a cheaper rate than would the application of superphosphate of lime.

Those who use gypsum as a top-dressing prefer to sow in dewy mornings or evenings, or during a slight shower of rain, so that it clings to the leaves of the plant, and they say that its effects, when it continues for some time on the leaves, are very remarkable. Moreton's "Cyclopædia of Agriculture" holds with this view, and gives some striking instances of the action of gypsum in this way. To account for this, it has been suggested that the well-known reaction of gypsum with ammonia (the latter obtained from the air) takes place on the leaves, and that ammonium sulphate (and chalk) is formed; but the explanation generally goes no further. From all the evidence on the subject, we cannot doubt the truth of the general statement, but the explanation offered is not so clear. If the formation of sulphate of ammonia on the leaf produces such striking results, the inference would be that the plant takes in liquid food by its leaves, which is quite contrary to the accepted idea that gaseous food only can enter in that way. Or it might be that the sulphate of ammonia formed on the leaves would be washed down to the ground near to the stem of the plant, and so in close proximity

to its roots, and in a convenient position to be drawn in by them; or the gypsum may simply absorb ammonia, and give it out to the leaves gradually. Perhaps some of your readers who are also botanical students could throw some light upon this part of the subject. Sometimes it is useful to apply both lime and gypsum to soils at one and the same time. Where a soil is deficient in sulphates, and yet contains an excess of organic acids which renders it sour, an application of 80 per cent. of gypsum mixed with 10 per cent. of lime or 20 per cent. of chalk would be an efficient remedy. There are, however, some samples of gypsum, particularly that from Sussex, which contain 10 to 15 per cent. of carbonate of lime in their composition; and in such a case as the one under consideration, a dressing of this kind of gypsum would effectually cure the disease without any admixture of lime or chalk, and it would certainly be the most convenient and best kind to apply.

These samples of gypsum, which contain some carbonate of lime, also usually have a little magnesia and a proportion of the alkalis in combination, and these substances add in no small degree to the value of the manure. Liebig discovered that gypsum, as well as lime, had the property of decomposing the alkaline silicates, thereby releasing the soda and potash required for plant growth; and Cossa found, by careful experiments, that a saturated solution of gypsum dissolved these silicates, and particularly acted upon the felspar, which yields large quantities of potash. Gypsum also mechanically absorbs ammonia from the air, and holds it until required by adjacent plants. My attention has lately been called by Mr. Gossage, of the well-known alkali works, Widness, to another compound of lime, which he has induced the farmers of that neighbourhood to utilise. It is the waste sulphide of lime from the local manufactories, and the way in which they use it is to apply as much as fifty tons to the acre in the early autumn. This crude sulphide kills all vegetable as well as insect life. It eradicates all noxious weeds and grubs, and, of course, nothing will grow for a certain period after its application. But by the action of the air, the sulphate of lime is gradually but completely converted into gypsum, in which form it furnishes lime and sulphuric acid in a mild and efficient manner for the use of future crops, and it is said that such an application as above described permanently alters and improves the whole character of the land, rendering it fertile where before it was comparatively worthless. Mr. Gossage states that at first the farmers were very reluctant to put this waste on their land at any price; but after the bolder spirits amongst them met with success in their trials with it, others came, and were pleased to pay for what they had previously considered a useless and cumbrous waste product. This also points to the conclusion that lime under certain conditions, and gypsum invariably, may be applied to soils with great success in much larger quantities than is usually the case.

Coppyhold Farm, Red Hill, Surrey. W. J. KEMP.

The weather in Colombo is still hot and dry, and up-country also a break seems to have taken place—unfortunately for those who have planted out hundreds of thousands of cinchona seedlings. The rainfall in Colombo for this month has been from 1st June to date only 4.3 inch.—June 24.

TEA.—*In re* joining the Indian Tea Syndicate—I think it would be a mistake, because Ceylon teas classed with Indian teas and sold for mixing purposes, for which most of the Indians teas are bought, would fetch poor prices in comparison. Where Ceylon tea has the pull is that it is a very nice drinking tea by itself.—*Cor.*

CINCHONA CULTURE: GOVERNMENT INTER-FERENCE WITH PRIVATE ENTERPRISE.

We have received the following for publication from the Secretary to the Government of Bengal:—

No. 42c, dated Howrah, the 30th May, 1881.

From G. King, Esq., M.B., Superintendent, Royal Botanic Garden, Calcutta, and in charge of Cinchona Cultivation in Bengal, to the Secretary to the Government of Bengal, Financial Department.

Some unfavourable remarks having lately been made in Indian newspapers as to the competition of the Government of India in the London markets with private growers of cinchona bark, I was induced to go into the matter, and it may not be out of place if I lay the results of my enquiry before Government.

2. The tone of the remarks referred to would lead the public to believe that the quantity of bark sold by the Government of India during 1880 formed so large a proportion of the total of Indian-grown bark as, in a perceptible degree, to influence the market to the detriment of private growers. This view is hardly borne out by statistics. From the circulars of two London firms of bark brokers, I find that the total importations of cinchona bark into England during 1880 consisted of 76,074 packages. Of these, 57,560 were from South America, 483 were from Jamaica, and 18,031 were from India and Ceylon. The 18,031 packages from India and Ceylon consisted for the most part of red and crown bark, there being only 207 packages of yellow, and of these 207, all but one came from the Sikkim Plantation, while the odd one came from the Government Plantation on the Nilghiris. The yellow bark sent by the Government of India came into competition, therefore, with no yellow bark grown in India or Ceylon, the fact being that in no plantation in India or Ceylon, except in the Government one in Sikkim, do more than a few yellow bark trees exist. Of 17,824 packages of India and Ceylon-grown red and crown barks sold in London, 1,174 were offered by the Government of Madras. The rest belonged to private growers. Madras Government bark, therefore, came into competition with privately grown Indian bark to the extent of 6.6 per cent.; and of the total bark imported into England, Madras and Sikkim bark together (1,380 packages) formed a portion of about 1.82 per cent. These calculations are of packages, as I do not know the exact weights in pounds; but bark packages are always pretty much about the same weight, and the results may be taken as substantially reliable. I hardly think these figures bear out the charge, so lightly brought against the Government, of having damaged the interests of private growers by flooding the market with bark grown with public money.

3. For many years prior to 1880, no bark had been sold from the Sikkim Plantation, the policy of that plantation having from the beginning been to grow bark for manufacture into a cheap febrifuge for the people of the country—a policy which has been consistently and successfully carried out. The 206 packages sent to London last year consisted of a kind of bark which could not be manufactured into febrifuge, and of which, except by sale, there was no means of disposing. If further exportation of similar bark has been made during the present year for a similar reason: but changes about to be introduced in the factory make it unlikely that it will be necessary to send any more bark to London for sale. As regards the produce of the Nilghiri Plantation, the policy of the Madras Government has all along been to sell it in the best market.

4. The figures I have just quoted show that it would be hopeless, even if it were good policy, for Government to try to lower the price of quinine for the people of India by lowering it in the home market, because that really means lowering it for the whole world by flooding the European markets with bark

of its own growing. The direct and simple way of carrying out its avowed object in maintaining cinchona plantations is, as it appears to me, for Government to manufacture the produce of these plantations for use exclusively in India. In its plantations, Government has the means of supplying itself with bark, and with the manufactured products of bark, at a greatly cheaper rate than it could buy them in the open market. In proof of this, I need only say that, on the Sikkim Plantation, bark is produced at a cost price of about 2½ annas per pound, and cinchona febrifuge at 9½ rupees per pound; while bark of similar quality fetches in London prices varying from two pence (for shavings) to eight shillings and four pence for good quill, and quinetum (which is cinchona febrifuge under another name) cannot at present be bought under forty shillings per pound.—*Times of India*.

LIBERIAN COFFEE AND TEA IN JAVA.

STEAM-PLUGHS IN COFFEE FIELDS.

(From the *Straits Times*, 9th June.)

NETHERLANDS INDIAN NEWS.

A correspondent of a Samarang paper, the *Indisch Vaderland*, furnishes that journal with the following particulars of a visit he paid last month to an estate in Java where steam ploughs have proved a success:—

“*Chikandie Udik*, 2nd May.—The first day of my arrival in Bantam was a very pleasant one, from my visit to the private estate styled Chikandie Udik, which lies on the boundary of the Batavia residency. Sad as generally speaking may be the situation in Bantam [owing to fever and cattle disease], it is particularly favourable and hopeful on this estate, which, everywhere bears witness to the fitness and energy of its manager. Probably throughout the whole of Java there is no second plantation where so many apparatus and machinery for modern agriculture are met with together as here. It may almost be termed a model farm. Of these agricultural improvements, the introduction of the steam plough deserves to be first mentioned. Chikandie Udik, it is true, is not the first estate in Java where that ingeniously devised implement has been in use. Years ago, it might have been seen on estates in the residencies of Samarang, Surakarta, and Surubaya, but to the manager of Chikandie Udik belongs the honour of being the first who so succeeded in practically utilising the steam plough, that the latter renders the same important services in Java as it does in Europe, America, Egypt, &c. After the failures alluded to above, it required much courage and energy to determine to risk once more the sum of 25,000 guilders in procuring such a machine, although the pressure of necessity was keenly felt when the murrain swept away thousands of buffaloes. Mr. Kimball, the manager of Chikandie Udik, has shown, however, that he does not view the matter as a mere experiment as his predecessors did. He who bought steam ploughs not as toys but from deeply felt requirements ensured the success of their introduction by procuring along with the machines, a person who knew how to manage them and could give the necessary instruction to the helping personnel. Thereby it became possible to brilliantly overcome the various obstacles on which previous experimenters had stumbled. The mistrust with which this product of modern ingenuity was at first greeted has now given place to a general acknowledgment that the enterprising land administrator, by purchasing the same, has gained a great advantage for himself, and has done a service to his tenantry. Hence his example has found imitation elsewhere, and now there are several steam ploughs either in Java, or on the way to it. At Chikandie Udik there are two steam ploughs, a large and a small one, the first with two engines of

16 and the second with two of 8 horse power. I had the privilege of seeing the larger one at work. The two engines were 150 metres apart from one another, and the five-fold plough, which was drawn hither and thither by means of wire ropes, turned up with the greatest ease the clayish soil, then very stiff from rain. The greatest length which can be ploughed at one course amounts to 150 metres. On the plough several natives sat. One of them managed the machine in a very simple manner, while the others continually took care to keep the ploughing irons clear of weeds and adhering earth. The smaller plough works more accurately than the larger one, but naturally cannot turn over, within the same time, such a large area as that does. That ploughing with steam works favourably upon the productiveness of the soil was apparent to me from the state of the sugar canes. I must acknowledge seldom to have seen such vigorous and more regularly planted growing canes as those presenting such a splendid appearance on the ground prepared by the steam plough.

“Not only for ploughing sugarcane and paddy fields, but also in preparing land for the planting of Liberian coffee, and for turning over the earth between the rows of the young plants, the steam plough has done excellent service. The planting of Liberian coffee is also one of the remarkable things on Chikandie Udik. Against this variety of coffee, as had been the case with steam ploughs, great mistrust was felt by many. The figures giving its yield, coming to us from Africa, were very generally looked upon as humbug. Even when it appeared that the tree thrived well in Java and gave promise of a great yield, it was said that the quality of the Coffee was of such a nature that it could not bear up against the competition of the common sort. Notwithstanding all this talk, the planting of it was actively pushed on at Chikandie Udik—and, now, people there have obtained results from it which go far beyond the boldest anticipations. I had an opportunity of inspecting narrowly the Liberian coffee gardens there, and can declare that it is very difficult to give a clear idea of the luxuriant growth of the trees, and the masses of berries with which they were laden. I saw thousands of trees, on whose branches whole clusters of colossal berries made a splendid show. The trees were so full of them that there was scarcely room left for young berries that were continually making their appearance. On many trees the fruit can be counted by thousands. As is well known, Liberian coffee has the peculiarity of growing by preference in low lying land, where the Arabian coffee always gives uncertain crops. Judging from the experience hitherto gained, it suffers not at all from the notorious leaf disease, and it has less need of shade than the common sort. This shade is here obtained by planting *kapok* trees and pepper vines between the high growing coffee trees, so that the same land yields three kinds of produce—coffee, *kapok*, and pepper. In the second year, the Liberian variety bears fruit. In the third year the latter can be counted by thousands. I saw trees 1½ year old which had a height of 4½ to 5 metres (a metre is 3·2809 ft.) Owing to this inclination to grow higher than the common coffee, the Liberian can be planted relatively close without diminishing production. As to the quality of the Liberian coffee, it is in my opinion more fragrant than the common variety, but when it is tried for the first time there may be something peculiarly unpleasant about it. After a couple of days this difference is no longer perceptible. To judge from what I saw at Chikandie Udik, Liberian coffee has a grand future before it in Java, chiefly because it is at home in districts where labour is more readily available than high upon the mountainous land.”

“In a previous letter, I had neglected to say anything about tea cultivation on the Chikandie Udik estate. I have spent almost a whole day in the tea

gardens and the premises where the leaf is prepared, and was astonished at the simplicity of all I saw. Tea growing is here an experiment, which has, however, succeeded very well. It has been proved here that it was not at all necessary, as so many had hitherto believed, to proceed to mountains 3,000 or 4,000 feet high for the sake of this plant."

The same journal, in its number of the 24th May, comments as follows on the report by a commission on Van Maanen's artificial coffee drying method:—

"The caution exercised by the Commissioners in their final judgment, we do not disapprove of. The results obtained in Ceylon from artificial drying of coffee by another method makes such a course a duty—but we cannot leave unnoticed that the advantages of Van Maanen's invention are so great, that the adoption of the mode of drying will, in many cases, become advisable, even if it should turn out that the color or the quality generally suffer a little from it. It ought not to be forgotten that the colour of coffee, though certainly of some value, is not so greatly so that a saving of 3 or 4 guilders per picul should not counterbalance this damage. The very considerable expense of constructing and keeping the drying receptacles in repair, the wages paid to labourers charged with the drying of coffee, and, above all, the risk attending drying in the open air, are wholly avoided by Van Maanen's method. This also furnishes further the advantage, that people become wholly independent of the height and dampness of the atmosphere, and can also send their produce 2 or 3 months earlier to market."

In the official report on the Western Division of Borneo for April, it is stated that the Liberian coffee plants in the Sintang district looked flourishing and had already attained the height of half a metre. Their distribution among the people will be proceeded with.

"Padang, 19th May.—A correspondent writes as follows from Bandar, an out post in Palembang:—The Dempo or Holy Mountain, which has a height of it is said 10,000 feet above sea level, and is inhabited by elephants, rhinoceroses, and goats, but which according to the natives is the abiding place of hundreds of protecting spirits, *devas* and other divinities, is now visited by an Englishman who intends to ascend the three summits—Dempo, Lumut and Berapa. He has undertaken the journey at a favourable time, if he wishes to see something, for the volcano has been very active of late. There have been gold diggings at the foot of this mountain but they are now of little consequence."—*Sumatra Courant*.

TASSAR SERICULTURE IN INDIA.

The Secretary of State for India has just communicated to the Society of Arts a despatch from Major G. Coussmaker, dated Camp Rajur, Taluka Akola, March 8, and reporting on the progress made in tassar sericulture during the preceding year. He considers that his failures last monsoon were due to the imperfect construction of cages in which he tried to rear the worms. They were at first made entirely of tarred screens of split bamboos, in which, however, the plants did not thrive. He then made the cages longer, and covered the tops with netting; but, unfortunately, wasps, &c., managed to get in and puncture the silk-worms, so that most of them died. Next monsoon he proposes to substitute for netting coarse open cotton cloth. The small plantation which has been laid out is thriving, and will eventually be able to support a considerable number of worms. Major Coussmaker had not been able to get all his accounts in, but he believes that not more than 220 out of the 500 rupees granted him by Government were expended on his interesting experiment.—*Pall Mall Budget*.

ARTIFICIAL INDIGO.

A recent discourse was given at the Royal Institution by Professor Roscoe, F. R. S., on "Indigo and its Artificial Production." The professor reminded the members of the institution that eleven years ago he had laid before them an account of a discovery in synthetic chemistry of high importance, that of the artificial production of alizarine—the colouring substance of madder. That was the first time the colouring substance of a plant had been artificially obtained from mineral products. He had now, he said, to give an account of a second striking case of synthetic chemistry in a similar direction—the artificial production of indigo. It was another proof of the fact that the study of the most intricate problems of organic chemistry, and those which appear to many to be furthest removed from any practical application, are in reality capable of yielding results having an absolute value measured by hundreds of thousands of pounds. The value of indigo imported into this country during 1879 amounted to close on 2,000,000 sterling, so that if artificial indigo can be produced at a price to compete with natural indigo, there is a wide field open to its manufacturers. Indigo has been known as a colouring matter from very early times. Cloth dyed with indigo has been found in the Egyptian tombs. Pliny and Dioscorides describe the method of dyeing, which is the same as that followed in Bengal at the present day. The early inhabitants of this island obtained it from the European indigo plant *isatis tinctoria*, the woad plant or pastel. After the discovery of the passage to India by the Cape of Good Hope, the Eastern indigo, derived from a species of *indigofera*, gradually displaced woad as containing more colouring matter. This, however, was not done without strong opposition from the European Powers and their Sovereigns, some of whom issued edicts prohibitory to its importation. The identity of the colouring matter of woad and of the Bengal plant was not established till the end of the last century. Concerning the origin of indigo in leaves, various conflicting opinions have been held. Schunck has, however, proved beyond all doubt that neither in the woad plant, the Indian, nor the Chinese and Japanese indigo plant does indigo blue exist as such. The leaves contain a colourless principle, which has been named indican, but this readily decomposes into (1) a sugar-like body, and (2) indigo-blue. It was shown by experiment that even bruising a leaf will produce this decomposition; but to secure the result for commercial purposes is a long, though not very complicated process. Before the synthetic production of indigo could be attempted an exact analysis of the natural indigo had to be known, not only as to its molecules, but as to the arrangement of the molecules among them selves. The synthetic production of indigo had proved a far greater puzzle than that of alizarine. The first step as to the constitution of indigo was made as far back as 1840, when Fritsche showed that aniline could be obtained from indigo. After some intermediate steps, it was found a crystalline body, to which the name of isatin was given, was obtainable from indigo, and then, in 1878, it was found conversely indigo could be obtained from isatin. There are three processes now known for obtaining indigo from isatin, but two of these are too costly to be of commercial value. Baeyer's process seems, however, to be even more than promising—to have established itself. He started with cinnamic acid from oil of bitter almonds, but this was too costly. Dr. Caro and Mr. Perkins have discovered how to obtain the cinnamic acid from tolvine—a coal-tar product. From cinnamic acid, however obtained, can be produced an acid complex in character, and to which a name descriptive of its composition is given—ortho-nitro-phenyl-propionic acid. The artificial production of indigo may even now be said to be within measurable distance for commercial success, for the ortho-nitro-phenyl-propionic acid (called for short

propionic acid), the colourless substance which on treatment with a reducing agent yields indigo-blue, is already in the hands of the Manchester calico printers, and is furnished by the Baden Company for alkali and aniline colours at the price of 6s. per pound for a paste containing 25 per cent. of dry acid. With regard to the nature of the competition between the artificial and the natural colouring matters, in the first place, the present price at which the manufacturers are to sell their propionic acid is 50s. per kilo. But 100 parts of the can only yield, according to theory, 63.53 parts of indigo-blue, so that the price of the artificial (being 73s. per kilo.) is more than twice that of the pure natural colour. Hence competition with the natural dye-stuff is not to be thought of until the makers can reduce the price of dry propionic acid to 20s. per kilo, and also obtain a theoretical yield from their acid. This may, or it may not, be some day accomplished, but at present it will not pay to produce indigo from nitro-phenyl-propionic acid. Nevertheless a large field lies open in the immediate future for turning Baeyer's discovery to practical account. It is well-known that a great loss of colouring matter occurs in all the processes now in use for either dyeing or printing with indigo. A large percentage of indigo is lost in the "cold vats" in the sediment. Another portion is washed off and wasted after the numerous dippings, while, in order to produce a pattern, much indigo must be destroyed before it has entered into the fibre of the cloth. Moreover, the back of the piece is uselessly loaded with colour. The proper way of looking at this question at present is to consider ortho-nitro-phenyl-propionic acid and natural indigo as two distinct products not comparable with each other, inasmuch as the one can be put to uses for which the other is unfitted, and there is surely scope enough for both. Still, looking at the improvement which will every day be made in the manufacturing details, he must be a bold man who would assert the impossibility of competition with indigo in all its applications, for we must remember that we are only at the beginning of these researches in the indigo field.—*Overland Mail*.

LIBERIAN COFFEE IN AUSTRALIA.

By degrees the advantages of Northern Queensland as a field for tropical agriculture are being realised, and sugar, spices, coffee, and other tropical produce are being gradually introduced into the Colony, to be grown almost alongside of wheat, and within a comparatively short distance of farms devoted to sheep and cattle rearing. An experimental growth of Liberian coffee, made by Mr. H. A. Wickham at his plantation at Maragen, on the Lower Herbert River, has proved very successful. The young plants, from seed supplied from Kew by Sir J. D. Hooker, have just ripened their maiden crop, and are described by the fortunate and enterprising planter as looking very promising for the future. The vast resources of Northern Australia for such an industry as coffee-planting or sugar-growing ought to be much better known in England than they are. The soil is fertile, and the climate better adapted to the European constitution than that of many other tropical countries whose resources have been hitherto more fully recognised. Land equal to any in the tropical world can be taken up for 5s. an acre, and the payment can be spread over a period of ten years. Here is a chance for young Englishmen with a little capital, and leisure to study the requirements of the country and the best methods of tropical agriculture before rushing into expenditure. Some of the surplus population of India should find congenial occupation and climate in Northern Australia, where they would find a heartier welcome than the "heathen Chinese"; but, while Coolie labour would probably be found best

suitable for the heavier labour of a plantation, there is ample scope for English labour, and still more for English capital, in tropical Australia.—*Colonies and India*.

"NEW COMMERCIAL PLANTS AND DRUGS."—We have received from Mr. THOS. CHRISTY No. 4 of this series of pamphlets. This number deals with Ceará Rubber, Mangabeira rubber, *Urostigma Vogelii*, apocynaceous rubber, *Landolphia*, &c., and a number of drugs some new to Europe. Regarding the *Urostigma Vogelii* Mr. Christy says:—"As Dr. Trimen has some of these plants growing in Ceylon, I look forward with interest to his accounts of the india rubber which they yield, and hope in a future number to be able to give some account of their value from an agricultural point of view." Apocynaceous rubber is thus described:—"A plant yielding rubber which grows in East Africa, and the seeds of which one of my correspondents sent me home among a collection of plants, together with a piece of very fine india-rubber obtained from it, appears to belong to a hitherto undescribed species. I planted the seeds corresponding to the rubber, and find it to be a *creper*,* but on account of the flower not being perfect, and there being no plant that exactly corresponds to it in the Herbarium at Kew or at the British Museum, it is impossible to give it a name until it has flowered. Some of these plants have been sent to Ceylon, to the Botanical Gardens and to merchants." Of the papaw we read:—"Dr. Bouchut (*Archives Gén. de Méd.*, July 1880) has found that both the diluted juice and Papaine, have the property of digesting living tissues, normal or pathological, such as adenomata and cancers, and converting them into peptones in exactly the same way as dead ones. It seems probable that this knowledge may be turned to account in the treatment of cancer and other abnormal growths. The false membranes of croup and diphtheria removed by tracheotomy, and also worms, such as tape worm, and round worms, are attacked and digested in a few hours by the Papaw juice." In the preface Mr. Christy says:—"The Ceará rubber has been so highly spoken of as to cause a great demand for the seed. The supply is short for the time being, owing to the trees being killed by the drought over a large radius of country in Brazil. According to Hecht, Levis and Kahn's report for 1879, 25 tons of Ceará Rubber and 900 tons of African *Landolphia* Rubber were imported some 350 tons of Assam (*Ficus Elastica*), 250 tons of Borneo (*Willughbeia*), 500 tons of Mozambique (*Landolphia*) Rubber. By this it will be seen that next to the Pará Rubber, of which 6,651 tons were imported, the *Landolphia* Rubber occupies the first place, while the Ceará, owing, no doubt, to the severe drought which has been prevailing in that district, only returns about 25 tons as imported into England; but I have no doubt that if this variety is well cultivated in Ceylon and other rubber growing countries, that its returns will rival with those of others. The Mangabeira will be another favorite variety of rubber tree, and it has not suffered by the drought. The fruit carries well, even to Europe, so it will be an acquisition in Ceylon. The small-leaved rubber plant I received from East Africa, and which is growing in Ceylon, is easily propagated by seed and cuttings; it has not been named, but the rubber was so much admired for its transparent appearance, that I preferred to allow the plants to go out nameless than keep them for the name. I have published the drawing as a guide to others to search to plants of a similar kind. From the samples of stems and pieces of trees in my possession, I am convinced that there are many other rubber plants that will repay the trouble of cultivation."

* When pruned it forms a bush or tree.

Correspondence.

To the Editor of the Ceylon Observer.

THE CINCHONA BARK TRADE IN SOUTH AMERICA; VINES, COAL, GOLD, &c.

Edinburgh, 30th May 1881.

DEAR SIR,—Some time ago, you asked me to procure some information from my brother in South America, on cinchona, but, in reply to my letter on the subject, it seems that he knows little about it. I annex quotations of what he writes on this, and some other matters.—Yours truly, P. D. MILLIE.

Concepcion, Southern Chili, 13th April 1881.

Cinchona—alas! I never saw a cinchona tree in my life! and all I know about it is the fact, that bark is brought down from the interior of Peru and Bolivia; that the tree grows on the mountains there, at a considerable elevation; that the climate where it grows is a wet one, during at least half the year, and is a rather cool although semi-tropical one; that there is no cultivation of the tree, and no care taken, that it will not, ere long, be exterminated, as the natives simply cut down, and strip the bark off every tree which they can find; that in view of this wholesale destruction, leading to a scarcity of bark, the British Government has done a good deal towards introducing the tree into India. The rest you know better than I do, as all which I have learned has been gathered from the Ceylon papers, which you send me.

It has struck me, the tree might grow very well in Chili: perhaps the climate is rather too cold, too like the south of England, where I suppose it would not grow. This is just all I know about it. This is a land of corn and wine, beef, and cyder: all over the south apple trees grow wild, and the cyder orchards are the woods and meadows: nobody does more than shake the trees year after year. This year, they are lamenting a bad crop of apples. What wonder?

The vines are a little more attended to, and the wines are good or bad, just according to the care bestowed upon its growth, and preparation. They are dirt cheap, and moderately used, being far more wholesome than any doctored European stuff—too often palmed off as port, sherry, and claret, on folks at home.

I have been wandering about the coal mines, south, in Lota and Lebu. There is coal all over the south—coal, for centuries, in sight, besides what is out of sight; for the half dozen mines at present worked fully cover the demand, and those who own coal land don't touch it. Posterity will, perhaps, export coal to Europe, as Europe is now doing to us, to our loss and detriment.

England sends us out coal, as ballast for ships, which come for guano, nitrate, wheat &c, and, as it has to be sold, the competition with our own mines sadly limits their output.

There is also iron, in abundance, here; but it is useless to think of working it in competition with England, short of labour as Chili is, at present. Gold is a queer subject at Lebu. I found everybody going about with nuggets, large and small, and everybody who had money buying gold from the explorers. Nuggets of all sizes, up to 40 ounces, had been bought, and one man brought in 12 lb. of gold, chopped up with a chisel and pronounced to be one nugget, which he did not wish to sell entire. It is found in the ravines, over an extent of six square leagues, and is believed to be in abundance everywhere, throughout the district.

The district is so densely wooded, that it is awful work to grope about the ravines, and grub up the

jungle, at the bottom. Many of the nuggets have been so found, and the gold formation of slate and quartz is everywhere overgrown. The ravines are singularly steep and deep. No one has as yet troubled himself about dust: it is all rough gold, or nuggets, which they bring in for sale.

The country near the diggings is the very finest of land, and, should a rush take place, many will remain to farm, as was the case in California—a fine thing for Chili, which wants something to stimulate immigration.

Gold has had its mission in this way, both in California and Australia &c. The lust after gold may also be said to have been the origin of the colonization of Mexico, and South America, by Spain.

I have read all the Ceylon papers about "New Products." There is probably some truth in the remark about "high cultivation"* having a good deal to do with leaf disease. You can't keep man, beast, or plant, long up to the mark by substituting stimulants for rest or for good substantial food, as in bulk manure.—P. D. M.) T. J. M. MILLIE.

* Artificial manures?—P. D. M.

[Unfortunately for this argument the leaf fungus first began in a district where no artificial manure had been used. We have, however, to thank Mr. T. J. M. Millie for a very interesting letter.—ED.]

CARDAMOMS.—Cardamoms are largely grown in some parts of the west coast and Mercara, and both the Governments of Cochin and Travancore enjoy a monopoly of the produce in their respective provinces. In the Cochin state the forest department pays special attention to the growth of cardamoms and 1,915 parahs of land are set apart for its growth. The collection of produce in the official year 1879-80 was 1,400 lb., valued at R2,800 against 1,070½ lb. valued at R1,551 in the previous year. The Dewan says that the financial results of cardamom cultivation are as yet far from commensurate with the outlay incurred by the Sirkar, but it is hoped that in time and with careful management a substantial improvement will accrue.—*Madras Standard.*

A NEW CEYLON INDUSTRY.—Mr. C Powell Jones has been spiteful enough to import from China a considerable quantity of silkworm eggs and he means to give the cultivation of mulberries and the production of silk a fair trial at Oliphant, Nuwara Eliya, and in Udapussellawa. The first importation of eggs was a failure; but this second has been so successful that there are more eggs than can be utilized in one or two experiments, and so a surplus is offered to the public at what seems a very moderate rate. At least any one who wants to try silkworms and mulberry cultivation cannot be deterred by a five-rupee note. It is well-known that the growth of the mulberry in Nuwara Eliya is most astonishingly rapid, so much so that Sir Samuel Baker recommended it to be used as a fodder for cattle. The shrub also grows freely in nearly all the coffee districts. One idea is that where cinchona dies out—and unfortunately such areas are only too common—the mulberry might be substituted in the form of hedges and the leaves made available for feeding the silkworms. We trust the experiment will be widely tried. In the dry climate of Uva especially, the silkworm ought to flourish; but why not also in Rakwana, Matale, around Kandy, and, if in Nuwara Eliya, possibly between Great Western and Adam's Peak? Mr. Bury of Golconda, Haputale, some years ago sent us some samples of the silk produced under his care, which was much appreciated by Coventry manufacturers. Kept in houses even in the wet districts, silkworms may be found to flourish well. New Products and New Industries being the order of the day, we wish this youngest Industry all success.

HOW TO START A GARDEN AND MAKE IT

PAY—(Continued from page 20).

(From the Indian Tea Gazette.)

SECOND YEAR.

	R.
Tea seed for planting at stake, and for nurseries, 30 maunds, at R70 per maund	2,100
Importation of 60 coolies, at R100 per head landed on the garden	6,000
Engagement of 10 local labourers under a two years' agreement, at say R25 per head	250
Wages of 125 labourers at an average of say R4 each per mensem	6,000
Establishment (The same as in the former year)	3,072
Loss on 1,200 maunds Rice, say	1,000
Garden stores, implements &c, say	800
Government fees, Law Expenses and 2nd instalment on account of Timber	650
Station or Steamer Agent's salary	180
Calcutta Agents' charges, say	600
Discount, Feed of live Stock, Stationery, Postage, and other Contingencies, say	1,348
Total...	R22,000

RESULTS AT END OF SECOND YEAR.

Receipts	Nil.
Debit Balance	R42,000

NOTES ON THE SECOND YEAR'S ESTIMATE.

Tea Seed.—Twenty-five maunds of seed would be required for the new extension of 50 acres, but in addition we have estimated for 5 maunds extra for the forming of a nursery or nurseries. It is advisable for many reasons that such should be made the second season. Five maunds of seed planted in nurseries would yield, the third season, sufficient seedlings to plant out 10 acres 4' x 4', and fill up, moreover, all vacancies that might occur during the second season in the 100 acres under plant. The third season we could thus plant out 10 acres with one year old seedlings, leaving 40 acres for planting seed at stake. The advantage of having a nursery to fall back on at the commencement of the third season is evident, for should an unusual number of plants die off in the 100 acres during the second season, the number of seedlings in the germinating beds would probably not suffice to fill up the vacancies the third season. There would in all probability, as we have stated before, be a sufficient supply of seedlings (raised from the first year's seed) in the germinating beds to meet all demands during the second season, but the requirements of the third season could not be met without the assistance of a nursery.

General observations.—All timber from the new clearance of 50 acres that is of any use for charcoal should be cut up, stacked in bhattas, made into charcoal, and then carefully stored in the charcoal godown. As much of the timber as will not answer for charcoal, should, instead of being allowed to lie about, be stacked under cover for firewood. The value of these suggestions will be felt in the fourth year, when, for the purpose of making charcoal, instead of having to take off a large number of hands from some other important work, much to its detriment, there will be a goodly store in the godown—more than sufficient most probably for the demands of the season. To succeed, everything should be done decently and in order. If from the very commencement a regular system of work is adopted and carried out, everything will go on smoothly, and nothing will be found undone that should have been done. In some gardens work always seems to be behind-hand, and everything seems to be done in a hurry. The reason is not difficult to find. Unless there is a regular system drawn out, adopted, and rigidly adhered to, the work cannot be carried out properly. We would advise all Managers

to draw out a regular routine of work for the season, and to stick to it most tenaciously. What a difference it would make in some gardens. Instead of everything being behind-hand, the work would always be in an advanced state; there would be no hurry, and consequently everything would be done thoroughly and well. Successful results are achieved by orderly working,—doing things by degrees, and not all of a heap at the last moment. It is advantageous in many other ways besides that noted above, to remove all timber instead of allowing it to lie about and rot. It gives the garden a much neater appearance, and by not being in the way of the coolies when hoeing, the ground is better cultivated. We have heard it stated, also, that rotting timber lying about tends to bring on blight, and it may be it is the cause indirectly of some of the blights by which the tea bush is attacked.

The 1 year old bushes towards the close of the season will require a slight "tipping." If they are vigorous healthy bushes, the amount of leaf obtained off the 50 acres would most probably be about 800 lb. green leaf = 2 mds. 20 seers manufactured tea. On no account should more than this quantity of leaf be allowed to be taken off.

We consider it most essential that the Factory should be completely furnished and fitted in every respect before the commencement of manufacture in the fourth season. The Tea Machinery also should therefore be ordered now, as a long time must needs elapse before it can be landed on the garden. The cost of the machinery, fittings, &c., we include in the estimate for the third year.

THIRD YEAR.

	R.
Tea seed, for planting at stake and for nurseries, 30 maunds, at R70 per maund	2,100
Importation of 60 coolies, at R100 per head landed on the garden	6,000
Engagement of 10 local labourers under a two years' agreement, at say R25 per head	250
Wages of 176 labourers at an average of say R4 each per mensem	8,448
Establishment	3,672
Loss on 1,800 maunds Rice, say	1,500
Tea Machinery, landed on the Estate, say	12,500
Corrugated Iron Roofing, Fittings for Tea-house and Bungalow, Garden and Tea-house Stores and Implements, Furniture for Bungalow	4,000
Government revenue at 3 annas per acre, Government fees, Law expenses, and last instalment of Timber	1,000
Station or Steamer Agent's salary	180
Calcutta charges, say	750
Discount, Feed of live stock, Stationery, Postage, and other Contingencies, say	1,600
Total ..	R42 000

RESULTS AT END OF THIRD YEAR.

Receipts	Nil.
Debit Balance	R84,000

NOTES ON THE THIRD YEAR'S ESTIMATE.

Yield.—During this the third season we have one hundred acres under plant, from which we can obtain a small quantity of leaf.

Two (rising three) year old bushes ... 50 acres.

One (rising two) " " " ... 50 "

We estimate that from the former we should be able to take off without any the least injury to the bushes 1,760 lb. of leaf, and off the one year old bushes 800 lb., giving thus a total of 2,560 lb of green leaf = 8 maunds of puca tea. But we wish it to be distinctly understood that this plucking of leaf is simply done for the benefit of the bushes, and not for the sake of obtaining a "return." Two year old and one year old bushes demand that they should be lightly

"tipped," to enable them to thrive and form into good bushes; they must therefore be plucked,—but, remember, *very lightly*, simply *tipped*, that the bushes may be *spared* as much as possible.

FOURTH YEAR.

	R.
Tea seed, for planting at stake and for nurseries, 30 maunds, at R70 per maund	2,100
Importation of 70 coolies, at R100 per head landed on the garden	7,000
Bonuses to 35 coolies for a two years' re agreement, say	800
Engagement of 10 local labourers under a two years' agreement, at say R25 per head	250
Wages of 224 labourers at an average of say R4 each per mensem	10,752
Establishment	3,672
Loss on 2,000 maunds Rice, say	1,650
Government revenue, fees, law expenses, &c.	500
Station or Steamer Agent's salary	180
Calcutta charges, say	750
Discount, Feed of live stock, Stationery, Postage, and other Contingencies, say	1,346
Total	R29,000

RESULTS AT END OF FOURTH YEAR.

Receipts	R5,000
Debit Balance	1,13,000

Yield.—This season we have 200 acres under plant, but we can only obtain leaf from 150 acres, and of this area 100 acres must only be "tipped." We have—
Three (rising four) year old bushes ... 50 acres.
Two (rising three) " " " " ... 50 " "
One (rising two) " " " " ... 50 " "

We have assumed that hitherto the bushes have only been "tipped;" that they have been spared as much as possible; and that the garden has been kept throughout in the highest state of cultivation: consequently we may assume that the three year old bushes, have proved themselves fine, strong, healthy, well-formed bushes, giving abundance of leaf. We may therefore safely calculate we have made from the leaf gathered off them, 1½ maunds of pucea tea per acre. Accepting of the same figures as we showed the last year for the other bushes, we obtain a total of 83 maunds, or say in round numbers 85 maunds pucea tea, as our outturn for this the fourth year. Taking into consideration that a tea-house complete in every respect is on the garden, a *net* average of at least 12 annas per lb. should be obtained for the same, without any difficulty. We should therefore have a clear return of at least R5,000 this year, and we note down this amount in the estimate under the heading of "receipts."

SUGAR AND CACAO.—The quantity of sugar shipped to end of April, is 23,863 hds.; and of cacao 5,747,900 lb.—*Trinidad Chronicle.*

PUBLIC SALE OF CINCHONA BARK.—Messrs. Robinson & Dunlop will put up for public sale on Saturday, 25th instant, at noon, 14 lots of cinchona bark. The first 5 lots are Stonycliff bark, 3 succirubra and 2 officinalis. The analysis by Mr. M. Cochran, of the stem and the root succirubra, lots 1 and 2, shews 1.78 average yield of sulphate of quinine. Total alkaloids 4.86. Lots 6 to 9 are Rickarton succirubra, and lots 10 to 13 are mixed succirubra and officinalis from Agrawatte, Carolina (Ambagamuwa), Wigton (Dimbula), Heenwelle and Hunucotuwa (Kotmale), the analysis by Mr. A. C. Dixon of the mixed stem pieces shewing 1.15 yield of sulphate of quinine in total alkaloids 3.97. Lot 14 is succirubra from Gavaetene. Nothing extraordinary in quality, but good serviceable lots.

COCOA IN GUIANA.—We hear encouraging accounts of the Cocoa industry which has been put on foot, the young trees testifying that the soil of this colony is admirably adapted for this cultivation, the late continuous drought having had no bad effect upon them.—*Georgetown Gazette, May 5th.*

MR AGOSTINI'S Coffee-piece at Coblentz is throwing out a most abundant show of blossom (Saturday 30th), and will look still better to-morrow and Monday. The St. Ann's hybrid in particular, is magnificent in its vigour and promise of a great crop. The little plantation—so near at hand—is well worthy of a visit just now. The hon. proprietor, delighted at his success, freely invites an inspection of his experiment by the gentlemen of the town.—*Trinidad Chronicle.*

TRINIDAD.—The shipment of cacao to date is 5,367,270 lb. Cacao expectations from most quarters are only moderate or small; but from Maracas Valley we have a very good account. Five coolie ships have come in from Calcutta this season. *i.e.*, since September 30th last, and two more are due. The five arrived are the

		Imm.	pd.	d'ring	pss'ge	bths.	pss'ge	retur-
							dths.	ners.
"Jura,"	No. 10—	535	3	2	5	10		
"Br. Nation"	,,	27—499	—	2	5	18		
"Sheila"	Dec. 77—	526	3	4	10	18		
"Neva"	Feb. 8—	471	—	1	7	7		
"Bann"	Mch. 16—	262	—	2	9	13		

—*Trinidad Chronicle.*

THE south-west monsoon threatens to be a failure in Ceylon and Southern India: at the present moment it is dry and hot with no prospect of rain. We fear for the grain crops in India. As regards coffee, leaf disease is beginning again to appear in certain districts, and crops in many cases are not to fulfil the promise which the fine blossoms led planters to hope for. Still the trees look well even without what planters used to think should be the annual dose of manure. This is the report from Dimbula. As an evidence of the success of Mr. Schrottky's vapourizing with carbolic acid and lime against leaf disease, we learn that the fall of leaf on Gleneagles estate on the operated coffee compared with that on adjoining coffee not treated is as to 11 to 81! Mr. Schrottky leaves the island to-morrow to return possibly in September.—24th June.

COFFEE IN NATAL.—We had hardly anticipated having again to use this heading, but the meetings and journeys of the Coffee Commission have caused some little interest to be taken in this defunct enterprise. The Commission seem to be having rather a jolly time of it, "borer and bark disease" do not interfere with many a pleasant luncheon. All the Commissioners have sunk money in coffee planting, and have taken to other pursuits they should therefore have little difficulty in determining the reason why everyone failed to make the enterprise pay. We hope the climate of this country will be compared by them with that of other successful coffee growing countries. Reliable data can now be secured for the past 15 or 16 years, a period covering the birth and death of the enterprise. Reit Valley estate is constantly quoted as a successful coffee estate; but before accepting the statement it would be interesting to learn what the capital account now amounts to, and whether a pound of coffee costs more to grow than it is worth. If enough money were forthcoming, it would be possible to grow coffee in England—under glass. Or perhaps the climate of Reit Valley, which is very different to that of the other localities in which coffee was grown, may compare favourably with that of successful growing countries.—*Natal Mercury, May 2nd.*